

Investments in power generation in Great Britain c.1960-2010 - The role of accounting and the financialisation of investment decisions.

Abstract

Purpose

This paper explores the increasing role of financialisation on investment decisions in the power generation industry in Great Britain (GB). Such decisions affect society, and the relative role of financialisation in these macro-levels decisions has not been explored from a historical perspective.

Design and method

The paper draws on historical material and interview data. Specifically, we use an approach inspired by institutional sociology drawing on elements of Scott's (2014) pillars of institutions. Applying concepts stemming from regulative and normative pressures, we explore changes in investments over the analysis period to determine forces which institutionalised practices - such as accounting - into investment in power generation.

Findings

Investments in electricity generation have different levels of public and private participation. However, the common logics that underpin such investment practices provide an important understanding of the political-economics and institutional change in the UK. Thus, the heightened use of accounting in investment has been, to some extent, a contributory factor to the power supply problems now faced by the British public.

Originality/value

This paper contributes to prior literature on the effects of financialisation on society, adding power generation/energy supply to the many societal level issues already explored. It also provides brief but unique insights into the changing nature of the role of accounting in an industry sector over an extended timeframe.

Key words: Investment, electricity generation, society, financialisation, institutional sociology

1. Introduction

The financialisation of energy policy implies increased use of market mechanisms, with the financial sector and financial actors (such as accountants) playing a critical role in the decision making process of investments in power generation assets. However, with Great Britain (GB) currently witnessing an investment hiatus, should an essential commodity such as electricity, be subject to values and ideology of this phenomenon? In other words, should investments in power stations be financialised¹? With the electricity industry struggling to secure investment, this paper challenges the paradigm of neo-liberal economic policy which is supported by financialisation for the energy sector. To be specific, this paper examines the increasing impact of accounting (with those using accounting as the financial actors with financial motive in the financialisation process) on such decisions. We do this by reflecting on historical developments in GBs generation market from circa 1960-2010².

Electricity is essential to support business and households, and, thus, so is maintaining a secure production of electricity. In power generation, the importance of investment is unquestioned, as commissioning a power station is a multi-million pound investments - or billion-pound if nuclear is considered. For example, the proposed joint nuclear project with EDF and CGN at the Hinkley Point C plant is estimated at £24.5bn (EDF, 2015), highlighting the significance of financial capital. Investments of such magnitude draw on many fields of expertise, one of them being (management) accounting, where various investment analysis techniques (e.g. net present value (NPV), return on capital employed) are utilised. However, financing and accounting are not the only concern in power generation investments – location of plants, demand, supply, economic conditions, government policy and market participation also feature, to name a few - which are beyond our scope.

In GB, the capacity of existing power stations determines the ratio between supply and demand, or the capacity margin. There is a present demand for new financing (Warren, 2014) to improve the capacity margin following an investment hiatus from 2006 to 2010, when the Big Six generators³ did almost no new significant investing. By examining the broader historical background to the present problem, and in particular the relative influence of

¹ A similar question is posed in the water industry (Bayliss, 2015).

² For this paper, it is important to specify GB rather than the UK, as Northern Ireland operates under separate market conditions as part of the Single Electricity Market (SEM) for the island of Ireland.

³ RWE Npower, EDF, E.ON, SSE, Iberdola and Centrica.

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3 financial actors in the investments, we can potentially attain an understanding of why GB is
4 lacking necessary investment. We can identify how institutional forces may have affected the
5 influence that financial actors have in the investment decision process; for example, what
6 caused them to change and/or remain stable, or to be more influential in investment
7 decisions? To help identify these forces, we draw on the work of Scott (2014), who identified
8 three pillars underpinning institutions and institutionalised practices – in particular normative
9 and regulative pillars. We can then draw some tentative explanations on the role of financial
10 actors (such as managers and accountants) and their methods in contributing to the present
11 GB energy crisis.
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19 The remainder of this paper is structured as follows. The next section, Section 2 provides, and
20 details extant literature on financialisation, institutional sociology and then some historical
21 and contextual background to the current energy crisis. Section 3 outlines our method, with
22 Section 4 detailing the nature of investment practices in GB's energy sector for the analysis
23 period. Section 5 completes the paper with some discussion and concluding comments.
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29 **2. Literature and context**

30 We now present a brief review of literature on financialisation and institutional sociology.
31 This is followed by some context on the current energy crisis GB faces.
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36 **2.1 Financialisation**

37 Studying the history of the political economy of the United Kingdom (UK) exposes
38 institutional changes, and the political and social changes within. Every industry is influenced
39 by political policies and/or macro incentives (Warren and Burns, forthcoming), which in the
40 case of the electricity industry can have a significant impact on investment decisions. While
41 money/finance has a pivotal role in the economy, this role has changed in the last 50 years.
42 Finance was a means to measure or offer a value, providing a product or service with a way
43 to exchange or be traded (Christopherson *et al.*, 2013); however, there has been a shift
44 towards 'finance capitalism', or the accumulation of profit within the financial system with
45 institutional investors having more influence on the operations of organisations.
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55 One reason for the changing influence of finance is a "phenomenon" (Epstein, 2005:3)
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3 known as financialisation. While a common definition seems elusive, various scholars have
4 offered a version. For instance, Palley (2007:2), explains financialisation is “a process
5 whereby financial markets, financial institutions and financial elites gain greater influence
6 over economic policy and economic outcomes [...] transform[ing] the functioning of
7 economic systems at both the macro and micro levels”. Epstein tries to encompass several
8 definitions, noting “financialization is a process that depicts the increasing influence of
9 financial motives, markets, actors and institutions on economies, both domestic and
10 international” (2005:3). As such, actors within economies, businesses and organisations are
11 subject to financialisation in that their decision-making may be based on expectations of
12 other financial actors. When shareholder value gained prominence in the 1980s and 1990s,
13 many (listed) businesses put an increase in shareholder value as their prime target. To achieve
14 this, businesses prioritised strategies that create a positive shareholder value added (SVA); in
15 doing so, accounting instruments such as NPV or the Internal Rate of Return (IRR) played a
16 prominent role. Therefore, to understand the process of financialisation, Krippner (2005) asks
17 *who* is in control of the organisation?
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30 At the same time, and as will be discussed later, a stronger focus on cost, efficiency and
31 performance clearly indicated that accounting, and in particular management accounting, can
32 provide a contribution to the process of financialisation. The relevance of accounting as a
33 component of financialisation is also linked to accountants, who seek to legitimise the use of
34 financial language and embed financial issues in support of decision-making (Legalais and
35 Morales, 2014). As information providers and advisors, accountants provide a strong
36 supporting role in the propagation of financialisation. Their interest is inherent, as their
37 position in the information flow (Yagoubi, 2014), their expertise in accounting and finance,
38 their importance as perceived by general management, as well as the advisory role between
39 operational and general management are legitimised by linking local operations to
40 financialisation (Legalais and Morales, 2014). To put it differently, a focus on decision-
41 relevant information provision, financial measures and outcomes reinforces the process of
42 financialisation. This notion puts accounting and accountants as critical components of the
43 financialisation process.
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56 The financialisation process links the accumulation of capital and the increasing power of
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3 shareholders on business strategies (Froud *et al.* 2006) to investment strategies that follow
4 financial motives. With Phillips' (2006, cited in Christopherson *et al.*, 2013) observation that
5 the financial services have simply taken over every aspect of the national economy,
6 Christopherson *et al.* (2013:351-352) agree and added that "finance has ceased simply to
7 assist the running and operation of the real economy of goods and services, but rather has
8 come to dominate, even displace, the latter." This observed dominance of financialisation
9 over investment decisions in the economy provides context to our examination of institutional
10 changes that have influenced investment decision making at a macro-level. Thus, we can
11 consider the impact that financialisation has had on energy policy and investments in this
12 industry, and the role of accounting therein.
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22 The past decades have witnessed changes in capitalism and the dialogues surrounding this,
23 regularly revolving around the issues of neo-liberalism, globalisation and financialisation.
24 However, as McNicholas and Windsor (2011) argue, the latter has not been the subject of
25 much attention. Despite the critical assessment given by studies of globalisation as a threat to
26 the productive economy at national level (Van der Zwan, 2014), changes in the UK political
27 environment comparatively fast-tracked financialisation (Davies, 2015). The UK Treasury
28 pursued policies providing the financial sector with more control over the economy in general
29 (Warren and Burns, forthcoming). With increased liberalisation and privatisation, the UK's
30 financialisation process was a national phenomenon in its own right (Epstein, 2005; Froud *et al.*,
31 2006). Although most research on financialisation is targeted at the financial sector (e.g.
32 Buchanon, 2016; Waldron, 2016), there is a growing interest in the impact on utilities; for
33 example, March and Purcell (2014) investigate the global water industry. Pushing the
34 boundaries of studies on financialisation is important because, as Van der Zwan (2014)
35 argues, studies on the process of financialisation have identified how global finance has
36 changed the logics that frame the economy.
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47 This paper develops an understanding of the changing logics behind investment decisions in
48 GB, logics which have influenced economic policy. With the electricity industry requiring
49 significant sums of financial capital to construct large scale power stations, access to capital
50 has changed over time. Additionally, new financial instruments emerged, e.g. to control
51 emissions, changing investment risk. In short, as Epstein (2005) argues, there are bigger
52 stakes at play. The financial rent of such investments now not only supports the basic needs
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3 supplied through electricity production, but provide pension funds through institutional
4 investors, for example. It is not only the capital investments that have been subject to
5 financialisation, the environmental impact of these assets have also been governed through
6 market mechanisms, similar to the water sector (Bresnihan, 2016).
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10 11 12 **2.2 Institutional Sociology**

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14 As noted, we draw on institutional sociology (IS) as a theoretical lens. Before detailing some
15 facets of IS, we should note that we are adopting a neo-institutionalist history approach - see
16 Rowlinson and Hassard (2013) - by drawing on neo-institutionalist concepts to illuminate
17 telling of historic events. We are not setting out to advance neo-institutionalist theory *per se* -
18 a notion that Rowlinson and Hassard (2013) refer to as historical neo-institutionalism. As will
19 be detailed later, we only draw on elements of Scott's work; namely pressures stemming
20 from regulatory and normative pillars that help to reveal the common logics that underpin
21 investment practices.
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30 IS has been utilised previously by accounting scholars – e.g. Akbar *et al.* (2015), Collier
31 (2001); Modell (2003); Nor-Aziah and Scapens (2007); Seal (2006); Tsamenyi *et al.* (2006).
32 We utilise it to examine how the role of accounting in investment decisions has changed over
33 time, ultimately contributing to financialisation processes and GB's potential energy crisis.
34 Tsamenyi *et al.* (2006), who studied the electricity industry, argue that IS is particularly
35 relevant to studies focusing on uncertainties, - and is useful for understanding organisations
36 competing for political and institutional legitimacy and/or market position - which is
37 applicable to the GB power generation industry.
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47 We draw on elements of Scott's (2014) three pillars of institutions (Figure 1) to determine
48 institutional factors driving investments. We focus on how investment practices changed over
49 time, at both organisational and a broader industry-level. The term 'organisational field' is
50 used to describe similar social groupings, and has been described as "set(s) of organisations
51 that, in the aggregate, constitute an area of institutional life" (DiMaggio and Powell, 1983, p.
52 148). This makes the collective, not the individual, the unit of analysis. In this study, the GB
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3 electricity generation industry is the organisational field. Collective beliefs emerge through
4 interaction within organisations, and in the short term, this behaviour creates social norms
5 within the boundaries of those beliefs (Greenwood *et al.*, 2002). Scott's (2014) pillars of
6 institutions can be applied to organisational fields. Specifically, we draw on the normative
7 and regulative pillars to frame to broader developments in the electricity industry. The
8 regulative pillar is often emphasised because of the high value it places on rule setting and
9 sanctioning power. For regulators, governments and the legal system, the regulative pillar is a
10 source of power; however, if regulation is weak, it may be subject to challenge from
11 organisations. The second pillar, normative, refers to norms and values, such as legitimate
12 profit-seeking behaviour or professional norms. We do not utilise the third pillar of Scott's
13 (2014) model, the cultural-cognitive pillar, as it focuses on common meanings and
14 conceptions within a cultural setting, shared by the actors within an organisational field. Such
15 shared conceptions are the result of intrinsic interpretations (the cognitive) of extrinsic stimuli
16 (the cultural). Individual decision-makers interpret and mediate between external symbols
17 and meanings attributed to observed objects and activities; they do this within the respective
18 cultural context they are set within. Making "sense" of what occurs in the organisational field
19 shapes the interpretation of the how and why. The desire to conform to behavioural patterns
20 observed – a "mimetic" mechanism (see below) – is subjective to the decision-maker, and
21 reflects back to the cultural context in terms of symbols and taken-for-granted beliefs.
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36 Using the pillars of institutions, studies have shown that the intervention of powerful bodies
37 or forces can cause organisational fields to become isomorphic, resulting in similar practices
38 within organisations (DiMaggio and Powell, 1983). Isomorphism refers "to the adaptation of
39 an institutional practice by an organisation" (Dillard *et al.*, 2004, p. 509). DiMaggio and
40 Powell (1983) suggested three processes of isomorphic change drive the homogenisation of
41 organisational fields; coercive, normative, and mimetic. Coercive isomorphism occurs in
42 response to informal or formal external pressures, for example, cultural or political pressures,
43 and regulative forces (the regulative pillar) (ibid). Normative isomorphism (the normative
44 pillar) stems from normative pressures (ibid). Professionalisation is a common normative
45 pressure, as managers in similar positions share similar training schemes/educational
46 background, creating a drive toward parallel career needs and goal-setting behaviours.
47 Finally, mimetic isomorphism transcends uncertainty within organisations by imitating
48 solutions devised by other organisations (typically within the organisational field) in response
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3 to similar problems. Some studies adopting IS have concentrated on isomorphism in
4 organisations, as deviations can cause discomfort (for example see Greenwood *et al.*, 2002).
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6 However, some studies discredit the influence of competing markets and possibly over-focus
7 on the impact of institutions. For example, research by Hoque and Hopper (1997) found
8 conflicts between institutional pressures and market forces, especially under turbulent
9 conditions. Tsamenyi *et al.* (2006) perceived this concept to be useful when analysing the
10 Spanish electricity industry, observing the institutional pressure from the government and
11 market forces on the industry.
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18 However, as we detail in the methods section later, we did not explore the cultural settings of
19 our 50-year timeframe and the corresponding cognitive patterns that may have arisen within
20 them. This is due to the relatively dominant influence of regulative and normative influences
21 on the electricity industry in the UK, and the difficulty to recreate the intrinsic mind-set of
22 decision-makers over 50 years. The usefulness of the regulative and normative pillars to our
23 analysis becomes evident when considering the dominant impact of legislation (regulative
24 pillar), professional standards in engineering, accounting, and pressures from shareholders.
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31 As noted earlier, accounting and accountants may have a role to play in the financialisation
32 process, as do other factors such as government policy and capital markets. These largely
33 external factors also have/have had a role in how investment decisions are/were made in
34 GB's electricity overtime. Other scholars, including Dixon and Sorsa (2009), have examined
35 financialisation from an institutional perspective and have emphasised the value of examining
36 this phenomenon from an institutional change lens. Thus, our drawing on regulative and
37 normative elements of Scott's (2014) work, and the exclusion of cultural-cognitive
38 interpretations of contemporary actors, enables us to trace forces for change in investment
39 decisions over time at the organisational field level.
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49 ***2.3 The current energy crisis***

50 To understand the current investment hiatus, the present-day problems faced by GB's
51 electricity industry are now briefly outlined. The Electricity Market Reform (EMR) was
52 implemented in 2014, as a response to a failing market and a lack of investment. GB
53 experienced its first shortage call in November 2015, which is a concern that supply would
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not meet demand. To try and overcome the investment hiatus, the EMR has introduced supply-side mechanisms to encourage investment, such as Contracts for Difference (CfD) and the Capacity Market. Demand-side issues were to be addressed through the Electricity Demand Reduction (EDR) programme. One media source reported in 2014:

Britain's supply of electricity is dangerously close to resurgent demand. The safety margin of capacity has been shrinking and now stands well below the 20 per cent necessary to insure against shocks. When demand rises in winter there is a high risk that the margin will disappear altogether. (FT, 2014)

The Financial Times (2014) suggested further that the security of supply crisis was not a revelation to UK politicians - it had been long known that one fifth of capacity would exit the market within the next ten years.

[Insert Figure 2 about here]

As shown in Figure 2, OFGEM's forecasts indicated a blackouts risk in the event of high demand between 2015 and 2017, as the de-rated margin⁴ will be close to 0%. In 2015/16 the data shows only a 4% margin on the base case, below regulators' advised margins. In the past, margins were typically averaged 20% to 25% (see Figure 3). The modelling in Figure 2 is based on analysis of the de-rated margin against the base case (or normal) demand for electricity. Since 2012, when the modelling per Figure 2 was completed by OFGEM, further concerns have been raised. A Scottish Southern Electric (SSE) spokesperson commented:

"We are heading for a critical period. We worry that [the Department of Energy and Climate Change] and National Grid have been over-optimistic," said Keith MacLean, director of policy and research at SSE at the Stationers' Company Autumn Forum in London. "We think that could easily flip to minus 5%." (Gosden, 2013)

In support of SSE's statement, the National Grid (BBC, 2014) created an emergency plan for the winter of 2014/15, to offer support capacity in the event of unexpected shutdowns.

[Insert Figure 3 about here]

Despite the media focus on potential blackouts, some note that GB has seen power cuts in the

⁴ The de-rated margin refers to data not based on design capacity or generator rate capacity, but data including sensitivities such as loss of load due to age and performance, the possibility of new power stations being commissioned on time, and the use of interconnectors.

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3 past, and therefore we could ask what is new?" In past decades, blackouts were not related to
4 a lack of investment, rather network failures⁵, shortage of fuel or industrial disputes⁶. As
5 noted above, the present threat to capacity is the planned exit of one fifth of current capacity
6 from the market by 2020 (Davey, 2012) (see Figures 2 and 4) and the reluctance to make new
7 financial investments. This raises an interesting question, namely how and why is significant
8 capacity leaving the system without new investment to replace decommissioned capacity?
9 This of course relates to our research objective.

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16 Figure 4 indicates the potential crisis, showing that more capacity is leaving the market than
17 entering. It shows the same de-rated base load line as Figure 2, but simultaneously compares
18 new capacity entering and decommissioned capacity exiting the system. For example, in
19 2015/16, approximately 4,250MW of new capacity joined the system, but twice that amount,
20 around 8,500MW, exited it.
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29 The impending drop in capacity has triggered the search for a resolution. Without energy, the
30 economy cannot sustain industry and services, and ultimately demand. For example, Helm
31 (2004) argues that GB's electricity industry has reliably maintained the UK's economic
32 stability since the 1970s, and the industry provides funds (tax revenues) to help maintain
33 public spending. Thus, the importance of attracting investment to support this industry cannot
34 be underestimated.
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41 3. Method

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43 The changing nature of investment decisions presented here is structured by time period.
44 These periods mark key legislative changes that resulted in major market structure changes in
45 the generation sector – such key events are useful to guide a historical research approach (Ó
46 hÓgartaigh and Ó hÓgartaigh, 2004). Legislative changes since 1947⁷, which brought about
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51 ⁵ For example, 2003 in London and Birmingham (OFGEM, 2005)

52 ⁶ The 1970s saw blackouts caused by industrial disputes that led to coal shortages. The government in 1973
53 imposed a restriction on power usage – non essential organisations were restricted to 3 days usage per week.
54 (Generator Power, 2013)

55 ⁷ The research examined impact from nationalisation in 1947 but it was not until 1957 that there was a change in
56 the legal framework that started to create change in investment within the industry. The change in 1957 took a
57 few years to expose change within the industry and therefore a round half a century analysis was finally decided

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3 nationalisation of the industry, and significant Acts creating structural changes to the industry
4 are used to explore how institutional forces may have influenced investment practices. The
5 time divisions are shown in Table 1. Additionally, the historical approach of this study is
6 supported by the fact that the process of financialisation occurs over a long period of time
7 (Palley, 2013) and to understand its impact, requires a significant time period for analysis
8 (March and Purcell, 2014).
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19 As were parsed our analysis into timeframes as per Table 1, it was quite apparent that
20 legislation and regulation were major forces affecting the generation sector. Thus, we
21 recognised the importance of the regulative pillar as per Scott (2014) from the outset. We
22 then set about collecting data from both primary and secondary sources. The primary sources
23 included fourteen interviews with industry experts, as per Appendix I. All interviews were
24 semi-structured and fully transcribed. As can be seen in Appendix I, most interviewees had
25 excess of twenty years' experience in the sector, the average being 28 years. The interview
26 data utilised here is in effect an oral history⁸ and interviews were conducted in a flexible
27 fashion with highly knowledgeable persons (Collins and Bloom, 1991). As noted in Section
28 2.2, we exclude the cultural-cognitive pillar of Scott's (2014) work, as given the more
29 historic focus and extended timeframe of this paper, it is not possible to interpret the mindset
30 of decision-makers over a 50-year period. Thus, any interviews conducted for this study did
31 not elicit cognitive motivations as to how and why decisions were made. Also, interviews did
32 not explore how decisions were informed by an intrinsic interpretation of the cultural context
33 at any time during our 50-year timeframe of analysis. Rather, the interviews provided
34 clarification and insights on regulative and normative forces identified within the secondary
35 sources.
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48 The secondary sources used include legislative acts (see Table 1), energy sector white papers,
49 regulatory reports and government reports. These secondary sources were selected based on
50 the period of the analysis, and on their relevance to the present study. For example, data and
51 reports from the Digest of United Kingdom Energy Statistics (DUKES) were used provide an
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55 as the period of examination 1960-2010.

56 ⁸ Example of oral history studies in the accounting realm include Ikin *et al.* (2012), Emery *et al.* (2002). See also
57 Tyson (1996).
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3 overview of energy usage and generation during the timeframe of our research. These sources
4 provided insights into how the industry responded to the regulatory influences and thus we
5 hoped to find evidence (or not) of institutional change and of normative pressures -
6 particularly from professionals like accountants.
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10 As mentioned earlier, we adopt a neo-institutionalist history approach - which specifically
11 here draws on strands of Scott's (2014) work to illuminate telling of historic events. Such an
12 approach is not uncommon in accounting history literature, as the nature of historical research
13 often means the views of actors cannot be obtained for reasons of mortality. Thus, well
14 developed theoretical frameworks are often utilised by researchers in a broad or partial sense.
15 To give an example relevant to this paper, Moreno and Cámara (2014) draw on institutional
16 sociology in a broad manner to explain how changes in the content of a Chairman's Letter to
17 shareholders overtime were affected by external factors such as the political environment.
18 Using elements of theoretical approaches is not uncommon in contemporary literature also.
19 For example, many papers draw on elements of Actor-Network theory to explain (see for
20 example Jollands and Quinn, 2017; Jones and Dugdale, 2002; Briers and Chua, 2001).
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31 **4. History of investment practices in the British electricity industry**

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34 Constant re-investment in new assets is essential to GB's generation market as old assets at
35 end of useful life need to be replaced and there is an increasing demand for electricity see
36 Figure 5.
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40 [Insert Figure 5 about here]
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44 To meet such increases in demand, heavy investment is required over time, often with new
45 financial backing. Investment patterns have changed in response to changes in fuel sources
46 over the period depicted in Figure 5. As Figure 6 reveals, investments between 1960 and
47 2010 varied by fuel type, with gas being the most popular fuel in recent times.
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51 [Insert Figure 6 about here]
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55 We now provide detail on each era as set out in Table 1, exploring the key influencers on
56 investment practices during each period and exploring the gradual process of financialisation.
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4.1 Nationalisation of the energy industry, 1947

The process of financialisation and the subsequent focus of accounting on costs and financial outcomes developed over a long period, and started in its strict sense after the Second World War (Crotty, 2005). The dominant paradigm in the decades after 1945 was Keynesian economics, which emphasised regulated market demand to pursue broader economic goals such as high employment and fast growth (Crotty, 2005). GB's power generation industry was no exception to this paradigm - it was nationalised and highly regulated in the decades after 1945, and financial motives in investment decisions very low.

Although nationalisation does not form part of our analysis, a brief reflection is useful. The Nationalisation Act(s) 1947 provided the government with authority to purchase privately owned assets and expropriate local government-owned assets (Patterson, 1999). The industry had been in crisis due to a chronic post-war plant shortage and power cuts were frequent (Cochrane and Schaefer, 1990). Thus, Government policy was to commission small (i.e. 30-60 Megawatts (MW⁹)) plants (Cochrane and Schaefer, 1990) to provide more balance to the market, and the industry was controlled¹⁰ by the Central Electricity Authority¹¹. Stability was achieved by the mid-1950s, however, the management and accountability of investments was lacking (Simmonds, 2002), therefore, the Electricity Act was passed in 1957.

4.2 The Electricity Act 1957 and developments until 1989

The Electricity Act 1957 provided a basis to change the management of the industry. The Central Electricity Authority was replaced by the Central Electricity Generating Board (CEGB), twelve area boards, and the Electricity Council (EC) (SWEHS, 2014). The newly formed CEGB was responsible for generation, the area boards for supply, and the Electricity Council for policy-making. The CEGB was a vertically integrated monopoly, meaning it operated generation and transmission for the twelve area boards (Newberry and Pollitt, 1997).¹² Executive managers were responsible for daily operations and non-executives for

⁹ Megawatt is a measurement of power – 1MW represents 1,000,000 watts.

¹⁰ The word *controlled* has been deliberately used instead of regulated because at this time state regulation was not required necessary because there was no competition or other policies that needed regulating.

¹¹ Prior to nationalisation, electricity had been supplied and distributed by 505 organisations (RWE, 2014). Nationalisation prohibited competition, as a competitive market was deemed too negative and associated with the mass unemployment of the 1930s (Helm, 2004).

¹² This paper will not include the development of the Scottish energy sector until the 1990s when the two

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3 satisfying societal needs (Cochrane and Schaefer, 1990). Despite these changes, the
4 government found it increasingly difficult to manage the industry as management control was
5 spread between departments. To promote operations and financial efficiency (including
6 investment), the government decided to appoint a chairman of the CEGB at the time of the
7 1957 Act. The government wanted someone who would share the same ideology (Cochrane
8 and Schaefer, 1990) and so appointed Christopher Hinton¹³ (SWEHS, 2014).
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14 The new framework provided greater stability, but not without problems. A particular
15 concern was non-executives being appointed with their own political agenda (Helm, 2004);
16 therefore, at this stage financial gain was not a priority. As a result of changes after the 1957
17 Act, the industry was working with political and organisational input, and without regulation.
18 Although large investments were made throughout the 1960s and 1970s (see Figure 6),
19 politicians and economists queried whether they were the right type. Coal-fired plants were
20 the focus of investment, as the coal industry was protected and politicians wanted to maintain
21 employment - creating mutual efficiencies for both industries (Chick, 1987). Therefore, the
22 economic growth of the country was prioritised and the role of accounting was minimal:
23 economists, engineers and politicians were the main decision makers of the investment
24 process.
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34 This lack of financialisation was at odds with the rest of the economy in the 1960s and 1970s,
35 and the Keynesian paradigm of strong social regulation started to erode (Crotty, 2005). Oil
36 price shocks, the abandonment of the fixed exchange rate system, falling profits and a failed
37 stock market led to a counter-movement to government regulation. This change in the
38 economic environment led to a stronger focus on costs, efficiency, and shareholders, paving
39 the way for a stronger impact of financialisation on investment decisions in organisations,
40 and ringing in an age of neoliberal globalisation (Crotty, 2005). As detailed later, the grip of
41 the British government lessened, and financial measures partially, if not fully, driven by
42 accountants were at the heart of investment decisions. However, the industries that were
43 nationalised, such as the electricity industry, were protected from this movement and the
44 phenomenon of financialisation.
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56 systems became more entwined.

57 ¹³ A Nuclear engineer
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3 Although the full impact of financialisation was not influencing investment decisions in the
4 generation industry, there were control concerns and the unclear roles and objectives of the
5 CEBG. These concerns resulted in regulations being introduced for the first time. In 1961, a
6 white paper publicly announced that nationalised industries must aim to break even (HMT,
7 1961) - a strong example for the introduction of accounting measures in investment decision-
8 making, and a normative force at that. The Government hoped that this would ensure careful
9 consideration of future financial investments. In the early 1960s, there was also some
10 recognition that a mixed fuel portfolio would be a sensible approach. The first nuclear plant
11 was commissioned in 1957 (DECC, 2008), and the industry envisaged more plants being built
12 during the following decade to counteract an over-reliance on coal (see Figure 6). The
13 investment in nuclear power was also a political move to mitigate political instabilities such
14 as the Suez Crisis in 1956 (WNA, 2014) - another example of the influences of normative
15 politics rather than financial motives influencing the investment decisions.
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26 Although the industry had experienced a positive influence from politicians until this point,
27 the first significant political battle of the CEBG was over nuclear power. Hinton, as Chairman
28 of the CEBG, fought against nuclear investment and won. This was a shock as he had been
29 chosen principally due to his background in nuclear energy generation, and his support had
30 been expected (Cochrane and Schaefer, 1990). Hinton was against the cost of nuclear and
31 opposed the government's pressure to build more of this technology (Taylor, 2007). Nuclear
32 investment slowed and alternative fuels were considered, marking an apparent reduction in
33 the strength of the government's influence over the industry, and a significant move to the
34 influence of the engineers on investment decisions. While it could be argued that this was a
35 sign of accounting becoming more influential in the investment process this could be
36 deceiving - Hinton wanted the money to be invested in engineering efficiency rather than
37 concerns of rates of return (Taylor, 2007).
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48 Investment in new assets increased considerably in the 1960s, as did cost. In 1967, a White
49 Paper on Nationalised Industries determined policy was needed on pricing and costing of
50 energy investments. However, decisions made by the CEBG were not affected in spite of
51 policy suggestions to increase control on investment. Information was not shared between
52 government departments, resulting in suboptimal decision-making, and this affected long-
53 term investment decisions (Chick, 1987). Accounting still had limited influence on the
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3 process. Any investments in coal, oil and nuclear continued with the aim of satisfying GB's
4 electricity needs (see Figure 6). All investments used rates of returns (RoR) provided by the
5 government for investment calculations. With the RoR being low, the engineers developed
6 investments that were engineering-focused rather than financially competitive – and, there
7 was no competition.
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11 In this period, UK economic policy was influenced significantly by the Department of Trade
12 and Industry (Warren and Burns, forthcoming). Thus, while policies were in place to
13 encourage investments that were accountable on cost, there were stronger institutional factors
14 at play. The government's main priority was to sustain a post-war economic boom, aided by
15 sustaining demand and supply in the energy sector - this continued into the 1970s. In
16 historical terms, government performance was measured by the cost of living and
17 unemployment levels (Chick, 1987), and large investments directly related to both. So still,
18 economists played a more significant role than accountants, and the industry continued to be
19 protected from the full force of financialisation.
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28 Helm (2004) argues that political agendas of the time affected decision-making on
29 investments, often resulting in decisions being driven by the timing of general elections rather
30 than accounting-based measures. The CEGB was happy for this to continue, as financing to
31 build new plants remained forthcoming. Despite the many criticisms of this era, it provided a
32 foundation for long-term decision making by executive managers. Although decision-making
33 was influenced by political objectives rather than key performance indicators, investment was
34 vast, and future planning within the industry embodied a positive outlook. As can be seen in
35 Figure 5, demand was increasing steadily, and the CEGB responded by building more power
36 plants, as seen in Figure 6. Investment decisions taken were driven mainly by engineers and
37 new technology, not accountants or accounting. Thus, larger plants became a typical
38 investment type during this era (Interviewee 3 and DECC, 2008).
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48 The 1970s witnessed a government shake-up, triggering a miners' strike and in turn a coal
49 supply problem (Cochrane and Schaefer, 1990). Conflict was also emerging between
50 politicians and industry managers (Chick, 1987). A question arose on how investment
51 decisions should be made, in particular whether investment decisions should be made by
52 government, economists or engineers – with accountants playing a minimal role in this
53 dialogue. Generally, the public and government were unhappy with the increase in public-
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3 sector borrowing to the nationalised industries - the electricity sector was largely held
4 responsible for increased public funding (Chick, 2007). At the same time, there was a
5 significant paradigm shift amongst political circles, as power was transferred from the
6 Department of Trade and Industry to the Treasury (Warren and Burns, forthcoming).
7
8 Although a public debate had started on the cost of the CEGB and its investments, plant
9 engineers noticed no changes their daily roles. Interviewee 3 (Head of Coal Operations)
10 stated:
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14 Money was not the focus, the industry made very little money, it was a monopoly. We
15 were not performance driven, we were not performance managed – we had no KPIs
16 on efficiency. Neither revenues nor capital was an issue at this point.
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19 However, due to anxiety on public spending and the reliance on particular types of fuels, the
20 government established a Department of Energy (DoE) in 1974. Its primary aim was to
21 ensure new energy policies included diversity to minimise the problems caused by events
22 such as miner strikes (Helm, 2004). There were concerns that too much capacity was being
23 fuelled by coal and oil (see Figure 6), and nuclear power became increasingly the centre of
24 attention:
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29 Nuclear power was big business in the 70s and I worked both on the basics and on the
30 experimental work in this field. It was a good time to work in the industry because
31 you could push the boundaries without been run by the budgets - of course the
32 budgets were there but not like today. (Interviewee 5, Environmental Planning
33 Manager).
34

35
36 After the freedom of investment in the 1970s and early 1980s, the government imposed
37 spending controls on the industry, and finally accountability of the industry emerged.
38 Following public concern, and increasing pressure from the Treasury, the parliament passed
39 The Competition Act, placing the energy industry under the Monopolies and Mergers
40 Commission (MMC), ending the statutory monopoly (Helm, 2004). This created tension
41 between the culture embedded in the nationalised industry and fundamentals of
42 financialisation, which was influencing the rest of the economy. An investigation by the
43 Monopolies and Mergers Commission on the CEGB was published in 1981. The
44 investigation focused on the financial operations of the CEGB and its accounting processes.
45 A main finding of the MMC (1981) report related to investment practices. The report
46 suggested the decision-making process was not transparent and seriously flawed due to
47 inaccurate accounting information and unrealistic forecasting. The MMC (1981) report noted
48 that new investment had been rushed through when supply far exceeded demand - even
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3 taking into account security of supply and increasing costs to consumers. It stated:

4 Demand forecasting by the board and the electricity supply industry as a whole
5 has been seriously inaccurate and has led to premature orders for new plant, which
6 has increased costs (MMC, 1981: 285)
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10 Despite the concerns of the MMC, the influence of accountants and appropriate use of
11 accounting processes continued to be problematic due to lack of competition.
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14 Although there were many changes in and discussions about industry cost reductions on a
15 social and political level, these were not transferred to the power generators. As Interviewee 1
16 (Head of Operations) stated:
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19 There were lots of people counting things but it was not efficient, because you had the
20 public money to spend. But we did have checkers checking checkers!
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23 Interviewee 6 (Business Services Director) agreed and added:

24 We had an ethos of technical excellence and we still had significant budgets.
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28 Interviewee 7 (General Manager, Operations), who in the 1980s was employed in an industry
29 that worked with the CEGB, confirmed the above statement:
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31 The CEGB was like an experiment on engineering excellence and it happened to have
32 this product called electricity, which people found useful....it certainly was not there
33 as a business, it was run for the public good.
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36 The conservative government became increasingly concerned with the lack of accountability
37 in the nationalised industries. The Energy Act 1983 removed the monopoly structure and the
38 obligation of the Electricity Board to supply, generate or distribute electricity. Government
39 energy policy changed from investment to “sweating the assets¹⁴” to reduce costs, which
40 started to develop new ways of providing returns on the current assets, opening the door for
41 the ideology of financialisation. As Figure 5 earlier illustrates, the 1980s saw the lowest level
42 of new capacity to the market for a 30-year period. Although the 1983 Act was forward-
43 thinking, Helm (2004) criticised its lack of detail and considerations essential for successful
44 implementation. Basic accounting principles, such as the cost of capital, were relevant, but as
45 there were still no competing organisations, such measures did not enter investment decision-
46 making. The Act was intended to open up competition, but the CEGB continued to have a
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56 ¹⁴ *Sweating the assets* is a term used to describe a plan to run existing power stations for as long as possible,
57 without concern for long-term supply.
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3 monopoly. Investment was low risk for the CEGB, which could continue to rely on end-users
4 paying. Meanwhile, new entrants only had access to short-term contracts (Helm, 2004),
5 thereby increasing their risk. They also had to borrow at much higher rates, making the RoR
6 to the CEGB incomparable to private companies. Thus, while new entrants were subject to
7 the fundamentals surrounding financialisation, the CEGB was still protected, making it
8 impossible to compete. Consequently, encouraging competition to the industry failed. This
9 resulted in the government changing its position, moving further towards privatisation. The
10 ethos of nationalisation had arguably failed, and pro-privatisation groups argued that
11 privatisation would improve efficiency (Chick, 2007).
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19 By the end of the 1980s, the government was determined not only to privatise the industry,
20 but restructure it (Patterson, 1999). As noted by Littlechild (2000), some principles laid the
21 foundations of these new plans. These included relinquishing management of the industry to
22 managers within, providing an opportunity for customers to take a bigger role in the industry,
23 i.e. offer more choice, increasing efficiency by targeting investment in new power stations,
24 providing good investment opportunities to the public, increasing revenue for the
25 government; and imposing the RPI-X formula¹⁵ as had been done in the gas and
26 telecommunications industries. The privatisation plan was fully unveiled in a government
27 White Paper in 1998, titled “Privatising Electricity”. The paper was followed by the
28 Electricity Act in 1989 (HMSO, 1989), which marked the privatisation of assets valued at £32
29 billion (Chick, 2007).
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40 *4.3 The 1990s*

41 Following the 1989 Act, the 1990s were a period of regulation-driven restructuring
42 (Newberry and Pollitt, 1997). For the successful privatisation of an industry, ownership and
43 regulation were required. As with other utilities being privatised around the same time, this
44 provided new sources of ownership, investment strategies and operations (March and Purcell,
45 2014). The privatisation process resulted in the CEGB being split into four separate
46 companies, three of which were floated on the stock market (RWE, 2014), inviting
47 shareholders into the fold. The ownership structure post-privatisation was as follows (RWE,
48 2014):
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57 ¹⁵ This refers to a regulatory price-cap mechanism.
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- National Power and Powergen (founded 1990) - owned the generators;
- National Grid Company (founded 1990) - owned the network and regional electricity companies acting as suppliers;
- Scottish Power and Scottish Hydro- Electric (founded 1991).

Nuclear plants remained under public ownership initially. In 1996, however, the more modern nuclear plants were floated as British Energy, with only the old Magnox¹⁶ plants remaining in public ownership (Newberry and Pollitt, 1997) within the Nuclear Electric entity. Immediately following privatisation (1991), 95% of the generating industry was owned by National Power, Powergen and Nuclear Electric; the remaining 5% were owned by interconnectors¹⁷ from Scotland and France (Littlechild, 2000). A separate company, the National Grid Company (NGC)¹⁸, operated transmission services. Thus, at the outset, the capital invested in the industry was still UK capital. However, change in ownership brought new financial investors on board. Many of the new owners were foreign, starting the globalization of the GB's energy industry and the impacts of financialisation, liberalization and globalization.

Privatisation brought about a change in values and attitudes, reflected in higher prices, and accounting became more important as each generator was answerable to shareholders. The values of financialisation were being adopted by the industry, as privatisation had opened the door to a change in ideology. Interviewee 7 (General Manager of Operations) recalled:

People suddenly became alive because they had new opportunities, to do things they could never do before, as they were constrained by the sort of very rigid structures that you often see in state run industries.

Interviewee 1 (Head of Gas Operations) added:

Private companies were now responsible for producing the best returns for shareholders and making the business profitable.

Therefore, if Net Present Value (NPV) of any investment was positive, investment occurred - a stark contrast to the during the nationalized era. During the 1990s NPVs were positive, and

¹⁶ Magnox was a type of nuclear power reactor – now obsolete

¹⁷ Interconnectors are simply electricity companies who are connected to England to supply electricity – generation is outside of England,

¹⁸ Now known as National Grid Electricity Transmission (NGET)

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3 Interviewee 3 (Head of Coal Operations) explained the efficiencies obtained:
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6 We moved away from keeping the lights on using very robust investment processes
7 that were based around the client (*the customer*) to a system that was cost conscious
8 and efficient. The efficiencies within investment included manpower, for example, an
9 existing asset 'Station A' had 650 staff before privatisation and a few years after
10 privatisation this was down to 260.
11

12
13 Once the protected coal contract¹⁹ ended in 1993, coal was no longer the cheapest generation
14 method, and throughout the remainder of the decade natural gas was preferred (DECC, 2008)
15 as it provided better returns for shareholders. By the mid-to-late 1990s, the regulator
16 (OFFER) were breaking down barriers to entry, and with attractive electricity prices the
17 generation industry attracted new competitors and new financial investors (Robinson, 2013).
18 These new competitors were known as Independent Power Producers (IPPs). As the IPPs
19 entered, the big players established during privatisation started to acquire. These changes in
20 ownership marked the start of a highly competitive GB electricity industry. Although new
21 built investment (especially in gas) occurred, most of it was through acquisition, and this
22 period was known as the "dash for gas". The increase in gas investment was driven by the
23 large margin between costs and revenue, with new entrants preferring efficient and cost
24 effective assets (IEA, 2007). As Interviewee 10 (Site Manager) said:
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27 We went from investing in reliable and conventional power stations towards
28 competitive and cutting edge technology.
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32 However, the gas stations were financed through debt. The International Energy Agency
33 (IEA, 2007) argued that investment in gas represented an ability to respond to changing
34 market forces. However, the Labour government intervened, fearing the influx of gas
35 investment was distorting the industry and leading to a lack of investment in coal. There was
36 tension between economic policy and the financialisation of the industry:
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39 They issued a moratorium, which effectively meant no more planning permission was
40 given around that time period (Interviewee 4, Commercial Manager).
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44 Therefore, while privatisation supported the values of financialisation, the economy was still
45 influenced by politics. The moratorium in October 1998 slowed down the rate of planned
46 investments (Simmonds, 2002). Therefore, although the government had formerly
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¹⁹ As part of the privatisation agreement, the government arranged for coal to be protected. Both National Power and Powergen would purchase their coal suppliers from British Coal. The UK coal industry was then privatised in 1994.

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3 championed market-led investment, there were signs of market manipulation via regulation -
4 regulation tied to counter the impact of financialisation.
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7 8 **4.4 The 2000s**

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10 From 2000 onwards, national and international regulation had great impact. A new regulatory
11 office, the Office of Gas and Electricity Markets (OFGEM) replaced OFFER through the
12 Utilities Act 2000. The UK government and regulator-based policy interventions included, 1)
13 the lifting of the gas moratorium (Simmonds, 2002), 2) the introduction of NETA (Warren,
14 2003), and 3) the introduction of the British Electricity Transmission and Trading
15 Arrangements (BETTA) (OFGEM, 2005) that included Scotland from April 2005.
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21 NETA was established to provide a transparent market to trade electricity. Trading on NETA
22 was through bilateral and multilateral contracts, creating an open market. NETA was the
23 additional market mechanism to control future investment; one of the most fundamental
24 changes amplifying the process of financialisation.²⁰ Following its introduction in 2001, the
25 English/Welsh power generation industry was viewed as one of the most competitive markets
26 globally (Haney and Pollitt, 2013; Robinson, 2013; Warren, 2014; Warren, 2003). As
27 competition increased, market-led investment appeared to work. However, the introduction of
28 NETA led to a reduction in prices, which altered investment patterns as the price of
29 wholesale electricity did not support continued investment. Accountants were putting a hold
30 on new investment as there were no returns to shareholders. With excess generation capacity
31 and no capacity payment in place under NETA, financially unviable plants were mothballed
32 and many IPPs went bankrupt. As the Head of Thermal Generation (Interviewee 14) stated:
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43 “there was a fundamental shift in the way we made decisions, this was the first
44 time we had seen good, technically efficient plants been shut down simply because
45 older plants, which were detrimental to the environment were making more money.
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47 The traders and the accountants could see better ways to make profit and the
48 production of electricity, in some cases, was not one of them”.
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52 By 2002, 40 percent of generating assets in the UK were owned by financially distressed
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55 ²⁰ The Pool and Settlement system required every generator to bid on the cost of generating electricity in half
56 hour periods. The highest accepted bid set the price for all generators in that time period. If the generator failed
57 to deliver there was no financial penalty. A capacity payment was also used under this system.
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3 companies, or had been repossessed (Thomas, 2006).
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6 In the same year as NETA was introduced, the energy sector witnessed the collapse of Enron.
7 Enron was a good example of a company in this sector moving from profiting by the
8 distribution of natural gas and electricity to making profit from trading energy derivatives –
9 this had an impact on UK energy companies. The demise of Enron not only had an effect on
10 further investments in the sector but also millions of pension holders (Blackburn, 2002) who
11 were reliant on the profits gained through the energy derivatives that the industry had become
12 reliant on over the physical flow of resources (Loftus and March, 2015). In the period that
13 followed, minimal new investment occurred (see Figure 6), and the generators sweated old
14 assets, many of which were coal plants (Interview 4, Commercial Manager). The result was
15 that some newer, more efficient power stations being mothballed due to associated finance, as
16 noted by interviewee 14, earlier. In other words, the new power stations were closed as the
17 debt attached was not payable – the return to shareholders did not support the operational
18 costs. This left old “dirty” coal plants in operation as these had no debt attached to them. As
19 shareholders demanded increasing returns, the generators’ business model changed. The
20 strong competition at the end of the 1990s weakened, and larger players acquired the smaller
21 IPPs. Stronger vertical integration became the norm, and operating budgets were squeezed to
22 manage reductions in wholesale pricing. For example, Interviewee 6 (Business Services
23 Director) commented:
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36 We probably had between a third and a half of the resources that we used to have in
37 the power stations. So we moved from engineering excellence to a focus on
38 competition and efficiency.
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41 The market structure changes outlined thus far also took place in a context of additional
42 environmental regulation. The environmental regulations implemented during the decade are
43 outlined in Table 2. The Renewable Obligations mechanisms and Large Combustion Plant
44 Directive triggered major changes to investment patterns and capacity margins. These
45 regulations triggered a demand for significant investments, as observed by Interviewee 11
46 (Environmental Manager):
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51 There was a huge increase of legislation emerging from Europe. The European policy
52 developments have necessitated significant investments in the UK portfolio.
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3 [Insert Table 2 about here]
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6 Despite the many new environmental policies and directives, the government continued to
7 believe the industry could manage the market. It offered no policy guidance, despite evidence
8 that EU environmental policies were making a significant impact on the type of investments
9 being made. Riley (2011) argues the regulatory impact started at the beginning of the century,
10 with the drivers firmly being environmental concerns. As Interviewee 5 (Environmental
11 Planning Manager) noted:
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16 The product was still fine, it's actually the way we make it that I suppose became the
17 big issue..... we just didn't face these kind of issues when I joined in 1970.
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20 Interview 8 (Head of Environment) agreed, adding:
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22 When I first joined the industry, in 1976, the environment was a bit of Research and
23 Development but never a big issue, it was a buried issue. Now it is one of the biggest
24 strategic issues we have to face. It has changed the way we consider investments. Now
25 you can't sit on a board without being an environmental expert.
26
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28 Emissions were an increasing concern, and the government implemented policies to reduce
29 them by offering financial incentives to build renewable capacity (Warren, 2014). The
30 Renewable Obligations mechanism was introduced in 2002. It offered financial incentives,
31 through the use of Renewable Obligation Certificates (ROCs), to generate electricity from
32 renewable sources like wind and solar. These certificates were intended to encourage greater
33 investment in assets fuelled by renewable sources, and as Figure 5 shows, investments did
34 consequently increase. If the generators exceeded their obligations, they could trade the
35 excess; but if they did not meet their obligations, a financial penalty was payable (OFGEM,
36 2014). Arguably, the environment has thus also been financialised by using economic
37 mechanisms to control emissions (Loftus and March, 2015).
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45 As investments in renewable assets continued and investment in other assets decreased,
46 questions arose about the ability of a market-led industry to ensure security of supply. The
47 risk to security of supply arose from the combination of concerns about a restricted gas
48 supply and unexpected outages due to technical problems (Interviewee 12, Trader). Despite
49 the capacity concerns, government focus remained on environmental regulations and targets.
50 In 2006, a white paper titled "The Energy Challenge" focused on two main concepts, energy
51 security and emission reduction. The government had to create a framework to offer more
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certainty to motivate investment. This framework focused on improving investment by opening up private investment in nuclear power. This demonstrated that the government still believed the market could establish security of supply through further deregulation.

When the 2006 White Paper was published, the Large Combustion Plant Directive (LCPD) and carbon emission reduction targets became the focus of investment, regulation and sustainability discussions. Environmental directives from the EU increased:

The directives required the Governments of the member states to introduce laws, regulations or whatever means to adhere to the minimum requirements, Europe is the driving force.... actually deciding if something needs doing for the common good. (Interviewee 5, Environmental Planning Manager).

The LCPD resulted in a commitment to close six of the 16 coal plants by 2015 and three oil-fired plants (Michaels and Williams, 2012). This equated to 12,338MW of capacity exiting the system, as the generators did not invest to reduce emissions. It was apparent by the end of 2006 that the industry had limited interest in new investment, whether gas, coal, integrated gas plants or renewables (IEA, 2007). Investment was declining (see Figure 6), due to a combination of pricing²¹, lack of government policy (Interviewee 1 – Head of Gas Operations), and increased regulation.

During the 2000s, the number of EU environmental regulations vastly increased (see Table 2). As Interviewee 2 stated:

You have to blame the EU for the second black industrial revolution.... the system just got bigger without considering the fluidity of the past and that gives a kind of arthritis in the control system which is not very helpful.

The UK government agreed to implement the EU directives without considering implications for future supply. Towards the end of the 2000s, it was clear to everyone (organisations, regulators and the government) that increased environmental regulations were provoking a crisis, despite denials by OFGEM and the government. The environmental regulators working with engineers could foresee the threat, as Interviewee 2 noted:

The main issues revolve around investment and how power will be supplied to the country ongoing past these milestones (*the deadline for directives such as the LCPD*) Many power stations will close to take the easier timing option, and that is a good

²¹ Although electricity prices were starting to increase the price of gas was also.

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3 commercial decision - whether it is a good decision for the national power supply
4 perspective remains to be seen.
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6 Interestingly, the generators argued that two key issues restricted investment, namely capital
7 constraints and environmental regulations (Interview 3, Head of Coal Operations).
8 Investment was stalled, despite fears that security of supply would become a problem.
9 Engineers were predicting that the government would need to change the structure of the
10 system, to support new investment through mechanisms such as capacity payment regulations
11 (Interview 3, Head of Coal Operations).
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16 The introduction of new market mechanisms to encourage new investment as well as
17 incentive based payments for technology that is environmentally sustainable complicated the
18 decision making process further, as it had not solved the problem. While there were small
19 investments made they were not significant enough to resolve the crisis, as the Head of
20 Corporate Regulations (interviewee 13) stated:
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25 At the moment we are trying to model why some technologies are more successful
26 than other in our responses to the EMR, also why the smaller generators are able to
27 submit lower prices. We have found there are many hidden subsidies in
28 distribution plants and we are lobbying to eradicate those. Smaller companies are
29 generally debt financed and this creates a cheaper cost of capital than the bigger
30 players with equity. Large companies have a bigger market rent to our tipping point
31 of investing in new plant and it is harder to meet.
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36 It was now suggested that privatisation and the ideology of financialisation placed energy
37 generation on a path toward crisis (Robinson, 2013). By 2010, the industry was facing a
38 problematic future because of lack of investment due to energy policies not supported by
39 incentives to change, early closure of coal plants and the decommissioning of nuclear plants
40 at the end of their useful life (Warren, 2014).
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45 **5. Discussion and concluding comments**

46 As noted in the introduction, current debate in the GB energy industry centres on pricing and
47 the investment hiatus (DECC, 2011). While electricity prices have increased, investment has
48 slowed (see Figures 3 and 5). The solution offered is the EMR which will deliver an
49 estimated £95 billion of investment to keep the lights on in the short term (DECC, 2014a). As
50 noted in the introduction, this paper seeks to understand how the financialisation of
51 investment practices has played an increasingly dominant part in this potential energy crisis
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3 in the UK. The Big Six have responded to the normative pressures from the market as any
4 privatised company would, by seeking to protect profits and seek low-risk investments on
5 real assets. However, influence from the government and regulators (regulative pressures) are
6 an important part of the picture when seeking to understand the current potential crisis in the
7 UK, as they as a regulative *opposite* to the normative responses of institutional actors in more
8 recent years. With the market privatised and the regulators introducing market devices to
9 control emissions, the generators have responded by maximising shareholder value through
10 profits emerging from both productive capitalism and speculative capitalism, a problem that
11 accountants have encouraged (Hatherly and Kretzschmar, 2011). Electricity generation is no
12 longer about simply generating electricity to meet public demand, it is generating electricity
13 in the most productive way to produce profit and sometimes this conflicts with the basic
14 needs of the country. Due to privatisation and the dogma of financialisation, market
15 mechanisms and institutional investors now exert normative pressures and control the
16 decision-making of the industry, facilitated by accounting teams and processes. The
17 following discussion draws on elements of Scott's (2014) pillars of institutions, where the
18 increasing influence of financialisation and accounting measures is an interplay between
19 regulative and normative pressures on the organisational field.
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33 In the previous section, it was noted that during nationalisation an open-purse policy created
34 intense investment periods during the 1950-70s. Although investment continued into the
35 1980s, growth slowed. Large coal and oil plants were used to maintain demand and there was
36 sufficient capacity. Investments in the nationalisation period were primarily subject to
37 government and regulatory influence. Thus, investment practices were effectively dictated
38 through legislation, with the government leading business plans for new investments. These
39 practices became the accepted way of thinking and acting on investment projects within this
40 period (and later periods), and we can construe them as institutionalised investment practices.
41 Thus, we can apply concepts outlined by Scott (2014) to tease out how investment practices
42 changed over time with the strengthening influence of financialisation, and, determine the
43 increased contribution and influence of accounting in the series of events leading to the
44 current energy crisis.
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55 [Insert Table 3 about here]
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3 Table 3 summarises the regulative and normative pillars, underpinning investment practices
4 up to 1990. In effect, the government used the industry to win votes, relying on investment to
5 reduce costs and protect employment figures. Legislation and the active role of the
6 government were the main regulatory instruments used. Accountants were part of the process,
7 but their influence was minimal to negligible, as the nationalisation of the industry buffered
8 any impact they may have had. At the same time, it also warded off financialisation
9 processes. Meanwhile, the CEGB had free reign to invest heavily in research and new plants,
10 and used this opportunity to drive forward a strategy of engineering excellence - a normative
11 influence driven by the engineering profession. Thus, prior to privatisation, there was a
12 dominant logic of engineering, where normative institutional forces framed the strategy of
13 energy generators. Engineering excellence determined the objectives of generators (Carter
14 and Mueller, 2006), which was to maintain the distribution network, and place emphasis on
15 research and development to further the technological advances (see also Table 3). Since this
16 was in line with regulative investment plans and Acts passed by the government, there were
17 no significant contradictions in the system (all parties followed an investment path) and
18 security of supply was by and large safe. In other words, during nationalisation, the
19 institutional forces acting on the organisational field were in compliance, and there was an
20 easy truce (Government vs. CEGB) as both shared the understanding that everyone should be
21 able to receive and afford electricity. The process of financialisation was constrained by the
22 fact that the product, electricity, was seen as a basic need, and its distribution over
23 technologically advanced networks driven by engineers (Carter and Mueller, 2006). With no
24 effective competition, the taxpayer was funding investments resulting in a low cost of capital,
25 there was no concern for shareholder value, and thus the industry could invest without
26 demands for high returns. As Scott (2014) argues, institutions provide direction and
27 expression to actions (decisions) and this provides the interest and motivation which
28 constitute the institution. The process of satisfying the demand for electricity was the
29 institutionalised direction and expression of the decision-making process until the 1980s.
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48 With the Thatcher-government ushering in an age of divesting assets to encourage market
49 entry and competition (Carter and Mueller, 2006), the successful privatisation in the telecom
50 industry triggered similar processes in other industries, such as railways and utilities. The
51 government introduced various Acts from 1989 to lessen the burden on the state, and increase
52 profitability in formerly nationalised sectors. For the UK electricity-generating industry, this
53 implied a change from the formerly dominant logic of engineering to a now rising dominance
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of the logic of financialisation (or what Carter and Mueller, 2006 term as a dominant logic of accountingisation). Privatisation created unease between the government and the CEGB, and thus the factors influencing investment practices changed (see Table 4). It created tensions between regulative and normative pressures, and altered both the competitive landscape and the preference for more profitable technology/fuel types. Lacking the scrutiny of investment plans by regulators or the government, the increasing focus on profitability triggered a dash-for-gas era during the 1990s, and ended investment in coal and oil. Gas was preferred as it offered better returns on investment. Any new investments now had to respond to the needs of the financial markets, requiring added shareholder value, and the process of financialisation was making a tangible impact on the decision-making process. Whilst the logics underpinning that process were at a transitional stage, as the engineering culture still existed, the accountant and accounting processes became more dominant (underpinned by financialisation). Dixon and Scott (2014) argue that the political economy provides varying sets of options, however, some options outweigh others, and in the 1990s the financial parameters of decision-making were outweighing the engineering values (similar Carter and Mueller, 2006).

The step back from government-led investments created a market that was simple at the outset. However, Table 4 shows that regulatory influence increased again during the 1990s, opening up competition and protecting consumers. Normative influences changed too, as shareholders materialised, and their demands for high returns on investments became the focus of investment plans - leading to a preference for cheaper fuel, gas, as noted. As the generators prioritised profit in a climate of price regulation, the strategy of sweating old assets continued. New investment was now financed through debt, and the financial services sector were now stakeholders. Thus, during the 1990s, investment practices were subjected to normative influences to a greater degree from accounting than previously. Investment techniques such as NPV, cost of capital and cost efficiencies came to the fore. This is not to say such techniques were not used prior to the 1990s, but as noted previously, profitability was not the driver of decisions.

[Insert Table 4 about here]

Around the year 2000, regulators acknowledged that market structures formed during

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3 privatisation had failed. At the same time, NETA and financialisation of the market became
4 more significant. However, the concept of trusting the market to send signals to instigate new
5 investment was problematic, as now with accounting as a normative force, only profitable
6 investments were likely to get accepted. Old capacity started to reach the end of its useful
7 life, and government and regulator-led investment incentives were biased towards
8 renewables, thus – at least partially - reintroducing objectives that were beneficial on a
9 societal level (see Table 5). This left non-renewables to the established normative pressures
10 as before, and it was not seen favourably to have a market in which the government
11 periodically meddles with selected investments. Interviewee 9 (Head of Gas Generation)
12 summarised the situation in noting that “the government is in and out of the water all the time
13 and it muddies your investment decisions”. This pattern of regulative interventions created
14 such uncertainty that it threatened all future investment by generators. The normative
15 influence of accounting during the 1990s resulted in poor investments from a societal point of
16 view (but beneficial from a profitability viewpoint), and there were no consistent regulatory
17 forces to counteract these new (and by now) institutionalised post-privatisation investment
18 practices, as depicted in Table 5. Limits on investment were compounded by EU
19 environmental regulations affecting non-renewables - for example, investments considering
20 the LCPD in 2006 using accounting measures would suggest they were not financially
21 attractive. In spite of the government introducing environmental regulations that required
22 compliance by generators to benefit from financial incentives, it did little to discourage the
23 Big Six continued to engage in accounting-driven behaviour. Investment in renewables were
24 undertaken not with the objective to fulfil societal needs as pre-privatisation, but rather to
25 benefit from available financial incentives. Profit was now gained through the production of
26 electricity and trading financial derivatives. It was common for generators to choose to stop
27 producing electricity and to sell gas they had bought through hedged contracts²². Traders and
28 accountants were still governing the decision to generate or not (Warren, 2003; Head of
29 Thermal Generation UK, Interviewee 14). There were no adequate regulative institutional
30 forces at play to counteract this accounting-driven view of investment or generation, as
31 government policies did little to achieve compliance by accounting-driven norms to ensure
32 basic economic and societal needs. The process of financialisation had introduced a persistent
33 element of strategizing to the benefit of shareholders and shareholder value – fulfilling the
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56 ²² This happened when the profit differential between the hedged gas price and the current price was higher than
57 the profit that could be made through generating electricity.
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energy demand of the public was no longer the priority of the investors who owned the physical assets.

[Insert Table 5 about here]

Bringing together Tables 3, 4 and 5, the interplay between and effect of regulative and normative forces on investment practices becomes evident over the time period. In light of our discussion, it is reasonable to suggest that (compliant) institutionalised investment practices are required to accomplish the overall objective to “keep the lights on”. As we illustrated throughout this paper, such practices include many concerns such as public interest, engineering and finance. Looking at the ‘Affect’ row of Tables 3 to 5 reveals a changing set of investment practices over time, and after privatisation in the 1990s, the influence of accounting became the dominant logic (Carter and Mueller, 2006). Concerns such as return on investment, profits, risk, which were all underpinned through the phenomenon of financialisation, turned out to be more influential in creating these institutionalised practices, which were spread through normative forces throughout the sector. Although normative and regulative forces still support these institutionalised investment practices more recently (see Table 5), the societal key priority of the sector, adequate and appropriate regulations to “keep the lights on”, has been absent as accounting dominated investment practices, and the logic of financialisation persists. To secure adequate investment that is able to meet demand adequately, a regulative force is needed to ensure investment - rules, laws, systems, monitoring, and sanctions – and override accounting views.

Thus, to sum up, the historical view provided in this paper provides evidence of an increasing importance and influence of financialisation in investment decisions on power generation in GB. A focus on accounting concepts and creating profit through speculative capitalism rather than productive has reduced investment on an adequate scale in recent decades. Added to this, when regulations such as environmental directives increased the need for investment in older plants, firms were unwilling to make the investment due to inadequate returns, and could only be lured by financial incentives. The declining investment has undoubtedly contributed to GB’s current energy problem, and accounting – as embodied within institutionalised investment practices - is arguably a contributory normative factor. The

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3 historical analysis has enabled us to propose this view, as without it we would not have
4 sufficient context or data to trace the changing role of accounting in investment practices in
5 GB's energy generation sector. Thus, similar to authors like Quinn (2014) and Richardson
6 and Kilfoyle (2016), we suggest that historical studies over an extended timeframe do help
7 interpret current issues. We would thus encourage future studies like the present one in other
8 sectors where accounting in a broad sense may influence investment practices or similar.
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14 We should note some limitations of this study. We focus on institutional forces - and
15 institutions do embody actors - but the majority of the analysis here is based on historical
16 documents. These cannot by definition embody actors or their intrinsic motives. We have,
17 however, supplemented our work with comments from interviewees (see Appendix 1), which
18 provides support for our analysis. A second limitation is the interviewees themselves, in that
19 they may not recall events from thirty or more years ago with complete accuracy. We also did
20 not investigate relevant cultural settings that may or may not have influenced cognitive
21 interpretations of the external environment by decision-makers. However, interviewees did
22 express similar and consistent comments, which were supported by the historical document
23 analysis. Third, we do not explicitly explore detailed accounting and/or investment practices
24 at a micro-level here, and future studies in this context may be useful. Finally, it could be
25 argued that the study of GB alone is a limitation. It is highly likely that all investments in
26 power generation regardless of location encompass accounting practice of some form. Thus,
27 comparable studies of accounting practices over time at a detailed level, while interesting
28 from an accounting history perspective, may be augmented with studies which explore the
29 broader and relative role of accounting in investment decisions.
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Appendix 1 – Interviewee information

Role	Interviewee #	Years of service (as of 2014)
Head of Operations	1	31
Environmental Permitting Regulator	2	21
Head of Coal Operations	3	38
Commercial Manager	4	16
Environmental Planning Manager	5	44
Business Service Director	6	25
General Manager Operations	7	23
Head of Environment	8	38
Head of Gas Generation	9	27
Site Manager	10	34
Environmental Manager	11	27
Trader	12	15
Head of Corporate Regulation	13	20
Head of Thermal Power, UK	14	30

<p>Electricity Act 1947</p>	<p>Foundation to restructure the industry through integration.</p> <p>Main objectives:</p> <ul style="list-style-type: none"> • Change of ownership of assets <p>Nationalisation of the industry occurred on the 1st April 1948 with the single ownership of all assets</p>
<p>Electricity Act 1957</p>	<p>Foundation to provide the dissolution of the Central Electricity Authority.</p> <p>Main objectives:</p> <ul style="list-style-type: none"> • Ability to dissolve previous framework and to reorganise the industry, introduction of the Central Electricity Generation Board (CEGB) and the Electricity Council • Introduction of generation through area boards • Provide framework on the organisation of research • Provide foundation of the control of finances
<p>Electricity Act 1989</p>	<p>Foundation to restructure and privatise the industry.</p> <p>Main objectives:</p> <ul style="list-style-type: none"> • Change of ownership of assets • Introduction of competition • Introduce independent regulation <p>Privatisation / liberalisation occurred 1990 – the <i>pool system</i> was introduced, a market mechanism for generation to sell electricity onto the system</p>
<p>Utilities Act 2000</p>	<p>Foundation of regulatory change and legislative parameters of the structure of the market to change. Supported by the Electricity Act 1989.</p> <p>Main objectives:</p> <ul style="list-style-type: none"> • Changed the regulation framework, an individual regulator was formed, OFGEM and there was a shift of responsibility from the secretary of state to OFGEM, OFGEM had new powers. • Separation of electricity supply and distributions businesses – separate licence required. • Provisions for NETA to be introduced, a market mechanism that would replace the pool system.
<p>The Energy Act 2013</p>	<p>Foundation for regulatory change and legislative parameters of the structure of the market to change.</p> <p>Main objectives:</p> <ul style="list-style-type: none"> • Decarbonisation • Introduction of new economic structures – introduction of EMR, new market mechanisms that it stated to stimulate new investment and provide security of supply within a decarbonisation policy • Introduction of new separate office for Nuclear, ONR. • Strengthening regulatory power – aligning the government strategy with OFGEM and provided more power to protect consumers. • Introduction of charging power for energy resilience.

Table 1 - Timeline of analysis, important Acts.

Year	EU, UK, UN instigator	Regulation	Main aim
2000	EU - latest update (2010/75/EU)	Waste Incineration (WID)	Prevent negative impact on the environment
2002	UK - latest update (2009/785/UK)	Renewable obligations (RO)	Mechanism to encourage renewable generation - financial incentives
2005	EU	European Union Emissions Trading Scheme (EUETS)	Reductions in greenhouse gas
2005	United Nations (2014)	Kyoto Protocol	Reduce collective emissions
2006	EU (LCPD, 2001/80/EC)	Large Combustion Plant Directive (LCPD)	Limit sulphur dioxide, nitrogen oxides and dust
2008	UK	National Emissions Reduction Plan (NERP)	UK change to support LCPD
2008	UK	Climate Change Act	Introduction of carbon budgets

Table 2: Environmental Policy and regulations for GB during 2000-2010, source: DEFRA (2014a), HMSO (2009), DEFRA (2014b), EA (2014), HMSO (2008)

	Regulative	Normative
<i>Basis of compliance and order</i>	Invest in new power stations to supply demand and create jobs; some acknowledgment of cost efficiency	Investments (new power stations) driven by engineering excellence - but complying with government policies of diversity.
<i>Mechanisms</i>	Coercive	Normative
<i>Indicators</i>	<p>Law: Electricity Act 1957: providing the legitimacy for government to take control of the industry, until the 1980 Competition Act all competition was illegal.</p> <p>Regulators: MMC involved in the 1980s.</p> <p>Government: Hand-picked CEO of CEGB and non-executives.</p>	Accreditation: Emphasis placed on engineering prestige - significant budgets for research and development.
<i>Affect</i>	Requests to provide more accurate data on investment plans; using government provided rates of returns for investment calculations.	Compliance on investment business plans; no real accuracy in terms of future demand predictions.

Table 3: Regulative and normative pillars of institutionalised investment practices, 1957-1990

	Regulative	Normative
<i>Basis of compliance and order</i>	Divestment of existing assets to reduce barriers to entry and encourage new competition to invest in new assets (power stations).	Investments now profit driven - accounting techniques became the driving factor (gas was the favoured fuel as it was most profitable).
<i>Mechanisms</i>	Coercive	Normative
<i>Indicators</i>	<p>Law: Electricity Act 1989 provided legitimacy to liberalise the industry and encourage competition.</p> <p>Regulations: OFFER created framework to encourage more competition and scrutinise prices.</p> <p>Government: divested ownership of assets.</p>	Shareholders now exist
<i>Affect</i>	Investment plans not scrutinised by regulators or government. Pricing focus driven by accounting practices.	Shareholders demanded return on investments and higher scrutiny of investments; business plans focused on accounting techniques and modelling.

Table 4: Regulative and normative pillars of institutionalised investment practices, 1990-1999

	Regulative	Normative
<i>Basis of compliance and order</i>	New market structure to encourage more competition; new incentives to encourage investment in renewables	Investments focused on acquisitions to gain market share, improve profits and reduce risk.
<i>Mechanisms</i>	Coercive	Normative
<i>Indicators</i>	<p>Law: Utilities Act 2000 created a new market structure and gave more legitimacy to the new OFGEM regulators</p> <p>Regulations: Focused on pricing, environmental protection and market dominance.</p> <p>Government: Focused on environmental objectives by providing policies in this area and financial incentives for renewables only.</p>	Shareholders: present and expect rewards to match the risk for each investment
<i>Affect</i>	Regulators require more information on investments when applying for licences relating to environmental directives. Use of cost benefit exercises.	Investment modelling continued to focus on returns.

Table 5: Regulative and normative pillars of institutionalised investment practices, 2000 - 2010

	Regulative	Normative	Cultural-cognitive
<i>Basis of compliance</i>	Expedience	Social Obligation	Cultural-Cognitive
<i>Basis of order</i>	Regulative Rules	Binding expectations	Constitutive schema
<i>Mechanisms</i>	Coercive	Normative	Mimetic
<i>Logic</i>	Instrumentality	Appropriateness	Orthodoxy
<i>Indicators</i>	Rules Laws Sanctions	Certification Accreditation	Common beliefs Shared logics of action Isomorphism
<i>Affect</i>	Fear Guilt/innocence	Shame/Honour	Comprehensible Recognizable Culturally supported

Figure 1: Scott’s (2014) three pillars of institutions.

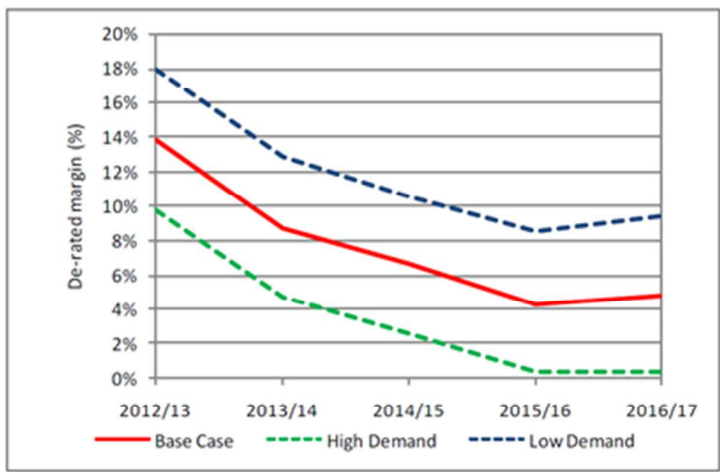


Figure 2: Base case and demand sensitivity - source OFGEM (2012)

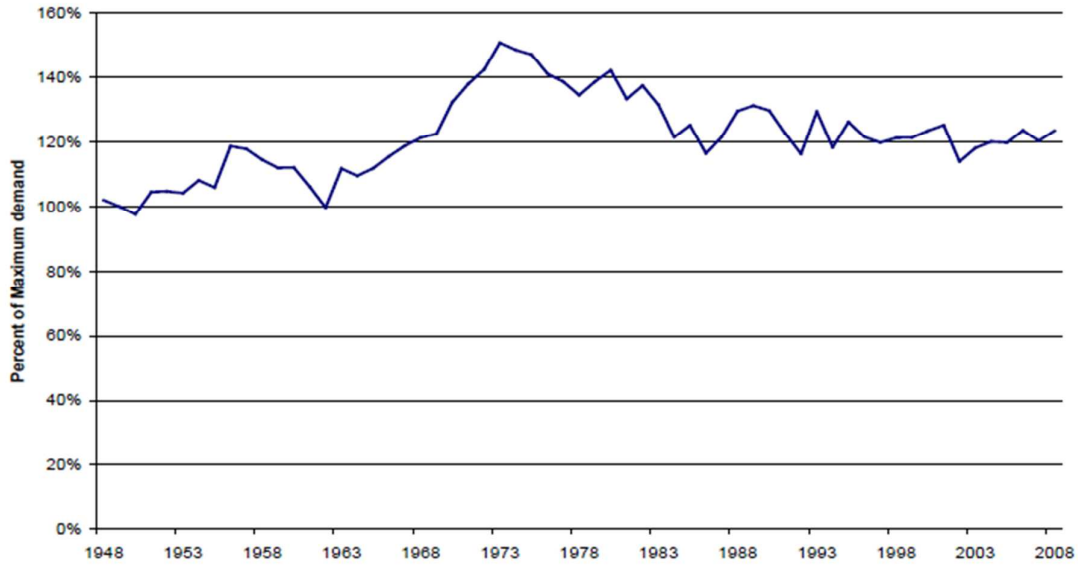


Figure 3: Capacity margins 1948 - 2008 - source: DECC (2008)

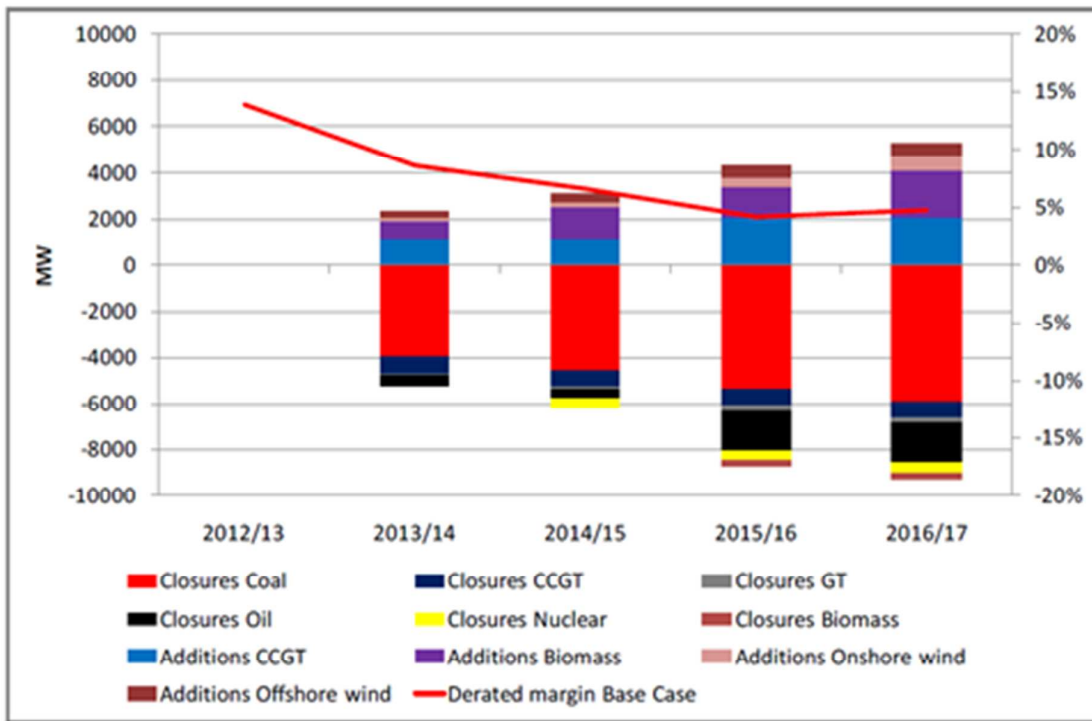


Figure 4: Closure of power plants, 2012-2017 - source: OFGEM (2012)

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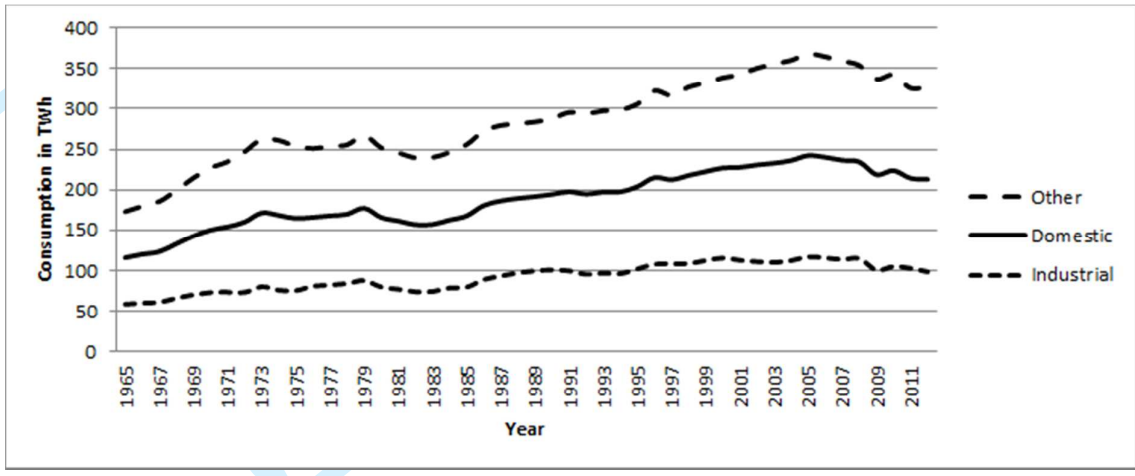


Figure 5 - Electricity consumption in the UK, source: DECC (2013)

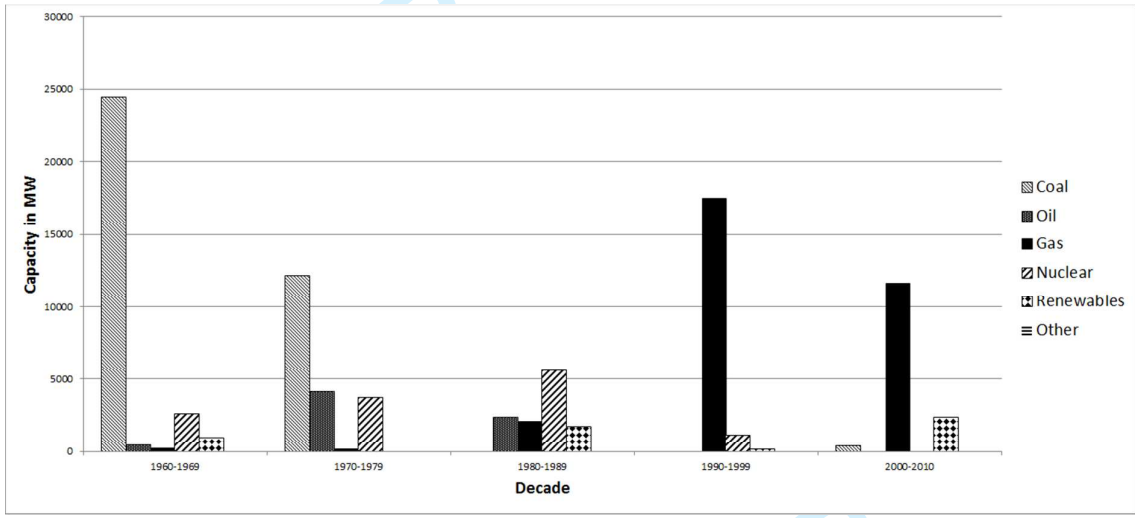


Figure 6 - New plant capacity in the UK Generation sector, source: original data, main source DECC (2014b)