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Article (Published Version)

Utilities Policy 47 (2017) 41–49

Contents lists available at ScienceDirect

Utilities Policy

journal homepage: www.elsevier.com/locate/jup

The governance of industry rules and energy system innovation: The case of codes in Great Britain

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ARTICLE INFO

Article history:
Received 30 May 2016
Received in revised form
19 April 2017
Accepted 21 June 2017
Available online 30 June 2017

1. Introduction

Transforming energy systems so that they are environmentally sustainable is now a central goal for policy makers around the world. It is widely understood that innovation has a central part to play in this transformation, not only in specific low-carbon generation technologies and fuels, but also in systems and networks, in consumer behaviour and in business models (EIA, 2015; Mitchell, 2016; IEA, 2016). While they are somewhat different in nature, such changes are as significant as those seen in the telecommunications sector over the last three decades, if not more so.

Analysis of the measures required to support innovation for sustainability in the energy sector has tended to focus on key policies, such as subsidies for renewable energy technology development and deployment, and increasingly in areas such as new approaches to regulation for 'smart grid' investments. Such a focus is understandable, as these headline policies do play an essential role. However, because such policies require an enabling environment to be effective, it is also the case that *all* the governance elements of energy systems need to be adaptable to change. If this is not so, the danger is that governance arrangements at a deeper or more background level, whether in planning rules, network charging, technical standards or trading arrangements, may make transformation slower, more costly or even impossible. Moreover, it is *a priori* plausible that such 'deep' governance arrangements will tend to reflect incumbent technologies and interests, and so are likely to be a barrier to innovation in the energy sector (Geels, 2014; Lockwood et al., 2017).

In this paper, we consider one element of this deep governance challenge, in the form of arrangements for amending the detailed commercial and technical rules found in electricity, gas and sometimes heat networks and markets around the world. To bring out the key issues, we examine in some depth the case of these rules in Great Britain (GB),[1] where they are known as energy industry codes. Such codes are effectively detailed multilateral agreements that define the terms under which participants can access networks and operate in markets, and are linked directly with licences.

As in other countries, the codes system in Britain was designed for conditions of technological and institutional stability, with a focus on economic efficiency. To provide investors with greater certainty and because it was believed that industry participants had greater technical knowledge, the governance of codes was largely delegated to the energy industry itself. This decision may be seen as a particular choice of institutional design. However, institutional designs also typically create unintended and unanticipated effects, and become outdated in changing environments (Pierson, 2004).

One particular concern about the GB codes governance system is that over time it has produced high levels of complexity and fragmentation which act as barriers to new entrants, and which both arise from and reinforce dominance by large incumbent actors in the process for changing codes. A second concern is the ability of the codes governance system to respond to the coming transformations mentioned above. Complexity and fragmentation makes systematic and non-incremental changes slow and difficult. There is also a gap between the direction of high-level policy and the formal objectives of codes. We argue that these problems produce a high risk of regulatory capture, including informational capture, and of regulatory inertia, and that the codes governance system in Britain militates against the innovation required for transforming the wider energy system.

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[1] Because Northern Ireland has its own regulator and industry codes, the focus here is on Great Britain rather than the UK.

http://dx.doi.org/10.1016/j.jup.2017.06.008

These problems have been recognised in recent attempts to reform the codes system, but these attempts remain piecemeal and insufficient. Most fundamentally, it is argued here that as long as the principle of 'self-authored regulation' adopted in the 1990s remains in place, codes will slow and sometimes prevent the realisation of policy change. Here, we develop an alternative agenda for reform, proposing a clearer mechanism for aligning policy and code change, reducing the risk of capture and addressing information asymmetries, while also addressing concerns about regulatory risk. We also reflect on the wider lessons from the British case for the governance of detailed energy industry rule changes in other countries.

The following section briefly lays out a conceptual framework for thinking about code governance as institutional design. In Section 3 we look at the case study of British industry codes, including formal governance rules and the problems that have arisen in practice, relating both back to the conceptual framework. Section 4 considers proposals for reform. In section 5 we place the British case within a discussion of governance frameworks for detailed rule change in other countries. Section 6 concludes.

2. Theoretical approach

Detailed commercial and technical rules in energy systems specify how actors should interact. These rules are governed in systems which vary across countries, but that in each case specify who can change these rules, under what conditions. Here, we argue that as such governance systems stipulate 'rules that assign normatively backed rights and responsibilities to actors and provide for their … enforcement' (Streeck and Thelen, 2005: 12) they can be seen as institutions. These institutional arrangements will tend to be quite stable, with their design tending to reflect principles that seemed appropriate at the time of any major structural reform in the energy sector of the country concerned. In the case of Britain, many elements of the codes system date from the 1990s, and were designed for conditions of technological and institutional stability. A widespread institutional design principle for the governance of these detailed rules, found in many countries, is some form of *delegation*. That is, the job of changing rules is rarely if ever undertaken by governments directly, but is delegated to another body, often a relevant system operator in gas and electricity, and sometimes an energy regulator.

As described in more detail below, the British governance arrangements are somewhat unusual in that they involve a 'double delegation', first from the government to the energy regulator, and then from the regulator to industry. These arrangements are sometimes described as a form of self-regulation, but since they actually involve regulations with the power of the state behind them, we argue that they are better described *self-authored regulation*.

However, there are limits to the efficacy of institutional design for a number for reasons. These include the fact that institutions have multiple effects, the likelihood of unanticipated effects, and changes to the wider policy environment (Clemens and Cook, 1999; Pierson, 2004). Moreover, despite any initial intentions, the working of institutions also tend to reflect and maintain inequalities of power 'by facilitating the organization of certain groups while actively disarticulating others' (Thelen, 2002: 92, see also Pierson, 2000). These considerations point to the possibility that over time, and especially during periods in which policy is changing rapidly, particular institutional arrangements in the energy sector will become dysfunctional, even if they were originally well-designed.

The design of code governance was based on assumptions about a set of anticipated benefits of delegation, but as Flinders (2008: 50) points out 'whether these benefits are delivered in practice depends on a number of factors as well as an acceptance that delegation may well entail certain costs, or at the very least trade-offs.' Here we consider such costs and trade-offs in three areas: regulatory capture, informational capture and regulatory inertia.

One rationale for the design of British code governance was that it would minimise regulatory risk, by making code modification subject to the control of industry actors and preventing the regulator from enforcing arbitrary changes. In theory this should reduce the cost of capital, and so ultimately benefit consumers (Newbery, 1999). On the other hand, because self-authored regulation involves a relatively high degree of independence of industry from government, it also increases the risk of *regulatory capture* (Shleifer, 2005; Wren-Lewis, 2011). Industry drafting of regulation involves a high degree of *de facto* control over the decision-making context, stability of arrangements (avoiding the costs of continuous lobbying), and the use of the monopoly powers of public authority, thus going far beyond attempts at simply influencing the regulatory process (Mitnick, 2011). The risks of distortion are potentially very strong. It is unlikely that any single company will manage to extract rent purely for itself through a code change, since it faces all the other companies directly in the modification process. Rather, the concern is that incumbents will collude to use code governance effectively to make entry by potential competitors more costly and difficult, as suggested by Stigler (1971).

Within the British code governance arrangements, and frequently also in other cases, the regulator has a final veto over code changes, which is in part designed to act as a check on the possibility of capture. This check will, however, only be effective if the regulator has sufficient expertise and information to judge effectively whether rule-writing powers are being abused or not. In the British case, an important second rationale for the institutional design of delegating authorship of regulations to industry was informational efficiency (Huber and Shipan, 2002; Flinders, 2008). However, this rationale arises from the existence of asymmetric information. In the standard principal-agent framework the agent (company) is better informed than the principal (regulator), for example about true costs of network services. The central problem for the regulator is then how to extract information from companies (this is the rationale for incentive regulation, e.g. Laffont and Tirole, 1993).

The same problem exists in code governance, since the regulator has to make a decision about modifications in the exercise of its veto, based on information and analysis. If it is to be an effective check on incumbent capture of rule-writing, the regulator has to have enough information and expertise to make correct judgements about whether specific modifications are distorted (Flinders, 2008; Baldwin et al., 2012). The more that the regulator has to depend on industry itself for analysis and information the higher the risk of '*informational capture*' (Wren-Lewis, 2011), involving partial, selective or misleading representation. The more complex an area of activity, the more difficult avoiding capture is likely to be (McCarty, 2013).

A third issue is that independence of decision making, along with formal remits that are hard to change, is built in to the design of regulatory frameworks precisely to protect against the potentially changing agendas of future governments. However, the disadvantage of such arrangements is that it can create *regulatory inertia* when wider policy goals, or other aspects of the environment such as technology costs, change (Faure-Grimaud and Martimort, 2003).

3. The case of code governance in Great Britain

We now turn to the operation of the British code governance

Table 1
Main energy industry codes in Great Britain.

Area	Title	Description
Electricity distribution	Distribution Code (D-Code)	Technical parameters relating to the planning and use of electricity distribution networks
	Distribution Connection and Use of System Agreement (DCUSA)	Covers commercial aspects of use of electricity distribution network services
Electricity transmission	Connection and Use of System Code (CUSC)	Framework for connection and use of high voltage transmission system and certain balancing services
	Grid Code	Technical aspects relating to connections, operation & use of transmission network
	System Operator/Transmission Code (STC)	Defines the relationships between National Grid as system operator and transmission owners
Electricity balancing	Balancing and Settlement Code (BSC)	Sets out rules for participating in Balancing Mechanism and for settling energy imbalance
Electricity retailing	Master Registration Agreement (MRA)	Rules for retail market processes including electricity registration, change of supplier processes and the Green Deal
Gas transmission and distribution	Unified Network Code (UNC)	Defines the rights and responsibilities for users of the gas transportation systems, and provides for all system users to have equal access to transportation services
Gas retailing	Supply Point Administration Agreement (SPAA)	Sets out the inter-operational arrangements between gas suppliers and transporters in the UK retail market
Gas and electricity smart metering	Smart Energy Code (SEC)	Defines the rights and obligations of energy suppliers, network operators and other relevant parties involved in the end to end management of smart metering in Great Britain.

Source: Licences, Code and Standard documents.

system in practice, and an assessment of the trade-offs identified in Section 2. The evidence and analysis presented here is based on a review of relevant documentation, including code websites, reviews by the energy regulator, the Office of Gas and Electricity Markets (Ofgem) in 2008 and 2013, evidence from the Competition and Market Authority's (CMA) energy investigation, interviews with Ofgem staff and some codes parties, and a workshop involving many of the major stakeholders in October 2015. A more detailed account is given in Lockwood et al. (2015).

3.1. Formal governance framework

To obtain a licence to operate in the gas or electricity sectors in Great Britain, companies are obliged to become party to, and comply with, relevant industry codes and related technical standards. These codes set rules for a large range of practices including: terms of access and connection to networks; charging methodologies; network planning and operation; data reporting and management; requirements, and rewards and penalties in balancing mechanisms. The ten main GB codes are shown in Table 1.

Each code has some form of panel or board which 'owns' the code and is responsible for overseeing the change, or 'modification', process. All codes also have an administrator body to maintain the codes and support the code modification process on a day-to-day basis. A modification (or 'mod') to a code is usually proposed by any party to the code, and in some cases, certain named outside bodies as well. Since 2008, the modification process has then been split into three tracks (Table 2). One is for minor modifications with 'non-material' impacts on code parties, which are handled entirely by industry on a 'self-governance' route. The assessment of the proposal is managed by the panel. Each code has its own specific procedure, although there are some common elements including referral to specialist work-groups for assessment of complex modifications and industry consultation on options. Panels then adopt or reject the modification.

The second track is for modifications that have more major consequences for parties. These are handled in the manner described above for the self-governance route, except that panels cannot decide on the modification themselves but rather make recommendations to approve or reject, with the final decision made by Ofgem. Thirdly, where Ofgem takes the view that policy change and the carrying out of its duties require it, the regulator itself can instigate a Significant Code Review (SCR) process.[2] However, while Ofgem could prepare the ground by carrying out analysis of changes needed and their likely impacts, it could not raise a modification itself; instead it would have to direct a licensee to do so on its behalf. As with an ordinary modification, Ofgem retains final decision powers.

As discussed above, these formal rules entail a double delegation of governance, which involves a number of potential trade-offs. We now consider each of these in turn.

3.2. Minimising regulatory risk vs. risk of regulatory capture

The first trade-off was that between the risk of regulatory capture and the minimisation of regulatory risk, with the latter intended to ensure a low cost of capital. There has been no systematic assessment of the claim that delegation of code governance has in fact reduced the costs of capital, as against a counter-factual, but a cursory analysis for networks raises some doubts about the materiality of the effect. Had the introduction of the SCR process in 2010 increased perceptions of regulatory risk, one would have expected to see the cost of capital for network companies rising after that date, had other factors remained the same. The actual cost of capital for companies is commercially confidential, but on the basis of Ofgem's allowances for the weighted average cost of capital (WACC), which are set through extensive research and consultation with financial markets, the reverse is in fact true. The allowed WACC has fallen steadily from above 5% for price controls in the mid-2000s to under 4% by 2014 (Table 3). Obviously, other factors did change over this period, not least the sharp reduction in interest rates after the financial crisis in 2009. Nevertheless, it does not appear that an increase in the degree of control of the regulator over code governance, albeit a modest one, has raised the cost of capital for networks significantly. In practice, the cost of capital for network and generator companies will be influenced by a range of factors, of which code governance arrangements are only one, possibly minor, element.

Against this, two features of the British code governance system in practice raise concerns about regulatory capture. The first is the *dominance of incumbent companies* in code governance bodies. The details of processes for determining membership of code Panels or Boards varies, but they generally involve a mix of elections from amongst industry parties (sometimes structured by type of

[2] So far there have been four SCRs, covering gas security of supply, electricity balancing arrangements, electricity transmission charging and faster switching.

Table 2
Alternative modification processes from the Code Governance Review 2008.

Modification procedure	Initiation	Development	Decision	Implementation
Self-governance (fast-track and regular)	Industry	Industry	Industry	Industry (network owner)/code administrator
Ordinary	Industry	Industry	Ofgem	Industry (network owner)/code administrator
SCR	Ofgem	Ofgem first then industry	Ofgem	Industry (network owner)/code administrator

Source: CMA (2015c: 467).

Table 3
Cost of capital determinations for network price controls 2004–2014.

Price control	Year	Vanilla WACC determination (%)
Electricity distribution network companies (DPCR4)	2004	5.55
Transmission network companies (TPCR4)	2005	5.1
Gas distribution network companies (GDPCR)	2008	4.9
Electricity distribution network companies (DPCR5)	2009	4.74
Gas distribution network companies (RIIO-GD1)	2011	4.2
Electricity distribution network companies (RIIO-ED1)	2014	3.76

Table 4
Code Panels/Boards. Number of members by category, October 2015.

	MRA	BSC	DCUSA	CUSC	D Code	Grid code	SPAA	UNC	SEC
VI supplier- generator	2	1	2	4	3	3	4	2	2
Network company	1	2	3	2[b]	6	10	2	5	2
Other Code rep.	1	0	0	0	0	2[c]	0	0	0
Other supplier	0	0	0	0	0	0	1	3	2
Other generator	0	1	1	2	1	3	0	0	0
Other network	0	0	0	0	1	0	1	0	0
Independent	0	8[a]	0	2[a]	3[a]	2	0	1	4
Consumer rep.	0	2	0	1	1	0	0	1	1[d]
Total	4	12	6	11	15	20	8	12	11
% VI	50%	8%	33%	36%	20%	15%	50%	17%	18%
% VI + network	75%	25%	83%	55%	60%	65%	75%	58%	36%
Independent chair	No	Yes	No	Yes	No	No	No	Yes	No

Source: Code websites, SSE (2015).
Notes: Excludes secretaries and GEMA members.
[a] Includes one independent working for Energy UK.
[b] Only one network rep. is allowed to vote on a given issue.
[c] Includes Irish SO rep.
[d] Currently vacant.

company i.e. networks, suppliers, large and small generators etc.), and the appointment of independent individual experts and a consumer representative. In some codes, such representatives are supposed to be independent, furthering the efficiency of the codes system rather than the interests of the particular companies they work for, but it is unclear how this is policed and, according to Good Energy (2015: 6), this is rarely the case in practice.

Table 4 shows the make-up of the main governing body of each code in late 2015. Between 8% and 50% of these bodies are made up of members who are employed by one of a group of large vertically integrated utilities that dominate both retail energy markets and electricity generation.[3] However, if the major regulated network companies are also included, then the 'incumbent' group has a clear majority of members on all codes except the BSC and the SEC. These network companies are of course incumbents in a special sense, as they are not exposed to competition in the normal way. Nevertheless, it is arguable that they have a vested interest in the maintenance of the current situation. Beyond the bodies at the apex of the governance system there are also work groups and sub-committees where much of the detailed analysis is done, and the basis laid for decisions. Here, incumbents tend to predominate more clearly because resource constraints mean that smaller actors often do not have the expertise and time needed (CMA, 2015b; DCRP, 2015).

A second issue is that the *complexity and fragmentation* of the codes governance system means that the fixed costs of compliance and engagement with the codes system are disproportionately high for smaller actors, *de facto* allowing larger incumbents to dominate (CMA, 2015b: 22–24, Ecotricity, 2015). Code and other licence documentation runs to over 10,000 pages (Good Energy, 2015), with some individual codes being in excess of 1000 pages. The large number of codes adds to costs and duplication, especially where changes cut across multiple codes, because of a lack of coordination across codes (Ofgem, 2014). While there are some core common elements, each code has separate information and communication technology (ICT) requirements, process rules, reporting arrangements, and credit and collateral arrangements, which also change frequently (Cornwall Energy, 2014). Just keeping up with modifications to codes and other licence conditions is a significant activity – there have been 241 proposed modifications to the CUSC since 2001, 275 to the UNC since 2005, and 327 to the BSC since 2010. One major supplier maintains a spreadsheet with over 3000 line-items to ensure compliance.

Beyond compliance, effective involvement in the code change process requires technical expertise and significant resource.

[3] Often known as 'the Big Six'.

Ofgem estimates that there are around 150 code panel-type meetings a year, and on average each modification proposal may require around four working groups, with more complex changes needing more (CMA, 2015a: 8). While all codes share the basic processes of developing, drafting, consulting and reaching recommendations on modifications, each is different in its details (Cornwall Energy, 2015).

3.3. Informational efficiency vs informational capture

The complexity and fragmentation of the codes system relates to a second trade-off arising from delegation, between the informational efficiency and informational capture. It is very likely that these features of the codes system make it more costly and difficult for the regulator to exercise its veto over modification decisions in an effective way. Ofgem currently makes around 100 decisions a year on modifications, drawing on expertise from across the organisation.[4] However, the complexity of codes is such that there are gaps where the regulator is at a disadvantage relative to industry and where external expertise is required. Ofgem has powers under licences to request information from industry, but there is a tendency for this information to be presented in ways that favours its sources.

Wren-Lewis (2011) notes that the risks of capture may be reduced by the representation of other interests, including that of consumers. Some codes panels do have consumer representatives, but as can be seen in Table 4 above, where they do exist they are in a minority, and in practice these positions represent one or two individuals who are too thinly spread to be an effective balance to industry representation. More generally, the complexity of the codes governance system in fact weakens any type of external accountability.

3.4. Regulatory stability vs. regulatory inertia

A final trade-off was that between regulatory stability and regulatory inertia. As in other countries, British energy codes were originally designed for a limited range of types of technologies, scales and institutional arrangements. A major challenge is that, as discussed above, all of these aspects of the system are now changing, and the next ten years is likely to see a major transformation in the way energy is produced and used. However, while the current code governance framework is well-suited to delivering incremental improvement, it does not readily support strategic or transformational change of the type that will be needed (IET, 2014; CMA, 2015a; Ofgem, 2015a).

One problem is that it is difficult to coordinate multiple modifications across codes. Moreover, many relevant groups, including manufacturers of meters, electric vehicles and charging equipment, the ICT sector, the home and building automation industry, aggregators, end users and community energy groups, which are currently excluded from the technical electricity codes will have to be brought into the system (IET, 2015). Yet, while code administrators do communicate with each other, no single body is responsible for addressing major changes that cut across codes under current arrangements.

The risk of inertia also is also related to the risk of capture of code governance by incumbents. Where such incumbents benefit from existing arrangements they have few if any incentives to drive through modifications needed for transformational change.

Even more fundamentally, the objectives against which code modifications are formally judged differ from the policy objectives of government. Code governance objectives still focus purely on ensuring effective competition, cost-reflexivity and consistency with European regulation. They do not include social and environmental goals.[5] Ofgem does take its remit (which has included sustainable development since the 2000s) into account when deciding whether to reject or accept recommendations, but this comes very late in the process, and is both an ineffective and inefficient way of fitting code governance to this remit. This situation means that it is effectively impossible to get panels to recommend modifications for the *direct* purpose of improving sustainability.[6]

4. Reforming code governance

4.1. Existing reviews

As noted above, Ofgem undertook a review of code governance in 2008 (GEMA, 2008). This review was prompted by several of the same problems that have been noted above. The main reform was the introduction of the SCR mechanism (see section 3.1 above). However, a number of problems with the SCR process have emerged, including Ofgem's limited capacity, duplication of analysis, and the fact that Ofgem cannot itself impose a modification itself (Citizen's Advice, 2015; Cornwall Energy, 2015). This in turn has meant that SCRs have taken substantially longer than was anticipated, with the first three (gas security of supply, electricity transmission charging and electricity balancing) taking between 32 and 44 months to complete (Ofgem, 2015a).

In addition, a code administrators' code of practice (CACoP) was set up, urging administrators to be 'critical friends', giving support especially to 'under-represented parties, small market participants and consumer representatives' (Ofgem, 2015b: 4). However, while it appears that the CACoP has helped smaller actors to some extent, it has been unevenly applied and oversight of code administrator performance appears to be weak (Good Energy, 2015; Cornwall Energy 2015, EDF Energy, 2015). More fundamentally, governance of code administrators seems almost absent (CMA, 2015c: 465), and Ofgem has limited powers to direct them or sanction them for poor performance against the CACoP objectives.

By 2015, Ofgem had acknowledged that these reforms were not sufficient, and opened up a further review of code governance. In parallel, the UK's Competition and Markets Authority (CMA) undertook a review of codes and code governances as part of an energy market investigation. The CMA concluded in 2016 that the conflicting commercial interests of code parties, their limited incentives to deliver policy changes and Ofgem's insufficient ability to influence the code modification process all created an adverse effect on competition (CMA, 2016).

Both reviews made quite similar proposals for further reform. Probably the most important of these was to give Ofgem more power to drive changes in code governance more directly, with Ofgem proposing to give itself new powers to lead an entire end-to-end process of development and modification itself in SCRs (Ofgem, 2016), and the CMA seeking to give Ofgem the role of annual strategic direction setting and powers to initiate and prioritise code changes in order to meet this direction. Both bodes also made proposals for strengthening the expectations of code

[4] Interview with senior official, Ofgem, 7 January 2016.

[5] The sole exception is the new Smart Energy Code.

[6] For example, when a small wind farm operator proposed a change to the CUSC to give guaranteed connection and priority access to renewable generators in 2007, it was rejected because while it was intended to support wider government policy on renewables the panel did not believe it would support the narrower economic efficiency objectives of the CUSC (Brattle Group/Simmons and Simmons, 2008). Davenport (2008) gives further similar examples.

administrators, with the CMA wanting to make code administration a licensable activity with objectives against which performance could be monitored. However, the implementation of proposals from the CMA has been delayed by the recent change in government.

While important, both of these reviews were limited in scope, with the CMA review focusing relatively narrowly on competition and harm to current consumers and Ofgem explicitly considering only incremental changes to the framework set up by the earlier 2008 Code Governance Review. Crucially, neither of these official reviews questions the fundamental principle of self-authored governance.

4.2. An alternative approach

Our starting point for an alternative approach is that there is a need to move away from self-authored regulation in a strategic way. Such a move implies relocating code governance, including the proposing and development of modifications, entirely out of the hands of industry and into a *dedicated codes governance body within the public sphere*. The strength of such an approach is that it would drastically reduce the danger of regulatory capture. As long as this body is given a clear remit, linked directly to government policies, the danger of regulatory inertia should also be removed.

However, such a reform also has potential weaknesses that we argue can be avoided only through building in certain safeguards into its design. These are the danger of increased regulatory risk and the problem of overcoming informational asymmetry. It is clear from the responses to even limited proposals for further increases in the scope of Ofgem's SCR powers that these are the central concerns of industry.[7] At the most basic level, these concerns are rooted in the perception that a public body that is able to write and adopt code changes is both 'judge and jury'. Issues arise at three stages in the process: the initiation of code change, the process of code change and the right of appeal.

One complaint is about short-term political pressures and "the need to do something" leading to "inappropriate" interventions (e.g. E.On, 2008), a concern clearly related to regulatory risk. As noted above, the evidence that a more directed form of code governance significantly increases the cost of capital is weak. However, in order to minimise perceptions of risk, there would have to be *clear and transparent links* between major code changes and specific policies, so that industry participants could be assured that codes could not be changed arbitrarily by the code body itself. In this sense, code change would then be part of the implementation of policy agreed at a governmental level, as a purely technical process.

A second fear is that code governance located in a public body would lead a flawed process without consultation. There are in fact incentives for government to ensure a good process for code change. The first is that in the absence of a robust and transparent process that is properly followed, the government is open to Judicial Review.[8] The second is that government fears disruption and a collapse in investment in the energy sector even more than does the industry, so it has a strong interest in making code changes that work effectively. Nevertheless, to counter the fear of flawed process (and to guard against any attempts by incumbents to recapture the process by lobbying), there would need to be a *robust and transparent consultation and decision-making process*, laid out in statute. Possible major code reviews would ideally be signalled as far ahead as possible, somewhat along the lines of the strategic work plans proposed by the CMA.

There is also a concern that even a well-intentioned public body leading code change may impose misconceived code changes, or changes with unintended consequences, because it would not understand the detailed working of the industry (RWE npower, 2015). This is, of course, the informational asymmetry argument that underpinned the principle of self-authored regulation in the first place.

On this issue, credibility can only be established over time by ensuring that a body in the public sphere making changes to codes does in fact have the *necessary knowledge and expertise*. Ofgem is currently proposing to take on this role itself, by expanding its powers within the SCR process. However, Ofgem is a large organisation with multiple responsibilities and limited resources. The CMA argues that it has engaged with codes in an isolated, reactive and piecemeal fashion, and does not have the incentive to devote significant resource to "systematically developing its knowledge and understanding of the substantive provisions set out in codes" (CMA, 2016: A10.4-4). Ofgem itself has suggested to the CMA that "as an economic regulator it is not efficient or effective for it to lead on the delivery and/or take a prominent role in drafting and implementing detailed and often technical code change in an ongoing basis." We would argue that for these reasons, it is not desirable that the function of code governance should be located within Ofgem but rather in a new code management body with dedicated resource and expertise. Such a body is likely to require capacity across a range of expertise, including a detailed knowledge of existing codes, electricity markets and networks, including supplier-consumer relationships and consumer behaviour; detailed knowledge of new and emerging areas and technologies; relevant legal expertise; analysis of economic impact; energy systems analysis; an understanding of IT, and project management.

There are other reasons for locating powers to manage code change in a new body rather than in Ofgem. Ofgem is supposed to be an arms-length regulator, independent of government, rather than a delivery body. It also has a particularly close relationship with network companies through its role as economic regulator, but many changes to network codes actually affect network users and customers as much if not more than networks. Separating economic regulation and code governance would therefore be desirable. Finally, by removing Ofgem completely from the upstream end of the code governance process, it can then play the role of monitoring compliance with licence conditions.

There are also arguments for a dedicated code management body *taking on the current functions of the code administrators*. A single body would facilitate better coordination of cross-code changes and allow for the standardisation and simplification of the current range of different practices, collateral requirements etc., where beneficial, all of which would help support smaller actors. There would be a single point of contact and website, plus basic steps such as the accurate translation of code requirements and code change proposals from legal and technical language into plain English, and the provision of 'one-stop shop' guidance to what parts of the code landscape an actor actually needs to pay attention to. This approach does open up the danger of the creation of silos in what becomes a larger organisation than any of the existing code administrators. This issue would have to be addressed through designing the core strategy of the body in such a way to avoid such silos, and linking this avoidance to performance indicators and, crucially, incentives for staff.

Finally, industry incumbents are concerned that any move away from self-governance to regulator-led or publicly-led code

[7] See the submissions at https://www.ofgem.gov.uk/publications-and-updates/code-governance-review-major-policy-reviews-and-self-governance-initial-proposals-8409 and https://www.gov.uk/cma-cases/energy-market-investigation.

[8] As currently happens: RWE recently undertook Judicial Review of a decision on transmission charging, but lost in July 2015.

governance should be balanced by a *robust right of appeal by individual companies or actors*, although this should be seen as a last resort. Under the Energy Act 2004, code decisions can be appealed to the Competition and Markets Authority. This could simply be continued.

4.3. Costs and impacts

The creation of new bodies is often associated with new costs, which raises the question of whether institutional reform is justified in terms of the benefits. It is not possible to give a quantitative impact assessment here, but some qualitative indication of orders of magnitude can be outlined.

One useful source here is the impact assessment (IA) exercise carried out for the 2008 Code Governance Review (Ofgem, 2010) (there are currently no impact assessments for the 2016 CMA review and Ofgem's further review). This exercise took one issue – electricity balancing cash out arrangements – and made a comparison of what the regulator thought would have been the likely impact of introducing a SCR process for this issue in 2005, as against the status quo at that time. The IA assumes that the SCR would be a quicker and less wasteful process than what preceded it, and that part of the change would involve a transfer of costs from industry to Ofgem, since the former would do less analysis. The resulting estimate was that direct costs would decline by £2m over 5 years. In practice, as noted above, the SCR process has not been as fast and efficient as Ofgem anticipated, and many of these savings may not have been realised. However, these process cost estimates should be set against the £100m of costs to consumers that the IA also estimates would have been avoided by the faster introduction of code change under an SCR.

We would make similar arguments here. British Gas (2015) estimates the annual cost of code administration across MRA, BSC, DCUSA, UNC, SEC and SPAA alone at more than £10m in 2015. The total cost of code administration may be of the order of £20–25m a year. Through rationalisation, and because our proposal would in practice mean the relocation of costs incurred by industry actors in existing code panels and working groups into a codes body, we do not anticipate major cost increases in the modification process. We would expect the number and speed of major code reviews to increase, which may raise annual costs modestly, but not by an order of magnitude.

However, as with the 2008 IA, the main point is that expected social benefits from policies – especially smart energy policies – requiring code changes that would be made only very slowly or not at all under the current system are of two or three orders of magnitude higher than any likely organisational cost increases. For example, a recent estimate of the value to consumers of a smarter electricity system with storage and flexible demand, which will require quite changes across many codes, is £8 billion a year (NIC, 2016). An estimate of net savings in investment costs arising from a smart grid strategy prepared for the Smart Grids Forum is approximately £10 billion a year by 2030, and over £40 billion a year by 2050 (EA Technology, 2012).

5. Discussion

The issues raised in this case are not unique to Britain; energy systems across the world are undergoing transformation and detailed rules in the forms of codes in all these systems will have to be adapted to facilitate that transformation. British code governance lies at one end of a continuum of arrangements. It is unusual in delegating so much of the initiating and drafting of codes to private industry actors. As noted above, arrangements in other countries do typically involve delegation, but this is most frequently to a publicly-owned independent system operator (ISO) or transmission system operator (TSO). For example, in most US jurisdictions, the governance of commercial and technical rules falls under the Boards of ISOs (which sometimes include more than one State) (Brattle Group/Simmons and Simmons, 2008). Changes can be proposed by the ISO itself, with advisory boards able to undertake analysis and make amendments, or by the Federal Energy Regulatory Commission, which also makes the final decision on code changes.

In Denmark, as in other Scandinavian countries, codes are generally somewhat more principles-based and simpler than in GB, and code changes less frequent. Modifications are handled by the state-owned TSO Energinet, which reports directly to the energy minister. Energinet runs consultation processes on proposed changes, and generally makes an effort to consult with smaller actors as well as larger ones. The Danish economic regulator then makes a final approval of changes. The system in Sweden is similar, with the government giving high-level guidance and the TSO governing energy sector rules, although the power of the regulator is more limited (ibid). In Norway, the regulator governs a set of general principles on which detailed rules are based, but these rules themselves are written, and may be changed, only by the state-owned TSO.

In these kinds of arrangements, the risks of regulatory capture are somewhat different from those arising in the GB case. While the danger in British code governance is about direct capture of the process by industry incumbents, the danger in cases where codes or their equivalents are governed by ISOs or TSOs is of indirect capture by industry, including via informational capture, and of organisational capture by the ISO or TSO itself. However, the danger that such an arrangement will delay or prevent rule changes needed for policy change determined by government is much less, since publicly owned SO bodies can generally be given direction, or steered through high-level guidance. The problem for governments (typically energy ministries) is then one of informational asymmetry, and their ability to tell whether SO bodies are indeed changing codes in appropriate ways to facilitate policy change. For many energy ministries this is likely to be a significant problem.

Another relevant factor here is the degree of openness of the rule change process. In Australia, while the Australian Energy Market Commission (AEMC) is the 'custodian of the rules', but rule change can be proposed not only by market participants, but also by any stakeholder in the energy system, including the Ministerial Council on Energy, the System Operator, federal and state regulators, and, importantly, consumers and consumer representatives (Brattle Group/Simmons and Simmons, 2008). Funding is available for these latter actors to advocate for changes to the rules. It is also worth noting that the rule change process in the US has some quasi-judicial aspects, with difficult or contentious rule changes being handled in formal hearings, with evidence given in the open. These types of change processes are more likely to reduce the risk of regulatory capture, and should form the basis for the design of a more open process of consultation in the British case.

The other relevant challenge that all countries potentially face is that of regulatory inertia. In many countries the criteria against which rule changes are judged, whether by SO bodies or by regulators, remain similar to those in the British codes governance system, i.e. relating to non-discrimination and cost-reflexivity. This is because as in the British case, network and market rules have been designed for economic efficiency rather than system transformation. The 2008 review of code governance in Britain identified this as a "fundamental flaw" (Brattle Group/Simmons and Simmons, 2008: 5), and it is likely to be a critical issue in detailed rule governance reform. Gaps between rule change objectives and policy objectives are also likely to be reinforced where economic

regulators make the final decision, since they are rarely focused on system transformation.

6. Conclusion

Detailed rules for commercial and technical practices are a crucial but often overlooked institutional element in energy systems. The design of governance of such rules will determine how readily they can be changed to facilitate innovation in technologies, business models and systems to allow decarbonisation.

In this paper we have explored these issues through the case of energy industry code governance in Britain. We have argued that a double delegation of code governance to the energy industry itself, producing a system of self-authored governance, has led to a complex and fragmentary system, dominated by large incumbent companies, and with criteria for code change that are adrift of important government policy objectives. These features suggest that there are some problematic trade-offs in the institutional design of British code governance, including high risks of regulatory capture, informational capture, and regulatory inertia.

These problems have persisted, despite reform efforts arising out of a Code Governance Review in 2008. Our proposals for reform are based on the argument that the principle of self-authored regulation should be challenged more fundamentally. Code governance should be located in a new code management body, with a clear line of accountability to government and a remit to amend codes to facilitate a sustainable and efficient energy system in line with specific policies. We also argue that with careful design of such a system, regulatory risk can be mitigated. Such a function is best located not within Ofgem, but rather within a dedicated body. Such a code management body would provide integrated and coherent oversight of all codes, providing clear guidance to industry participants on the principles of the codes and a 'one-stop shop' assistance function for new entrants and smaller actors. It would need sufficient capacity and expertise to carry out these functions efficiently and effectively. We do not offer a full cost-benefit analysis here, but previous impact assessments suggest that while costs of reform would be of the order of £1–10 million annually, a more effective system would bring forward sector transformations with a social value of the order of £1–10 billion annually. Moreover, the need for a change in approach in Britain is clearly linked to a specific set of challenges that the energy system faces over the next few years. Once the major transformations in this system are complete, and the pace of change slows, it may be desirable to return to a more delegated approach.

The British case represents an extreme on the spectrum of institutional designs for the governance of detailed rules found across energy systems across the world. Nevertheless, these designs almost always involve a degree of delegation, precisely because the rules are so detailed, and so some of the underlying issues apply far more widely. In many cases, the primary delegation is to state-owned system operator (SO) bodies, and so the dangers of capture, including informational capture, relate to the relationships between governments, SOs and regulators. In addition, the gap between criteria for rule changes on the one hand and wider policy objectives on the other that is found in the British system appears to be quite widespread, and will need to be addressed in most cases.

Acknowledgements

This work was supported by The Engineering and Physical Sciences Research Council (EPSRC)[EP/K001582/1 and EP/N014170/1]. We are grateful to participants at a workshop on 'Codes Governance for the 21st Century' held in London in October 2015 for discussion of the issues relating to codes governance, and to two anonymous reviewers for useful comments on earlier drafts. The research materials supporting this publication can be accessed by contacting the corresponding author.

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