

System change in a regulatory state paradigm: the “smart” grid in the UK

Matthew Lockwood

Energy Policy Group, University of Exeter

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New Thinking For Energy



Introduction

- Governance for innovation in the energy sector: case study of the 'smart grid' in the UK
- Three questions:
 - *What change has actually happened in network governance since 2000?*
 - *What is the nature and significance of change?*
 - *What explains what has changed (and what has not)?*
- + Implications for governance
- Existing literature on the UK smart grid
 - economics (e.g. Pollitt and Bialek 2008), innovation studies (e.g. Bolton and Foxon 2010) and energy policy studies (Woodman and Baker 2008, Shaw et al 2010)
 - Policy- rather than politics-focused (although see Mitchell 2008, Ch. 6)
 - Pre-dates key review of regulatory framework and introduction of new regulatory framework

The smart grid concept

- Applies to low-voltage distribution networks rather than high-voltage transmission
 - Renewable generation directly on distribution networks means accommodating 2-way flow of power
 - Dealing with variable renewable generation by balancing through flexing demand rather than supply, requiring smart meters and appliances (including EV charging/discharging)
 - Electrification of heat and transport will mean massive network reinforcement costs without smart solutions that can limit peak demand
- Involves major technological and operational innovation, from current centralised one-way power system
- From passive distribution network operators (DNOs) to active distribution system operators (DSOs), i.e. active network management

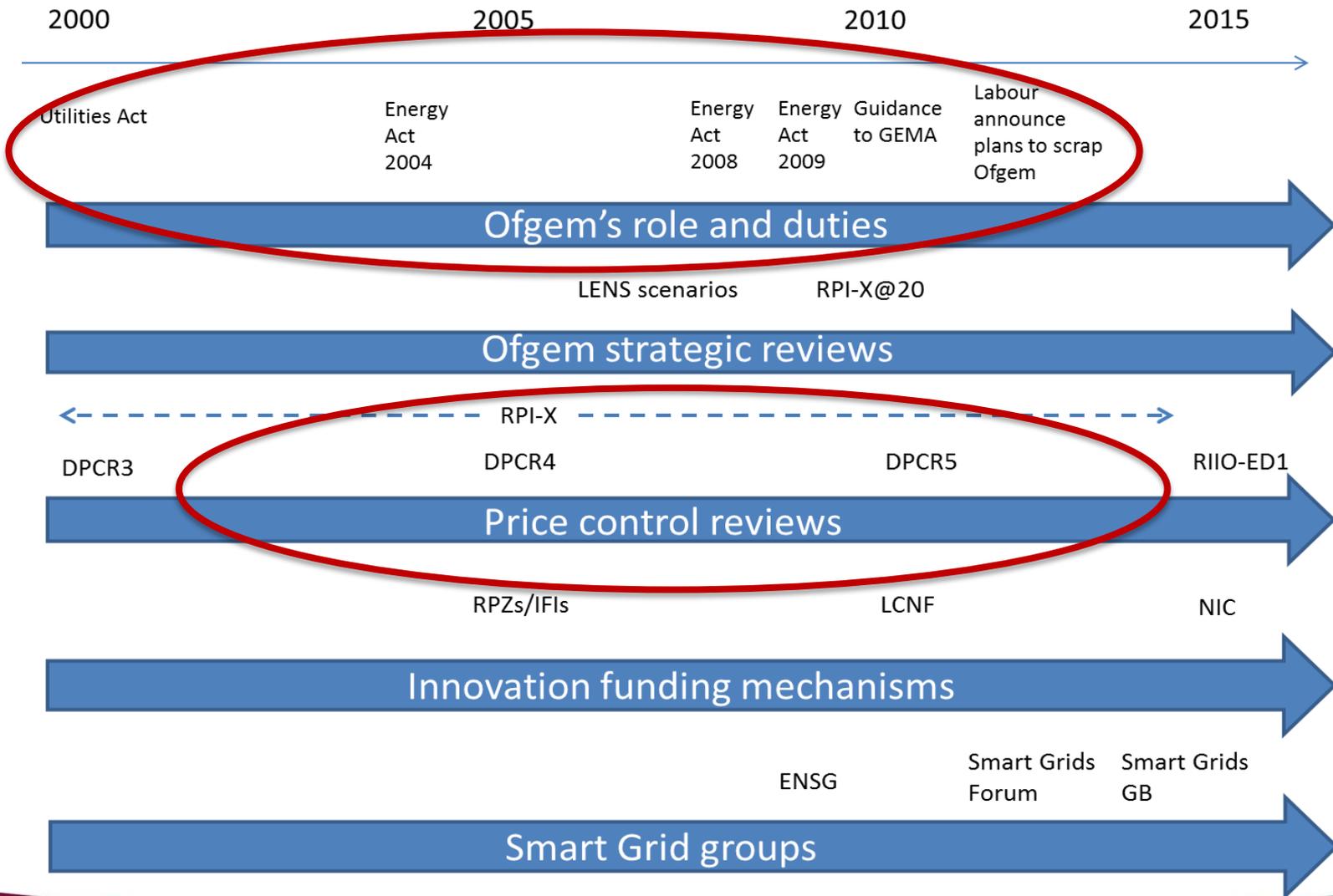


The governance challenge

- Involves major changes from centralised one-way power system ***innovation*** in an historically un-innovative industry
- Will need major changes in ***governance***
- Since 1998 networks run by privately-owned monopolies, regulated by electricity regulator (Ofgem). Currently 14 DNOs in GB.
- Since privatisation, DNOs regulated under ‘RPI-X’
 - Revenue cap, which determines charges to customers (via suppliers)
 - Cap adjusted for inflation (RPI) and for efficiency factor (X)
- Regulatory regime seen as producing efficiency but not innovation:

“It would be crude but not an unrealistic simplification to say that the way energy networks are designed, built and operated has not changed significantly since they were built in the post war period.” (Smith 2010: 9).

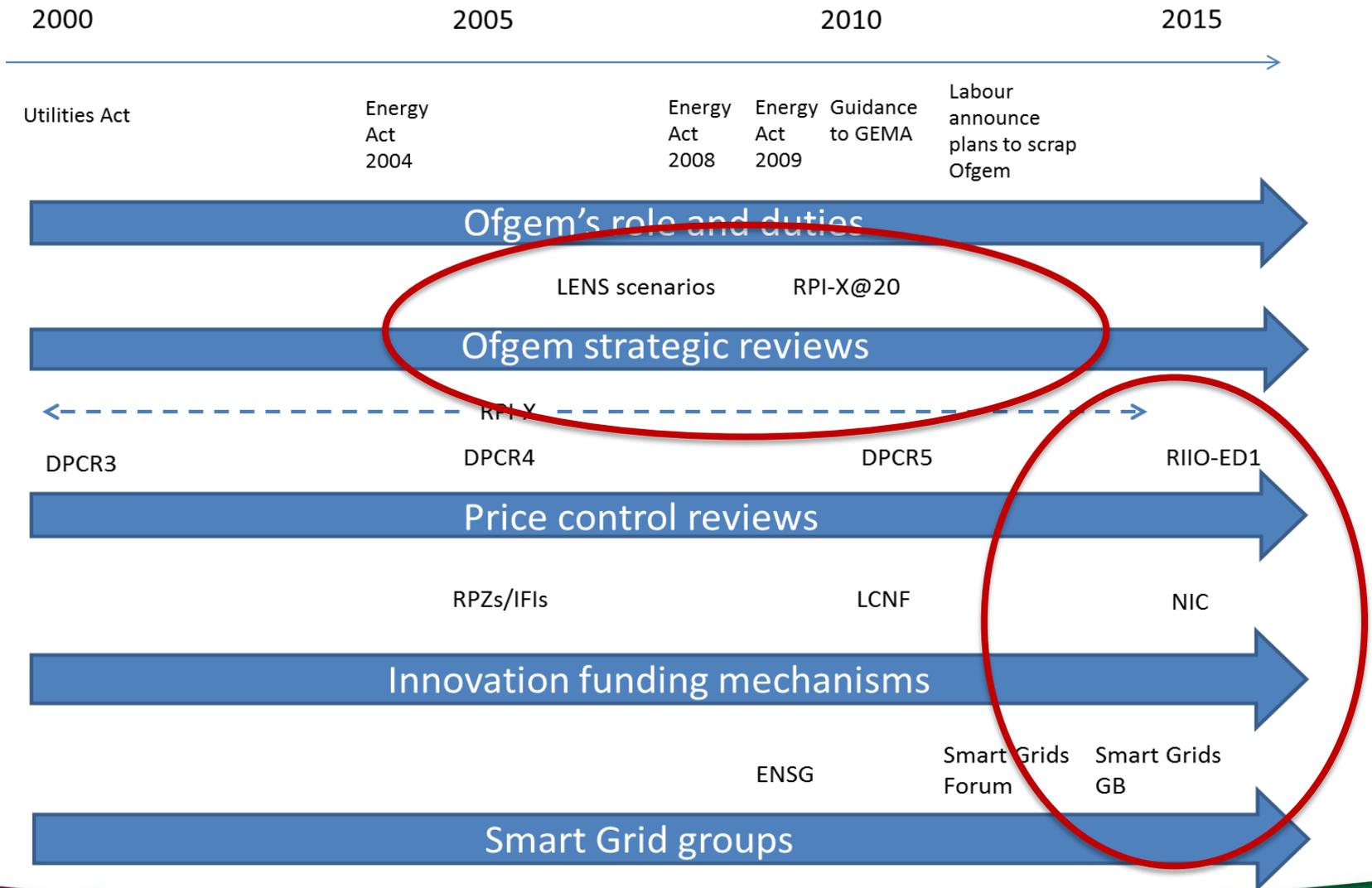
Innovation and the governance of electricity distribution networks from 2000



Five key unresolved issues in the late 2000s

- Connecting and managing ***distributed generation***
 - Ineffective incentives to connect; piecemeal, unstrategic approach
- ***R&D*** on networks
 - Funds for R&D made available (IFI/RPZ, LCNF), but overarching regulatory framework disincentivises innovation
- ***Bias towards capital spend***
 - Complex incentive scheme to try to balance treatment of capex and opex, but ‘fit and forget’ still dominates
- Dealing with ***uncertainty about future network needs***
 - Argument for greater coordination and anticipatory investment, vs. Ofgem approach of ‘wait for proven need’
- ***Ownership and competition***
 - DNOs banned from owning generation/storage. Also several DNOs owned by vertically integrated supplier/generators. Virtually no means of competition by IDNOs.

Ofgem's response



Does RIIO-ED1 represent regulatory innovation?

- Assessing regulatory innovation: Black (2005), based on Hall (1993), first, second and third-order change
- Change in the five areas?
 - Connecting and managing ***distributed generation***: Specific incentive removed...overall output incentives supposed to deliver for DG customers, but these are small
 - ***R&D*** on networks: NIC/NIA is similar scale to LCNF
 - ***Bias towards capital spend***: Switch to totex efficiency incentive + requirement for smart grid development plan, but largely gradualist approach (see below)
 - Dealing with ***uncertainty about future network need***: Rejection of coordination in favour of 'adapted regulatory framework'. Need to plan for LCT growth is significant but gradualist and has been interpreted in a minimalist way
 - ***Ownership and competition***: No major changes
- **Overall: some first-order and second-order changes, but not a third-order regulatory innovation involving paradigm change**

Explaining (lack of) major change

- Institutional theory
 - major change often explained by exogenous shocks or pressures (“critical junctures”) (Peters 2012; Hall and Taylor 1996; Mahoney and Thelen 2010)
 - but such junctures do not always lead to change (Cappocia and Kelemen 2007)
- **A weak policy “shock”**
- **Institutional path dependencies**
 - Persistence of focus on efficiency...
 - ...creating a risk-averse industry focused on stable returns...
 - ...above all, a high degree of discretion as a legacy of club government (Moran 2003), producing ‘regulatory inertia’ (Faure-Grimaud and Martimort 2003)

Conclusions and implications

- Lack of regulatory innovation means only minor change in technological and commercial innovation in electricity distribution networks
- Despite major political pressure on regulator since early 2000s
- Why? Due to lack of policy push from government and institutional path dependencies
- In UK, smart grid still framed in terms of *future not current* needs of low carbon electricity policies - contrast with Denmark and Germany
- Acceleration of smart grid agenda needs:
 - Stronger signal from government in form of more effective policies to support LCT growth
 - Change in institutional relationship between government and regulator (e.g. reduce discretion, change nature of regulator, give smart grids development to another institution)

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