Institution:
University of Cambridge

Unit of Assessment:
UoA18

Title of case study:
Electricity Policy Research Cluster: Theory, Quantitative Analysis And Policy Advice

1. Summary of the impact (indicative maximum 100 words)

The Electricity Policy Research Group (EPRG), led by Professor David Newbery, has undertaken research into electricity market restructuring, privatisation and regulation that has achieved internationally leading status among public policy makers. Government users, both national and international (in the UK, Ireland and the European Commission) request EPRG policy advice on electricity market design, monitoring for market abuse, regulation of transmission and distribution, and design of access pricing. Industrial users demand analytical briefings and credit EPRG for moving the debate from rhetoric to more quantitative approaches.

2. Underpinning research (indicative maximum 500 words)

The impact described in this case study is underpinned by research carried out by the EPRG under the leadership of Professor David Newbery (employed by the University of Cambridge since 1966) with input from Neuhoff (Cambridge), Brunekreeft (Cambridge), Roques, Nuttall and Pollitt (Judge Business School, Cambridge), de Neufville and Conners (MIT), Grubb (Cambridge), Gilbert (University of California) and Strbac (Imperial College).

EPRG's underpinning research expanded from an initial study of UK electricity privatization in 1990 to encompass most aspects of electricity, gas and carbon markets; regulation of transmission and distribution; and performance of industry and regulatory structures. EPRG's website lists an average of 30 new working papers annually. This case study describes a subset of that research, led by David Newbery on (A) transmission access pricing and use and (B) electricity and carbon market reform.

A. Transmission: In response to the challenge of connecting new renewable generation, the Government's Energy White Paper (May 2007) prompted Ofgem to launch its Transmission Access Review (TAR). Earlier research (Brunekreeft, Neuhoff and Newbery, 2005, of Cambridge University) argued cogently for Locational Marginal Pricing (LMP) to guide generation investment to the efficient location and ensure efficient dispatch, supplemented by additional access charges.

B. Electricity and carbon market reform: Newbery had published extensively on the design and operation of the electricity wholesale market of England and Wales since its launch in 1990. He and others extensively criticised the 1998 proposal to reform the electricity market (Newbery, 2005), providing the intellectual foundation for the Government's Electricity Market Reform White Paper of 2011. Roques, Newbery et al. (2006) argued that fossil generation enjoyed a natural hedge because the price of electricity was set by the cost of fossil fuels and the carbon price, disadvantaging low-carbon generation such as nuclear power. Newbery criticized the way in which the EU Emissions Trading System (ETS) determined the price of carbon by setting a quota. The intellectual case for setting a carbon price or tax instead was developed in Grubb and Newbery (2008). Newbery (2008) further argued that fixing a quota amplified market power in the gas market. A series of presentations and submissions, summarized in Newbery (2011), argued that the ETS meant that any additional renewable energy would not reduce CO2 as that was set by the cap, undermining support for the Renewables Directive, whereas a carbon tax would ensure that any additional renewable energy would create additional carbon reductions; and pointed out that the ETS carbon price was too volatile, too low, and not credible.

3. References to the research (indicative maximum of six references)

Brunekreeft, G., K. Neuhoff, and D. M. Newbery (2005). 'Electricity transmission: an overview of the current debate', *Utilities Policy,* **13** (2): 73-94, http://dx.doi.org/10.1016/j.jup.2004.12.002

Newbery, D. M. (2005). 'Electricity liberalisation in Britain: the quest for a satisfactory wholesale market design', *Energy Journal*, Special Issue on European Electricity Liberalisation, ed. D Newbery: 43-70.DOI 10.5547/ISSN0195-6574-EJ-Vol26-NoSI-3

Roques, F. A., W. J. Nuttall, D. M. Newbery, R. de Neufville, and S. Connors (2006). 'Nuclear Power: a Hedge against Uncertain Gas and Carbon Prices?', *The Energy Journal,* **27** (4), DOI 10.5547/ISSN0195-6574-EJ-Vol27-No4-1.

Gilbert, R. J., K. Neuhoff and D. M. Newbery (2004). 'Allocating Transmission to Mitigate Market Power in Electricity Markets', *Rand Journal of Economics,* 35 (4): 691-709.

Grubb, M. G. and D. M. Newbery (2008). 'Pricing carbon for electricity generation: national and international dimensions', in M. Grubb, T. Jamasb, and M. Pollitt (eds.), *Delivering a Low Carbon Electricity System: Technologies, Economics and Policy*, Cambridge: 278-313.

Newbery, D. M. (2008). 'Climate change policy and its effect on market power in the gas market', *Journal of European Economic Association*, June 6(4): 727-751, DOI 10.1162/JEEA.2008.6.4.727

Newbery, D. M. (2011). 'Reforming Competitive Electricity Markets to Meet Environmental Targets', *Economics of Energy & Environmental Policy,* **1**(1): 69-82, http://dx.doi.org/10.5547/2160-5890.1.1.7

All outputs can be supplied by the University of Cambridge on request.

Evidence of 2* or better quality

The Faculty of Economics at Cambridge was ranked first in the world in REPEC's energy economics citations in 2009, with Professor Newbery as the top ranked author. EPRG research quality is also testified to by requests from regulatory agencies, the European Commission, the World Bank, and governments for advice, visits to hear our results, and in our presentations at international conferences.

Key research grants or end-of-grant reports:

1. Professor D.M.G. Newbery and Faculty of Economics
Electricity Policy Research Group
ESRC under Towards a Sustainable Energy Economy Programme (TSEC): RES-152-25-1002
1 October 2005 to 30 September 2010
£2.39 million – end-of-grant report submitted Dec 2010

2. Dr Michael Pollitt and Faculty of Economics
Meeting the Challenge: Designing Effective Policy for Climate Change in the Electricity Sector
ESRC Follow-on funding
1 Oct 2010-30 September 2011
£78,331.97 – end-of-grant report submitted December 2011
3. Dr Michael Pollitt and Faculty of Economics
EPSRC SUPERGEN – Flexnet
1 Oct 2007- 30 Sept 2011. £644,690

4. Details of the impact (indicative maximum 750 words)
Two categories of evidence demonstrate that EPRG research has exercised an impact beyond academia: demand by non-academic users (and in particular their willingness to incur costs to secure access to research); and direct testimony, as documented in a 2012 ESRC-commissioned impact evaluation report by CAG Consultants (source 8).

Demand by non-Academic Users

The main conduit for the EPRG's research is the Energy Policy Forum which is funded by annual subscriptions from a number of corporations. Users beyond academia both from the public and private sector have been anxious to participate in EPRG via a programme of conferences,

seminars, dinner discussion groups, on-site briefings, working papers, newsletters, online updates, advisorships, and secondments. Each year, the EPRG has held two domestic and one international conference to disseminate research, attended by 70-100 separate stakeholders from industry and government. The need to cap attendance at 100 indicated the existence of excess demand. Numerous non-academic users subscribed to EPRG working papers, newsletters and updates, such DECC, Ofgem and the Prime Ministers' Office. Ofgem demonstrated demand for EPRG research by inviting EPRG staff to act as Advisors, including David Newbery, Steven Littlechild and Michael Pollitt during the 2008-2013 period. The Department for Energy and Climate Change, 'impressed with previous "prophetic" EPRG research on electricity market design' requested and obtained an academic secondee, Christian Winzer, from EPRG to work on a technical update paper on Electricity Market Reform (5/11-3/12) (p. 22, source 8). As a result of Newbery's prominence through EPRG's conferences and publications in assessing market reform he was recruited as the Deputy Independent Member of the Irish Single Electricity Market Committee (Nov 2012) and a Technical Expert in DECC's Electricity Market Reform Delivery Plan Panel (Feb 2013).

Non-academic end users incur costs in order to learn about EPRG research, indicating their expectation that it would positively affect their activities. Public-sector users incurring such costs included the UK House of Commons, the Japanese Diet, the Department of Energy and Climate Change, the Treasury, 4 regulators including Ofgem. 7 NGOs, 5 Industry bodies and 6 firms. The costs incurred included pecuniary expenses, the opportunity cost of time, and – for key stakeholders – annual subscription fees for membership in EPRG's Electricity Policy Forum. Firms were willing to pay £20,000 per annum and government agencies £3000 for membership.

As another example of impact arising from this research, Ofgem invited Newbery to the TAR stakeholder meeting on 5 Nov 2007 where he presented the case for an enduring LMP-based access regime. The Government overruled this idea and chose "connect and manage" to which Ofgem responded by commissioning Newbery to write a report on transmission charging, which was published in 2011 (source 1 and 2). Similarly, the European Commission's Directorate-General for Energy, concerned at the slow pace of integrating national electricity markets and cross-border transmission, commissioned Newbery and Strbac to write a report on transmission, which was published in 2011 (source 4) to adjudicate between proposals for Physical and Financial Transmission Rights, drawing on earlier work of Gilbert et al (2004) (source 5).

Direct testimony

On Transmission Pricing:
An impact evaluation report by CAG Consultants (2012) concludes uncompromisingly that governmental and industrial users regarded EPRG research as exercising an impact on their decisions. The EPRG 'were seen as a primary source of advice and knowledge on energy economics and markets, especially by the Department for Energy and Climate Change (DECC) and Ofgem' (source 8).

On Electricity Market Reform;
EPRG has played an influential role as a sounding board for the Electricity Market Reform process and face-to-face briefings with DECC (2010-2013) in Cambridge and London led to a number of policy impacts' (p. 4, source 8). DECC described EPRG as 'the premier group in electricity markets' (and David Newbery as a key player)' (p. 16, source 8). DECC stated that a number of suggestions made by EPRG 'are now being proposed for legislation'. (p. 16, source 8). Newbery's work also 'created interest from Australia and the EPRG study is cited in the new Australian approach' (p. 16, source 8). An EU policy-maker stated, 'we have followed what [EPRG] are doing, downloaded papers, and been inspired by documents' (p. 19, source 8). Industrial users credited EPRG with 'moving the debate from a rhetorical one to a more quantitative approach, where facts and figures are being brought to bear. They moved the policy debate forward on issues such as carbon capture and storage, distribution networks, energy market reform, ... cost of renewable policy, security of supply, ... and how commercial projects ... should be taken forward and regulated. This greater understanding has had an impact at EU level which then is passed down to

industry.' (p. 4, source 8). One industry stakeholder commented: 'We value them [as being different to consultants] because of their independence and ability to free think and take a rounded look' (p. 35, source 8). The House of Commons acknowledged the contribution of Newbery on Electricity Market Reform as special advisor in HC (2011) Electricity Market Reform, HC 742, 16 May, Vol 1 (sources 6 and 7).

5. Sources to corroborate the impact (indicative maximum of 10 references)

On transmission pricing:
[1] Ofgem commissioned and published Newbery's (2011) report on transmission charging, at: http://www.ofgem.gov.uk/Pages/MoreInformation.aspx?docid=93&refer=Networks/Trans/PT
[2] The Ofgem website traces the history of this inquiry at: http://www.ofgem.gov.uk/Networks/Trans/PT/Pages/ProjectTransmiT.aspx **while**
[3] Person 1(Senior Partner, Ofgem) can corroborate the contributions made.
[4] DG-ENER commissioned and published the report by Newbery and Strbac (2011) on Transmission:
http://ec.europa.eu/energy/gas_electricity/studies/doc/electricity/2012_transmission.pdf
[5] Person 2 (Administrator, DG-ENER, european Commission) can corroborate the contributions made.

On Electricity Market Reform (EMR):
The House of Commons acknowledges the contribution of
[6] HC (2011) Electricity Market Reform, HC 742, 16 May, Vol 1 at:
http://www.publications.parliament.uk/pa/cm201012/cmselect/cmenergy/742/742.pdf
[7] Person 3 (Clerk to the Committee) can support the impact the advice had in influencing the report and the subsequent White Paper.
[8] For an overall evaluation of EPRG impact, see CAG Consultants, *Impact Evaluation of the ESRC's Energy Research Groups*, March 2012
http://www.esrc.ac.uk/_images/Impact_Evaluation_of_ESRC_Energy_Groups_25-7_tcm8-22272.pdf