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UNIVERSITY OF SOUTHAMPTON
FACULTY OF BUSINESS AND LAW

Can we keep the lights on? Investment,
regulation & sustainability in the UK
electricity industry.

by

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Thesis for the degree of Doctor of Philosophy

May 2013

Abstract

The United Kingdom (UK) electricity generation industry is shrouded in uncertainty, particularly as a consequence of new environmental regulations. Using a longitudinal case study, this thesis analyses how, following the introduction of the Large Combustion Plant Directive – LCPD, the industry used investment appraisal techniques to strategically mobilise power and effect change to UK policy.

Through the use of interpretive research and drawing on the ontological framework of structuration, this thesis will interpret how actors¹ used the rules and resources associated with investment appraisal techniques to manage the balance of power. Although the LCPD directive was a ‘command and control’ regulation, the generators were able to use the existence of contradictory structures, the absence of resources, and weak rules to negotiate a significant consultation process to effect policy change. Their actions resulted in the introduction of the 2011 Whitepaper ‘Energy Market Reform’ (DECC, 2011).

This study will analyse those actors who take part in the decision making process by examining how environmental directives, such as the Pollution and Prevention Control (PPC) and the LCPD, were implemented within the UK and their consequences. This process will reveal how industry reluctance to commit capital to developing new technology resulted in the threat of blackouts in the UK, creating a debate as to who would supply the £200 billion capital required.

This study identifies the complex struggle for power within the generation industry set within the paradox of achieving strict *environmental targets*, creation of *profit* and the *security of supply*, with the winner being determined via the investment decision process. International generators demonstrated a ‘wait and see’ approach to investment, using accounting techniques to justify a strategic policy that placed them in a position of power. This power was then used as a means to provoke a discourse that enabled the generators to establish their own needs.

This is not a direct study of accounting change, but of how existing accounting structures were used to facilitate a process of political and social change to establish new business models within liberalised industries; thereby lending great significance to some of the rules and resources connected to accounting.

¹ Giddens assumes actors and agents are synonymous, however, for the purpose of consistency the word ‘actor’ will be used throughout this research.

Contents

Abstract	3
Figures.....	11
Tables	13
Academic Thesis: Declaration of Authorship	15
Acknowledgments.....	17
Abbreviations and Acronyms.....	19
Chapter 1: Introduction	25
1.0 Introduction	25
1.1 Personal inspiration for this thesis	27
1.1.1– Background and rationale for the study	27
1.2 The political, social and financial background to the industry	31
1.2.1 Regulation, sustainability and investment	33
1.2.2 The White Paper, 2011.....	39
1.3 Theory and method.	41
1.4 Aims of the study and the contributions	42
1.5 Design and Structure of the thesis.....	44
1.5.1 Chapter 2, Literature review on investment appraisal	47
1.5.2 –Chapter three, Methodology and method.....	48
1.5.3 Chapter four: Theory.....	48
1.5.4 Chapter five: Analysis “What frame of reference is used when communicating and making investment decisions?”	49
1.5.5 Chapter six: Analysis “What are the social, political and economic factors influencing investment in this industry – what are the norms and sanctions?”	49
1.5.6 Chapter seven: Analysis “What resources are used when making investment decisions, what are the sources of power?”	50
1.5.7 Chapter eight: “What role does investment appraisal play in the investment decision-making process within the UK electricity Industry?”	50
1.5.8 Chapter nine, Conclusion	51
Chapter 2: Literature review	53
2.0 Introduction	53
2.1 What is investment appraisal?.....	54
2.2 – Capital budgeting in mainstream accounting literature	55
2.2.1 – Mainstream research within the electricity industry	58

2.2.2 Limitations of current research in the electricity industry	61
2.2.3 – Agency and contingency theory and capital budgeting	62
2.2.5 Alternative behavioural research and capital budgeting	64
2.3 –Interpretive Studies of capital budgeting	65
2.3.1 Interpretive studies in accounting literature	66
2.4 Sustainability in general	67
2.4.1 Sustainability in accounting	69
2.5 Regulation	71
2.5.1 Environmental regulation in general	72
2.5.2 Environmental regulation in accounting	73
2.5.3 Environmental regulation in the generation industry	75
2.6 Conclusion	76
Chapter 3: Methodology and method	79
3.0 Introduction	79
3.1 Methodology – epistemology and ontology within management accounting	80
3.2 Interpretive research	84
3.2.1 Interpretive research from an inter-subjective position	85
3.2.2 Validity and reliability in interpretive research	85
3.3 Using interpretive research in this thesis	87
3.3.1 Pragmatist Philosophy	89
3.3.1.1 Abductive reasoning: How pragmatist philosophy will be adopted in this thesis	91
3.4 Suitable research methods for the chosen methodology	92
3.4.1 Case study method	93
3.4.2 Data collection – tools and design	95
3.5 Conclusion	98
Chapter 4: Theory	101
4.1 What is theory?	102
4.1.1 Level of theorising	103
4.1.2 Contributions of theory	104
4.2 Giddens – Structuration theory	105
4.2.1 The agent	106
4.2.2 Structures and systems	108
4.2.3 Duality of structure	109
4.2.4 Structures: signification, legitimation and domination	110
4.2.5 Power	110

4.3 Criticisms of Giddens' ST.....	113
4.4 What does ST offer accounting research?.....	115
4.4.1 Duality perspective in accounting research.....	116
4.4.2 Social structure is comprised as three interrelated structures; signification, domination and legitimation	125
4.4.3 A basis for theorising both accounting continuity and change	128
4.5 How structuration theory is used within this research	129
4.5.1 How structuration theory is used to refine and design this thesis	130
4.6 Conclusion	134
Chapter 5: Analysis – the role of investment appraisal, signification	137
5.0 Introduction	137
5.1 Signification	138
5.2 Establishing a framework for understanding the LCPD – the regulatory framework	139
5.2.1 Analysing the directive at policy level.....	140
5.2.2 Analysing the directive at an individual site level	144
5.3 The missing frame of reference – sustainability	147
5.4 The existing frame of reference – investment appraisal for investments.....	149
5.5 Merging the frames of reference to make investment decisions.....	153
5.5.1 The business plan as a tool for merging frames of reference.....	154
5.6 Overlapping social systems.....	158
5.6.1 International companies communicating on an international portfolio level....	158
5.6.2 Overlapping regulatory frames of reference	162
5.7 Communication and ontological security	165
5.8 De-coupled and missing frames of reference.....	166
5.7 Conclusion	168
Chapter 6: Analysis – what are the norms? Legitimation: Examining the changes in social, political and economic factors	171
6.0 Introduction	171
6.1 How Investment norms have changed throughout history in the UK electricity generation market.....	173
6.2 'Norms' in regulation.....	183
6.3 'Norms' in investment	189
6.3.1 The impact on investment of accounting standards	193
6.4 'Norms' in sustainability.....	196
6.5 Why the 'norms' and 'sanctions' are in a state of uncertainty.....	198
6.5 Conclusion	207

Chapter 7: Analysis – the role of investment appraisal: Domination	209
7.0 Introduction	209
7.1 Domination.....	210
7.2 Resources influential in the decision making process	212
7.3 Mobilising power	213
7.3.1 Mobilising power when making investment decisions	214
7.4 Mobilising power – the environment	225
7.4.1 Lobbying and debating to mobilise power.....	228
7.5 Mobilising power – sustainability.....	239
7.5.1 Real options create opportunities to mobilise power	244
7.6 Resources needed to make investment happen in the UK generation industry	247
7.7 Conclusion	248
Chapter 8 – Structuration theory and capital budgeting	251
8.0 Introduction.....	251
8.1 The role(s) of investment appraisal.....	253
8.2 Linking the modalities of structuration theory.....	254
8.3 The role of accounting across the modalities of ST	256
8.4 Capital budgeting across the modalities of structuration theory.....	257
8.4.1 Capital budgeting as a ‘frame of reference’	258
8.5 Capital budgeting influencing the ‘norms’	264
8.6 Capital budgeting and domination	268
8.6.1 Exploring the strategic nature of IA as a mediating tool, exposing high risk factors.....	273
8.7 Why capital budgeting became a strong mediating device - Real options	275
8.8 Problems are UK specific - Overlapping social systems	278
8.9 Capital budgeting influencing change.....	280
8.10 Conclusion	283
Chapter 9 – Conclusion.....	287
9.0 Updated overview of the industry.....	288
9.1 Overview of the research	290
9.2 Examining how the structures are entwined	294
9.3 Contributions.....	298
9.3.1 Contribution to knowledge.....	298
9.3.2 Contributions to industry	299
9.3.2.1 Contributions to Policy implications.....	302
9.3.3 Methodological contribution.....	302

9.3.4 Theoretical contribution	303
9.4 Limitations	305
9.5 Future studies	306
9.6 Conclusion	306
Appendices	309
Appendix 1 - Timetable for the LCPD to be implemented in the UK	309
Appendix 2 - Stage one initial consultation process	310
Appendix 3 - Value chain of UK electricity generation industry	311
Appendix 4 - List of plants directly affected by the LCPD	315
Appendix 5 - Detailed explanation of regulations: LCPD and IPPC.....	317
Appendix 6 - Capacity and demand for electricity in the UK.....	323
Appendix 7 - List of nuclear plants closing down	324
Appendix 8 - Current portfolio within the UK, dates when the investment occurred ...	325
Appendix 9 - The use of semi-structured interviews	326
Appendix 10 - Taping of interviews	327
Appendix 11 - Explanation of interviews and consent	328
Appendix 13 - Coding of data	331
Appendix 14 - Limitation of data collection at stage three	332
Appendix 15 - Interviews and key informants of main stage collection.....	334
Appendix 16 - Example letter requesting interview	336
Appendix 17 - Interviews and key informants of main stage collection.....	337
Appendix 19 - Involvement of all actors within this case study	340
Reference list.....	343
Key informants from Industry conferences.....	373

Figures

Figure 1 Focus of the case study	43
Figure 2 Research design	46
Figure 3 - Construct of reality, Source: (Nørreklit et al, 2006:50)	84
Figure 4: Industry framework to be examined.....	95
Figure 5: Giddens' Stratification model of action (Source: Giddens, 1979)	106
Figure 6: Giddens' duality of structure (Source: Giddens, 1984:29)	111
Figure 7: Four principal origins of structural change (Source: Englund and Gerdin 2011:585).	119
Figure 8: Giddens' duality of structure linked to research questions.....	131
Figure 9: Extending legitimation to examine the influence of social totalities.....	132
Figure 10: Model of the design process	133
Figure 11 Signification portion of the framework	138
Figure 12 Signification conclusion from the framework	168
Figure 13 Legitimation structure from the framework	171
Figure 14 Legitimation conclusion from the framework	206
Figure 15: The domination structure portion of the framework	210
Figure 16 Giddens' duality of structure linked to research questions.....	252
Figure 17 The UK electricity generation industry investment paradox.....	294
Figure 18 UK electricity generation industry modelled via structuration theory.	297

Tables

Table 1 Abbreviations and Acronyms	22
Table 2: Three main approaches to accounting research	82
Table 3 Stages 1-3 of data collection	96
Table 4: Stages 3-6 of data collection	97
Table 5: Llewellyn's five levels of theorising (Source: Llewellyn, 2003:667)	103
Table 6 'Norms', historical perspective from an organisational, field and societal level.	174
Table 7 Risks and uncertainty associated with current investments	205

Academic Thesis: Declaration of Authorship

I, Elizabeth Ann Warren

declare that this thesis and the work presented in it are my own and has been generated by me as the result of my own original research.

Can we keep the lights on? Investment, regulation and sustainability in the UK electricity industry

I confirm that:

1. This work was done wholly or mainly while in candidature for a research degree at this University;
2. Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
3. Where I have consulted the published work of others, this is always clearly attributed;
4. Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
5. I have acknowledged all main sources of help;
6. Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
7. Either none of this work has been published before submission, or parts of this work have been published as:

Signed:

Date: May 2013

Acknowledgments

Pain, joy, stress and sheer exhaustion are only a few of the emotions that I have experienced during this PhD journey and I am not the only person who has suffered. My supervisory team, my family and my colleagues have all engaged in this process, some directly and others by offering quiet encouragement. Everyone involved deserves an unreserved thank you for tolerating my behaviour and the need to lock myself away in my study, for countless hours at a time.

Although my comments above may infer that I have not enjoyed the PhD process, this is not the case. The process of completing a PhD has intellectually challenged me by inspiring me to push the boundaries of my understanding of theory and philosophy. By attending doctoral colloquiums, academic conferences and industry conferences, I have been able to extend my knowledge of research, and also my understanding of management accounting. By pursuing my research interests I have been able to provide so much more to my own students, which I hope has made me a more rounded and inspiring lecturer.

My husband and two daughters deserve the first mention; trying to complete a PhD part time whilst working and trying to be a good wife and mother, has at times been impossible. The completion of this thesis would not have been possible without their encouragement and the time they would have spent with me that was sacrificed so that I could close the study door and remain focused. Towards the end of the PhD the time they gave me was invaluable and I will never be able to express how much this actually meant to me. The whole family is very much looking forward to the completion of my PhD and I am told on its completion there will be a big party, not just for me but for them as well, whereby they will have their wife

and mother back (*I have yet to tell them about the articles that will then need writing!*).

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Abbreviations and Acronyms

AEP	Association and Electricity Producer
BAT	Best Available Technology
BERR	Department for Business Enterprise and regulatory reform (formerly the DTI)
BIS	Department of Business, Innovation and Skills
BREF	BAT reference document
CCGT	Combined Cycle Gas Turbine
CCS	Carbon Capture Storage
CEGB	Central Electricity Generating Board.
CFCs	Chloro Fluoro Carbons
CSR	Corporate Social Responsibility
CVaR	Conditional Value at Risk
DCF	Discounted Cash Flow
DECC	Department of Energy and Climate Control
Defra	Department of Environment Food and Rural Affairs
DTI	Department of Trade and Industry
DUKES	Digest of United Kingdom Energy Statistics
EA	Environment Agency
EC	European Commission
EFLs	External Financial Limits
ELV	Emission Limit Values
EU	European Union

EU ETS	European Union Emissions Trading Scheme
FGD	Flue Gas Desulphurisation
FIDs	Foreign Direct Investments
FRS10	Financial Reporting standard – Goodwill and intangible assets
GEMA	Gas & Electricity markets authority
IA	Investment Appraisal
IED	Industrial Emissions Directive
IPC	Integrated Pollution Control
IPP	Independent Power Plant
IPPC	Integrated Pollution Prevention and Control Directive
IR	Interpretive Research
IRR	Internal Rate of Return
JEP	Joint Environment Programme
LCP	Large Combustion Plants
LCPD	Large Combustion Plant Directive
MA	Management Accounting
MACs	Management Accounting Control Systems
MAS	Management Accounting System
MMC	Monopolies and Mergers Commission
NERP	National Emissions Reduction Plan
NETA	New Electricity Trading Arrangements
NGC	National Grid Company
NGT	National Grid Transmission

NIS	New Institutional Sociology
NPV	Net Present Value
Offer	Office of Electricity Regulation
Ofgas	Office of Gas Supply
Ofgem	Office of the Gas and Electricity markets
PB	Pay Back
PPC	Pollution Prevention Control
RO	Real Options
RO	Renewable Obligations
ROCS	Renewable Obligation Certificates
RRR	Required Rate of Return
RPI-X	Retail Price Index
SA	Scenario Analysis
SBU	Strategic Business Unit
SCR	Selective Catalytic Reduction (SCR)
SCBP	Sophisticated Capital Budgeting Practices
SCM	Strategic Cost Management
SIDs	Strategic Investment decisions
STPR	Social Time Preference Rate
ST	Structuration Theory
TDR	Test Discount Rate
UK	United Kingdom

VaR	Value at Risk
-----	---------------

Table 1 Abbreviations and Acronyms

“Electricity is a fundamental part of our daily lives. It lights our homes and streets, keeps our schools and hospitals running, and powers our businesses. That’s why it is so important that the electricity market works effectively.”

(DECC, White Paper, 2011)

Chapter 1: Introduction

“We need £200 billion of new investment to replace outdated stock, or the lights will go off” (Charles Hendry, Minister of State, 21st October, 2010)

“Since the market was privatised in the 1980s the system has worked: delivering secure and affordable electricity for the UK. But it cannot meet the challenges of the future” (The Rt. Hon. Chris Huhne MP, cited within DECC, 2011)

1.0 *Introduction*

There is an apparent lack of academic research interest within the United Kingdom (UK) electricity generation industry. This has been acknowledged as a problem by the UK government and in the latest annual statement from DECC, it was stated that they will address the need to open the industry to allow future academic research to become more established (DECC, 2011). This thesis, offers a necessary contribution to this area, covering two main research topics; the first related to public policy, and the second to the practice of investment decision making.

This introductory chapter explains the main topics of research within this thesis, and why they are important. As the chapter proceeds the main research questions are presented and the basic structure of the thesis is described to introduce in general terms, how the research

questions will be addressed in the main body of the thesis.

The quotations above illustrate that significant investment within the UK electricity generation industry is required to secure the future of the economy. A substantial investment of £200 billion is necessary to insure that the population's basic electricity will continue to be met, and to ensure that the industry creates a solid infrastructure that will provide a well-diversified fuel portfolio to meet future environmental objectives. The capital required cannot be generated from the balance sheets of the industry alone because they neither have the cash available or the credit ratings to be able to attract the full investment cost (CityGroup, 2011). However, investment in this industry is contingent on a change to public policy that will provide security to investors.

Investment does not occur within industry without significant prior consideration, including analysis of current and future public policy, due to the long-term concerns that must be satisfied. Management accounting provides various tools, which can be utilised within the investment decision making process; techniques such as Pay Back (PB), Net Present Value (NPV), Internal Rate of Return (IRR), Scenario Analysis (SA) and Real Options (RO). All these techniques comprise a capital budgeting process that has been developed from a set of normative theories relating to the theory of the firm relative to capital markets.

The principles behind capital budgeting were developed within the engineering industry and are now deeply embedded within the power generation industry (Haka, 2007). However, the

long term implications of how capital budgeting techniques can impact on relevant future public policy still requires further exploration; policies including those too guarantee the sustainability of this industry. By examining public policy and issues of investment decision making in the UK electricity generation industry, a better understanding of theory can be developed, which in turn can contribute to better practice.

1.1 Personal inspiration for this thesis

Although a personal journey cannot be the sole impetus for academic research, such a journey is often drawn upon as an essential part of the process. To understand the reality of the actors observed it is important for the reader to acknowledge that although this was a longitudinal case study, conducted over six years, the researcher has been part of the industry for some 21 years. Therefore, this section will support the ontological position of the researcher demonstrating the validity of the project.

1.1.1– Background and rationale for the study

Teaching Management Accounting and Strategic Financial Management for the past 13 years has led me to analyse the strategic importance of decision making and the tools used to assist such decisions, forming a significant part of my academic career. Textbook scenarios and questions cover the basic numeric techniques of decision making and the vast majority of students leave the classroom believing that investment appraisal and decision-making is

simply a calculable exercise; providing a magical numerical solution.

Although my academic background is the main influence for this research, it does not wholly explain the inspiration for this specific study. In 2001, I began a master's thesis examining "The evolving role of management accounting information" within this industry when the New Electricity Trading Arrangements (NETA) was introduced. NETA brought lower prices to consumers, although this was not as significant as some had expected, and there debates revolved around whether reductions were a consequence of the new system or whether prices would have simply run their natural course without NETA. However, during this study I began to observe something within the industry that connected to my teaching. Whilst researching for my Masters, I observed that whilst prices began to drop, power stations that were not due to be shutdown began to be mothballed².

The prices were simply too low to sustain the cost of running these power stations and, with too much generation capacity, this represented a classic investment appraisal decision. The return did not match the risk of continued investment; therefore, abandonment was a priority. This was a good example to use in the classroom in order to demonstrate that investment appraisal is not simply a technique to use when making decisions about new investments but that it can also be applied to continued investment decisions, opening the door to other more realistic options.

² Mothballing is a common term within the industry when a power station is shut early. It is possible to re-start such stations with significant investment. Six months notice has to be given to the National Grid Company (NGC) before a power station can be removed from the grid.

However, as my Masters concluded, it became apparent that even though the long-term forecast was for prices to increase, security of supply³ was rapidly reducing. Few significant investments were being discussed at industry conferences, and the Office of Gas and Electricity Markets (OFGEM), the industry regulators, had devised a new system in anticipation that future investment would be market led without the need for government intervention. They believed that the market would rebalance itself and investment would follow market price curves in line with basic investment appraisal theory, as taught in most accounting courses.

The mothballing of excess capacity was an example of OFGEM's statement that their system was working (OFGEM, 2002), i.e. when reduction in prices prevented excess capacity. However, it did not explain why new investment did not begin to emerge when prices started to rise. During this period, a significant number of new environmental directives emerged from the European Union (EU). Discussions of both the European Union Emissions Trading Scheme (EU ETS) and the Large Combustion Plant Directive (LCPD)⁴ were taking place within the industry. Both directives would affect future investment decisions, but it was unclear how. By using basic real options theory, it became clear that it was wiser to make investment into research and development rather than to make decisions about future capital investment.

³ Security of supply refers to the ability of supply to cover demand, needing a contingency percentage to cover power stations on expected maintenance periods and unexpected shut downs due to technical problems.

⁴ Details of the timetable of the implementation process is provided in Appendix 1

After my Master's thesis was successfully completed, I maintained a close relationship with the industry and continued to attend industry conferences; aware that this was both useful for my teaching and in the knowledge that the commencement of a PhD was imminent. By 2006, the year I began this journey I conducted seven preliminary interviews⁵. I wanted my PhD to relate to the current industry, one that could be used for both traditional research purposes but also provide good teaching exercises. Through my own experience, I was interested both pursuing investment within the industry and following 'hot topics'.

An interesting phenomenon emerged during these initial interviews. The regulators and government were still proudly declaring that the NETA system was a supreme example of the UK leading the world in a liberalised market. The market was "working", with private investment being market led and consumers protected through a rigorous regulatory system. However, whilst the government was committed to environmental protection, the generators and consultants were discussing an impending crisis, the possibility of multiple blackouts within the next ten years. At industry conferences OFGEM stood firm, stating that all the scenarios they had examined gave no indication of a potential crisis.

This conflicting evidence propelled an interesting question to the fore: "***What roles do investment appraisal techniques play in the investment decision-making process within the UK electricity Industry?***" If, capital budgeting theory holds, why were there conflicting ideas

⁵ List of the initial interviews is provided in Appendix 2

about the future investment pattern within this industry? Surely, future investments within this industry could simply be modelled based on future price curves and risks?

In this initial phase of the research it was apparent that the conflicting messages were coming from the actors involved, and that there were contradictory structures within the system, including issues surrounding the protection of the environment, society and the shareholders. At the time my PhD began, the EU ETS and LCPD were emerging as significant features that would be instrumental in shaping the future of the industry. The LCPD itself presented a situation in which generators within the UK had to make expensive investment decisions regarding their coal plants. These decisions would influence future investment decisions generally within the industry. Given that my personal and teaching interests lay firmly within the investment decision making process and the strategic future of organisations, I determined that it would be appropriate to examine the role of capital budgeting. The revised directive would provide the thesis with a strong context. The next section of this chapter will provide a brief summary of the political, social and financial factors that impact on this study and the investment appraisal process within the industry.

1.2 The political, social and financial background to the industry

“The global power market . . . may be described as an odyssey, an epic journey into the unknown. Certainly, the pace of change continues to gather speed, with new products, markets, problems and solutions appearing almost daily, making it virtually impossible to predict with any real accuracy what form the power market will

hold even a year hence.” (Appleyard, 2001: 1)

Since privatisation in 1990, there have been revolutionary changes within the UK electricity industry. The process of privatisation for the electricity industry was immensely complicated as it was the largest privatisation plan the Conservative Government had been involved in, as the combined net assets were in excess of £42 billion (Surry, 1996 & Chesshire, 1997). It was anticipated that the closure of the nationalised industry would provide a more economically aware and financially viable competitive market. Although the government had encouraged competition within the industry via the Electricity Act 1983, this had failed because independent companies could not provide financially viable investments plans to compete with the Central Electricity Generation Board (CEGB), which used a 5% real rate to justify investments (Chesshire, 1997).

At the commencement of privatisation, the electricity industry was highly concentrated, divided into three major generators of electricity: National Power⁶, Powergen⁷ and Nuclear Electric⁸ (Dnes et al, 1989)⁹. In the first eleven years after privatisation, the industry witnessed an influx of international companies, and by 2001, the market structure of the electricity industry had changed dramatically. There were in excess of 40 generators, a power pool replacement known as NETA and full retail competition.

⁶ Separated into two companies, Innogy (2000) now known as RWE (2002) and International Power (2000).

⁷ Now owned by Eon since 2002.

⁸ Until 1996 this company's ownership was maintained by the Government (now known as British Energy)

⁹ This case study will focus on the generation side only of the industry – a detailed value chain of the whole industry can be found in Appendix 3.

Following the introduction of NETA the market became very intense, because, the industry had a full open market with too much capacity. Electricity prices dropped and the market became saturated. By the end of 2010,¹⁰ larger dominant players had either purchased smaller plants from the Independent Power Plants (IPPs) or from the banks. This left only 28 major power producers responsible for the bulk of the generation within the UK (91% in 2009); in the main, these were large International vertically integrated organisations based outside the country (Dukes, 2010). Although national statistics number the major power producers at 28, in fact, within the industry, the dominant players are the big six: Centrica, E.ON UK, EDF Energy, Npower Renewables, Scottish and Southern Energy and Scottish Power Renewables (Cornwall, 2009).

1.2.1 Regulation, sustainability and investment

As described in the first section of this chapter, the process of investment appraisal will be examined within the framework of the UK public policy paradox; that of trying to achieve environmental protection, security of supply and investment decisions within a privatised industry. In other words, this thesis will consider investment, regulation and sustainability.

The regulation within this industry adds an interesting character to research, because it is the vehicle within which the government can push their own political agenda, such as with

¹⁰ The analysis of the industry finished at the end of 2010, therefore all data was correct at this time.

regards to the environment, while at the same time it plays a significant role in the investment decisions made by generators. In terms of regulation, this thesis is comprised of both the LCPD¹¹ and IPPC (now known as the PCC)¹². Both are environmental directives that aim to protect the environment. The LCPD is a European directive aimed at reducing nitrogen oxide (NO_x), sulphur dioxide (SO₂) and dust emissions, to reduce problems such as acid rain. The directive is aimed at protecting the public from air pollutants that are considered to represent health risks (European Commission, 2001).¹³

The LCPD directive has a long standing history, with the first (88/609/EEC) published in 1988 (European Commission, 2001). The directive was updated following the signing of the Gothenburg Protocol (1999) which was intended to reduce “trans-boundary air pollution to abate acidification, eutrophication and ground level ozone, which includes, inter alia, commitments to reduce emissions of sulphur dioxide and oxides of nitrogen” (European Commission, 2001, p. 1). Although these protocols and directives were signed well in advance of the commencement of this thesis, in 2006, the practical application of how they could be met continued to be discussed when this thesis began. The continued discussions resulted in decisions regarding investments still being analysed in terms of investment appraisal techniques, and these decisions remained undecided during the first couple of years of the thesis.

¹¹ The power stations, which were directly impacted by the LCPD regulations, are listed in Appendix 4 and a detailed explanation of the regulation is provided in Appendix 5.

¹² It is important to acknowledge that from the 1st January 2011 the PCC became part of the Industrial Emissions Directive (IED). The IED consolidated the PCC and six other directives. For the purpose of this thesis the discussion will revolve around the LCPD and IPPC (the previous name of the PCC) due to the fact that when the main data collection took place these were the directives being used.

¹³ Although some of these references may seem outdated these were relevant for the decisions made within this research.

This LCPD directive required all installations to either opt in or opt out of the directive and to summarise the outcomes as succinctly as possible. For example, ‘opting in’ meant that the installation would need to invest in very expensive Fuel Gas Desulphurisation (FGD) equipment to reduce pollution, and ‘opting out’ would result in the installation only being able to operate for 20,000 hours, during the period from 2008-2015 prior to closing. This was an example of regulation being enforced with harsh penalties for non-compliance, but with no incentives.

The result of the LCPD is an intended 11,842 MW of capacity shutting down by 1st January 2016, out of 33,839 MW of plant capacity that was affected by this directive. To put this in perspective the statistics from Dukes (2010) show that the highest demand during the winter of 2009-2010 was 60,231 MW¹⁴, which is lower than previous years due to the economic pressures currently within the UK with maximum demand being 77% of the UK capacity (Dukes, 2010).

As can be seen in the previous section, regulation in this industry is directly connected to sustainability issues. Sustainability itself can be defined as “an economic state where the demands placed upon the environment by people and commerce can be met without reducing the capacity of the environment to produce for future generations” (Hawken, 1993 cited in Forsyth, 2011:27). According to this definition it is evident that sustainability includes environmental and economic issues as judged from a long term perspective.

¹⁴ A list of capacity and demand of the UK is provided in Appendix 6

Sustainability issues are paramount to understanding why investment has come to be recognised as a problem requiring analysis within this industry; as emphasised in the following quotation from Hendry (2010).

“We face the greatest energy challenge of our lifetime”

(Charles Hendry, Minister of State, 2010)¹⁵

As previously discussed, the introduction of the LCPD will remove capacity from the system, and this, in conjunction with nuclear closures¹⁶, is one of the biggest problems the industry faces in terms of sustainability. It is important to understand what sustainability means in terms of this thesis. Sustainability in this thesis relates to the *sustainability of the generation industry, the economy* of the UK and the *social requirement* for the provision of basic resources, in this case electricity. Sustainability in this study does not solely refer to the environmental aspects of this subject area, although it is in an important aspect it also considers the ability to continue generating the electricity required. At the crux of the sustainability issues within this industry are renewables. The industry has been provided with incentives to encourage investment in wind technology; however, they also have to invest in other more reliable sources, as the wind does not always blow. This means that the required

¹⁵ All quotations within this chapter were obtained through the collection of data from The Energy Forums in both presentations and panel discussions – a full list of these are provided after the bibliography.

¹⁶ A list of the nuclear plants closing is provided in Appendix 7

capacity for generation is significantly higher than has been required in the past. This in itself is causing concern for investors because many can expect to have ‘stranded assets’ on their balance sheets to cover the uncertainty of wind technology. Sustainability and regulation issues are therefore relevant when examining the role of any management control systems or techniques.

With sustainability not only considering the environmental targets within a social system but also the long term ability to meet the needs of the future generation new investment is required to provide electricity for future generations. The recent White Paper (DECC, 2011) acknowledges that, due to the scale of the investment required in the UK electricity generation industry and the failures in the existing market, the signals for private investment are inadequate to prompt sufficient investment. The current government has not only been left with energy policies that do not address the problem of the industry energy portfolio¹⁷, but has also been left heavily reliant on fossil fuels.

The reason that investment in new assets is a problem under liberalisation is that, as new investments are made, subsequent pressures on pricing occur. Ultimately, the decrease in pricing results in return on investment decreasing, making the investment unattractive in the short term (Dyner, et al, 2003). The gap between price and risk is a significant issue because the model private investors use to make decisions relies on returns and risks being compatibility, for investment to take place.

¹⁷ An analysis of current portfolio within the UK is provided in Appendix 8

Shareholders demand good returns on their investments. It is therefore unsurprising that the UK is now in a position where a significant proportion of generation assets are either coming to the end of their useful life naturally, or are closing because the owners' cost benefit analysis does not show profitable results. Investing in the necessary equipment to comply with new environmental EU legislation creates, in many cases, unprofitable projects. As the big six companies in the UK generation industry are international companies, their capital allocation for new investment can be considered from an international perspective. Therefore, if the cost of capital and risk is lower in another country compared to the UK, then that is where they will make the investment given that returns are higher. There is no loyalty to the UK.

Investment in the generation industry is encouraged by speculation around low security of supply, which will ultimately push up the price of electricity; however, an increase in pricing must also occur alongside secure policy. Increases in prices result in the short run price being above marginal costs, and this provides an additional contribution to cover the cost of capital (Redpoint & ES, 2007). Investment within this market cannot be completed quickly, as internal decision making processes must be undertaken to analyse whether investment is financially viable (which is the focus of this thesis). This is essential as the life of a plant can be up to 50 years. In addition, planning and applying for permits can take between 4 and 7 years (Euroelectric, 2004). Issues of regulation, investment and sustainability have created a paradox – these aspects do not connect together, and in fact, in some instances are contradictory. The government and regulators finally recognised these contradictions in 2011 in a new White Paper.

1.2.2 The White Paper, 2011

In July 2011, five and a half years after this research began the paradox described above was recognised by the government and the regulators and a White Paper was published; the White Paper was entitled “*Planning our electric future: a White Paper for secure, affordable and low-carbon electricity*”. It covers issues of investment, sustainability and regulation. The White Paper does not offer any detailed solutions; it merely sets the scene and states that a new industry framework is required if we are to secure the necessary investment to keep the lights on in the UK. The White Paper is very timely and provides additional evidence of the issues discussed in this thesis. The industry has been demanding a new industry framework since the conception of this study.

The uncertainty of not having such a framework has resulted in many investment decisions simply being left on the shelf because the generators could not afford to take the risk of making large investments without a clearer picture of the political agenda. As with all models, investment appraisal techniques are only as good as the information used within them, and unless appropriate industry frameworks are in place they can become political bargaining tools, rather than decision making tools.

The 2011 White Paper recognises that major changes are required to create a new industry framework to encourage investment. Below is an extract from the White Paper (DECC, 2011)

that outlines the government's proposals:

- 1 **“Provide a more efficient and stable framework for investors, ensuring that the cost of capital required for new-carbon generation capacity is lower. This varies by technology but the overall effect of the cost of capital reductions from Electricity Market Reform will be a potential saving of £2.5 billion over the period to 2030”**
- 2 **“Encourage investment in proven low-carbon generation technologies, but also allow new technologies such as *Carbon Capture Storage*¹⁸ (CCS) to get off the ground and allow them to become cost-effective and compete without support. This is vital to our ability to adjust to different scenarios for fossil-fuel prices”**
- 3 **“Boost competition within the market as it will provide the framework for independent generators and new investors in low-carbon generation. The ability of new entrants to come to the market will also be supported by action from Ofgem to improve liquidity”**
- 4 **“Lead to competition within and between different low-carbon generation technologies for their appropriate role in the energy mix, as we move to technology-specific auctions for contract towards the end of the decade, and technology-neutral auctions further in the future”**

¹⁸ Words added by author.

- 5 **“Introduce an appropriate policy framework in the electricity sector to contribute towards delivery of the fourth carbon budget, and . . .”**
- 6 **“... achieve our aims at least cost to the consumer”**

Source: (DECC, 2011:8)

This study will consider all of these issues as they affect the capital budgeting process: How can sustainability be achieved with so many outstanding questions? Does capital budgeting hinder or enable a sustainable industry?

Following this introduction of the practical elements of the thesis, the next section of this chapter will describe how an academic anchor will be provided, by detailing the theory and method employed within this research.

1.3 Theory and method.

Although the context in which this study rests is based upon three elements; investment, regulation and sustainability, the primary focus is on the role of capital budgeting. Capital budgeting research often favours normative and positivistic/empirical work, which examines various tools, or the complexity of tools used within the capital budgeting decision making process (Klammer et al, 1991; Collier & Gregory, 1995; Barniv et al, 2000; Brounen, De Jong, & Koedijk, 2004); as will be discussed in detail within Chapter 2.

However, few have analysed the capital budgeting process by assessing those actors who

participate in the decision itself (Haka, 2007). A distinct lack of research that examines the way in which accounting tools and knowledge are used to engage in a discourse to establish power exists; this ultimately assists individuals to realise their own needs (Miller & O’Leary, 2007). Investigating the role of investment appraisal from the perspective of the players within the industry provides an opportunity to examine it within an organisational and institutional context.

Therefore, the parameters of this study are to examine public policy around the question:

Can we keep the light on; investment, regulation and sustainability of the UK electricity Industry? The broad parameters will be achieved by exploring the ‘who’ and ‘why’ questions that relate to the academic gap in the literature within investment appraisal (Northcott, 1991; Miller & O’Leary, 2007).

This research will be a longitudinal field based study, which will draw on structuration theory (ST) as a sensitising device, to examine the macro paradox of investment, regulation and sustainability within the UK electricity industry in reference to the data. The data will be collected through interviews and from documentary evidence, to establish how investment decisions are made within this industry and what role investment appraisal plays.

1.4 Aims of the study and the contributions

This thesis has several aims, the first of which is to reduce the gap between theory and practice. This will be achieved by providing a comprehensive analysis of the wider role of

capital budgeting within organisations. With the contribution laying firmly in the field of capital budgeting theory, this thesis does not intend to provide a detailed analysis of regulation and sustainability. However, Chapter 2 will consider some of the research in this area to analyse whether any useful methods or theories can be derived from these two subject areas. Regulation and sustainability were used to understand the systems and structures that comprise the reflexive monitoring of the process of investment appraisal, within the introduction of the revised LCPD. The relationship between investment, sustainability and regulation in the context of this study is shown in Figure 1.

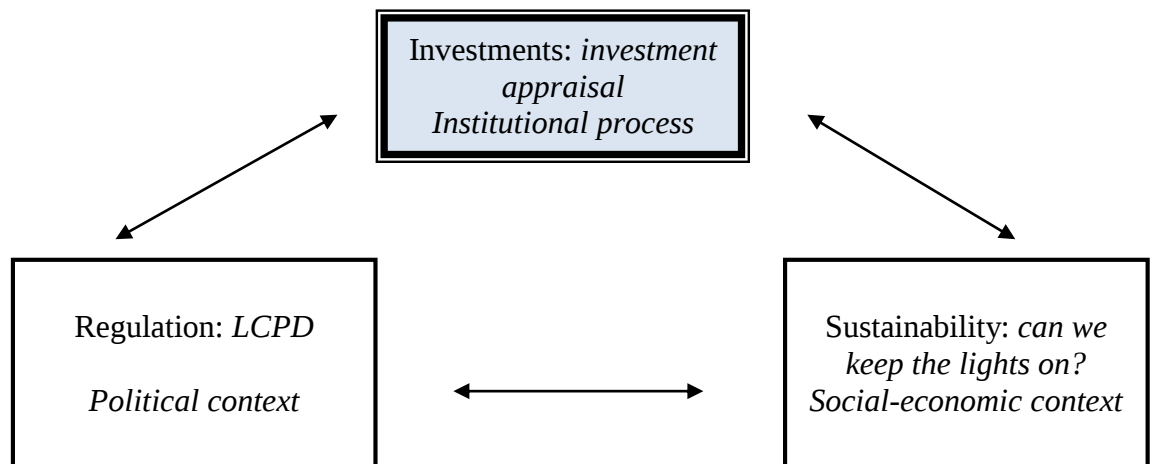


Figure 1 Focus of the case study

Although all three elements respond to each other, the main research question is based on investment; therefore, the main research question is as follows:

What roles do investment appraisal techniques play in the investment decision-making process within the UK electricity Industry?

However, based on the context of this study, which includes regulation and sustainability, and with the knowledge that both significantly affect the investment appraisal process, the research question has three sub questions. These sub-questions incorporate issues of regulation and sustainability, whilst at the same time linking directly to ST¹⁹.

- a) What frame of reference is used when communicating and making investment decisions?
- b) What resources are used when making investment decisions and what are the sources of power?
- c) What are the social, political and economic factors that influence investment decisions and have these changed over time? How and why are these investments selected?

These sub-questions will be used to structure an analysis of the thesis, each with separate analysis chapters. Each chapter analyses one of these research questions, with the findings chapter providing a discussion of the main research question.

1.5 Design and Structure of the thesis

The research design was not a sequential process and involved both an academic overview and industry input; Figure 2 represents the stages of the process. As can be seen, it was

¹⁹ This will be explained in detail in Chapter 4.

necessary to implement a process of moving backwards and forwards in order to create this design rather than following a linear process. The reflexive nature of moving to and from the empirical data and theory was used to make sense of both the research question and to analyse the empirical data.

The study was designed to encompass both an academic interest and to have relevance to the electricity sector; by theorising an industry problem, it was possible to unpick a complex situation. Vaivio (2008) advocates the balance of the practical and theoretical aspects of research and states that it is imperative to ensure the research questions are relevant, as Nørreklit et al (2006) argue, they must fit within the reality of practice. Vaivio (2008) suggests that over emphasis on the theory can make research unattainable for most readers, and of interest to only a very small niche academic community. On the other hand, over emphasis on the practical can separate it from the academic domain. Therefore, achieving a balance of an academic and practical nature was very important to this study.

The research questions were formulated using a process of going backwards and forwards from the academic literature and the industry to detect ‘phenomena of interest’, as can be seen in Figure 2.

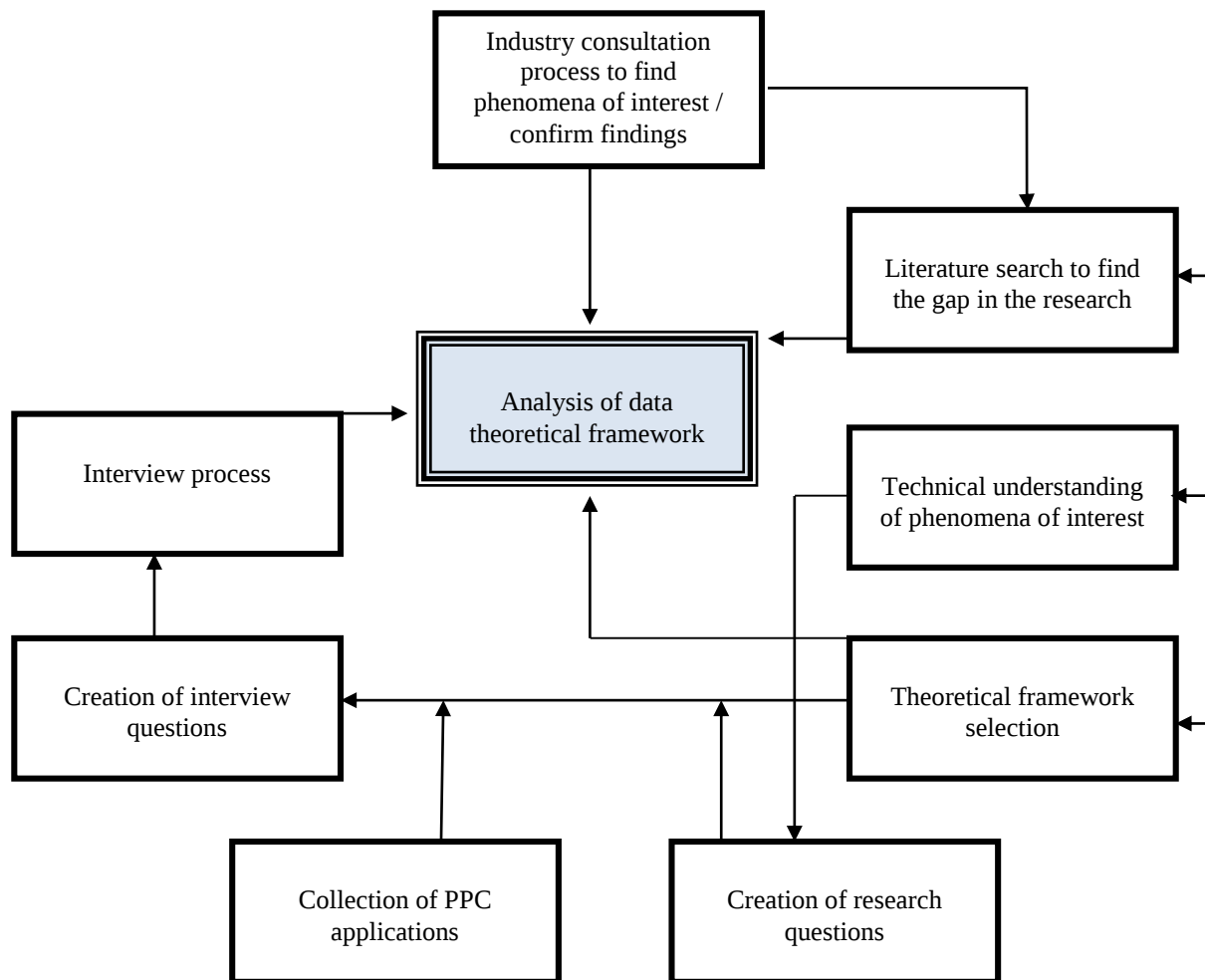


Figure 2 Research design

As can be seen in Figure 2, the literature review, the technical understanding and theoretical framework were the basic elements in creating a suitable research question. By reading the literature on both capital budgeting and evaluating possible theoretical frameworks, it was possible to create a clear picture of the methodological position of the researcher. By understanding the alternatives to this position, it was possible to situate the suitable lines of enquiry within methodological paradigms. As depicted in Figure 2, analysis of the data within

the theoretical framework is the one aspect of the case study that draws upon all the work within the previous chapters. In considering methodological reasoning, whilst using the data from other literature, industry knowledge and interviews, it was possible to intuit the role of investment appraisal. The research design helped to formulate the structure in which the thesis has been presented, and which will now be briefly discussed.

1.5.1 Chapter 2, Literature review on investment appraisal

Chapter 2 will provide a critical review of the literature, based mainly on investment appraisal, although sustainability and regulation will be examined briefly. The literature review will be used to explain why this project is using an alternative methodological position for the majority of the research conducted in this topic area, i.e. an interpretive stance.

The literature chapter will therefore be presented as a critical analysis of work undertaken on investment appraisal from the three main streams of management accounting research. The studies will be examined and presented by the various theories that rest within those positions.

By examining the three positions of management accounting and the studies already published in this area, Chapter 2 will help identify any gap that lies within the literature. The literature review highlights that the current research will focus more on what tools are used, rather than how they are used. Thus, exploring whether capital budgeting techniques are passive or strategic models will help to interpret the role of capital budgeting.

1.5.2 –Chapter three, Methodology and method

The methodology chapter will offer the reader a discussion of why and how interpretive work will be used within this research, examining both the epistemological and ontological position of this study. As the methodology is discussed, it will also be examined from a practical perspective by providing an explanation of the data collection process and methods employed, demonstrating a link between method and methodology. Whereas, Chapter 2 will examine whether capital budgeting techniques are passive or strategic and Chapter 3 will question whether these tools represent reality or constitute it.

1.5.3 Chapter four: Theory

Following on from the methodology section, Chapter 4 will examine in detail the theory used. As previously referred to in this chapter, this study will use ST. Chapter 4 will examine what this theory is and provide a detailed explanation of ST including a critique of Giddens' original work. In addition, it will demonstrate how the theory of structuration is consistent with the methodology, method and data within this thesis.

Following this critique, the chapter will analyse how ST has been used within the management accounting area. Using Englund & Gerdin's (2011) framework to discuss how management accounting can be researched, this case study, will draw upon Giddens' theory in a contemporary context. The chapter will conclude by presenting a model of how structuration will be used within the thesis, showing how the theory was used to refine the

research questions, design the data collection, and analyse the data collected.

1.5.4 Chapter five: Analysis “What frame of reference is used when communicating and making investment decisions?”

The first analysis chapter will explore the frames of reference used within the communication process when making investment decisions. Thus, providing the reader with the opportunity to identify how the industry implemented the LCPD within the UK, and how a frame of reference emerged through the consultation process of the directive. Examining both the environmental directive and investment requirements provides a classic example of how and why strong forms of communication emerge, and what role capital budgeting theory plays in this.

1.5.5 Chapter six: Analysis “What are the social, political and economic factors influencing investment in this industry – what are the norms and sanctions?”

As much as current resources play an important role in our understanding of the inter-play between the various actors, historical context play a far greater role in our understanding of how the structures and asset portfolios have emerged into the position that they have. By interpreting investment history at the government, regulation and generation level, this chapter will provide the reader with a better understanding of how the balance of power has altered over time. The historical context will also explain why the UK asset portfolio is in the position that it is today. By observing what are considered to be normal practices within the industry, it is possible to analyse why this industry has been left in a state of uncertainty

with contradictory structures.

1.5.6 Chapter seven: Analysis “What resources are used when making investment decisions, what are the sources of power?”

Understanding how various people within the industry have communicated their understanding of the current situation and the position that they would like to see reflected within the future regulatory policies, requires an understanding of resources. By understanding these resources, this chapter, will examine how they can be used to mobilise power; providing an analysis of how and why investment has or has not been made in the industry.

The use of resources within the industry is directly related to capital budgeting techniques, and this chapter will demonstrate how accounting can be used as a vehicle to mobilise power. Combining the use of accounting with both current resources and those resources that are missing will present an understanding of what is required to satisfy investment demands.

1.5.7 Chapter eight: “What role does investment appraisal play in the investment decision-making process within the UK electricity Industry?”

At the beginning of this chapter it was clarified that the purpose of this thesis was to analyse the role of investment appraisal in the decision making process within the UK electricity industry. Chapter 8 sets out to address this question by bringing together the findings of the

previous three analysis chapters.

Although Giddens' ST was used to analyse the individual structures within this theory in the preceding chapters, this chapter will synthesise this material in order to ascertain the key elements of the process, and if there are any necessary ingredients missing, in order to achieve the required investment. Therefore, Chapter 8 will examine the three structures within ST from a horizontal perspective, to examine the relational link between the three respective modalities; thereby, examining the role capital budgeting.

1.5.8 Chapter nine, Conclusion

The final chapter will provide an overview of the current political setting of this research and analyse how the research progressed, by providing a brief conclusion to each chapter. Thereafter, this chapter will assert the contributions in terms of methodology, theory and knowledge, which will then link directly to the policy implications of this study. As with all research, there are some limitations, and due to these limitations there are areas for future investigation, which will be identified within the final part of the conclusion.

Chapter 2: Literature review

2.0 Introduction

As previously discussed within the introduction chapter, a potential contribution of this thesis lies within the capital budgeting literature. Although this thesis covers issues of capital budgeting, regulation and sustainability, its focus is on actors and their use of capital budgeting. Therefore, this literature review will mainly cover the capital budgeting literature rather than regulations and sustainability literature. It should also be noted that the research included within this chapter does not constitute the main platform for providing data to use within the analysis chapters. The majority of the literature discussed within the current chapter focuses on entirely different research objectives and methodological underpinnings, which do not assist in interpreting the overall findings of this particular thesis.

As this chapter will demonstrate, there is only small amount of literature examining capital budgeting from an interpretive perspective and this is one of the potential contributions of this PhD. Therefore, this literature review chapter will critically analyse why there is a need for studies undertaken from an interpretive stance to advance knowledge within the capital budgeting area. Further literature will be reviewed in Chapter 4 to discuss structuration theory and to provide support for the data interpretation within this research.

Although the body of capital budgeting literature itself is vast, this chapter will pragmatically limit the analysis to ensure manageability of the data. Despite the extensive nature of the literature in this area, development within capital budgeting has been limited in recent decades (Miller and O’Leary, 2007). The limited research in this area is surprising in view

of the fact that researchers, since Bower in 1972 (cited in Miller and O’Leary 2007), have stated that there is a distinct need to address the ***process*** of capital budgeting.

The call by Bower (1972) highlighted the need to examine capital budgeting by combining both theory and practice, not only in terms of what is used, but also how it is used. As argued by Miller and O’Leary (2007), capital budgeting is useful for offering an understanding of more than valuation techniques, although the majority of mainstream work has focused upon this.

2.1 What is investment appraisal?

At the outset it is important to propose an acceptable working definition of what Capital Budgeting / Investment Appraisal actually is. Verbeeten (2006:108) states that “Capital budgeting practices are defined as the methods and techniques used to evaluate and select an investment project (i.e., the decision making role of the accounting system”. Capital budgeting is the practice whereby the actors within a situation attempt to assess whether a future project can achieve a rate of return high enough to satisfy their shareholders; this process includes evaluation of known and potential risks (Brookfield, 1995).

The decision making process involves more than simply numeric proposals such as payback, IRR and NPV (the traditional approaches). Pfeiffer and Schneider (2010:1) propose that the process of capital budgeting “defines a set of rules to govern the way in which managers at different levels of the hierarchy produce and share information about investment projects”, although this can be extended to the communication process within the organisation field, including with regulators, if involved. The investment decision making process also includes

assessment of human behaviour and the resources of the individuals involved in the process, the organisation itself and the institutions around them.

This study will explore the role of investment appraisal within both the energy industry generators' decision making processes and the context of the implementation of the revised Large Combustion Plant Directive (LCPD), thereby providing a research field that encompasses economic, political and social influences.

2.2 – Capital budgeting in mainstream accounting literature

An abundance of literature exists, that examines the types of capital budgeting tools used within the industry; i.e. Pike and Wolfe (1987), Klammer et al (1991), Sangster (1993) and Sandahl and Sjogren (2003). Alkaraan and Northcott (2006) are critical of these works because they contain many contradictory findings. In 1991, Northcott independently questioned the methodological underpinnings of most capital budgeting research, namely work accepting the dominant rational economic perspective, which often use survey studies. She argued that research based on surveys offers little depth and largely fails to adequately contextualise process. She explains that “DCF concepts were born of the economic literature and brought with them many of the basic premises of neo-classical theory” (Northcott, 1991:221); leading theorists to address ‘what’ and ‘how’ questions ignoring the importance of considering ‘who’ and ‘why’ (Northcott, 1991). Northcott (1991) concluded that unless researchers find alternative ways of examining capital budgeting the development of the theory would stagnate. Therefore, examining implementation issues and the process of negotiation is critical, as it helps to address the ‘who’ and ‘why’ questions. Although many of the studies mentioned above are not current, similar articles are still being published, such

as Bennouna et al (2010).

Following the criticism of studies based on positivistic work, in a subsequent joint publication, Alkaraan & Northcott (2006) used research methods primarily associated with mainstream work. They questioned the techniques used within Strategic Investment Decisions (SIDs) such as surveys and statistical testing; suggesting an extension of the results of the statistical testing by conducting interviews in order to explore questionnaire responses more fully.

It is not suggested herein that mainstream research, often referred to as ‘scientific’, is wrong, as this would suggest that being unscientific is correct. Interpretivists do not reject science simply the reductionist version of it. Nørreklit et al (2006) argue that the issue with mainstream research is that a reductivist view of science focuses only on one or two dimensions of reality, which although might be acceptable with ‘hard science’, it is not appropriate to social science.

Research from a mainstream perspective not only includes traditional capital budgeting techniques but also incorporates many studies that evaluate advanced techniques, such as real options. The time value of money is the foundation of both management accounting and finance techniques within capital budgeting, thus, many authors have drawn upon Myers’s (1977) concept that an asset can be considered as having the value of a call option and this is known as real options theory.

It is generally recognised that real options theory improves the traditional methodology of

models such as NPV (Brookfield, 1995). Real options theory considers that in situations of uncertainty, *waiting* before investing can bring more benefits to an organisation. Pawlina and Kort (2003) used real options to model market uncertainty in asset replacements. Through simulations they demonstrated that the direct effects of uncertainty were greater than those of strategic options, concluding that the timing of the replacement of assets would increase with uncertainty. However, the main assumption of this study was that individuals should pursue the option that produces the best financial outcome. This assumption should be viewed with caution; actors do not necessarily choose the option that provides the greatest financial benefit as there can be other political and strategic reasons behind their selection process, explaining why context is crucial.

A large percentage of studies on capital budgeting use methods embedded within a mainstream (positivist) methodology because capital budgeting theory itself evolved from financial economics (Haka, 2007). Given this belief, it was proposed that players in the market would pursue their own self-interest to seek out the best possible outcomes from all decisions. Therefore, the use of NPV suggests that if an outcome is positive then acceptance of this will provide the best possible outcome. Traditional economic theory also presumes that the cash-flow involved in such decisions is used to maximise owners' wealth and that future costs can be estimated (Ekanem, 2005). However, the complex nature of both economics and politics, within which businesses now have to make decisions, can result in the information within the models being inherently unpredictable. Producing reliable and accurate future cash-flow projections in a situation of unpredictability is very difficult, if not impossible. Even with the added use of abandonment and real options theory, accurate prediction in an environment of regulatory uncertainty is not realistic.

Arthur (1995, as cited in Mouck, 2000) questions whether capital budgeting techniques, such as NPV, can actually predict economic efficiency. Most managers are aware of the limitations of investment models and aim simply to rationalise their decisions based on limited information, utilising rational methods but acknowledging their restrictions. This suggests that there is a strong need to understand how, why and by whom these decisions are being made, and what role capital budgeting plays in this process.

2.2.1 – Mainstream research within the electricity industry

Within the electricity industry there has been an influx of research examining uncertainty through the use of real options, see Pawlina & Kort (2003) as discussed above. In addition, Fuss et al (2010) based their investment decision making analysis on uncertainty within the electricity industry, highlighting the impact of real options and portfolio theory on making optimal investment decisions regarding new technology and mitigating climate risk.

Fuss et al (2010) use a real options model to examine how investment decisions can become irreversible, due to the high levels of sunk costs involved when making these particular decisions. The modelling in this study includes the impact of risk investor type using Value-at-Risk (VaR) and Conditional Value at Risk (CVaR) measurements; however, the lack of understanding of how human behaviour and power influences such decisions exposes the limitations of the study.

Real option modelling was also examined by Yang and Blyth (2007) in the context of uncertainty over future carbon prices. Using the discounted cash flow approach, they attempt

to model how organisations within the industry might use real options to make strategic decisions. They concluded that it was not possible to quantify fully all the risks and uncertainties proceeding from government policy on climate change. The nature of changing regulations makes the modelling of such investments problematic, as will be explored in this thesis.

In addition to research based on uncertainty, investment risk is another area of concern within the electricity generation industry. As will be discussed in Chapter 6, investment risk relates to the problem of short term contracts producing price uncertainty. The lack of secure price predictions creates problems when investing in assets, especially those with a long life span. When exploring this area, Neuhoff and De Vries (2004) investigated the theoretical concept that a competitive market will provide sufficient incentives for investment to occur. Modelling risk adverse investors and consumers, they concluded that the lack of long term contracts excludes the theory of competitive markets, providing sufficient incentives for long term investment. Neuhoff and De Vries's (2004) conclusion is based on applying the utility function to individuals' behaviours.

Although risk and uncertainty are of significance to the research in this area, there have been a number of general studies analysing investment. Gross et al (2007) investigated the way in which generators consider future investment within the industry, attributing the importance of the investment process to the fact that shareholders' demand a good rate of return on investments. Gross et al (2007:42) noted that real options techniques are used infrequently within the electricity industry and the determinants of investment decisions include "expertise and qualitative perceptions of corporate decision makers". Although Gross et al

(2007) argue this point, they do recognise that the market itself and the structure of the industry, including regulation, influences the strategic decisions made by corporate decision makers. One of the main considerations for decision makers within this industry includes portfolio diversification. This diversification refers to the use of different fuel sources, each of which incurs different risks.

Furthermore, Gross et al (2007) reported that there were some games in play regarding making decisions based on predictions over whether new support would be provided when using of a particular technology. By analysing support in this way, companies avoid investing immediately, taking a wait and see approach to investment. When more than one company pursues this strategy, the government is then pushed to provide support as a matter of urgency. However, successfully pressuring the government in this way requires the company to predict the decisions its competitors will take. The ability to internalise some of the risks of using 'on balance sheet' financing can also influence investment decisions and Gross et al (2007) argue that smaller riskier projects are often favoured over higher risk decisions, because they do not require debt financing.

Investment decisions within the electricity generation industry have been the focus of attention relating to the regulatory impact of the EU ETS (Lauikka & Koljonen, 2006; Hoffmann, 2007). The EU ETS is the EU European Emission Trading scheme, which all the electricity generators across Europe are subject to. The LCPD directive, which is the contextual setting of the study, has been implemented to reduce Nitrogen (NO₂), sulphur dioxide (SO₂) and particulates, whereas the EU ETS has been implemented to reduce Carbon Dioxide (CO₂) emissions and encourage low carbon investments.

Lauikka and Koljonen (2006:1072) have centered their attention on the market within Finland and their study has analysed the impact of price risks and uncertainty in relation to the emission allowance within this scheme, to reduce CO². Real options' modelling was used within a hypothetical model to incorporate a single firm's optimisation point, using stochastic modelling. The modelling concluded that basic NPV modelling "ignores the value of the option to alter operating scale". However, the Finnish electricity market is very different from that of the UK, in that its asset base structure relies heavily on hydropower. The Nordic countries are very advanced in terms of climate issues within this industry, which is helped by their geographical landscape. Although this article was documented as a case study, the research leaned towards a highly positivistic stance not analysing any of the social implications of these types of investment. Therefore, Lauikka and Koljonen's (2006) study should not be confused with the case studies typically carried out within management accounting from an interpretive perspective.

2.2.2 Limitations of current research in the electricity industry

A potential problem associated with many of the studies completed within this industry relates to the way in which the contextual setting is recognised and considered. Generally, the social and political background to investment decisions is incorporated by predicting the future impact of statistical modelling. Analysing investment in this manner precludes an actual understanding of how actors influence variables such as politics. The majority of these studies do not include data collection to explain how the actors involved in such decisions influence the future with intentional acts; the notable exception being Hoffmann (2007).

2.2.3 – Agency and contingency theory and capital budgeting

Mainstream accounting research applies a vast array of theories. Haka (2007), in her comprehensive review of capital budgeting research documents, stated that agency theory is a favoured theory, used within the mainstream paradigm. Agency theory considers the agent and principal relations and the problems that can arise from information asymmetry. One example of agency issues within capital budgeting was presented in the work of Harris et al (1982), which explored management accounting issues by examining the agency problems created by the allocation of resources. The modelling process was used to study human behaviour.

Haka (2007:712) argued that studies using an agency based approach assume “individual utility functions represent a desire for more economic wealth, risk aversion, and less effort”. However, many alternative studies have observed managers favour ‘loss aversion’ rather than ‘risk aversion’; thereby questioning the basis of those studies that apply agency theory. Research that raises questions within agency based studies is generally taken from psychology-based research using theories such as prospect theory, drawing on the work of Kahneman & Tversky (1979).

Using the same methodology as Harries et al (1982), McNeil and Smythe (2009) were unable to analyse human behaviour and power resources, when examining issues associated with government policies and when distributing scarce resources, successfully. McNeil and Smythe (2009) set out to model agency problems and to examine the power of managers to extract more of the capital budget than they deserved. However, they subsequently questioned their own basis for measuring power, and the possibility of measuring it

objectively. The authors themselves recognised that “lobbying power and lobby efforts of division managers are not, practically speaking, directly observable” (McNeil and Smythe, 2009:65).

Continuing the search for an explanation of power and control, Wood & Ross (2006) scrutinised capital budgeting from a regulatory perspective studying environmental social controls. Social controls such as disclosure, subsidies, regulation and stakeholder opinion were observed to identify the most influential organisations when making capital budgeting decisions. Using an experimental method they discovered that decision makers are most influenced by stakeholder responses, followed by subsidies, regulatory costs and then disclosure. This led them to conclude that stakeholder perceptions are influential in assuring social control. Decision makers are well aware of how stakeholders’ perceptions direct strategic intention, suggesting that the extreme reductionist view that decisions are made purely on economic efficiency, is questionable. Wood and Ross (2006) conceded, that their use of modelling was limited and that further extension of the research through a case study would have provided a richer insight into how environmental social controls could be used more productively within capital budgeting.

An alternative approach to agency theory, when studying capital budgeting, is contingency theory, which claims that there, is no ideal way to structure a company, or to make decisions. Optimal solutions are contingent upon both internal and external influences. Approaches from this perspective have studied investment decisions from a contextual approach, such as that of Carr et al (2010), which examined the differences in the ways in which organisations undertake Strategic Investment Decisions (SIDs). By examining organisations according to

two scales, market orientation and performance, in relation to shareholder expectations, they were able to investigate variances within alternative capital budgeting techniques. They also extended their research to address the way in which techniques and information were used in the decision making process.

2.2.5 Alternative behavioural research and capital budgeting

Not all studies from a positivist modelling method accept the reductivist concept of individualism; some favour a more psychological/behavioural perspective. For example, Boyle and Guthrie (2006) examined the use of payback and NPV rules, stating that within a climate of uncertainty, intuitive responses to costs and benefits often take place. Intuition can explain the short term view of decision makers rather than following traditional positive NPV rules. Similarly, by considering psychological perspectives, while working within a normative framework, Roberts and Henneberry (2007) examined the investment decision-making process of property investors. By analysing investors through a normative-behavioural framework they found that investors have a tendency to take short cuts in the decision making process. They are typically influenced by sentiment, judgement and bias, adding support to Boyle and Guthrie's (2006) findings that intuition is a significant component of the decision making process.

Whilst documenting information regarding the selection of techniques within capital budgeting can be beneficial, the use of survey type studies and modelling studies does not further the reader's understanding of how these techniques are used. Additionally, they do not provide an insight into how these techniques work in conjunction with other managerial

roles, suggesting that an alternative approach is required to advance knowledge within this area. Mouck (2000:282) agrees, arguing that capital investment decisions involving complex decisions are part of “actor / artefact networks, as well as the related opportunities for economic actions are likely to be emergent phenomena that are generated by the interactions of actors”. In other words, decision making is a complex process that requires an understanding of the actors making those decisions and the institutional factors surrounding them.

2.3 –Interpretive Studies of capital budgeting

Haka (2007: 698) considered the array of research carried out covering “time horizons, project risk, market risk, time value of money, weighted average cost of capital, option values, value chain analysis, game theories, simulations etc...” within the capital budgeting area. Following her analysis, Haka (2007) emphasises that these investment decisions, no matter how technical, nevertheless rely on business experience and intuition as found by Van Cauwenberge (1996). Citing the influence of outside actors is also considered; Haka (2007) highlights the importance of understanding the influence of societal institutions upon capital budgeting practices.

Haka (2007) argues that one of the most difficult factors when making an investment decision, especially a long term investment, is uncertainty. Uncertainty can incorporate many issues such as long term pricing, market instabilities and future public policies. This study examines investment appraisal in a context that incorporates all of these issues. As will be discussed in Chapter 5, some of the uncertainties experienced by generators as a consequence of LCPD include unknown future price curves and, more significantly the potential for future

revisions to regulations and energy policy.

As cited by Haka (2007) field research in capital budgeting began with work by Istvan (1961) and Silhler (1964). Their studies recognised that in order to gain an understanding of how managers approach the decision making process it is essential to speak to the people actually making the decisions. Unlike the assumptions of the normative studies, discussed earlier, the decision makers in interpretive studies are assumed to have varying degrees of ability and the environment in which they operate informs their motivations. Actors intentionality play a significant role in the decision making process. Decision makers do not simply follow the sole aim of finding the optimum economic outcome, that is, they are not always driven by maximising profit (Ekanem, 2005 & 2007).

2.3.1 Interpretive studies in accounting literature

One of the few studies examining capital budgeting from a more complex perspective is that by Miller and O'Leary (2007). They considered how capital budgeting instruments link actors to their domains, investigating the idea that this link affects the development of future markets. Miller and O'Leary (2007) argue that the capital budgeting literature should address the need to resolve the lack of empirical studies on capital budgeting, by focusing on complex managerial and institutional process.

Previous to the work of Miller and O'Leary (2007), Shank (1996) used a single case study to explore the limitations of traditional NPV frameworks, considering Strategic Cost Management (SCM) as an alternative. On the basis that strategic considerations do not fit the traditional NPV model well, he examined company investments in two ways; using a

traditional NPV framework and using an SCM perspective that incorporates value chain analysis, cost driver analysis and competitive advantage. Shank (1996) concluded that a traditional NPV framework is more of a constraint than a decision making tool. The argument is based upon decisions being accepted, not because of the NPV driver, but due to the way in which the NPV framework is framed. Miller and O’Leary (2007) argue that NPV models are often used as mediating instruments. Having provided a selected overview of literature in the capital budgeting area the focus now turns to literature on sustainability and environmental regulation.

2.4 Sustainability in general

Sustainability is not a new area of research; however, it is becoming increasingly focused, with the environment becoming a more significant feature in terms of politics and corporate governance. Various studies have examined whether environmental and financial sustainability represent a paradox (Forsyth, 2011) and whether there are conflicts between environmental and economic discourses (Bonnedahl & Eriksson, 2011). Accounting has become a stronger feature of the research in this area leading to debates on what sustainable accounting actually is. Researchers considering sustainability now accept²⁰ that it is linked to three main factors: economics, social implications and environmental concerns (for examples, see Gold et al, 2013 and Grover 2013).

There are studies into sustainability in many different subject areas, such as that by O’Dwyer et al (2011), which explores the concept of legitimacy within the area of sustainability

²⁰ This will be discussed throughout the chapter, demonstrating different perspectives

insurance reporting. Drawing on Suchman's typology of legitimacy they examined the interdependency and interaction between pragmatic, moral and cognitive legitimacy. O'Dwyer et al (2011) explained that they applied a qualitative methodology, because areas of sustainability within insurance were rarely discussed leading to the need for an understanding of the processes. The choice of research methods by O'Dwyer et al (2011) reflects Miller and O'Leary's (2007) argument favouring more interpretive work in the area of capital budgeting.

However, not all the work carried out in the area of sustainability is based on qualitative methods. In fact, there are a significant proportion of studies in the area of sustainability that focus on measuring the relationship between different variables and sustainability factors. For example, Mulliner et al (2013), whose work is based on the housing industry, applied a multi-criteria method to analyse the affordability of sustainable housing. Within their study, they noted that measuring the study variables was very difficult due to the lack of availability of the necessary data. The authors concluded that it is difficult to measure sustainability with accuracy.

Although the Mulliner et al (2013) study used quantitative modelling to try and measure and rank sustainable variables against sustainability in different locations, other articles such as that by Hwang et al (2013) use highly quantitative methods, such as Data Envelopment Analysis, to create new models of measurement. Hwang et al (2013) based their study in the automobile industry on creating a model that could be used to measure the performance of desirable outputs (e.g. speed and efficiency) against undesirable outputs (e.g. emissions). Although the model was successfully built, but there was little understanding of the impact

of the model, which had yet to be tested in industry. The previous two studies, Mulliner et al (2013) Hwang et al (2013), are typical of quantitative studies in the area of sustainability, in that they attempt to either measure the relationship between variables of sustainability or create models to measure what the authors consider to be the variables of sustainability. Whilst this type of study can provide interesting data, they do not provide an understanding of the complex problems within sustainability, unlike the work of O'Dwyer et al (2011) where interpretive methods are used. The next section will analyse several studies that have been conducted regarding sustainability within accounting.

2.4.1 Sustainability in accounting

Sustainability in accounting often revolves around a discussion of the *triple bottom line* in (Gold et al, 2013), which considers the impact of economic, social and environmental factors within the business. Gold et al's (2013) paper is one such example; it analyses sustainable supply chain management in the food industry from the triple bottom line. The researchers rely on theory-led de-contextualization to expose a new way of business thinking. The conclusion of the Gold et al (2013) paper is that by analysing supply chains, and by examining the actors involved it is possible to highlight the win-wins and tradeoffs that occur from an economic, social and environmental perspective. In addition, Spence and Rinaldi (2012) argue that by incorporating an economic, social and environmental perspective into decision making organisations can provide CRS in terms of economic, environmental, and ethical governance. Using a case study approach, similar to Gold et al (2013), Spence and Rinaldi (2012) used Foucault's concept of governmentality to analyse the supply chain within a large supermarket. The key contribution of the Spence and Rinaldi (2012) is the notion that sustainability as a practice can be transformed across organisational practices. The senior

managers within the Spence and Rinaldi (2012) paper were able to embed sustainability within their own decision making practices and extend this through into the supply chain management by embedding the policies within their suppliers also.

Although there are many other papers similar to Gold et al's (2013) and Spence and Rinaldi's (2012) not everyone agrees that it is possible to achieve strategies, which can be successful from an economic, social and environmental perspective. For example, Gray (2010) argues that business narratives on sustainability do not realistically address the issues of sustainability; he argues they often focus on business sustainability rather than on sustainability of the planet. Gray (2010) states that most narratives of *business* sustainability are based upon un-sustainability in planetary terms, reasoning that it is organisations that are working against the sustainability of the planet.

This thesis does not aim to analyse the narratives of the actors in terms of sustainability focused on the planet, although this is naturally implied as the LCPD directive is aimed at creating a sustainable planet. As the thesis focuses on the decision making process it will automatically refer to sustainability as organisations view it. Having acknowledged the discourse of sustainability in accounting, the chapter will now draw attention to studies on sustainability within the generation industry.

2.4.2 Sustainability and the electricity generation industry

In developing the theme of decision making, there have been studies that specifically analyse investment and sustainability within the context of the international electricity industry.

Bobker (2006) examined the relationship between investments, infrastructure and urban sustainability as related to electricity capacity. Following Bobker (2006), Verbong and Geels (2010) analysed possible new ways of exploring sustainable transition, which includes analysis of infrastructure and policy developments. Furthermore, there is a discussion paper by Grover (2013) addressing issues exposed by both Bobker (2006) and Verbong (2010) in more detail, in the context of sustainable electricity generation in India. The Indian government pursued green growth in the electricity generation industry, and Grover (2013) provided a paper analysing the implications of considering the supply side management of nuclear generation and the support required through legal frameworks to ensure sustainability. Although there was no particular methodology or theory used in the Grover (2013) paper, what it did confirm was that sustainability cannot be analysed in isolation because, it incorporates issues of economics, politics and the longevity of an industry. However, the discussion paper also covers issues that are not relevant to this thesis, for example in that sustainability in India emphasises the importance of providing a system that covers the whole country because unlike the UK, not all villages in India have electricity yet. A further significant difference between the UK and the Indian generation industry is that within the UK there is a higher degree of regulation, which is the subject of the next section.

2.5 Regulation

Practitioners and academics have long questioned the use and success of regulation (Woo et al, 2005) and the appropriateness of specific regulation (Thomas, 2006), whilst others have examined the issue by creating frameworks that encompass varying types of regulation

(Hirschhausen et al, 2004). Within the utility industries researchers have examined different aspects of regulation, these include; Gas (Conrad & Waddams-Price, 2001), Water (Ogden, 1995; Burns et al, 2005 & Cashman, 2006), Telecommunications (Bromwich & Hong, 2000) and Electricity (Pagach & Peace, 2000; Warren, 2003; Thomas, 2004a, 2004b, 2006; Burns et al, 2005; Tillema, 2005). More recently, within the generation industry, researchers have focused on regulation as prompting restructuring trends (Hickey & Carlson, 2010) and the relationship between incentive regulation and investment (Haffner et al, 2010).

The impact of regulation upon industry is an important aspect to consider because the reaction of the industry typically determines the success of any given regulatory directive. Regulation and its impact upon industries has been considered in reference to documented policies such as pricing (Dnes et al, 1998 & Acutt et al, 2001) and yardstick competition (Ogden, 1995 & Burns et al, 2005). Environmental regulation has received increasing interest with the Environment Agency having to comply with both policies from the UK and the EU (Cashman, 2006). Therefore, the chapter will now analyse research into environmental regulation in general.

2.5.1 Environmental regulation in general

The area of environmental regulation covers many industries including the aviation industry. Much like the generation industry, which is the subject of this thesis, the aviation industry is considered a high polluting industry and as such is the subject of many research projects addressing the role of environmental regulation. Adler and Gellman (2012) provide a discussion paper examining the impact of environmental regulation, considering possible strategic methods for reducing risks from such regulation. As well as the paper encouraging

the industry to consider de-regulation in many areas, it also offers a good teaching discussion to assist in understanding the implications of this within this industry. It is an unusual paper in that no specific theory or methodology has been used; it is simply an exposition of the current discussions relevant to this industry.

However, as just stated discussion papers are not representative of the standard research in this area, with Dray (2013) providing a more typical paper consisting of quantitative modelling. Still researching within the aviation industry, Dray (2013) examines the same areas as Adler and Gellman (2012), looking at ways of mitigating risk as related to environmental regulation. However, rather than producing a discussion paper that examines the main concerns within the industry, Dray (2013) analyses aircraft lifecycles related to variables such as fuel prices, policy (regulation) and economic cycles testing different models. The aim of Dray's (2013) paper is not to provide an understanding of the implications of environmental regulation upon social practices but instead to offer the aviation industry a methodology for testing different lifecycles for aircraft. Analysing the lifecycle of aircraft illuminates the need for the industry to be compliant to regulation whilst also remaining accountable to the demands of stakeholders, leading to a discussion of studies on environmental regulation and CSR.

2.5.2 Environmental regulation in accounting

Accountability within environmental regulation is often subject to discussion in the context of CSR, for example see the work of Trendafilova et al (2013) and Crittenden and Crittenden (2012). Trendafilova et al (2013) analyses the professional sports industry and the growing attention directed towards environmental management. Using institutional theory through a

semi-induction method (also known as the abductive method, which will be discussed in Chapter 3) they examine why this industry has extended its involvement in environmental regulation, concluding that the media, as well as the government and regulators, play a substantial role in shaping this behaviour. Although this paper provides some new and useful insights into the way in which CSR is shaped by institutional forces, the authors concede that the study is limited because it only examined the industry over a short period. Trendafilova et al (2013) argue that a longitudinal study would have exposed more information about the behaviour within the industry and a clearer understanding of it.

Extending the analysis of CSR, Crittenden and Crittenden (2012) have written a discussion paper investigating how companies should manage the governance game when entering the emerging markets. Although environmental regulation is firmly embedded in mature and stable markets such as the UK, they explain that the game is very different in emerging economics because it is a turbulent market. The Crittenden and Crittenden (2012) paper is similar to those of Grover (2013) and Adler and Gellman (2012), in that there is no particular theory used. The work relies on a combination of research discussions that expose the issues both academics and practitioners need to consider and address. Crittenden and Crittenden (2012) argue that companies working in emerging economics cannot rely on CSR to guide their decision making, without considering all aspects of sustainability. Working in emerging economies and mature markets means the generation industry has been affected by unstable environmental regulations. Generators within the UK have invested in emerging economies where there is little regulation and also in mature markets where changes to the government provide new and changing regulations. The final part of this literature review will examine some of the research into environmental regulations within the generation industry, although

it should be noted that some of the capital budgeting reviews have touched upon this area already.

2.5.3 Environmental regulation in the generation industry

The generation industry is an industry that is required to produce profits for their shareholders in most capitalist economies. Therefore, it is understandable that many of the studies regarding environmental regulation focus on the costs of such regulation. Sueyoshi and Goto's (2013) study is one example of this, it examines the impact of regulation on advanced clean coal technology, in America. Adopting a method of Data Envelopment Analysis, this particular paper examines the desirable output (the production of electricity) and the undesirable outputs (the emissions). The conclusion of this paper is based on the need for more effective legal enforcement of regulations, as undesirable variables have increased in some areas, specifically CO² control. Whilst the conclusion of this paper was interesting, it is valuable to note two things; firstly the regulations on environmental control are vastly different in America than the UK, where environmental regulations are much more stringent, and secondly, although the conclusion was interesting it did not indicate how success could be achieved or the influence of the actors within the system.

The Burtraw et al (2012) is another quantitative study where they examine the impact on gas prices of demand and regulations to see which has the biggest impact on prices. The conclusion of this study was that although gas prices had the most significant impact, the two factors are interdependent. For example, the regulations that lead to the generation of power at coal plants more expensive are influencing the decision making regarding investments; an additional factor is that in America, the extraction of shale gas has become much cheaper.

The combination of regulations and gas prices will naturally encourage generators to work with gas. Although the quantitative analysis does not expose any of the behavioural action of the actors involved, it does highlight the interdependence of these various factors in complex decision making processes.

2.6 Conclusion

As can be seen from the previous sections, capital budgeting research has drawn upon concepts such as option valuations and value chain analysis. It is evident that the vast majority of work in the area of capital budgeting is within the mainstream paradigm and this often provides data relating to the techniques are used and also to which models identify variables of influence in the decision making process. However, this chapter was designed to identify the gap in the literature.

Examining decision making from an extreme reductivist perspective supports the assumption that all investments are made seeking optimum economic outcomes. However, it has been evident in some of the studies cited within this chapter, that decision makers are very knowledgeable regarding other stakeholders' objectives and aims, and this impacts the decision making process. It is accepted that the actors in the electricity generation industry are highly educated and very knowledgeable; they are not standard business people as most come from a very technical and scientific background. These actors are able to appreciate capital budgeting theory whilst acknowledging the limitations of theory. They are capable of applying a theoretical aspect to their decision making process, but at the same time incorporating their own needs and the objectives of other stakeholders.

This case study is not intended to provide documentary evidence of what capital budgeting techniques are used. This thesis will consider whether the tools used are passive or strategic techniques and this will help to address the role of capital budgeting – this is the gap identified in the literature. To address whether the tools are passive or strategic the study will adopt a similar position to Hoffman (2007), in that, this study will examine the impact of the LCPD whilst trying to understand the role of capital budgeting.

The study will not examine capital budgeting from a solely economic perspective, it will incorporate social and political aspects as suggested by Bobker (2006), Verbang (2010) and Grover (2013). To this end, the study will therefore provide an empirical analysis that examines the process of capital budgeting, contextualised within a complex situation of regulatory uncertainty. With the gap in the literature identified the following chapter will consider the methodology and methods that will be adopted within this study; those that have a direct fit with the research question as identified within the literature.

Chapter 3: Methodology and method

3.0 Introduction

The previous chapter, presented a selective review of the capital budgeting literature. Therein it was made apparent that traditionally research in this area has developed from a variety of methodological backgrounds, and that the majority of this work rests within mainstream accounting, resulting in a focus on techniques used and the subsequent outcomes. The present thesis does not intend to replicate these studies by following the mainstream paradigm. As Chapter 1 states, the study will instead investigate the role of investment appraisal to understand who uses it, why they use it and how they use it. In other words, it will focus on *process*. Closing the gap in the literature, this study seeks to determine whether capital budgeting tools are presented as passive mathematical tools, or whether they are strategic, i.e. used to gain a political advantage. To explore these questions, interpretive research (IR) will be used.

When applying an interpretive approach, it is important to observe how and why accounting information is used within the decision making process, rather than simply to focus on a single outcome. To achieve the aims of the research, the interviews and data collection took place over six years, 2006-2011, providing a longitudinal case study. Although the empirical data form a significant part of this thesis, the strength of IR is that it provides an opportunity to bring together both empirical data and theory, explaining how the decision making process evolved over the six years of the study.

Studying theory and practice in interpretive work can establish thick²¹ explanations through *abductive logic* (Lukka and Modell, 2010). Abductive reasoning overcomes some of the traditional problems associated with researching capital budgeting, as will be demonstrated by exploring the three main approaches within management accounting research: mainstream, interpretive and critical. Analysing the extreme forms of all three approaches will also support the argument that IR can develop the thick explanations required to interpret the role of capital budgeting. Thus, in outlining the methodology employed in the thesis this chapter includes a critical analysis of these three main approaches and the traditional separation of objective and subjective ontological positions. A critical evaluation of the ontology of research will provide the reader with an understanding of why IR, through abductive reasoning can facilitate an inter-subjective approach.

3.1 Methodology – epistemology and ontology within management accounting

For a researcher to be able explore management accounting he must first understand how managers provide validity in practice. As reasoned by Nørreklit et al (2006), research from any paradigm can be distorted if any one aspect of reality is ignored; facts, logic, values and communication must be linked. For example, IR can be distorted if there is a suppression of socio / economic logic and individual values. Nørreklit et al (2006:44) suggest that any research within IR, which chooses the extreme variant of social construction, would not be valid in practice because there is a logical requirement to “apply rational and logical economic calculations in choosing between opportunities and controlling its own future becomes incomprehensible”.

²¹ The word thick is used by the authors Lukka and Modell (2010). Other authors have used the term ‘rich’.

Research methodology is important because research is “informed by what we know philosophically and its application affects what we come to know” (Smyth & Morris, 2007:424). In simple terms, if a research methodology is not robust then, neither will be the research that it produces. However, the epistemological and ontological assumptions of the researcher are key determiners of the methodological positioning (Ryan et al., 2002 & Ahrens and Chapman, 2006). This methodological positioning determines whether the research is considered mainstream, interpretive or critical. The researcher’s epistemological assumptions relate to beliefs about what knowledge is, and ontological assumptions relate to beliefs about both physical and social reality (McKenna et al, 2011).

Mainstream logic is not aligned with the aims of this thesis. Exploring the role of capital budgeting by identifying the motives of those actors who make the decisions (the identified gap in the literature), this study represents actors as guided by strategy. Therefore, the actors in this study are recognised as highly intelligent, knowledgeable and not as passive social dupes. In addition, the political slant of critical analysis, searching for endemic conflict caused by social injustice, is not an ontological objective of this study. Rather, this study will examine the social interaction involved in decision making to interpret the role of capital budgeting, requiring an interpretive stance. The thesis has adopted ontologies and theories that avoid the debates of subjective versus objective and voluntarism²² versus structuralism, by using a multi-dimensional concept of reality (Nørreklit et al, 2006, Nørreklit, 2011 & Seal 2012). Thus, the research does not present exaggerated versions of any one paradigm as often

²² Voluntarism is the reliance on voluntary action to establish an institution; free will results in action that occurs without being restricted by constraints.

presented in frameworks such as that of Ryan et al (2002), as presented in Table 2 or Burrell and Morgan (1979).

The main differences in beliefs are illustrated in Table 2.

	Epistemological assumptions	Ontological assumptions
Mainstream accounting – uses positivistic methodology	Theory and observation are independent of each other, and quantitative methods of data collection are favoured as a basis for generalisations.	Empirical reality is objective and external to the subject (and the researcher). Human actors are essentially passive objects, who rationally pursue their assumed goals. Society and organisations are basically stable, and dysfunctional behaviour can be managed through the design of systems of control.
Interpretive	Theory is used to provide explanations of human intentions. Its adequacy is accessed via logical consistency, subjective interpretation, and agreement with actors' common sense interpretations.	Reality is socially created and objectified through human interaction. Human action is intentional and has meaning grounded in social and historical context. Social order is assumed and conflict mediated through shared meanings.
Critical	Criteria for judging theories are always temporal and context bound. Social objects can only be understood through a study of their historical development and change. Within the totality of relations.	Empirical reality is characterised by objective, real relations, but is transformed and reproduced through subjective interpretation. Human intention and rationality are accepted, but have to be critically analysed because human potential is alienated through false consciousness and ideology. Fundamental conflict is endemic in society because of social injustice.

Table 2: Three main approaches to accounting research

(Source: adapted from Ryan et al (2002: 41-43)²³

²³ Although the format of the information is different from the original source, the narrative remains the same.

Literature such as that produced by Kakkuri-Knuuttila et al (2007) and Vaivio and Siren (2010) explores some of the finer details of the three approaches depicted in Table 2. However, rather than researchers trying to follow a framework that categorises paradigms and follows a tick box approach, Kakkuri-Knuuttila et al (2008) and Lukka and Modell (2010) argue that it is important to understand the research objectives. Table 2 is a simplified categorisation of research paradigms, which is used for teaching purposes. However, as argued by Lukka and Modell (2010) research methodology is about research objectives and this includes the research questions and empirical context. A researcher must also ensure that the theory used within the research is consistent with the methodology adopted.

It is important that the researcher present the *reality* of his research rather than trying to follow the extreme categorisations. Managerial reality comprises four themes: facts, logic, values and communication (Nørreklit et al, 2006, Nørreklit, 2011 & Seal, 2012), as is diagrammatically depicted in Figure 3. Facts relate to data that is observed by the actors' logic, and should be considered as future possibilities, whilst values are both intrinsic and extrinsic, providing motivation for actors. The final aspect of analysing the 'truth gap' between knowledge and practice is the communication process. Nørreklit et al (2006) and Nørreklit (2011) argue that the gap can be closed by analysing facts, logic, values and communication in one study, preventing researcher exhibiting bias towards any one feature, as is the case with traditional paradigms. The research adopted in this thesis avoids the naive view of facts that are often used in the generalised simplification of the main paradigms – facts are not the same as things, they are constructed by the actors through a process of

analysis against things (Nørreklit et al, 2006)

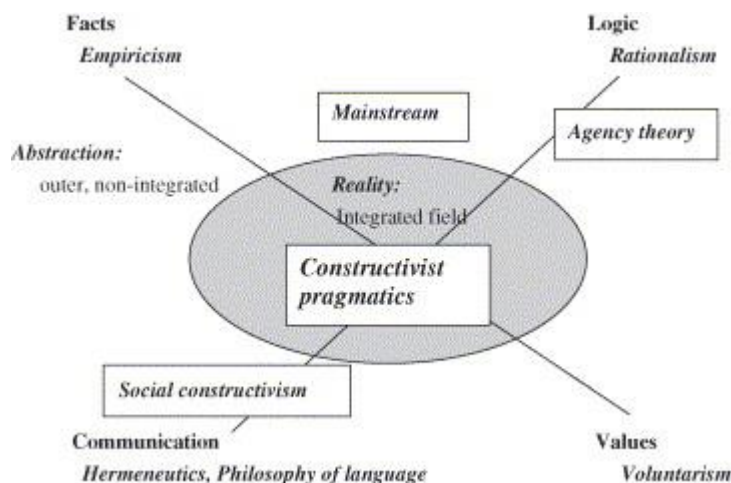


Figure 3 - Construct of reality, Source: (Nørreklit et al, 2006:50)

The concept of ensuring the facts, logics, possibilities and communication are all analysed within the research is particularly important in this thesis, because as stated in the introduction chapter, this research aims to address the gap between theory and practice. To narrow the gap between theory and practice it is essential to examine the reality of the actors, rather than the aspects of ontology that suit the author's chosen paradigm.

3.2 Interpretive research

Table 2 provides an explanation of interpretive work, which suggests that knowledge of reality, from an interpretive perspective is gained through social construction. Andrade (2009) explains that social construction can include language, consciousness, tools, documents, shared meanings and other artefacts. Interpretive work, in its extreme form, refutes the existence of an objective world, and interpretivists would also argue that explanations are generated as research findings emerge. As with all paradigms, there are

extreme versions of interpretive work. However, within management accounting, most interpretive work is established within a non-extreme version of IR, from an inter-subjective position, which is analysed below.

3.2.1 Interpretive research from an inter-subjective position

Lukka and Modell (2010) advocate that most research of an interpretive nature focuses on the inter-subjective rather than the subjective, supporting Giddens' (1979) argument that it is not possible to separate human interaction from structure. The inter-subjective is argued to create a set of shared meanings, which individuals, through the process of reflexivity, can use to create inter-subjectivity amongst each other. This means actors can agree on the meaning of something through the process of interpretation, which then becomes a fact in their own reality. Shared agreements have no objective basis as they have been created through a sense of understanding between more than one actor. Interpretive work provides research, which considers 'emic' understandings of actors meaning as characterised by a certain degree of thickness. Lukka and Modell (2010) use thickness to refer to the researchers' ability to combine theory with empirical work.

3.2.2 Validity and reliability in interpretive research

To interpret 'a shared set of meanings' in IR requires the data and the process of analysis to be valid (Nørreklit et al, 2006). For something to be valid it must be reliable; the notion of reliability is traditionally related to whether the instruments used for measurement and the resulting measurements are fit for purpose. If the measurements and instruments are judged suitable then they are said to be valid and likely to produce reliable findings (Ahrens &

Chapman, 2006). However, in interpretive research the issue of measuring instruments is not relevant because IR does not measure anything. Ahrens and Chapman (2006) argue that in IR the issues of reliability and validity take on different meanings and are difficult to separate. The question asked of data in interpretive research is “do they say valid and reliable things about the field?” (Ahrens & Chapman, 2006:833).

Nørreklit et al (2006) extend this argument and state that reliability refers to different professionals being able to take the same data and reach the same conclusion; within IR, this represents a position of inter-subjectivity, in which interpretations agree. Referring to validity, Nørreklit et al (2006) add that whether it is a statement, model or a set of concepts under analysis, these must correspond to reality. Validity is the examination of a common procedure that is “able to provide an adequate idea or picture of reality” (Nørreklit et al, 2006:44). Lukka and Modell (2010) augment this argument stating that a researcher, from an interpretive position, should question validity by examining whether a piece of research is credible. To achieve credibility, Kakkuri-Knuuttila (2008) asserts that interpretive work includes the researchers’ ability to balance subjective (the *emic* perspective) and the theoretical relevance (the *etic* perspective).

As referred to previously, Ahrens and Chapman (2006:833) discuss validity further by asking whether projects “say valid and reliable things about the field”, establishing whether the data is usable. Rather than creating rules to demonstrate whether the work is as scientific as studies from mainstream accounting research, we should be asking if the research fits reality and if the data used is valid. Lukka & Modell (2010:463) support this discussion and argue that validation should refer to “the ways through which the credibility of a piece of research is

developed and legitimised in front of relevant audiences”. IR is about describing social phenomena, which also requires explanatory elements (Lukka and Modell, 2010). There is a need to explore how explanatory elements of IR can be validated, whilst retaining the methodological stance of IR (Lukka and Modell, 2010); this will be examined in the next section, where the manner in which IR will be used for the purposes of this thesis is considered.

3.3 Using interpretive research in this thesis

Vaivio (2008) argues that interpretive research provides an opportunity to improve knowledge in management accounting. Analysing investment appraisal from an interpretive viewpoint helps to address some of the gaps identified in the literature when considering the process within complex managerial and institutional processes (Miller and O’Leary, (2007). This can be achieved because IR offers a rich insight into research phenomena.

The main research question in this thesis, as set out in Chapter 1, involves analysis of the role of investment appraisal within a situation of regulatory uncertainty. It also examines how decision makers interpret the role of investment appraisal as informing the decision making process. Vaivio (2008: 66) argues that the decision making process is a set of “complex bundles of interconnected, loosely coupled events that bounce back and forth. This involves many actors who represent diverse opinions, interests, biases, hidden agenda and competences”. Considering Vaivio (2008), it is necessary to examine how and why decisions were taken within the generation industry, by interpreting the stories provided by the different stakeholders. The stakeholders include the generators themselves, the regulators, the analysts and the politicians.

The study of management accounting can focus on the way in which humans interact, and given that the actors create the rules of accounting, we suggest that accounting systems constitute the reality of this process. As Giddens (1984) argues, this thesis takes the view that actors are self-aware, employing strategies that are embedded within the process. Interpretation of these strategies will help to provide an understanding of the role of capital budgeting. The resources and rules (Giddens, 1984), which are formed within accounting systems, can be analysed to understand the role such systems play in the decision making process, and theory can help to provide an understanding of how investment appraisal techniques can form rules and resources within the process.

The focal point of this interpretive research is capital budgeting theory, which includes numeric calculations and values. Accounting values can be seen as subjective from an extreme form of interpretive work; however, there are alternative perspectives. Mouck (2004), building on the work of Searle (1995), argued that some numbers are epistemologically objective translated through institutional reality. Although there is no objective basis for the rules and techniques that generate them, the numbers form a shared set of meanings – the inter-subjective position. Although Mouck (2004:525) argues that some financial values can be classified like this, he also makes it very clear that they have “an ontological subjective mode of existence”. Therefore, from an ontological viewpoint, the numbers are considered to be socially constructed²⁴; however, at the same time they are components of reality for those who use them. Due to the objective of this thesis, which

²⁴ Although the numbers are seen as socially constructed, the author accepts the view that these numbers are used within models that are based on normative theories- this will be discussed later in this chapter.

involves highly sensitive internal decisions, there will be no attempt to interpret the numbers although they will be accepted as part of social reality. The thesis will focus on the process of using the numbers (investment appraisal) and question the role of this process in developing the future of this industry.

When analysing decision making, the researcher cannot ignore the reasoning of NPV theory and the associated calculations, because they comprise one aspect of the logic managers often use to justify their decisions. The results of logics are the values produced from cash flow modelling. Facts relate to the data, as observed by the actors, and this relates to Mouck's (2004) argument that data can be epistemologically objective whilst being ontologically subjective. Therefore, the data collected must not be screened on a methodological basis; rather the collected data must contribute to an understanding of the reality of the actors involved.

As previously stated, this thesis will adopt an interpretive stance from an inter-subjective mode by applying the opinion of Nørreklit et al (2006) that facts, logic, values and communication must all be considered when collecting and analysing the data. Within this research it was important to collect data providing insight into the social, economic and financial aspects of the decision making process. Collecting such a wide range of data provided an opportunity to examine whether investment decision making is a complex managerial and institutional process (Miller & O'Leary, 2007).

3.3.1 Pragmatist Philosophy

Analysing multiple facets of IR provides an opportunity to analyse "much more than just

subjective ‘emic’ understandings of actors’ meanings. By focusing on the sequence of events and actions in specific, local contexts, it is in a good position to trace the dependencies (causal links) between examined mental states” (Lukka and Modell, 2010:463). Lukka and Modell (2010) propose that work that is IR by nature can in fact provide explanations from an external perspective. These explanations are based on ‘emic’ meanings and can be considered ‘thick’. By applying the empirical data and observing it through a theoretical lens, we can provide a thickness to the explanation.

Referring back to the issue of the inter-subjective, Lukka and Modell (2010) explain that social constructionism can be used to understand the role played by judgment and the inter-subjective. Expanding on this, both Nørreklit et al (2006) and Kakkuri-Knuuttila (2008) argue that a non-extreme view of social-constructivism connects both co-operation in a social setting and the theory of explanation. Lukka and Modell (2010) take this further and state that this means pragmatism can be considered the human philosophical stream of thought. Theory and knowledge only receive meaning when applied in everyday life, thus supporting the emic understandings within IR.

The role of theory is central in pragmatism because truth is always relative to theory and pragmatism accepts several truths. However, using a realist stream of thought, Lukka and Modell (2010) and Nørreklit et al (2006) refute the supposition that all truths are equally acceptable. Lukka and Modell (2010) state that IR can integrate social constructionism and a moderate form of realism by using pragmatist philosophy. Therefore, validity within IR can be examined through authenticity and plausibility, in other words, being able to research procedures so that the facts, theory, logics and values can be analysed in the context of the

environment in which they take place (Nørreklit et al, 2006). Authenticity refers to ‘defining the elements of any IR’; by this Lukka and Modell (2010) refer to the thick descriptions used within research. Plausibility relates to the credibility of the explanation produced, and is not related to the number of interviews conducted, rather whether the explanations given on the basis of the data are reasonable and relevant. The questions then asked in relation to the data, are whether the author can use it to provide a plausible account and to provide thick descriptions leading to explanatory indications.

Providing a plausible account requires an understanding of the social world and an ability to identify causal links to make sense of the data collected. Lukka and Modell (2010) explain that people develop meanings to situations and these can be used in the process of generating actions, making decisions and giving explanations. These explanations can be used to refine theory and help to progress work in academia and industry, thus providing a good response to the main criticism of IR: ‘how can research which cannot generalise, contribute to either academic literature or industry development?’

3.3.1.1 Abductive reasoning: How pragmatist philosophy will be adopted in this thesis

From a pragmatist stance, it is important to understand how thick explanations can be developed in order to offer useful contributions to academia and industry. Lukka and Modell (2010) offer a solution through the process of abduction. The use of abduction is not new to management accounting; Modell (2009) used this approach within an IR paradigm setting. The classical approach when categorising research into subjective and objective styles creates distinct forms of reasoning, inductive and deductive respectively. Deductive reasoning is used predominantly in analytical work through testing hypothesis, and inductive modes of

reasoning focus on generating new theoretical understandings based on empirical work. However, abductive reasoning offers the researcher theoretically informed explanations of empirical data, which, as Lukka and Modell (2010) explain, can sometimes generate surprising results.

Abduction uses empirical findings as the basis of analysis but does not reject the inclusion of theoretical knowledge which deductive research would use as an objective fact. Abductive reasoning uses theory to provide the most appropriate explanation, as established previously; theory is part of the actors' reality. The abductive and inductive approaches both begin with empirical data; the difference is that abduction uses theory to provide thick explanations of data.

This thesis integrates social constructivism with a suggestion of realism under a pragmatic philosophy. By using abductive reasoning an inter-subjective position will be attained, where the 'emic' and 'etic' will be brought together in order to develop thick explanations, thus, providing a new contribution to studies on capital budgeting theory. To be able to generate thick explanations of the role of investment appraisal, the data collected as discussed in Tables 3 and 4 will be used within a case study setting.

3.4 Suitable research methods for the chosen methodology

Interpretive work uses various research methods within management accounting research, for example, historical reviews, group discussions, case studies, surveys and experiments (Ghuri & Gronhaug, 2005). In the literature review, Chapter 2, many capital budgeting articles were reviewed covering a variety of research methods. However, those based on

interpretive work were found to use either a single case study or multiple case studies.

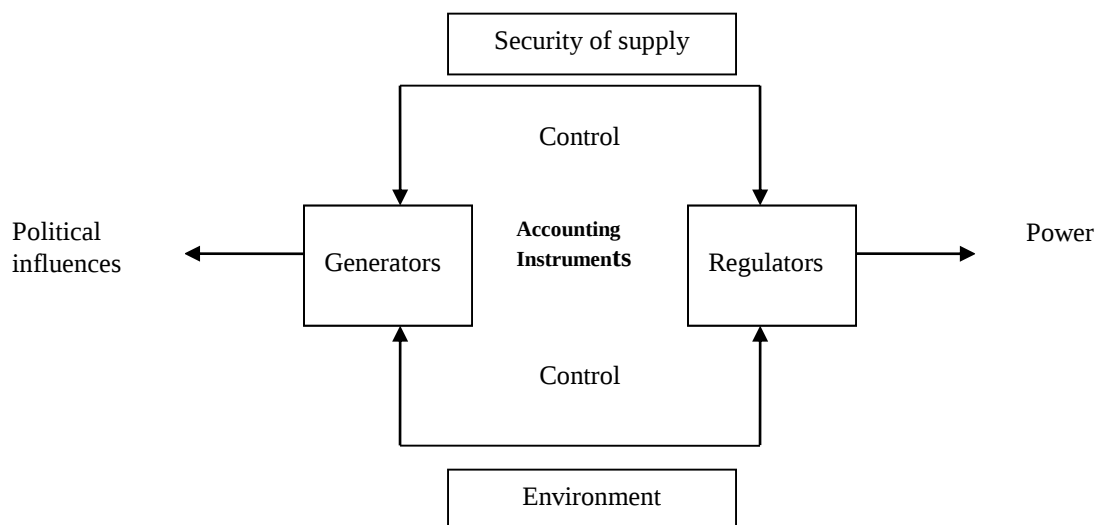
3.4.1 Case study method

Based on the nature of the research questions within this thesis, the research method selected is a single case study; however, it is a single case study based on multiple sources of data and companies. Although most single case studies are based upon one single company this is not the case for this study. The case study is referred to as singular because it is based on the impact of the LCPD and the role of investment appraisal within a single industry; the UK electricity industry. Many different organisations are consulted as part of the analysis, but they are not examined in detail, as it is combination of information from these different sources as it pertains to the industry as a whole that is relevant to the analysis in the thesis. By incorporating all the stakeholders it will be possible to represent the reality of all those involved in the decision making process, rather being limited to one actor's or institution's interpretation.

Battilana (2006) supports using several companies for a single case study. He argues that the use of an entire organisational field, rather than focusing on individual organisations, is a more efficient way of gaining insight into the practices of institutions. Illustrating the approach, Figure 3, presents the framework that is considered relevant to this project. The four boxes signify the main elements of the study; the generators, regulators, environment and security of supply. It was essential that initial contact with the actors within these four areas was established before the research began. The shareholders and political influences that sit outside the main framework were analysed using documentation, including shareholder reports and White Papers, as discussed in more detail in the next section. Within

the framework itself, the issues to be examined are shown to be control and power with accounting instruments as related to investment appraisal. The discussion concerning power and control will develop through the narratives of the relevant actors and documentary analysis.

The narratives of the actors were collected using semi-structured interviews²⁵; these were taped²⁶ and then transcribed. The actors were provided in advance with an explanation of the interview process²⁷ and how the data collected would be used. Throughout the interviews, cognitive interviewing²⁸ was used to minimise the impact of the time differential on the data collected.



²⁵ Discussion of semi-structured interviews provided in Appendix 9.

²⁶ Discussion of taping interviews provided in Appendix 10.

²⁷ The form which provided explanation about and requested consent for the interviews is provided in Appendix 11.

²⁸ Discussion of cognitive interviewing is provided in Appendix 12.

Figure 4: Industry framework to be examined

Adopting a case study approach proved useful for closely observing the behavioural issues that evolved through power and control struggles during the implementation of the LCPD. Thus, it can be argued that case study work helps researchers to get closer to the subject being researched (Hopper et al, 2001). As noted by Yin (1994) a case study approach is suitable for research that seeks to analyse contemporary phenomenon (the LCPD) in situations where both the phenomenon and the context (the struggle between investment, regulation and sustainability) are not well-defined. Therefore, to provide thick explanations, all the social, economic and financial factors had to be analysed²⁹.

3.4.2 Data collection – tools and design

The next section will include a table representing the data collection process that took place over six years. The following tables, Tables 3 and 4, provide an overall picture of the process, stakeholders involved, the method and the time period during which the different stages occurred³⁰.

²⁹ Data coding analysis provided in Appendix 113.

³⁰ The detail of the information within the tables is expanded on in the appendices.

Data collection stages and method

Data collection – stage	Stage one: Initial consultation with industry experts to identify industry hot topics.	Stage two: Gaining technical understanding of the regulations.	Stage three: Collecting LCPD documentation – regulation applications.
Method	• Initial unstructured interviews • Attending industry conferences • Collection of White Papers and public presentations	• Attending industry conferences • Informal discussions with industry experts • Collecting EU directives	• Unstructured interview with Strategic Environmental Officer of EA • Physical visits to some regional EA offices to collect information • Virtual collection of some documentation from the EA regional offices who operated in this form.
Notes	All methods included collecting data from consultants, analysts, generators and regulators – see Appendix 2 for full details of those involved.	Conferences attended included ‘ <i>Kyoto – at what price?</i> ’ London June 2006 and ‘ <i>Implementing EC emissions directives</i> ’, Germany, November 2006. Stakeholders included in informal discussions include regulators, associations, generators, Transmission team, Trade Unions, consultants, analysts, trainers.	The interviews were necessary to establish which stations had opted in and out - at this stage there was no publicly available information. During the collection stage, it became apparent that each regional office had requested different information and some had used documents as their personal libraries, resulting in much of the information not being available. Therefore, this was a limitation of the data collection process (see Appendix 14).
Time period	2006	2006-7	2008-9

Table 3 Stages 1-3 of data collection

Data collection - stage	Stage four: Secondary data collection on industry background	Stage five: Primary data collection on industry background and current decision making process	Stage six: Triangulation of information
Method	- Collection of White Papers - Collection of historical studies on the industry	Semi-structured interviews with actors in the industry who had knowledge ranging from 6-40 years spent in the industry.	- Attendance of two key industry conferences, <i>The Energy Forum Annual Conference</i>, London, Oct 2010 and 2011. - Industry debate, Institute of Directors led by Professor Dieter Helm, London, Oct 2011.
Notes	This collection process included industry and academic sources.	Companies interviewed included Scottish Power, International Power PLC, Drax, RWE Npower, Credit Sites, E.on, UK, Environment Agency – see Appendix 15 for full list. Interviewees were established through contacts made at previous industry conferences, initial interview stages and cold calling. Letters were sent out via email and followed up via telephone conversation. See Appendix 16 for letter sent out.	Attendance was twofold; first, to gain new knowledge about the latest White Paper and second to triangulate the information gained in stage five, with the knowledge of CEOs from the big top six energy companies and regulators. Key informants included the Minister of State, and actors within Scottish Power, International Power, Accenture, KPMG, Powerfuel, Mainstream Renewable Power, Costain, Citigroup, EDF, PWC. See Appendix 17 for the full list of key informants.
Time period	2009	2009-10	2010-11

Table 4: Stages 3-6 of data collection

As can be seen in Tables 3 and 4, the data collection process involved all stakeholders within this process. A variety of data collection methods were used to ensure that the data reflected the realities of those involved in the decision making processes. The stages were developed to collect facts, logics, values and information about the communication process. The thesis does not rely solely on semi-structured interviews. In fact, the interviews only form part of the data collection process. As explained in Chapter 1, the author has been close to this industry for over twenty-two years and throughout this period has attended industry conferences on a regular basis. Key informants have been met at conferences and the critical debates that have emerged at such events have provided a valuable source of information. Regular attendance at industry social events has also afforded the author an informal view of the industry, a view that many researchers would not be party to. However, it should be noted that the researcher is not employed within the industry.

To be deeply embedded in the research and being able to access the ‘emic’ understandings of the actors allows a researcher to provide thick explanations (Kakkuri-Knuuttila, 2008). Lukka and Modell (2010) argue that embedded within these ‘emic’ understandings there are explanations of actors’ behaviours. Both Kakkuri-Knuuttila (2008) and Lukka and Modell (2010) agree that the ‘emic’ understandings and the explanations should not be separated.

3.5 Conclusion

This chapter has provided an overview of the three main streams of MA facilitating an explanation of why IR is used in this thesis to interpret the investment decision making process and to develop academic literature and industry knowledge in this area, i.e. filling the gap. Lukka and Modell (2010) explain that IR can use the inter-subjective to provide

plausible and credible research by bringing the ‘emic’ and ‘etic’ together. By contrasting empirical data with theory it is possible to develop an understanding of the decision making process that bestows authenticity on this thesis.

Adopting an abductive logic approach makes it possible to analyse the role of capital budgeting within the decision making process in an inter-subjective manner. It is possible to consider the role of capital budgeting in this way, when NPV theory cannot provide a solution. This represents the researcher’s position that the facts, logic and values of a research setting cannot be ignored (Nørreklit et al, 2006).

Therefore, this thesis will provide a study that adds value to the capital budgeting literature, by presenting a longitudinal case study. The data for the case study was collated following a structured data collection process as discussed in Tables 3 and 4 and the data positions all stakeholders in terms of their independent realities. Extending the question posed in Chapter 2, ‘are capital budgeting techniques passive or strategic?’ this chapter raises the question ‘do these tools represent reality or constitute reality?’ The following chapter will question the role of theory in exploring these questions and provide a detailed examination of the theory of structuration. This theory has been selected because it provides a logical fit with the identified gap in the literature and the assumptions of the research.

Chapter 4: Theory

4.0 Introduction

The previous two chapters have reviewed the current literature and established the methodological underpinning of the thesis. It was argued that an IR approach could advance understanding of capital budgeting in conjunction with abductive logic, closing the gap in the literature identified by Miller and O’Leary (2007). The process Miller and O’Leary (2007) refer to as essential for future researchers to cover is decision making within complex managerial and institutional environments.

This chapter examines the theoretical context within which the ontology and epistemological beliefs accepted by the researcher can be embedded within an appropriate theoretical framework. The chapter aims to provide the reader with an explanation of structuration theory (ST), a discussion of how it can be used within accounting research and also to present a model showing how it will be used within this thesis. The model demonstrates how interpretations within this study focus on theory by sensitising the data to reflect the details of the policy debate that was taking place within the electricity generation industry at the time of the study. In the generation industry, the discussion around investment and policy is carried out without explicit reference to capital budgeting theory; however, a range of facts that are interwoven in their narratives determine the actors’ behaviours.

Using ST to bring clarity to the current situation this research will expose implicit financial theories and assumptions, which highlight the problems within the regulatory system. Therefore, ST theory will help to unpack a very complicated situation, making it understandable, and also providing an opportunity to represent ‘emic’ meaning in order

to create thick explanations.

ST is mobilised within this research in three ways:

- 1) To refine the research questions;
- 2) To design the data collection process; and
- 3) To analyse the data collected.

Each of these aspects will be examined throughout this chapter.

4.1 What is theory?

Ahrens and Chapman (2006) argued that a good field study is one that analyses a problem within the frame of a suitable theory, and in which the theory allows the researcher to contribute to evolving debate within the area under examination. Theory can be an important tool / framework for guiding the researcher in making sense of a complicated problem. In addition, theory can assist the researcher to analyse large volumes of data and more readily uncover any significant phenomenon. However, before understanding how theory can be used on a practical level, it is important to address the question ‘what is theory?’ Researching from an inter-subjective position requires the researcher to interpret the meaning of what is happening, thus, theory plays a role in pursuing that said meaning.

Llewellyn (2003) suggests that we move away from an understanding of theory born out of positivism. The mainstream perspective of theory is that of “an ordered set of assertions about generic behaviour or structure assumed to hold throughout a significantly broad range of specific instances” (Sutherland, 1975:9) with Weick (1989:517), adding that “as the range of specific instances becomes broader, the resulting ideas are more deserving of the label theory”.

4.1.1 Level of theorising

Qualitative work based on the methodological underpinning of paradigms, such as IR, does not relate to the definitions given by Sutherland (1975) and Weick (1989), because Llewellyn (2003:667) argues that theories are for “working and doing as well as reflection”. Rather than focusing on the word ‘theory’, it is important to discuss the role of *theorising*. Llewellyn (2003) proposes five levels of theorising and explains that alternative theories offer a different focus to research. The five levels of theorising that Llewellyn proposes are presented in Table 5.

Level	Theory	Focus
One	Metaphor	Imaging and rounding out experience
Two	Differentiation	“Cutting the pie” of experience
Three	Concepts theorise	Linking agency and structure through practice
Four	Theorising setting	Explaining how contexts for practices are organised
Five	Theorising structures	Explaining impersonal, large scale and enduring aspects of social life

Table 5: Llewellyn's five levels of theorising (Source: Llewellyn, 2003:667)

This research combines level three and four theorising. Llewellyn (2003) argues that level three represents the highest form of theorising, where the actor can be the unit of analysis. Level three explains how concepts such as ‘decision-making’ can connect the way in

which the actor and the structures work together, whilst level four provides an opportunity to analyse how the broader social setting or contexts are organised.

The research presented in this thesis is primarily concerned with the role of investment as a consequence of the decision making process. Therefore, it is important to understand how actors' actions and the structures within the generation industry work together. However, as this decision-making concept is considered within the boundaries of regulatory and sustainability issues (political and social), it is important to understand the impact of the wider contextual setting³¹ and how this setting has arisen.

4.1.2 Contributions of theory

In understanding the role of theorising within the context of this thesis, it is important to examine Vaivio's (2008) research, which develops the work of Keating (1995), by arguing that contributions from qualitative work come in three forms: theory discovery; theory refinement; and theory refutation. Theory discovery is when a qualitative piece of work seeks to explore an unknown phenomenon of interest and from the outset builds the foundations of a new theory. Theory refinement is the process of refining data collected through a pre-determined theoretical framework, allowing the data to be sensitised. Through the process of theory refinement, newly observed data can refine theoretical components, which were not previously explained in adequate detail, and can also add strength to previous explanations. The final contribution can be through theory refutation, whereby analysis of the data collected in a specific context can demonstrate that a theory regarding management accounting does not in fact fit with practice in a real organisational setting.

³¹ Although the wider context will be examined, the structural properties are still considered to be local and not external to the actor.

Therefore, IR can provide contributions in many different forms. The research presented in this study aims to use ST in order to explain the role of investment appraisal within the UK electricity generation industry. The contribution of this thesis will be to refine theory for use with capital budgeting. In refining theory at the individual actor level whilst incorporating the industry structures, this thesis will contribute by analysing evolving inter-subjective positions in the decision making process. The subsequent evaluation will provide an opportunity to understand the meaning of the role of capital budgeting by interpreting the actions of knowledgeable actors who are making decisions. The next section of this chapter will analyse the detail of ST.

4.2 Giddens – Structuration theory

ST is embedded within the epistemological beliefs and ontology of hermeneutics, which is the study of the theory and the practice of interpretation. Giddens (1984:3) accepts “human activities demand a familiarity with the forms of life expressed in those activities”; refuting the idea that institutionalisation is an outcome or process unique to individual actors. Giddens (1979) also contests the idea that institutionalisation is due to the existence of societal totality, by arguing that it is a result of “social practices across space and time” (Giddens, 1984:2). Studying a research question adopting structuration theory involves the observation of the ‘ongoingness of social systems’ and this involves both the analysis of continuity and change (Englund et al, 2011). To achieve this, it is necessary to observe the environment, which enables the reproduction of action.

Giddens’ (1979, 1984) theory of structuration is based upon several assumptions; two³²

³² The others will be discussed as the chapter progresses.

of these are that all social actors are knowledgeable, and that they have a conscious understanding of their actions. In this case study, the actors have knowledge of capital budgeting theory. The level of knowledge that an actor has is determined by two factors: the unconscious and unacknowledged conditions of the unintended consequences of action. ST also assumes that social behaviour includes day-to-day actions, which become routine (simply habits), and that social actors are constrained³³ in part by the structural properties of systems. However, it is important to highlight that although structures provide constraints this does not always result in actors accepting those constraints. Ultimately, Giddens (1979, 1984) argues that actors are responsible for their own behaviour; society is not a sufficient excuse to justify their actions.

4.2.1 The agent

The knowledgeable agent plays an important role in Giddens' ST. Giddens (1979) provides a diagram which represents the stratification of action to explain how action occurs; see Figure 4.

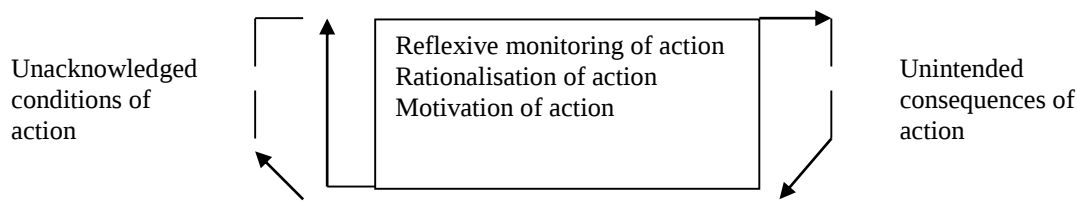


Figure 5: Giddens' Stratification model of action (Source: Giddens, 1979)

The model, shown in Figure 4, begins with the starting point that actors analyse their own actions and believe that others do the same. During the process of reflexive monitoring actors develop a firm understanding of the activities surrounding their actions. This

³³ The constraint of structures will be examined later on in this chapter.

reflexivity allows them to avoid the constraints or the contradictions inherent to structures, or even to purposefully use them. Giddens (1984) suggests that if required actors can engage in an explanation of their actions, although, under normal circumstances they are not asked to do so. Within the model, Giddens (1984) purposefully separates reflexive monitoring, rationalisation and motivation of action. The reflexivity process within this model is the “institutionalisation of knowledge.....the process of disembedding knowledge from those practices through which it is sustained in action” (Busco et al, 2006: 17).

The daily activities of an actor, as Giddens (1979) discusses, are not prompted by motivation; the action itself is a process of reflexivity and rationalisation. In terms of action Giddens (1984) states that it occurs only when the actor requires a deviation from the norm. Although actors can explain their actions, because they have a sound theoretical knowledge of their surroundings, they cannot typically explain their motives. It is here that one is able to understand the inter-subjective position as discussed within Chapter 3. Theory does not always explain the outcome of a process because motives can be driven by numerous factors and so sometimes surprises can occur. However, by reflexively examining the empirical data and the theory, it is possible to develop thick explanations of action that can contribute to both academia and industry.

Referring back to the stratification model of action, the actor himself is the one that makes the action happen through conscious motivation. However, Giddens (1979 & 1984) stresses the actor’s ability to choose to act as intrinsic to, and representative of, the dynamic nature of the individual. Giddens (1984) argues that actors are not social dupes; instead, they are existential beings.

4.2.2 Structures and systems

The three main principles of Giddens' (1979) structuration theory relate to 'structure', 'systems' and 'duality of structure'. Duality of structure will be considered in the next section. The structures that Giddens (1979) refers to are the rules and resources that are available within social settings. Unless rules and resources are used, they do not exist within the context of time and space, they are located only within the systems, existing as memory traces. However, the systems themselves are where the actors' actions occur, because the actor reflexively monitors these whilst drawing upon the structural properties. Systems cannot work without structure; the structure is both the enabler and the constraint for the action of the actor (Giddens, 1979).

Those structures that certain social groups' processes rely upon heavily are referred to by Giddens (1979) as 'structural principles'. These structural principles exist because of the knowledge that the actor has of the structures. The practices that are put into action by the totalities identified within the 'time and space continuum' are known as *institutions* (Giddens, 1984). In the process of interaction, it is the use of the structural properties by the actor, when producing or reproducing action, which triggers modifications to the structure. Giddens (1979) argues that the decision to accept a given structure lies solely with the knowledgeable actor. Therefore, the structure is both the impetus for, and a direct result of, action.

Of course, structures can co-exist where there are different rules and processes involved, resulting in unintended consequences and contradictions. Giddens (1979 & 1984) distinguishes very clearly between contradiction and conflict in social theory. Contradiction is the "opposition or dis-junction of structural principles of social systems, where those principles operate in terms of each other but at the same time contravene one

another” (Giddens, 1979:141). Contradictions emerge in two ways: through primary contradictions, as a constitution of societal totalities; and secondary contradictions, which are dependent upon or created by primary contradictions (Giddens, 1984). Neither type of contradiction should be confused with conflict, which Giddens (1984:198) explains as the “struggle between actors or collectives expressed as definite social practices”. Although Giddens (1979 & 1984) establishes distinctions between contradiction and conflict, he also states that the two often occur concurrently.

4.2.3 Duality of structure

The third principle, as referred to in the previous section, is the duality of structure. A combination of reflexive monitoring and structural properties forms the basis of Giddens’ (1979) duality of structure. The structural properties used within systems by actors are socially constructed (Giddens, 1979) and then these properties are created through the memory traces of the structures. Giddens’ (1979 & 1984) work analyses individual behaviour at the agency level and the micro level, and then identifies interactions between social boundaries and forces at the macro level - in other words, the institutions. However, he also states that social life is not determined by either individuals’ random acts or as a direct result of social boundaries. He argues that action is a result of human agency and social structure working in relation to one another. As social actors repeat certain acts this leads to the reproduction of social structure. Although Giddens (1979 & 1984) accepts that social structure is created through traditions, institutions and moral codes, he states that these only hold whilst the individual accepts them. As soon as the individual starts to reject them, they will be replaced by new traditions, institutions and codes.

The issue of subjectivism and objectivism was discussed in Chapter 3 in some detail. However, it also needs to be highlighted once more that Giddens’ (1979) proposal

regarding duality results concepts of action and structure that ‘presuppose one another’ therefore being part of this debate. He further argues that the relationship between the two is dialectical. In other words, it is not possible to distinguish between them because agency has elements that interact. The interaction that emerges through social activity involves moments in time that are in fact temporally, pragmatically and spatially intersecting one another (Giddens, 1979, 1984). Therefore, it is the concept of the dialectic of control clarifies how secondary contradictions can emerge, as actors and social totalities engage in the dialectic of control when competing over access to resources and / or how they should be used (Conrad, 2013).

4.2.4 Structures: signification, legitimation and domination

Giddens (1979) bases his theory on three inter-related structures, namely: signification, legitimation and domination. Although Giddens (1979) accepts that through reflexive monitoring and rationalisation of actions we produce intended actions, he also acknowledges that, through these processes, actors sometimes generate unintended consequences. Unintended consequences can translate into ‘unacknowledged conditions of actions’ and can subsequently feed back into the creation of future actions, without having been realised. That is to say, structures are both part of the process and the outcome of the reproduction of action. Giddens (1979:91) argues that, “although agents operate within structurally determined limits, they none the less have a certain relative autonomy and could have acted differently”, and this is because actors have the choice to exercise power or not.

4.2.5 Power

The process of action and human action within the ST framework is centred on power,

providing a means of accommodating both power and agency issues into a single framework. Giddens (1979) argues that for an actor to choose to become involved in a process or not they must have the power to influence that process by drawing on available resources. Giddens (1979) embeds power in his duality of structure, referring to resources as structural properties within social systems. The knowledgeable actor will automatically rationalise structural properties and reproduce them within their actions. Therefore, power is not itself a resource, nor is it isolated to conduct and action; rather it is part of the process of interaction.

As Giddens (1984: 16) states, “[R]esources are a media through which power is exercised as a routine element of the instantiation of conduct in social reproduction”, it is also part of the space and time continuum within which actors may have power exercised upon them, through the use of resources by their superiors. However, actors can also use these resources as a means of exercising their own power upon their superiors; this is what Giddens (1979) refers to as the ‘dialectic of control’, as discussed in the previous section.

Giddens portrays his notion of the ‘duality of structure in Figure 5

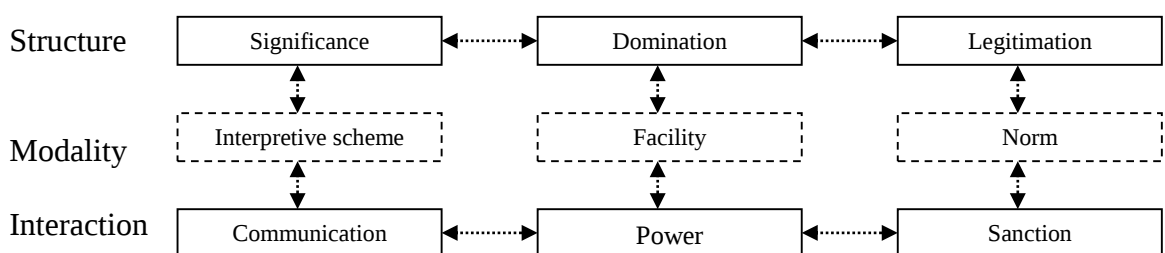


Figure 6: Giddens' duality of structure (Source: Giddens, 1984:29)

Figure 5 shows three structures: signification, domination and legitimation. Giddens' (1979) signification structure can be broadly explained as a theory of coding. The diagram shows that for an actor to draw upon a signification structure to justify action he will use

interpretive schemes (Giddens, 1979). These interpretive schemes then provide an understanding of the process through the use of communication. The second structure, legitimation, is explained by Giddens (1984) as the theory of normative regulation. Normative regulation relates to the values and ideals held within a social setting; therefore, the actor will draw upon structural properties in order to generate norms.

Giddens' (1984) final structure, domination, is separated into two distinct categories: the theory of authorisation, which relates to political institutions; and the theory of resource allocation, which refers to economic institutions. Giddens (1979) explains that the domination, or the power process, is dependent upon two types of resources: allocative resources and authoritative resources. Allocative resources refer to an actor's command of an object, which could mean items such as stock and other assets, whereas authoritative resources account for the ability of an actor to take command of other actors. It is within domination that power, conflict and contradiction are observed (Giddens, 1979). The greater the contradictions and overlaps of contradictory principles, the stronger the potential for conflict.

Although power, conflict and contradictions can arise through domination, the relationships between them are more complex than that. Domination and contradictions are both structural concepts; however, Giddens (1979) provides reasoning which states that domination is reproduced through the presence of contradiction. The concept of domination can be researched and understood by examining both contradiction and conflict; however, contradiction is only related to power through domination (Giddens, 1984). In other words, contradiction is related to power through the resources used within social interaction. The relationship between conflict and domination emerges through these power relations.

The process of resource allocation forms the relationship with the remaining two structures within Figure 5, because it is the way in which resources are used that determines the development or destruction of the signification or legitimation structures (Dillard et al, 2004). Giddens (1979) proposed that systems and structures are recursively related and due to the duality of agency and structures.

4.3 Criticisms of Giddens' ST

Although the chapter so far has introduced principles of ST, it is important to address criticisms of this theory. Giddens' (1979) duality of structure and ST has received many criticisms since it was written in the 1970s, including critiques at an ontological level and those based on the lack of guidance for applying the framework to empirical studies (Stones, 2005). For example, both Gregson (1989) and Hekman (1990) criticise Giddens' theory for not being supported by empirical work and examples. Heckman (1990) states that ST does not provide a viable epistemology, as this is something left to the researcher.

In addition to epistemological criticisms, Barley and Tolbert (1997) and Archer (1996) have highlighted the problems around 'conflation' of structure and agency. Giddens (1979 & 1984) explains that modalities are the processes by which structures are turned into interaction by the actors. However, Barley and Tolbert (1997) argue that by reducing structure into action or indeed vice-versa, it is difficult for the researcher to document them when writing about them.

Despite the problems associated with the original presentation of ST, Stones (2005) attempted to resolve some of these by taking structuration and its general ontology and converting it into an ontology in situ. Stones (2005) suggests that he has mobilised his

work into a more accessible form of ST that can be used with empirical work, referring to his work as Strong Structuration Theory (SST). Stones (2005) claimed that he achieved ‘ontology-in-situ’ by extending Giddens’ duality of structure into a ‘quadripartite cycle of structuration’, whereby he delivers a complex framework that includes four elements, namely: 1) external structures; 2) internal structures – which are divided into two further classifications; 3) active agency and 4) outcomes of action. He argued that separating internal and external structures helps to provide a way of analysing social actions; however, there are some concerns about approaching accounting research in this way.

Examining Stones’ (2005) work, Englund et al (2011) argued that separating structures into internal and external elements can create conflict within the duality perspective; however, they do accept that Giddens’ work is subject to interpretation. Englund and Gerdin (2011:583) also question the separation of structure, stating that Giddens (1984) argues “social structures constitute memory traces in the human mind, and exist only as they are drawn upon and reproduced by human agents in particular time/space locations. Accordingly, everything is internal and local”. Therefore Englund and Gerdin (2011) suggest that if you are to separate structure into internal and external elements, it can be argued that it will not follow the philosophy of the duality of agency and structure. In fact, both Kilfoyle and Richardson (2010) and Englund and Gerdin (2011) agree that by doing this the dualism that structuration aims to avoid is introduced.

Finally, although Giddens’ duality of structure provides a means of discussing the reproduction of the structures, Archer (1996) suggests the theory does not address the key questions that relate to why some social reproductions succeed and others do not. Although Archer’s comments were valid in 1996, there have been further developments to Giddens’ work, which have aimed to overcome some of the criticisms highlighted

previously. Kilfoyle and Richardson (2010) and Englund and Gerdin (2011) built on Giddens' work, and Englund and Gerdin (2011) offered a framework to address the question of why some changes are successful and others are not, in their 'drivers of structural change'. This is discussed in detail in section 4.4.1.2 – later in this chapter.

In addition to the specific criticisms of the theory, there have also been other more generalised comments made regarding its use by contemporary researchers. One argument has been that ST has had its 'fifteen minutes of fame' and its time has passed (Parker, 2000). However, following the work of Macintosh and Scapens (1991) and since Parker's comment, ST has been used as a sensitising device in many subsequent management accounting case studies. For examples of work using structuration see Ahrens and Chapman (2002), Seal (2003), Seal et al (2004), Conrad (2005), Joseph (2006), Jack (2007), Gurd (2008), Moore (2010) and Conrad and Uslu (2011). Englund et al (2011) noted that in the 1980s three articles were published using ST within an accounting context, nineteen in the 1990s and forty-three between 2000 and 2010, demonstrating that structuration theory is still considered a valid theory in this area.

4.4 What does ST offer accounting research?

The theory of structuration provides a framework that assumes all human action occur within the context of pre-existing social structures. The social structures within the focal system are governed by a set of norms and/or laws distinct from those in other social systems. Therefore, all human action is influenced by context. However, the structure and rules are not permanent and external, but sustained and modified by human action, thus giving equal status to human action and social structures. Englund et al (2011:2) claim that ST is "an ontological framework for the study of human activities", challenging mainstream accounting research based on positivism and functionalism. Hence, Giddens'

ST extends management accounting research to include the social and political phenomena that influence systems and structures that fall under examination (Moore, 2010).

Englund et al (2011) argue that Giddens' (1979) concept of duality made a significant contribution to accounting by offering a new way of observing the subject. Prior to this, it was typical for accounting to be presented as an objective reality or a subject that was dominated by structures; even though it was accepted that domination was constraining accounting practices. However, as already stated, Giddens' (1979) ST focuses on the relationship of agency and structures within the duality and that provides an opportunity to study human action from an inter-subjective perspective. Roberts and Scapens (1985) first introduced ST to the management accounting research world, and in so doing shifted the emphasis of the research from pure systems to an accountability of systems.

Englund et al (2011:2) declare that ST offers accounting research three unique opportunities:

- “1) the introduction of the duality perspective;
- 2) the conceptualisation of accounting as an interwoven social structure (consisting of signification, legitimation and domination); and
- 3) a basis for theorising both accounting continuity and change.”

Each of these will be considered in turn.

4.4.1 Duality perspective in accounting research

Kilfoyle and Richardson (2010) argue that Giddens' duality resolves the paradox of agency and structure. Englund and Gerdin (2011:582) argue that by removing the

separation of agency and structure, the researcher is able to reflect on how actors consider the structure and make changes when they are 'conditioned by this very structure'. It is important to understand how Giddens' ST differentiates accounting research from other sociological theories such as Actor Network Theory and New Institutional Economics. Kilfoyle and Richardson (2010) state that there are four types of research which consider agency and structure: 1) agency centred; 2) structure centred; 3) a combination of agency and structure; but where the distinct ontology of each are maintained; and finally 4) agency and structure which removes the separation between the two. The third type of research is known as a dualism approach and the fourth is known as duality - which is where structuration is positioned.

Duality within structuration dissolves agency and structure through "a recursive relationship between situated practices *per se* (social systems) and the virtual and underlying principles that generate such practices (social structures)" (Englund et al, 2011:10). This recursive relationship separates research on duality from that based on dualism, while still maintaining that social systems and structures are separate entities. Focusing on how ST can be used in accounting, Englund and Gerdin (2011) state that the duality can be analysed from a *flat/local* duality perspective. From the flat/local perspective, the term 'flat' relates the absence of micro or macro structures and 'local' means there are no external structures. By observing all the original ontological elements of Giddens' duality perspective, Englund and Gerdin (2011) provide a way of understanding how change can be observed within MACS.

4.4.1.1 Duality and methodological bracketing

Scapens and Macintosh (1990, 1996), Boland (1993; 1996) and Englund et al (2011) have heavily debated the adoption of structuration as a sensitising device when using a duality

approach in accounting research. The two methodological approaches applied to achieve this are an institutional approach and a strategic conduct approach. These approaches relate to the use of Lounsbury's (2008) institutional logics and Oliver's (1991) strategic approach to rationality. The institutional approach focuses on how structures are reproduced across space and time, whereas the strategic approach examines knowledgeable agents.

Englund et al (2011) argue that although methodological bracketing when conducting institutional analysis is both methodologically possible and legitimate; however, focusing on an institutional perspective may create a dualism problem, suggesting that accounting can be seen as a macro structure constraining the actors. This thesis will focus more on the roles of the knowledgeable agents using contradictory structures to create conflict. This conflict will then be examined to observe whether it is used strategically in order to force change. These changes are not to the accounting systems but to the accountability of investment decisions, thereby using structuration to assess strategic behaviour. Within Chapter 2 a question was asked about whether capital budgeting techniques were passive or strategic; it is therefore important to examine accounting concepts in terms of the knowledgeable agents using them.

4.4.1.2 A flat ontology of duality

Englund and Gerdin (2011) propose a way of interpreting structural change by building on the work of Kilfoyle and Richardson (2010). Kilfoyle and Richardson (2010) demonstrate change can be generated from both endogenous origins and exogenous shocks. Providing a flat and local duality perspective, Englund and Gerdin (2011)

advance on this, by incorporating triggers of structural change within drivers of change. Englund and Gerdin (2011) use the following table to analyse duality and structural change in accounting research:

		Drivers of structural change	
		Intentional agency	Unintentional agency
Triggers of structural change in relation to a focal social system	Endogenous	A	B
	Exogenous	C	D

Figure 7: Four principal origins of structural change (Source: Englund and Gerdin 2011:585).

Within this diagram, endogenous triggers relate to sources within the system, and exogenous shocks originate from outside the system. In addition to the triggers, this model suggests that change can be either intentional, driven by agency or unintentional. Within these boxes there are several ways suggested for effecting change within the framework and these will be discussed subsequently. Box A suggests that knowledgeable and reflexive actors are triggered to seek changes due to something that already exists within the system. Although the actors are bound by the structures within the systems, they are not social dupes and are capable of making conscious decisions to effect change. The actors create these changes to support their motives and intentions as conditioned by social structures, which are themselves contextually and historically conditioned (Englund & Gerdin, 2011). There are three reasons why this type of change is possible, and Giddens (1979) supports the first notion, relative to multiple structures and

contradictory systems, stating that it can be created by contradictory structural principles creating fault lines in systems, which can be an impetus for conflict.

The second notion of change in Box A refers to the unintended / unsatisfactory outcomes of earlier actions. The second reason for change is inspired by Giddens' (1984) explanation that actors can take collective action to alter structural arrangements. The outcomes of the collective action develop into unacknowledged conditions, which can motivate actors to instigate further changes.

The final reason for change in Box A is based on the transposability of social rules, based on DiMaggio (1997, as cited in Englund and Gerdin, 2011). This reason is closely related to the second reason, although it is differentiated by the actor's motivation to change the current structural arrangement. The final explanation emerges because existing social rules are not apt for the aspirations of the actor, leading him to extend or modify those rules.

Box C in the framework represents intended structural changes from exogenous sources. Englund and Gerdin (2011) stress that although the structures influence change, they are not influencing them in a dualism manner, and actors are not pushed towards change. The actors in fact pull away from external social systems to 'absorb' change, which can take place in two forms: the first when multiple social systems are seen to overlap, and the second when actors copy external structures from other social systems.

Actors that are part of an overlapping social system become aware of alternative structures, which will then compete with those in the 'focal system' (Englund and Gerdin, 2011:587). In situations where competing structures can emerge through overlapping social systems actors can take advantage of the rules and resources present, and use them

to legitimise their actions in the 'focal system' (Whittington 1992, as cited in Englund and Gerdin, 2011). Giddens (1979 & 1984) supports this theory when he stresses the need to analyse changes resulting from external impacts.

Continuing to focus on intended exogenous influences, the second reason for change is based on imitation of structures from other social systems when there is uncertainty in the 'focal system'. DiMaggio and Powell (1983) argued that actors can seek solutions from external social systems when there are no obvious goals within the current system or when technology is misunderstood.

The third box, Box B, in Englund and Gerdin's (2011) framework is based on unintentional change, as triggered by endogenous sources. Kilfoyle and Richardson (2010) explain that unintentional change can occur from within the 'focal system'. The relationship between structures and agency can be complicated when the agencies have to interpret the structures and reproduce them. The first argument is based on Scott's (2003) work, which states that ambiguous structures have to be interpreted by the agency and interpretation can result in variant solutions arising, unintentionally triggering change. Giddens' (1984) argument about this situation is that actors have to respond to situational contingency, meaning that they can draw upon existing structures in changing circumstances, resulting in unintended actions. Englund and Gerdin (2011) stress, once again, that structures are not dominant and that actors can draw upon or modify the way in which they use existing structures to respond to changing circumstances.

The final reason for change in Box B is also based on Giddens's (1979 & 1984) discussion of the 'stratification model of action', which examines the reproduction of action and reflexivity. Sometimes, during the process of reproduction and reflexivity, unintended

consequences occur and the actors are required to respond to those consequences. The responses to unintended consequences emerge creating new circumstances, thus, actors who are not seeking change are required to respond to their own previous actions.

The final box, D, in the analysis of structural change includes unintentional change as triggered by exogenous influences. Changing conditions affecting the social systems outside the 'focal system' can influence changes within. Englund and Gerdin (2011) stress that this must be viewed from a flat and local duality perspective; suggesting the actors themselves construct the exogenous sources as a trigger for change, thus change is not forced upon them. Rather, external events are internalised through their reproduction of action. The two reasons given for change in Box D relate to changing conditions within social systems (Giddens, 1991) and mechanisms for diffusion processes (Scott, 2003).

Changing conditions within social systems can occur when the conditions of social systems lead to change. For example, Giddens (1991) discusses situations wherein a scarcity of resources impacts on how a 'focal system' responds. These exogenous influences can trigger actors to respond to, and make changes, even though they were not originally seeking to make changes. Englund and Gerdin refer to Giddens (1990), and state this is still observed from a flat and local duality because the actors make changes based upon their own motives and reasons. Scott (2003) argues that the actors can cause unintentional change in the 'focal system' when there are institutional carriers, i.e. actors who transfer practices and structural principles from one social system to another.

Although Englund and Gerdin's (2011) framework is offered as a way of studying embedded actors who are influencing and creating change in management accounting practices, it also helps to address change in a general way from both a flat and local duality

perspective. In doing so, it eradicates the problems that arise from separating structures, thus resolving the issue of duality and dualism. Supporting the need for this type of framework, Lounsbury (2008) called for research in management accounting that extends work examining micro-processes across intra-organisational situations. Around the same time, Ahrens and Chapman (2007) argued for more studies to stretch analysis, to include more institutional processes. Englund et al (2010) suggest that structuration's flat ontology of embedded agency is a way of realising both of these concerns, allowing the researcher to explore change using a flat local duality perspective. Although Englund and Gerdin (2011) offer this framework as a way of more fully comprehending change from an accounting perspective, the researcher proposes that the framework can also examine how accounting is used as a vehicle for creating change.

4.4.1.3 Using a flat ontology with pragmatic constructivism (PC)

In Chapter 3 Nørreklit et al's (2006) PC was discussed. The use of PC allows researchers to close the gap between practice and theory by analysing reality through the four dimensions: facts, values, possibilities, and communication. By observing all four dimensions of reality the problems associated with reductivist research are avoided.

PC is used within this research as a way of conceptualising the ontology of accounting research. In a PC ontology, reality and the world are not the same thing (Nørreklit et al, 2006) because actors construct their own reality through the integration of facts, values, possibilities and communication. In other words, social reality is different from physical reality when observing social phenomenon. Both the flat ontology of Englund and Gerdin (2011) and the PC of Nørreklit et al (2006) are based on a social constructivist approach, but not in an extreme form. That is to say neither PC nor the flat/local ontology from

Englund and Gerdin (2011) view accounting as an external system that dominates the actors within systems. Both models from Nørreklit et al (2006) and Englund and Gerdin (2011) are open in that they offer a framework to sensitise the data. PC guides the researcher to avoid a naive representation of facts whilst the drivers of structural change in a flat local ontology, helps the researcher to understand the change based upon the facts of the actors. PC and the flat and local ontology are two different models, yet they are not incompatible.

Nørreklit et al (2010) argue that an accounting framework based upon theories such as economics can guide scholars and practitioners. Englund and Gerdin (2011) explain that these frameworks can be described as stocks of knowledge that actors draw upon during their interaction with other actors. At no stage is the author suggesting that accounting is an external structure or indeed a structure in itself. Nørreklit et al (2010) state that accounting theory is stable skeletal in practice; although, the theory can be questioned when problems emerge, suggesting these are subject to change as are the structural properties within Englund and Gerdin's (2011) flat/local ontology.

Nørreklit et al (2010: 768) are in favour of accounting researchers having “an overarching conceptualization of practice”, which means they are suggesting that all researchers should consider facts, values, possibilities and communication as a study of the reality of the practice. However, whilst observing these concepts Nørreklit et al (2010) add that such concepts are theory loaded and integrated. The ST that Englund and Gerdin (2011) base their flat/local ontology on uses structures that are theory loaded and also entwined. Therefore, PC is used in this research to analyse facts, logics, possibilities and communication within the actions of the actor and within the structures of the system.

The author therefore argues that the flat/local ontology used within this chapter is compatible with the PC. As the authors of PC argue: “The centrality of integration in pragmatic constructivism encourages a variety of theories and methodological approaches in future research and practice. The critique that pragmatic constructivism is restrictive is misplaced. It provides the basis for a new way to analyse behaviour in the economic sphere of society” (Nørreklit et al (2010:771).

4.4.2 Social structure is comprised as three interrelated structures; signification, domination and legitimation

Englund et al (2011:495) argue that the second contribution that Giddens’ ST offered accounting research is the ‘conceptualisation of accounting as an interwoven social structure’. This section will examine how ST has been translated into the elements of management accounting research and consider some of the articles that have applied this theory through the use of social structures. Macintosh and Scapens (1990) and Macintosh (1995) proposed that ST offered an opportunity to explore MACs within a social and political context. Macintosh and Scapens (1990) argue that the three structures that Giddens includes in his duality of structure: signification, legitimation and domination reflect meaning, morality and power, respectively.

Macintosh and Scapens (1990) explain how management accounting can be viewed in relation to a signification structure. Signification relates to the rules, concepts and theories of the organisation in question and the Management Accounting System (MAS) facilitates meaningful communication between managers relating to the various structures such as profit, economics and accounting concepts. Interpretive schemes provide a cognitive basis of assistance to actors so that they may understand their own actions and

those of others (Macintosh & Scapens, 1990). Understanding their own action, the actors draw upon the meaning of the structure whilst reproducing its properties. In other words, interpretive schemes represent a “frame of reference” (Conrad, 2005:4).

Macintosh and Scapens (1990) consider the concept of profit, which exists outside time and space, observing that managers have a shared understanding of what profit actually is prior to integrating it within their MAS. It is the social construction of the MAS, created through the shared understanding of the knowledge of stocks from accounting theory, which locates profit in time and space. The use of that system also aids the communication of profit. Dillard and Roslender (2010) explain that accounting codes include items such as rules, concepts and theories, and that examples within accounting include depreciation, transfer pricing, profit and discounted cash-flows. These codes are used within ‘interpretive schemes’ by managers to understand and make sense of an event. Therefore, within this project interpretive schemes need to be analysed from an accounting and regulatory perspective. An exploration of what the codes are used for within interpretive schemes is required to make sense of the investment decisions taking place.

One example of accounting analysed within a regulatory system is that Conrad (2005) uses in reference to ST to explore accounting systems and accountability within the gas industry to explain how the RPI (Retail Price Index- pricing formula) is used to communicate organisation activities between the regulator and the regulated. Another example is the study of the EU ETS by Moore (2010), whereby the interpretive schemes related to the regulation were examined. Within the signification structure, the impact of the EU ETS was analysed by examining the accepted measurement standards and recording devices. The studies by Conrad (2005) and Moore (2010) provided a good understanding of accounting systems, because Giddens’ framework interprets how MAS

provides the rules and procedures for what is classified as acceptable behaviour. The system does this by providing a socially constructed process of accountability.

The process of accountability represents the relationship between a signification structure and a legitimation structure; the latter providing the rules of the signification structures. Returning to research by Conrad (2005), she observed the rule limits regarding price increases and adequate standards of service. These rules helped the regulator to ensure that the regulated followed the correct procedures and obeyed the rules. By using standards and rules, the regulator can issue sanctions and rewards based on the behaviour of the regulated. The use of these norms (morals and values) within these settings provides an opportunity to sanction particular types of behaviour within setting in which they are taking place (Macintosh & Scapens, 1990).

To complete Macintosh and Scapens' (1990) exploration of the MAS within this framework, they explain that the MAS of an organisation provides an actor with a resource through which to exercise power, both in a broad and narrow sense. In the gas industry, Conrad (2005) refers to the domination structure as the action of the regulators, drawing upon both allocative and authoritative resources. The discussion of power is a vast area of debate and the study draws on Giddens' (1996:744) definition of power, which is the "ability of individuals or the members of a group, to achieve aims or further the interest they hold". Tsamenyi et al (2006) and Collier (2001) argue that this definition provides an opportunity to explore power both as an enabling source and as a source of conflict. Tsamenyi et al (2006:414) argue that "power is enabling when mobilised to pursue interest, and conflicting where interest of actors are divergent".

As domination and power are central to Giddens' duality of structure, it has been focused

on heavily in many recent studies, for example, those of Tollington (2006) and Jack (2007). Tollington (2006) examined a crisis of domination in the consultation process of FRS10 (a UK accounting standard) and Jack (2007) focused on the shifting asymmetries of power when farmers were forced to engage in accounting. Englund et al (2011) state that Giddens' ST offers accounting researchers diverse ways of analysing accounting practices. Accounting researchers can therefore, use the three interwoven structures, presenting accounting as an interpretive schema, a facilitator of power and a set of norms.

4.4.3 A basis for theorising both accounting continuity and change

The third contribution of ST to accounting research, based upon the findings of Englund et al (2011), is that it provides a basis for examining accounting in terms of continuity and change. ST has been widely used to explore why accounting practices have remained the same in some cases and changed in others. Interpreting accounting in this manner has relied upon the concept of reflexive and knowledgeable agents.

Accounting continuity can be examined by understanding actors' needs for ontological security, whereby actors follow routines in uncertain situations in order to lower their anxiety levels. In addition, structural clashes can motivate the political reproduction of current structures in order to maintain current systems. Based upon Giddens' (1979) dialectic of control, continuity can then be examined from the position of the actors by using resource asymmetries to resist change (Englund et al, 2011; Seal & Ball, 2011). Accounting change and ST reverts back to the discussion in section 4.4.2.1 of this chapter, which explains how a flat local duality can be used to explore structural change. Thus far, this chapter has examined ST in general and ST within accounting. The chapter will now explain how ST will be applied in this research.

4.5 How structuration theory is used within this research

Within this study, it will be possible to examine how the role of investment appraisal is used within the decision making process. The ‘focal system’ is the UK electricity generation industry and the role of investment appraisal will be examined by analysing how contradictory structures are reproduced, or otherwise, by knowledgeable actors. The implications of overlapping social systems, other European and Non-European generation industries, will also be addressed. Understanding the social dynamics of the industry and the influence of narratives on investment will assist in interpreting the role of capital budgeting. Therefore, ST will be used to present how and where accounting is represented through an interpretive schema, a facility of power and a set of norms. The data will then be used to explain how these structural principles function to contradict or conflict with other structural principles within the same industry. In addition, ST, using the flat local duality framework (Englund and Gerdin, 2011), will be deployed to analyse the triggers of change and intended and unintended consequences.

This thesis will examine whether contradictions have emerged through the privatisation process in the generation industry, studying the tensions between searching for profit and those caused by the moral obligation of the state to accommodate the basic needs of society. Privatisation introduces competition into markets, and the process of competition drives international capitalist behaviour. This study will question whether overlapping social systems (the various generation industries across the world) effect change at a local level. Finally, the impact of international environmental protection legislation will be the final contradiction examined. ST provides a good fit with the practical setting of this thesis. As stated earlier in this chapter, Macintosh and Scapens (1990) and Macintosh

(1995) argue that ST offers an opportunity to explore MACs within a social and political context. The three central aspects of this study are embedded within MACs, politics and social responsibility, as discussed in Chapter 1.

Giddens' duality of structure is used to analyse how these three structures, which relate to investment, regulation and sustainability, are enacted. Although the structures exist, the deployment of existing resources has enabled the various actors to respond to the implementation of the LCPD in different ways, leading to the current crisis, as reflected in the latest White Paper.

4.5.1 How structuration theory is used to refine and design this thesis

As discussed in the introduction to this chapter, the main question was developed by identifying a gap in the literature and referring this to the methodological position of the researcher. Therefore this section of the chapter will be used to explain how the research questions, main and sub-questions, were refined using ST and this is presented in Figure 7. Each sub-question, highlighted in green, is directly related to one of the structures by examining the structure, modality and interaction within Giddens' duality of structure.

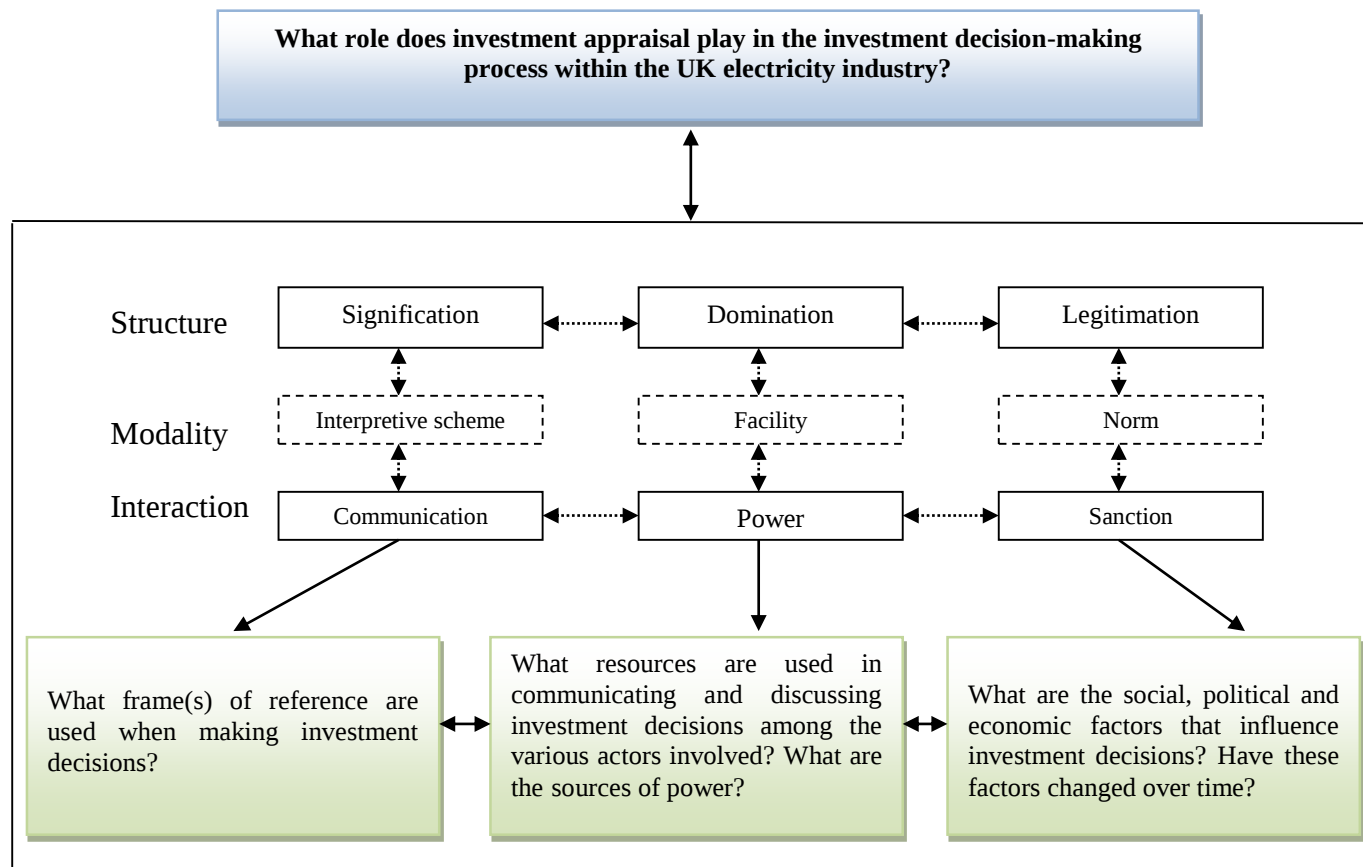


Figure 8: Giddens' duality of structure linked to research questions

Giddens' duality framework offers three structures, which consider communication, power and sanctions. From these structures the author then offers three sub-questions relating to the role of investment appraisal techniques. Communication allows the frame of reference to be explored and power examines the use of rules and resources and sanctions identifying the influence of social, political and economic factors.

Establishing the sub-research questions related to the three structures presented an opportunity to refine the interview questions by applying the theory within each structure. These questions allowed the researcher to collect data relating to the reality of the actors: the facts, logics, values and communication that are based upon the social, political and economic environment.

Analysing triggers for change in social, political and economic environments requires ‘norms’ to be understood; accepted ‘norms’ will influence these environments. By addressing the higher concerns of social, political and economic issues this case study will explore how the societal totalities of the government, regulators and generators have influenced changes within the accepted ‘norms’ and ‘sanctions’.

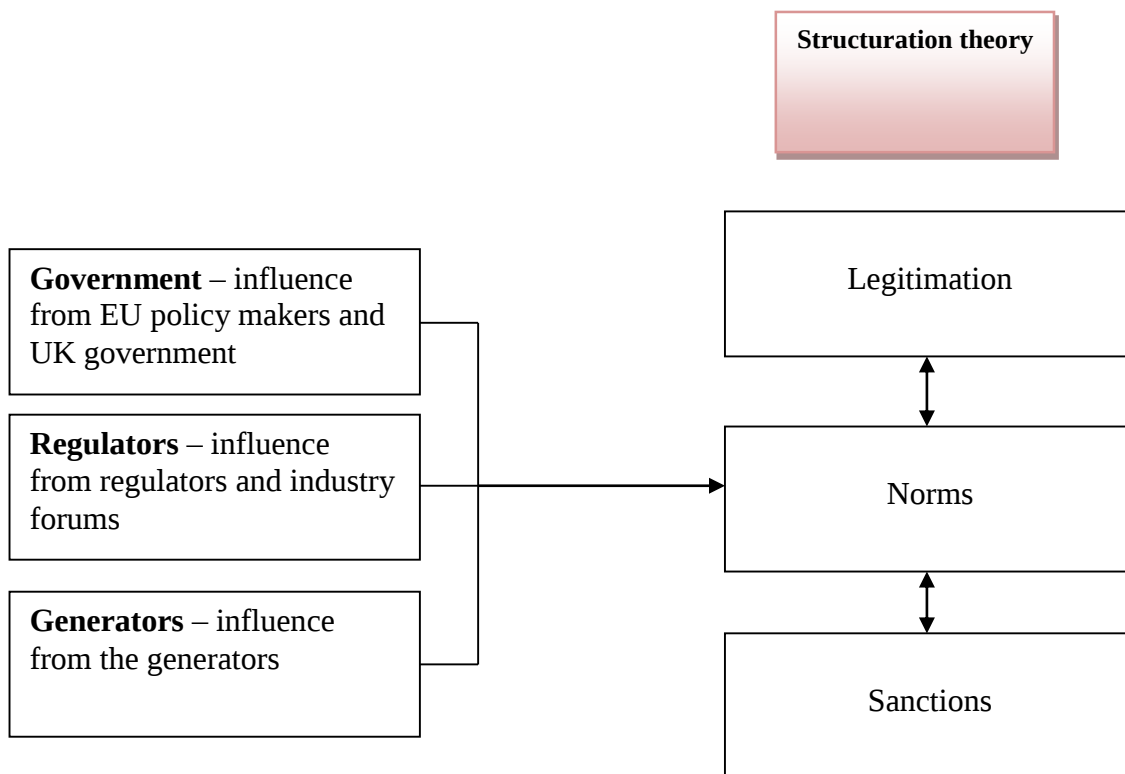


Figure 9: Extending legitimization to examine the influence of social totalities

Ribeiro and Scapens (2006) explained that organisations often adopt rules and norms that are accepted socially and culturally. It is those rules, which are used to legitimise processes and decisions. Bringing together Giddens’ duality of structure and understanding the influence of historic ‘norms’ of this industry, the model used for the thesis is as follows on the next page:

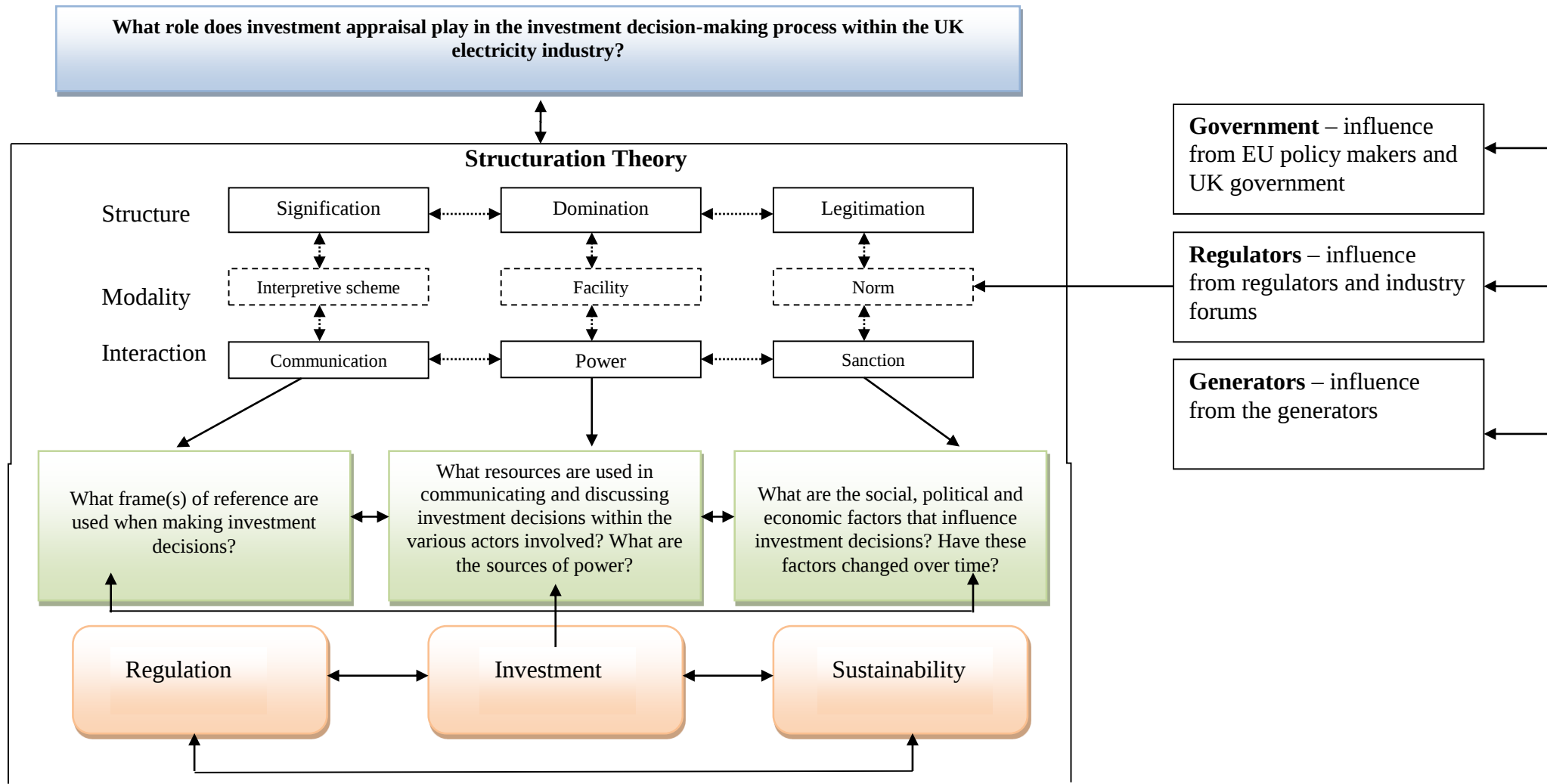


Figure 10: Model of the design process

The main research question is highlighted in blue at the top of the model. To address this research question successfully, the three structures within Giddens' ST inform three sub-questions, highlighted in green, which guide the analysis of the main research question. The data collected through the interviews, as presented in Tables 4 and 5 in Chapter 3, was collated when designing interview questions using ST³⁴. The information collected from the interviews was based upon the three themes of paradox within the UK generation industry, i.e. regulation, investment and sustainability, as highlighted in orange. These questions were tested using pilot interviews and shaped by feedback from the interviewees. The data collected was analysed based on the three structures and is presented in separate chapters: Chapters 5-7.

4.6 Conclusion

Referring back to Chapter 2, the literature review, Haka (2007) emphasised the importance of understanding capital budgeting through the influence of societal institutions. ST overcomes some of the problems that other research have encountered when assuming that decision makers always aim to maximise profits (González González, 2010). By using a flat local duality perspective (Englund and Gerdin, 2011) this research maintains the inter-subjective position, as discussed in the previous chapter; drawing upon Giddens' (1979; 1984) notion that agency and structure do not pre-suppose one another. Using ST, this thesis will examine investment appraisal in three interwoven structures and analyse it against other competing and contradictory systems' structures. By observing change within this industry and questioning whether overlapping social systems have been used as a way of facilitating power, the research will question the motivation for change. ST rests firmly within the epistemological and

³⁴ The translation of theory into interview questions is discussed in Appendix 18

ontological position of this research, and links to research questions by using theory. The model, Figure 9, demonstrates the relationship between the theories and research questions within this thesis.

Now the literature gap, methodology and theory have been established, the remaining chapters will provide the data analysis and present the research findings. Each structure within Giddens' theory will be used pragmatically to divide the interpretation of the research questions. From here on, the research will focus on the shared interpretations of the actors, using theory to assist in understanding the meaning of these interpretations.

Chapter 5: Analysis – the role of investment appraisal, signification

5.0 Introduction

The framework presented in the previous chapter demonstrated how ST was used to refine the research questions to formulate one main research question and three sub-research questions. The remaining part of this thesis includes three separate chapters that will analyse the three structures within Giddens' duality of structure: signification, domination and legitimation. These structures will provide a means to observe the social action that emerges when actors interpret the rules and resources within their focal system. Following the presentation of the analysis chapters, there is a separate findings chapter to address directly the main research question.

The use of ST will provide an opportunity to understand how the three modalities reflect the investment decision-making procedures that are followed within the generation industry. Examining the social action of communication in combination with power and sanctions provides an opportunity to interpret the role of capital budgeting within a complex and uncertain regulatory setting. Whilst the data will be related to structures presented across three chapters, this research accepts that all structures and modalities are intertwined; as will be demonstrated in Chapter 8. Jack (2007:907) stated that "Analysing structure and action in context is like examining a stereogram, such as one of the artist M. C. Fisher's famous symmetries: one has to focus on one shade or shape at a time to see what is in the picture, altering focus each time until the picture is understood".

5.1 Signification

In the previous chapter, the modality that relates to the signification structure was said to provide a cognitive basis to assist in understanding the meaning of actors' actions, using interpretive schemes. The aim of this analysis is to understand and interpret the data as it relates to the first sub-research question, which is highlighted in green below:

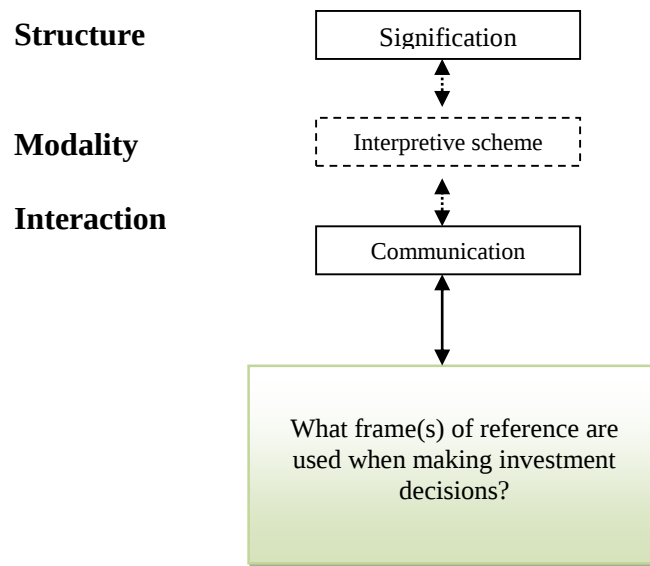


Figure 11 Signification portion of the framework

Establishing structural principles within this industry and questioning how they are drawn upon to guide decisions is important when interpreting their role in investment appraisal. The decision-making within this thesis relates to the implementation of the LCPD. The LCPD is a directive established by the EU, which was signed up to by the UK government, who in turn gave authority to the Department for Environment, Food and Rural Affairs (Defra) to establish a workable framework within the UK. This framework was designed to satisfy the levels of compliance required by the EU within a local context.

Thus, although it was Defra that produced the information for the LCPD, it was the Environment Agency working alongside the Joint Environment Programme (JEP)³⁵ that created the framework.

Past studies, using ST, have focused purely on the MACs in reference to the structure of signification (see Conrad, 2005, as an example); however, in this study it is important to understand the frame of reference from three perspectives; investment, regulation and sustainability. The research in this thesis is aligned to Moore's study (2010), in which the modalities are examined according to: the directives, the issue of security of supply and the accounting implications.

5.2 Establishing a framework for understanding the LCPD – the regulatory framework

By understanding how actors learn about a new regulation or accounting system, it is possible to explain how (or whether) a new process will become embedded within the everyday transactions, beliefs and norms of an industry/organisation. The LCPD in the UK is part of the Pollution Prevention Control (PPC)³⁶ application. In the UK, if a generator does not have PPC consent then they cannot continue in business. When a modality such as an interpretive scheme draws from legal or social structures, as with a new regulation, then a process of consultation (Tollington, 2006) often underpins it. This was certainly the case with the LCPD, as an intense lobbying took place, during which information was revealed about the decision-making process.

Two separate learning requirements were observed in this case: 1) understanding the policy and the

³⁵ JEP consists of the main generators within the UK

³⁶ Details of the PPC application are provided in Appendix 5. This was the correct name of the application at the time of the interviews, and so, to guarantee consistency it is used throughout.

implications of future strategic objectives; and 2) appreciating how the LCPD affects individual sites. The latter was crucial because each site is different and has different issues; therefore, the actual decision to opt in or out of the directive had differing implications for each plant. Giddens (1984) argues that actors' actions are simultaneously constrained and enabled by the structural properties of the system within which they are operating. Through a process of interacting with the regulators, the generators had the opportunity to shape some of the forthcoming structural properties of the system. Although the EU directive was an existing rule that the actors were expected to interpret, they were also required to establish rules that would be applicable locally to comply with the directive. The generators realised that this was an invaluable opportunity to use their engineering knowledge in order to influence a new regulatory framework, as their knowledge and contribution would have a direct impact on investment decisions. The engineers have more knowledge relating to the technical aspects of the industry than the regulators and this meant their expertise was needed to help construct the new processes.

5.2.1 Analysing the directive at policy level

Understanding the directive was the individual generator's responsibility. The discussions started at organisational field level. As a Pollution Infringement and Control Team Leader explained:

“On a national level people were talking about policies and principles and they’re trying to make . . . bring clarity about those kinds of things”

The LCPD was communicated with the generators through Defra and members of forums such as the JEP and the Association of Electricity Producers (AEP). Non-members found out about the forthcoming

directive from various publications³⁷. Before any discussions took place the individual actors who visited the forums simply read the directive as presented on the EU web site. All the interviewees agreed that this was the first step in the process, a Business Service Director stated:

“as soon as something like this is started . . . to be socialised by the regulators or legislators you read it quickly, it appears in bulletins there are various legal firms who send out monthly bulletins on environmental matters. There’s the Eng report . . . usually is quite a good hands on what’s emerging from Europe etcetera. The AEP are active, and of course the people on the AEP are all separately talking to Brussels and Westminster and others and they’ll very quickly send a note out to say - blooming heck there’s something coming down the line called the LCPD.”

The generators have a strategic interest in anything that may change the nature of their organisation. Therefore, engaging in discussions regarding regulations involves a process of debate, in which the regulators and the two groups of actors work together to understand how they can take the LCPD and make it workable. An Environmental Manager noted:

“We had meetings with Defra and meetings with the EA through our JEP forum. We literally sat round a table and, you know, the EA tried to understand it as well. What does it mean when it says that you will actually meet this limit on sulphur? But you have this option to do it in a slightly different way. What does it mean?”

³⁷ Many of these publications were published by the likes of JEP and AEP

What are these type scales on monitoring? How can we interpret that in terms of something the EA can transform into a permit that we can actually carry out?”

Although the generators and regulators were conversing, this thesis is not suggesting that regulatory capture took place; there were many disagreements and in one case a legal disagreement³⁸. Giddens (1984) argues that social action recursively transforms social structure and therefore the action of actors when lobbying is a very important aspect of the consultation process. The regulators wished to benefit from the generators' knowledge, and meanwhile, the generators needed to be part of the debate for strategic reasons.

In conjunction with the directive itself, the guidance notes published by Defra were also retained as an artefact, so both actors within the EA and the generation companies could consult these to increase their knowledge. In addition to the associations mentioned earlier, Defra set up an LCPD stakeholders' group and encouraged all who were interested to engage in forums. Those involved on the operational side of the business then received information based on the LCPD once an investment decision had been made. A Site Manager who was involved in project managing one of the investments, made after the LCPD was enacted, commented:

“I was more from a constructional part of the project within the station itself. The actual legislation and the impact of the legislation comes from our Engineering colleagues in our Environmental department. I had various meetings with them and

³⁸ The legal disagreement will be discussed in the domination chapter.

attended a couple of conferences and obviously I knew the basics . . .”

This shows that the LCPD’s role did not infringe on day-to-day operations, it was more strategically aligned with the decisions made by top managers. From an operations perspective, once the investment was given the go ahead, construction took place with only a general awareness of the regulations. The focus of this study will therefore be on those actors who participated in the investment process, itself rather than the operations³⁹ of the investment.

The specific role of JEP, as a complement to Defra, was to understand the operational implications of the legislation for the future of the industry. In 2006, in the UK, the process by which the LCPD would be implemented was unclear, as was the methodology that would be used to ensure the emissions limits would be measured and met. As an Environmental Manager explained, this had big implications for generators:

“We sat down with the EA and said look we really need a framework that we can use for investment purposes going forward.”

The generators were aware that they were being asked to make large investment decisions that would impact on their future portfolio. They also recognised that any proposals would have long lead times, because investigating suitable technology takes considerable time. In January 2008, with the deadline close, the generators had no other option than to start preparing business plans relating to future

³⁹ The term ‘operations of the investment’ refers to the physical construction of the investment.

investment, whilst the details were still been debated.

As mentioned above, the emission limits were provided by the EU, and these were straightforward, but the framework within which the emission targets would be achieved was the UK's responsibility. This is where the dialogue became very interesting between the regulators and the generators. In terms of an organisational process, the individual generators also needed to understand how the directive and possible frameworks would affect their own investment decision making. The LCPD consultation included many discussions over this, because it was not obvious which technology would meet the approval of the LCPD. Lobbying was a significant part of the process as both sides had different objectives. The regulators needed to protect the environment, whilst the generators needed to safeguard the interests of their shareholders by producing a good return on their investments. In addition to making a profit, the generators were also seeking to protect their competitive position within the market place. This leads to the first set of contradictory structural properties, located within the same system: profit from investments versus environmental protection via future investments.

5.2.2 Analysing the directive at an individual site level

Although the first part of the process was to understand the meaning and the content of the new directive, the next step, as a Site Manager discussed, was to understand the impact of the LCPD on individual sites:

**“On a local level you need to think about how this relates to specific installations . .
 . how it relates to perhaps those wider guidance documents that exist. I mean we
 did a lot of reading of the regs . . . because not only do we have to make decisions**

when applying for the permits, but we need to talk to the operators . . . because there is a huge chunk of people left out of that dialogue.”

The need for a detailed understanding of the directive led the individual generators to lobby the UK government, as the right framework would make the decision-making process simpler. An Environmental Planning Manager explained that:

“We’re always looking over the horizon . . . one of my jobs is to make sure we’re aware of what’s coming up, and we have a good input in through the various avenues. We have the government and the regulators and try to influence the way - for example in this case - the regulations through the PPC Act were going to be framed to make sure the LCPD needs were met.”

Lobbying was an essential way to protect the future of the individual power plants, given that each generator had their own technical and future portfolio requirements. Working alongside the regulator allowed each generator to understand the requirements of the directive; however, every individual wanted a secure workable framework that matched their own plant needs, and which would maintain or establish their competitive positions within the market.

The lobbying for individual frameworks was crucial to competitiveness, as no generator wanted a competitor to have a framework that would allow them relatively more flexibility. The framework within

which the emission limits would sit was subject to debate. The Emission Limit Values (ELVs)⁴⁰ were part of the original directive and were the regulators first choice for a UK based framework. Also of relevance was the fact that the LCPD also offered an opportunity for individual governments to set their own limits in the form of a National Emissions Reduction Plan (NERP). The basic difference between the two options centres around tradable and annual limits and the other issue associated with deciding a framework involved determining whether power plants would trade under individual units or a plant wide regime. The LCPD set a national level to be achieved by 2020, but no limits for individual installations. Setting individual limits was down to the regulators; therefore, this is what was up for discussion. Many generators have more than one unit on one site, so this had significant financial implications.

As one Head of Environment explained:

“Different generators were looking at different types of investments - we were looking at the long term because our plant was not due to shut down until 2030; however, some of the others were due to shut down around 2016, they had short term investments to make. We had some quite acrimonious debates around the LCPD - and whether we wanted to go for NERP or the ELV. We basically were going for the long term so we wanted NERP but not everyone else was interested in the long term and they wanted ELV’s for short term management.”

⁴⁰ A detailed explanation of the regulation is provided in Appendix 5.

The forums discussed what was practical and what was not and so a coded framework was negotiated between the regulators and the generators. This coded framework was used alongside the already established framework of financial requirements; stakeholders demanding financial viability in the form of business plans using investment appraisal techniques.

The lobbying and individual requirements were established using IA techniques in order to model various options and to determine which definitions and schemes would provide the best outcome for the individual generators. In terms of Pragmatic Constructivism (Nørreklit et al, 2006), IA techniques were used to generate possibilities and the outcomes were used as facts. These facts were then aligned with their values to determine the best possible position and once established, they were then used to communicate with the regulators and politicians in order to lobby to meet their own needs. By defining an environmental framework, which matched their objectives, it would be possible to increase profit. This explains how a consultation process that was intended to discuss the environmental interpretation scheme, was used by the generators to consider their own strategic future. An interpretive scheme could be used by the regulators to comply with the EU directive, whilst also encouraging generators to mobilise their capital, by investing.

5.3 The missing frame of reference – sustainability

The issue at the heart of the negotiation was the lack of a real UK energy policy, in a form that could guide future decisions related to carbon pricing. This leads to a feeling of uncertainty and the LCPD implementation highlighted this. As the UK government adopted the EU ETS the nation's future policy on carbon was not clarified; thus, long-term investments were being modelled on the basis of short term

assumptions and the generators knew this was not a sound foundation for future investment. The argument then proceeds that, in addition to the codes created from environmental legislation, finance and engineering requirements, a future energy policy should have been solidified as part of the terms of reference. Energy policies should include clear long-term commitments to adoption of a range of technologies. As one Station Manager said:

“We were trying to get a good indication from the Government on what was going to be *policy, going forward*, you know when you’re investing for thirty years and spending hundreds of millions on them, yeah. There was *no clear economic signals for [sic] the Government* and when you actually looked at FGD at Plant B at the time it was marginal whether it . . . it paid for itself or not. So it was hard, hard to determine whether you’re making the right business decision, for the shareholders. So it was quite a difficult time I think for the company, to make the decision whether to invest or not to invest. And I think for a period of six months it was on and off the table so many times because changes in the full price codes just completely blew it out of the water and put it back in the water . . . so it was, was a very difficult time.”

A clear policy would create more certainty within the industry, which would lead to secured investment, because it would send clear signalling as to pricing curves. This would resolve security of supply issues and sustainability problems within the UK. However, at the time of the interviews UK politicians and regulators denied that there was a problem with sustainability, rejecting the notion that a new policy was required.

5.4 The existing frame of reference – investment appraisal for investments

The theory of investment appraisal is an established structural property, and although the numeric techniques for investment appraisal are socially constructed, these theories are often taken for granted. Within the industry, it is important to understand the social interactions implicit in the decision-making process, as the outcomes of the techniques are facts of the actors' reality. That is not to suggest that the facts cannot change, as they always do in response to shifts in variables, but that it is critical to recognise the role of investment appraisal in the communication modality to fully appreciate how these techniques are used.

With this in mind, the study will accept that the frame of reference for investment appraisal is an embedded piece of knowledge, and that the process of acquiring this knowledge will not be examined. Normative theories exist in the time space continuum within Giddens' structuration theory, with actors drawing upon these structural principles when making decisions. Indeed, as the LCPD was beginning to be socialised within the industry it was apparent that finance was implicated in investments. As an Environmental Manager stated:

“It’s purely a financial decision at the end of the day isn’t it? You know you’re not going to be making an investment if you’re not getting a *return on that investment* . . . there are a number of factors that need to be taken into account. But effectively an investment appraisal would be made on the technology that’s required to meet the *particular limit*, and if it didn’t come up . . . you know didn’t meet the *required*

rate . . . then you know it's unlikely to go forward."

Thus, the actors recognised that knowing the rate of return is essential for decision making. In fact, all the interviewees stated the same objective when first questioned about how decisions to opt in or out of the LCPD were made. One interviewee stated that the payback on most new power plants is around 15 years; therefore, it is essential to have detailed discussions that everyone can follow. The use of terms such as 'rates of return', 'hurdle rate', 'NPV', 'investment appraisal' and 'scenario analysis' were all embedded within the accepted 'norms' of the business, as can be seen in this statement by an Environmental Manager:

"There's models that are designed and they, you know look across a broad spectrum of different aspects. Different environmental constraints that come in have different . . . you know . . . impacts on the customers. What effects [do they have⁴¹] on the curves? It's not just a straight NPV . . . well I suppose yeah I'm looking at an NPV, you're looking at *returns versus outlay*, to see what profits there with lots of *sensitivities in different scenario based analysis* that's going on there."

When discussing the financial objectives there was no need to provide an explanation, whether brought up by the interviewee or interviewer. Financial terms were an accepted phase of the decision-making process for the engineers, environmental managers and the regulators. Indeed, the basic financial terminology of investment appraisal was firmly established along with the knowledge of how

⁴¹ 'do they have' are words added by the author

investments would be funded, as a General Manager in operations discussed:

“The decisions were completely different for different organisations and depending, you know, on whether you’re financing projects on balance sheet, or whether you’re dept. structuring your projects. Your cost of capital may well vary quite significantly, and, it of course depends *on risks* as well, all of these things . . . Are risk rated? And the bigger the risk the *greater the return* that we’d expect to see.”

Every interviewee used the rate of return to justify whether an investment would be accepted or rejected, demonstrating that a shift from early post privatisation to mature privatisation has taken place. Most of the interviewees were familiar with what their own company rate was, although most were not able to provide the researcher with the information. However, an Environmental Manager commented that:

“I’m not an Accountant but there’s a hurdle rate set by . . . by finance, the company has a hurdle rate, which varies depending on . . . obviously what you know, what market infrastructures, rate of adjusted cost of capital - and to be honest with you it doesn’t vary that much because for a number of years it’s sat at about eight, nine percent, I think it’s lower than that now but it’s not significantly lower.”

This ball park figure for a rate of return was also commented on by another interviewee from a different generator, although he did add that the rates would vary slightly depending on the strategic nature of the investment. The use of financial language within the investment appraisal process provides the actors

with a cognitive basis for understanding their own actions and those of others making similar decisions (Macintosh and Scapens, 1990). As Conrad (2005) stated, this process becomes their ‘frame of reference’. Therefore, it can be argued, as Macintosh and Scapens (1990) did; that the MCSs is the modality itself, but the structures are the rules, concepts and theories of the organisation. The interviewees had a good knowledge of the hurdle rates required and their frame of reference included an understanding of the nature of the rates required, and that they were dependent on the type of investment. For example, a Station Manager said:

“Hurdle rates have changed and they go up and down, and there’s different ones for . . . if you want to go out and build a new plant or a new project - whatever that is really - there’s a different hurdle rate than capital spent to maintain the old plant. FGD falls into the, the former.”

This shows that the LCPD investment decisions were considered as existing investments, which in meant they had different rates of return to new investments. New investments were the alternatives in the scenario modelling, being considered as part of the business plans. As well as establishing financial knowledge, the new environmental knowledge (established through the consultation process) was part of the communication process used for determining whether the investment should go ahead. The modelling required emission limits to be included within the scenario analysis. An Environmental Manager said:

“we provide them with information in our view on how you could actually *meet these limits* you know what arguments you could put that could actually could be

consentable and permitable for example. They, together with finance, take a view on what *return* they're going to get . . . we feed in the options in terms of environment, we also feed in what we think the regulator will accept, and also more importantly our looking over the horizon."

5.5 Merging the frames of reference to make investment decisions

Once the LCPD was understood and a framework negotiated on a national level, individual generators had to integrate the new frame of reference within their financial modelling. IA was not an easy process because the generators had to incorporate the new frame of reference alongside those that already guided their decision-making. The principal difficulty, within the process, related to the uncertainty that emerged from the absence of a future energy policy. Although making a decision to opt in or opt out of the LCPD was directly related to the regulations set by the LCPD, generators also needed to evaluate their future portfolios, and possible new regulations should ideally be part of the modelling process.

The communication process, as a social action, is central to investment appraisal when making an investment decision based on interpretive schemes. The language, presentation of business reports, and the application necessary for the PPC application all provide a story for determining where investment appraisal techniques fit within this process. Dillard et al (2004) explain that the signification structure represents a theory of coding that refers to the symbolic representation of meaning. Therefore, in order to understand how investment appraisal is used in action it is necessary to consider how the decisions of the LCPD were interpreted and communicated (Macintosh & Scapens, 1990).

5.5.1 The business plan as a tool for merging frames of reference

A business plan is one way to bring together all relevant frames of reference. Although finance and the environment were two common concerns discussed throughout the interviews, the interviewees also analysed their own responses and reflected on them. The interviewees stated that although the investment appraisal informing these decisions was necessary and a core element of the business plan put forward to the executive boards, there were inherent problems. The requirements for making an investment appraisal based on a business report are restricted by capital constraints. This notion of financial constraints was frequently discussed amongst the interviewees, probably because implementation of the LCPD legislation coincided with the beginning of the credit crunch. As a Business Services Director said:

“In theory because you do meet that rate of return, the company would be motivated to go and get that market cash - you know, go to the bank or go to the parent for more cash. But in reality you know we tend to have capital constraints as well . . . its cash constraints . . . we don’t always run to the bank because we’ve got an investment that looks good.”

As well as capital constraints the models themselves were the source of problems; the same interviewee argued:

“It’s a crystal ball but we give the best advice that we can and we take the decisions on that basis. For a long time it looked like the FDG for example, for the LCPD was

not an investment we wanted to make . . . but quite interestingly the *rules on carbon changed* and that's what swung the pendulum back in favour of the investment . . . at the last second we decided to opt in. A guy suddenly realised that the changes made the models go from red to black."

The quotation from the Business Services Director highlights the nature of how future regulations can impact on decisions. Modelling cannot account for all potential future changes, and a change to a regulation can directly impact on a decision being made, because it shifted the entire model from being unacceptable to acceptable. Investment appraisal models in this industry are designed to incorporate future price curves, the reactions of other generators, legislative requirements (now and the future) and possible future energy policy. As the Business Services Director states:

"The energy management team have quite sophisticated planning models, they don't just do *cash-flow analysis* . . . they *model a portfolio* and the impact of *emissions legislations* etcetera . . ."

Therefore, business plan modelling unites all the frames of reference: finance, regulation and energy policies as well as missing data, for which assumptions were made.

From the interviews, it was apparent that the investment appraisal process was actually the central focus when holding all the information from different specialists. All the data provided from the engineers, environmental specialists, traders, risk specialists and legal specialists was translated into numbers, which everyone could understand. An Environmental Manager commented that:

“When we put together a board paper . . . they don’t necessarily crawl over the model. I guess when we put together a board paper we hand it to them . . . they look at the numbers and satisfy themselves that this is an accurate reflection of what’s required - not from a technical perspective just from, from purely economic model and numbers have been fed in there. So on any board paper we would say we’ve run this past insurance, we’ve run this past risk, we’ve run this past finance and they’ve all signed onto this as a business case model.”

The board has a responsibility to ensure that strategic decisions are taken in the best interests of the diverse stakeholders, and that investments consider the need to add value to the business. The modelling process provides an opportunity for legitimate communication, and therefore, legitimation for any action that is taken. This is why many of the generators used consultants to provide forward pricing curves; not because they did not have in-house capabilities, but to provide external legitimation of the numbers they used to make assumptions.

The actual models used for the investment process were confidential, and none of the generators would release these. Independent analysts commented that this was normal, and that it was an form of informal power. A Senior Utility Analyst stated that:

“I think a lot of companies are quite reluctant to actually put down their numbers in terms of investment decisions. We have a hurdle rate, you know IRR plus; or you know investment comes to plus two percent something like that - WACC plus two

percent . . . but you never actually know what the WACC is, particularly of any particular project. So I would say most of the communication, even if you ask them a very specific question, some companies are quite good and they will give you more detail and you know sometimes you'll get a cost of capital for this particular part of the business but you won't get a cost of capital for this plant . . . you know what are you assuming for that particular plant: what do you need to make to build that plant? So most of the communication I would say tends to be more on the strategic level, you know, we think it's good to invest in this because it will give us, you know, a better strategic position, it will balance our generation portfolio and, well, maybe we're losing money on this one but we're making money on that one, and the added flexibility gives us means that we can actually make money on the portfolio overall."

This shows that the generators use both financial and strategic language when communicating their decisions, internally and externally. Providing strategic assumptions for investment decisions does not allow competitors access to information that they can take advantage of. By translating decisions into both financial and strategic decisions, generators are able to draw on both the signification of the frame of reference and legitimise this according to shareholder protection. Using the common language of investment appraisal and the morality and sanctions of predicted energy policy or current directives, provides generators with resources⁴². Resources can be put into action if the actor is motivated to do so, and mobilising these is an opportunity to demonstrate their ability to secure a place in the industry over future generations.

⁴² Resources as Giddens explains them are discussed in the domination chapter.

5.6 Overlapping social systems

In addition to the contradiction between some of the frames of reference, there was also the added complication of overlapping social systems. When discussing investments actors were not just concerned with individual projects, they were also considering the impact on their portfolio, as highlighted in the last quotation from the Business Services Director. Reference to their future portfolio was common amongst the interviewees. The issue being that there are only two UK electricity companies left in the UK. Although some of the generators maintain their UK brand name, such as Scottish Power, these generators have international parent companies. This creates two issues; 1) you have international companies competing for capital to be used in different social systems (different countries), and 2) you have governments providing different regulations in the separate countries, because the implementation of the EU directives are locally based. The overlap of social systems formed part of the discussions amongst the executive board, and, as would be expected, also impacted business plans.

5.6.1 International companies communicating on an international portfolio level

Investment decisions are not based purely on the required rates of return. Within the investment appraisal process there was an automatic reference to the future of the company's portfolio, and this reference was not solely UK based. The Business Service Director (see below) provides one of the many responses received when asked about how the decisions were made:

“We were all convinced that Plant B⁴³ was out and we had to invest in CCGTs and things elsewhere to keep the *portfolio a reasonable size* and keep it growing.”

The investment process included investment appraisal and the strategic objectives of the company, including the parent company’s aims, which proved to be a significant factor in the decision making process, as the Business Services Director noted:

“The LCPD was a strategic investment and it was presented as such. It was fundamentally about the *future of our company*. . . it was about cutting off our right arm or keeping it sowed on. So all the strategic issues were presented, but behind that of course comes the *financial analysis* and all the *comparison of different options and risks and issues*. But, it was very much about working in a business . . . what do we want to be? Do we want to be in or out and save £200 million pounds and invest that elsewhere?”

This is evidence that although the actors all immediately responded by saying that finance was the key driver of these decisions; the strategic direction of the companies was also significant. Decision-making did not simply mean calculating an NPV and making a decision; there were codes of reference that were consulted, i.e. finance, environmental targets and longer term strategic implications. However, it needs to be highlighted that the sustainability of the UK market was NOT part of the decision making process. There were no longer any sanctions or rules in place to legally enforce a sufficient supply of electricity⁴⁴.

⁴³ Name of Power Station changed to protect the identity of the company.

⁴⁴ These missing sanctions and rules will be discussed in the following two chapters.

As one Station Manager stated:

“I think the primary drivers are always profit and as part of that, you have, you have policies - so for example, one of our key strategic drivers is to be a largest renewable company in the world. Our organisation invests heavily in renewables around the world because it believes strategically it’s the market to be in, it’s the growth industry”

All the generators were well aware that the models they were creating to calculate the investment appraisals were driven by the environmental directive, which is why many of the companies saw a large growth in renewables. They understood that the environment would be the driver for all of their future commitments. Typical comments regarding what drove investment included one from an Environmental Manager:

“Well, compliance with statutory limits, and investment to produce viable plants that will operate under those statutory limits”

In this quotation the terms of reference show a clear relationship to the sanctions imposed by the environment directives; the statutory limits. Most interviewees discussed the changing shape of the generation industry and focused on positioning future investment to enable growth. However, as discussed previously, most generators were holding back on investment, mainly due to the uncertainty

over the future energy policy and the lack of substance in the published White Papers⁴⁵. Haka (2007) explains the importance of this by noting that one of the most difficult factors in investment decisions, especially long term investments, is uncertainty.

Although all the actors stated that it was the NPVs that determined the decision, they accepted that strategic policy was just as important. The absence of a future energy policy created uncertainty, which in turn resulted in the NPV calculations being unreliable. Although the calculations were untrustworthy for decision making purposes they were still used as part of the communication process, because this was the common language. At the beginning of one interview, the Head of Environment commented that it was the required rate of return and the investment appraisal that determined whether or not the decision would go ahead, later he admitted that:

“At the end of the day it’s really a gut feeling I think . . . as to whether a particular station wishes to be in the market and I think you can do as much of a dance as you like but unless you’ve got the confidence that, that, plant is going to run long term or for as long as you need it to run, then you’re going to come with a little decision. So I’m not sure it’s always going to be a pure NPV today, it’s always a big question of well what’s the gut feeling?”

Sykianakis and Bellas (2005) studied FDIs and noted that it is very difficult to categorise different elements of the decision-making process. They observed, from their research, that the first part of the

⁴⁵ It should be noted that when the interviews took place the latest White Paper, 2010 had not been published.

process was of a political nature, where the top management made the decision whether to invest abroad; they characterised this as the commitment stage. Following this stage came the more practical step determining ‘how they were going to carry out the investment?’ The final step reflects the cyclical nature of information involving a series of smaller decisions. Each decision made impacts on other assessments, which also continually evolve as external information becomes available. Although their study was based on a very specific type of investment, it does highlight the problems associated with normative assumptions; i.e. that there is no linear process when making investment decisions, and that many of these decisions are based on gut feeling.

Ekanem (2005 & 2007) discusses how small companies use the concept of ‘gut feelings’ ‘judgement’ and ‘experience’, thereby not reflecting a ‘rational decision maker’ in the traditional sense. However, evidently, when faced with uncertainty, larger companies employ similar approaches. Although, typically with larger companies some form of modelling is completed as part of the process, because the shareholders demand an audit trail as part of the decision-making process. In addition, modelling can be used as evidence during the lobbying process. As the decisions made by the generators relied less on concrete evidence than was ideal, due to the lack of a public policy for the future on energy generation and emissions, finance characterised their language when presenting their decisions and business plans. When making investment decisions they referred to discount rates, rates of return, NPVs and the emission limits relating to known environmental targets.

5.6.2 Overlapping regulatory frames of reference

Business plans predict the future cash-flow possibilities of an investment. To be able to model portfolio

requirements for the future requires strong leadership from the government and from regulators. As discussed above, future energy policies will have a big impact on the future of investments in the generation industry. As a General Manager of operations acknowledged, there are many risks and uncertainties involved in making these decisions (it should be noted that the interviewee referred to them all as uncertainties):

“ The other point is you’re not just investing in FDG or SCR because these plants are largely over forty years old and if you are going to run them for another twenty years, in order to get your return there is a whole series of other investments you’re required to make; to make the rest of the plant capable of running. We had to invest many millions of pounds on other overhauls and upgrades. There is a lot of *uncertainty* over the full price curve, carbon and what other generators’ actions will be”

The future price curves and competitors' directions were accepted risks. What the generators were concerned about was the genuine uncertainties that related to public policy on items such as carbon prices and the general direction of the industry. Despite the publication of many White Papers since privatisation, there have been no strong policy statements mapping a course for the UK in terms of energy. A General Manager of Operations explained that although these investments are like any other investment, the introduction of carbon trading made things more complicated:

“It (The LCPD) was no different from any other investment analysis we make. We

. . . we simply look at the option of fitting⁴⁶, the option of not fitting, what we thought the market was going to be in the future, and what we thought our competitors were going to do, because that would affect the full price, and simply did an *NPV calculation*. It made *economic sense* and it was a *straight forward investment analysis*, nothing more than that. The biggest problem is establishing the assumptions you are making that decision on. The *price curves* are the difficult bit, probably the most difficult is the *carbon price*, carbon (prices) are just a political construct, so you know they will be whatever the politicians want them to be.”

The problems faced by generators in the UK were exacerbated by the fact that in many other European countries government takes the lead by forming business contracts with companies that supply the basic needs of the countries. While the UK needed investment, the companies which would supply the capital for that investment were considering international portfolios, and working within different markets across Europe and elsewhere. Their business plans reflected the complications of investing in different countries; and alternative investments included a need to invest in other countries. The regulatory frames of reference, from other countries, were used to fill the gaps in the missing UK energy policy.

Englund & Gerdin (2011) explain that when actors become aware of alternative structures that compete with existing structures in the focal social system, they pull knowledge from those alternative systems. By exploiting the rules and the resources from overlapping social systems, actors can use these to legitimise the decisions they take. One example of where generators used overlapping social systems to

⁴⁶ The interviewee is referring to fitting the FDG technology policy to meet the emission limits of the LCPD.

make their decisions occurred between the UK and Portugal. The Portuguese government provided a framework covering the LCPD, which allowed future risks to be analysed. Therefore, companies investing in both countries were able draw upon the regulatory frameworks and energy policies in both countries and consider the alternatives. Making sense of regulations is provides crucial information for investment decisions, and therefore if a clear framework is not provided in the focal system the actors will reach out to other available systems to guide them.

5.7 Communication and ontological security

Dillard and Roslender (2010) explain that managers use codes from available frames of reference in order to make sense of their decisions. Busco et al (2006) consider uncertainty as critical when actors move from reliance on their normal routines, to using their ‘discursive consciousnesses. The ‘discursive consciousness’ in this case involves rationalising their decisions by using their engineering experience, which is driven by their need for ontological security (Giddens, 1984).

One interesting item, which was evident in the discussion of how LCPD investment decisions were made was the lack of reference to the PPC application itself. Although the EU provides the methodology directive all the interviewees automatically referred to their internal modelling when asked how they made their decisions. The emissions limits were part of the terms of reference the generators used for their own internal modelling to make the said decisions. The PPC applications were only part of the process once the decisions had been made and these applications provided very little information as to the process involved.

One of the regulators stated that they were not interested in the financial aspects of the decisions if the generators chose to opt out. The regulators would only be interested in a financial analysis if the generator chose to opt in, but not using Best Available Technology (BAT). The regulators would then require a detailed financial examination to justify the generator's action. This is not surprising because the PPC application offers cost benefit analysis as an *option* for the generator. Within the PPC application, the accounting codes were not the main source of communication between the regulators and the generators. The main source of information was the environmental assessment given in the PPC application, which meant that the shared rules and concepts were based on environmental codes and emission targets. This resulted in two systems running alongside each other - the investment decisions and the PCC application.

5.8 De-coupled and missing frames of reference

The interviews demonstrated that the investment appraisal had been decoupled from the environmental appraisal required by the regulator. Three frames of reference were required to support the three factors within the paradox of the UK generation industry, one for the environment, one for the shareholders and one for the security of supply.

However, the frame of reference for the security of supply no longer existed because there was no *real* energy policy informing the generators of future investments. The government seems to have presumed that striving for profit maximisation would be sufficient to guarantee investment to be market led. However, the generators realised that the main institutional shareholders do not currently visualise the generation industry as high risk, and that they prefer low risk investments. Following the new legislation,

which highlighted the lack of a strong energy policy, it became apparent that there were higher risks involved, which the returns could not support.

The remaining two frames of reference: the environment and the shareholders can be linked directly to financial theory and regulations, when modelling. Although both frames of reference were used, they had become decoupled, because the permits for the regulation did not require any financial evidence unless the generator was not using BAT.

Giddens (1984) argues that the structural principles that a group of actors rely heavily on are founded on the knowledge of the actors themselves. When the actors act upon these structural principles they become institutionalised in practice; this has occurred in regards to the constant use of investment appraisal techniques. It is not the requirements of the regulators that form the basis of this institution, it is the experience of past investments that have shaped the 'norms' of decision making; therefore, it is an unconscious process in which the actors recognise that the structures are not perfect. In fact, these techniques are similar to a guessing game; however, this game is accepted and the generators continue to re-enact this process because it provides a good mode of communication. The IA communication process is one which is accepted as a standard process amongst all the actors involved.

Investment appraisal has its place in the time-space continuum through its repeated use in business plans that are presented to boards of directors. In this case, the structure becomes both the impetus and the result of the action, demonstrating the 'duality of structure' in action. The use of investment appraisal was embedded within the structural principles of this industry before this research began. However, investment appraisal techniques were not used solely to make the decisions (the decision making process

was more complicated than that) in this case it was used to identify the unknown variables. These variables were then subject to a process of lobbying to make the modelling more realistic. At industry conferences, the modelling was demonstrated to show how small changes to future regulations could impact not only on the financial outcomes of projects but also the security of supply; thus engaging politicians in a serious debate on the security of supply.

To summarise, based on Giddens' duality of structure in this study:

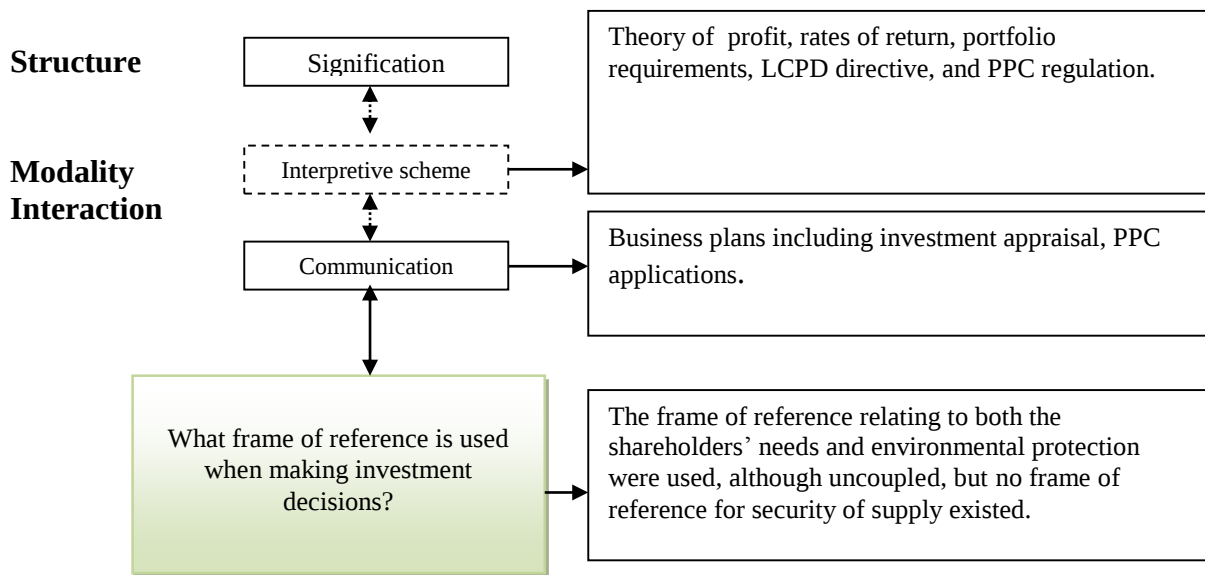


Figure 12 Signification conclusion from the framework

5.7 Conclusion

This chapter has analysed the UK generation industry, using Giddens' ST. The focus of this chapter was to provide the reader with the findings related to the frames of reference within the context of

implementation of the LCPD within the UK generation industry. It is apparent that at the time of the interviews, and when the decisions relating to the LCPD were made, two frames of reference were dominant; investment and regulation. However, to provide informative investment appraisal models information regarding regulation, investment and sustainability were all required.

The frame of reference for regulations were used at a general level for the PPC application. The frame of reference for regulation was then designed in the UK, by the generators and regulators. It was here that IA was used first as a mediating device. IA applied the general principles of the LCPD directive and tested them using existing knowledge (theory), reproducing them to examine the consequences. The IA models created a workable methodology to evolve a regulatory framework. Although the rules were eventually agreed upon, following intense lobbying, the regulation frame of reference continued to be re-enacted, through the application process. The application process for the permits required under this regulation was de-coupled from the modelling of the investment decisions themselves.

The normative IA techniques / framework of reference had been deeply embedded within this industry since privatisation in the 1990s. This was the main frame of reference when communicating decisions were used to lobby politicians in order to create grounded arguments to inform future policy decisions that could be centred on sustainability. The frame of reference relating to sustainability was the one missing item. Although there were nominal White Papers, they represented little value for the industry. Long term investments require long term policies, the set of White Papers produced during the ten year period running up to the LCPD decisions contained a lot of information without committing to any one item. The lack of policy created a void in the modelling of investment appraisal techniques.

Earlier in this chapter the process of using the frames of reference in conjunction with the 'norms' established through a legitimisation process was considered. The next chapter will consider how legitimisation processes are established within this industry, what they are and what the missing rules and resources relating to sanctions might be, which complicate the decision making process.

Chapter 6: Analysis – what are the norms? Legitimation: Examining the changes in social, political and economic factors

6.0 Introduction

Using the framework established in Chapter 4, this chapter will examine the legitimation structure outlined by Giddens' (1979) structuration theory (ST). The theory will be related here to the changes in 'norms' within the generation industry, particularly as these effect investments. By examining social, political and economic changes it will become apparent why missing sanctions and policies have placed the industry in a state of flux, and identify what is required to encourage investment.

Structuration Theory

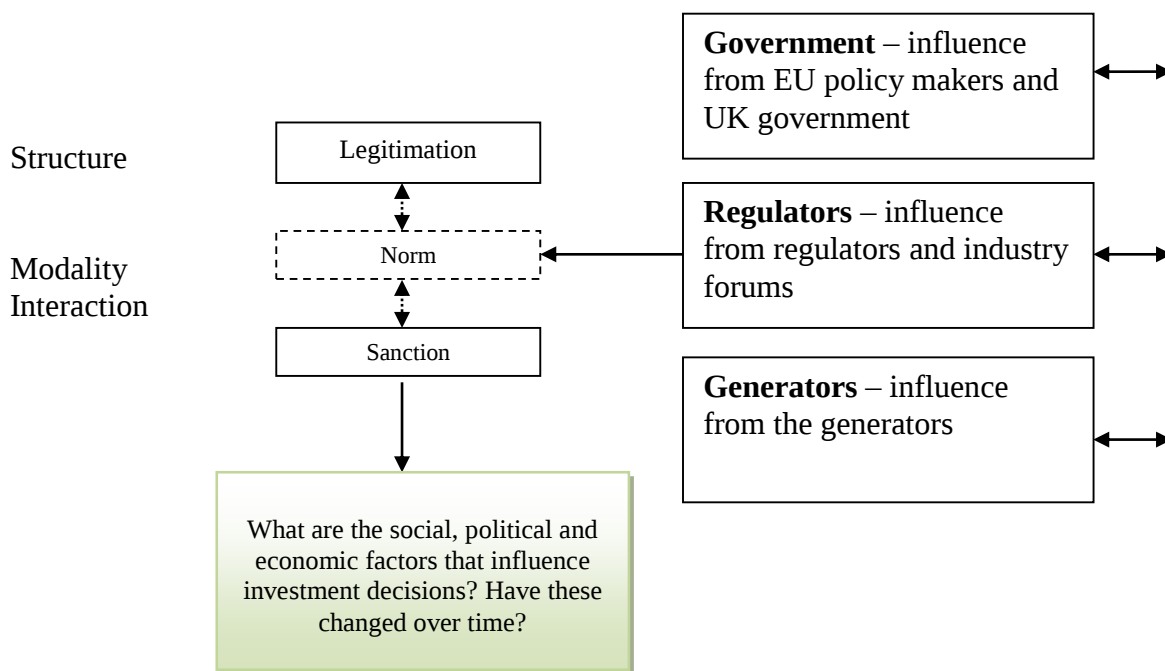


Figure 13 Legitimation structure from the framework

The ‘norms’ within the generation industry continually change at the organisational, organisational field and societal level, which are represented as the generators, regulators and government in Figure 12. In terms of ST, this means the structures that provide the constraints within the system also keep changing. By providing the reader with an awareness of these changes, it is possible to explain why investment patterns have changed over time. This chapter will clarify the current situation concerning the process of change by examining the issues associated with investment appraisal, sustainability and regulation. This will make it possible to identify ‘norms’ and ‘sanctions’ and to provide an insight into how institutions influence each other (Scapens, 1994).

Legitimation can be scrutinised by examining events, ‘norms’ and sanctions’ and it will become apparent that these have changed significantly over time. Although this thesis is examining change, the framework established in Chapter 4 provides a position of stability from which to view the adjustments that have occurred. The theory within the framework helps to guide the selection of facts and also provides an analysis of those facts. By using industry data this chapter will provide a map across time (see Table 6) providing an overview of the drivers of investment that represent accepted ‘norms’. Examining historical changes reveals how investment decisions have altered as institutional structures have changed.

Supporting the work by Lounsbury (2008), this historical examination will identify that the changes were not made through mindless mimicry, the actors were either taking advantage of current situations or strategically adapting to competitive changes within the industry. The knowledgeable agents only acted beyond the daily routine when there was a motive to do so, and change was instigated only when the institutionalised routine did not mesh with their own agendas. Following a brief summary of how

investments have transformed over time the three issues core to this thesis: investment; regulation; and, sustainability will be examined in more detail in order to understand the current issues.

6.1 How Investment norms have changed throughout history in the UK electricity generation market

The following six tables provide an overview of the main issues from an organisational, field and societal level. Presenting an analysis of investment from all three perspectives will facilitate understanding of the changing structural principles within this industry. All the data in these tables is drawn from a combination of the works of Surrey (1996), Helm (2004), Chick (2007) and the interviews conducted by the author.

Table 6 ‘Norms’, historical perspective from an organisational, field and societal level

Timeframe	Organisational influence – generators	Field – regulators, lobbying groups and industry forums	Societal – EU and UK policy makers	Norms and sanctions developed
Nationalisation – 1970s	Executives at the power stations were responsible for day-to-day operations. Investments had very low capital cost because there was minimal risk, a natural monopoly. From 1964, the cost of capital was 7.5% and investment appraisal was prepared but had no influence. <i>Investments were driven through engineering excellence.</i>	Regulators were not seen as necessary when competition was illegal. Then in the 1960s, regulation was introduced, and so investments should break-even, which moved to Required Rates of Returns. Market – natural monopoly with vertically integrated business model. Lobbying groups focused around constituency and political agendas – <i>Investment was used for job creation in certain constituencies.</i>	Drive for a basic standard of living. Drive for economic growth through investment. Politicians were non-executives responsible for meeting the social needs of the country. <i>The investment process was cyclical, around elections.</i>	Although each level of influence had their own goals, their agendas were not conflicting. Mixture of economic growth and social improvement. <i>Investment driven through growth and social issues and political agendas - votes.</i> <i>Profit was not a driver resulting in long term decision making.</i> Investment - political bargaining role

Timeframe	Organisational influence - generators	Field – regulators, lobbying groups and industry forums	Societal – EU and UK policy makers	Norms and sanctions developed
1970s	Government set Required Rate of Return, although method of investment appraisal and discount rate was left to industry to determine. Industry continued to refer to historical costs, even in an era of huge inflation. Pushing through lots of new investment whilst debates within the organisational field took place. <i>Investments were driven through engineering excellence whilst complying with the need for diversity.</i>	Debates by regulators on how financial targets should be set within nationalised industries – no real progress made. <i>Investments recognised as needing to be financially viable - protecting society's role in paying for these investments.</i>	Economic uncertainty pushed the government to become more economically focused. Department of Energy created to ensure both diversity in portfolio of investments and to push for Test Discount rates to be used, although this soon moved back to Required Rate of Return, set at 5%. <i>Investments became politically important in ensuring diversity so the country was not held accountable to individual fuel types, ensuring sustainability.</i>	Agency problems appeared with decision making becoming a main focus of concern – who should make the investment decisions? Conflict became part of the game. Mixture of economic stability, social welfare, diversity. <i>Investment driven through the need for diversity.</i> Investment – political bargaining role.

Timeframe	Organisational influence - generators	Field – regulators, lobbying groups and industry forums	Societal – EU and UK policy makers	Norms and sanctions developed
1980s	Required rate of Return increased to 8% but was still not the same as new private entrants; therefore, true competition did not emerge. New investment was not needed but occurred anyway. <i>Investments were driven through engineering excellence whilst complying with need for diversity.</i>	Drive for industry to move away from monopolies and the Monopoly and Mergers Commission (MMC) was put in place to protect society. MMC conducted a critical investigation into the investment process and concluded that their investment appraisal process was seriously flawed. <i>Investment should be pursued under controlled costing.</i>	1980s Competition Act opened the door for new entrants into the market. Drive no longer sustainable - the market could do this. <i>Investment should ensure diversity, i.e. nuclear.</i>	Although the government and regulators were aware of the flaws in current, investment strategies the CEGB continued to push investment though, knowing there was no competition. Conflicts in the drivers for investment. Investment - political bargaining role

Timeframe	Organisational influence - generators	Field – regulators, lobbying groups and industry forums	Societal – EU and UK policy makers	Norms and sanctions developed
1990s	Privatisation removed the barriers to entry. Pool and Settlement system provided incentives for new investment due to the market structure. Dash for gas, cheapest way to invest to increase profit. Large margin between cost and revenue. Towards the end of the decade there was an influx of new entrants alongside larger players seeking vertical integration. <i>Investments were driven through the need to create profits and new business model (vertical integration)</i>	Environmental regulation started to appear - however, compliance was achieved through natural market structures, the move towards gas. To follow through privatising principles, competition was forced through by divestment plans. <i>Investments were driven through by divestment agreements.</i>	Investments to become market led. Although diversity was still under political discussion. Towards the end of the decade, the government started to consider long term sustainability issues. <i>Investment should be market led but with considerations of diversity.</i>	Competition was the name of the game with the government taking a hands off approach and the regulators becoming more influential. Investment in the market was significant with high prices due to a floor market agreement pushing prices high. Investment – rational / instrument role

Timeframe	Organisational influence - generators	Field – regulators, lobbying groups and industry forums	Societal – EU and UK policy makers	Norms and sanctions developed
2000-2006	Reduction in prices due to NETA saw a mass reduction in new investment. Bankruptcy was common among the smaller players. Lobbying became a political tool for the generators to influence regulation requirements. <i>Investment was higher, based on the acquisition of existing plants to increase market share and secure profits through stronger vertically integrated business models.</i>	Regulation created a new market structure – NETA to reduce price manipulation. Environmental targets became a significant role of regulation compliance. Lobby groups and advisory groups were strongly established within the industry, to work alongside the regulators on the knowledge gap between regulators and generators. <i>Investment to be driven within environmental constraints.</i>	Environmental targets at the beginning of the decade became the main drive in political discussion. There was recognition that the market structure of the industry needed to be refocused and NETA was designed and in position by 2001. <i>Investment should be market led.</i>	Hands off approach from the government provided more power to the regulators and generators. Lack of knowledge from the regulators created an opening for generators to take a stronger lead in shaping the future of the industry. Investment rational /instrumental role

Timeframe	Organisational influence - generators	Field – regulators, lobbying groups and industry forums	Societal – EU and UK policy makers	Norms and sanctions developed
2006-2010	Real investments limited due to politically uncertainty. Lobbying continuing to become a stronger feature in the industry. <i>Investment driven through financial security of renewable incentives.</i>	Environmental targets now playing a significant role in regulation compliance. Strong links between generators and regulators which enables knowledge sharing. <i>Investment pushed through compliance procedures relating to environmental targets.</i>	Environmental targets used as political voting tool, however, realisation that security of supply is once again an emerging issue. <i>Investment is seen as necessary to achieve both environmental targets, but mixed portfolio and security of supply issues re-emerging. Still adamant that investment needs to be market led and favour of nuclear investments changing. By Autumn 2010, an urgent energy forum was set up to address both environment investment and security of supply.</i>	Conflicts between generators and EU and UK policy makers with the regulators mediating. Investment needed and generators willing to make investments but not without strong government energy policies. Generators taking advantage of environmental incentives. Investment – Symbolic in relation to environmental regulation.

Table 6 suggests that the structural properties within the social system have changed dramatically over time. The history of change, which covers nationalisation to 2010 is important because this was when many of the existing assets in the current portfolio, were constructed. The influence of the politicians and the role of the regulators and generators, in terms of investment, have changed significantly. Investment has changed through the introduction of various social agendas and investment has been used as a political bargaining tool, a rational instrumental tool and finally as a symbolic tool. The role of investment has directly influenced the sustainability of the industry.

Englund and Gerdin's (2011) triggers of change assists in this examination of how investment has changed over time. The changes were influenced by the 'norms' and 'sanctions' that defined the industry at any given time; however, as Giddens (1984) stresses, these 'norms' and 'sanctions' constrain rather than govern the action of actors. Investments made during the period of nationalisation up to the 1970s were not influenced on a day-to-day basis by the theory of investment appraisal because engineering excellence was driving the making of investments in this period. Engineering constituted the reality of the actors. There was no significant role for MACs here because it was a nationalised industry; MACS existed, but they were not acted upon because there was no 'sanction' that affected day-to-day life.

The structural properties within the political sphere focused on using the industry to win votes; this resulted in the only significant investments being made in the lead up to elections. The generation industry was seen as a way of providing society with its basic needs (Helm, 2004) and gaining votes; the regulators were not of relevance here because they were not needed. The only role investment appraisal had was symbolic. The generators had no reason

to seek change because strategically this suited, as they were free to do as they wished as long as they delivered engineering excellence.

In the 1970s a few changes occurred, driven by exogenous triggers (Englund & Gerdin, 2011) in overlapping social systems. The oil crisis (A General Manager of Operations interviewee and Helm, 2004) prompted government realisation that there could be an energy crisis if they did not diversify the generating portfolio. Therefore, the industry was asked to research new technologies that would overcome reliance on oil. The ‘norms’ of the political sphere had changed due to identification of problems elsewhere and this led to sanctions for the industry to create new solutions (Whittington, 1992).

The regulators sought to make changes, but there was no authoritative power for them to draw on given that the politicians were more concerned with diversity. Therefore, the generators were free to do what they thought best, which was to ‘research new technology’. Nevertheless, the role of MACs within investment was still symbolic as the government saw it as their role to ensure the country had an adequate electricity supply, at an affordable price. The knowledgeable actors within this industry were capable of taking responsibility for the industry; however, there was no motive for improvement to change the situation because they found themselves in a very appealing position. The generators could therefore advance research through their own knowledge and there were no financial constraints. The industry witnessed many changes to its structure; however, these changes did not impact on investment in this decade.

In the 1980s, however, the political sphere changed dramatically, with fierce competition

arising across other industries. The political changes paved the way for the Competition Act, which finally gave the regulators a way to effect change by the wielding of authoritative resources. Although new structural properties emerged, they were not put into practice. The Competition Act had the potential to create change in the MACs by creating a new focus on profit; however, no changes occurred because no serious competition emerged within the generation industry. The generators continued to focus on creating investment through engineering excellence, with investment appraisal being merely a symbolic gesture. Collier (2001:467) explained that “power and conflict are in a contingent relationship, it follows that power does not necessarily imply conflict of interest if different groups are shared”. In this situation even when interests are not shared, if there is absence of conflict then change is not required. Even though there were fractures appearing within the structural principles, it was not in the interests of the different social totalities to instigate change and there was no motive to do so.

The 1990s saw the introduction of genuine change in MACs, particularly those related to investment appraisal and features of privatisation. The government took a step back and gave the resources required to generate authoritative power to the regulators; expecting them to oversee the day-to-day running of the market. The regulators now had the necessary resources to forge a competitive market, triggering the need for fully functioning MACs. Following privatisation, the generators fully participated in new investments. The regulators forced the divesting of assets to encourage competition; the generators were satisfied with this change because they were able to manipulate the pricing framework to create vast profits. The regulators focused on competition and had little time to focus on preventing the manipulation of pricing rules.

The theory of investment appraisal became more meaningful, as the generators now had the responsibility to provide profits for their shareholders. These changes occurred through exogenous influences (Englund and Gerdin, 2011), but were also intentional. The government, who were involved in many other privatised industries, drew on their knowledge of how these industries worked and demanded similar changes from the UK electricity generation industry. Changes were enacted using legislative resources to create new market structures and accepted 'norms'. Scott (2010) suggests that when there is ambiguity within the goals of a system, actors then adopt external solutions and implement them into another system. It can be argued that the government, wishing to seek competitive and market led investment created new sanctions leading to accepted 'norms'.

This very brief overview of the changes to 'norms' and 'sanctions' is important, in that it provides an understanding of what prompted the changes that have occurred since the turn of the millennium. The remaining part of this chapter will examine the last decade in more detail in order to understand the current 'norms' and 'sanctions' within this industry. The chapter will also explain some of the power games that will be played out in the next chapter, Chapter 7. The following section discusses recent changes to 'norms', from the perspective of investment issues, regulatory issues and sustainability issues.

6.2 'Norms' in regulation

Since 2000 regulation has had a marked impact on how this industry operated. Soft regulations were no longer part of the agenda and policy developments swiftly emerged. However, most policy developments were driven by EU involvement, rather than UK

intervention; the one exception to this was the NETA. NETA was established to provide a more transparent market, following the problems with price manipulation in the 1990s. Trading now occurs through a variety of bilateral and multilateral contracts. This has created an openly competitive market avoiding manipulation within a Pool and Settlement Agreement.

These changes to the market's structure were forced through by the politicians and industry regulators, in a coercive manner, and this had a large impact upon the industry. Although this may suggest that the structures within the system were dominating the actors, this was not the case, they were merely constrictive influences. The knowledgeable actors were given the simple choice of either accepting the rules and sanctions or not. The generators could choose whether to remain in the UK or whether to invest elsewhere.

Electricity was now trading as a commodity, causing prices to fall whilst the price of gas increased. Investments into gas power stations in previous decades were causing problems, particularly for new entrants who only had a small percentage of the overall market. The larger more dominant players had assets vested to them with no debt, and were in a much better position. Following the inevitable bankruptcies there was also added pressure on investment from the new LCPD. By 2006 there was mass confusion within the industry as to how the LCPD would be implemented and as to the direction of the future energy policy. New sanctions were put in place and there were consequences for those generators that failed to comply with the LCPD. However, there were no supporting frameworks to back these new directives, as was discussed in the previous chapter.

Generators continued to use rationalistic investment strategies, investing in only a few CCGT (new plants); the majority of these investments were symbolic investments in wind generation, as the financial incentives to build wind farms, to improve government targets, were attractive to the generators. The incentives also helped the generators to establish their environmental strategies, resulting in the pattern of investment being influenced by the regulators. Corporate Social Responsibility (CSR) also drove the industry to focus on environmental issues, as can be seen from an extract from the CSR statement by nPower below; they aimed to garner good reviews from the public, by marketing themselves as having environmental responsibility:

“Even though we’ve opted out, we’re still working hard to ensure we meet emissions limits. For example, we’ve been bringing NO_x emissions down at Didcot using range of engineering and combustion techniques.”
(nPower, CSR, 2010)

In fact nPower ‘opted out’ of the LCPD, so this statement demonstrates that the generators as a whole have accepted the social pressure towards environmental change, causing environmental sensitivity to become a ‘norm’. External support can be gained by aligning oneself with accepted ‘norms’, and strategically this is a good way of signifying CSR. The additional investment commented on in the previous quotation, regarding the ‘opted out’ plants, is not a rule devised by regulators, but one that is socially formed. The ‘norms’ created by public perception are just as important as those created through legislation. Informing the public of the need to meet environmental targets is now part of the generators everyday routine; as emphasised by a Business Services Director when he said:

“We’ve got fingers on the pulse - as far as emerging thinking - where the environment is concerned, because it’s the whole future of the business.”

This reference made by the Business Services Director suggests that organisations are strategically trying to position themselves by using these new social rules to their advantage rather than mimicking earlier decisions and reacting only to institutional pressure (Oliver, 1991). Based on Oliver’s (1991) research, the generators were responding to mandatory change and extending this to attract social legitimation within a highly competitive market. They can acquire this type of legitimation by presenting themselves as environmentally friendly companies, through achieving strategic aims based on environmental objectives.

The industry was now an established, liberalised market, subject to both competitive and institutional pressures (DiMaggio & Powell, 1983). Organisations were not just seeking pure financial gain, it is evident, as already indicated, the generators were also seeking the social support of the wider stakeholders in order to gain legitimacy (Meyer & Rowan, 1977). Legitimacy provides leverage when seeking approval for other decisions; therefore, the ‘norms’ of an industry are established through the identification of socially accepted practices that can underpin authoritative power. As noted by González and González (2010), being technically efficient is no guarantee of success, it is legitimacy that ensures survival within the industry (Meyer & Rowan 1977). Therefore, to be successful within a privatised industry, generators must be both technically and financially efficient and also be prepared to play the game by lobbying towards future goals.

González and González (2010) examined the Spanish electricity industry, interviewing one of the parent companies that also participated in the study, Iberdrola. They found that a CSR model, which includes environmental protection, is not just a way of internalising CSR ‘norms’ but is also a way of providing a platform to persuade stakeholders that the commitment a company has is genuine and not just for publicity. The generators realised that they had a considerable part to play in setting the ‘norms’ of the focal systems and that they could do this through lobbying.

Returning to the discussion of environmental regulation, rather than social approval; by this time the revised LCPD had been put in place, and the regulators and lobbying groups and forums were trying to establish the UKs interpretation of the EU directive, as discussed in the previous chapter. Although in the past regulators and government bodies were closely linked with, and separated from the generators, the relationship between the generators and the regulators had become stronger⁴⁷. This relationship became more powerful because they were required to create a framework to support the ‘sanctioning’ aspect of the industry; the permit. The permit would specify the terms of the authorisation to continue in business. The lack of leadership from the government, with regards to signing agreements, whilst having no real public policy on energy, started to create tension. Collier (2001) noted that, to a certain extent, organisations need the support of government bodies for survival and the lack of direction in this case was creating a problem.

The generators and regulators began to work together to understand the new environmental directive and its operational implications. The rules surrounding the application of the

⁴⁷ As stressed in the previous chapter this was not in regulatory capture way.

LCPD were established when the regulators consulted with both professional bodies and the generators. The regulators recognised they did not have the technical capabilities to work through the detail by themselves. The actual emission limits of the directive were established coercively by the EU, but applied on an individual country basis. As an Environmental Planning Manager explained:

“A joint forum was created with the Environment Agency to make sure there’s a common understanding from both sides as to what the implications would be for regulations. From our point of view - and to also understand what’s required from the Environment Agency’s point of view - to actually make sure they meet due diligence to make sure the requirements are met”

The Environmental Planning Officer demonstrates here, that in addition to the ‘frame of reference’, a sanctioning process was also being fashioned. Of course, each lobby group had its own political agenda and their own objectives that they hoped to see reflected within the rules. The LCPD required that these new rules were created to ensure that the directive would be adhered to. This chapter will not discuss this process, as this forms the analytical portion of the following chapter; however, one example of the process is below.

“The UK Government has two options for implementation. UK COAL is active in a concerted lobbying campaign for the Emission Limit Value (ELV) approach rather than a National Emissions Reduction Plan (NERP). UK COAL supports the position taken by The Confederation of

UK COAL Producers (COALPRO) on this issue.” (ukcoal, 2010)

During the consultation period, the rules created through consultation with shareholders, regulators, professional bodies and governments specified the environmental emissions targets, such as Renewables Obligation (RO), LCPD, PPC and EU ETS. Towards the end of the 2010 time period there was renewed interest in the security of supply issue, although this had yet to be fully socially recognised.

At the end of this decade, the government finally announced that it accepted that the industry as a whole required major changes and that the ‘arm’s length’ approach had not worked in terms of expected investment.

“It’s an extraordinary volte-face to admit that a liberalised market won’t achieve its objectives. They have argued against intervention and said markets would engage with the issue of security of supply. The Irony is incredible” (Helm as cited in Webb, 2010:1)

The next section highlights the issues associated with the ‘norms’ as they influence investor behaviour.

6.3 ‘Norms’ in investment

Regulatory changes had a big impact on investment patterns. New investments at the beginning of the 2000s were limited and investments more commonly occurred in the form

of takeovers of smaller independent companies. These takeovers were either direct or by banks seeking to acquire a portfolio of assets. A stronger vertical integrated business model was developing, with fewer competitors existing within the industry, thus change became a process of mimetic behaviour. Uncertainty as to how the industry would cope with the new market structure resulted in the majority of companies seeking the same business model to protect themselves, evading uncertainty, which created pressure. The shift in market structure within the new investments by independent companies created a new culture within the CCGTs.

The shift in the business model demonstrates the interplay between the regulators, changing the market structure of the industry and the response of those generators seeking efficiency. A similar situation was found by Tsamenyi et al (2006) when they examined the Spanish electricity industry. They reported an adjustment in accounting systems due to changes in internal management, institutional forces, and market forces. They found that pressure from institutional sources was relative to the pressure of market forces. In the research on the Spanish Electricity industry the generators identified new business models to enable competition around the newly formed structural properties, and this had a direct impact on investment patterns and the actions of the actors. In the Spanish electricity industry there was a reduction on new builds and an increase in acquisitions, which was similar to the experience in the UK market.

As touched on above, engineering excellence was no longer a factor determining success, because the training in response to the new market structure had developed the engineers' language from one of pure engineering to one that was commercially aware. The engineers

demonstrated their capabilities by adapting to new constraints, and communicating on a daily basis with traders (Warren, 2003). This culture filtered through all aspects of the business, which meant that it also influenced investments. The role of the engineers working for new industry entrants was changing; however, employees within the old coal plant companies retained their former culture. The focus of decisions became more rational and targeted on finance, in particular evading bankruptcy. Many of the American entrants to the UK market chose to retreat, because it was no longer a profitable industry to be in (Warren, 2003).

Whilst the generators were protecting themselves from the changes that emerged from the new market framework, they also acknowledged that the future of the industry was becoming very uncertain. There was no strong direction from the government, and as discussed earlier, investment patterns had changed. No longer was government policy an effective tool to help guide investments. This means that influences on investment and established rules were separated at the organisational level, in the organisational field and at the societal level. This conflict strengthened the emphasis on lobbying within this industry. Lobbyists from professional bodies and the generators themselves⁴⁸ applied pressure to establish new ‘norms’ and ‘sanctions’.

The regulators at this time were focusing on correcting the market structure, but at the same time worked on the environmental targets, which were emerging from both the UK government and the EU. Discussions over how the revised LCPD could be operationalised created forums of debate. New rules were being created and implemented with the

⁴⁸ Lobbying will be discussed in detail in the next chapter, domination.

assistance of the regulators, for example the RO and the EU ETS. Both regulations focused on improving environmental targets and both directly influenced investment from the generators. The government was pushing for stronger environmental commitments, and were adamant that security of supply was not a concern. They argued that the market would resolve any problems that may occur in the future; however, based on regulators' behaviour they could not envisage any.

The changing pattern of investment within the industry provides the reader with an understanding of how the 'norms' and the rules of investments had been influenced by nationalisation. Industry investors now examined the roles played at an organisational level, organisational field level and societal level. This information explains why the country is now in a position whereby the asset portfolio is in serious need of new investment if any future security of supply is to be guaranteed.

At the root of these problems for investment was the fact that the government had signed up to new environmental targets that would affect the future of the industry, but that the generators were unsure to what extent and in what way. Within the industry it was known that some of the targets could not be achieved in practice, if the current market environment and the lack of public policy were to prevail. In addition to industry regulation, financial accounting standards were also making an impact on the 'norms' of investment within this industry.

6.3.1 The impact on investment of accounting standards

The investment process is not just about internal decisions and the production of investment appraisal numbers it is also relates to the way in which the stock market reacts to an investment decision. Investment analysts play a significant role in this decision making process. Three of the interviewees commented on the issue of the ability to raise capital and expressed concerns that they may lose their triple A rating in the market. This would have a big impact on their ability to raise capital off balance sheet, if required for future investment. Therefore, the legitimisation process for current investments, including the LCPD played a role in this process. The external reaction of the stock market to investment pronouncements had to be factored into decisions, and so became part of the boards' negotiations. Analysts were interested in credit ratings and the application of the accounting standards that related to the investment decisions.

Although the focal point of this thesis is the role of investment appraisal in decision making, it is important to understand the role of other factors that have an influence on investments. Cash-flow predictions and accounting standards are two conceptually different aspects affecting the decision making process; however, to present a deep understanding of this process both aspects need to be considered. Two of the interviewees discussed the implications of the financial reporting standards on their decision making process, because this affected the public's perception of what they were doing. IAS 39 is one of the standards that had a direct impact on this and relates to:

“An entity shall recognise a financial asset or a financial liability on its

balance sheet when, and only when, the entity becomes a party to the contractual provisions of the instrument.” (www.iasb.org)

The investment decision making process is intrinsic to financial reporting standards, as a Commercial manager explained:

“That’s (IAS39) having an impact on investment decisions . . . in that whereas a party might have made some investment decisions because it looked like the right thing to do, now, because of the impact it might have [an effect] on your financial reporting. Although the underlying transaction remains the same, the way it needs to be reported means that it might, it might not be perceived as being as good a transaction, as it actually is and therefore you wouldn’t necessarily want to take it for that reason”

Although investment appraisal is the basis of the communication process and has a significant impact on decision making, investment decisions are still influenced by financial accounting regulations. The reaction to investments externally amongst the market is an intrinsic part of the decision making process, one which is not only based at the strategic level with board or accounting discussions. The impact on decision making lies deep within the industry and although not all interviewee’s can speak at length on the topic, many are aware of the implications. Although a qualified accountant made the previous comment; a General Manager of Operations who has an engineering background said:

“I think what has changed in recent years is the degree to which, how, matters will be treated from an accountancy perspective . . . it’s influence on our decision making. So we find IS39 makes a big, big impact on our decision making, how we treat things”

He went on to explain that engineers now have to be aware of how their contract negotiations can affect the way in which those contracts are perceived financially on the balance sheets. It is common within this industry, for example, to use indexation contracts on fuel, labour and metals. As the General Manager of Operations explains:

“With a contract for an overhaul if there are indexations in these contracts and, and . . . you know that potentially you could make it a derivative and that gives a different accountancy treatment then we have to be a bit more cautious. Our Engineers now know that when they negotiate contracts they need to make sure that if there have got indexation provisions within those contracts against an underlying issue then they need to speak to the Accountant to make sure that there isn’t some nasty financial accounting surprises that comes out of that.”

In the case of the LCPD, the issue of overhaul of investment was a component of the investment appraisal, because many of the coal plants had a limited life that was relative to the technology in place. If the organisations chose to opt in to the directive then they would be completing an overhaul and they would need to secure a payback on the investment, fitting the necessary technology to reduce emissions. The process of securing contracts relating to

the investment was very important. Although the engineers were not expected to have full knowledge of how this worked, they were expected to consult the accounting team. The accounting team had full knowledge of the accounting standards and were able to pass this knowledge onto the engineers, so in effect they were able to secure contracts that would be appropriate for the company. This use of IAS39 demonstrates that MACS and financial accounting are still very much interwoven; although the actors who discussed it, said that it was an important part of the process but it not one that dominated their decisions. Although financial standards influenced the decision making process, they did not influence the role of investment appraisal.

6.4 'Norms' in sustainability

In this thesis, sustainability issues relate to societies' needs for environmental protection and supply of electricity, and to the investment returns for shareholders. As stated in the introduction chapter, sustainability in this thesis relates to the continuation of the industry, not just environmental factors. The moral requirement to provide a secure electricity flow was not evident in this period, which has created unintended consequences including future threats of blackouts. This occurred because, creating changes to the market through privatisation of the generators resulted in unintended consequences regarding the security of supply.

Tollington's (2006) study of legitimization tensions also observed the emergence of problems as a consequence of establishing new rules; in this case, there were two moral obligations relating to sustainability that created tension. The first point of tension was the need to meet environmental targets in order to reduce environmental damage; tension arose because more

investment was required, but meeting targets reduced the potential profits for investors. This opposition of profit seeking and meeting environmental policies represents a contradiction within the industry. Generators responded to their moral obligations to investors in different ways, with some generators simply opting out of the directive and announcing the early closure of the power plants. Other generators considered the longer term portfolio requirements, leading to improved prospects for the investors. Portfolio requirements in some cases were more important than financial results and these were also very uncertain due to the lack of information regarding the future energy policy. In the time period of this study, 2006-2010, the moral requirements were based around legal and economic protection, which were highlighted within the sanctions.

Although the generators continued to highlight the problems associated with providing a security of supply, the government ignored their concerns. With no sanctions for a reliable electricity supply, and because the government insisted that investment would be market led, there was no longer any moral obligation that needed attention, leading to the absence of a policy for security of supply. The generators were not to blame here; in fact, they had been pushing for a full consultation on security of supply issues from the outset of the debate. The generators wanted, and at the time of writing this work, still do want financial incentives to provide 'security of supply'. Generators were also lobbying for the return of capacity payments, which would increase their profits and provide more protection for their investments.

With the changes to policy regarding the environment, and the needs of shareholders in a privatised industry, it became obvious that of the three aspects of this study: investment;

environment; and security of supply, two have very clear legitimating aspects attached. The investment process is comprehensive and generators have an obligation to provide returns to their shareholders, and environmental issues are overseen by strong environmental directives driven by Brussels. As a consequence, it is the security of supply issue, which is also connected to the sustainability of the industry, which has been left with no clear sanctions.

6.5 Why the ‘norms’ and ‘sanctions’ are in a state of uncertainty

“Certainty paradox – in order to have certainty you have to go through a period of uncertainty.” (Hendry, 2010)

Uncertainty in this industry is at the crux of the problems being discussed in this thesis. The problem with uncertainty is that it encourages short sightedness amongst investors, which can lead to a lack of investment (IEA, 2007 and DECC, 2011). The commercial risks within the generation industry centre on uncertainty as to whether the government will provide incentives to encourage new builds in the near future (Redpoint, 2006). The possibility of future funding is causing reluctance amongst generators to take action now. The release of a new White Paper (DECC, 2011) suggests that new incentives will be forthcoming, apparently justifying the generators decision to hold back on investment. This reflects the fact that by waiting for the government to concede there is a problem and take action, rather than seeking to grow the market independently, has been an effective policy. Market failure, and lack of market signals for investors have resulted in a need to reform the market (DECC, 2011).

At the time the investment decisions related to the LCPD were taking place, electricity prices of were volatile and this volatility increased due to the uncertainty of which fuel would have

the lowest cost (Redpoint, 2006). The price risk is fundamentally the biggest risk the industry faces because the generators' short term goal is to maximise profits for investors and so 'optimisation' is vital (Sullivan & Blyth, 2006). Partly in response to price uncertainty, the industry within the UK has moved towards vertical integration, with companies securing a more balanced portfolio to include investment in supply and generation (Redpoint, 2006). This change in the business model has resulted in companies not prioritising investment in the less profitable generation side of the business. New independent investment into the UK market is unlikely to occur because of the market structure and NETA. It is this lack of liquidity in the market that is at the root of its failure, this is something the White Paper agrees to address (DECC, 2011).

Due to the lack of liquidity, the UK regulation on the RPI-X has focused the generators' attention on minimising costs, because the regulations are based around short term but fixed costs. Investment is not a top priority because generators have been "sweating" existing assets to keep costs down (Helm, 2005-6). The older plants used in the 'sweating exercise' were vested to the privatised companies at the beginning of the 1990s and are debt free, therefore, the generation of electricity from these is much cheaper than investing in new plants (Warren, 2003). Through privatisation the cost of capital has also increased because the perception of risk is higher (Euroelectric, 2004) and the market is not providing strong enough signals to mediate the risks (DECC, 2011), thus, adding to pressure to hold back on investment. This was also acknowledged in the 2011 White Paper (DECC, 2011).

The risks that have led to holding back investment have not only occurred because of capital costs, but also due to the uncertainties in the 'norms' and 'sanctions' within the UK and

overlapping social systems such as the EU. International companies operate in various countries resulting in the financial function of their businesses becoming heavily entwined with strategic decision making (Euroelectric, 2004). It is no surprise that there is a reluctance to invest until there is a marked improved return on investment. The cost of capital is driven by two forces; “i) The level to which it is possible to finance the project with debt relative to residual equity, and ii) The actual rate of return required both on debt and equity. It is suggested that relatively low risk projects may be able to finance large capital requirements with debt at low rates” (IEA, 2007, p. 75).

The high returns required within the NETA framework have not resulted in a long term futures market and therefore long term investments are not matched with long term security (Helm, 2005-6). As Howell et al (2010) explain, the market structure for selling electricity from the generators tends to include contracts lasting no more than three years on average, which does not support the long term nature of the investment required in the generation industry. The overlapping social systems within the international portfolio have proven to generators that longer term commitment and security can be achieved in other countries. In other countries, security of supply is still government policy and contracts are awarded to generators that respond to security issues.

Howell et al (2010) have analysed the investment problems within the UK electricity industry, examining how vertically integrated companies can create accumulated hold up risks along the value chain. As touched on above, when retail supply and generation are combined in one company long term investment problems on the generation side can emerge when the supply side encounters losses from long term contracts. These losses are a result in

the fall of wholesale prices, creating cascading hold up risks. Risks of this nature result in lower than efficient investment patterns at the generation end of the business, although the study recognises that vertical integration can protect companies from some of the risks associated with wholesale price fluctuations.

In addition to the accumulated hold up risk on the vertically integrated business model, there are also implementation risks. Implementation risks are associated with the planning and application processes for new builds and additional investment (Redpoint, 2006); in other words, the red tape associated with all investment in the industry. The red tape is now very time consuming and complicated, resulting in companies needing to employ consultants, which is very costly. Holdup risks can also occur due to the framework within which the generators sell their goods into the normal commodity market. Problems in the commission of new investment result in high financial penalties, thus adding to the risks, which the market is supporting in terms of return (DECC, 2011).

Regulators exert a heavy influence on investment strategy in the form of regulation risk; companies have a choice to either follow regulations or close. The result of environmental regulation imposed through both EC directives and UK government policy is uncertainty regarding how new or extended regulation effects the market. An increase in the cost of capital works against the investments required, both for the security of supply and also for EU directives. Generators are also unsure of future investment incentives, for example green certificates (Euroelectric, 2004). These certificates provide financial incentives and can play a big part in investment decisions; if investment decisions are made too soon they could miss out on future support. Although the 2011 White Paper suggests that grandfathering of old

incentives will be used (DECC, 2011)

Before this research began Euroelectric (2004) argued that uncertainty exists within environmental regulations and that this was a major concern within the industry that it is the responsibility of the government to resolve. The government needs to provide a secure and stable environment within the industry to encourage investment. Changing environmental objectives and policies every couple of years will not encourage investment. The IEA (2007b) argues that the lack of long term solutions from the government creates an industry that is unwilling to provide heavy investment. The current White Paper (DECC, 2011) accepts that this as an uncertainty that they can help with by providing solid support by grandfathering previous initiatives. In other words, they will continue to support previous contracts such as ROs.

Grandfathering was much needed, given that the industry has been shaken within the past couple of years by two EU governments making unexpected and retrospective changes to regulations within their own countries. Germany announced a nuclear tax regime, which is predicted to amount to around £12bn over the next five years and Spain retrospectively have withdrawn the solar subsidies they had previously offered to encourage renewables (Citigroup, 2010). The impact on UK investment is significant because this adds to uncertainty within the UK, given that the companies investing in both Spain and Germany are also big investors there. As Citigroup (2010) state, this will increase the cost of capital for all investment across Europe. The companies from these two countries will be drawing upon the changing sanctions within their own countries and using this knowledge when making investments within the UK.

The impact of the current uncertainty that the environmental directives are creating in the UK can be shown in the NPV calculations. The companies try and avoid uncertainty by waiting until policies are cleared, thus reducing the risk from bad investments. However, if companies wait too long to avoid the uncertainty, they have to incorporate the opportunity costs income they have chosen to forgo (IEA, 2007a). The discussion in this section has confirmed that although this industry had two out of the three required legitimization structures in place, the future remains uncertain. The new coalition government's White Paper (2011) is a recognition of this, and a statement of intent to enact change.

Industry has welcomed the consultation process to bring about change; it the decision to leave the industry to decide how to go forward that resulted in the 'sweating of old assets,' which added to the current urgent requirements for new investment. This was highlighted by Powell (2010):

“The government have been putting general policy in place expecting the market to sort itself out - clearly that is not working, what we need is a much stronger leadership”

Budge (2010) agreed with this, saying:

“All we need is leadership from the government and then we can go . . .”

And Kusterner (2010) added:

“There is a need for a more strategic public policy to facilitate investment.”

It is evident that a cycle of investment in new power stations is needed, but the lack of clear policy direction has created so much uncertainty that it is possible that investment will come too late. If not planned carefully, investment will be rushed through, without steps being taken to ensure that it is the right type of investment. Investments need to meet the needs of the country as a whole and this includes security of supply, responsibility to the environment and balanced fuel use. The ageing portfolio for generating assets and the restrictions forced on the generators through environmental regulation are areas requiring further exploration.

Generally economic theory suggests that capital can always be found if the right returns are available for investments; the problem currently is that the risks and uncertainties do not match the returns that the market is offering, as highlighted below:

“Only a fraction of the estimated £200bn investment needed by 2020 has been made, because volatile energy process, and short term supply contracts that have characterised liberalisation, have made spending such huge sums too risky.” (Webb, 2010:1)

However, with the government now at least recognising that market led investment is not to be relied upon, as market signals are just not strong enough, a new Electricity Market Reform will be issued to determine the success of any investment.

A summary of the risk and uncertainty that affects investment decisions is provided below:

Risk / uncertainty	Impact on investment
Hold up risks	• Accumulated risks associated with the vertical integration business model.
Regulatory uncertainty	• New revisions to environmental regulation from the EU • Lack of a strong energy policy within the UK • Technical changes to BAT
Commercial price risks	• Changes to price curves can alter the financial viability of an investment appraisal
Implementation risks	• Hold up risks with the planning and application process.

Table 7 Risks and uncertainty associated with current investments

Table 7 details the risks that have a direct impact on the ‘norms’ and ‘sanctions’ within this industry. In terms of the outcomes from these risks, impact can also be observed in the framework below.

Examining Giddens' legitimation structure we can summarise that:

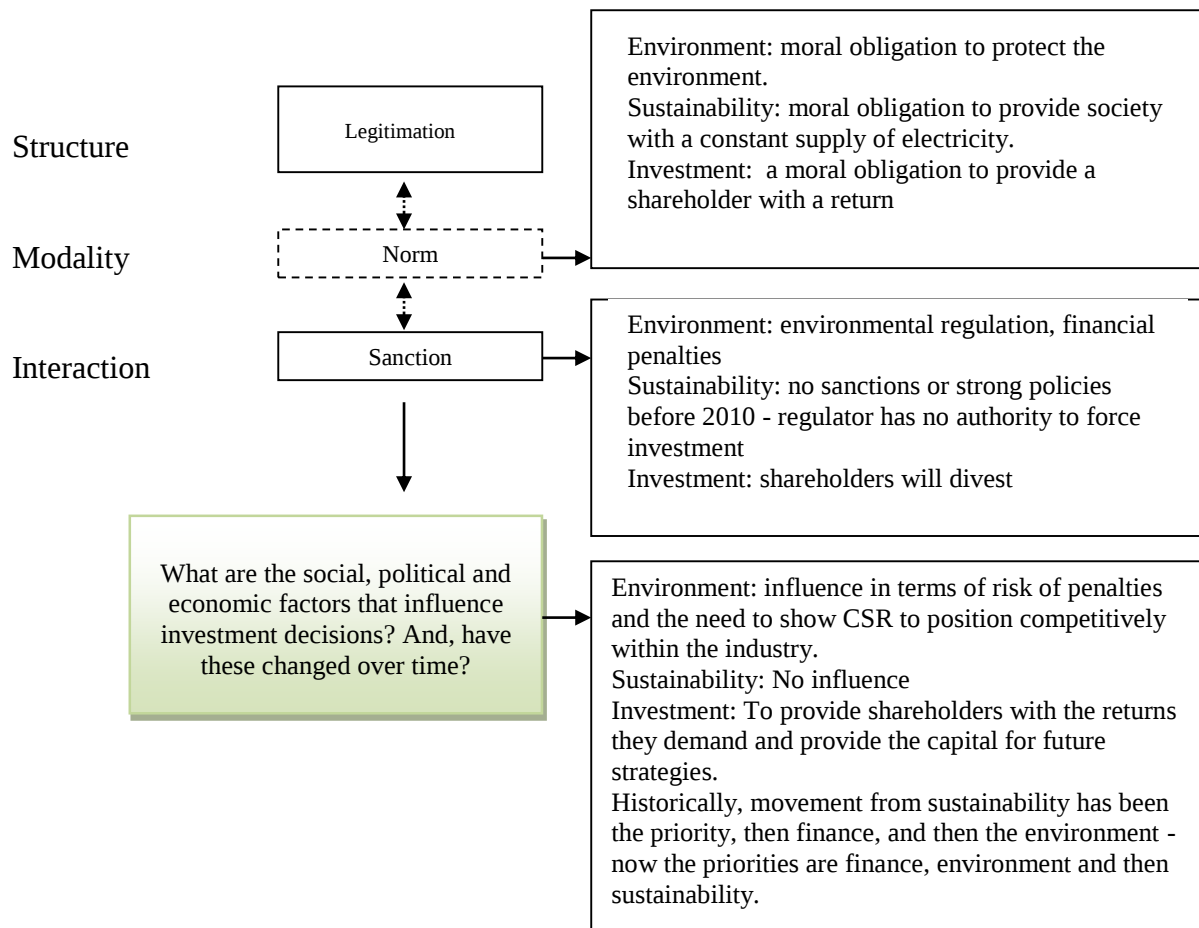


Figure 14 Legitimation conclusion from the framework

It can be clearly seen that although there are many uncertainties and risks in this industry, these would be manageable if all the required structural properties were in place to support the three goals of the industry; investment, environmental responsibility and the social goal of sustainability. At the moment the absence of sustainability 'sanctions' or market mechanisms to support this are significant factors in impeding future investment.

6.5 Conclusion

This chapter has presented the process by which investment decisions in the UK electricity industry have been made, from an historic context. Since nationalisation, the institutional pressure on generators has changed both in context and in terms of the groups of actors involved. The role of legitimacy has been instrumental in understanding why the UK market is now in desperate need of a new investment. The current portfolio is a result of both institutional and market pressures, and is based on the organisational, political and social ‘norms’ and ‘sanctions’ that arise throughout the generations.

ST states that it is important to understand the historical context within which a study fits, and this is recognised as imperative here. Many of the assets that form part of the current portfolio were designed and commissioned throughout the period examined in this chapter. Analysing the ‘norms’ and ‘sanctions’ in the areas of investment, regulation and sustainability, and understanding the general risks that directly impact on these issues has provided a thick explanation for why the industry became the subject of immense speculation in 2011; when the new White Paper was published. Although the press hijacked the discussion to present the generators as the big bad wolf, by examining the structures together, it is apparent that the truth is more balanced, and it is possible to see how the industry has ended up in such difficulties.

Whilst the issues surrounding need for investment are being recognised by the general public due to the higher profile media coverage, what is not being reported is how these issues will be resolved? The short term solution would be to cover the potential gap in supply with more gas generation (Westwood, 2009), as both the cost and the commissioning time is better than

any of the other alternatives. However, a longer term solution would require a mixture of a stronger government energy policy and widespread public acceptance of alternative generation methods, i.e. nuclear. In other words the 'norms' and 'sanctions' need further consideration, which is what the White Paper (DECC, 2011) finally recognised.

The role of accounting in terms of capital budgeting has shifted as the 'norms' and 'sanctions' in the industry have changed. Prior to privatisation, accounting was merely a passive tool employed symbolically for the public benefit. However, following privatisation the role of accounting has progressed, it is now a strategic tool, which can be used to identify missing rules and sanctions, which has opened the door to legitimate lobbying. The knowledgeable actors are constrained by the current regulations, but by modelling future investments they are able to strategically identify fractures within the system. The models constitute reality and the actors use this reality, when motivated, to suit their own agendas.

The frames of reference and the 'norms' and 'sanctions' have been presented in this chapter. These provide a very good foundation for understanding the key issues, and the domination of structure is significant in understanding the role of investment appraisal. This will be explored in detail in the next chapter.

Chapter 7: Analysis – the role of investment appraisal: Domination

7.0 Introduction

Following the discussion of the signification and legitimation structures in the previous two chapters, this section will examine the procedures for creating new regulations, lobbying towards suitable frameworks and implementing the LCPD. The aim of achieving a workable framework will be considered by evaluating the power struggles between the regulators and generators. The power struggles will be assessed by investigating how the generators, regulators and politicians have responded to change through an interpretation of the decision making process. The analysis will uncover a significant political turn around relating to this industry. This chapter will illustrate that politics within this industry has changed dramatically regarding the future of alternative investment, and this is best understood by establishing the problems and contradictions within the industry.

Presentation of the issue of investment in the generation industry through a domination structure will contribute an interesting and vital element to the analysis in this thesis. The interpretation of the actors' actions will reveal the interplay between the various groups; regulators; generators; and politicians. This analysis of the actors' behaviour and motivations will also provide an understanding of why a paradox has emerged in this market, in relation to investment, regulation and sustainability. The key issues when interpreting the facts are to achieve an understanding of how resources have been drawn upon by the actors within the industry, and how these resources have changed.

7.1 Domination

Domination examines the theory of authorisation and considers political institutions and the theory of resources, which can be applied to analyse economic institutions. By assessing domination, Giddens (1979) argues that one is able to track the progress and location of power. This chapter will analyse the second sub research question, highlighted in green, Figure 14:

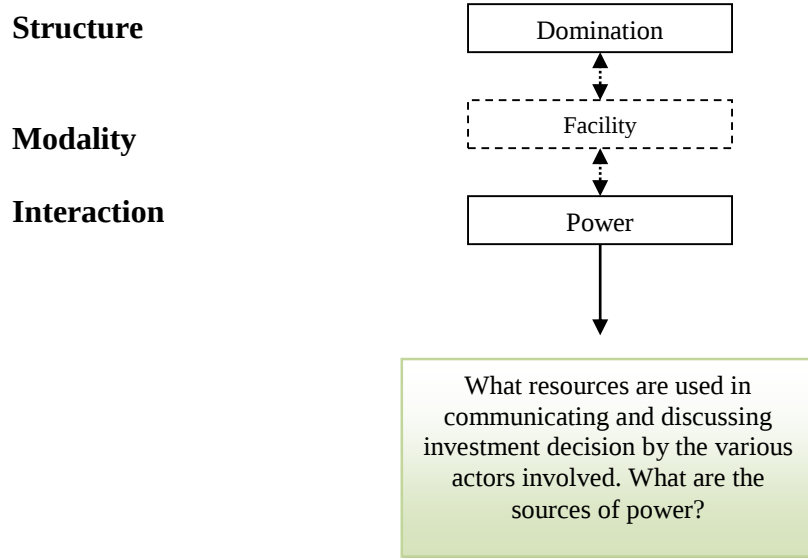


Figure 15: The domination structure portion of the framework

All the actors within this study are considered to have some ability to create change. The dialect of control, as discussed within Giddens' (1984) ST explains that it is possible for less powerful actors to manage resources in such a way that they are able to establish control over those that are perceived to hold more power. Therefore, the relationship between the various networked actors is 'dialectical' in nature in that they all have an effect on each other.

Domination will be analysed from three perspectives: (1) how the generators draw on their expertise and resources to formulate decisions; (2) how the regulators and generators mobilised power in forming the frame of reference relating to the LCPD; and (3) how the generators forced a crisis debate regarding sustainability. Although these three aspects focus on the actors it must be emphasised that all actions were constrained by the structures that enabled the actors to create change, as will be demonstrated.

The story of domination will reveal that the investment decisions, made during the period covered by this research, have resulted in some unintended consequences. These investment decisions added to the pressure on the government to sit up and realise that there is an issue regarding security of supply. This is essential as the UK has had no policy on this issue since privatisation, something that has resulted in the key actors ignoring this concern in their decision making process. Although this chapter separates the power struggles pertaining to investment, environmental issues and sustainability, it should be highlighted that all the issues examined occurred simultaneously, and that one did not presuppose the other.

The unintended consequences of government policy since privatisation, in view of EU regulations, and subsequent crisis talks are central to facilitating an understanding of the process of human action in this context. In Chapter four, through the use of Giddens' ST, a discussion emerged that explained that structures can co-exist even where they involve different rules and processes. Such co-existing structures can result in unintended consequences and contradictions⁴⁹. It is within the domination structure that emerging

⁴⁹ This thesis does not suggest that unintended consequences or contradictions are either good or bad.

contradictions can be seen very clearly. Giddens (1979) clearly distinguished between conflict and contradiction in his social theory. Contradiction is the “opposition or dis-junction of structural principles of social systems, where those principles operate in terms of each other but at the same time contravene one another” (Giddens, 1979:141). The current chapter will establish how the paradox established in this thesis, emerged because of the contradictions within the industry structures.

7.2 Resources influential in the decision making process

Power, as described by Giddens (1984), is generated both within and through structures of domination; the role of power revolves around resources. Giddens (1979 & 1984) explains that no actor is without resources, which they can draw upon to exert power. Even in terms of coercive power, actors utilise resources to transform a situation into something that creates a position of advantage, thereby influencing the system of accountability. The two types of resources that Giddens uses within his theory in order to express how actors mobilise power within action are called ‘*allocative*’ and ‘*authoritative*’. Allocative and authoritative resources represent structures of domination. Giddens (1979 & 1984) does not accept power as a resource; rather he argues that it is a part of the duality of structure, in the form of domination. Power only exists when an actor wields it in action, and this can be achieved by drawing on available resources.

Power can be viewed as either ‘*transformative*’ or ‘*domination*’, depending on whether it involves the conduct of an actor or a structural quality, respectively. Resources are the means by which meaning and sanctions are actualised (Giddens, 1979). Power is only generated within actors’ structural reproduction. Giddens (1984) argues that in a relational sense, power

is the ability of actors to achieve outcomes that benefit their interests, and these are only realised with the involvement of other agencies. The regulatory qualities of the structures within the social system create a relationship between structures and forms of domination, argues Giddens (1979).

Allocative resources are those which “generate command over objects or other material phenomena” and authoritative resources are those which “generate command over persons” (Giddens, 1979:100). In this study, one example of power generated from allocative resources relates to the physical assets of the generators; the power stations used to generate electricity. It is through co-ordination of the advantages afforded by these resources that power might be generated. Therefore, the resource that creates power is not the individual power stations, but the co-ordination of power stations; i.e. the capability to control objects. An example of authoritative resources, in this case study, is PPC legislation. The regulators are able to control (or at least influence) the strategic investment patterns of the generators (society). The legislation, the PPC, creates a greater capacity for controlling patterns of action across the time space continuum. It is important to note that the resources only exist when meaning is associated with them, and that normative sanctions can be associated with such resources (Giddens, 1979 & 1984). The scope of meaning and the normative sanctions demonstrate the resources’ transformational characteristics.

7.3 Mobilising power

By using the resources to which they have access, actors are able to mobilise power, thereby controlling objects and society. As previously mentioned, Giddens (1979 & 1984) argues that

all actors, no matter who they are, have the ability to act differently. One example of this is presented in the work of Seal and Ball (2011), where budgetees had the ability to say no to a complex public budgeting system. Although the complex budgeting system was the product of political and economic power, the budgetees did not simply accept the changes. This is an example of the dialectic of control working within a social system.

In this study, the power mobilised by the generators was the ability to transform power stations from static assets into working assets; in other words, there was a strategic decision to generate electricity from the power stations to acquire capital. By coordinating physical assets, the generators were able to influence where the capital would be invested and used for further investment. The transformation of a physical asset into capital allowed the generators to establish greater lobbying power, which slowly moved the structures of legitimisation, as will be discussed later in the chapter. In the previous example, the enlargement of allocative resources resulted in the expansion of authoritative power.

7.3.1 Mobilising power when making investment decisions

Generators mobilise their power when making investment decisions in reference to the LCPD, providing an opportunity to understand their actions when drawing on resources. As mentioned earlier, although the internal and external processes of decision making will be examined as two separate issues, it is important to remember that both occurred simultaneously. There were two big issues from the generators' perspective, when making capital investment decisions: 1) there was no meaningful future energy policy and 2) there

was a lack of a framework for the LCPD itself, until very late in the process⁵⁰. The lack of an agreed framework for LCPD implementation was an issue in 2006, at the start of this project. As Chapter 5 demonstrated, investment decisions were being prepared at the same time as the frame of reference for the directive was being established, thus uncertainty existed. The coding of the directives was required to establish a solid methodology behind the investment models. Long-term investment decisions within the industry require a good few years, therefore, this lack of certainty regarding the LCPD created problems. Investing such significant amounts of capital over such periods happens slowly, as a Station Manager explained:

“Well the decision making process goes to the exec board, we have a big process . . . our environmental group, they tend to catch all the legislation ahead of time and then they actually start to look at what the implications of that legislation are. How does it relate to our business plans or operating fuel plants? And at that stage they will start to look at it so it’s generally three, four, five years ahead of any sort of implementation on a project while that debate is going down. So all that would’ve obviously gone to the top of the organisation eventually with guidance from our Environmental Management Team.”

However, in the case of the LCPD, although a decision had to be implemented by 2008, in 2006 a framework was still being negotiated. This in itself provided an opportunity for the generators to be heavily motivated to work with the regulators; finding a workable

⁵⁰ Both discussed in previous chapters, chapter 5 & 6

methodology to implement the directive. The generators were in a position to draw on their engineering knowledge and apply it to the directive from the EU. The transformative capabilities of the generators involved the ability to take a directive and convert it into something useable; this was one method of exerting influence over society. The regulators did not have this expert knowledge, but they did have the authority to make final decisions. Giddens (1984) suggests that motivation is based on the ‘wants’ of the actors, which in turn will instigate the grounds for action. Although there was no framework, the generators wanted codes in place, so they could make informed decisions based on the engineering facts related to their plants.

The motivation for the generators to become involved in the process of the creating the framework was due to the fact that each investment decision is unique, dependent on specific circumstances and the technology used. Each generator would have to comply with the same targets set by the LCPD, so naturally they wanted to influence the system. The investment appraisal was not the same for every plant in the same company. The PPC also implemented location specific boundaries. An Environmental Manager explained:

“I was writing these licences for four power stations. They were all extremely different. Location impacted on one asset investment, short term issues on another, technical issues on one of the them and pattern of generation on the other.”

This interview shows how investment decisions were based on consideration of different issues; some were pure profit conscious decisions made on a short term basis, and others

were more strategically aligned with the company's mission. In addition, the impact of existing portfolios also encroached on the analysis and the generators had to anticipate whether the competitors would opt in or out; if they were to opt out, how then would they use their 20,000 hours? A Site Manager explained:

“I think that depends on the portfolio they’re operating in, and it depends what the portfolio mix is - because if you’ve got a gas plant an oil plant, a coal plant - you can obviously change your strings and decide which way you’re going to go. Some organisations will frontload their hours because they think the market at the moment is at the highest it’s going to be, others are holding back because their perception of the market is that they will see improved spreads towards the back end of the opt out period. So it’s interesting but there are different strategies and I think the different strategies of how they’re perceiving the market plus what they’re portfolio is made up of and how they’re actually getting their power to the market at the moment.”

7.3.1.1 The business plan

The process of investment decisions was based on business plan proposals, as highlighted in Chapter 5. The generators submitted plans to the board of executives and these strategic investments required large amounts of capital and influenced future portfolios. The preparation of the business plan included a significant amount of work from various actors, all of whom were drawing on different theories and knowledge. It is not possible to diagrammatically represent the process or provide a definitive list of people involved,

because each organisation's structure is different. This was apparent throughout the interviews; however, a sample of actors emerged as common contributors in the process, these included the environment, legal, engineering, trading, treasury and the commercial teams. In addition, before the board received any plans, the treasury team completed a check on the models presented.

The treasury team are comprised of a group of accountants who provide an audit service before a project is presented to the board; although the name provided for this team varied between organisations. Those involved had a very clear awareness that the process of making investments was more about their ability to transfer relevant resources into action in order to generate a profit. Future profits were the motive behind the use of both allocative and authoritative resources. Financial rewards could be converted into a return for the shareholders and additional capital for reinvestment. If the suggested investments would not provide the required amount of profit or meet the organisation's strategic goals then capital was held back. An Environmental Planning Manager explained:

“There's clearly a strategic department in commercialising management who look at what we're going to invest in, they're not particularly the economists as such, a lot of them are engineers, mathematicians who understand what the drivers are. And how you effectively monitor them. That's the key thing and that's what we try to do. How do you convert these drivers so you can actually look at what it's going to cost you, what you might get out of it, but clearly there's also the people from our trading side.”

The Environmental Planning Manager supports the findings of Azapagic et al (2011), who explained that in this industry the drivers of investment are varied, therefore, you need many actors to interpret consequences in terms of technology, the environment and the socio-political arenas. The drivers need to be converted into cash so they can be analysed within a capital budgeting model. Profit is a significant factor and the driver for most privatised industries. Although newspapers and regulators were investigating the electricity companies' high prices and profits towards the end of this project (2010), such investigations reflected a common misunderstanding of the way in which generators work. The press and regulators investigations were related to the prices consumers are charged at the end of the supply chain. Although the regulators cannot force the generators⁵¹ to change their prices they can instigate very testing audits if they believe there is foul play.

The prices charged to consumers are measured against spot prices. At the end of 2010 spot prices were very healthy; therefore, the press and the regulators were questioning the high prices to consumers and lack of investment in the industry. However, the generators rarely use the spot price of the market because there is little liquidity there, so they hedge by using forward contracts as pricing measures. Long-term decisions are not based upon the current spot prices they are based on future predictions of price curves, which are assumptions based on current energy policies.

Although the press engage in debates about how cash rich these companies are, their balance sheets cannot support the level of capital required to fulfil the investment needed in the UK

⁵¹ Regulators can only directly influence the suppliers' prices.

(Atherton, 2010). The generators' discussions on where their capital should be invested are fundamental to the internal decision making process. The companies were influenced by the regulators drawing on authoritative resources such as the LCPD directive and PPC applications, although they did have the opportunity to opt out. The investment was not mandatory and therefore it was the generators' choice to interpret whether the terms of the LCPD were commercially viable.

7.3.1.2 Justifying investment decisions

The determination over whether investment was commercially viable was decided by the generators, drawing on their opt in or out resources to justify their decision making. However, their decisions were not straightforward due to the quantity of missing information, which made it impossible to make simple financial decisions. As Azapagic et al (2011:6) explain, by “evaluating the sustainability of a particular set of policies, decision-makers will have to cope with huge factual uncertainty”, simply because policies do not exist. A Business Services Director explained that although decisions were considered based upon future years, actual decisions were often decided upon at the very point of the deadline.

“We made the decision at the board meeting on the very day that you had to opt in or out your plant and we had a brand new Chief Executive. It was his first board meeting and at his first board meeting he was getting a 5pm deadline to send a fax, do you want to build FDG or do you not?”

In this particular case, the need for ontological security was apparent; the old CEO was an

accountant by trade and used MACs to reduce the anxiety of making decisions about investment. If the business plan produced the right outcome and was not too sensitive then he had achieved the ontological security required to satisfy himself that he was making the right decision. However, the new CEO did not have that embedded ontological need. Burh (2002) argued that accountants heavily value their ontological security, which explains why they may be more dependent on the process of using MACs rather than including wider strategic implications. The new CEO chose to use their own judgment regarding the investment. An Environmental Manager, who worked for the same company, also discussed how the decisions to opt into the LCPD took place:

“Whenever that date was, we had, we had not made a decision; as the market prices started to pick up it became more marginal and we had the Chief Executive at that time who was an accountant by trade and he was, he was still uncomfortable. I think we had submitted board papers on at least two or three occasions where he kept pushing back on it and saying well this is still too much . . . and not prepared to make a decision based on that. There was a change of the Chief Executive, he was a different character, had a different style to the other one. The board paper went in again and it was still a pretty marginal case at the time but he just took a decision to say well you just have to trust the markets on this, we can no longer faff about.”

7.3.1.3 Justifying investment decisions using overlapping social systems – country based influences

In addition to the problems of missing information, these investment options, as discussed in the signification chapter, clearly link to portfolio requirements in the case of international electricity companies. The investment decisions have capital restrictions because the money available for the company could be invested anywhere in the world. A General Manager of Operations explained:

“The Portuguese Government made their decisions much clearer and they made very early decisions, they wanted to implement the 2016 limits by 2008. So that made the decision much earlier, hence we, we made our decisions much earlier.”

The transparency of the Portuguese government functions as a resource to enact a ‘*transformative capacity*’; this capacity establishes power in the social interaction. Resources are also structural elements within the social systems. The duality of structure signifies that the resources are not only additional elements to communicate meaning and the normative sanction. They actually offer the actor the ability to actualise the process of meanings and sanctions. Clear guidance from the Portuguese government explains how the generators relied on the guidance provided by future energy policies to make their decisions, thus, highlighting the problems caused by a lack of energy policy in the UK.

As discussed in the previous chapters, the lack of policy in the UK slowed the investment process. The interviewee quoted above was responsible for investments across Europe; as the LCPD is an EU directive it affected all the coal plants owned by the company across Europe. The generators were not against investment, they simply required a strong policy to

provide them direction.

Investment appraisal models required information about future strategic directions in order for it to be possible to predict future prices. As an Environment Planning Manager acknowledged:

“Commercial Assets Management have all the spreadsheets and they of course take a portfolio view.”

If one country provided strong direction for the future energy markets, the investment would have fewer uncertainties, thereby providing a more sensible investment appraisal process. By providing better incentives to the generators, investment was encouraged in countries with strong authoritative resources. An Environmental Manager who worked for a different generation company, also raised similar concerns:

“We do tend to operate with the open markets, there’s very little protection in there, and by that, I mean the market regulates itself. However, we can’t take unnecessary risks with strategic decisions . . . if you take our parent company, we’ve just purchased plants in Netherlands; now if the market is more stable in the Netherlands compared to what it is *here*⁵² then we invest elsewhere. UK people will see the capital spend if they⁵³ can see more stability and guaranteed returns.”

⁵² Word added

⁵³ ‘They’ refers to generators

Some other interesting cultural factors were also raised in the other interviews. It was not just how local governments approached the LCPD that made a difference to the decision making process but also the relationship the parent company had with its own government and regulators. Several of the interviewees commented that, having a parent company that was German led to a more conservative approach to decision making and confusion over the lobbying approach (discussed further in the next section).

Cultural differences relating to their attitudes of shareholders was also very prominent and UK actors commented that, because the UK operated in a much more liberalised market, the decision making in the UK was much more commercialised and shareholder driven. This influence fits with the difference in accounting frameworks for the different countries. Seal et al (2004) argued that structural principles can, and do vary between industries and countries. Cultural differences relate to the 'norms' of a particular social system and they have a direct influence on how power is mobilised to create change.

Culture can facilitate change and the main generators within the UK were international players. Therefore, by using Englund and Gerdin's (2011) framework, the generators were operating in more than one social system. Although electricity is a homogenous product, the markets within which it is produced are certainly not. Every country has a different asset base, market structure and political system. These three issues influence the business models within the social systems, directly impacting on the investment decision process. As discussed previously, some countries subject to the same directive provided much stronger support for the generators and left fewer uncertainties.

Englund and Gerdin (2011) explain that change can occur when there are overlapping social systems, and in this case change was intentionally sought using exogenous triggers. The generators were aware of alternative systems because they conducted business within them and they were able to justify the rules and resources for these alternative systems by holding back capital within the UK.

7.4 Mobilising power – the environment

Accountability of investment decisions was extremely important in this case study, not only in terms of financial gain but also in regards to compliance with environmental regulations. Conrad (2005) provides a very good explanation of how accounting systems fit within accountability systems. She used the supply side of the gas industry to demonstrate how regulatory compliance procedures include many key financial controls. However, this is not the case in this particular study. The key to the compliance was achieved through recognition of emission limits with emission levels as controls. The decision making process in most cases was de-coupled from the application process by the regulator. Although the finances were not central to the PPC application they became important if a generator did not follow BAT and wanted to justify another option.

In some of the applications, where the generators did not use BAT they did present a financial justification, one example of this was Fiddlers Ferry. In this case, the generator only upgraded three out of four units to LCPD standard and so the regulators requested a full economic argument to justify this. Although the regulators, the EA, are environmentalists, they do not adhere blindly to directives. They also consider each situation, not only the LCPD

requirements. Referring to the Fiddlers Ferry application the regulator stated:

“If we force them to put all four units on, they say it’s gold plating. They will say because we’re going well below the standards (*the emissions limits*) that have been set by EU you’re commercially disadvantaging the Power Industry. Power can be brought over from France by the inter-connector . . . all this sort of thing. So you know, we are between the devil and the deep blue sea on this. If the regulations said that you’re either going to get that result or you’re probably going to get the Environment Agency taking a judicial review for misapplying, the, the regulations, who would win I don’t know? Who’s being a gentleman who’s...who’s going to be a gentleman, I mean once it goes to judicial review it’s out of our hands.”

Giddens (1979) explains that central to his theory is the concept that actors have knowledge (although some can have more than others) about the actions they take, thereby emphasising the dialectic of control. Here the regulators are demonstrating that they do not simply follow rules and sanctions; if they recognise something is not appropriate they will change their demands. The regulators have the ability and discretion to act independently, despite the constraints within the system. However, that is not to say the regulators cannot mobilise their judicial authoritative resources when required. In some cases, they did engage in judicial review to contest some of the applications made by one of the generators who opted into the LCPD and found themselves in a problem situation. The responsible actor in this situation, an Environmental Planning Manager stated:

“The Environment Agency said well we generally believe this is an issue . . . even though what we were doing was actually reducing the emissions, so the emissions were coming down but the argument was that we were doing it in a significant way⁵⁴. Both sides actually involved Counsel, Barristers at great expense; we never actually went to Court in the end. Our Barrister had one opinion and the Environment Agency’s Barrister had another opinion. We then wrote another set of opinions and then eventually after a period which lasted about nearly two years while we’re actually getting ready to build the thing, they eventually decided that no okay this did trigger a significant change.”

The Environmental Planning Manager highlights why the process of lobbying and negotiation is critical to the generators in this process. The signification modality was referenced in order to create legal conflict, drawing upon the interpretation of the directive itself through the frame of reference to exert power. The generators were able to draw upon their engineering knowledge to demonstrate that the regulators had misinterpreted a definition within the frame of reference; something, which proceeds from the signification structure.

The ability to change a definition through legal proceedings demonstrates that the signification structure only exists virtually. When the generator refused to accept the term of reference, the meaning, the legal dispute caused the recursive cycle of signification to end. It could be argued here that regulators were the dominant actors, but in fact, their lack of

⁵⁴ Under the directive if significant changes to the plant were made this would recategorise the plant and stricter emission limits would be required.

engineering knowledge created a conflict between the definitions; thus demonstrating the ‘dialectic of control’. Lawrence et al (1997 as cited in Conrad 2013) argue that ‘system contradiction’ can be one of the biggest factors affecting change; as within this study, their research demonstrated how, when facing disruption, actors challenged the structures of signification by challenging the meaning of their everyday activities.

The meaning of the LCPD framework, which was challenged, was exercised through the application process, the PPC application. The implications of getting the correct framework were very important for the regulator, EA, and also the generators. Therefore, the next section of the chapter will explore how the framework was debated, lobbied towards and finalised, by examining the various actors. Examination of the actors will provide an interpretation of how each drew on the various resources available to them to establish their own voice and mobilise their power.

7.4.1 Lobbying and debating to mobilise power

The actors involved in the generation of electricity, i.e. those who were able to influence decisions, are shown in Figure 15. With each power plant and company portfolio having different requirements, the opportunity for the generators to form lobbying groups was a significant factor in influencing the future of the LCPD. Groups can draw power from both the numbers of actors involved and the knowledge that they hold. Giddens (1984) argues that the coordination of people represents authoritative power. Although size in itself does not represent an authoritative resource, the ability to bring together a collection of actors does

effect a significant difference in the generation of power⁵⁵. Associations, such as JEP, provided a platform for authoritative resources to be created by co-coordinating engineering knowledge from all the generating companies.

All of the actors in this case study have some authoritative resources, although some have more than others. When comparing the government, the regulators and the generators, one would expect the regulators and government to have the most ability to actualise power because they have substantial authoritative resources to draw upon. However, as argued earlier by Seal and Ball (2011) the principles by which a system operates can be contradictory. Contradictions provide an opportunity for so-called weaker actors to be motivated to work towards their own needs by working within contradictions.

⁵⁵ Generation of power here refers to the ability to create a source of power to instigate change rather than generation of power relating to generating electricity.

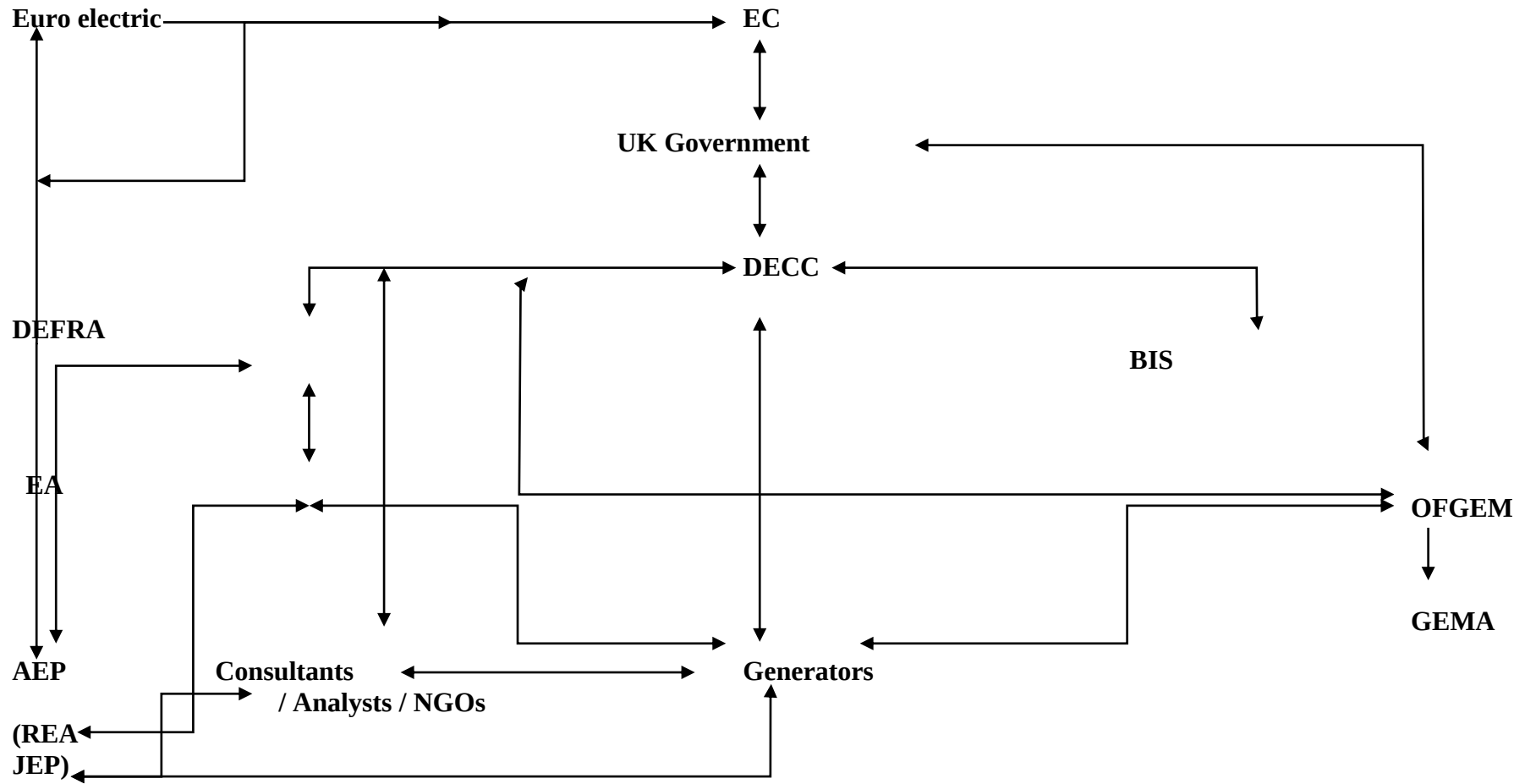


Figure 15 Actors within the UK electricity generation

Figure 15 demonstrates that the decision making process involved many actors⁵⁶ from different backgrounds. In this industry, there are two main regulators, the EA, which is the focus of this study, and Ofgem, the better known regulators who protect consumer rights. Both are involved, but in the process of negotiating a national framework, it is the EA that is relevant here.

The opportunity for heavy lobbying was established when the government signed up to the LCPD without the regulators having sufficient technical knowledge. The joint discussions between the regulators and the associations were very important. As an Environmental Manager acknowledged:

“One of the main problems we have is uncertainty. They often put the cart before the horse, you know, they’ve signed up to policy, you know legislated developments and quite honestly I think they’ve no idea how they’re going to get there.”

Although this is a directive that comes straight from Brussels and has an impact across Europe, the countries are given the directive and then told to implement it locally. The directive is very detailed but has significant ambiguities. At the start of the process the finer details were unclear, as already discussed in Chapter 5. This lack of clarity created confusion for the decision makers because the generators did not have access to a strong UK energy policy for modelling purposes. The Head of Environment explained:

⁵⁶ An explanation of these actors were used in different stages of this case study is presented in Appendix 20

“The LCPD is, is a piece of legislation which is written by European Bureaucrats in closed rooms with presumably a fair bit of understanding of what they wanted, but when it’s written down, in the cold light of day, sent out to the member of states it is extremely descriptive and some of the definitions just weren’t clear. So definition of plant, definition of start up and shut down, definition of twenty thousand hours, they had to be worked out afterwards, and that was where the debate was.”

These debates occurred within individual countries. It was understood that the definitions of the technical terms of the directive were not irrelevant; in fact, they defined the economic viability of the project. The generators realised there were problems at the outset, but with the separation of the government’s involvement, the issues were not actualised until the decision making process was well under way. The way in which technology would be monitored and the way in which hours would be counted, for example, were all relevant issues affecting the investment decision making process. A Site Manager added:

“In 2000 there was very little Government involved I mean they just did not take the message and I think were probably taken aback by the actual . . . what they actually signed up to at the end of the day . . . Civil Servants didn’t really understand quite what the problems were . . . they suddenly realised we’ve signed up for something we don’t really know what we’ve, what we’ve actually signed up to.”

The industry was in a state of turbulence when the project began, but investment decisions still needed to be made. There were many detailed elements of the directive that needed to be debated and understood. These included how to define ‘start up’ and ‘shut down’, basic engineering terms, but ones which the regulators did not have sufficient knowledge of in order to frame a definition. A Head of Environment explained:

“The LCPD is a very difficult beast and it’s actually down to the detail on how we define what start up and shut down etcetera is. And so the Environment Agency came along to us at JEP and said, well look let’s develop the regime - how do you define start up shut down, how do you define all these other regimes like breakdown etcetera? So we had some quite interesting debates around start up and shut down.”

The engineers knew that this directive could not be designed without their involvement; this placed them in a good position. The generators could influence the design of the framework, which of course could help them in their own future investments. Although, the regulators would determine the final framework, as they had the authoritative resources to draw from to make this happen, their lack of engineering knowledge gave the generators power. The generators could then draw upon their own knowledge and lobby for a framework that would favour their agendas.

There was clear evidence of the dialectic of control; although the regulators had the most control because they ultimately determined the framework, the generators and all the other actors had a role in shaping the future structures. As mentioned in the previous section, this

process took place alongside investment appraisal procedures and the generators were able to identify issues immediately. One of the generators said that the main issue with modelling was the alternative scenarios for opting out of the directive; a Business Services Director said:

“I remember specifically it was very unclear for a long time, some fundamentals like if you opt out you get twenty thousand hours. Is it twenty thousand hours per unit? Or per site? It turns out it’s per stack/ per flue, well plant A has got four flues inside one chimney four independent flues, well what’s that then? Is that four units or one flue of four chimneys within one windshild? You try to model the opt in economics versus the opt out if you don’t know the rules for opt out you can’t compare it to opt in and decide which is optimal. There was that, and then of course starting up and shutting down, is that part of your twenty thousand hours because we didn’t have an answer to that for some time.”

These uncertainties led to delays in the investment decision-making process. Uncertainties for new investments, the alternatives and the lack of information in the industry resulted in the generators choosing to do nothing rather than making a decision, in other words drawing on real options theory. As a General Manager of Operations stated:

“There are so many issues that it’s a stifling investment at the moment and uncertainties about which direction Government policy wants to

take . . . the Industry . . . that making a decision at the moment is quite difficult. So consequently you make no decision, or make a decision not to make a decision.”

However, with the LCPD, this was not the case; the generators had to make a decision. The option not to decide simply did not exist because the regulators had the judicial resources to force a decision. All the generators had to comply under the Environmental Permitting Act (EPA), and therefore the regulators could draw on the EPA to force decisions; the power was in the mobilisation not the fact that the sanction was present. The generators needed to prepare the investment appraisals to prepare business reports for their boards and the regulators had to issue permits out which they were unclear of how to implement. A typical problem for the generators related to the timing of the decisions being made. An Environmental Planning Manager explained:

“We got the consent for *plant C* FGD in nine months but that was like a record, we normally get like a year to eighteen months to actually get the consent. You’ve got to be sure that you’re going to get the consent to get the investment decision . . . before that you’ve then got to go out and get someone to build your bit of plant. So these things have like a five year lead time on them, so to suddenly part way through say well hey there’s a different definition, here it is, very, very difficult actually.”

The regulators interviewed accepted the generators’ arguments, acknowledging that they needed the generators help to work through the directive. Although both parties agreed to

work together to establish a workable framework, it was not a straightforward process. The generators felt the regulators lacked focus, and the regulators recognised that the generators are commercial businesses and so have their own motives. One Environmental Manager, commented that:

“Defra and others are moving forward but they’re not entirely clear on what they’re actually doing a lot of the time, like a rudderless ship you know. So you often find they’re actually happy to speak to you and take on board your ideas and get a better understanding of what this actually means Defra are really keen to keep us on board”

Whilst the regulator, who’s role was Pollution Infringement and Control Team Leader stated:

“The difficulty, I would say with all these things, is when a regulator is speaking to an Operator and that relationship is not an open truthful relationship I suppose.”

Conrad (2005) analysed the relationship between the regulators and the firms; she identified that uncertainties provide an opportunity for the management of the firms to manipulate accounting information to legitimate their own actions. Identifying a fracture in the structure opens up possible solutions to the generators’ own problems. This study shows the regulators knew that the generators were doing this, but accepted this was to be expected from members of a commercialised industry. The regulators explained that the process of privatisation creates a situation in which motives are typically profit led and so to enact change you do need to find a balance. The rules of action included a fair amount of game playing, which

was accepted as a consequence of privatisation.

It is apparent from the previous two comments that actors have different motives for what they are doing and both are aware that they have to work together. An Environmental Planning Manager made it clear that although the two actors were working very closely together, regulatory capture was not something that occurred:

“Meeting our regulator, clearly we might have issues and we do in fact. Regulators are individuals, some are not very nice people and some of my colleagues are probably not very nice people. But we both understand that we’ve got our bit to do, they’ve got their bit to do and we understand that, and I think they also understand us, they understand what . . . what, we’re coming from and work quite well in that sense. Now the danger to an outsider is it might seem like a cosy relationship.”

Each generator had their own battles with the regulators over the issues that most concerned them. Although in an advisory capacity the generators worked together as a group with the regulators, they were simultaneously lobbying separately with politicians and Defra. The generators were able to use a common frame of reference; i.e. the codes related to investment modelling theory, and identify the impact of missing sanctions to explain what was required. The generators acted in two capacities: as advisors and as commercial actors. While negotiations continued, modellers were used investment appraisal to demonstrate the outcomes of different types of definitions and frameworks. This allowed the generators to

calculate how the outcomes of these negotiations would affect them financially. At this point investment appraisal was used as a form of internal communication, but during the advisory and lobbying process, it was the LCPD, environmental targets and framework of reference that were discussed with regulators.

The consultation process did not finish in time for all the decisions regarding implementation to be made before targets had to be met. Thus, penalties for not implementing appropriate technology were not imposed, even though the regulators had the sanction to do so. They recognised that the bigger picture had to be acknowledged; there had been a lack of clarity, which had overly delayed decisions. As one senior regulator stated, they could not let the lights go out, so they had to work within the system. A General Manager of Operations, who did not achieve compliance on time explained:

“With LCPD you know, people put off and put off making decisions about fitting FGD, because the clarity wasn’t there in the regulation from the Government. When we finally got the clarity, it was too late to actually meet the LCPD compliance dates and get your FGD plant built. We’re just commissioning ours. But we’ve been in, in under LCPD limits since January last year, so we’ve been burning very, very expensive ultra low sulphur Indonesian coal since January last year. I mean we have had some flexibility from the Regulators . . . they have been relatively supportive in helping us manage our way through this position.”

An Environmental Manager who was part of the regulatory team, added:

“We shared a bit of the pain with them. You have to decide that if shutting the power stations down is going to black the actual grid out. You’ll actually cause more pollution doing that . . . so the considerations are pretty subtle and there used to be, in the IPC, derogation for emergencies. They could ring up and say we’ve had the grid ask us to do something and it will mean breaking the limits, can we do it? And if it was a grid emergency we would say yes, I mean for example Drax, by switching its FGD’s off it can immediately export sixty megawatts more power.”

The previous comment shows that the LCPD process was part of a bigger discussion taking place regarding investment in the industry and longer term sustainability. The LCPD was simply one of the issues for the regulator. Ofgem and the government have had to recognise that their vision of market led investment, whilst trying to keep prices for consumers low, was simply not going to work.

7.5 Mobilising power – sustainability

The perception of risks from investment in the generation industry in the UK are not just apparent from the generators’ lack of current investment, but can also be demonstrated through the change in the industry supply chain. In the past, as new investments were considered by the generators, tenders for new technology would be put out. In the case of the LCPD, part of this process continued, and suppliers of technology would be chosen by the generators in order to design new solutions. The cost of this research would be borne by the

supplier and could be anything up to £1,000,000. However, uncertainties in the industry often resulted in the investment being pulled at the last minute because the generators could not justify the risks and uncertainties according to the returns they were modelling.

In these cases the suppliers would lose their initial upfront research costs. By the end of this project, the supply chain management had changed and tenders were no longer being accepted by suppliers. The generators pay the suppliers to work alongside them, by forming partnerships and engaging in joint ventures. The lack of a future energy policy resulted in the entire industry becoming inherently risky to participate in. An Environmental Manager confirmed this and said:

“The markets *have*⁵⁷ changed now . . . companies are no longer saying well actually yeah we’ll put a bid in for it, the risks are too great for that, so you are trying to get partnerships for the company, we pay companies to work with us to pull together designs.”

The changes in these business models have altered the way in which the generators use their budgets, impacting on the bottom line of their income statements. The changes in the ‘norms’ and ‘sanctions’ have provided an opportunity for the generators to wield authoritative power, by drawing on the allocative resources created through the decision not to use material assets to demand action from the government regarding uncertainty. By playing on the societal need for a constant electricity supply, the generators have mobilised their power not guarantee supply to create crisis talks. The threat ‘blackouts’ is a powerful ‘hostage’ tool.

⁵⁷ Word added

In the case of the regulators, EA, were only interested in the environmental targets. These targets were, to some extent, separated from the security of supply issues representing a contradiction between the concerns of EA and Ofgem. As an Environmental Manager explained:

“There’s been a slight conflict between the regulators, one of their (Ofgem) prime motives has been supporting their consumer and therefore making electricity cheaper and that, it continues to be a motive, a motive . . . particularly as we’ve experienced in the last sort of eighteen months where affordability of everything is seen as being a big issue, people’s incomes are under pressure.”

The generators emphasised to politicians their inability to make long terms investment decisions while consulting on the process for the framework of the LCPD; they asserted the need for a more secure energy policy. However, at the start of this project, it was difficult to establish policy because Ofgem denied that future security of supply was an issue; their main concern was to ensure that consumers achieved low prices. The defiance of Ofgem on this subject resulted in the politicians not taking the generators' concerns seriously during the first four years of this case study. As a Head of Operations critiqued:

“I think the Government have questions to face, and they should be facing them now . . . you can’t drive down prices from the point of view of Ofgem, the Government and public perceptions. I call it my mother-

in-law test, my mother-in-law will look at Company B and say you guys make billions but you're asking us for more, that's ridiculous, but she doesn't see actually the billions we make is not enough money to build. We need more than the billions we have if we're going to have to develop a new gas plant, put all the environmental stuff into the existing coal plant and sustain that and develop a nuclear capability."

It is true that the motives of the two regulators are deeply contradictory; it is not possible to maintain low prices for consumers and shut down environmentally unfriendly power plants while relying on long-term investment with no secure energy policy; facts that have been ignored for too long. Generators highlighted these problems during the lobbying phase, but they appear to have had an inner confidence that they had the upper hand, as ultimately, despite the privatised nature of the industry the government would never intentionally allow the lights to go out.

However, throughout the interviews, one issue was clear issue: the generators were not legally required to invest and keep the lights on, there were no sanctions attached to failure to do so. Seal et al (2004) noted that conflicts in supply chains exist regardless of regulator intervention; customers typically want low prices and firms want high prices. In this case study the additional factor of regulators demanding generators meet environmental targets heightens the contradiction. Pressure on pricing and environmental regulations have combined to reduce firms' security in terms of their returns on investment. This is a critical problem in the UK market, as the generators are privatised companies whose purpose is to generate profits for their shareholders. A Station Manager stated:

“The regulators, Ofgem, have no legal back up to make us invest. The legal requirement for generators to ensure security of supply was removed through privatisation. Of course, Ofgem can play around with the market structure to encourage investment but so far, they have avoided this because both they and the government believed investment would be market led. This has not worked, market led investment will only work with a strong policy in place.”

Industry conferences have provided platforms for the debates relating to the lack of authority. Coad and Herbert (2009) advocate that for an actor to engage in action they must have the ability to communicate, exercise power and to gain legitimation through either normative approval or the use of sanctions. Referencing this, in relation to investment, neither the regulators nor the generators were able to exercise sanctions or incentives to encourage the mobility of capital. The capacity to mobilise investment at the level required to provide security of supply no longer existed.

By the end of this study, the regulators and government had made a U-turn; they accepted that the industry would not be able meet future demand and admitted the need to completely transform the way in which the market operates. It was also accepted that financing the full £200 billion capital required to complete all investments within the industry was problematic; the government admitted this following the White Paper (DECC, 2011). Even though newspapers are declaring that these are cash rich companies draining people of money as they provide a basic need, it has long been acknowledged that meeting high environmental

targets is costly. The additional investments required to fulfil environmental targets are known as stranded assets; i.e. those which sit on a balance sheet. Generators need extra assets to cover their investments in wind technology, as the wind does not always blow. The capital that exists currently is inadequate and how the government will raise the remainder is under debate. The cost of achieving environmental targets, using the rules and resources available now, is going to be very expensive. Additional costs will need to be passed on to the consumer in one way or another.

7.5.1 Real options create opportunities to mobilise power

The generators were well aware that they had the ability to mobilise their power to achieve their aims. They recognised at the beginning of this project that eventually sustainability issues would prove to be an advantage, a fracture in contradicting structures that could be used to full effect. Securing more certainty in the industry could be achieved by simply refusing to generate (real options theory). Many simply stated that security of supply was no longer their problem; their concern was to generate profit, as an Environmental Planning Manager stated (*this was a typical response*):

“No one has to keep the lights on any more, no one at all. I guess under the Electricity Act, suppliers have a duty to supply to residential users I think that’s actually required, but nothing in the Act says how they’re going to get the stuff they’re going to supply, the argument is the market will meet it. So if we stop generating the theory is that those suppliers who have this requirement to supply will panic and start giving us more

then we'll start generating again."

The ownership of physical assets, which there is no legal requirement to use, is a very powerful resource, and liberalisation removed sanctions to protect the security of supply, thereby removing an important resource from the system (i.e. the ability to co-ordinate a strategic response to instigate asset use). The generators understood that by simply doing nothing another actor will be forced to act; by holding back capital in terms of investment they triggered a crisis relating to sustainability. In many of the studies using ST the power mobilised through authoritative resources has been a very strong source of change. An interesting feature of this study is the strength and significance of the allocative resources, in terms of how command over objects reduces the power of others.

Using Englund and Gerdin's proposed framework for exploring change, the generators were seeking intentional change within the system. The generators identified the fractures within the current systems created by contradictory structures; the need for investment to provide basic needs, the need to protect the environment and the need to insure profitability for shareholders. The conscious reasoning of the generators focused on the control of physical assets, pushing politicians to consider future energy policy, because 'blackouts' are not vote winners.

The Security and Exchange analysts within the industry anticipated this move by the generators. Those in the interview process stated that they knew the generators would simply hold back their investment (their capital) until the prices were right, or until the government moved in to provide an incentive for them to invest. They explained that with it being so

difficult to raise external capital, the generators were examining the Capex budgets and asking themselves how much they wanted to spend given the many uncertainties. Typically, as long the firms were able to maintain their market share they were content to hold back on investment until they know that the required return would be forthcoming. The risks currently involved in investment are simply too high for predicted returns.

The lack of a normative policy, results in the ontological security of the decision makers being unstable. Moore (2010) argued that it is the process of drawing upon a frame of reference, signification, and normative regulation, legitimation, which provides ontological security. Giddens (1979) states that all social practices prompting action involve all three modalities; the lack of strong legitimate sanctions creates problems.

One interesting aspect within this study is that the regulator known as Ofgem, states that their remit is:

“Ofgem is the Office of the Gas and Electricity Markets. Protecting consumers is our first priority. We do this by promoting competition, wherever appropriate, and regulating the monopoly companies which run the gas and electricity networks. The interests of gas and electricity consumers are their interests taken as a whole, including their interests in the reduction of greenhouse gases and in the security of the supply of gas and electricity to them.” (www.ofgem.gov.uk)

This reference suggests that the regulators have authoritative power over the generators to

ensure a regular supply of electricity, however under the current market system this is not the case. As Ofgem's website states, they take action when a company breaches the terms of their licence, acts anti-competitively or breaches consumer protection law. 'Failure to make investments' is not governed by any of those sanctions. However, the regulator does have the ability to change the market structure to incentivise investment.

The generators, while advising on the LCPD, were also lobbying for radical changes to the market structure, for example, wanting 'capacity payments'. A capacity payment is a payment made to a generator to insure the potential for generation is in place. Currently, generators will only invest if they believe that future demand and prices will provide returns. A capacity payment is made to the generators regardless of whether they run a plant or not, in other words it is a contingency plan for security of supply. Capacity payments are a possible variable that can be incorporated into modelling scenarios, and are also up for discussion following the White Paper (DECC, 2011).

7.6 Resources needed to make investment happen in the UK generation industry

The domination story does not end here because the heated discussion on investments is ongoing. Rather than the LCPD being the issue, the investment issues revolve around a new directive, the IED, and the new potential energy policy (following the White Paper, 2011). This is only the beginning of a much bigger story as to how investment appraisal will play a role in the future of the UK electricity industry. Although the generators acknowledge that they themselves have forced the crisis, the next task is to ask consumers to understand the implications. The generators believe this is going to be their biggest task to date. An

Environmental Manager concluded his interview with the following comment:

“There’s a gap in knowledge as well for the consumer . . . the consumers don’t actually understand how this is going to impact on their prices. But, I think to be fair I think that’s down to us, we’ve had these debates. I do think it’s down to the Utility Company, we should be spending more and more time trying to talk about you know (*investment*) and sell it to the public face, because we’re seen as just money grabbing companies. It’s difficult, it is . . . the Government are never going to come out and do that because politically it’s suicide.”

Therefore, based upon Giddens’ structure of domination it can be concluded that:

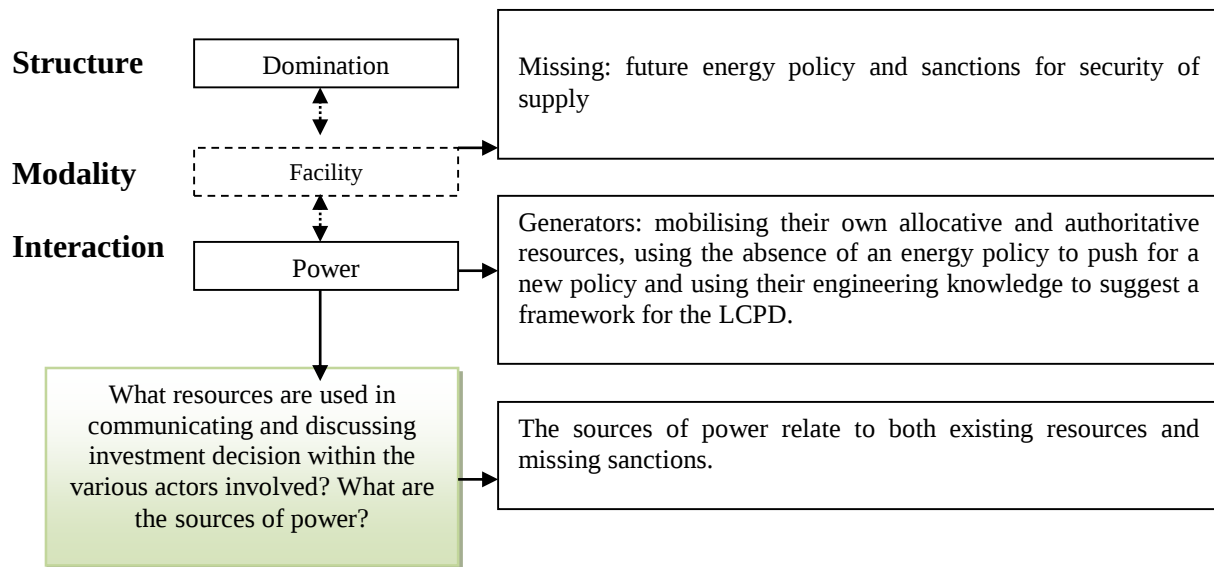


Figure 16 Domination conclusion from the framework

7.7 Conclusion

The mobilisation of power has presented itself in two ways; firstly the generators were able

to use their engineering knowledge to shape the LCPD, and secondly the lack of knowledge amongst regulators provided a window of opportunity for the generators to play a role in this. The knowledge the generators hold was used to their advantage, modelling different meanings/interpretations of the LCPD. When this thesis began, although a completion date had been set by the EU for the LCPD to be implemented, the UK had not worked out a framework as to what the regulation meant in practice or how it should be implemented. All the actors in this story had resources that they were able to draw upon to ensure their agenda was presented fairly and implemented within the system. Therefore, although the structures were contradictory the actors were able to work alongside each other.

However, in terms of future regulation this was an entirely different matter. The failure of the generators to mobilise their resources to date has been significant enough for the regulators and the government to recognise that an open consultation on the future of the industry is required. The generators have decided to only invest in the basics until they see a more secure energy policy. This behaviour reflects Giddens (1979) dialectic of control; that is, the structures of the industry were there but the generators slowly started to reduce their reproduction of these structures. By holding back capital they demonstrated their ability to mobilise their power.

By the end of this project (2010), the government had announced a completely new strategic consultation process on the future of the industry. The focus would be on the targets and the ability to secure investment to achieve environmental targets. If the government acts, as they suggest this will, to align the three modalities for security of supply, this will provide the missing link over the coming decades. A typical answer when the generators were asked what

had been the biggest change in the industry over the past ten years, they cited the regulators and the government finally realising that investment could not be secured unless the energy policy was properly thought-out. The lack of an energy policy has made the investment appraisal process uncertain; as in economic terms models showed the ratio of profit to risk did not add up to investment in the UK market. Seal et al (2004) noted that instability and implied threats were the central aspects of power within their study of the supply chain management system.

Now that the three modalities identified within ST have been analysed, it is possible to bring together the results of the current chapter and the previous two in order to answer the main research question. Interpreting the results presented herein, the next chapter will present the findings of this thesis and clarify the role of capital budgeting in contexts of uncertainty.

Chapter 8 – Structuration theory and capital budgeting

8.0 Introduction

The current chapter will remind the reader of why the subject of electricity generation is important in the UK, and how the industry framework contributes to existing problems. The significance of new regulation requirements, and the paradox these create, will clarify how this contextual setting provides an opportunity to explore some of the areas in IA that are yet to be satisfied within the literature, by presenting the findings of the main research question.

The case study reveals the narratives of those actors that were able to identify primary contradictions within the system, to uncover secondary contradictions to support their own strategic intentions using the dialectic aspects of contradiction (Conrad, 2013). Power is an important aspect of control (Broadbent, 1997 as cited in Nandan, 1998) and the generators in this thesis used the dialectic of control to argue for change, i.e. reform within the industry to enable better management of future investment.

Chapter 4 of this thesis provides the reader with an analysis of ST, focusing on how it would be applied within this research. A model was discussed within Chapter 4, which diagrammatically represents Giddens's duality of structure, as recreated in Figure 16:

What role does investment appraisal play in the investment decision-making process within the UK electricity industry?

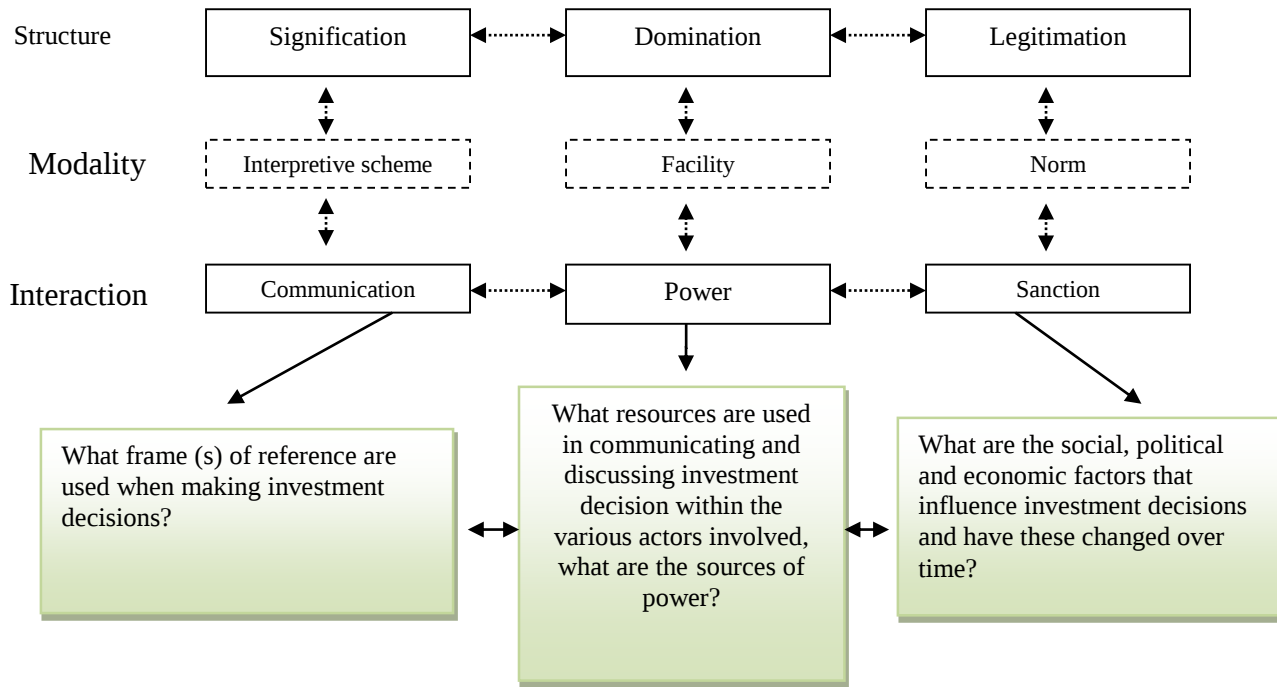


Figure 16 Giddens' duality of structure linked to research questions

In Chapters 5, 6 & 7 each structure was examined in terms of its respective modality and interaction, however, each one was examined relative to the business setting to enable the detail of the story to emerge. In Chapters 4-8 it was emphasised that although the data within each structure would be examined separately, the researcher accepted the entwined nature of all. Therefore, although capital budgeting, sustainability and regulation have already been examined in terms of the vertical structures within this diagram, this chapter will elaborate, by examining to what extent capital budgeting enables or hinders progress towards more sustainable generation of electricity. To examine the current paradox within this industry

from a horizontal perspective, this chapter will analyse the processes in place and the technical accounting and power structures relating to capital budgeting.

8.1 The role(s) of investment appraisal

Chapter 1 of this thesis demonstrates that electricity generation is vital; and from the analytical chapters it is evident there are huge uncertainties about future generation prospects in view of a lack of new investments being made in a private market context. In addition, the analysis chapters exposed the inherent contradiction of electricity generation being a local issue to be resolved by national governments, and the main electricity generators being multinational giants operating from a global perspective. In the introduction chapter, further concerns arose incorporating factors such as pollution, climate change and energy sustainability.

In summary, any analysis of investment in electricity generation in the twenty first century must factor in issues of regulation and sustainability (Hoffmann, 2007). Dunk (1999) states that little work has been carried out to investigate the role of capital budgeting within a regulatory setting and this regulatory uncertainty creates complex managerial settings requiring further analysis (Miller & O'Leary, 2008). The current thesis adds to the small body of literature in the area of regulatory and complex managerial settings.

By examining the current paradox within the UK electricity generation industry it is accepted that there is an understanding of capital budgeting models, which are shared with other players, such as government policy makers. An understanding of how capital budgeting

models became central to the mediating process has been achieved by investigating the research question: “What role(s) does investment appraisal play in the decision making process within the UK electricity industry”. The findings of the three analysis chapters have highlighted that the role of investment appraisal within this thesis was threefold:

- 1) To provide a frame of reference when communicating internally and externally, therefore a strong interpretive scheme;**
- 2) To help defend the decisions by using investment appraisal as a frame of reference, thus, creating legitimization for investments; and**
- 3) To identify high risk factors within capital investments which provided information to use in the process of lobbying?**

These contributions will be explained and examined by evaluating the use of capital budgeting across the three structures that comprise ST analysis. However, first, a more general discussion will be introduced to consider how the structures work together in theory, before ST is used to explain these contributions.

8.2 Linking the modalities of structuration theory

Giddens’ (1979) duality of structure was discussed in detail in Chapter 4. Within that chapter, the notion that modalities are central to theory and the fact that this constitutes interaction was emphasised. Interaction is central because structuration does not focus on either “the experience of the individual actor, nor the existence of any form of societal totality, but [on] social practices ordered across space and time” (Giddens’ (1984:2). Throughout Giddens’

(1979) discussion of the role of interaction he makes it very clear that the communication of meaning is not separated in its own right, in fact it is linked very closely to both power relations and normative sanctions. In the case of this thesis, this implies that the process of decision making not only includes interpretation of knowledge, but also the sanctioning of conduct, encompassing power relations. Englund and Gerdin (2012) argue that it is the recursively interrelated nature of the three structures and systems that distinguishes structuration from alternative theories that separate actors and structures; here they are two sides of the same coin.

Explaining the concept of the entwined nature of modalities, Giddens' (1979:82) uses a very simple example. He explains that when an individual says they are 'going out for a walk' there are two factors to consider; what does it mean to say you are 'going for a walk' and what are the norms when 'going for the walk'. He extends his explanation to say that 'strolling down a pavement' is very different from 'wandering down the road' because the latter does not adhere to normal conventions of public safety; thus, meaning and norms are interlinked. Giddens' (1979) clarifies the difference between interpretive schemes and norms as not substantive, but in fact analytical, thereby emphasising the accountability of language.

In addition to the meaning of communication and the norms being related, norms are also connected to facilitated power, because normative resources can be drawn upon when an actor mobilises power. The interaction processes within the normative realm relate to both rights and obligations, and the actions that realise both of these factors (Giddens, 1984). Within the duality of structure, norms have to be sustained through social interaction, which

means that there is a negotiated space within which actors can mobilise these actions or not, depending on their motives and their calculation of the risk involved in not acting. Therefore, if the sanctions associated within the norms are a lower risk than not achieving the desired outcome then the actor may choose to behave differently; therefore, the interaction will affect the sanction itself. One of the key assumptions of ST, is that actors are very knowledgeable and that they understand the consequences of their actions, including the consequences of not adhering to rules and obligations (Englund and Gerdin, 2012).

8.3 The role of accounting across the modalities of ST

Returning to Chapter 4 in section 4.4.2 the interrelated structures were examined from the accounting literature in terms of interaction. Englund and Gerdin (2012:6) found, through their detailed analysis of research conducted using ST, that researchers “draw upon this notion (of social structures) to conceptualize accounting as a type of virtual and unobservable cognitive template for (inter)action”. The analysis of previous accounting papers using ST revealed that accounting has been seen as a language, embodying moral order and providing the capacity to negotiate between different sets of actors in terms of power (Englund and Gerdin, 2012). In terms of a language or ‘frame of reference’ accounting has been discussed as the way actors understand the meanings associated with their actions; thus, embodying moral order for accounting has been seen as a way of holding others accountable for their actions and finally as a way of controlling and managing other actors (Englund and Gerdin, 2012).

Although the previous three chapters have analysed investments, sustainability and regulation in terms of capital budgeting within the silos of each structure, it is important to

understand how the practices of capital budgeting interrelate and how they can hinder or enable change to create a sustainable generating industry.

8.4 Capital budgeting across the modalities of structuration theory

Within Chapters 5, 6 & 7 it became apparent that capital budgeting was more than a basic calculation. The theory revealed the meaning behind the discussions between regulators, generators and government. Although Miller (1991:733) argued that in the past “DCF techniques have made it possible for governments to seek to act at a distance on the economy without intruding within the private sphere of managerial decisions” this was not found to be the case here. In fact, the capital budgeting process enabled generators to force the government to listen to their demands for new market structures and policy, becoming a mediating device. Generators were able to manipulate industry circumstances to achieve reform, as Giddens (1984: 257) argued, the process of power is the “capacity to achieve outcomes”; the generators mobilised their power to fight against the government, trying to distance themselves from investment in a privatised industry. This mobilisation of power is a good representation of the relational notion that the dialectic of control exists within social systems.

Although Giddens’ (1979) work on the dialectic of control is subject to interpretation this research largely agrees with Nandan (1998); in that the term *dialectic* can be used to refer to the “shift in the balance of power over time and space, due to changing circumstances, as a result of the attempts by ‘knowledgeable’ subordinate agents to use the (meagre) resources at their disposal”. The three contributions of this thesis are based on cognisance that generators created a shift in the balance of power by identifying the contradictions within the

industry and exploiting the changing circumstances within the UK economy.

The first contribution, explaining how IA was used within the decision making process, relates to how IA evolved into the main narrative by becoming the interpretive scheme (a frame of reference) used, not only within companies but also between the regulators and government. IA became the constant in a very uncertain and ever changing environment, and was the language that the members of a multinational industry could all interpret.

8.4.1 Capital budgeting as a ‘frame of reference’

Despite some of the “local” sounding names, the home base of the majority of the main generators was outside the UK. For some of the generators their home base not only provided them with commercial security, irrespective of outcomes in the UK; but it also meant that their home markets need not share the same political, economic and ideological positions. In particular, the relationship between economics and science might be quite different in a state which has decided, for geo-political reasons, to develop a large nuclear generating capacity (such as France or China), and a country that has for different political reasons decided to reduce its nuclear industry (such as Germany). Thus, in contrast to the UK, where economics drives science, generators may well be based in countries in which the science is primary and the economics of generation is secondary. In addition, the main environmental regulation comes from either supra-national organisations such as the European Union or international protocols covering commitments on issues such as carbon emissions. In short, players are located in different states with different political and economic relationships (Jessop, 2002). From a discourse perspective, the industry is *global* in an objective or physical sense, and it is influenced by a variety of local, *national* discourses (Fairclough, 2006).

The use of different homes for key players means that the values, logic and facts that inform their investment decision making will be different, requiring a common language to interpret outcomes and consequences. The differences that generate overlapping social systems will be discussed later in the chapter, as each player assigns a particular rhetoric to discuss proposed investments in electricity generation. As will be demonstrated, these rhetorics place investment appraisal practices in a mediating position at the heart of negotiations. The meanings created via capital budgeting are of significance in understanding the role capital budgeting has across the structures of ST. Giddens (1979) explained that meaning only becomes significant if it is connected to normal society conventions. The generators in this research aimed to make a sound financial investment, which in this case means that they must adhere to future public policy. However, for norms to be sustained they must be reproduced through social interaction, thus, if generators choose not to invest, policies become open to consultation within a negotiated space, wherein actors can mobilise their own resources through the notion of a dialect of control.

Investment techniques were a focal point enabling emissions targets, technology, strategies and political arenas to be analysed and communicated. Overlapping social systems invoke varied structural principles and properties, which can be translated using investment appraisal tools. When making the investment decisions, one of the roles of investment appraisal is as a vehicle of communication. Although more than one frame of reference applies throughout the internal investment decision making process (emission limits and strategic frames were present), investment appraisal theory was used as the main language. At industry conferences, rates of return and NPVs are part of a language understood by generators, regulators and the government; these were the codes drawn on and used from the theory of

investment. Although emissions limits were also part of the accepted framework, it was not used as the main set of facts/ rules when making business decisions. The language of investment appraisal became the dominant language, as stated in Chapter 5, because the regulators accepted that finances would come first.

The frame of reference relating to emissions limits was a technical language, which was linked to the directive that the government had agreed to sign up to. In Chapter 6, the risks of this industry were considered in detail and were mainly related to the revised directive and policies. In an industry, which has changing regulations and uncertain policies business language; in this case the investment appraisal language, becomes dominant because it is stable. The emissions frame of reference could change, and did change during the period of this research as a result of the changing political agenda; for example, the PPC, which contains the LCPD, became the IED. The theory of investment appraisal gave ontological security to actors because it presented a shared set of meanings, in which all social groups were understood across overlapping social systems, and so it remained constant. From an economic agenda, the terms of reference that related to investment appraisal interpretation schemes were directly related to the issue of protecting shareholders and providing them with expected returns.

As Englund & Gerdin (2012) state, the structure of signification provides for interpretive schemes, and in this case the theory of capital budgeting became the language of the generators, regulators and government, by drawing on the rules of this theory. It is this interpretative scheme that allowed all parties to understand investments, in terms of financial

outcomes, environmental targets and sustainability. The meaning of capital budgeting actually provided the meaning of the results.

8.4.1.1 Capital investment practices as mediating instruments

Although the capital budgeting literature itself is vast, it has been noted that development within capital budgeting has been limited in recent decades (Miller and O’Leary, 2007). As argued by Miller and O’Leary (2007), there is more to capital budgeting than simply understanding valuation techniques from a normative perspective.

Capital budgeting is much more complex than simply making calculations. The rhetoric of the three main players within this industry are different; the goals of the regulator are to reducing pollution, the generators to make profit and the government to achieve security of supply. The regulator and government largely express their goals in physical and scientific terms; however, the chosen mode of regulatory and policy intervention is mostly economic, through manipulation of prices for electricity and for carbon (Hoffmann, 2007). In this regulatory context, the actual techniques of investment appraisal (i.e. DCF and real options) that have been analysed so intensely in accounting literature *are* relevant. The relevance is not because they necessarily *determine* the final decisions on when, where and how to invest, but because they are understood and accepted by all the parties involved in negotiations on key regulatory decisions such as allowable or even guaranteed future prices. The common language is the capital budgeting language.

Due to mutual acceptance of investment calculations and logics, all parties are able to construct a view of the future in which electricity prices are key inputs in the calculation process. As Pfeiffer and Schneider (2010: 1) explained it, the process of capital budgeting “defines a set of rules to govern the way in which managers at different levels of the hierarchy produce and share information about investment projects”. These sets of rules may be extended to incorporate the communication process within the organisational field of the electricity industry, to include regulators and government ministries, as well as privately owned generators. The central mediating role of investment appraisal in electricity generation is shown schematically in Figure 18. Net present value is shown as the outcome of revenues (price x quantity); costs which are affected by generating technology and energy costs, and the discount rate which will vary according to business risk. The government requires a guaranteed supply and uses the pricing mechanism, for certain fuel types⁵⁸, to incentivise private generators to generate in a sustainable manner. The regulators main impact is on costs as they expect chosen technologies to reflect concerns about pollution and CO₂ emissions, and the generators want positive NPVs. This model is very simple as it does not capture issues of uncertainty or the strategies of multinational companies; these will be discussed later in this chapter.

⁵⁸ During this research, the pricing incentives only related to selected environmentally friendly technologies. All other technologies were priced through the trading of electricity.

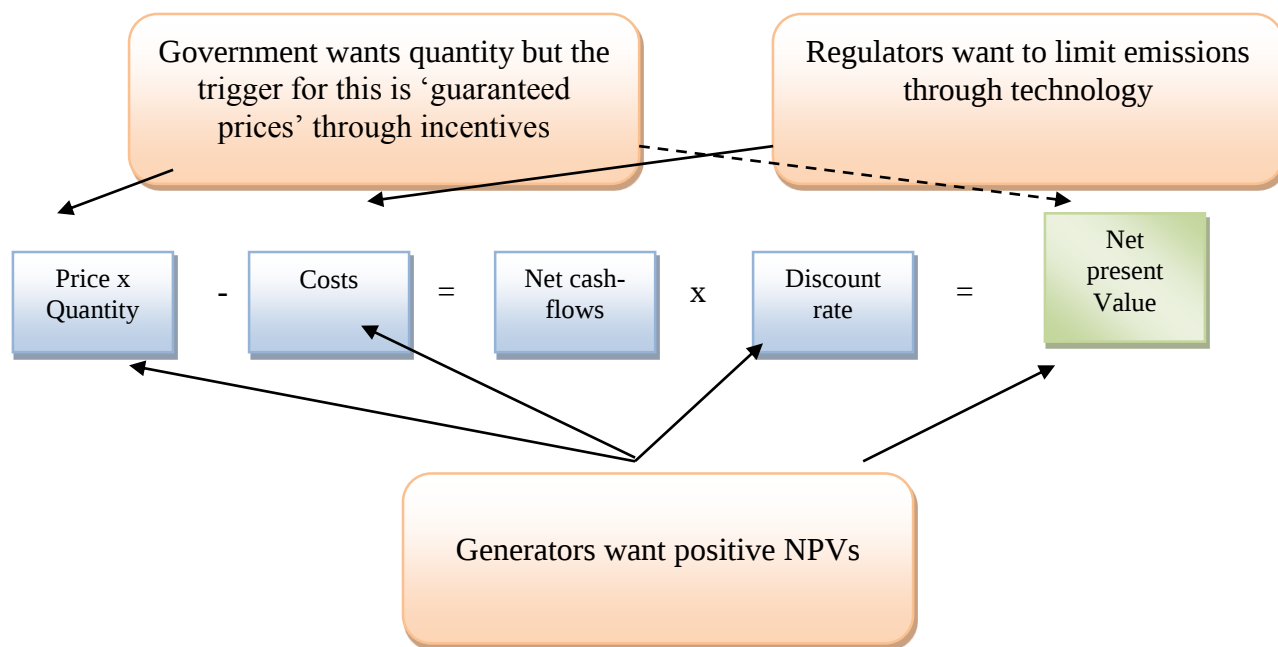


Figure 18 - Use of capital budgeting as an interpretive scheme

When working in an industry where there are many overlapping social systems, investment appraisal tools are the language used to translate possibilities of future investments, possibilities for future regulation and finally possibilities affecting the impact of these on sustainability. Such possibilities are influenced by past, current and future societal expectations and norms; which is why Chapter 6 analysed the capital budgeting processes over time. Englund and Gerdin (2008) argue that accounting, and this includes capital budgeting, should not only be seen as establishing frames of meaning but also as setting the standard (values and norms) by which various actors or groups of actors can be judged. Therefore, the next section of this chapter will examine how the structure of legitimation provided the 'norms' for investment.

8.5 Capital budgeting influencing the ‘norms’

At the same time as the government privatised the industry, taking a step back from investment declaring that it would become market led, Miller (1991: 736) also argued that “Firms were persuaded to use DCF techniques for investment decisions by virtue of their objectivity and superiority to conventional techniques. Economic growth would thereby be stimulated, the performance of individual firms improved, and the need for direct intervention by government avoided”. It seems that the government still held this belief when deciding to leave the newly privatised industry to follow its own investment path. However, the government did not consider the importance of the political policies behind these investments. The modelling of such investments exposed the significance of future political policy, and within Chapter 5 the example of one company changing their investment decisions based on a new policy regarding carbon trading was a prime illustration. Capital budgeting modelling considered the wider economic environment by including the requirements of various stakeholders that influenced the generator’s futures. The government and regulator are one of the most influential stakeholders because changes in policy can have a direct impact on the profitability of a single investment. As was demonstrated in the analysis chapters, when there was a change in policy such as the German turnaround on nuclear generation, substantial financial consequences emerged for all involved.

Legitimation is one of the most discussed uses of IA in management accounting textbooks (Drury, 2012 & Burns et al, 2013), although the term legitimation may not be used, these authors discuss how capital budgeting techniques can be used to make and confirm decisions.

None the less, explanation is needed to expose the more critical role of capital budgeting in this thesis. As previously identified, the modality of ‘norms’ provides morals and the values, which the frames of reference are based upon. Within the thesis, the decision to make investments was discussed using IA language and theory as the basis of the narrative, as highlighted in the previous section these decisions were also based upon the various rules relating to such decisions. Relating to the finances and returns of the investment decisions, they had already established ‘norms’, which included shareholders' demands. It was accepted practice that each project must gain required rates of return and that all of the actors in this study recognised this. If companies did not follow these ‘norms’ then quite simply shareholders would sell their stock. The need for companies to provide required returns resulted in this being a substantial component of their business plans and subsequent discussions.

Whilst maintaining the needs of shareholders the regulators could be appeased by the IA modelling addressing the environmental regulations within business plans. The modelling demonstrated the financial consequences of adhering and not adhering to those regulations established by the EA. As Giddens (1979) argued the actor will always analyse the risks of adhering to the values and expectations against the risks of not. The sanction of ‘not adhering’ was simply that the EA would not provide a permit, which would result in the company no longer being able to generate. Although environmental targets were used within the modelling this was for scenario planning, they were not used to legitimate investment decision to the shareholders; this was achieved through referring to required rates of returns and strategic responses. However, when a company chose *not* to invest, the emission directive could be used as part of the justification. The generators would explain that the

investment did not reach the required returns for the shareholders, due to the stringent requirements of the regulations. Here the generators used capital budgeting to emphasise the ‘sanctions’ of the regulators, which lent significance to the meaning of negative NPV.

The consequence of the main frame of reference being drawn from the theory of capital budgeting was that the generators used their own investment appraisal modelling to make internal decisions, and they de-coupled the environmental permit process, which they saw as a paper based exercise. In fact, the two processes were not only separated in terms of narratives but the actors completing the modelling were not the same actors who completed the permit procedure. Therefore, the rules and sanctions of the EA were adhered to but did not reflect the primary values of the generators. Although the two parties had contradictory objectives, they were able to work alongside each other, without detriment to either party in most cases. Giddens (1979) explains this is because contraction does not necessarily imply conflict.

The link within capital budgeting, in this case, between the signification modality and the legitimation modality, can be understood by examining the main coding used and the sanctions related to the various stakeholders. With the IA modelling being the vehicle of reference, the coding used included both the theory of IA and PPC emission limits (which draw upon the LCPD directive). Macintosh and Scapens (1990) argue that actual codes such as profit, NPV, rate of return, ELVs etc. all sit outside Giddens’ time space continuum. They sit outside of this as a set of shared understandings which result from historical process of ‘norms’, ‘sanctions’ and ‘beliefs’. This frame of reference was not a representation of reality,

it actually constituted to the reality of the process. Through a process of interaction, the regulators and generators were able to draw upon past 'norms' and 'sanctions' and create a new LCPD framework, this in turn created a new set of resources that could be used when creating new investment decisions. Chapter 5 demonstrated that codes for investment appraisal have always existed within this industry but it was the privatisation of the industry and the changing market structures (NETA) that resulted in the financial theory becoming more deeply embedded.

It is the use of this shared set of knowledge in MAS, within the business plans for the investment, which gives codes such as profit and NPV their place outside the time space continuum. Established theory explains why PPC never became an integral part of the process; remaining simply a process of filling in forms after a decision has been made, making it possible to have separate teams of actors completing investment modelling and permit applications.

The uncoupling of the application process from the investment decision by the relevant actors makes sense in the context of this study. The regulator's main concern here was to ensure compliance with EU directives, and as discussed in Chapter 5 was not about finances. Removing the obligation to protect society, by providing a reliable electricity supply means the financial implications of investments only relate to the responsibility for providing returns to investors. Therefore, the only legitimization required was related to the values of finance and environmental targets.

The values of an actor or set of actors can determine whether or not they feel the need to mobilise power and instigate change. The next section of this chapter will assess how generators exploited the contradictions of regulations to shift the balance of power and demand reform within the industry by using capital budgeting modelling to expose contradictions.

8.6 Capital budgeting and domination

Miller (1991: 735) stated that “[f]or differing periods, and with differing effects, accounting technologies have been identified as integral to, and enabling of, particular strategies of macro-economic government”. In this research the accounting process of capital budgeting and the modelling that is part of this process has certainly been found to influence the macro-economy in terms of future investment policy and the financial incentives the government are now considering. It could be argued that influencing change within this industry could be very difficult because of the regulatory nature of the industry; however, the use of regulations to achieve control provides contradictions within the system that can be used within the dialectic of control set by generators. Giddens (1979:148) stated that ‘The more tightly-knit and inflexible the formal relations of authority within an organisation, in fact, the more the possible openings for circumventing them’, and this can be argued to be the same within this industry. By refusing to provide required investment the government was forced to engage in a consultation on EMR, demonstrating the way in which capital budgeting can facilitate change within society. The ability of generators to use capital budgeting to expose weak or missing policies, and the future consequences that arise from these highlight how capital budgeting can shape norms and future sanctions. That is, not simply creating change within

the industry, but also the general economic health of the country, because the financial incentives will come from taxpayers. As Miller (1991: 735) states “There are broader vocabularies, arguments and rationale in relation to which accounting technologies can be given meaning and accounting innovation promoted. These can include overtly political arguments that seek to give issues such as investment decisions significance beyond their immediate context within firms, helping to link in argument and thought apparently discrete issues with much wider concerns such as the economic health of the nation”. Therefore, a lack of investment is not just a concern for the industry; instead, what is at stake is the economic welfare of the country. Blackouts within the UK would have a direct economic impact on all industries. Furthermore, the key to establishing investment in this industry is to legitimise investments.

Environmental investments were controlled through regulatory frameworks, which were established through the development of ‘frames of reference’, and these regulations were established to provide controls over emissions. This was a form of control in a relational sense, because although the government created regulations through the regulators to control the industry it only resulted in control in a broader sense if the generators adhered to them. That is not to suggest the generators did not adhere to them, they did, although in many cases this led a decision not to invest in the UK because capital budgeting modelling demonstrated that it was far more financially effective to invest in other social systems in other countries. The relational nature of the control in this system rests with the regulation capacity of the government; however, the control of the ability to generate or to not generate electricity rests with the generators. As Giddens (1979) and Nandan (1998) argue, power is subject to the dialectic of control, because power over one actor is dependent on the power another actor

holds over them.

Although emission permits were separated from the investment appraisal process, this in itself provided an opportunity to seek the best alternative form of action. For example, pulling down an old plant and commissioning a new plant could achieve the regulator's requirements and provide the necessary financial incentives that the shareholders required. Generators with international portfolios could choose to invest in the UK or invest their capital in other geographical areas. This was achieved by modelling all the options using investment appraisal techniques, thereby providing legitimisation for capital to be mobilised from one country to another or from one type of technology to another. Although the LCPD was implemented within the UK, the investment appraisal process was an international one with alternative industry options. Therefore, investment appraisal techniques became a tool legitimising investment, by offering a way to compare overlapping social systems, thus satisfying shareholders requirements.

When discussing capital budgeting as the common language earlier in this chapter, using capital budgeting was identified as a first step for mediating in the industry. However, the use of capital budgeting as a mediating instrument was much more significant than that, it became a strategic tool to focus on intense lobbying. Capital budgeting exposed many future scenarios, because facts were defined by their possibilities or *logics* (Nørreklit, 2011). The PC framework sees managers and other organisational members as reflexive actors who constantly monitor both existing and alternative practice. In short, they consider different *possibilities*, even when in overlapping social systems. As Nørreklit (2011, p. 25) explains, possibilities are “constructs of something that does not presently exist based on something

that does exist ... (T)o construct possibilities, one must perform logical operations”. In addition, ST suggests that actors will only instigate changes if they are motivated to do so; meaning that although actors recognise alternatives it does not mean they will act upon them.

Since actors need to be motivated, a third dimension of reality is its *values*. Unlike in neoclassical economic theory, the PC approach does not assume a particular universalist set of individualist or self-seeking values. Since values are an individual’s motivating force, Nørreklit *et al.* (2006, p. 47) argues that “if the world does not appeal to the values of a person, that person becomes passive” and “managers should recognize and respect the values of employees in order to strongly motivate them”. ST agrees that such values provide the socially acceptable norms of the stakeholders. In the case of the LCPD becoming part of the value system of the UK electricity industry through sanctions, the values and rules relating to the environment only motivate generators when strategic incentives or financial returns are attached.

This final dimension of reality is *communication*; ST relates to the frames of reference. Communication plays a very special role in management control as it is the key to integration between the other dimensions: “formats the organisation as a common space of meaning” (Nørreklit, 2011, p. 30). Within the international industry of generation, capital budgeting became a common frame to establish meaning. Communication is far more than just a simple exchange of information; it helps not only to construct different dimensions of reality, but also to integrate them via organisational and institutional arguments or rhetoric. Therefore, the interpretive scheme, as discussed in section 8.4 is central to the decision making process and to the process of mobilising power.

In this setting, capital budgeting practices are mediating devices (Miller & O’Leary, 2007) in two ways. First, they link the science and economics of electricity generation within the generators’ own *models / frameworks* (Norrekli, 2011). Secondly, they link the science and the economics in the *negotiation space* between the generators, the government and the regulators. This thesis found, the use of contradictions by the various sets of actors enabled a dominant rhetoric to emerge, one stressing the need for a reform. In this second form of mediation, the interventionist role in capital budgeting practices means that these practices are not only about linkages and communication; in fact investment appraisal models with a set of implicit prices, industry outputs and associated technologies lie at the centre of the negotiating framework. The negotiating space was created by contraction and uncertainty about future government policies.

As was discussed in the analysis chapters, a key problem in investment decision making is uncertainty (Haka, 2007). Uncertainty can incorporate many issues, such as long term pricing, market instabilities and future policies. As will be discussed in the next section, some of the uncertainties experienced by generators making long term investment decisions included unknown future price curves and, more significantly, unknown future revisions of regulations and energy policy.

Capital budgeting techniques were used to generate possibilities and the outcomes; the outcomes then became the facts. The facts were then aligned against their values to determine the best possible position, and once established they were then used to communicate with the

regulators and politicians in order to lobby towards their own needs. By defining an environmental framework that matched their objectives, it became possible to increase profit. The consultation process was intended to discuss the environmental interpretation scheme, and was used by the generators to consider their own strategic future. An interpretive scheme would be used by regulators to comply with EU directives, and at the same time to encourage generators to mobilise their capital, by investing.

8.6.1 Exploring the strategic nature of IA as a mediating tool, exposing high risk factors

By modelling the economic reality of future investments, it is possible to understand how a negotiation space evolves, and also how the process of interaction within the domination structure evolves. The consultation process, for the LCPD, occurred at the same time as the decision making process, and therefore the frame of reference and investment appraisal, was a very useful form of internal communication. The modelling helped to translate the lobbying process into an event by drawing on generators' motives and to compare the logic and facts with the values of the organisation (Nørreklit et al, 2006). In this thesis, this included the values of international companies. The lobbying process also highlighted the current overlapping social systems and contradictory structures, which the UK government could no longer afford to ignore.

The investment appraisal process cannot be label purely as an MA technique because it constitutes reality, which in itself explains its strategic nature. It is a strategic tool, similar to the value chain, helping the organisation to mobilise future structures within the industry to

satisfy their own strategic intentions. By modelling scenarios, they were able to identify high risk factors and focus their lobbying on those issues. In Chapter 5, examples were provided that demonstrated how generators modelled various definitions within the LCPD directive and also in view of future policy changes. Although the definitions were a short term consultation, the profit seeking lobbying process was a long term, high risk process; one that sought policy changes.

The use of IA modelling by both the individual generators and joint collaborations with consultants, have resulted in many cases of not using existing capital to invest, forcing the government into a corner. Security of supply is one of the key values for governments, as it is directly linked to votes. Current market rules are not working and the fact that prices have been leading investment, due to the uncertainty of future policy, has led the government to initiate a major reform in the market. This recognises a need for a ‘real’ new energy policy to contribute greater certainty to the modelling equation. The new White Paper (DECC, 2011) emerged five years after this PhD began and has the potential to bring the required certainty to the industry.

In this thesis, both allocative and authoritative resources were drawn upon, and used in conjunction with investment appraisal techniques to engage in a lobbying process. In terms of the LCPD, although the completion date for the LCPD was set before this research began, the UK had not actually created a framework for its operation within the UK. Regulators were not able to shape the framework by themselves because they lacked engineering knowledge of generators. Therefore, rules and systems could not be created without

understanding technical implications. With this in mind, generators were able to model various scenarios in order to understand the financial implications of different frameworks, and then lobby for those frameworks that suited their agendas. This of course was not straightforward because each generator wanted something different; they were not mindless dupes copying one another. Each generator had different plants and portfolios, which in turn had different needs. Through the process of lobbying, some gained an essential strategic advantage over others.

In addition to lobbying for the LCPD regulation, generators continued to apply pressure for future regulation; ultimately, this, combined with a lack of sanctions, has resulted in an urgent need for £200 billion of capital to be invested. The accounting tools focused on the uncertainty of future price curves due to uncertainty of future regulation, resulting in minimal investment taking place. There was no policy in place to protect current or future investment in the UK, whereas in other countries this was not an issue. This lack of a ‘security of supply’ policy as a legislative requirement that created a process of de-institutionalising. There was simply no need for the generators or regulators to draw upon these resources when making investment decisions. The politicians argue that these resources were not required, because investment would take care of itself, driven by market led investment return.

8.7 Why capital budgeting became a strong mediating device - Real options

The reason why capital budgeting became a very powerful mediating strategic device was that politicians and regulators’ notion of market led investment contained a significant flaw based on the logic of modern investment appraisal; they ignored the concept of real options.

Real options theory provides a way of analysing investment opportunities, where, if the risks and uncertainties are too great, the value of postponing investments can out-weigh the returns gained when making an immediate investment. As Guthrie (2012:1) explains “Modern investment theory recognises that firms often have flexibility regarding when and how they invest and they have sought to incorporate that flexibility into decision making by using real options analysis”. It is the flexibility that the generators hold, which maximises their ability to influence the future of the generation industry.

That is not to say generators will do nothing, they can and do make applications to construct and invest in new plants, but they can then choose to retain these permits until future policy is decided. Guthrie (2012:1) argues that “An important source of real option value derives from the firms’ flexibility regarding the timing of investment, since this allows them to wait and see how the future uncertain economic conditions evolve, for example, before committing to large irreversible investments.” In this case study the value comes from a ‘wait and see’ approach towards future regulation. The generators recognise that future regulations could improve the economic conditions associated with their long term investments. Although real options theory does not sit within the traditional set of investment appraisal techniques, it is certainly something discussed within the industry, although not necessarily in reference to the theory. The lack of a framework of reference relating to a future energy policy in the UK presents itself as a fracture within the system. Guthrie (2012) states that real options analysis is very important in industries where there are high capital investments, including the UK generation industry.

The generation industry sought change throughout the period of this case study to be able to facilitate the new investments required. By drawing on the theory of capital budgeting and understanding of environmental frameworks generators were able to demonstrate through capital budgeting modelling that there was no benefit to making investments in the UK until the government made significant changes. The contractions between ideology and economic consequences provided a motivation for generators to engage in a lobbying process to instigate change, using a dialect of control. Verdu et al (2012) argued that within those industries that face unpredictability because of environmental change, they seek changes to processes or modification to existing ones. In addition, Conrad (2005) states that a requirement for change can emerge either through conflict or crisis. During this case study, there was no sudden crisis, however, the changes to market structure, over time created a paradox. The problems of investment only emerged when the added pressure of environmental regulations presented itself, thus the paradox created a conflict within structures. The paradox was created by having a privatised industry without the need for generators to protect the 'security of supply'. Naturally, generators focused their investments on satisfying financial requirements, and strategically aligned themselves to environmental targets, thereby concentrating on two of the three factors of greatest importance within the industry.

Giddens (1984) explains that when a conflict occurs, and social codes or 'norms' may be abandoned, such as 'security of supply' in this case, actors will take control by socially constructing a new set of dominant structures. The interpretations of this industry reveal that the new dominant structures were the rates of returns, competitive positioning, and environmental targets. Real options theory gave the actors the ability to adapt to changing

environments at both a strategic and operational level (Verdu et al, 2012), providing information to detect fractures within systems, and enabling action to be mobilised in order to work towards specified agendas.

The shift in leading social structures has resulted in the current energy crisis, which although it was dismissed by regulators and politicians at the beginning of this study has now been accepted as of significance (DECC, 2011). This was an unintended consequence; but it was no longer a concern of the generators in their everyday operations. Accounting models did not include this as variable, other than to expect to anticipate an increase in future price curves when supply reduced and to demonstrate there would be a future concern over 'security of supply'. There was no accountability for this 'social problem' because it had been removed from the sanctions imposed within the focal system. It is argued that real options modelling can assist organisations that are multinationals and have awareness of such theory; by reducing side risk (Criouci & Bennett, 2011). Within this case study, the narratives of the managers suggest that they were aware of real options and were in a position to operate within overlapping social systems.

8.8 Problems are UK specific - Overlapping social systems

The lack of a coherent UK energy policy created the majority of the uncertainty within the industry. The problems discussed within this chapter so far were UK specific, which was due to the political management of the country. The UK aimed to be a role model for those industries that self-managed investment through private means; however, this could only

work in a closed environment, in which there was a clear future direction. The UK electricity generation industry is not a closed market, investment has an international influence. The lack of direction from the government towards general investment played an enormous role in the uncertainty surrounding investments relating to the LCPD.

The absence of a comprehensive, general energy policy created a problem for generators when making long-term decisions for the LCPD and on other general investments. As Gerdin and Englund (2012) argue, the frames of reference are based upon the ‘norms’ within the industry, and because there were no rules of ‘security of supply’ then there were no sanctions. A lack of sanctions resulted in generators using this contraction in values to open up a negotiation space to discuss them. The generators knew the government could not continue to hold off intervention for much longer because security of supply would become an issue; as many interviewees said, the government could not let the lights go out. Adding pressure to the UK government was a means of overlapping social systems with countries that provided more clarity; resulting in generators drawing upon alternative structural principles to justify their demands with the focal system. Investment modelling could be used to legitimise the choice of investment.

Therefore, the uncertainty created by the government hindered the strategic direction and development of the generators within the UK. These generators played on the potential power they could mobilise, which resulted from the resources they owned, and also related to their ability to control production by owning capital, technology and knowledge. The resources that the generators controlled could force a crisis, and evidently did. The new White Paper

(2010) is finally addressing the concerns of the generators raised at the beginning of this project, which date back to 2006. The LCPD investments were all implicated in this push to raise awareness of future problems. The use of investment appraisal in order to justify investment decisions was manipulated to create an opportunity for future regulation by playing on voters' needs. The modelling process within the investment appraisal process highlighted security of supply issues within the industry, providing a strong negotiation position.

By taking bold decisions to shut the plants down early, generators who opted out helped the industry to highlight the emerging security of supply issues. The generators who chose to opt out of the directive declared that they would be shutting down because the financial implications of continuing were not appropriate to their shareholders. As many of the generators stated, they had nothing to lose. The strategic decision to run 20,000 hours hard and fast was taken by most generators, because this would reduce fixed costs. Generators were also hoping that if they ran the hours fast and there was a crisis, the government may re-think their target dates, there could then only be benefits for generators. These benefits would include movement to a future energy policy and possibly an extended allocation of hours to provide security of supply.

8.9 Capital budgeting influencing change

Although the regulators, OFGEM, have the power to change the structure of the market, they have no legal sanctions to force generators to invest. In fact, they do not even have the power to force generators to use the assets they have to generate electricity; if the spark spread is

high then the generators will sell gas rather than generate electricity with it⁵⁹. It was exceptionally naive to believe that market led investment would work without a solid energy policy in place. The generators have used this naivety to push for return on the capacity payment scheme, to bring more certainty in future investments.

As previously discussed, Giddens (1979), argues that all social practices involve all three modalities and therefore when one of these modalities is weak it creates a negotiation space. That set of actors which is motivated by their values can engage in the dialectic of control to act upon secondary contractions (Conrad, 2013). In this case, generators motivated by shareholder needs and the strategic objectives of a company engaged in a lobbying process can force the government to sit up and listen by holding back their capital.

The role of privatisation has been well documented in the public sector, especially relating to the shift from a language of engineering to a language of accounting. For example, Dent (1991) examined the rail industry, and closer to this study Ogden (1995) researched the water industry and Conrad (2005) the gas industry. Nevertheless, this study provides a unique opportunity to examine how the process of privatisation and the dominance of accounting language can push the government to re-examine their policy on investment. The government is now re-analysing the role of private organisations within the electricity industry so that they are encouraged to become more responsible for the basic social needs of people in the UK. Thus, this study provides a good opportunity to interpret investment at the stage of

⁵⁹ An example of how a CCGT would respond.

mature privatisation and to consider the structural properties of an industry in this position.

In comparison to the Seal and Ball (2011) paper, the government has found it difficult to address problems in this industry. In the Seal and Ball (2011) paper, the government found it difficult to leave the schools without money as a budgeting crisis hit. Although, at the same time, the government did not want to be seen as bailing out schools. However, the current crisis investigated in this study is different from that examined by Seal and Ball (2011) as the crisis in this crisis in this thesis relates to the future. In this study, the issue of investment was the problem but what escalated the problem was the public perception that these companies were cash rich. Creating a new energy policy, which will directly translate into increased consumers' bills will not be a vote winner, which explains why each political group has avoided this task. However, the change of government in 2010 provided an opportunity for the coalition to acknowledge that there was a problem, following significant lobbying from all the generators. Generators held back capital and used a modern investment appraisal frame of reference, so that the government could no longer ignore the problem.

The government could not be seen to be letting the lights go out, yet they could not be seen to be bailing out an industry, which on paper looks very profitable. The review, which started in autumn 2010 was inevitable and has been since the beginning of this project. The generators throughout this study demonstrated the duality of control concept, mobilising power by drawing on their knowledge, while working within the constraints of the current structures. The generators made good use of their own resources, the lack of government resources and a missing frame of reference, to highlight their needs; their motivation was the

need for more certainty.

The government and the regulators were arguably the more dominant actors because they have more resources to hand. However, with the lack of current sanctions (both those that provide incentives and punishment), the current market structure and lack of energy policy has opened up fractures within systems, creating problems. The domination of these actors in terms of investment in this industry has been subverted through the mobilisation of the three connected modalities that the generators hold. The modalities are represented through a strong frame of reference using investment appraisal tools and their resources. This study is suggesting that this is a useful case when studying how Giddens (1984) uses the concept of the dialect of control in order to describe how actors can exercise control over other actors that may be seen traditionally as holding more resources, through the use of accounting tools.

8.10 Conclusion

Capital budgeting plays a significant role in articulating the way in which accounting can instigate change in wider social practices, which is an additional contribution to this research. This Chapter has demonstrated how the concept of dialectic of control allowed generators within the electricity generation industry to demand reconstruction and revision of the market structure relative to investment. The use of capital budgeting techniques allowed generators to exploit the notion of the 'double contingency of interaction'. This notion indicates that the reaction of each party or actor to an interaction that takes place is contingent upon the responses of others. Each party or actor, in effect, has reciprocal opportunities to sanction the

acts of others. The government can, not only use the process of regulation to create sustainable generation if the generators accepted the terms of the regulation, but it also has the choice to invest internationally. The acceptability of regulation and the consequences of such regulation were determined using a capital budgeting modelling. Therefore, capital budgeting modelling has not enabled the government to stand back from industry as was originally intended (Miller, 1991), in fact capital budgeting theory provided an opportunity to expose the contradictory nature of the regulations in place and to shift the power balance in favour of the generators. The generators are able to control the process of generation, and utilise the 'norms' of shareholders demand for investment to provide economically sound returns. The meaning of a sound return was created through the theory of investment and generally accepted coding of the term profit.

Although the general press suggest a lack of investment is easy to resolve, simply by building more power stations, this solution does not recognise the complexity of the current situation. Yes, it is true that building more power stations would resolve the problem; however, behind the capital budgeting analysis of these investments there are complex political problems. This research reveals the tremendous complexities involved in making investment and ST has helped to demonstrate and analyse this. The Press present a superficial presentation of the problem; however, this research portrays a fairer representative of the current issues. The political negotiations involved in devising new policy are creating barriers to investment. In addition, these barriers include ideological factors, which relate to the UK's wanting to achieve significant environmental protection at a level that does not currently match the financial problems the UK is struggling with. The problems do appear to be UK specific because other countries with more pressing financial difficulties, such as Portugal, manage

to avoid this investment problem. The lack of government direction seems to be the source of the problem and the capital budgeting modelling exposed it. The current uncertainty has provided more leverage to the strategy of investment appraisal and it has become more than just a passive technique, satisfying the question raised in chapter 2.

The role of investment appraisal in this research project has led to an interesting analysis. The UK electricity generation industry has provided a platform to examine investment within a complex managerial environment (Miller & O'Leary, 2007). The current position of the UK electricity generation industry has provided a contextual background that is profitable yet unstable. The focal social system under analysis is also under immense pressure from overlapping social systems that have more clarity and certainty in terms of comparative structural systems. With this as the background to the study, it sits in a paradox of sustainability, investment and environmental regulation. Using real options theory generators have been able to form authoritative power collectively by holding back capital. Some of the generators have opted out of the LCPD, which has created even more pressure on an already strained system.

The techniques within investment appraisal have become the main frame of reference; it is a tool to mobilise power and a strategic analytical framework used to identify potential lobbying strategies by comparing facts and logic with the value of the individual organisations. Thus, the roles of capital budgeting in a situation of uncertainty are: 1) a common frame of reference 2) a legitimating tool, and 3) a strategic analytical tool, which can be used to identify opportunities. Therefore, the process of investment appraisal is not

one that represents reality; it actually constitutes reality, answering the question provoked by the methodological discussion in Chapter 3. Capital budgeting constituted reality not only by providing the meaning and language of investment in this industry but also by enabling a negotiation space to evolve by using a mediating device. The mediation device drew on the needs and values of the various stakeholders in the industry to establish a debate on reform, the EMR.

Although some may argue that the generators shift the balance of power by holding back investment, preventing development of a sustainable industry this is not the full picture. Sustainability is not just related to emissions, sustainability is about the ability to have an industry that can continue to produce the basic needs of civilisation into the future. Yes, the population of the world needs green generation but it also needs a long term strategy that provides long term investment to provide basic needs such as electricity. Ignoring long term investments is not only naive but dangerous for the whole economy. Therefore, this research argues that capital budgeting has created a short term problem by seeking a sustainable way of generating electricity involving holding back capital in the short term; but, that it has also been a mediating device establishing a much needed reform.

Chapter 9 – Conclusion

“The current energy market has served us well in recent years. But we now face a number of unprecedented challenges which the market will struggle to address. This is why we are working towards a market framework that encourages the right kind of investment, and the growth of the new energy economy.

An economy in which:

- **security of supply is achieved by diversity of generation technologies;**
- **in which affordability is ensured by competition between generators;**
- and,**
- **in which climate change is tackled by reducing carbon emissions.**

We want to develop a diverse energy mix by encouraging new investment. We are establishing a stable and long-term framework to mobilise private-sector capital. According to a recent poll of more than 150 investors by Credit Suisse, the UK is overwhelmingly perceived as the favourite region in terms of regulation, ahead of all other countries. And the UK has the best wind, wave and tidal resources in Europe. So there is good reason to believe we can achieve the kind of investment we need, *provided that we get policy right as we go forward.*”

(Hendry, 2012)

9.0 Updated overview of the industry

The extract from Charles Hendry's speech, provides insight into the current state of play in the UK electricity generation industry. The quotation conceptualises the complexity within the industry relative to investment, regulation and sustainability. The speech also stresses the need for a stable energy policy, to avoid future problems of sustainability. The industry is currently in a state of flux and the balance of how regulations are used within this industry is a 'hot' topic currently. At the beginning of this thesis, regulation was described as important for protecting and overseeing costs to consumers and the environment (although this had no impact on the generation side).

Throughout the time in which this thesis was written, regulation has expanded, with the emergence of EU directives on the environment. The UK government has signed up to these directives; yet they have taken a hands off approach towards investment in the industry. Rather than analysing investment as the bigger picture the government has only intervened by offering incentives that satisfy environmental targets. For example, they have offered financial incentives to invest in wind technology and more recently, nuclear power.

Investment in this industry was deemed to have been market led, although, as shown throughout this thesis, direct manipulation, through the use of ROCS has unbalanced the market in respect to achieving a sensible fuel portfolio. With the industry now influenced by financial incentives towards wind power, further uncertainty as regards sustainability has emerged; with a threat to the long term security of the industry. Long term investment will require significant capital and security from the government in terms of policy. Currently the

requisite policies are not in place to create confidence in the market and encourage other countries to transfer capital to the UK.

The expanding environmental regulatory framework has had a detrimental effect on sustainability issues in the UK. Within the current structures, investment appraisal modelling suggests that investment is not supportable, as there are currently too many unknown variables. The rationale and purpose of regulation has been misguided, as has the government assumption that it can use the environment as a marketing tool, to present the government as ‘good citizens’ and win votes. Ultimately, this has backfired, because the policy of strong environmental emissions targets has resulted in sustainability concerns due to highly expensive investment requirements. The current economic climate does not support a ‘green planet’ ideology, and the realisation that strong environmental emissions will result in increased ‘bills’ has resulted in the generation industry becoming subject to increasing public debate.

The increasing debate over the industry, in the UK press, has been an intentional consequence of generators applying a real options argument to ‘hold off’ from investing in the UK. By creating a public debate, the issue of the government not having a meaningful energy policy has led to a consultation process. The process began with the White Paper (DECC, 2011), which is to completely transform the industry’s market framework. The government has been forced to accept that the issue of sustainability must be addressed, and this means they will need to create new policies and market structures to encourage a balanced portfolio. No one knows whether this consultation process will be successful, but there is certainty that

regulatory intervention is required to encourage investment; as no government can afford ‘blackouts’ to occur.

9.1 Overview of the research

The overview of the UK electricity generation industry, in Chapters 5, 6 & 7 clearly illustrates that investment is at the centre of the sustainability problem. Analysing the capital budgeting literature in Chapter 2, demonstrated that the majority of previous research has focused on the outcomes from investment appraisal rather than the processes, including the decision making cycle. However, outcomes do not explain how or why industries and companies choose to invest or otherwise. In addition, outcomes do not help us to understand how management accounting tools and techniques are used within the investment process.

In the literature review, two main papers were introduced to identify a gap in the literature used to create an academic anchor for the research. In the first paper, Haka (2007) suggested the existence of a need to explore the use of capital budgeting analysis rather than numerical calculations and techniques. In the second paper, Miller and O’Leary (2007) called for more empirical studies to analyse the *process* of capital budgeting / investment appraisal. With the literature demonstrating a need to interpret the process, and with the current industry paradox, research questions were developed to satisfy both academic and industry problems. To address the issues raised by the research questions the researcher had to ensure a compatible ontology, theory and methods to provide validity to the thesis.

A longitudinal case study was used to explore the role of investment appraisal techniques under conditions of regulatory uncertainty. A case study undertaken over a significant time period was chosen to allow sufficient time to explore the process of investment appraisal, thereby addressing Miller and O’Leary’s (2007) calls for the investment process to be interpreted. Haka’s (2007) suggestion that this topic needs to be examined from a paradigm that allows human interaction to be considered, requires a shift of focus from the traditional ‘positivistic’ and ‘normative’ research that dominates the current literature.

At this stage of the research process the work of Mouck (2004) was drawn upon; he argued that numbers can be considered as epistemologically objective, through institutional reality, whilst accepting that there is no objective foundation for the rules that institutions generate. Although Mouck (2004) argues that numbers can have an epistemological objectivity he makes it evident that they have an ontological subjective mode of existence, referring to numbers as socially constructed. This research sets out to consider whether accounting was passive and simply represented reality, or whether accounting could be argued as strategic because it constituted reality. To conduct research, which would consider investment appraisal in this manner, it was necessary to determine a compatible methodology and method.

To achieve a compatible methodology and method it was necessary to interpret the meanings of the process from an actors' own experience, therefore considering the reality of the actors to provide a vast array of possibilities. To achieve thick explanations of the process this research combined the emic meaning of the actors' own experience, whilst accepting the

facts, logics and values (Nørreklit et al, 2006) embedded within the actors' own reality; the theory of the NPV. Making this an explicit assumption meant economic theory was not rejected; it was accepted as the reality of the actor. Thus, the epic understanding of theory created an opportunity to bring together emic meanings and epic understandings of the investment appraisal process; creating a study from an inter-subjective perspective. The inter-subjective position was established using ST, and abductive reasoning through IR; bringing together social constructivism and a hint of realism through pragmatic philosophy.

Actors facing endless possibilities need to apply limitation measures, to be able to engage in future social action, and the structuration processes enables actors to do this. ST offers a conceptual framework from which to consider human interaction within a social and political setting. This case study has demonstrated that accounting, through the use of capital budgeting modelling, can become a significant source of power, especially when contradictory structures exist and there are missing rules and resources within the industry. Examining capital budgeting in this setting has provided the opportunity to explore the truth that actors are not simply mindless dupes, emphasising Giddens' (1984) duality of structure and dialectic of control. This is demonstrated by the way in which the generators have worked within the fractures in the focal system to mobilise their own resources, thus establishing power. Although the generators have not held many authoritative resources they created authorisation by collectively moving their capital outside of the UK, into regions where more clarity was offered.

Exploring the concept of ST and conceptualising the significance of Giddens' work in the

accounting field, the recent work by Englund et al (2011) and Englund and Gerdin (2011) has been applied to consider how investment decisions are affected by contradictory structures and overlapping social systems. The UK generation industry had contradictions that have resulted in a paradox emerging, and in investors becoming international players deploying capital into countries, offering less uncertainty, and thus functioning with overlapping social systems.

The research into the '*role of investment appraisal in an area of uncertainty*' was refined into the three sub-questions using ST (Giddens, 1984, Englund et al 2011 & Englund and Gerdin 2011); this was modelled in Chapter 4. Each sub-question was designed around the theory that could be applied to address the main research question. By designing the research questions and interview questions around this theory, it was then possible to present analysis chapters according to the three modalities, whilst accepting that they are all entwined. By interpreting each modality through an individual lens, it was possible to acquire a detailed understanding of the reality of the situation.

To explore this research, Figure 19, was presented in the introduction chapter to highlight the conflicting factors within the UK electricity generation industry. The structures and conflicts were presented at the beginning of this PhD and have proved to be central, being identified as problems in the latest White Paper (DECC, 2011). To examine the role of capital budgeting techniques within this industry, at a time of regulatory uncertainty, it has been necessary to consider the social, economic and political structures that exist, so as to make an impact on the investment decision making process in terms of capital investment.

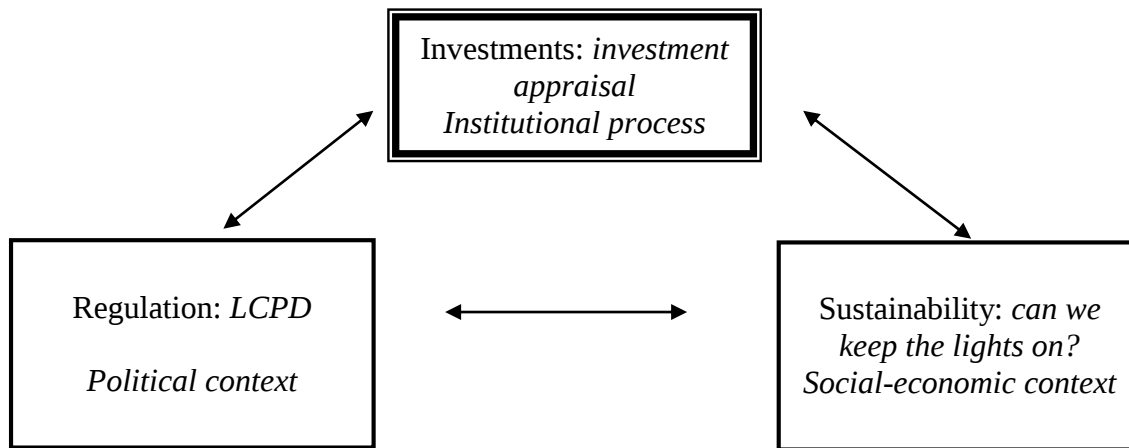


Figure 17 The UK electricity generation industry investment paradox

Figure 19 represents those factors that exist within the industry, which have created the current paradox. Each can be considered as comprising structural principles that relate to profit maximisation, protecting the environment and maintaining an acceptable security of supply within the UK, i.e. keeping the lights on. All of these structural principles, are, within their own right, embedded within some / all of the actors of this industry and exist in a ‘time and space continuum’.

9.2 Examining how the structures are entwined

In Chapter 8, the duality of structure was examined by considering how the three structures within ST are entwined when analysing the three respective modalities and identifying links and relationships through capital budgeting. Chapters 5, 6 & 7 provided a detailed insight into the individual structures within ST so that each could be understood in detail. However, Giddens (1979 & 1984) clarified that in reality structures are not standalone; therefore, Chapter 8 offers an interpretation of how capital budgeting links to investment, regulation

and sustainability across all three structures. Identifying the impact of future policy through capital budgeting has been made possible by establishing a powerful position for generators, and this was examined through Giddens' dialectic of control model, the government and the regulators still took the responsibility to provide security of supply.

Following privatisation and the introduction of heavy environmental regulations from the EU, the government's aim to use capital budgeting to initiate efficient investment within the industry has failed (Miller, 1991). In fact, capital budgeting has altered in its use, from merely a numeric calculation to justify investment to one that is strategic in nature and used to identify future possibilities to emphasise the need for change by highlighting future crises. The strategic nature of capital budgeting has been emphasised by generators' requirements, and those of other stakeholders. The shareholders required good rates of return and profits deeply embedded within the reality of the generators, as they now work within a privatised industry. The government accepts this structural principle as they were responsible for establishing a market framework, and the regulators accept it because they comprehend the demands of a privatised industry. However, although both the government and regulators understand the demands of the shareholders they have not accepted that the incompatibility of these demands with the ideology of a greener industry within a period of financial instability.

In addition, environmental structural principles are also accepted and embedded by all. Regulators enforce the regulations, and so accept them, as does the government, as it signed up to it, and the generators accept it on two levels; 1) because there are sanctions to secure

enforcement, and 2) because it provides a competitive position.

To understand the role of investment appraisal within the turbulent period of the electricity industry, this study explored investment appraisal within the context of the introduction of the LCPD. At the same time as the LCPD was implemented a wider discourse was being had regarding security of supply and further environmental regulations with stricter targets. It was emphasised that investment could not be considered in isolation, but only by considering financial factors and the accounting techniques used within the decision making process. The social, political and economic structural principles had to be interpreted together because all were entwined and connected through capital budgeting, reflecting the interrelatedness of the three modalities of Giddens' (1979) structuration analysis.

Using ST to unravel a very complicated industry has led to findings, which suggest a need for a new policy and a market reform to encourage investment. There is increasing security of supply concern, due to the closing down of plants through regulation, and this has been an issue addressed within the investment appraisal undertaken by the LCPD. Security of supply concerns and increasing regulations have produced reactions within the market that had to be modelled when predicting future prices curves. Future price curves were and are fundamental investment appraisal techniques. Therefore, analysing environmental targets, social needs and the needs of the shareholders has provided an opportunity to explore how accounting techniques have been used and what their role was.

Figure 20 represents a basic form of ST, covering three aspects of the study within the main research question of this thesis. Although Figure 20 shows how all the issues are bound, when they are examined from the perspective of investment appraisal a link is missing. As previously discussed, sustainability issues no longer hold any power over the investment decisions made by generators, although the reduction in capacity has been modelled using investment appraisal techniques to create a public crisis.

Key: IS: interpretive scheme, P: power, S: sanction

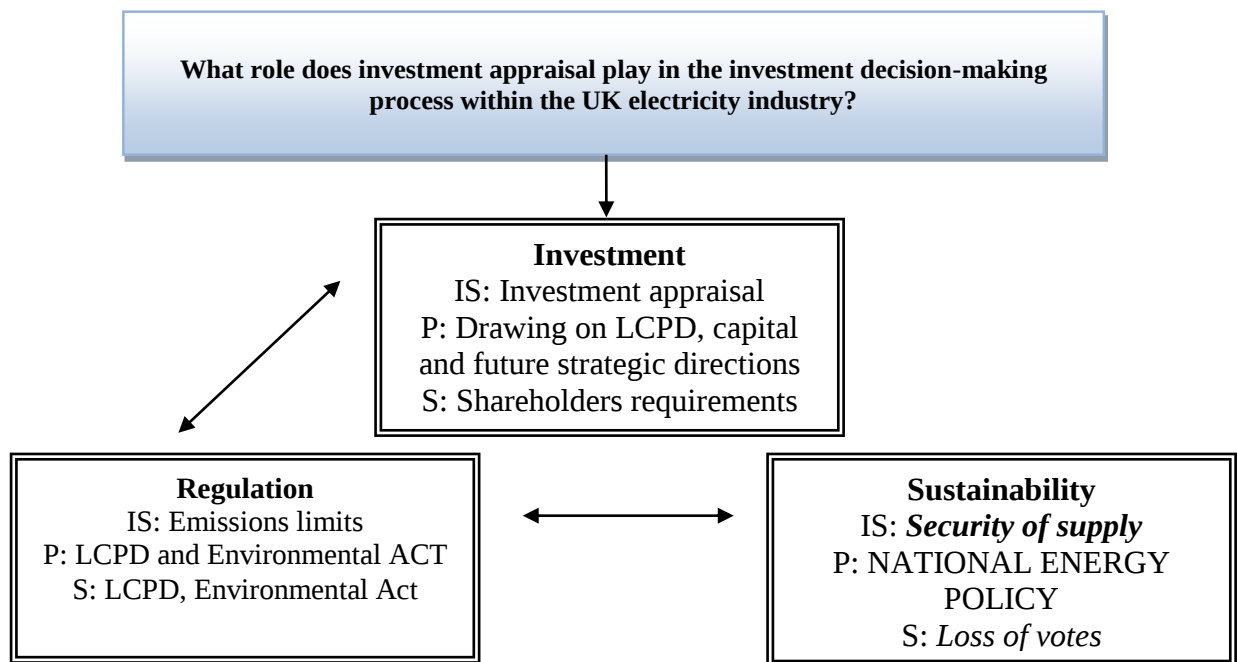


Figure 18 UK electricity generation industry modelled via structuration theory.

In capitals in the sustainability box, is the issue of national energy policy that has created the most amount of uncertainty within this study. The result of this uncertainty has been the new White Paper (DECC, 2011), which has laid the foundation for the 'Road to Reform'. Giddens (1984) argued that structures could co-exist when there are different rules and processes involved, although these can create unintended consequences. The fact that all aspects

required for a successful industry co-exist has, in this case, resulted in a questioning of sustainability. As Giddens (1984) argued, environmental and investment factors work together, even though they are de-coupled, because they have existing rules, processes and sanctions, which bind them. However, sustainability is not imposed via sanctions on the generators; thus, it need not be part of their reality, as they are international companies. Therefore, instead of sustainability driving investment, investment has been driving the need for financial incentives to ensure sustainability is achieved in the future.

9.3 Contributions

In Chapter 8, the three roles of capital budgeting were discussed in detail; however, the contributions incorporate more than this. The following sections highlight all of the contributions made within this thesis.

9.3.1 Contribution to knowledge

Using ST to analyse the paradox of investment in the UK electricity generation industry has provided a detailed understanding of why the three structures are significant for maintaining a balanced portfolio within the UK. Contradictory structures, with overlapping social systems have provided a setting in which investment appraisal has become more than a simple MA technique; the technique has not been used passively but strategically. As highlighted in the previous chapter, the role of investment appraisal is used as: 1) a common framework of reference both internally and externally; 2) a legitimization tool; and 3) a strategic tool to engage in lobbying activities.

By considering the investment cycle as a process rather than an outcome it has been possible to understand why and how capital budgeting has emerged as a political tool that can be used both as a vehicle to justify decisions, explain the implications of those decision at an international level, and to create future strategic lobbying directions. The capital budgeting process became the link within the three structures, and so accounting played a vital role in constructing change by formulating a crises. All of these issues are examined in detail, and all three provide some of the missing knowledge as related to the process of investment appraisal (Miller and O'Leary, 2007), which plays a role in the decision making process (Haka, 2007).

The theoretical uses of capital budgeting have been analysed in the past; however, its importance as a strategic mediation device is often ignored in the teaching textbooks (such as Drury, 2008). However, this thesis updates the link between theory and practice, providing students with a clearer understanding of capital budgeting techniques, as not simple decision making calculations, but rather strategic mediation devices. Therefore, this thesis provides an excellent example of how accounting can create change rather than account for change.

9.3.2 Contributions to industry

Understanding investment in this industry and the role of capital budgeting provides clarity to the current position of this industry. Now the industry has entered a full consultation process, following the White Paper (2011), this study not only provides an understanding of the processes that resulted in this situation, but also lays out clear policy implications for the future. It is important to understand the role that each actor plays in a process and also their

understanding of the current situation. It is apparent that expectations of industry investment without market intervention are unrealistic, in view of the significant regulatory environmental policies that have been imposed. Conferences that took place within 2012, in which the author participated, saw politicians continuing to assert that the UK can attract the required investment capital to sustain a competitive and reliable industry; although they have conceded that reform is needed to secure investment. Despite the generators within the industry publically discussing their current and future investment patterns at the same conferences, as discussed in Chapters 5, 6 & 7, the government has still not fully understood the urgency and attendant difficulties implicated in this process.

With the focal market being part of a much larger international market the competition for capital is high. The current research demonstrates that generators are not loyal to the countries within which they invest; in fact, generators home countries typically have a greater influence on them than national governments. If their needs are not satisfied by the host investment country then the investment will be held back, or at worst never made.

With alternative social systems providing clear directions and support from the state, the UK market needs to provide support and structural principles to reduce regulatory uncertainty. With a lack of guidance from the government, this industry has been transformed and current business models have created significant power for generators, not through authoritative resources but through the ownership of allocative resources. Although generators own allocative resources, and are able to determine the generation of electricity, they have also collectively formed authoritative power, due to the majority of companies withholding

investment.

Due to a combination of the lack of guidance from the government and the financial environmental incentives provided for specific technology, the portfolio of the UK is now unbalanced. Significant investment in wind technology is financially unproductive in the long term, because stranded assets are required to support the system when the wind does not blow. In addition, there is an issue, as sustainable technologies are ignored simply because the government decides the placement of incentives. The generators have been able to use capital budgeting modelling to highlight the problems associated with this type of investment. Whilst they do not oppose wind technology, they have been able to demonstrate the long term impact of not providing the incentives needed create a more balanced portfolio. This thesis has provided an understanding that generators will always seek to take advantage of financial incentives, because these match the needs of their stakeholders; although they may not reflect the social needs of the country.

The industry has demonstrated, throughout the LCPD process that engineering knowledge and environmental expertise in the UK can work effectively together. Therefore, in this next stage of the consultation process, future technology should be considered by the experts and not by the politicians. Long term sustainability requires long term decision making and principles to insure sufficient resources, not short term decisions based on the timing of the next election. Long term decisions should consider the balance of shareholder requirements, regulation and sustainability. Sustainability issues should prompt a serious debate on guaranteeing future capacity while supporting new greener technology.

9.3.2.1 Contributions to Policy implications

The previous section discussed the contributions to industry by providing an understanding of how this crisis has occurred. Accounting information has not only provided a legitimate reason not to invest using real options theory, but has also provided a strategic device to provide a future narrative for the possible impending crisis. Although it could be argued that accounting has created problems impeding establishment of a sustainable industry by withholding capital based upon the modelling taking place, it can also be argued that it has strategically revealed the need for an urgent reform. This thesis has also shown that UK policy has focused purely on the UK as a market, and that this no longer works as a strategy. With a legacy of privatised industries, UK policy now must consider international concerns. Opening up the industry to international organisations requires that the UK government consider how it will compete for capital to provide a sustainable industry. UK policy must represent the reality of the actors within it; therefore, they must consider international portfolios and other national policies to which capital is being attracted. The UK economy is struggling, it is no longer an Empire, and future national policies must live up to the new ideology of global business.

9.3.3 Methodological contribution

In addition to the knowledge and industry contributions, this case study makes a unique methodological contribution by using abductive reasoning to explore the role of investment appraisal. Throughout this research, the gap in the literature has established a need to explore the process rather than the outcome of investment appraisal. IR provides a solid ontological position to explore the reality of how investment decision making has evolved over the time

period of this study. By using the emic meanings of the actors it was possible to explore investment decisions by viewing the organisational and institutional influences that have impacted the investment process; in this case the environmental and sustainability issues. Thus, by exploring contradictory structures, we can provide the reader with a more contextual and interpretive understanding of the investment appraisal process.

This study has interrogated the role of investment appraisal to provide a more meaningful understanding of how management accounting techniques are used in practice. The use of IR has established that accounting does not simply represent the reality of an actor but also constitutes the reality of the actor.

9.3.4 Theoretical contribution

Abductive reasoning applied to IR made it possible to create a framework, presented in Chapter 4, based on the theory of structuration. By accepting that the theory of investment was embedded within the structures of the industry actors, it was possible to understand their reality. It was established that the actors incorporated normative theories of investment along with other strategic considerations when making investment decisions.

It is important to stress that the current conclusions of this thesis may change very quickly; as they will be considered within the limitations of this study. However, by unravelling the complexity of this situation it becomes possible to explore the possibility of further interpretations of this and other similar industries. Although the rules, resources and

structures will no doubt change again in the next five or six years, through the Road to Reform consultation, the framework created in Chapter 4, remains constant and can be used for further studies. Therefore, a significant contribution of this thesis relates to the model it provides. The model can be used to explore the relationship of the three investment structures within this industry as it changes and to determine the impact of these on the role of investment appraisal.

The model also uses Englund and Gerdin's (2011) flat ontology of change to explore how contradictory structure and overlapping social systems can be used to explain how and why the role of investment appraisal alters. An investigation of the process of change was conducted by examining the manner in which the actors accepted some structural principles and ignored others by drawing on alternative social systems to justify their investment decisions. Therefore, Englund and Gerdin's (2011) framework has provided data that gives us an updated and contemporary use for Giddens' structuration theory. Updated theory was used whilst retaining the important 'duality' concept, which many other attempts to update this theory have failed to do.

An interesting feature of this study was that rather than focusing on management accounting change following a significant shock within the focal system, which most other studies do, this research offers an opportunity to use ST in a mature privatised industry in which structural principles have emerged over a long period of time. With this approach it was possible to explore a management accounting technique that has adapted in its use, to effect change in other structural principles within the system. An additional theoretical contribution

has been the use of ST to consider management accounting systems whilst analysing sustainability and regulation across all three structures within the theory.

9.4 Limitations

All research is subject to limitations, regardless of which paradigm is adopted (as discussed in Chapter 3). Validity can be lacking when focusing on only several aspects of reality at any one time. This can compromise the validity of any work that is trying to close the gap between theory and knowledge. This thesis has tried to reduce this limitation by presenting the research from an inter-subjective position, and by using abductive reasoning to interpret the emic meanings of the actors, applying etic understandings from theory, which is one of its contributions.

Although this has enabled the researcher to provide thick explanations of the role of investment appraisal within the context of the study, these findings are not generalisable, nor were they intended to be. As referred to earlier, the variables that impact on the role of investment appraisal will keep changing; that is the nature of business. The environment within which business takes place evolves naturally according to changes in structural properties at the organisational, field and societal level. In Chapter 8, the limitations of this study to the UK situation were highlighted; the problems that are occurring in the UK are unique. Other countries with the same regulatory demands are not experiencing the same problems with investment, because their governments offer the certainty required to secure capital investment.

9.5 Future studies

The main limitations of this research, which relate to the findings not being generalisable, opens up future possibilities for new research. The framework within this thesis could be used to follow the 'Road to reform' consultation process, concentrating on investment, to investigate whether new rules and resources are being established through lobbying. It would then be valuable to interpret whether these changes are altering the role of investment appraisal techniques. The framework established through the theory will remain constant but variables will change. We then ask: Will this change the role of investment appraisal? Will the balance of power move once again?

In addition to expanding on the future research in the UK electricity generation industry it would be interesting to create a comparative case study set within another country, in which the structures missing within the UK system are present. Countries such as Portugal and France would offer good comparisons, because the portfolio of assets and political intervention is very different from the UK. An alternative comparison would be another utility industry, so as to examine how accounting techniques relate to investment, and to question if the roles played by investment identified in this study are industry specific or not.

9.6 Conclusion

Although it can be argued that environmental concerns and legislation are not aligned to the financial returns demanded by shareholders, this thesis has demonstrated that these concepts are not incompatible. Contradictory structures are not the cause of finance becoming

prominent; however, the lack of resources to support the structures in this industry has led to a situation in which investment appraisal techniques have come to provide the prominent frame of reference. The techniques have become strategic by nature, which in turn enables all the other issues to be considered within one frame of reference. Investment in this industry requires a knowledge of technology, regulation and political debate; this form of accounting then translates all this information into one model in order to constitute reality and thus provide strategic directions from which the companies can then lobby towards.

Although finance became the prominent frame of reference here, the increasing importance of corporate social responsibility, particularly for publicly listed companies, has resulted in companies needing to demonstrate they are environmentally friendly. The opportunity to strategically position themselves as socially responsible companies also plays a big role in the investment process. Current incentives, such as ROCs, have made new environmentally friendly investments easier; however, this has consequences for type of investment needed to establish a sustainable future. Environmentally friendly investments can be financially justified, by drawing on both the need to provide returns and to reduce emission limits. Thus, current investments are more symbolic than genuine; they fail to address the future needs of the industry.

Issues of sustainability in this industry have resulted as an unintended consequence of the investment process. Privatisation and the market led investment process has resulted in the need for serious debate within the industry, hence at the end of this thesis it has been cited as the political agenda necessary for this industry. Although the structures that relate to the

environment, sustainability and investment, have remained standard within the industry, the way in which the 'norms' and 'resources' have been drawn upon in order to mobilise power through the use of investment appraisal techniques has changed.

Unlike the situation noted by Conrad (2005), whereby the suppliers of electricity were believed to experience incompatible requirements from shareholders and regulators leading to conflicting accountability for the two sets of actors, this situation did not raise such issues. The LCPD was a legislative requirement but the generators had the option to opt in or out, and of there were financial penalties for opting out. The role of investment appraisal for internal decision making is to be expected, as management accounting text books all state. However, the investment appraisal process is not just about making financially generated decisions; it also aided the lobbying process and was used for mobilising power. By modelling various scenarios relating to the LCPD, based on various definitions and frameworks, the individual generators were able devise their own agenda, creating motives for change.

Appendices

Appendix 1 - Timetable for the LCPD to be implemented in the UK

2005	Decisions on UK implementation route.
By end 2006	UK authorities to ensure that the instruments for implementing the plan are finalised and operational, sufficiently in advance of 1 January 2008, to ensure that the combustion plant sector included in the NERP will comply with the plan by 1 January 2008, taking into account the time required to implement emission reduction projects.
By end 2007	UK authorities to ensure that competent authorities have sufficient measures in place to monitor and enforce compliance with the plan. Competent authorities to issue to operators variations to process authorisations, to apply the requirements of the revised LCPD to existing combustion plants, unless these have already been included in IPPC site permits.
1 January 2008	Start of compliance period for objectives from 2008 to 2015 inclusive. Start of annual reviews by operators (verified by competent authorities) of operating hours (rolling average over previous five year period) for solid fuel plants with a capacity greater than 500 MWth, to assess the applicability of the low load factor derogation for NO_x. Start of annual submissions from an operator that has taken up limited hours derogation, to the competent authority of a record of the used and unused time allowed for the plants' remaining operational life as provided in Article 4(4)(b) of the Directive. Start of annual monitoring and enforcement by competent authorities of combustion plants within the plan to ensure compliance with the objectives of that plan.
1 January 2016	Start of compliance period for objectives from 2016 to 2017 inclusive.
1 January 2018	Start of compliance period for objectives from 2018 onwards.

Source: Defra 2006

Appendix 2 - Stage one initial consultation process

Role of actor	Formal exploratory interviews / informal discussions
Senior Commercial Trading Manager	Formal exploratory interview
Senior Regulation Officer	Informal discussions
Station Manager	Formal exploratory interview
Energy markets officer	Informal discussions
Strategic Environmental Officer	Informal discussions
Project Manager	Formal exploratory interview
Managing Director	Informal discussions

Appendix 3 - Value chain of UK electricity generation industry

Primary activities:

History: post privatisation of this industry, companies were involved in many different types of businesses; however, in the last five or six years (dated 2009) most organisations have focused on their core business to become lean, vertically integrated companies; therefore, they have ensured their primary activities links and reduced the costs involved. Most organisations within this industry hold larger international portfolios; there are very few UK companies within this industry. Within the UK, most companies work within portfolios.

Trading fuel: At the start of the process, before electricity can be generated, the fuel that will be used to generate the electricity needs to be sourced. Most companies within the industry have their own trading section, which trades (using all financial tools including hedging and short selling) for the fuel that the generators need for their own use. In addition, they will trade fuel generally at this point, adding value to this activity. It is possible to outsource this activity, but it is highlighted as one of the main value added activities in the chain. Typical fuel would include coal and gas. This is part of procurement, but fuel is kept as a separate activity and is considered part of primary activities.

Inbound logistics: Once trading is complete, the fuel is then transported to the individual generating plants (Power Stations); the means by which this task is carried out is determined by the fuel source used. If it is gas, the generator will need to pay for the rights to use the NGTs gas pipes. If the fuel is coal, then shipping and lorry/train transport will be organised. No organisation within the industry has ownership of the transportation of fuel sector

(although you could argue that Centrica is part of NGT). Therefore, either this activity is outsourced or a fee is paid. Regulation determines that individual companies cannot own their own pipelines.

Generation: The next activity relates to where the electricity is produced. The generation will be determined by the fuel source. This is a highly regulated activity and the barriers to entry are extremely high, even though it is a privatised industry and is subject to the EU directive on competition that seeks to maintain open competition. However, tight health and safety, environmental regulations and a liberal market prevent small players from being able to afford to enter the market anymore. All the large players within this industry own their own generating plants as this is a big value added activity. It is typical for generators to be cost centres within the UK. If a plant is a gas fuel sourced, then many of the generators will also have gas storage facilities; this adds value because it enables them to blend generation and trading of the gas.

Trading: The trading department then trade the electricity generated by the generators. All electricity is traded using the financial tools available. This electricity is traded to both wholesale and retail companies. Most companies within the industry have their own trading sections, which work alongside the generators. A close relationship between the generators and traders adds value because they can squeeze maximum profit out of working out whether to sell fuel on or to generate with it, and if so how⁶⁰. A close relationship also helps to determine the most efficient maintenance and resolution of failure to equipment patterns.

⁶⁰ Power stations have different options regarding how they should generate; for example base load, where the whole of the plant will generate at full capacity for long periods, or two shifting where the plant will start around 6am and stop around 6pm once maximum demand is finished. Each option provides different profits because there are different risks involved.

Transmission: This activity is part of the outbound logistics, where the electricity is actually transmitted across the country to where it is required. This activity occurs at the same time as the trading and the supply (next activity) as this is a fluid activity that happens as soon as electricity is generated. Electricity is not like a normal commodity that is traded, because it cannot be stored. Transmission activity is highly regulated because the country's economic survival depends on it. The transmission cables on a national basis are owned solely by NGT. However, companies within the industry can invest in local area remission boards. The generators pay the NGT a fee for using transmission lines as determined by location.

Suppliers: Electricity that is traded to the retail companies is then sold on to general consumers. The supply side of the industry is highly regulated but has low barriers to entry; therefore, there is an abundance of competitors within this SBU. At this point marketing will take place. This is an activity, which some companies within the industry participate in and others do not. It is a strong value added activity for a company with a strong brand name. A few years ago, companies who invested in retail supply also tried to diversify and at the same time as selling electricity tried to sell phones etc. However, this was not successful because their brand was unknown in this area and they returned to the core competences.

Service: The final activity in the industry is the service end, which relates to normal consumers. Therefore, this effects maintenance of the local distribution lines and meter readings etc. For those companies who own retail suppliers this is the activity that they are responsible for. It can be partially outsourced, for example meter reading. Although this may not be seen as a typical value added activity if the markets correct themselves it can add value. This is also part of outbound logistics.

Support Activities:

Firm's infrastructure: Each company within this industry has a unique infrastructure.

Regulation Compliance: In this industry, due to strict health and safety and environmental regulation, this is a major secondary activity. Most companies have their own compliance departments/sections, although some of this, if they are a smaller company, can be outsourced to consultants.

Human resource management: This activity is organised through shared centres generally within the industry. Therefore, although the firms' infrastructures within this industry vary enormously, HRM activity is normally carried out in central locations. The industry has generally found that this is the best way of cutting costs.

Procurement: Although fuel procurement is part of a primary activity and much of the procurement relating to operations is generally part of operations, there is a tendency to try to co-ordinate this activity within the industry to create as much leverage in contact discussions as possible.

Technology development: Within this industry, this is now mainly outsourced. The core competency of the industry is now privatised and does not rest in this area. Although it is typical to use M&A if a company requires expertise in a direction they are strategically interested in.

Source: Combination of interviews.

Appendix 4 - List of plants directly affected by the LCPD

Installation	Operator*	Installed capacity MW	Capacity opted in MW	Capacity opted out MW
Drax	Drax Power	3,960	3,960	0
Eggborough	British Energy	2,000	2,000	0
Cottam	EDF Energy	2,000	2,000	0
Ferrybridge	Scottish and Southern	2,000	1,000	1,000
Fiddlers Ferry	Scottish and Southern Energy	2,000	2,000	0
Didcot A	RWE npower	2,000	0	2,000
Tilbury	RWE npower	1,020	0	1,020
Kingsnorth	E.ON UK	2,000	2,000	0
Ratcliff	E.ON UK	2,000	2,000	0
Ironbridge	E.ON UK	1,000	0	1,000
West Burton	EDF Energy	2,000	2,000	0
Peterhead	Scottish and Southern	1,320	1,320	0
Longannet	Scottish Power	2,304	2,304	0
Cockenzie	Scottish Power	1,152	0	1,152
Aberthaw	RWE npower	1,500	1,500	0

Kilroot	AES	1,500	1,500	0
Uskmouth	Uskmouth Power	393	393	0
Littlebrook	RWE npower	1,370	0	1,370
Fawley	RWE npower	1,000	0	1,000
Grain	E.ON UK	1,300	0	1,300
Total		33,839	21,997	11,842

Source: data collated from RWE (2008)

*Operator's names were correct at the time on the plants opting in and out of the LCPD.

Appendix 5 - Detailed explanation of regulations: LCPD and IPPC

The LCPD is a European directive aimed at reducing SO₂, NO_x and dust emissions, which will help to reduce problems such as acid rain. The directive is aimed at protecting the public from air pollutants that are considered health risks (European Commission, 2001). The directive has a long standing history, as the first directive (88/609/EEC) was published in 1988 (European Commission, 2001). The updating of this directive relates to the signing of the Gothenburg Protocol (1999), which stands to reduce “transboundary air pollution to abate acidification, eutrophication and ground level ozone, which includes, inter alia, commitments to reduce emissions of sulphur dioxide and oxides of nitrogen” (European Commission, 2001, p. 1). The directive covers any generating installation with a thermal input of 50MW or more, which covers all coal fired generating plants in the UK. Due to the fact that the directive has changed over time, the installations are classified into three types; existing installations⁶¹, ‘Old’ new installations and ‘New’ new installations.

Every installation over the 50MW thermal output had to either opt in or opt out of the directive by 30th June 2004 (Defra, 2006b). Those who opted in have to comply with the regulations of the directive, and those that opted out will only be allowed to operate⁶² for 20,000 hours between 2008-2015 and then they must close, Article 4.4 (Wenning, 2006). The LCPD sets a national level to be achieved by 2020; there are no limits on individual installations, this is down to the regulators at the national level to control. The LCPD also offers an opportunity for individual countries to set their own limits, which are known as the National Emissions Reduction Plan (NERP), 2001/81/EC. Therefore, the UK uses a

⁶¹ The regulation and industry refer to installations, although the general public would refer to these as power stations.

⁶² The plant will be considered to be operating if any part of it is operating and this does not take into account the load factor.

combination of ELVs and NERP to achieve LCPD requirements.

To comply with the LCPD targets coal plants will have to install Flue Gas Desulphurisation (FGD) equipment, by 2008, to reduce SO₂ emissions, and NO_x reduction systems such as low nitrogen oxide burner by 2008 and Selective Catalytic Reduction (SCR) equipment, by 2016 (Defra, 2006b), all of which require heavy capital investment. This is because existing plants have to achieve new plant standards.

To ensure that the ELVs or NERP are adhered to the government stated that it would issue “financial penaltiesto be set for each unit that the emitter is out of compliance, and could be set at a level several times higher than the expected market price of an allowance.....there might also be potential for applying criminal penalties” (Defra, 2006b, p. 12), therefore using financial sanctions to ensure compliance.

IPPC

Directive 96/61/EC: this directive is the framework used by the EU to improve the environment as a whole (EPA, 2006). Every generation plant within the UK had to have a permit issued by the Environment Agency (EA) by October 2007. However, it was not simply a matter of being issued a permit by this date to comply with the IPPC directive; the installation had to actually be in the position that the permit was to be issued for (Europa, 2007a). The permits were issued based on plants working using BAT as defined in Article 2-11 of the directive (EPA, 2006). To aid generators to understand the process, the European IPPC Bureau published the BREF documents for those undertaking the process. The permits for existing combustion plants has to be submitted to the EA between January – March 2006 (Lowe & Day, 2006).

The IPPC directive evolved from four basic principles: 1) an integrated approach; 2) BAT; 3) flexibility; and 4) public participation.

The integrated approach refers to the general purpose of the directive, which is based on the environmental impact of a plant as a whole. Therefore the directive does not refer to one specific issue, it covers multiple issues such as water, land and air pollution (Europa, 2007b).

BAT is defined by the Environment Agency as “the most effective and advanced stage in the development of activities and their methods of operation, which indicates the practical suitability of particular techniques for providing in principle the basis for emission limit values designed to prevent and, where that is not practicable, generally to reduce emissions and the impact on the environment as a whole” (Environment Agency, 2003, p. 2) they extend this description:

“Best – means the most effective technique for achieving a high level of protection of the environment as a whole.

Available – means techniques developed on a scale which allow them to be used in the relevant industrial sector, under economically and technically viable conditions, taking into account the costs and advantages

Techniques – includes both the technology and the way the installation is designed, built, maintained and decommissioned.”

Source: (Environment Agency, 2003, p. 2)

The IPPC directive was implemented in the UK through the Pollution and prevention Control

(PPC) regulation 2000, England and Wales⁶³ (Defra, 2007).

The BAT guidance is provided by analysing the cost and benefits of typical plants within the sector the applicant is part of. Within the EU there are approximately 50,000 IPPC installations (Wenning, 2006); these include the combustions plants covered by the LCPD. The permits issued were determined by the individual location and conditions (which include the cost benefit analysis) of the installations as well as the BAT. Therefore, the permit applicant must weigh the economic costs against the environmental benefits (European Commission, 2006). After the 2007 deadline installations were required to update their investments after acceptance of BAT; and the emission of the installation should be reduced in a cost effective manner (Europa, 2007a).

The costs associated with this permit were not as significant as the costs associated with the LCPD, with an average cost of £100,000. This cost includes the application fee, which is set by the regulator, the cost to meet BAT, consultant's costs and time of the management of the organisation, estimated to be around 130 days (Lowe & Day, 2006).

The third principle, flexibility, provides the local regulators the opportunity to examine each plant individually. In addition, the final principle provides the general public with the right to access permits prior to submission, after an audit trail that follows the successful application (Europa, 2007b).

The IPPC legislation covers approximately 55,000 installations in the EU (Delbeke, 2005)

⁶³ Towards the end of this project the regulations had changed again, the Industrial Emissions Directive (IED) was to replace the PPC and would merge four other directives, including the LCPD. However, for the purpose of this thesis the PPC will continue to be referred to as this was the process, which took place when making the investment decisions.

The overlaps of the LCPD and IPPC

The LCPD sets targets, which are the minimum requirements; this is a legislative requirement and does not have any influence on the application for the IPPC permit application (article 18.2 of the IPPC). However, the IPPC may require higher targets for individual installations depending on the local conditions and BAT as described in the BREF for Large Combustion Plants (LCP). Therefore, although the ELV targets are not set for individual plants and the generators have the option to opt out of the LCPD they were still required to apply for the IPPC permit by October 2007. However, as the BAT is not a legislative requirement, only a target, it is the local conditions at the installation that will determine if the higher targets are met by the individual installation. This is where the use of consultants has become the norm. Generators have to apply for their IPPC permits via the Environment Agency.

The process for opting in or out of the LCPD is separate from the IPPC application, but the ELVs from the LCPD have been included within the IPPC application. The Environment Agency declared that ‘Electrostatic precipitators’ and ‘FDG’ will be considered BAT for control of coal generators (Environment Agency, 2006); this was included in their advice as a response to the LCPD requirements within the industry. Therefore, the permit for the IPPC was inclusive of the investment needed for the LCPD, unless the applicant has opted out of the LCPD; although all generators who have opted out of the LCPD still need to obtain a PPC permit.

Note: the IPPC and the LCPD are both European directives, which are implemented in the UK by the PPC; known formally as the IPC. The PPC is a regime that also covers other

environmental directives. However, within the UK industry the IPPC and LCPD are referred to in discussion, not the PPC. By the end of this case study, it had become integrated into the IED.

Appendix 6 - Capacity and demand for electricity in the UK

	Generation capacity in the UK (MW)	Maximum demand met in the UK (MW)	% maximum demand in relation to capacity in the UK (MW)
2005	73,941	61,697	83.4
2006	74,996	59,071	78.8
2007	75,979	61,527	81.0
2008	76,783	60,289	78.5
2009	78,255	60,231	77.0

Source: Data collated from Dukes (2010)

Appendix 7 - List of nuclear plants closing down

Nuclear Station	Commissioning date	Planned closure date	MW Capacity
Oldbury-on-seven	1968	2008*	434
Wylfa	1971	2010	980
Hartlepool	1984	2014	1,190
Heysham 1	1984	2014	1,160
Hinkley Point B	1976	2016	860
Hunterston B	1977	2016	860
Dungeness	1985	2018	1,040
Heysham 2	1988	2023	1,230
Torness	1989	2023	1,205
Sizewell B	1995	2035	1,188

Source: Data collated from www.niauk.org and Dukes (2010)

Appendix 8 - Current portfolio within the UK, dates when the investment occurred

	Coal	Diesel	CCG T	Other *	Nuclea r	Oil	Wind	Gas	Hydr o	Biomass	<100M W	101- 299 MW	300- 799 MW	799>
1920s	0	0	0	0	0	0	0	0	4	0	4	0	0	0
1930s	0	0	0	0	0	0	0	0	7	0	7	0	0	0
1940s	0	2	0	0	0	0	0	0	0	0	2	0	0	0
1950s	0	3	0	2	0	0	0	0	38	0	41	2	0	0
1960s	6	0	0	13	1	1	0	0	15	0	24	0	4	8
1970s	7	1	0	9	3	1	0	0	0	0	6	1	1	13
1980s	0	0	0	5	5	1	0	0	0	0	0	0	3	8
1990s	0	1	25	14	1	0	33	2	0	0	49	6	11	10
2000s	0	1	12	6	0	0	91	9	15	2	117	8	5	6
2010s* *	0	0	1	0	0	0	3	0	0	0	2	1	0	1

Source: Data collated from Dukes (2010)

*Other includes generally a combination of fuel types.

**2010s –this only includes investment up to May 2010.

The Department of Trade and Industry (DTI) stated that in the medium term the electricity market would have to invest significantly to maintain demand, although this prediction is based on maintaining a 20% spare capacity target. That means around 25GW of new generation capacity is needed, which represents around one third of today's generation capacity (DTI, 2006). Therefore, over the next three decades there needs to be heavy investment to ensure the lights stay on (Euroelectric, 2004).

Appendix 9 - The use of semi-structured interviews

According to Arksey and Knight (1999) semi-structured interviews are the most common form of qualitative work, such as studies by Conrad (2005) and Moore (2010) which analysed utility industries using structuration theory (as discussed in chapter 2). The use of semi-structured rather than structured interviews, allows the researcher to question the actors using the framework of Structuration Theory to guide the necessary areas of questioning. This provided data that could be analysed subsequently using the intended framework. This form of interviewing also allowed the interviewer to focus on discussions generated from the interviewees, which had not been considered before the interview, especially matters relating to a technical nature.

The use of semi-structured interviews allowed the interview questions to be designed by using the conceptual framework selected for this project. Therefore, Giddens' (1984:29) duality of structure, as discussed in chapter four, was used as a sensitising device. The model as it was presented by Giddens was examined in relation to the three structures, Signification, Domination and Legitimation. The research topic was then analysed against the three structures and relevant questions designed to enable the researcher to guide the interviewees, see Appendix nineteen. Therefore, the conceptualisation of the interview questions was designed using 'a prior theoretical orientation' (Vaivio, 2008). Using semi-structured questions this prevented the sensitivity of the data being ignored by an over prior theorisation process which can sometimes occur (Ahrens and Dent, 1998).

Appendix 10 - Taping of interviews

After choosing to use interviews as the main method of data collection the question of whether to tape the interviews or not, had to be addressed. The decision to tape or not to tape varied depending on the stage of the data collection. In stage one, as this was more of an informative process, the interviews were not recorded and only notes were taken. Following this, in stage two, the recording of the focus group was not agreed; therefore, this decision was taken away from the author. In stage five (stages three and four did not include interviews), all interviews were taped as these were to be used as the main part of the analysis, therefore all data needed to be captured.

As can be seen in the letter, see Appendix twelve, which was sent to the interviewees, all potential interviewees were told in advance of the intention to record. This gave the interviewees an opportunity to reject the recording of their interviews. None of the interviewees requested this.

It is often argued that the use of taping in interviews can restrict the information (Arksey & Knight, 1999) you receive but in fact the interviews were very informative⁶⁴ and at times the information became sensitive and they simply asked that that information not be disclosed. However, that is not to say some of the more colourful stories did evolve when the tape-recorder was switched off. Although this information could not be directly used in the analysis it did inform the project and provide a more detailed understanding of what was happening within the industry.

⁶⁴ In the opinion of the researcher

Appendix 11 - Explanation of interviews and consent

The following extract was the basic introduction given to all the interviews:

Thank you for agreeing to participate in this study. First of all, I would just like to explain briefly what the study is about. I am a Principal Lecturer in management accounting at the University of Greenwich and I am also a PhD student at the University of Loughborough (moved to Southampton following the interviews). My current project is an examination of how accounting can be used as a tool to aid decision making within the specific context of the UK electricity industry. The project is in two parts; 1) understanding how the decision making process has changed over time, examining nationalisation, early privatisation and now, and 2) specifically what impact the LCPD has had on this decision making process when the industry has security of supply and profit as two important considerations.

My line of questioning involves two types of interview techniques: 1) open recall - where I will ask you to speak freely about changes you have seen within the industry and the impact of the LCPD (where relevant); and 2) directed questions – in which I will ask you questions that you may have already discussed within your free recall section. I want to stress that I am not wasting your time by doing this as I am following a particular interview technique called Cognitive interviewing, which helps to justify the validity of the data collected. Therefore, I am not testing you, merely ensuring that I can justify the content of my study when I reach my viva.

I would also like to repeat what I stated in my letter to you requesting this interview:

Information regarding interview

- 1** The interviews will be recorded unless you object;
- 1** You can request a copy of the transcript at any time;

- 2** If you would like to retract a portion of/ or your entire interview you have the right to do this at any time; and
- 3** All material gathered will be treated as confidential and anonymous so that the sources are protected.

If you are happy with this information and agree to continue with the interview, please sign below.

.....

Appendix 12 - Cognitive interviewing technique

Due to the nature of some of the data collection involving past recollections, to ensure the validity of the data, the researcher chose to use Cognitive Interviewing. Milne and Bull (2002) argue that the use of cognitive interviewing increases the ability of the interviewee to recall data with higher accuracy. This form of interviewing is a common interview technique used within the police force (Milne & Bull (2002)). The full process of cognitive interviewing includes “(1) the report everything instruction (2) the mental reinstatement of context, (3) the recalling of events in a variety of different temporal orders, and (4) the change perspective technique” (Milne & Bull, 2002:743).

In full cognitive interviewing, Milne and Bull (2002) explain, the process includes asking the interviewee to explain their full recollection of events without interrupting (1) then the interviewee is asked to think back to the events and describe their emotional and physical reactions at the time of the events discussed (2). Once this is complete the interviewer then facilitates the interviewee to explain the events in a different order (3); this probing allows the interviewee to “utilise data –driven processing of non-schematic information resulting in the retrieval of more script inconsistent information” (Milne & Bull, 2002:744). The final phase (4) is where the interviewer asks the interviewee to recall the events from a different perspective. The basis of this interview technique comes from the encoding specificity principle (Tulving and Thompson, 1973 as stated in Milne & Bull, 2002) and the multi-component view of memory trace (Bower, 1967 as stated in Milne & Bull, 2002).

Appendix 13 - Coding of data

With the data collection process explained, this section examines how the analysis of the data was carried out in relation to the coding of the interviews and how the data was used to analyse the research questions. The coding process was lengthy, as the first stage included going through each individual interview and gathering the information and creating a table to categorise the information. Once the information had been collated according to the various issues identified in the three structures of the framework, it was then possible to proceed to analysis.

The analysis process included examining the data in each area and identifying common themes and unexpected issues. These were then transferred into a second table of information so that common themes and unusual issues could be used in the discussion. The final stage of the coding included information not used. This was stored as unused data in the event that during the analysis unused data may be needed for unexpected advances in the analysis

Appendix 14 - Limitation of data collection at stage three

Included in the methodology⁶⁵ of the LCPD was the fact that all information regarding opting in or out of the LCPD must be made publicly available via the local Environment Agency site. Therefore, stage three of the data collection process included the gathering of LCPD applications from the various Coal Fired Power Stations. Although initially this was considered an easy process, it later was found not to be. Through interviewing the Strategic Environment Officer, of the EA in stage one, the researcher was provided with a list of all the relevant Power Stations, which had to opt in or out of the LCPD. A contact for both the generator and the EA was provided on the list. Due to the LCPD methodology being publicly available, the EA provided an online request for all applications. Therefore, each PPC application was researched and reference number established. For each application a request for information was submitted; these requests were sent to the local EA, where the information was stored.

The researcher made an appointment with the EA in the South East and met with administrators and explained what information was required, and that any questions regarding the information from other EAs could be dealt with. It was apparent immediately that the process of retrieving the information was not going to be easy, because some of the PPC applications included over 1000 pages and in other cases there was only a small amount of information.

The administrators accepted that their own officers used the storage of the applications as their own personal library and could not find all the documented information, as they did not store it electronically at all of the EA offices. The cost of retrieving the applications ranged from £80-£120, as they were

⁶⁵ This is industry terminology and should not be confused with research methodology.

allowed to charge for photocopying and the time taken to retrieve the information.

The process of requesting applications continued online as storage issues may have only been localised to the EA visited. Some EAs were very swift with their information, and about five were able to send information electronically, some with a charge and others without. Other offices struggled to respond to the request quickly.

The lack of information from some offices and the inconsistency of information generally, resulted in the author deciding this was not a reliable information sources, and consequently the project would need to rely more on the interviews than the PPC applications due to the vast lack of consistency in the information provided. Therefore, due to the cost and the quality of information provided a decision was taken not to pay for the remaining information, as it was deemed not particularly pertinent to the study.

Appendix 15 - Interviews and key informants of main stage collection

Role	Length of interview	Length of time in industry / associated with
Strategic Environment Manager	50 mins	22 years
Business Services Director	1 hr	29 years
General Manager Operations	1 hr	19 years
Head of Environment	1 hr 5 mins	33 years
Head of Gas Generation	50 mins	23 years
Site Manager	35mins	29 years
Pollution Infringement and Control team leader	50 mins	6 years
Senior Utility Analyst	50 mins	12 years
Environmental Planning Manager	1 hr 15 mins	40 years
Strategy Development Manager	1 hr 20 mins	18 months
Environmental Permit Regulator	1hr 30 mins	19 years
Head of Coal Operations	1hr 10 mins	30 years
Head of Generation	45 mins	26 years
Commercial Manager for Energy Wholesale Gas Operations	1hr 5 mins	11 years

Each interview started with an informal discussion about the industry; this was carried out for two reasons, first to relax the interviewee and the second to demonstrate to the interviewee that the researcher knew the industry well and could speak the industry ‘language’. Speaking the interviewees’ language is an issue discussed by Vaivio (2008), who states that it is essential for the researcher conducting qualitative work to be able to speak in the language of the interviewee.

Relaxing the interviewee was very important because the more relaxed the interviewee was the more

receptive they would be to the process of the interview. In addition, it was important that the interviewee knew the researcher had a good knowledge of the industry to prevent time being wasted during the interview with unnecessary definitions, thereby ensuring a high level discussion took place.

Following the informal introduction to the interview each interviewee was taken through the protocol of the interview process, repeating the information provided in the letter sent. Therefore, each interviewee had the recording process explained, the anonymity policy, offer of a transcription and the offer to withdraw at any point in the study.

Following the interviews, all the interview files were sent out to be professionally transcribed verbatim and later smoothed out. None of the interviewees requested a copy of the interview, therefore none was sent out. Although originally this was presumed to be the final stage of the data collection, this later changed; a final data collection process was added when a relevant industry conference was held at the end of the research period.

Appendix 16 - Example letter requesting interview

Note – all letters were emailed to the recipients and on letter headed notepaper. All were adapted to tailor the information depending on the role of the interviewee.

Dear xxxx

Re: Request for an interview

I am writing to request an interview with you in relation to my PhD. I am currently analysing the impact of the Large Combustion Plant Direction (LCPD) on the UK electricity industry. When I interviewed one of the Strategic Advisors for the Environment Agency, Dr Peter Newman, he gave me your contact details as the contact for Grain, Kingsnorth, Littlebrook and Fawley.

I am hoping to conduct the remaining interviews in the next two months, and I am therefore hoping that you will be able to provide me with a convenient time in which I will be able to see you. As a key informant within this process, your contribution will be valuable. To date my key informants include Head of Unit for the European Commission, Analyst at Merrill Lynch, Advisor at Eurelectric, FDG Manager from RWE, Compliance officer within Drax, Engineering Manager from British Energy Head of Trading and Gas from Conoco Phillips, Station Manager, Director of Generation, Accountant, Environment Manager from Scottish Power, amongst others.

I appreciate that your time is valuable and assure you that the interview will take no more than one hour. Further information regarding the interview is below; however, please feel free to contact me by e-mail regarding any further information you may wish for. I will be out of the country between 23rd July and the 4th August and the 18th August through to the 25th August.

Information regarding interview

- 4 The interviews will be recorded unless you object;
- 5 You can request a copy of the transcript at any time;
- 6 If you would like to retract a portion of/ or your entire interview you have the right to do this at any time; and
- 7 All material gathered will be treated as confidential and anonymous so that the sources are protected.

Yours Sincerely,

Liz Warren

PhD Candidate, University of Loughborough (*PhD transferred to Southampton following the data collection*)

Principal Lecturer, University of Greenwich

Appendix 17 - Interviews and key informants of main stage collection

Role	Length of interview	Length of time in industry / associated with
Strategic Environment Manager	50 mins	22 years
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Site Manager	35mins	29 years
Pollution Infringement and Control team leader	50 mins	6 years
Senior Utility Analyst	50 mins	12 years
Environmental Planning Manager	1 hr 15 mins	40 years
Strategy Development Manager	1 hr 20 mins	18 months
Environmental Permit Regulator	1hr 30 mins	19 years
Head of Coal Operations	1hr 10 mins	30 years
Head of Generation	45 mins	26 years
Commercial Manager for Energy Wholesale Gas Operations	1hr 5 mins	11 years

Appendix 18 - Translating theory into interview questions

	Signification	Domination	Legitimation
Issues	1) How do all the actors involved make sense of the problems and what they say, decide and do? 2) How have CBTs been for making decisions and communicating such decisions? 3) How are these driven by domination and legitimation structures and how have these changed over time? 4) Is the shared accounting knowledge the main frame of reference between the actors? 5) Has a shared knowledge of accounting always been used as the frame of reference – or have the frames of reference changed over the three time periods? E.g now the EU directives are a shared source of knowledge.	6) Who are the actors involved and how do they use the resources available to influence power on those held accountable? 7) How is accounting used as a source or power? Is it used to make decisions or justify decisions ...this influences who holds the power? 8) How have these power roles changed over the three time periods? 9) What forms of power are being used in this situation? Transformation capacity of human action or/and relational power?	10) What are the determinants that re-enforce signification structures? 11) What are the resources? Both allocative and authoritative? 12) What are the social, political and economic factors that have driven investment over the three year time periods?
Notes	-9 What are the structural principles? Which are gained through the shared knowledge of the structures.	-10 Most past studies have focused on regulators holding power through the accounting information provided by other actors involved. An interesting point to look for here is who does hold the power, through which resources??? Is the accounting information used to hold power over other actors and in what way – have the regulators used it to get generators to adhere to EU regulations - or have the generators rejected the rules (structures) and used accounting to justify chasing new objectives, thereby not opting into the LCPD???	-11 Are the aims of achieving environmental policies, security of supply within a privatised industry too difficult to achieve??? -12 Are CBT techniques within a privatised industry a source of resource?

Questions	a) How does everybody in this process understand what the requirements of the LCPD are (prompts possible: how did you learn about the LCPD, what training did you have, how did you pass that information onto the people working with you?) b) How have / How do you think the decisions to opt in or out of the LCPD have been made? (prompts possible: have you used the documents provided by the regulators or was there an internal process first? / do you think the documents you provided formed the basis of the decision?) c) In an ideal world how do you think investment decisions in this sector should be made, on what basis? (prompt: for example in the 1960s investment decision were made purely on the predicted growth on electricity needs). d) In the real world what do you think drives investment decisions in this sector?	e) Who is involved in the LCPD process? f) How influential is accounting in the communication process of this LCPD process? (prompt: on the documents presented to the regulators although there is a cost /benefit section this is only one small section in the whole document. g) How has the use of accounting changed over the course of your career in this sector? h) The industry has many different professionals involved, engineers, regulators, accountants etc. Over time how do you see these roles in relation to who has the most influence. i) How do you see the different professional influencing decisions within this industry. . . for example the regulators use the law as a basis of power (hint at security of supply).	j) The energy sector at the moment is currently having to comply with environmental directives set by the EU and other sources, ensure security of supply and generate profit – if you had to put these in order of importance how would you rank them with the first being the most important? k) Over the course of your a career in this sector have you witnessed any changes in the importance of the environment, security of supply and profit in this industry? l) When making investment decisions what information do you draw on (do you think is drawn on).
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Appendix 19 - Involvement of all actors within this case study

Group of actors	Stage of data collection	Method used
Euro electric	Stage 2	Group Q&A in conference setting, presentations and informal discussions. Official publications.
EC	Stage 2	Group Q&A in conference setting, presentations and informal discussions. Published directives.
UK Government	See DECC and DEFRA	n/a
DECC	Stage 6	Group Q&A in conference setting, presentations and informal discussions. In addition government speeches publicly available.
DEFRA	Stage 2	Group Q&A in conference setting, presentations and informal discussions. In addition formal publications publicly available via web site.
BIS	Not relevant	n/a
EA	Stage 1,2, 3 & 5	Telephone interviews, Group Q&A in conference setting, presentations and informal discussions. Official publications. PPC applications and formal interviews face to face.

OFGEM	Stage 2	Group Q&A in conference setting, presentations and informal discussions. Official publications.
GEMA	Not relevant	n/a
JEP	Stage 5	Many of the members of the JEP were interviewees.
AEP	Stage 2	Group Q&A in conference setting, presentations and informal discussions. Official publications.
REA	Stage 2	Group Q&A in conference setting, presentations and informal discussions. Official publications.
Generators	Stage 1, 2,4,5,6	Face to face interviews, Annual Reports and PPC applications. Group Q&A in conference setting, presentations and informal discussions.
Consultants / analysts	Stage 1,2,4,5,6	Face to face interviews, Group Q&A in conference setting, presentations and informal discussions.

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