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The capital budgeting process and the energy trilemma - A strategic conduct analysis

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ABSTRACT

This paper examines capital budgeting and its role in the ‘energy trilemma’. The key focus is on the role of knowledgeable agency in the analysis of strategic conduct. In particular, this study demonstrates how accounting tools can be used by executive managers, who, whilst dominant in their own organisations, are themselves subordinate to government in the United Kingdom and at the European level. The strategic conduct of actors is examined in a narrative, theorised case study setting spanning an 11-year period from 2006 to 2017. The principal contribution to knowledge from this study is the extent to which strategic investment accounting has played a role in changing regulatory and government policy in a privatised industry. Government and regulators were forced to take the generators’ concerns seriously, because the generators (based on knowledge derived from capital budgets) restricted their capital expenditure rather than mobilising their resources. The generators highlighted that not only was this a problem of environmental sustainability and price for consumers, but also one of long-term supply. They argued that the government had to address all aspects of the trilemma when creating policy.

1. Introduction

Encouraging the right type of investment is essential to the success of any energy policy. Suitable investments would maintain low prices, achieve reductions in emissions, and keep the lights on (Warren, 2014). The World Energy Council has identified supply, pricing, and emissions as the three major global energy concerns, termed within the industry as ‘the energy trilemma’. However, establishing a suitable energy policy is subject to complex regulatory systems, which both impose controls on prices to consumers and set out environmental targets for companies. This can be specific to a particular country. In the energy industry, any type of change requires complicated discussions and debates with regulators, politicians and generators. Although the relative dominance of each group of actors varies across the world, each country faces a similar problem: how to balance the energy trilemma.

The energy trilemma is recognised as an urgent problem in Great Britain (GB),¹ the geographical setting for this case study. It is urgent because energy prices for consumers rose during the main data collection period for the case study, 2006–2014 (DECC, 2014a²), while security of supply is an unresolved issue (OFGEM, 2012,³ Johnson, 2014, Grigorjeva, 2015, Yiakoumi & Rouaix, 2016,

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E-mail addresses: e.warren@gre.ac.uk (L. Warren), lisa.jack@port.ac.uk (L. Jack).¹ The paper will refer to GB when discussing investment problems because Ireland has a separate energy system, which is regulated by its own body.² DECC is a department called the ‘Department of Energy and Climate Change’.³ Ofgem - Office for Gas and Electricity Markets.<https://doi.org/10.1016/j.bar.2018.04.005>

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DBEIS, 2017⁴). In 2011, the industry regulators acknowledged that the country's market energy structure was no longer fit for purpose (DECC, 2011), highlighting the distinct lack of significant new investment. According to DECC (2014b) the requirement for reduced emissions is the only component of the energy trilemma that is currently being achieved. This has led to public outrage, and questions over why such a crucial commodity such as electricity is apparently being irresponsibly managed (Inman, 2014; Morison, 2014). Appreciation of the significance of lack of investment is central to understanding the energy trilemma. As Falkner (2014, p. 188) argues, "energy is central to the survival and prosperity of human society".

During the period covered by the study, the industry argued that the *laissez-faire* approach by the Government regarding investment in new power plants discouraged capital investment. We examine how senior managers at the electricity generation companies used accounting in communications with regulators and governments when seeking change. In particular, we investigate the extent to which senior managers used accounting techniques strategically during the implementation of the revised Large Combustion Plant Directive (LCPD). The LCPD is a European directive aimed at reducing nitrogen oxide (NO_x), sulphur dioxide (SO₂) and dust emissions to combat environmental problems such as acid rain. Their conduct was calculated both to transform the structures within which they had to work, and to change the conduct of others.

In response to the calls for studies which focus on the role of a knowledgeable agency in the analysis of strategic conduct (Coad, Jack and Kholeif, 2016; Englund, Gerdin, & Burns, 2011; Roberts, 2014), we focus on the roles of knowledgeable agents in using contradictory structures to generate conflict. We observed agents using their knowledge of those structures and the actions of others in a deliberate way. Agency concerns how they actively influence, motivate, start an argument or discussion, and whether outcomes are intended or unintended. As Stones has argued, conduct analysis examines how we feel when things are against us, in relation to established norms (Stones & Jack, 2016). The changes in this case study do not concern accounting systems but rather the accountability of investment decisions, thereby using strategic conduct to assess strategic behaviour. We will be drawing on Giddens' original Structuration Theory (ST) and building on Stones' (2005) development of the knowledgeability of agency. This enables us to contribute to the development of structuration theory in accounting research by analysing how people use accounting to control and change others (Coad, Jack, & Kholeif, 2016). Therefore, our main themes are:

- 1) How did the agents think about the context?
- 2) How did the agents plan their conduct?
- 3) What actions were taken using capital budgeting?
- 4) What were the outcomes of actions based on knowledge?

The theoretical contribution emerging from the analysis and interpretation of the case study strengthens our understanding of how change can be accounted for using strategic conduct analysis. A principal criticism of Giddens' ST is that it is often used to demonstrate how institutions become established and maintained, but not how structures and actions adjust over time. This is attributable to the underdeveloped epistemology of the original theory, and its concept of strategic conduct analysis. How particular agents draw strategically on their knowledge of structure and the conduct of others when they attempt to alter the knowledgeability and perspectives of other agents, shows how structures might become altered.

The remainder of this paper is structured as follows: Section 2 examines the capital budgeting literature; Section 3 introduces the methods employed within this case study research; Section 4 provides an overview of the theory; Section 5 describes the background to the environmental regulations imposed in the UK; Section 6 presents the case study; Section 7 is the discussion, and Section 8 provides the conclusion.

2. Literature

Investing in capital projects, such as power stations, is a complex process. Management accounting offers many numerical techniques that aid capital budgeting for decision-making in such projects. CIMA (2009)⁵ found that 60% of organisations use Net Present Value (NPV), 55% use the payback method, 43% use Internal Rate of Return (IRR) and 18% use the Accounting Rate of Return (ARR) for capital budgeting analysis. These are often referred to as the traditional methods, whilst other more sophisticated methods, such as Real Options, sit outside that group. Only two are based on the use of discounted cash flows: NPV and Real Options. NPV is the most prevalent method encountered in our study.

Alkaraan and Northcott (2006) state that Strategic Investment Decisions (SIDs) can be distinguished from operational investments by considering level of risk, intangible outcomes, the size of investment, and long-term impact on company performance. The majority of SIDs use capital budgeting as a decision making tool; the basic definition of capital budgeting is "a process concerned with decision making in respect of specific investment project choices and the total amount of capital expenditure to commit" (CIMA, 2009, p. 7). However, when dealing with high levels of risk-taking, the process can be much more complex than the definition suggests. Pfeiffer and Schneider (2010, p. 1) extend the basic definition of capital budgeting and propose a process of capital budgeting that "defines a set of rules to govern the way in which managers at different levels of the hierarchy produce and share information about investment projects". This could be extended to encompass the entire communication process within the organisational field, including with regulators. The investment decision-making process also includes the assessment of human behaviour

⁴ Department that was created after DECC. DEBIS is the 'Department of Energy, Business and Industrial Strategy'.

⁵ CIMA is the Chartered Institute of Management Accountants.

and individuals' resources, as well as those of the organisation itself and the institution surrounding it.

Emmanuel, Harris, and Komakeck (2010) argue that every capital investment decision involves uncertainty, particularly those that are innovative in nature; here, we argue that the presence of new regulations can be equally problematic when engaging in strategic decisions. Of course, the literature has demonstrated that capital budgeting techniques are not just used as decision-making tools, just as this paper demonstrates that information from capital budgeting can be used to produce change in the structure, knowledgeability and processes of the market. Others have shown that it can be used as a tool for mediating (Miller and O'Leary, 2007) and legitimising (Moll & Hoque, 2011, pp. 86–101). Jones and Dugdale (1994) find that field and practitioner narratives have been explaining the wider use of investment decisions for some time. They noted that previous scholars had called for more work on the strategic nature (Scapens et al., 1982; as cited in Jones & Dugdale, 1994) of using capital investment techniques and consideration of processes as a whole (King, 1975; as cited in Jones & Dugdale, 1994).

Looking first at the general literature on investment decision-making, work on the energy sector is sparse in business journals but has received more coverage in policy and utilities journals. For example, Peng and Poudineh (2017) examined the use of investment vehicles in the developing sector in Tanzania to fund increased plant capacity in a state-owned utility company through independent power plants, energy power producers, small power producers and the increase in public-private partnerships with mainly Chinese companies. Although this paper does not examine the decision-making process itself, it does highlight the growing dependency on government and international partnership investments. This is very similar to the current proposals for a new nuclear plant (EDF, 2018) in the United Kingdom (UK). The majority of papers in this area examine investment patterns using econometric modelling. In a study of the sector in Germany, Cullmann and Nieswand (2016) conclude that generators increase their investment in the base year of incentive regulation, but do not examine how these decisions were brought about.

Pineau, Rasata and Zaccour (2011) use stochastic modelling for prediction purposes. They found that within a Finnish, oligopolistic market, it was difficult to predict choice in technology because the model had incomplete information on how the players determined their choices. These studies point to the lack of studies into how investment decisions are made. They also highlight the fact that investment problems in the energy industry are common across countries.

Within business journals, some studies have considered investment in the electricity sector. Warren, Quinn, and Kristandl (2018) examined the influence of financialisation on investment decisions in GB from 1960 to 2010. Using a similar methodology to ours, it was found that the common logic that underpins investment practices in GB have changed over the period examined. They emphasise that it is necessary to understand political-economic and institutional change in the UK to fully appreciate how and why investments are made in this industry. They also found that the use of accounting in investment has to some extent been a contributory factor to the power supply problems now faced by the British public. However, they do not address the problems that have occurred following 2010 or the decision-making process itself. In a similar vein Warren and Seal (2018) consider the performative properties of the discounted cash flow model, reconnecting politics and the economy.

Despite the extensive literature in the area of investment appraisal (for example Pike & Wolfe, 1987; Northcott, 1991; Sangster, 1993; Sandahl & Sjogren, 2003; Ekanem, 2005 & 2007; Alkaraan & Northcott, 2006; Kerler, Fleming, & Allport, 2013; Elmassri, Harris, & Carter, 2016 and Harris, Northcott, Elmassri, & Huikku, 2016), capital budgeting has received limited attention (Miller and O'Leary, 2007). This is surprising, since Bower (cited in Miller and O'Leary, 2007) identified a distinct need to address the process of capital budgeting in 1972, and Jones and Dugdale (1994) questioned the academic focus on application and technique rather than the gap between theory and practice. This is more surprising when it is considered that capital investment decisions are critical to organisations' future performances (Emmanuel et al., 2010), because significant investment is often irreversible due to the enormous sunk costs involved (Chittenden & Derregia, 2015).

As capital budgeting evolved from financial economics (Haka, 2007), the majority of studies in this area employ methods embedded within a mainstream (positivist) methodology (for example see Pike & Wolfe, 1987; Sangster, 1993; and Alkaraan & Northcott, 2006). Hence, the literature assumes that market players pursue their own self-interest to ensure the best possible outcomes from all their decisions. For example, the use of NPV implies that if an outcome is positive or holds the highest NPV, then acceptance of it will provide the best possible results for those who benefit from the cashflow surplus to the cost of capital. In addition, traditional economic theory also presumes that cash-flow decisions are typically made to maximise owners' wealth, and to provide a basis on which to estimate future costs (Ekanem, 2005).

Regulation within the UK energy market is broadly based on the same neoclassical economic theory (Bohne, 2011) as capital budgeting. The basic foundation is: 1) people have rational preferences regarding the possible outcomes; 2) individuals maximise utility, and firms maximise profits; and 3) people act independently on the basis of full and relevant information. Moreover, within neoclassical economic theory, the effective implementation of regulations as a foundation for market structure is assumed; this provides a role for politics and public bodies as well as economists (Bohne, 2011). However, because market structure has failed to meet the expectations expressed by the generation industry, it is necessary to question how this affects capital budgeting processes. As Bui and Villers (2017) have found, decisions relating to climate change policies often produce conservative strategies.

The increasing use of regulation to impose political policy and balance macro-economic concerns raises questions over the role of regulations in decision making, especially when they generate greater uncertainty. Even with the added use of abandonment and real options theory, accurate prediction in an environment of regulatory uncertainty is unrealistic. As Haka (2007) argues, uncertainty is one of the most difficult factors to address when making an investment decision, especially when evaluating a long-term investment. Uncertainty relates to the variables affecting long-term pricing, market stability, and unpredictable future public policies.

According to Elmassri et al. (2016) and Harris et al. (2016), most previous work in the area of SIDs has ignored the role of agency

and the context of evolving and changing external⁶ structures. In support of this view, [Elmassri et al. \(2016\)](#) explain that the very nature of SIDs results in changing structures. The understanding of how agents respond to this in their judgments is another element missing from the literature in this area. However, as [Jones and Dugdale \(1994\)](#) explained, context is a significant factor in how capital budgeting would be used in practice. We examine investment appraisal in a context that incorporates all the factors arising from environmental regulation, the unknowability of future price curves, and, more significantly, the potential for future revisions to regulations and energy policies. Uncertainties are known to result in companies postponing investments, as has occurred within the GB generation industry ([Chittenden & Derregia, 2015](#)).

3. Theoretical framework

Giddens' work on ST provides a "comprehensive theoretical system which theorists love to interpret and contest" ([Bryant & Jared, 2011](#), p. 12). However, it also offers an ontological orientation to social life that "has done better than any other (meta) theory available" ([Bryant & Jared, 2011:12](#)). Nevertheless, "structuration theory would be still more effective if it were made easier for researchers to move from ontology in general to substantive inquiries ... what is missing from Giddens' theory of structuration is concern for the strategic context of action." ([Bryant & Jared, 2011:12](#)).

Giddens' ST relies on methodological bracketing for the analysis of evidence. The focus is either on structure through institutional analysis, or on agency through strategic conduct of analysis. Bearing this in mind, [Englund et al. \(2011\)](#) identified three core ways in which accounting could be conceptualised; 1) accounting as a structure; 2) accounting as an artefact; and 3) accounting as an interplay between structures and artefacts. While ST has served as the foundation of some interesting research in the field of accounting (for example [Ahrens & Chapman, 2007](#); [Seal, 2003](#); [Seal, Berry, & Cullen, 2004](#); [Conrad, 2005](#); [Jack, 2006](#); [Gurd, 2008](#); [Moore, 2010](#); [Conrad, 2013](#); and [Englund, Gerdin, & Abrahamsson, 2013](#)), existing studies lack a thorough examination of strategic conduct ([Englund & Gerdin, 2014](#); [Roberts, 2014](#)).

The lack of strategic conduct studies is partially explained by the fact that [Giddens' \(1984\)](#) own development of structuration placed more weight on ontology than epistemology, resulting in strategic conduct analysis being less developed and understood. However, Strong Structuration Theory (SST) ([Stones, 2005](#)), which synthesises critiques of Giddens' original theory, does attempt to develop epistemology and advance empirical study using the theory, as it "can translate the ontology of ST into the epistemology and methodological understanding required by researchers on the ground" ([Jack & Kholeif, 2008](#), p. 30). The dynamic use of SST provides an opportunity to analyse "the issue of agency in situ rather than on structure cut off from agency" ([Coad et al., 2016](#)). Accounting studies applying ST tend to overuse the methodological bracketing that focuses on institutional rather than strategic conduct analysis ([Englund & Gerdin, 2014](#)).

We examine the strategic conduct of the actors/agents within GB's electricity generation industry to understand how they use their knowledge of the contextual field to strategically respond to change while lobbying for further change. Conduct analysis is when the agent needs to be examined by looking inwards, a very different form of methodological bracketing to "when the researcher is looking at the actor hermeneutically" ([Stones & Jack, 2016](#), p. 1148). The understanding that "what is going on in the heads of people is never free-floating ... it is always embedded in contextual fields" ([Stones & Jack, 2016](#), p. 1149) remains consistent in both ST and SST. Context analysis looks outward to what the agents-in-focus perceive as external structure and their understanding of the internal structures and conduct of networked others. While there have been discussions about whether to use the flat ontology of ST ([Englund & Gerdin, 2016](#)) or that developed by Stones' SST ([Coad et al., 2016](#)), there is agreement that both approaches represent "a powerful tool in analysing management accounting and changes" ([Englund & Gerdin, 2016](#)).

[Giddens' \(1979, 1984\)](#) theory of structuration is based upon several assumptions, two of which are that all social actors are knowledgeable, and that actors have a conscious understanding of their actions. An actor's level of knowledge is determined by two factors: the unconscious and unacknowledged conditions of the unintended consequences of action. ST also assumes that social behaviour includes day-to-day actions, which become routine (i.e. habits), and that social actors are partly constrained by the structural properties of systems. However, it is important to note that although structures provide constraints, this does not always result in their acceptance by actors. Ultimately, [Giddens \(1979, 1984\)](#) argues that actors are responsible for their own behaviour, as society does not represent a sufficient excuse to justify their actions. Agents have the ability to plan their conduct, and do not have to simply accept the constraints that surround the decisions they take.

Strategic conduct analysis is defined by [Giddens \(1984, p. 378\)](#) as "concentrating upon how actors reflexively monitor what they do; how they draw upon rules and resources in the constitution of interaction", which focuses on contextually situated actions. This type of analysis requires detailed accounts of agents' knowledgeability, motivation, and the dialectic of control. Thus, knowledgeability and motivation are central to Giddens' ontology and strategic conduct. As [Stones \(1996, p. 43\)](#) observes, "The more knowledgeable agents are about their conditions of action ... then, all things being equal, the less likely they are to engage in practices that then lead to unintended consequences". Part of that knowledgeability involves understanding the extent to which domination within systems can be countered ([Stones, 2005](#)), and actors' positions regarding the ability to enact a dialectic of control. This study observes agents who in one context can dominate the decision-making process by virtue of their managerial position, but who are subordinate in other contexts (national or European regulatory contexts). Thus, they experience the dialectic of control from both sides.

Although [Giddens' \(1979\)](#) work on the dialectic of control is subject to interpretation, this research largely agrees with [Nandan \(1998\)](#) in allowing that the term *dialectic* can refer to shifts in the balance of power over time and space, with the associated changes concerning changing circumstances. However, [Nandan \(1998\)](#) explains that those changing circumstances represent the outcome of

⁶ These studies used Strong Structuration Theory (SST), hence the use of the term 'external structures'.

knowledgeable, subordinate agents using the (meagre) resources they own. Frames of reference are provided by agents' knowledge of rules and routines and the resources available to them, as well as of the regulatory environment and its norms and sanctions and patterns of decision-making involved in capital budgeting. They can then strategically draw on these to determine when to exert power, and when to resist (Saravanamuthu & Tinker, 2003).

Stones' (2005) SST developed Giddens' (1984) concept of dialectic of control into a framework of resistance, using the agent's context and conduct analyses to reveal where, when and why agents choose to avoid control. The approach proposed by Stones (2005) involves carrying out an analysis from the position-practices of one or more agents-in-focus. Stones and Jack (2016) argue that the difference between ST and SST in the area of strategic conduct analysis is that the design of the project must "include conduct analysis of other actors and a deeper hermeneutic analysis of the actors within the structural context" (p.1150), thus bringing the actors in situ (Coad et al., 2016). While the authors agree that full use of SST can be very insightful, the research design of the original case study was based on ST. This paper will therefore retain the concepts of strategic conduct and the dialectic of control by evidencing the careful selection of communications. We consider the concept of 'conduct' as a process that is active, processual and ongoing, not only comprised of individual acts or individual documents, but also involving motives, influences, arguments, stance taken, and even conspiracies.

This case study examines the strategic conduct involved in negotiating the energy trilemma. The capital budgeting process provides an interesting context within which to examine the complexity of the strategic conduct of agents. Our case study presents agents' context analyses of a complex market structure, which enabled generators to analyse in turn the strategic conduct that would force the Government to listen to their demands for new market structures and policies. The generators were able to manipulate industry circumstances to achieve reform; as Giddens (1984, p. 257) argued, the process of power is the "capacity to achieve outcomes". The generators mobilised their power to fight against the Government, which in turn sought to distance itself from investment in a privatised industry, thus triggering a power shift.

This case study contributes to the debate by illustrating how generators shifted the balance of power by both identifying contradictions within the industry, and exploiting changes in the UK economy. This power shift has instigated the Electricity Market Reform (EMR), which brought about significant changes to the UK market structure.

4. Research method

To examine the role of capital budgeting against the backdrop of environmental regulations that impose uncertainties on decision makers, we present a longitudinal, narrative theorised case study spanning the period 2006 to 2017. The research instruments used to collect data for the case study were designed to include the collection of both primary and secondary data. Primary data comprises mainly semi-structured interviews⁷ and public focus groups with regulators, politicians, analysts, engineers, accountants, strategic

Table 1
Interviewees' length of time in the industry.

Role	Years of service (as of 2016)
Head of Operations	33
Head of Thermal Power	33
Environmental Permitting Regulator	23
Head of Coal Operations	40
Commercial Manager	18
Environmental Planning Manager	44
Business Service Director	27
General Manager Operations	25
Head of Environment	40
Head of Gas Generation	29
Site Manager	36
Environmental Manager	29
Trader	17
Head of Corporate Regulation	22
Head of Thermal Power, UK	32

advisors, environmental managers and five of the big six energy generators. Initially, all six of the energy generators were contacted and interviews arranged; however, due to practical timing issues only five were interviewed. The individuals interviewed were found through various channels; some were identified as knowledgeable in the area being examined at industry conferences, others through personal contacts within the industry or through asking interviewees if they could recommend others in specific jobs. The semi-structured interviews used 15 main interviewees, some of whom were interviewed several times. The average duration of each interview was 1 h and 5 min. As can be seen in Table 1, most of the interviewees had significant industrial experience.

The interviews and secondary data collection took place over a 10-year period, although the bulk of the work was carried out

⁷ Questions provided in the [appendix](#).

between 2008 and 2010. However, most interviewees were contacted after this period to confirm information from their interviews or to request further clarification on specific issues. In addition, two new full interviews in 2016 confirmed market changes and the outcomes established in relation to the case study. The interviews were all recorded, with the exception of one preliminary phone interview and two follow-up interviews. Upon completion of the interviews, they were transcribed and a process of thematic analysis used. Following the transcription of each interview, the interviewer analysed the transcript to identify emerging themes; these helped to inform future interviews without influencing the ability of the interviewees to express an opinion.

Secondary data included additional data obtained from document analysis (e.g., White Papers, company reports, industry discussion papers, Government minutes from public discussions, and European directive reports). Finally, industry conferences were attended annually throughout the data collection period, allowing the researchers to follow the changes put forward in policy statements.

5. Background

Before the UK electricity industry was privatised in 1990, the majority of investment in the UK energy market centred on the use of coal and oil (Warren et al., 2018). However, after privatisation, the 1990s witnessed a rush of new investments, relying on low-priced gas as the main fuel (Warren, 2014). Following the introduction of a new market structure in 2001,⁸ six dominant competitors emerged; they are vertically integrated to the limits that the regulations⁹ allow. The main generators hold oligopoly power and the network is a natural monopoly. Since 2001, electricity has been sold in the same way as any other commodity, traded through mechanisms such as spot pricing and future contracts. However, unlike other commodities, the risks involved in these future contracts are high, because there is no way of storing electricity.¹⁰ Consequently, the costs associated with breakdowns are high, and investments in the industry reduced significantly over time. The reduction in investments can be attributed to rising gas prices and growing uncertainties surrounding the increasing number of environmental regulations introduced by the European Union (EU) (Warren, 2014; Warren et al., 2018). There is little doubt that the new market structure introduced in 2001 increased the complexity of the investment decisions within this industry. Uncertainties and risks created instability when the Government adopted a *laissez-faire* approach. However, this changed following intense lobbying from the generators alongside investment hiatus, which resulted in the introduction of the EMR during 2013 in GB.

The problems discussed in this case study are specific to GB; however, other liberalised energy markets face similar problems. Grigorjeva (2015:1) argues that “the incompatibility of the still persisting functioning principles of the electricity markets with the changed market reality have resulted in serious market failures which negatively affect investment climate and therefore pose a risk towards the security of supply in the EU.” This case study focuses on thermal power within GB, as these were the plants that were affected by the LCPD. It is important to note that many other narratives occurred alongside the debate we focus on, including the nuclear debate and the carbon tax debate.

Since 2000, environmental regulation has been a key political issue in the UK (Warren et al., 2018). One of the most significant regulations to affect investment strategies within GB was the LCPD. The directive is intended to protect the public from air pollutants considered to represent health risks (European Commission, 2001).¹¹ Some parties view setting environmental targets as a way of winning votes. Consequently, successive Governments have focused on policies highlighting a green agenda, leaving general investment up to the industry. Since 2000, the energy industry has demanded policies that provide certainty on issues, such as which technologies will receive Government support in the future, so that they can make investment decisions. However, the Government objective was market-led investment. The Government wanted to open the markets to encourage broader competition in the hope that this would drive prices down and encourage investment; however, these are contradictory objectives when investments are long-term.

Although the LCPD was signed well before this case study began, this directive added to the contradictory objectives set out by the Government. The LCPD resulted in new targets for reducing emissions, which would ultimately have an impact on both prices and new investment. Nevertheless, at the start of the case study and during the data collection phase, how these regulations could be met was still a topic of discussion. Investments were still being analysed in terms of investment appraisal techniques, and decisions concerning the LCPD remained unresolved during the first three years of the study.

As a result of the LCPD, all installations (coal and oil stations) had to either opt in or opt out of the directive. ‘Opting in’ meant the installation would need to invest in costly Fuel Gas Desulphurisation (FGD) equipment to reduce pollution, on average costing £200 million. ‘Opting out’ would result in the installation only being able to operate for 20,000 h from 2008 to 2015 until closure. The considerations made by generators in relation to their investment decisions were not based solely on whether to invest in FGD equipment. Alternative investments were considered, such as commissioning new power stations and closing old ones.

The LCPD had a significant impact on the UK energy portfolio. 11,842MW out of 33,839MW¹² of supply was closed down when generators chose not to make new investments (Dukes, 2010). The reduction in MWs entering the system created a strain on the

⁸ New Electricity Trading Arrangements (NETA) - a system that mainly used future contracts. The system was introduced to remove the price manipulation associated with the previous system (The Pool System).

⁹ These competitors cannot operate within the management of energy infrastructure, which in England and Wales is owned and operated by the National Grid.

¹⁰ Storage of electricity is one of the biggest research projects in this industry.

¹¹ Although some of these references may seem outdated, these were relevant for the decisions made within this research.

¹² 33,839MW was the amount of supply affected by the LCPD; these decision were taken in 2008. To put this into perspective, in the following year (2009–2010), maximum demand in the UK was 60,231 MW (DUKES, 2010).

supply of electricity, one of the consequences identified in the trilemma. The LCPD highlighted a number of problems within the energy market, the biggest of which was that as Government policies neither identified nor supported the frameworks required to reduce uncertainties, there was a halt to investments within the UK (Warren et al., 2018). The EU directive had encouraged the UK Government to focus on emissions, resulting in too little attention being directed towards supply and pricing.

6. Case study

This case study is structured as follows: 1) how agents thought about the context surrounding the investment decision; 2) how the agents planned their conduct; 3) the actions that were taken using capital budgeting; and 4) other actions based on knowledge outcomes. We aimed to understand how the agents-in-focus thought about the context of the investment, their knowledge of the structures and how others would act during the process. The analysis shows what the agents felt when the policy changed and they perceived the new rules to be working against them. It also examines how they planned their conduct to influence, motivate and create discussions to counter to dominant groups. The last step is to follow the outcomes of the conduct aimed at shifting the balance of power within the industry away from the regulators and towards the generators.

6.1. Capital budgeting: how agents thought about their context

When the LCPD was implemented, all the generators who owned power stations using coal and oil had to respond to the Environment Agency (EA), stating whether or not they intended to invest in the requisite technology to reduce emissions. This process required each generator to submit an application to the EA under Pollution Prevention Control¹³ (PPC). However, before these submissions could start, a process of reflection on the current context of the decision and where the company wanted to be strategically was required.

Capital budgeting played a significant role in this reflection. When making investment decisions, one of the roles of capital budgeting is to act as a vehicle for communication, drawing on codes from the theory of investment. Accounting drove the discussions on how the new regulations would affect the future of the company, how their competitors would react and how their decision could influence or disrupt the industry going forward:

We had to sit and think about what we wanted to do it was like having a crystal ball and somehow we had to give the best advice it was a big grey area that made us think because there was so much forecasting required and uncertainty involved. (Business Service Director)

The language of investment appraisal (accounting) became dominant in the reflection process because it provided a platform where everything could be translated into something everyone understood. Regulators accepted this approach because they understood that finances would come first for generators. One member of the regulatory team (Environment Agency¹⁴) stated:

We are interested in the quality and quantity of the investments, but of course at the end of the day this has to translate into numbers because the numbers have to be justified; they are not going to do it if the economics are against it.

In this case, the values and data for capital budgeting decisions were unknown. As a Business Service Director explained:

The details of the directive were very unclear for a long time; some of the fundamentals were missing, like if you opt out and you get 20,000 hours, what does that mean? Do the 20,000 hours refer to a 'unit' or per 'site' - in the end it turned out to be per 'stack'. If you have four flues inside one chimney what is that? How can you model the economics of opting in and opting out if you don't know the detail?

Here, they drew on their knowledge of engineering, legislation and finances to make sense of the new rules. As one Head of Environment explained:

So we're in a position of major transition, the industry was changingwe have never done anything quite like this beforewe had to sit and think about these changes but also others and the futurewhat did it all mean for us.

This was a critical reflective point, because the generators that wanted to opt out and hold back investment needed to ensure they could secure as much profit as possible during the final stage of a power station's life before they were forced to close it down. It was clear that the generators felt that things were working against them and that they had to think about how to overcome those problems. The complexity of the situation was revealed in the initial debates, because although the majority of the generators were involved in the Joint Energy Project (JEP),¹⁵ and were arguing for clarity on various points, they were simultaneously preparing for separate lobbying processes (to be discussed in the next section). However, before they could do that, they needed to fully understand the changes in the market and industry at large. The individual power stations represented by the JEP all had different needs, as the definitions within technical policies had different financial impacts for each site. No single power station is built or designed in the

¹³ Now called the Industrial Emissions Directive (IED).

¹⁴ In this case study, there are two sets of regulators: the Environment Agency (EA), who were part of Stage 1, and the Department of Energy, Climate and Control (DECC) in Stage 2 - the name of this department has since changed.

¹⁵ The JEP mainly consisted of environmental managers and engineers.

same way as another. For example, when debating the definitions of shutdown and startup in terms of their treatment in the 20,000¹⁶ hours ahead, a Head of Environment said:

The LCPD was a difficult beast ... we were trying to define startup and shutdowns ... it became very obvious that some companies wanted to go down one route and others down another, the divisions were obvious.

As each power station was designed with different technology, the way in which these definitions were determined made a difference to what would count towards the 20,000 h, resulting in dissimilar financial consequences. The knowledge that the generators exchanged information with the Environment Agency (EA) to flush out the complications of a directive on paper needed to be translated into engineering terms and financial outcomes. Moreover, the way in which the emissions would be monitored was also the subject of significant debate. Knowledge exchange took place between all parties, and was essential to understand the problems that were faced. For example, the generators were unhappy with the original directive suggesting how emissions should be monitored: should hours be counted, per unit, per site or per stack? Following the debates, one regulator understood that:

You can see that *the generators* with the same power output, they have basically the same technology and they are treated differently because of some technically ill-informed bureaucrats ... we get directives and they make claims on what is possible but it is not until we talk to industry that they tell us it is not possible unless they are in perfect working conditions, so at this point we have to go back to the bureaucrats and say have you actually got evidence that this can be done? It is a circulating body of knowledge to which people jump into the pot.

As the stock of knowledge for all the agents became clearer, NPV modelling provided a platform to think about the wider picture. It was an extremely complicated process, which began with the environmental directive itself. With the engineers and regulators working together to consider the situation facing them, the aim was to avoid unintended consequences. One Head of Operations stated:

The decision begins with asking yourself how you can survive in the market ... what will the future electricity prices be like? What size do you want your company to be? What technology do you want to be known for? You look at the project ... how much does it cost to buy land? For alternatives what would the price of a gas contract be? What would the rent connection be for the location you have chosen? What is the hurdle rate for that particular type of project? Because these do vary for different projects.

Projecting pricing curves was an essential aspect of the modelling process, completed either in house, or by outside consultants. However, as one General Manager of Operations stated:

The pricing curves are the most difficult, we have a whole range of tools that our trading guys use and they have statistical packages that do the number crunching, but typically the most difficult thing is the price of carbon and knowing what your competitors do - what your competitors do will affect the price of electricity going forward.

Such work needed a team with expertise from different areas of the firm:

We have a Commercial Team that are responsible for all big investments. If it is a capital project they will go direct to the engineering group. The Engineering Group will help with engineering compliance. The trading team will also be involved because they will feed in the pricing curves. Of course there are legal consults etc. (Head of Coal Operations)

The information required to complete a model takes a long time to acquire. With policies changing and the details of directives being decided upon during the planning stage, modelling can take around five years, as explained by one of the Environmental Managers:

When the LCPD was on the horizon, it was like right guys, we've got five or six years to sort this out ... someone will start looking at the kit needed so the engineering people, the commercial development team will look at the options available to meet this criteria, checks and appraisals. I will look at the law and keep them updated as to what is happening. The financial stuff happens separately from what I do, all I do is make sure they have the right information from an environmental point of view.

The NPV modelling provided an opportunity for the generators to think about their own plans and involvement in the JEP. They added to their knowledge by furthering their understanding of how their competitors would be conducting themselves in this process. This was essential in planning their own conduct going forward.

6.2. How agents planned their conduct

The generators planned their conduct using the capital budgeting model to bring all the options to the table. The process of how capital investment decisions were made, who was involved, and the strategic nature of the accounting process that took place as part of the modelling is shown in [Table 2](#)¹⁷.

¹⁶ If the generator chose to opt out of the LCPD they would seek derogation from the regulation that would allow them to operate for 20,000 h without having to comply with the required investment to reduce emissions.

¹⁷ Every generator will have their own process, but the interview data show that this is the average process - also note that the names of teams will vary from organisation to organisation.

Table 2
Stages of the capital budgeting process for the LCPD.

Process	Stage	Details and who was involved	Documents used and those strategically ignored
1. Clarity of the directive – using accounting information to inform engineering decisions.	Stage 1	At this stage the technical issues within the directive had to be determined to translate the issues into financial values. Involved: external consultation with Environment Agency, Joint Environmental Project, and other generators.	The key document was the LCPD directive itself.
2. Development of the capital budgeting modelling and business plan.	Stage 2	Internal consultations with commercial teams, engineering teams, trading teams and legal consults.	Here the UK implementation policy was used alongside engineering documentation, legal statements and economic predictions. The permit application and cost benefit requirement from the regulatory was ignored at this stage.
3. Business Plan (containing the results of the capital budgeting) is sent to the assurance team/treasury teams.	Stage 3	Internal consultation with the team of accountant - usually termed Assurance or Treasury. To be signed off.	Internal documents are the focus at this stage - i.e. the business plan alongside the strategy documents for the parent company.
4. Business plan (containing the results of the capital budgeting) is sent to the board.	Stage 4	Business Plan presented to the Board.	Internal documents are the focus at this stage - i.e. the business plan alongside the strategy documents for the parent company.
5. Continuing the lobbying process for future change.	Stage 5	Processes 2, 3 and 4 are repeated until the final decision is made. This took several years. The generators continued to lobby Whitehall for changes to energy policy and market structure to encourage new investment.	Data from the modelling is used in a negotiating space - alongside government consultation documents.

The first step in the introduction of a new environmental directive is for DEFRA, the Environment Agency and the generators to work through the directive together to understand how to formulate a general policy with targets. Part of each of their contextual analyses is to create a workable framework to enable the generators to make decisions about whether to opt in or out of the directive.

Capital budgeting modelling began during the process of negotiation between the EA, JEP, individual generators, and lobbyists. When the Government privatised the industry, they declared that investment would become market-led. “Firms were persuaded to use DCF techniques for investment decisions by virtue of their objectivity and superiority to conventional techniques. Economic growth would thereby be stimulated, the performance of individual firms improved, and the need for direct intervention by Government avoided” (Miller, 1991, p. 736). However, this assertion failed to consider the influence of politicians’ actions on investments. When the language of capital budgeting prevails, the modelling of all investments, including the LCPD, exposes the significance of future political policies and current frameworks. It demonstrates that to create a model, additional decisions needed to be made to support any predictions. This was an important step when the generators were engaged in conduct analysis.

Although the Government had taken a laissez-faire approach, most environmental regulations require the generators to select Best Available Techniques (BAT).¹⁸ However, at this stage the Government either could not or would not provide sufficient detail. This became a problem when modelling alternative investments. As a Team Coordinator of the EA stated, ‘The Government is so feeble in terms of laying down a national strategy’.

The generators found it difficult to plan their approach to decisions when there was little guidance on future policies. It was accepted practice that each project must gain the required rate of return and that all actors should recognise this. The need for companies to provide required returns was a substantial component of their business plans and subsequent discussions.

This stage of the process took considerable time; in fact, some of the finer details were still being debated in 2008, the year when decisions had to be made. This first stage involving working with the regulators was important, because the right discussions and lobbying could mean the difference between a successful project and an unsuccessful one. The generators wanted all the details presented in a financial format, so that they could understand the impact of the changes they were facing. The regulators were also open to criticism because they did not have all the answers. The generators realised they could strategically use financial arguments to embed knowledge of ultimate consequences into the discussions. They used this to present suggestions of what would work to transform the directive from words on a piece of paper to something operational. In other words, they were able to plan their conduct around the financial data they were modelling.

This point was affirmed by one of the generators, who said:

The LCPD is a piece of legislation written by European bureaucrats in closed rooms ... the definitions were not clear. The Commission went overboard in terms of detail and as a result it did not work. One of the things we lobbied for to overcome many of these problems was plant-wide management and we got that. For other generators the decisions were far more complex.

The withholding of investment by the generators became an act of strategic conduct, one of resistance or salvo in a dialectic of control. In the case of the LCPD, the process involved negotiating space prior to making decisions. In process 2 (see Table 2), the modelling process begins to develop scenarios that can be used to decide whether to opt in or out of the directive.

¹⁸ “Best available techniques’ (BAT) means the available techniques which are the best for preventing or minimising emissions and impacts on the environment.” <https://www.gov.uk/guidance/best-available-techniques-environmental-permits>.

Completing the full cycle of the business development planning can also be seen as conduct analysis. When the modelling is complete, the business plan is then checked alongside the model prepared by the accountants. They are usually positioned in the ‘Assurance Group’ (also known as the ‘Treasury Group’), referred to as stage 3 in Table 2. As one Head of Coal Operations stated:

They don't crawl over the model but they have to satisfy themselves that it is an accurate reflection ... not from a technical perspective, from a purely economic perspective.

However, both the General Manager of Operations and the Commercial Manager argued that one of the most important checks for all the modelling requirements is carried out on underlying transactions, as under IAS 39¹⁹ the incorrect reporting of items can create problems. One Commercial Manager argued:

One party might look at a capital investment because it looked like the right thing to do, but now because of the financial reporting, although the underlying transaction is the same, the way it is reported it might not be perceived as being a good transaction.

Once the Treasury has signed off the Business Plan, process 4 begins, and the Business Plan is submitted to the Board of Directors. The Board does not see the modelling itself, but the Business Plan contains the rationale and the outcomes of the modelling. In the companies that were interviewed, all parties confirmed that the Chief Executive makes the final decision. For the investments considered in this case study, Processes 2–4 happened several times because the uncertainty within the modelling was so high that it was, in many cases, difficult to formulate decisions:

Earlier on a lot of it is educated guesswork; we have to keep refining the model until we get a clearer view. (Head of Coal Operations)

There was a clear process, almost a ritual that had to be followed to justify the decision-making process and the ultimate decision. In addition, it helped them to plan future lobbying. The generators had to draw on their knowledge of their own company, the actions of their competitors and future moves from the regulators and Government. Withholding investing would have a significant impact in the UK, but would not stop the parent companies growing because each of the large players were international companies who could use their capital anywhere in the world.

The modelling demonstrated the financial consequences of adhering, or not adhering, to the regulations established by the EA. The regulators were aware that the generators could make things difficult for them, and that they would have to share some pain along the way. One regulator said:

We shared a bit of the pain with them; you can't shut a plant down if that means it will block the actual grid because you will cause more pollution doing that.

By working collaboratively, the regulators and generators increased knowledgeability on both sides. The regulators understood how the definitions would affect the generators financially, but also became aware of what might happen to the supply of the electricity if they did not work together. Additionally, the generators were able to work more efficiently to carry out modelling when working with the regulator, because they grew to understand how and in what ways the market would analyse emissions in the future.

6.3. Actions taken using capital budgeting

The actions taken on the basis of knowledge derived from capital budgeting involved three stages. The first stage involved the generators deciding whether or not to opt in or out of the directive. If they opted out, they would be requesting a limited life derogation as a result of the 20,000 h generation scheme (steps 2–4 in Table 2). The generators used the capital budgeting modelling to present scenarios:

We have to model the different scenarios we had 15 options running with this one. It is more complicated than it looks because we have to work with potential suppliers to see if the options are economically viable so we have to invest to speculategone are the days where we just put a tender out. We were looking for an 8% or 9% return. (Head of Coal Operations)

Each generator had to create the business plans using the outcomes of the modelling. The boards would make a decision based on their strategic intentions and the economic viability of each power station. The scenarios included incoming cashflow from opting for the derogation and shutting the plants down.

In the second stage, those who decide to comply with the directive had to decide how they wanted to be governed. During their context analysis of these investments and the strategic conduct planning for the lobbying of better technical guidance on how the directive could work, the generators had managed to convince politicians that two approaches were acceptable. The Head of Environment gave this evidence:

We had Ministers turning up wanting to know why we wanted the National Plan rather than the ELV, it was quite an intensive debatewe got both.

¹⁹ Relevant at the time of the interviews. IAS stands for International Accounting Standards <http://www.ifrs.org/issued-standards/list-of-standards/ias-39-financial-instruments-recognition-and-measurement/>.

The two governance approaches were the Emissions Limit Value²⁰ (ELV) and the National Emissions Reduction Plan²¹ (NERP). Modelling allowed each generator to calculate the economic effects of having emissions measured and managed in different ways. However, this was, once again, not as straightforward as it seems, because they knew there was uncertainty about how these rules may have been due to change in 2015. Some generators who chose to make a decision before the full information was available in order to take action did make mistakes. This explanation was given by one of the Environmental Planning Managers:

The definitions and governance changes made a huge problem for one generator who did not hold out for the lobbying to end; they had decided to fit FGD to half of the plant but they only had one stack so they were left hanging...

The lobbying process had proved invaluable in improving the accuracy of the modelling process. The third action was based on how each generator would lobby for change to the market framework. They needed to persuade the Government to provide a clearer policy. This applied to both the generators who opted out and those who opted in, because the UK now needed new investment to replace the power stations that would be closing. The investment hiatus started at this point.

Miller (1991:735) stated: “[f]or differing periods, and with differing effects, accounting technologies have been identified as integral to, and enabling of, particular strategies of macro-economic government.” The use of regulations to achieve control provides contradictions within the system, which serves the dialectic of control set up by the generators.

Giddens (1979, p. 148) stated, “The more tightly-knit and inflexible the formal relations of authority within an organisation, in fact, the more the possible openings for circumventing them”. The withholding of investment forced the Government to engage in a consultation to effect reform, which led to the Electricity Market Reform (EMR). Here, capital budgeting did facilitate change in societal structures. The ability of generators to use capital budgeting exposed the weakness of laissez-faire approaches to energy policies. This also affected the general economic health of the country, because these financial incentives come from taxpayers.

Due to the introduction of the revised LCPD, generators were able to take a firm stand regarding investment. A significant number of power companies chose to opt out of the regulation, because the modelling, lack of secure incentives and uncertain policies resulted in risk deemed incompatible with required returns. Once the LCPD reform process had concluded, it was apparent that the generators were not going to make investments for the sake of it:

We have to fight for capital; we put the business plans forward, but so do Mexico, America and Spain. (Head of Coal Operations)

However, the biggest problem was not the planned shutdown of the large coal and oil plants. In fact, this was a direction that the UK Government favoured; i.e. a smaller portfolio of assets reliant on fossil fuel. The more urgent problem was stated by the Government in 2007 as:

Energy companies are also going to be making large investments in the coming years to update and replace ageing power stations and infrastructure. We need to create the right conditions for this investment, so we get timely and increasingly low carbon supplies. (DTI, *Meeting the Energy Challenge*, White Paper, May 2007).

Although in 2007 and 2008 the Government remained strong in its emphasis on market-led investment, the generators were lobbying for change in incentives for new investments. One explanation from the generators was:

I don't think they will relax the rules (on emissions²²) but I think they will pay some kind of capacity payment just in case they need a backup. (Head of Coal Operations)

The problem arose when alternative investments failed to materialise. Some companies proposed new gas power stations, but did not build them. A Head of Corporate Regulation told us that:

The most significant thing we need is a clear energy policy by the Government. A coherent policy, so for example the Government targets of renewables are quite frankly not worth the paper they are written on because we do not believe they are achievable ... a horrifying bodge you would expect from the politicians.²³ For 20 years, the industry have spotted that we are reaching the end of the lives of many assets but the Government won't commit on coal power, nuclear etc; it is all sky dreams of renewables. First you need policy from Government, then planning, then the serious money will come from the big players.

An Environmental Planning Manager added a typical comment from the big six in 2008:

No one has to keep the lights on anymore, no one at all. I guess under the Electricity Act, suppliers have a duty to supply to residential users ... I think that's actually required, but nothing in the Act says how they're going to get the stuff they're going to supply. The argument is the market will meet it. So, if we stop generating, the theory is people will panic and give us what we want.

The lack of investment resulted in a shift of power between the Government, the regulators and the generators. This became

²⁰ This was where a power station must meet specific limits based on the amounts of pollutants produced on a “milligramme per cubic metre of waste gas” basis. This information was correct at the time the decisions were taken.

²¹ A generating company would be given an allowance, known as a bubble. The bubble would be the amount of a pollutant that could be emitted in any given year. The bubble issued under NERP would be tradeable within a member state. This information was correct at the time the decisions were taken.

²² Added for explanation.

²³ This was based on the position in 2009.

Table 3

Structural changes created through the use of accounting information.

Stage	Process	Structural changes	Changes in knowledgeability
Stage 1: Changes made during discussions about the LCPD	The generators demonstrated the need for change to definitions and two different systems of measuring pollution. Generators and EA debated the directive as agreed by European think tanks.	Definition changes and two processes were agreed through lobbying with regulators (EA). Intended consequences of lobbying.	Working with the generators increased the regulators' knowledge of the situation and the potential consequences of their original formulations, to the extent that the regulators altered their perceptions of what was required and what would work.
Stage 2: Lobbying for change in incentivising new investments.	The generators continued to lobby the government and DECC for changes in policy by holding back from making new investments.	The government made a significant turnaround and changed its approach to investment in the industry by amending the market structure by introducing market mechanisms. However, changes were not as anticipated by the generators. New significant investment have still not occurred.	By working with the regulators in stage 1 the generators increased their own knowledge of how to use accounting information strategically to gain the power to instigate change. The government gained knowledge relating to the future problems of the industry by the generators, strategically using the outcomes of the accounting analysis, which demonstrated that there would be no new investment until the policy and the market changed.

apparent by 2011, when the regulators and Government finally accepted that market-led investments were not working. The generators' lobbying of Whitehall²⁴ was beginning to have an impact. The generators used their modelling to explain why they were not investing, and made a deliberate choice to strategically use accounting to demonstrate their arguments. Subordinates started to take strategic action to instigate change by withholding investment, an action designed to create a level of what Giddens (1984) would call dialectic of control. The generators used the knowledge they had gained in Stage 1 to instigate market changes (see Table 3). Through lobbying and the modelling of future problems and supply issues, the Government acknowledged that change was indeed required, as demonstrated by DECC, another industry regulator:

Security of supply is threatened as existing plants close. Over the next decade we will close a quarter (around 20GW) of existing generation capacity as old or more polluting plants close. Modelling suggests that the de-rated capacity margins could fall below five percent around the end of this decade, increasing the likelihood of blackouts. (DECC, 2011:5)

The White Paper continued:

There is broad consensus that current market arrangements will not deliver the scale of long-term investments needed, at the required pace, to meet the challenges ... the challenges of decarbonisation and security of supply. Nor will they give the customers the best deal. (DECC, 2011:6)

The environmental investments the Government had favoured back in 2006 (see above), but which did not materialise, were controlled according to a regulatory framework designed to provide some controls over emissions. These controls were imposed in a relational sense, because although the Government created regulations enabling regulators to control the industry, control only resulted if the generators adhered to them, which they did. In many cases, this led to a decision *not* to invest in the UK, because capital budgeting modelling showed it was demonstrably more financially effective to invest in other countries. Whilst the Government can pass regulation, control of the ability to generate or to not generate electricity rests with the generators.

6.4. Outcomes of actions taken based on knowledge

The generators knew the Government could not continue to hold off any intervention indefinitely, because security of supply would become an issue. As many interviewees stated, the Government could not let the lights go out. Adding to the pressure on the UK Government, the generators also had access to and knowledge of overlapping social systems in those countries that provided more clarity in their regulations. The generators knew that a lack of investment would lead to a change in the market structure, because blackouts result in a backlash against the industry and a loss of votes in national elections. However, the generators had the option to simply invest capital in a country where more certainty exists. The primary concern of international generators is how best to satisfy their shareholders,²⁵ not governments.

Therefore, the uncertainty created by the Government hindered the generators' strategic direction and willingness to pursue

²⁴ Whitehall is also known as the British Civil Service.

²⁵ Most investors will have other investments, therefore lowering the generating capacity and the consequences of power failures and blackouts would be as bad for them as it is for everyone else. To support a policy of not investing is not in their interest either. However, the parent company of the UK generators will consider the risks involved in long-term investments. If they can secure better returns through an investment hiatus they will, or they will divest their assets in that country and move location.

development within the UK. The generators played on the potential power they could mobilise, which resulted from the resources they owned (capital, technology and knowledge) and their ability to control production, to eventually force a crisis. The White Paper (2011) took steps to start addressing the concerns the generators had raised at the beginning of this project in 2006. The modelling process within the investment appraisal process highlighted security of supply issues (part of the energy trilemma) within the industry, and the generators used this knowledge, providing a strong negotiating position. The accounting, i.e. the process of modelling, demonstrated the consequences of not changing the market.

By taking courageous decisions to shut down plants early, those generators who opted out helped the industry focus on the emerging security of supply issue. The generators' decision to opt out reasoned that the financial implications of continuing would alienate their shareholders, and the accounting models provided the evidence they required to explain this to the regulators. Many of the generators stated they had nothing to lose. The strategic decision to run 20,000 h hard and fast was taken by most generators to reduce fixed costs. The generators were also hoping that if they ran the hours fast, forcing a crisis, the Government would rethink their target dates, which would be of benefit to the generators. These benefits would include a move towards a more secure future energy policy, and possibly an extended allocation of hours, to provide security of supply.

7. Discussion

It was exceptionally naive to believe that market-led investment would work without implementing a focused energy policy. The generators used this naivety to push for returns on the capacity payment scheme²⁶ to ensure that future investments could be made in a climate of greater certainty. In this case study, we provide evidence to demonstrate that structural change was attributable to the strategic conduct of generators, both at the stage of negotiating an operational framework for the revised directive and when the generators withheld investment on the basis of accounting information. The accounting information generated knowledge on which the generators could act, but also changed the knowledgeability of the regulators/Government.

With the generators refusing to invest, the Government could not be seen to be letting the lights go out, or to be bailing out an industry which on paper looked profitable. The review that commenced in autumn 2010 was inevitable. The EMR is the result of that review, and in 2014–15 the first phase of a new market structure was completed. Throughout this study the generators, despite being under the authority of the regulators and Government, were able to mobilise power by drawing on their knowledge, while working within the constraints of the current structures. The generators maximised the impact of their own resources, the lack of Government resources, and the missing frame of reference to highlight their needs, motivated by a desire for improved certainty. Accounting models provided the foundations for lobbying for changes, although as one member of the regulatory team (working for one of the generators) said:

NPV is the traditional method we use when looking at any investments and also when deciding how to lobby for change; we use this with the regulators through our published responses and with Treasury when we are acting as the king of consultants to demonstrate things to them.

Capital budgeting plays a significant role in articulating how accounting can instigate change in wider social practices. Demonstrating this is one contribution of this research. Generators within the electricity generation industry drew strategically on their knowledge of the regulatory environment, their business and their resources to demand the reconstruction and revision of the market structure relative to investment. The use of capital budgeting techniques allowed generators to exploit the notion of a 'double contingency of interaction'. This indicates that the reaction of each party or actor to an interaction that takes place is dependent upon the responses of others. Each party or actor, in effect, has reciprocal opportunities to sanction the actions of others. The Government cannot use the process of regulation to create sustainable generation if the generators are able to create a negotiation space (Warren & Seal, 2018) to drive change using contradictions within the trilemma. Therefore, capital budgeting modelling has forced the Government to interact once again with the industry (Miller, 1991). The capital budgeting process provided an opportunity to expose the contradictory nature of the regulations in place and shifted the power balance in favour of the generators, adding further pressure to the trilemma. The generators are able to control the process of generation, and utilise the 'norms' of shareholders' demands for investment to provide economically sound returns.

The political negotiations involved in devising new policy have previously created barriers to investment, as shown here. The lack of Government direction seems to have been the source of the problem, and the capital budgeting modelling exposed it. Current uncertainty has provided greater leverage to the strategy of investment appraisal, and has become more than simply a passive technique.

In summary, the generators undertook a two-stage lobbying process. First, the changes to the implementations of the directive itself included changes to the definitions and the ways in which emissions would be monitored. Although not all the generators received exactly what they wanted, enough substantive changes were made to the directive to demonstrate the power of the generators' strategic conduct. The EA agreed that changes were required once they understood the engineering capabilities of the various plants. Ultimately, both the EA and the generators agreed that the original directive included targets and processes that were either simply not possible or very unlikely. Both increased their knowledgeability through the use of the language of capital appraisal to demonstrate the economic consequences of the environmental directive.

²⁶ The capacity payments are that part of the EMR were first introduced in 2014, as mentioned in a previous footnote. The market had a capacity payment system, following privatisation; however, it was removed when the market structures changed and electricity was sold in the same way as any other commodity in 2001.

Second, the generators were clearly hoping for a capacity payment to encourage new investment. Such capacity payments were introduced through the EMR. However, the way in which this has been implemented has resulted in no new significant investment by the six large generators. Consequently, there is now a movement among some of them to divest from this side of the business. Therefore, the consequences of this lobbying for change has resulted in unintended consequences for the generators. The story of what has happened since the EMR is complex and requires a new approach to understand the consequences of implementing a novel market process. Using the methodological brackets of agents' conduct and context analysis, interviewing and documentary analysis focuses attention on eliciting knowledge and understanding agents in terms of the analysis that they apply towards their own situations and the situations of those they are trying to influence. Through this analysis, researchers might then identify the specific choices made to alter the actions of others, and thus the structural elements of systems.

This review of how senior managers in the electricity generation companies acted to address the energy trilemma offers an example of a clear application of strategic conduct analysis. They drew reflexively on their knowledge of the contradictory positions of the EU regulators (reducing emissions) and the GB Government (in terms of keeping prices low for consumers and maintaining security of supply); of the resources available to them as providers of capital; of the environmental impact of different methods of electricity generation; and of the presentation of evidence in the form of capital budgets. In addition to their knowledge of context, they understood the extent to which they could resist those in authority and what the conduct of the regulators and the Government might be, in order to shape the framework for the implementation of the LCPD through a capacity payment system. They were able to enact what Giddens' (1984) termed a dialectic of control, and what Stones (2005) reframes as concepts of reflexivity and resistance. In doing so, the perspective and knowledgeability of the regulators, Government and, to some extent, the public, was altered. This, in turn, led to reallocation of resources; amendments to rules and routines, and reconsideration of what constituted normative behaviours.

Expressed differently, structural change was a result of strategic conduct, including a deliberate choice in the use and presentation of capital budgeting by generators. Theoretically, this allows us to extend our understanding of ST in an accounting context by viewing accounting as not simply being embodied in rules, routines, resources and norms, but as a strategic choice in communication. We can perceive how agents conduct themselves by using accounting in persuasive discussions and arguments, both oral and written. When other agents accept or adopt such communications, and these become part of their own knowledge and arguments, then structures change to accommodate new knowledge, either as the original agents intended or otherwise.

8. Conclusions

This case study has demonstrated how the strategic conduct of the generators included using accounting to produce change in the structure, knowledgeability and processes of the market. The case study also shows that the concept of a dialectic of control allowed generators within the electricity generation industry to demand reconstruction and revision of the market structure relative to investment. The paper also demonstrates how the Government and regulators were forced to take the concerns of the generators seriously due to an investment hiatus. Rather than mobilising their resources, the generators held their capital back. The need for resources to tackle emissions provided the industry with sufficient evidence to force the Government to consider the problem of energy as not just one of the price paid by consumers, but also of long-term supply and environmental sustainability, demanding further investment. The knowledgeability of the generators also played an essential role in effecting change in the rules and structures of the markets within which they operate - rules and resources that impact investment directly. However, recent changes in the energy markets arising from the falling prices of oil, and pressure for renewable resources, means the value and use of capital budgeting by managers and the Government should be kept under observation by researchers to enable the structuration processes in accounting practice to be understood more fully, particularly in industrial contexts.

As well as contributing to knowledge of how strategic investment decision-making takes place within energy markets, an under-researched area, we also make a theoretical contribution to structuration theory as it is used in accounting research. Stones' (2005) development of the epistemology of ST is strengthened through the empirical evidence presented in this study, which shows how persuasive arguments, using the language and logic of accounting, can change structures. Whilst further theoretical development is necessary, the contribution made here is a greater understanding of how accounting can be used (or misused or abused, as Jack (2017) posits) in attempts to change organisational and societal systems. Based on the evidence from this case, we suggest that researchers pay more attention to the precise nature and choice of accounting communications made by agents with a strategic interest in making or preventing change.

Appendix. Interview questions

The questions are representative of the questions in the main data collections period; however, it should be noted that the exploratory interviews and follow up interviews focused on different areas. Later interviews focused on the outcomes.

- 1 Name
- 2 Job title
- 3 Have you worked in this industry or been associated with this industry within any other roles than your current position?
- 4 Company
- 5 How long have you worked in or been associated with the industry

The following two questions are very much open ended and I am interested in your thoughts and knowledge:

- 6 In terms of how the industry has changed, what would you say have been the biggest changes?
- 7 How would you describe the current position of the UK electricity industry – what are the main issues and who do they involve?

Now I have some specific questions which as I explained early may repeat some of the issues you have just discussed but they have evolved from the research framework that I am using for this project.

- 8 Are you/were you involved in the LCPD as part of your role? If so, how?
- 9 How did you get to understand the requirements and implications of the LCPD? *For example did you have training, informal conversations with other people in the industry etc*
- 10 How were/how do you think the decisions to opt in or out of the LCPD were made? How did you plan for these changes? The regulator provides a guide on how to determine the decision but do you think this was used as part of the process or simply to submit the decision made by other internal processes?
- 11 In an ideal world how do you think investments decisions should be made, on what basis? *For example in the 1960s investment decisions were made based upon predicted growth of electricity needs*
12. In the real world what do you think drives investment decisions in this sector?
13. Who would you say are the main people involved in the LCPD process?
- 14 How influential is accounting in the communication process of the LCPD process? *On the PPC document, although there is a small section for cost/benefit it is only one small section of this document.*
15. Over your career in this industry/being associated with this industry how has the use of accounting changed?
- 16 The industry has many different professionals involved for example engineers, accountants and regulators. Have you seen any changes in the influence of these roles within the industry.
17. How can professionals in this industry influence decisions, for example, the regulators can use the law if organisations are not complying with the various regulations.
- 18 The energy sector at the moment is currently having to comply with environmental directives set by the EU and other sources, ensure there is security of supply and generate profit – if you had to put these in order of importance how would you rank them with the first being the most important.
19. Based on your previous answer, over the course of your career in this sector have you witnessed any changes in this ranking?
20. When making investment decision in the UK electricity industry what information is gathered to make these decisions/do you think is drawn upon?
21. Now we have discussed my questions have you got any other information which you would like to add?

Additional questions if relevant to the person being interviewed:

- 22 What was the cost of FDG?
23. Do you think the regulators anticipated as many opt outs?
24. Information from regulators – was everything clear? How did you lobby the regulators if you required more information?
25. Did the regulators change any of their policies, standpoints due to the lobbying from other parties?
26. Do you see the industry changing in the future in relation to regulation – more, less or stay the same.
27. How closely did the environment teams and the Environment Agency work together of the problems of the LCPD?

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