



## **Regulation of Energy Efficiency by Voluntary Agreement: South Africa's Energy Efficiency Accord**

by

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DECLARATION

Submitted in partial fulfillment of the requirements for the degree of  
Masters in Development (MDev), in the Graduate Programme in  
Development Studies, University of KwaZulu-Natal, Durban, South Africa.

I declare that this dissertation is my own unaided work. All citations,  
references and borrowed ideas have been duly acknowledged. It is being  
submitted for the degree of Masters in Development in the Faculty of  
Humanities, Development and Social Science, University of KwaZulu-Natal,  
Durban, South Africa. None of the present work has been submitted  
previously for any degree or examination in any other University.

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25 November, 2008

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Signed

## **Abstract**

Energy efficiency is an issue currently generating huge interest as a potentially cost-effective solution to the twin challenges of environmental pollution from energy production, and the increasing scarcity of energy resources. This research aims to interrogate the practicalities of regulation of energy efficiency to ask what scope there is for public-led encouragement of greater energy savings in industry. Shortcomings of current theory addressed include a discounting of the impact of heterogeneity of industrial activity on prospects to effectively regulate for energy efficiency, and a conflation of the different aspects of societal functioning to which energy efficiency regulations and incentives can be applied. The research argues that the scope for energy savings has been exaggerated and the factors which drive pursuit of energy efficiency within firms of different sizes poorly understood and articulated. The Voluntary Agreement form of environmental regulation is assessed for its applicability to regulating for energy efficiency in the context of these characteristics of energy efficiency in industrial settings. An in-depth interview approach with core participants in an example of a Voluntary Agreement for energy efficiency in South Africa, the Energy Efficiency Accord (Accord), reveals the difficulties of regulating for specific technologies, the generally targeted nature of energy efficiency incentive schemes which provide household and commercial-type programmes to heavy industry, and the fact that environmental objectives and capacities are highly developed within firms interviewed and in most cases precede participation in Accord activities. The inference is that participation at this stage of the Accord's existence is driven by the need to develop and maintain relations between key stakeholders, and to exploit opportunities to influence the form of energy efficiency regulation enacted as opposed to the need to obtain forms of technical guidance. The particular pattern of participation in the Accord is argued to result in part from the historical dominance of large, energy-intensive firms in South Africa, and to be consistent with the theory that the more energy-intensive firms in a society will be motivated to participate in voluntary initiatives such as the Accord.

## **Preface**

The work described in this dissertation was carried out in the School of Development Studies, University of KwaZulu-Natal, Howard College Campus, Durban, from February 2008 to August 2008, under the supervision of Doctor Richard Ballard.

These studies represent original work by the author and have not otherwise been submitted in any form for any degree or diploma to any tertiary institution. Where use has been made of the work of others it is duly acknowledged in the text.

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Signature

## Table of Contents

<b>Abstract</b> .....	<b>ii</b>
<b>Preface</b> .....	<b>iii</b>
<b>Table of Contents</b> .....	<b>iv</b>
<b>Acknowledgements</b> .....	<b>v</b>
<b>List of Acronyms and Abbreviations</b> .....	<b>vi</b>
<b>Chapter 1: Introduction and Research Outline</b> .....	<b>1</b>
1.1 Introduction .....	1
1.2 Research Problem and Chapters Outline .....	3
<b>Chapter 2: Methodology</b> .....	<b>5</b>
<b>Chapter 3: Environmental Regulation</b> .....	<b>9</b>
3.1 The Evolution of Environmental Regulations .....	9
3.2 Regulating for Energy Efficiency .....	14
3.3 Arguments in Support of Voluntary Agreements .....	23
3.4 Conclusions .....	26
<b>Chapter 4: Industry and Electricity in South Africa</b> .....	<b>28</b>
4.1 The Form of Industrial Development in South Africa .....	28
4.2 Review of Arguments .....	33
<b>Chapter 5: Environmental Policy and Regulation in South Africa</b> .....	<b>34</b>
5.1 The Energy Efficiency Accord .....	38
<b>Chapter 6: Presentation of Findings</b> .....	<b>42</b>
6.1 Arguments Against Effective Regulation of Energy Efficiency in Industry by Traditional Means .....	43
6.2 Outlining the Motivations for Firms to Take Action on the Environment and Participate in Accord Activities .....	45
6.3 Testing the Assumptions .....	52
<b>Chapter 7: Conclusions</b> .....	<b>54</b>

**Abstract** ..... **ii**

**Bibliography** ..... **57**

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## List of Acronyms and Abbreviations

<b>ANC</b>	African National Congress
<b>Accord</b>	The Energy Efficiency Accord
<b>CaBEERE</b>	Capacity Building in Energy Efficiency and Renewable Energy
<b>CBLA</b>	Capacity Building in Leadership and Action
<b>CIPEC</b>	Canadian Industry Program for Energy Conservation
<b>DME</b>	Department of Minerals and Energy
<b>EMS</b>	Environmental Management System
<b>EPA</b>	Environmental Protection Agency (United States)
<b>ESCO</b>	Energy Services Company
<b>Eskom</b>	Electricity Supply Commission
<b>GHG</b>	Green-House Gas
<b>IDC</b>	Industrial Development Corporation
<b>ISI</b>	Import Substitution Industrialisation
<b>MEC</b>	Minerals-Energy Complex
<b>MW</b>	Mega-Watt
<b>NBI</b>	National Business Initiative
<b>OECD</b>	Organisation for Economic Cooperation and Development
<b>Strategy</b>	The Energy Efficiency Strategy of South Africa
<b>EETC</b>	Energy Efficiency Technical Committee
<b>TNC</b>	Trans-National Corporation
<b>UN</b>	United Nations
<b>White Paper</b>	White Paper on the Energy Policy of the Republic of South Africa



# Chapter 1: Introduction and Research Outline

## 1.1 Introduction

### Energy and Mankind

Modern society has been built on a steady supply of relatively cheap and plentiful energy. The exploitation of a progression of energy sources, from the burning of firewood, to the discovery of coal, oil and gas, and more recently to nuclear and other technologies, has facilitated the organisation of people and exploitation of the natural environment on an ever greater and more sophisticated level:

The wide-scale use of coal in England set the conditions for the Industrial Revolution. A century later, oil and natural gas, followed by a plethora of 'advanced' technologies ranging from nuclear to solar, completed the transformation, dragging the industrializing world into modernity and in the process fundamentally and irrevocably reordering life at every level. (Roberts, 2005:5)

Development, as it is understood from a modern perspective, cannot occur without growth and expansion of a country's economy and an increase in the number of economic activities which take place, almost all of which involve the use of energy. The role of energy within development is therefore central and fossil fuels such as oil, coal and gas are the most plentiful, easiest to extract and cheapest to use. Electricity is the main source of energy in households and industry and is a fundamental driver of economic activity:

Virtually all forms of contemporary industrial, manufacturing and service activity require electricity to operate. Although some firms and individuals can and do function without it, it is impossible to compete meaningfully in today's global economy without access to cheap and reliable electric power (Macdonald, 2008:3)

As the use of fossil fuels has increased, so have the associated environmental

problems. Carbon dioxide and other pollutants emitted from human activity have skyrocketed over the past century leading to a host of adverse consequences: "...the use of hydrocarbons to meet economic and social needs is a major driver of our most important environmental changes, including global climate change, acid deposition, urban smog and the release of many toxic materials" (Hall, 2003:318). The finite character of fossil fuel energy sources adds another dimension to these concerns. As demand grows for all forms of energy, so governments, firms and individuals become more anxious over security of supply and the price increases which accompany scarcity. In the medium to long-term, governments worry about the continued prospects for economic growth and competitiveness in a progressively more resource scarce world (Jaccard, 2005:17).

### **Energy Efficiency and the Energy Efficiency Accord**

Energy efficiency is, at first glance, a panacea for all of these concerns. By making a society and its economy more energy efficient one can theoretically allow for growth and 'progress' to continue whilst modifying the amount of energy required, reduce pollution, and the risks of demand outstripping supply. These characteristics have served to position energy efficiency centrally within the range of policy recommendations and environment-related discourses that have rapidly proliferated in most settings over the past decades. The range of regulations related to energy efficiency is broad, and includes the setting of standards for specific appliances and technologies, energy savings target-setting, financial incentives and voluntary approaches. Voluntary Agreements are relatively recent additions to the universe of environmental regulations and entail commitments between industry and government for firms to voluntarily pursue agreed upon environmental objectives. South Africa's Energy Efficiency Accord (henceforth the Accord) is an example of a Voluntary Agreement, signed in 2005 between the South African Department of Minerals and Energy (DME) and 30 firms and industry associations in South Africa<sup>1</sup>. It stipulates various strategies to pursue the government's energy savings target for mining and industry of 15% by 2015. The Accord is administrated by the National Business Initiative (NBI), a business advocacy organisation established in 1995 with a strong focus on environmental and sustainable development issues. An investigation of the Accord forms the basis of research undertaken here.

The rationale for this research is based on the urgency with which environmental and

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<sup>1</sup> The number of members has since increased to 39

resource scarcity problems need to be addressed at this time, and the need to continue to evaluate the efficacy of regulatory options intended for these purposes. Voluntary Agreements are a relatively new form of regulation, and much scope exists for evaluating their role within the broader regulatory universe and in the context of these overarching environmental objectives.

## **1.2 Research Problem and Chapters Outline**

The central question which this research seeks to answer is: What motivates stakeholders to pursue the Voluntary Agreement form of regulation to encourage energy efficiency within industry in South Africa? This research question is composed of two main sub-questions. These are: 1) What differentiates Voluntary Agreements from other forms of environmental regulation in the case of energy efficiency? 2) What motivates active participation in the Energy Efficiency Accord? These questions can be broken down into a number of strands of enquiry which are summarised in the chapters outline below.

Chapter two deals with methodological issues, including the research design, the generalisability of findings, and how the process of identifying respondents uncovered the phenomenon of uneven participation by members in Accord activities.

Chapter three begins by examining the concerns over environmental problems and how these translate into pressures for governments and firms to take action on environmental issues. Voluntary Agreements are described as a form of regulation which satisfies these demands and allows responsibility for achievement of environmental objectives to be shared between government and business. A conceptual framework within which to investigate the research questions is constructed from the literature on “second generation” environmental regulations and Voluntary Agreements. Next, the inherent attributes of energy efficiency in industrial settings are assessed for their influence on the practicability of a range of regulatory approaches. I argue that energy efficiency issues are complex and resist regulation by conventional, or “first generation” instruments. The chapter ends with arguments for the suitability of Voluntary Agreements to regulating for energy efficiency in industry.

Chapter four examines the form of industrial development in South Africa in order to

expand on the set of factors which motivate active participation in Accord activities. Arguments for dominance of certain types of firms historically are based principally on the Minerals-Energy Complex (MEC) concept developed by Fine and Rustomjee (1996). These historical patterns are linked to current patterns of dominance in the economy, which in turn are argued to find expression in patterns of Accord participation. The relationships between the electricity sector and large, energy-intensive firms is examined from past to present to trace changes in electricity supply priorities and their influence on firm behaviour. I argue that energy-intensive firms are motivated to establish and maintain good relations with key stakeholders in government and the power utility.

In chapter five, the relevance of conclusions reached in chapters three and four are assessed in relation to energy efficiency policy and regulation in the South African context. The regulatory-mix which has evolved to cover energy efficiency in industry in South Africa is examined, as well as the role that the Accord fulfils within this mix.

Chapter six presents the findings from field research in two main sections. The first section assesses the evidence for resistance to conventional forms of regulation by energy efficiency in industry outlined in chapter three. The second section outlines the motivations that drive firms to pursue energy efficiency, and to participate in the Accord based on assumptions formulated in chapters three, four and five. The chapter ends with a review of the validity of assumptions formulated as a conceptual framework in chapter three.

Finally, chapter seven presents conclusions from the research.

## **Chapter 2: Methodology**

### **Research Design**

The research here takes the form of a case study based on in-depth interviews. The case study approach is deemed appropriate primarily due to the uniqueness of this form of environmental regulation in South Africa. The choice of the Accord as a case raises the question of how generalisable the findings may be. I argue that the Accord is an example of the wider set of Voluntary Agreements, and that the respondents from industry are well established, internationally competitive industries. This means that the research questions can be approached in the context of existing literature on Voluntary Agreements and of energy efficiency issues within industry. The case is situated within a particular region (South Africa) which introduces specificities that need to be accounted for in the analysis of what motivates stakeholders to participate in this instance of regulation. I argue that these specificities of for instance, firm relations with a sole energy supplier, are not so unusual as to render conclusions irrelevant to other contexts. It must also be understood that Voluntary Agreements are often described in the context of the broad set of environmental problems, yet this is a heterogeneous set, and examining the specific case of energy efficiency in industry provides the opportunity to contribute to the understanding of how the Voluntary Agreement form of regulation operates in this particular area.

### **The Research Process**

An issue which presented itself early on in the research process was uncertainty over the willingness to participate by potential respondents. Through correspondence with the NBI it became clear that the degree of willingness to participate in research was directly correlated to the level of participation members demonstrated in Accord activities. A core group of respondents was identified who had over time demonstrated regular meeting attendance, active participation in discussions, and who had contributed to the evolution of Accord functions. Various options were mooted and discussed with the NBI, including administering by email a set of questions to a wider set of respondents in order to diversify the data sources and research methods. Concerns were raised regards the possibility of 'respondent fatigue' and replication of data – as the NBI was at that time administering a questionnaire to its members to assess the Accord. At the time of writing this questionnaire is still in the process of being administered, and correspondence with

the NBI shows there is a high percentage of non-response, further reinforcing the impression that many Accord members are not particularly active in their membership. The form of research undertaken was influenced by these developments and shifted towards an in-depth interview approach with the core group of highly active members. The phenomenon of uneven participation naturally became an object of enquiry and helped to guide the development of tools for research and analysis. I argue that this self-selection of participants not be seen as a constraint on scope and viability of the research, but rather as a phenomenon, the exposition of which may produce interesting conclusions. Notwithstanding difficulties of finding willing participants, the final group of respondents represents a mixture of the main participants and stakeholders in the Accord, including from government, the Accord administrator and the national electricity utility.

### **Sample Composition**

Respondents are drawn from all the main stakeholders in the Accord. These include from the “core industries” which are most active in their membership, the administrator of the Accord, the partners from government, and the parastatal power utility. Respondents from industry include representatives from the mining, liquid-fuels, cement, coal transport, and pulp and paper industries<sup>2</sup>. These are traditionally energy-intensive industries and are amongst those that, according to Fine and Rustomjee (1996), have historically dominated the industrial sector in South Africa. The research provides an opportunity to understand the perspective of this defined grouping on energy efficiency. Industry respondents are those who represent their firm at Accord activities and whose positions within the firm are related to energy and energy efficiency matters. As a result they are conversant with the issues researched. Public sector respondents include from the Department of Minerals and Energy (DME), the National Energy Regulator of South Africa (NERSA) and the parastatal electricity utility Eskom. Respondents from business advocacy groups include the administrators of the Accord, the NBI, and Business Unity South Africa (BUSA)<sup>3</sup>. Due to corporate rules governing disclosure, certain respondents chose not to have their names and the names of their organisation disclosed. Where the name of the firm or organisation is entered as 'Anonymous', references will include the name of the sector or industry, e.g. 'Cement Industry'. Where the name of respondent is

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<sup>2</sup> Anglo American is the majority shareholder in Mondi South Africa, a major pulp and paper firm. The respondent from Anglo American responded to energy efficiency-related issues in both the mining and pulp and paper components of the business.

<sup>3</sup> BUSA was formed in 2003 as a business advocacy organisation. It has over 500 members and is highly active in the policy arena representing business interests (<http://www.busa.org.za>)

entered as 'Anonymous', references will be to 'Anonymous'. The format for references will be: 'Name of Sector / Industry' + 'Name of Respondent'. Here follows a list of the respondents:

<b>Firm / Organisation / Dept.</b>	<b>Respondent</b>	<b>Sector / Industry</b>
Department of Minerals & Energy (DME)	Tony Golding	Government
Central Energy Fund (CEF)	Dr. Elsa du Toit	Government
Eskom	Vashna Singh	Parastatal Power Utility
National Energy Regulator (NERSA)	Anonymous	Electricity Regulation
Anglo American	Ian Langridge	Mining / Pulp & Paper
Anonymous	Anonymous	Cement
Anonymous	Anonymous	Petro-Chemicals
Richards Bay Coal Terminal (RBCT)	Leon Willemse	Coal Transport
National Business Initiative (NBI)	Yaw Afrane Okese	Business Advocacy
Business Unity South Africa	Anonymous	Business Advocacy
Energy Management Consultant	Pierre Chantraine <sup>4</sup>	Energy Consultancy

## **Interview Process**

The majority of interviews were conducted in approximately 1 hour face-to-face sessions with respondents from March 25 to April 1, 2008. These Interviews were recorded on tape and later transcribed. Additional interview material was obtained in email format from Leon Willemse and Pierre Chantraine. All face-to-face respondents were shown and signed Informed Consent Forms. Interviewees by email were provided with electronic versions of these forms and asked to express their disclosure preferences in writing.

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<sup>4</sup> Respondents consulting included 9 weeks in South Africa in 2004 & 2005, working on a Voluntary Energy Efficiency Framework for NBI, which informed the development of the Accord.

## **Chapter 3: Environmental Regulation**

This chapter begins by examining the evolution of concerns over the environment (and in particular the role of energy in the development of environmental problems) as the source of motivation for environmental regulation to be enacted. I argue that initial attempts by governments to tightly control aspects of society gave way to new forms of regulation as a response to the inherent complexities of many environmental problems, the high costs and limited success of more traditional forms of regulation, and to initiatives by the private sector which began to encroach upon the regulation forming and implementation terrain of government. Voluntary Agreements are examples of this new, or “second generation” of regulatory arrangements as they create shared responsibility for environmental outcomes between government and business. The first part of the chapter ends with the formulation of a number of assumptions on what motivates stakeholders to pursue the Voluntary Agreement form of regulation. These assumptions form a conceptual framework to guide the development of arguments and testing of research questions. The second part of the chapter examines energy efficiency in industrial settings. I argue that the inherent characteristics of energy efficiency within these settings resist certain forms of regulation, including the “command-and-control” approach and incentivisation through the Demand-Side Management (DSM) approach. This character to energy efficiency prospects in industry constitutes a strong set of motivations for stakeholders to seek alternative and more satisfactory solutions. The final part of the chapter makes the case for why the Voluntary Agreement approach is suited to regulating for energy efficiency in industry and why it can be considered as a specific case of this form of regulation.

### **3.1 The Evolution of Environmental Regulation**

Gorman (1999) argues that residents of the more affluent societies of North America and Europe began, in the 1960s, to place more value on clean water and air than had their predecessors. Attention began to be directed to the quality of the environment due to rising pollution of rivers and the air, urban smog, and contamination of food (Gorman, 1999:34). The relative lack of environmental regulatory mechanisms at that time meant that little could be done to prevent these issues from worsening, and efforts were made to forge a new guiding ethic for regulation based on environmental values. Such an ethic began to emerge in the 1970s, evidenced by a new raft of regulations and an



accompanying set of environmental institutions such as the United States Environmental Protection Agency (EPA) which began its operation in 1970 (Gorman, 1999:35). The publication of “ The Limits to Growth” in 1972 by the “Club of Rome”, an informal organisation of “scientists, educators, economists, humanists and industrialists” was a highly influential account of the pollution problem which helped to advance the debate over human impacts on the environment (Meadows et al, 1972). This organisation had as its objective to examine the “complex of problems” faced by the world's societies, conceived of as five factors which determine and limit growth: population, agricultural production, natural resources, industrial production and pollution (Meadows et al, 1972:12). Stormer (2006) argues that this social awareness of the potential limits to economic growth was triggered in the 1970s by several environmental catastrophes and issues such as the oil crises<sup>5</sup>. At this stage, the impact of energy production and use on the environment was not yet clearly or commonly understood. Energy was viewed primarily as another key resource, along with drinking water, capacity of the earth to produce food, and others – which a growing human population threatened to chronically deplete. In the late 1970s, inhabitants of industrialized countries were becoming increasingly aware that energy was used wastefully, with this observation “...especially pertinent in the US and Canada where relatively inexpensive energy resources had allowed these countries to develop energy-intensive industries and lifestyles” (Jaccard, 2005:88). At this time, environmentalists began to express concerns “...because they recognized the link between energy use and pollution” (Jaccard, 2005:89). Energy production and its use in industrial activity took centre stage once the phenomenon of global warming was identified. In 1979 the first World Climate Conference “...highlighted concerns arising from the increased carbon dioxide in the atmosphere” (Stern, 2005:514). A number of international summits, agreements and treaties have followed which translate into increasing pressures on governments and the private sector to take action on environmental issues.

The evolution of these concerns has encouraged attempts to regulate different aspects of society. A common response to pollution concerns has been the implementation of “command-and-control” regulations which have been described as “first generation” environmental regulations. Command-and-control regulations stipulate standards and technologies with which those regulated must comply or be penalised. This approach

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<sup>5</sup> The 1973 oil crisis was a result of an embargo on oil exports from Saudi Arabia and Iraq to the United States. The 1979 crisis was caused by the shutting down of Iranian oil fields during a period of revolution in that country (Roberts, 2005:54)

dominated environmental policy in the 1970s and is still prevalent today (Jaccard, 2005:271). Command-and-control regulations have come under increasing criticism for inhibiting innovation, being inflexible, incurring high costs, and providing diminishing returns (Gunningham, 2007:200). More recently, a “second generation” of regulations has emerged which is premised on an understanding of an “...increasingly complex, diverse and interdependent society” in which “...command-and-control is a blunt tool that is not well-suited to meet many of the challenges which lie ahead” (Gunningham, 2007:201). A key characteristic of this new generation of regulations is the role for firms in addressing environmental concerns themselves through the integration of management systems within the firm locale, setting of environmental targets, inter-firm associations, and elaboration of agreements between key stakeholders (Gunningham, 2007:209). Stormer (2006) describes how firm responses have evolved in relation to an evolving social context in which environmental concerns and their associated pressures have been steadily increasing. In the 1970s firms needed to respond to strict command-and-control regulations. In the 1980s firms became more pre-emptive by developing environmental strategies to avoid legislation, such as through pollution prevention. In the 1990s there was a focus on implementing systems to manage environmental problems, formation of industry associations, and networking, all as firm-led initiatives with which to improve understanding of environmental problems, share information and take action on environmental issues. These developments sparked interest amongst policy-makers who began to examine ways of formalising these initiatives and providing public sector support if needed (Stormer, 2006:33). Khanna and Anton (2002:540) argue that an increasing number of firm-led initiatives from the 1990s onwards to integrate environmental planning into business operations has been driven by various factors, including the desire to avoid increasingly stringent environmental regulations with their rising costs of compliance with inflexible technology-based regulations, the need to respond to environmental concerns among consumers, and the incentive to enhance firm reputation with shareholders and the public. The Organisation for Economic Cooperation and Development (OECD) argues that the larger and more visible firms in industry “...behave in ways that they feel maintain their legitimacy in the eyes of industry peers, customers or governments irrespective of individual cost and efficiency calculations” (2000:73). A key characteristic therefore of second generation environmental regulations is a sensitivity to the range of motivations to respond to environmental problems which apply at the firm-level.

The progression from first generation to second generation environmental regulations is here understood as characterised by two interrelated and complementary phenomena. First, there has been an encroachment into the regulation forming and enforcement territory of governments by firms actively seeking to minimise costs of compliance with standards, ensure that regulations are fair to the company, enhance their reputations with governments and customers, and satisfy the demands for action on the environment which originate from the wider society. Second, there has been a willingness by governments to cede this responsibility in the face of the costs and complexities of certain instances of environmental regulation, and a fuller awareness of the range of factors which motivate firms to take action on environmental problems.

### **Environmental Regulation: The Role for Voluntary Agreements**

Voluntary Agreements are an example of regulation in which the encroachment of firms into environmental regulation-forming territory, and the ceding by governments of their traditional roles in this regard, both find expression. Voluntary Agreements are described as "...non-mandatory contracts between equal partners", one of which is government (Gunningham, 2007:205). They involve specific commitments to environmental protection developed through bargaining between industry and a public authority, with incentives for action arising from mutual interests rather than from a regulated incentive scheme (Gunningham, 2007:205). The threat of possible legislation can accompany such bargaining, with the implicit understanding being that if business voluntarily achieves given environmental outcomes, government will hold off on implementing legislation it would otherwise consider to address the problem (OECD, 1999:132). Gunningham (2007) describes how the complexity of certain environmental problems makes them difficult and costly to tackle, so governments seek out solutions which minimise costs, and turn to the private sector to draw on knowledge and expertise "far superior" to that residing within government structures (pg. 206). Such an approach is understood to allow for innovation and the bringing to bear of firm-specific human and technological resources on a given environmental problem. By pursuing this form of regulation, government may avoid or reduce the costs of standard regulation development and monitoring (Gunningham, 2007; Barton et al, 2007). An OECD (1999) review of Voluntary Agreements argues that they are most appropriately used where technological uncertainty prevails and where close industry cooperation is needed in order to define realistic objectives and to encourage innovation. As Voluntary Agreements are a relatively recent phenomenon, some argue that too little attention has

been given to evaluating either their economic or environmental benefits (Gunningham, 2007, Beardsley, 1996). They are however theorised to give rise to a range of benefits, including collective learning, generation and diffusion of information, increased stakeholder participation, consensus building and encouraging the use of environmental management tools that facilitate meeting legal standards and achieving better environmental performance (OECD, 1999). Scepticism has grown however of the overall utility of Voluntary Agreements, with many arguing that they are ineffective at generating economic and environmental benefits (Gunningham, 2007; Gallagher, 2007; OECD, 1999). Reasons given include the central role of industry in the target-setting process (which serves to scale back the ambition of goals), the scope that exists for "free-riding" by members, uncertainty over regulatory threats, and the non-enforceability of commitments (OECD, 1999). One of the biggest criticisms of voluntary approaches is that any positive changes or advance towards the agreed upon goals are ascribed to the effects of the voluntary regulatory mechanism, despite the difficulty in establishing causality: "Achievement of a given voluntary environmental target does not confirm the effectiveness of the regulation, for it could be that even without it the desired environmental improvement would have been achieved" (Jaccard, 2005:281). This perspective on voluntary approaches maintains that they allow for participants to satisfy the set of expectations originating in society – that business and government take action to protect the environment – whilst not significantly restructuring that aspect of society intended to be controlled:

Voluntarism...allows firms to look like good corporate citizens, protecting the environment "because they care." Governments like voluntarism because it is politically feasible; they are seen to be taking the initiative in addressing an environmental challenge, and it is impossible to prove in advance that a new voluntary program will be environmentally ineffective and economically inefficient (Jaccard, 2005:281)

It is not within the scope of this research to conclusively establish the effectiveness of a particular instance of Voluntary Agreement (here the Accord) at realizing environmental goals. Therefore no definitive view of the accuracy of these criticisms of the environmental and economic efficacy of the voluntary approach to regulation (which are best substantiated through a quantitative approach) are possible here. These and other assumptions can however be approached qualitatively through the investigation of the

research questions.

## **Conceptual Framework**

The research undertaken here seeks to detail the range of motivations which apply to firms and governments to pursue the Voluntary Agreement form of regulation. Therefore the review of literature and construction of arguments are focused on outlining these possible motivations. The following assumptions derived from the literature covered thus far on second generation environmental regulations and Voluntary Agreements are to guide in this process: *Assumption 1: Environmental problems can be complex in ways which make regulation for them by conventional means difficult and costly.* If the argument can be made that regulating for energy efficiency in industrial settings is a complex, difficult and potentially costly exercise, this would imply incentives to seek out regulatory alternatives which share responsibility between governments and business. By so doing, governments may avoid the costs involved in regulating for energy efficiency, and businesses may avoid the imposition of costs and restrictions on their activities. *Assumption 2: Because Voluntary Agreements allow for firm-specific human and technological resources to be brought to bear on an environmental problem, individual firm responses will be different and informed by their existing environmental capabilities and objectives.* It may be common for firms to have developed existing environmental objectives and capabilities which impel them to take action on a given problem such as energy efficiency. This relates to the question of whether activities would have proceeded and outcomes been achieved even in the absence of the agreement – and therefore speak to the issue of environmental and economic efficacy of this approach to regulation. Interviewing firms to ascertain the ways in which they approach the matter of energy efficiency allows for the role of the Accord in decision making to be understood. Investigation of these points in turn improves the understanding of Voluntary Agreements as ‘second generation’ environmental regulations which draw on the range of motivations to pursue environmental objectives which apply at the firm-level. *Assumption 3: Particularly larger, more visible firms, are motivated to improve their standing with key stakeholders such as government through participation in voluntary initiatives, irrespective of the cost or technical utility of such participation.* Here, exploration of motives moves away from environmental-related utility of participation in this form of regulation, to issues of utility of relations between stakeholders and firm strategies for securing their positions within the economy. These issues are especially pertinent for the case studied here as active member firms are

classifiable as a certain type whose position in the economy has historical antecedents.

### 3.2 Regulating for Energy Efficiency

It is common in the literature on environmental regulations to refer to environmental problems collectively in discussion of regulatory forms that have arisen in response to them. The peculiarities and complexities of each problem extend to a number of variables, including industrial settings, technologies involved, rate of technological change, and costs of controlling for environmental problems - with all of these having impact on the feasibility of different regulatory approaches, and on variations within a specific form of regulation. Environmental issues such as energy efficiency also tend to be emotive, and it is important to distinguish between rhetoric and reality in ascertaining the scope for the control of a particular problem, and what the relative strengths and weaknesses are of different regulatory options. Here, the specific case of energy efficiency within industrial settings is examined to explore these issues, and to examine the case for appropriateness of the Voluntary Agreement form of regulation.

In economic terms, energy efficiency is usually used to refer to the pursuit by firms of more efficient use of energy in production processes or other processes within the ambit of a firm's functioning. Here, "second-law efficiency" is relevant. This is defined as "The ratio of energy input of a device to the *minimum* amount of energy theoretically needed to perform a task" (Thirring, 1958:22, emphasis added). In other words, if firms use energy in the pursuit of an outcome (e.g. a step in the production process), the choice of device becomes critical to the energy efficiency of the system. A production process operating at "optimum efficiency" would have every device achieving second law efficiency.

The oil supply crises in 1973 and 1979 were developments which encouraged action by industrialised countries to reduce dependence on imported oil, the major source of transport fuel and a significant input to electricity generation (Roberts, 2005:53). These activities included the development of domestic oil resources where possible, contracting with non-OPEC<sup>6</sup> oil suppliers, and the pursuit of greater energy efficiency (Jaccard, 2005:89). In the early 1980s, a global recession created a willingness amongst consumers to conserve electricity, actively supported by utilities in the form of sizeable programmes to foster energy efficiency (Jaccard, 2005:90). Demand-side management

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<sup>6</sup> Organisation of Petroleum Exporting Countries (OPEC)

(DSM) initiatives, which seek to modify energy usage patterns amongst consumers, made up a large part of these, with US utilities spending over \$20 billion between 1980-95 on efforts to encourage sparing use of electricity (Wirl, 1997). Constraints on energy resources was the main driver of these initiatives, with the environmental dimensions present, albeit not as a particularly important component. With time, the rationale for the pursuit of energy efficiency evolved to encompass both resource preservation and environmental protection considerations. Ross (1992) describes how the pursuit of energy efficiency, as it stood by the early 1990s, was based on the following rationale:

(i) to reduce costs, so human, capital, and natural resources can be used for other purposes; (ii) to ease the pressure on petroleum supplies as we move into the 21<sup>st</sup> century; (iii) to reduce the pace of greenhouse gas emissions, easing the need for drastic measures in that sphere; (iv) to pave the way for implementation of alternatives to fossil fuels; and (v) to increase industrial competitiveness (pg. 827)

Pronouncements on energy efficiency have come to be characterised by these ambitions and they are here conceived of as informing the pressures which are placed on both firms and governments to take action towards the attainment of greater energy efficiency within society.

### **Scope for Energy Efficiency: Hyperbole or Bona Fide?**

The extent to which energy efficiency savings are possible within industrialised settings is, however, debatable. Authors such as Lovins (1982, 1990) have extolled the virtues of energy efficiency as being able to radically reduce the amount of energy required in industrialised countries. Yet the savings possible within the production systems of the industrialised world were seen by some to be negligible, even during the oil crises of the 1970s: "...the efficiency with which energy was producing goods and services was assumed to be optimum and in 1973, the Chase Manhattan Bank saw virtually no scope for conservation, save by minor curtailment" (Pendse, 1979:80). Authors like Ross (1989 & 1992) maintain that there is great potential for energy savings within industry even within highly developed economies. Ross bases this conclusion in large part on data which shows energy intensity in industry decreasing by 0.5% to 1% per year among OECD countries over a 20 year period from 1970 to 1990 (Ross, 1992:827). However, upon closer examination one sees that this is largely ascribed to the fact that

manufacture of "bulk materials" such as metals, cement and paper are "...declining relative to total production in most affluent societies" (Ross, 1992:827). Bulk materials are more energy-intensive to produce, so this overall decrease in energy intensity could be as a result of this process of "dematerialization" (Ross, 1992). Marlay (1984:1279) argues that a decline in energy-intensity as a result of a change in the composition of industry "...could easily be interpreted as promising signs of industry's improving energy efficiency. While this may be true in one sense, no fundamental improvements in the technologies of production were made at all". The method of measuring energy-intensity for a particular country can therefore demonstrate apparent gains in efficiency at the aggregate level, yet with these gains "...fully explained by a single change in the composition of industrial production" (Marlay, 1984:1280). In some parts of the world, including South Africa, the energy-intensive manufacture of bulk materials continues to dominate in the economy. Enthusiasm for energy efficiency may be diminished in such contexts by virtue of their economic profile. Lovins is the most well known of the energy efficiency advocates. He is unfailingly positive about its potential benefits, claiming that

...efficiency technologies have already begun to sweep the market despite the many obstacles placed in their way...there is now abundant evidence that efficiency's rapid rise to complete dominance of marginal investments would be a natural outcome of free-market competition among all ways to provide desired energy services (1990:97)

Lovins' enthusiastic approach and his use of superlatives and absolutes in his reasoning suggests an emotional investment in the subject matter which should give pause. Jaccard (2005:238) summarises the less sanguine view of the potential for energy efficiency measures to elicit significant savings in industry: "...energy efficiency is usually more expensive than it is portrayed by advocates who ignore key intangible factors like the risks associated with new technologies and with technologies requiring longer payback periods". The "Stern Review of the Economics of Climate Change" (2006) reads as a comprehensive how-to manual on how to mitigate the effects of climate change and covers a wide range of policy options and examples of best-practice from around the world. Energy efficiency-related issues are linked conceptually here to efforts at reducing emissions and pollution and are indexed 18 times, yet apart from the usual sweeping and enthusiastic statements for energy savings potential Jaccard describes as "overly optimistic", the main substance of energy efficiency-related prescriptions relate



to domestic energy use (light-bulbs, refrigerators and other household appliances) and commercial and public buildings. In terms of industry, savings achieved over time refer to efficiency improvements in the energy production industry as opposed to industry as a whole. The only example given for energy efficiency savings in industry is for reducing waste gas-flaring in oil fields, refineries and industrial plants (pg. 308). This is specific to a limited range of industries. The report acknowledges that "There is much debate about how big a reduction in emissions efficiency measures could in practice yield" (2006:248). It goes on to say, "While estimates vary between studies, there is general agreement that the possibilities for further gains in efficiency are appreciable at each stage of energy conversion, across all sectors, end uses and economies" (Stern, 2006:248).

From the opposing viewpoints on the scope for energy efficiency in industry, it is not clear what the actual prospects are for improvements. Much depends on the relative nature of the industrial activity undertaken, structure of the economy, and stage of industrialisation in a given context. Different interests invested in energy efficiency also manifest in different opinions on the scope for savings possible. These differing opinions illustrate what a complex and potentially fraught issue energy efficiency is. It is an appealing idea for its seeming simplicity and promise of an answer to many of the more intractable environmental problems of recent times. However, the debate over extent of savings possible points to the complexity of the issues involved. These complexities are now described in more detail.

### **Heterogeneity of Industry Limits the Scope for Conventional Regulation**

Standards-based regulations for energy efficiency which seek to pursue "second-law efficiency" need to apply to the particular technologies which utilise the energy. The difficulty arises when considering the vast array of technological applications in industry. It is relatively easy to regulate for efficiency of household appliances for instance as the technologies are usually well established and individual energy parameters, such as standby power of musical and other devices, can be isolated and controlled for. In industry however, the issues are much more complex as industrial processes can differ greatly from firm to firm. Jaccard (2005:92), writing from professional experience of managing a major efficiency estimation project, claims that the estimates of his team were substantially lower than those of Lovins and other efficiency advocates. The lower results were deduced to be "...primarily caused by the technological heterogeneity of industrial energy uses" (2005:93). Jaccard states, logically, that "...isolated evidence of

efficiency gains for certain systems should not be extrapolated to the entire industry or even a specific industrial sector” (2005:93). Ross (1989:315), in providing a list of energy efficiency enhancing technologies and applications for industry, states: “These examples illustrate a property of many electricity conservation technologies and many new applications of electricity. They are specific to a manufacturing process and cannot be summarized by a short list of generic technologies”. This property of energy efficiency makes regulating for it in industry, at the very least, a complex process. Chudnovsky and Lopez (2007:82) argue for the heterogeneity of environmental problems which are “...highly location – or firm specific” for which there may be no “on the shelf technological solutions”. The authors maintain that each firm must develop “...endogenous innovatory capability” to deal with environmental challenges such as energy efficiency (pg. 82). I argue here that the fundamental characteristics of energy use in industry act as very real constraints on the capacity to regulate beyond a limited number of technologies that are common across many industries (such as electric motors or insulation piping). For many industries, the specificity of process technologies implies that to improve energy efficiency, or economic efficiency in general, requires the bringing to bear of firm-specific resources on activities within the ambit of the firm. This constraint on the feasibility of developing technical regulations for energy efficiency in certain industrial settings has not been explicitly enough stated in the literature.

### **The Source of Energy Savings in Industry and Conventional Forms of Incentivisation**

Another characteristic of energy efficiency in certain industrial settings which has not been clearly articulated in the literature relates to the distinction in the categories of energy efficiency which can be pursued. This is the difference between energy efficiency for households and commercial settings on the one hand, and energy efficiency for more energy-intensive industrial processes on the other. For the first category, DSM information and funding campaigns can be effective at, for instance: allowing for retrofitting of lighting systems and increasing information on household appliances to aid in consumer choices. For the second, significant energy savings come from changes to capital machinery. I argue here that too often these two categories are conflated and the impression is given by efficiency advocates that energy efficiency is a relatively cheap and easy option to pursue to reduce energy use (and therefore pollution), without differentiating for the costs and processes involved in different settings. If pursuing significant energy savings in industrial settings, changes to production processes are

what is required:

...the most important mechanism that leads to more efficient use of energy in industry is process change, that is, the use of new technology to provide the same products or services...Comparatively small improvements in energy efficiency may be obtained through backfitting in existing industry (Johansson et al, 1983:356)

Considering the source of efficiency improvements amongst the largest users of energy in society, it is important to ascertain whether current means of incentivising or subsidising efficiency are effective. DSM programmes have historically been the most common form of energy efficiency incentive programme, usually offered by a power utility, and can involve the provision of information on more energy efficient products and behaviours, and subsidies to encourage the adoption of more efficient technologies (Jaccard, 2005:91). Most DSM programmes target household energy use and commercial settings such as shopping malls and small businesses (Littlechild, 1996:608). Once again, perspectives on energy efficiency enhancing prospects are mixed. Lovins (1990:105), in bemoaning the plans of the US Department of Energy to cut funding for DSM information and incentive programmes, makes the claim that "... such investments in the past have consistently yielded returns of hundreds or thousands of percent to the national economy". Conversely, Wirl (1997) found that approximately \$20 billion spent by U.S. electricity utilities on DSM in the 1980s and 90s did not result in a reduction in the electricity to GDP ratio of the economy relative to industrialised countries that made only negligible efforts at improving energy efficiency. Jaccard (2005:92) claims that "Detailed studies have found that the anticipated energy efficiency gains of DSM programs tend to exceed the realized savings revealed by end-use hindsight analysis". Part of the problem lies in the scale and categories of funds traditionally made available through DSM funding. Heavy industry tends to take up a disproportionate percentage of energy use in an economy, yet DSM campaigns are usually focused on households and commercial enterprises for whom major energy costs include lighting, refrigeration, heating and air-conditioning (Jaccard, 2005:92). Within these settings, significant scope does exist for energy savings through retrofitting with more energy efficient devices, and behaviour change by, e.g. the switching off of lights and devices when not required. Evidence shows that DSM campaigns can be successful in these settings, especially when supported by and undertaken within

specific institutions such as government buildings (Littlechild, 1996:609). However, this approach struggles to make impact on energy usage patterns amongst large users of power. The argument constructed here for why this is so relates to what motivates different types of firms to pursue energy efficiency and adopt management systems with which to conceptualise and pursue efficiency objectives. Motivations can originate from considerations of energy price, the need to reduce pollution which accompanies productive processes, and from the energy and capital-intensive nature of business. These motivations are now further explained.

### **Energy Price, Pollution Prevention and Energy-Intensity Drive Efficiency**

Price of energy is a potentially crucial factor to consider in driving energy efficiency in industry. In theory, if the price of energy rises faster than those of the other inputs to production, "...manufacturers will attempt to reduce their energy costs by eliminating waste and substituting, where possible, cheaper and alternative inputs. The result is improved energy efficiency" (Marlay, 1984:128). Changes in energy use associated with the oil crises of the 1970s and the global recession in the 1980s have suggested that the price of energy is a major driver of change in energy use in industry. Once again, debate exists over the share of efficiency gains and of changes in the composition of industrial output towards less energy-intensive industries in these savings. Marlay (1984) claims that, whilst energy efficiency improvements did play a role in changes in industrial energy use during this time, these only accounted for roughly one third of reduced energy demand:

After 1973, industrial use of energy changed significantly. Higher energy prices brought improvements in energy efficiency, particularly with respect to the use of fossil fuels. These improvements reduced growth in energy demand, but only in part. Importantly, industrial economic growth slowed and the composition of industrial output shifted away from large energy-using industries. Slower growth and shifts in output mix together accounted for about two-thirds of the reduced growth in energy demand (Marlay, 1984:1282)

Jaccard (2005) argues that energy prices do have an impact on energy efficiency activities, but maintains that prices would have to rise significantly before sustained improvements of energy efficiency in industry were probable: "More efficiency would be

economic if the final price of energy were to double. Dramatic increases in energy efficiency trends will be difficult to achieve if final prices to businesses do not increase by more than 25-50% over most of the century” (Jaccard, 2005:238). A discussion of the role of energy price in determining energy efficiency brings the focus back to the firm as the site where innovation occurs. A number of authors argue that environmental performance improvements, including savings in energy, come purely from the incentive to increase productivity and profit. Khanna and Anton (2002:541) argue that, even in the absence of regulations, firms will adopt environmentally friendly practices if the benefits from increasing input-efficiency in production are larger than the costs of adoption. In these instances, positive environmental outcomes are a result of internal firm reorganisation in order to profit-maximise. Florida (1996) argues based on a survey of 256 U.S. manufacturing firms that environmental improvements result from efforts to innovate and implement new and more efficient production systems and practices. The Environmental Management System (EMS) is one of the key mechanisms adopted by businesses in order to meet the general objective of greater economic efficiency. Khanna and Anton (2002:541) define an EMS as “...management practices that integrate the environment into production decisions by identifying opportunities for pollution (waste) reduction and implementing plans to make continuous improvements in production methods and environmental performance”. Zilberman (1997:32) equates EMSs with efficiency-enhancement and states that “Efficiency can be understood to be enhanced generally by an effective EMS”. Khanna and Anton (2002) and Zilberman (1997) argue that firms involved in polluting activities and who are energy and resource-intensive have taken the lead in developing these systems-based efforts at environmental management, which have in turn sparked interest amongst policy-makers in promoting EMSs to complement the existing regulatory system. Arguments made earlier regarding the debate over scope for energy savings in industry, and those presented here that firms’ efforts to introduce environmental management systems can result in efficiency enhancements, may seem to contradict each other. This is not to suggest that energy efficiency improvements are not possible, rather that the scope of savings possible in industry have likely been exaggerated, and that the factors which motivate pursuit of energy efficiency poorly understood and articulated. To further understand the role of energy price in driving energy efficiency, it is necessary to understand the impact of the nature of firm activities and the role of energy prices. In terms of energy-intensive industries,

Krarup and Ramesohl (2000) argue that technological innovation to continuously improve production processes is common and itself gives rise to energy efficiency gains: “In most energy-intensive industries, core processes have been continuously optimized. Any gains in energy efficiency, therefore, will depend on technological innovation in process technology” (pg. 41). These upgrades are undertaken because prices of inputs and the efficiency of their conversion by capital machinery into outputs make up a large fraction of production costs (Krarup and Ramesohl, 2000:42). As a result, at any one point in time the scope for efficiency savings in these firms may not be so great – as they will have kept up with efficiency-enhancing changes possible. Polluting firms similarly have incentive to keep up with what changes they can introduce to respond to or avoid strict command-and-control regulations and the negative attention which polluting activities attract. The position adopted here is that these types of firms have had more motivation over time to improve environmental performance and efficiency generally and so have led the development of management systems with which to do so. The gap between current and potential energy efficiency may, in the case of these types of firms, not be sufficient to expect major energy savings in a given economy at any one point in time to come from this section of industry.

Decreasing energy resources should lead to increasing energy prices which would serve to continually bring a wider variety of firms into the space within which decisions on inputs, outputs and efficiency take on greater significance. Change in energy prices is therefore conceived of here as the major determinant in spreading awareness of and interest in energy efficiency within an economy. It is firms for whom energy, or input-output issues have erstwhile had little significance (for instance due to low energy prices and a smaller fraction of energy costs in total costs) that would benefit most from DSM information and incentive campaigns, with the effectiveness of such campaigns here understood to be largely contingent on a parallel rise in energy prices. Importantly, for there to be a significant and sustained push towards greater energy efficiency, energy prices would need to increase fairly dramatically (Jaccard, 2005). The effectiveness of any campaign or approach to encouraging energy efficiency is here argued to be further determined by whether resources exist for integration at the firm-level of management systems for conceptualising and pursuing environmental objectives. DSM programmes are generally targeted and formulated too broadly to allow for this to take place.

### **3.3 Arguments in Support of Voluntary Agreements**

Having established that energy price, energy-intensity and polluting potential of industrial activity are fundamental to determining firm's pursuit of energy efficiency, what then is the scope for regulation? Arguably, Voluntary Agreements are more suited than other regulatory regimes. For a number of reasons, energy efficiency in industrial settings resists regulation by the more traditional means. The constantly evolving nature of technology makes regulation which specifies technology applications quickly redundant. The heterogeneity of technology applications between firms makes it difficult for bureaucrats to come to terms with these complexities. The high costs involved in undertaking industrial process change make DSM-type incentives largely ineffective. Some form of regulation must be enacted however to satisfy the demands for action which derive from the wider society. The adoption of a Voluntary Agreement in the case of energy efficiency in industry would allow for the right signals to be given out, both from government and business, that something is being done, thereby satisfying demand that action of some kind be taken. A Voluntary Agreement also avoids the economic inefficiencies which would be incurred if a command-and-control approach were adopted on a scale beyond a limited set of "horizontal technologies" which are common across many industries. The site of control shifts more towards firms that can bring to bear their own resources and develop strategies with which to achieve goals – which may integrate technical objectives (such as increasing energy efficiency), with strategic objectives (such as enhancing their image in the eyes of customers and government). Voluntary Agreements can also encourage the adoption of EMSs and other tools to aid in conceptualising and pursuing energy efficiency, which may be particularly useful to those firms who have not paid much attention to energy efficiency matters until prompted to do so by societal pressure or a rise in energy prices. The appropriateness of the Voluntary Agreement form of regulation for energy efficiency does not imply that its enactment will necessarily lead to energy savings. Constraints may exist related to costs of industrial process change, or the expansionary plans of participants may ultimately result in increased total energy use. I argue here that Voluntary Agreements are a satisfactory arrangement for potential stakeholders because of the inherent characteristics of energy efficiency in industry which make it resistant to regulation by more conventional means, and for the potential advantages this approach affords in terms of political expediency, reputation enhancement and others. For energy-intensive industries, the need for regulation to encourage energy efficiency specifically (as opposed to pollution reduction) is argued to be unnecessary as these firms will engage in process upgrades and input changes where possible to

enhance efficiency as a matter of course. For these firms, what is more important is in satisfying demands for environmental action, enhancing their reputations with various stakeholders, and working to ensure regulations suit their activities – which are objectives participation in a Voluntary Agreement can to some degree facilitate.

## **Examples of Voluntary Agreements**

### **Canadian Industry Program for Energy Conservation (CIPEC)**

CIPEC is close to the Accord in both form and content. A key difference is in the relations between government and industry. In the case of the Accord, it is administered from within the civil sector by the NBI, and both firms and government are seen as equal partners to the initiative. In the Canadian example, the agreement is between firms and CIPEC which “..while Industry led, is operated by government” (Interview with P. Chantraine, 2008). CIPEC is seen as the main delivery programme of the Office of Energy Efficiency. The programme offers financial incentives for retrofitting of industry and performing energy assessments, as well as providing information services – including directories for networking, workshops and benchmarking information. The extent of participation is much greater than in the Accord, with 5000 firms accounting for 98% of Canada's industrial energy usage accounted for (CIPEC, 2006). This means that there is much greater scope for information service targeting at firms who may be less familiar with energy efficiency and may not have environmental management systems fully in place. The regulatory backdrop for the programme illustrates some of the arguments put forward here. There are regulations in Canada governing the manufacture and distribution of certain products, such as household goods, for which efficiency standards can easily be developed. There are efficiency regulations for a limited set of "horizontal" technologies within industry, including steam-boilers and electric motors. Large energy savings projects undertaken within industry are therefore partly supported by information provision and cost-sharing for supporting processes such as energy audits, yet the onus is on individual firms to initiate such projects. There are no sanctions for not pursuing energy efficiency per se. The way in which the achievements of the programme are described is perhaps indicative both of the need felt by governments to demonstrate successful action on the issue of energy efficiency, and of the inherent difficulties involved in regulating for it. The official website carries the claim that “Through CIPEC, the mining, manufacturing and construction sectors have voluntarily met and exceeded annual targets to reduce their energy intensity” (OEE,



2008). The next paragraph introduces the qualifier: “Thanks *in part* to CIPECs efforts, the more than 5000 companies that represent over 98 percent of Canadian industry have reduced their combined energy intensity by 9.1 percent between 1990 and 2004” (emphasis added). The programme’s 2006 Annual Report further qualifies the claim: “The sectors that CIPEC represents reduced their combined energy intensity by 9.1 percent between 1990 and 2004” (CIPEC, 2006:35). I argue that this shift in the way of ascribing the means for energy savings indicates both the temptation to ascribe success to participation in the programme, and an understanding of the possibility that these firms would have achieved these savings independently. No evidence is supplied as to whether energy savings are as a direct result of participation in the programme or of developments which would have taken place independently.

### **French Voluntary Agreements on CO<sub>2</sub> Reductions**

In response to the commitments by France to reduce CO<sub>2</sub> emissions after the United Nations Rio Earth Summit in 1992, the French Ministry of the Environment elaborated a standard “Voluntary Agreement Procedure” with which it began to pursue agreements with mainly energy-intensive firms (Krarup & Ramesohl, 2000:14). In order to conclude a voluntary agreement, firms had to provide background information on their energy consumption and CO<sub>2</sub> emissions, set objectives of emission and energy consumption reductions, and discuss (but not commit to) “technically and economically feasible” energy savings or substitution measures to reach these goals (Krarup & Ramesohl, 2000:14). The French example is described as a set of non-binding agreements without legally defined tasks, rules or sanction mechanisms. A review of the French agreements has found that they have had some success in fostering individual energy savings projects, but have not changed the underlying strategies of the firms, most of whom pursue optimisation in production processes independently – which themselves result in energy savings (Krarup & Ramesohl, 2000:41). Participation in the agreements did facilitate greater communication between stakeholders, in particular by creating fora in which to discuss environmental and technology issues between firms and government. Amongst the smaller, less energy-intensive participants, participation aided in the integration of energy efficient management practice, whereas these practices were already entrenched within the larger firms. For these less energy-intensive firms, participation led to improved investment activities which benefited from “...better knowledge and communication on profitable measures” (Krarup & Ramesohl, 2000:34). The review also found that penetration of the ethos of the agreement in firms “...strongly

depends on the given individual company culture, which will hardly be affected by the agreement scheme (Krarup & Ramesohl, 2000:42).

### **3.4 Conclusions**

I argue that the regulation of energy efficiency is a complex task, both in terms of the technical considerations which apply when pursuing the objective of greater efficiency in industrial processes, and in terms of the range of pressures which governments and firms experience to take action on environmental issues. Energy efficiency has been identified as a potentially simple and cost-effective approach to reducing energy use volumes and therefore the polluting effects of power production, which has raised it to prominence in a world facing the twin challenges of dwindling conventional energy resources and rising pollution from energy production. The heterogeneity of industrial processes, and the high costs involved in making changes to energy and capital-intensive production processes, limit the effectiveness of more traditional command-and-control regulations and DSM-type incentive programmes. I argue here that large, energy-intensive firms will be motivated by price considerations to pursue energy efficiency in their production processes continuously over time. Polluting firms will be motivated to pursue greater efficiency with which inputs are used in production, leading to fewer potentially polluting outputs to the production process. I argue here that these types of firms will have developed sophisticated internal resources with which to engage with the problem of energy efficiency and so will not require assistance from governments in this regard. However, such firms, due to their high profile in a given society and their susceptibility to imposition of command-and-control regulations, are motivated to demonstrate conformity to expectations to take action on environmental issues. The Voluntary Agreement form of regulation satisfies this peculiar set of conditions by accommodating the need to demonstrate commitment to environmental objectives whilst not imposing stringent and potentially irrational requirements on firms. I also argue here that the documented features of Voluntary Agreements of aiding in information sharing and “learning by doing” are, in the case of energy efficiency, of most use to those firms which are not familiar with efficiency matters – by definition firms that are less energy-intensive or polluting. For these firms, energy price and the urgency with which environmental problems are viewed in their setting will be the crucial factors which influence participation in and value derived from the Voluntary Agreement form of regulation. A key assumption of these arguments is that, in settings characterised by

low energy prices and pressures to take action on environmental problems experienced unevenly amongst firms of different sizes, large energy-intensive firms or those with higher polluting potential will be more likely to actively participate in a Voluntary Agreement for energy efficiency, whilst smaller and less polluting firms may take little interest as long as conditions remain unchanged.

## **Chapter 4: Industry and Electricity in South Africa**

In this chapter, the development of industry in South Africa is investigated to assist in explaining the particular pattern of participation in Accord activities. Fine and Rustomjee's (1998) concept of a Minerals-Energy Complex (MEC) at the centre of an accumulation strategy in South Africa is adopted to help explain why energy-intensive firms are the main participants in the Accord. The arguments presented here seek to show how certain kinds of firms have come to be dominant in South Africa, partly due to state support and to the peculiarities of the apartheid system. Provision of cheap electricity has also played a role in allowing these firms to flourish. These MEC-type firms are, by virtue of their size and capabilities, able to ensure their positions within the economy. This involves the influencing of policy and pursuit of other opportunities. These firms also have it in their interests to be aware of developments in the energy and electricity sectors due to the energy-intense nature of their activities, uncertainty over medium-term electricity supply and a possible realignment of electricity provision priorities.

### **4.1 The Form of Industrial Development in South Africa**

South Africa's modern economic history had its start in the discovery of diamonds in 1867 and gold in 1886 (Marais, 1998:7). These discoveries were to shape the trajectory of the South African economy from then onwards as foreign capital began to pour into the country to finance the multitude of mining operations which rapidly proliferated (Marais, 1998:8). This process established mining centrally in the South African economy and "...spearheaded the highly centralized character of an industry which would remain at the centre of the South African economy for the next century" (Marais, 1998:8). Fine and Rustomjee's (1996) theoretical concept of an MEC is adopted here to understand the development of industry in South Africa over this time period. Their central thesis is that the mining and energy sectors, together with a number of associated manufacturing sub-sectors, have constituted the "core site of accumulation" in the South African economy over the previous century (pg. 71). A number of authors, including Wolpe (1972), Fine and Rustomjee (1996), Feinstein (2005), Marais (1998), Freund (2008), Gelb (1991) and Crankshaw (1996) have written on the South African polity and economy of various periods in the 1900s. There is broad consensus amongst these authors that, within the industrial sector, a number of key industries and firms

have tended to dominate. These include Anglo American in the mining industry, Sasol in petro-chemicals, and Iscor in steel and metal beneficiation. Indeed, conglomeration of firms in specific sectors has been one of the hallmarks of South Africa's economy. Roberts and Rustomjee (2008:14) describe how the development path of South Africa's chemical industry after the 1950s was dominated by large scale domestic capital in close relations with government and specialist state institutions. The dominance of firms like Sasol resulted in the exercise of considerable market power on downstream industries, ultimately impeding their competitive growth prospects (pg. 15). There is debate over the extent to which the South African economy has been able to diversify into secondary manufacturing. Lipton (1986:144) argues that rapid growth of manufacturing occurred in the early to mid 1960s as a result of strict exchange controls, expansionary policies and increased industry protection. This growth was constrained however by the shortage of skilled and semi-skilled labour as a result of the "job bar" which stipulated ratios of white to black workers (Lipton, 1986:144). Gelb (1991:15) makes a similar argument about skills shortage as the result of adoption of "Fordist" production methods, yet without "...its social labour processes or its mass consumption norms". As a result, skills shortages and poor local demand put a brake on potential for expansion of the manufacturing base and domestic market for goods. Lewis et al (2004:151) argue that, whilst import substituting industrialisation (ISI) in South Africa led to highly diversified consumer goods production, a significant capital goods producing sector did not develop. Furthermore, tariff protections, subsidies and other forms of support conspired to form a powerful "anti-export bias" and accounted for "...the emergence of dynamic inefficiencies in the manufacturing sector" (Lewis et al, 2004:152). As a result, the industrial landscape in South Africa has not been able to shift significantly away from dominance by a handful of large firms involved in energy-intensive activities.

The political transformation which took place in South Africa in the mid 1990s was, on face value, of the order which had the potential to be accompanied by profound changes in the economy. A strong mandate existed for restructuring of the society and economy to benefit the previously disadvantaged. The set of policies adopted in the period immediately following democratisation signalled such an intent, yet hopes (and fears) of such radical restructuring were short-lived. Fine and Rustomjee (1996) describe the transition from apartheid to democracy in the mid 1990s as a process in which "...the apartheid regime...sought to guarantee the interests of the large-scale capitals

organised around the MEC even as it...released the reins of immediate political power” (pg. 206). According to the authors, compromises to big capital and continuity of key personnel in economic affairs, mining and energy were characteristic of this period (pg. 3). Marais (1998) provides a set of explanations as to how and why this happened. He argues that “When the ANC was unbanned in 1990, it had no economic policy, a peculiar situation for an eight-decade-old liberation organization despite the efforts internationally on the left to train a cadre of ANC exile economists” (pg. 147). Initially the economic direction the ANC would choose to take was debated at an ideological level and largely influenced by the left. However, initial signals given out by the movement in the form of its "growth through redistribution" approach were “...severely censured by mainstream economists and in the media” (pg.149). The outcome of this barrage of criticisms was the abandonment of this approach and the steady introduction of a more moderate type of thinking. Marais describes the evolving ANC economic direction at this time as one heavily influenced by a “...bewildering assortment of seminars, conferences, workshops, briefings, international 'fact-finding' trips and high-profile visits by carefully chosen foreign 'experts' – financed by business and foreign development agencies” (pg. 150). Once the debate over future economic and social policy shifted from an ideological to a technical terrain, business actors could “...successfully conduct a vigorous political and ideological struggle at a nominally technical level, deploying massive resources to great effect” (pg. 158). This coordinated project by a well-resourced private sector allowed for the particular form of accumulation which had predominated over the preceding decades to proceed uninterrupted. Continuity within the economy here is understood simply as an outcome of a meeting of opinions, objectives and strategies with the better resourced of these winning out. Roberts (2006) provides a similar explanation for continuity in the South African economy. He argues that firms that have developed productive strengths are able to reinvest to grow their businesses, adopt new technologies and exploit opportunities as they arise. The example provided by Roberts is that of the petro-chemicals giant Sasol “...which leads local industry in ongoing R&D spending to continuously improve its capabilities” (pg. 5). Recent work by Roberts and Rustomjee (2008) argue that Sasol's dominance of the liquid fuels upstream industry has strengthened over the past 15 years as it has been able to seize initiative from its Trans-National Corporation rivals in the oil industry. Despite government attempts to diversify the economy away from dependence on these historically dominant capital-intensive industries, these same actors are able to use their advantageous positions to continue to “...set the agenda for industrial development” (Roberts, 2006:5). As

Macdonald (2008:6) puts it, "...it is safe to say that the MEC still represents a 'system of accumulation' in South Africa and one that will likely remain so for some time to come".

### **Electricity and MEC-Type Firms**

Bond (2002) argues that there has long been a close and mutually dependent relationship between mining and electricity. At the start of the 21<sup>st</sup> century, coal mining was responsible for 80% of South Africa's energy needs and exported coal made up one fifth of exports (Bond, 2002:304). Electricity is used to power mines and heavy industry, and to beneficiate metallic and mineral products. The mining industry collectively is responsible for the production and a significant part of the consumption of energy. Fine and Rustomjee (1996) argue that political and cultural elements have played a key role in the expansion of the electricity sector and its links to industry. The expansion of electricity generation capacity and the establishment of Sasol in the 1950s were part of a process of supporting Afrikaner industrial concerns which were beginning to encroach into the boundaries of the predominantly British controlled MEC as they were at that stage (pg. 157). Eskom was allowed to seek capital from different sources to fund expansion. They did this by receiving \$100 million from the World Bank from 1951-67 and in the form of bond purchases from international banks. The threat of looming sanctions created extra incentive to proceed with expansion before external funding sources were closed (Bond, 2002:306). By 1990 Eskom had a 34,000 MW capacity when the highest local demand was only 21,800 MW. The result of this over-investment in and supply of electricity was that Eskom was able to provide artificially cheap electricity to large, energy-intensive operations and white households over the decades (Bond, 2002:307).

Is there continuity in the relations between the electricity sector and industry to the present? Some have argued that the political transition in the 1990s signalled a realignment of priorities for electricity provision towards a range of social development objectives and away from the motivations of the past. The White Paper on the Energy Policy of the Republic of South Africa (White Paper) certainly signalled a shift in thinking as Kessides et al (2007) have pointed out:

...policy options identified in the White Paper indicated the potential to move boldly from the status quo to a new, clear vision and policy framework for the energy sector in South Africa. Gone were the exclusive concerns of fuel

security and self-sufficiency held by an apartheid government beleaguered with international sanctions (pg. 72)

Macdonald (2008) agrees that the stated objectives in policy have changed, but argues that the shift away from a priority focus on MEC-type industries did not occur:

Post-apartheid restructuring in the electricity sector may be illustrative of a strengthened 'developmental state', but this is a state that operates primarily in the development interests of capital – particularly those factions of capital closest to the MEC-plus economy"<sup>7</sup> (pg. 15).

Bond (2002:309) argues that, despite the rhetoric to be found in policy documents, MEC-type electricity customers are still given priority, with this at the expense of the poor: "The late-apartheid solution, inherited and amplified today, was to give the largest corporations...ever cheaper power, and penalise the poor with extremely expensive prepaid meter systems". I argue here that this rhetoric, whether or not it has resulted in significant changes to the approach to electricity provision, nevertheless constitutes a shift in attitudes towards more equity in provision priorities, and therefore a potential weakening of the privileged position held by these MEC-type firm. An awareness as early as the mid 1990s of looming electricity reserve margin decline to chronic levels would have introduced further insecurity<sup>8</sup>. Increasingly frequent disruptions in electricity supply have been characteristic in the South African economy in recent years. Initially confined mainly to the Western Cape Province, a combination of factors led to chronic supply problems around the country towards the end of 2007. Various explanations were offered for the problem, including a shortage of coal supplies due to unusually wet weather affecting the usability and transportation of coal stockpiles. Underlying the electricity supply interruptions however is a deeper problem of dwindling electricity reserve margins due to an absence of new power station construction since the 1980s. At present, Eskom's build programme for new power stations projects new generation capacity to come online in 2012 at the earliest<sup>9</sup>. This scenario has had immediate impact on electricity prices. The latest agreed electricity tariff increase in 2008 is for 27.5%<sup>10</sup>.

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<sup>7</sup> The 'MEC-plus economy' referred to here consists of MEC-type industries as conceptualised by Fine & Rustomjee (1996) together with a range of, mainly urban and electricity-based industries such as financial services and telecommunications.

<sup>8</sup> Reserve margin steadily declined from roughly 30% in 1997, to 14% in 2002 and 8% in 2005 (Kessides et al, 2007:35)

<sup>9</sup> Personal communication with Vashna Singh, Project Manager, Pricing Product Development, Eskom.

<sup>10</sup> This increase in electricity tariffs took place after interviews had been conducted, so its effects are not



## 4.2 Review of Arguments

I argue here that a number of factors specific to the South African context would contribute to an eagerness on the part of MEC-type firms to remain on good terms with both government and the electricity utility by exploiting opportunities to develop relationships and demonstrate their willingness to cooperate with government on power-related issues. MEC-type firms have thrived in South Africa and continue to do so. These firms are well positioned to exploit opportunities as they may arise to ensure their advantageous positions, and have demonstrated in South Africa's transition period in the 1990s that they have the sophisticated capabilities with which to do so successfully. In this conception, no convoluted system of patronage between government and big industry is required beyond the possession of internal resources and the strong initial bargaining positions held by these kinds of firms. The crucial factor at work here is the capacity of these firms to have their interests manifested in the political and economic realms, which is what allows for governments to come and go and for the same industries or actors in the economy to predominate. One of the major interests of these large, energy-intensive firms has been to ensure steady supply of cheap electricity. I argue here that the shift in political rhetoric to include greater consideration of equity in electricity provision, and the gradual reduction in electricity reserve margin, with the lengthy period of uncertainty of electricity provision it has ushered in, would cause these energy-intensive MEC-type firms some anxiety and increase the urgency with which they identify and exploit opportunities to maintain good relations with government and the power utility. I argue that participation in an agreement such as the Accord provides opportunities to build relations with government and the power utility as energy efficiency is directly linked to the utilities attempts to modify energy use volumes, and to the pressures government experiences to be seen to be taking action on environmental issues.

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gauged in the views of respondents and no definite conclusions as to its specific effects can be formulated. However, the increase is consistent with arguments presented here around the trend towards increase in the price of power.

## **Chapter 5: Environmental Policy and Regulation in South Africa**

In the case of South Africa, one can clearly see how a discourse which links energy efficiency to environmental and resource scarcity issues enters the policy-making arena from the late 1990s, shortly after the political transition from apartheid to multi-party democracy. A World Bank study of the electricity industry describes these changes thus:

The advent of democratic government and the re-acceptance of South Africa by the international community offered the opportunity for a radical shift in energy policy. Energy policy was...taking into account important international trends which were placing greater emphasis on efficiency and environmental sustainability. (Kessides et al, 2007:72)

The "White Paper on the Energy Policy of the Republic of South Africa" (henceforth the White Paper) (DME, 1998), as a key energy policy document, lays the groundwork for an energy efficiency strategy built upon these elements:

The energy sector has larger environmental impacts than most economic sectors, with associated greenhouse gas emissions feared to be a major contributor to global warming. Energy policies are already responding to pressures to reduce emissions as energy investments are subjected to greater environmental scrutiny. Other responses have included a greater focus on energy end-users, with policies to encourage energy efficiency and demand-side management being put into place (DME, 1998:21)

The Energy Efficiency Strategy of South Africa (henceforth the Strategy) (DME, 2005a) takes its cue from the White Paper, with energy efficiency conceptualised and motivated by these same concerns: "Energy efficiency will reduce the local environmental impacts of [energy's] production and use. These impacts include the atmospheric emission of harmful and odorous gases...Energy efficiency is one of the most cost-effective methods of reducing Greenhouse Gas emissions, and thereby combating Climate Change" (DME, 2005a:5). The statement within the Strategy that "...in many respects we start with a clean slate with little energy efficiency measures having taken place" (DME, 2005a:2) strengthens the perception that this rationale has been developed in an

international setting and has entered the South African context in an already mature form, coinciding with South Africa's political transition in the mid 1990s. The government has responded to these international trends by formulating policies which incorporate an emphasis on climate change, pollution prevention, and the pursuit of energy efficiency as a "cost-effective" means of pursuing environmental objectives.

### **The MEC Within the Energy Efficiency Strategy**

In terms of major energy users, and therefore key targets for encouraging energy savings, the kind of MEC firms described by Fine and Rustomjee (1996), and which make up the core respondents from industry studied here, are positioned centrally within the Strategy. The "Industry and Mining Sector Programme" of the Strategy states that industrial energy usage is dominated by a small number of "...energy-intensive industries", including "...metals processing, mining, pulp and paper, and the petrochemicals industry", with these industries responsible for 47% of total energy demand in the country (DME, 2005a:28). The ways in which energy-intensity and the potential for energy efficiency are described reveals some of the potentially flawed reasoning which is recruited to service the idea that energy efficiency is a simple, attainable goal. The "problem" is described as: "In 2001 South Africa had the 26th biggest GDP in the world but was the world's 16th largest consumer of energy" (DME, 2005a:8). Two reasons are provided. The first relates to the nature of industrial activity in the country and further reinforces the validity of the MEC thesis:

Mining, minerals processing, metal smelting and synfuel production are *inherently* intensive users of energy. South African gold mines are very deep with low ore concentrations, so it *necessarily* requires much energy per ounce of gold. The process used by Sasol to convert coal into liquid fuels is such that only about a third of the energy in the coal ends up in the liquid fuel (DME, 2005a:8, emphases added)

The second reason given for the high energy intensity of the economy is South Africa's "historically low electricity price":

Our abundant coal reserves have partially contributed towards an economic environment wherein the unit price of electricity is amongst the cheapest in the world. One of the undesirable side effects of this has been that energy

efficiency has been demoted to make way for “priority” considerations, such as plant expansions and increases in production throughput. The second reason [therefore] for the high energy intensity is that South Africa is sometimes wasteful in the use of energy. Low energy costs have not encouraged industry, commerce, transport and households to adopt energy efficiency measures. (DME, 2005a:8)

The argument that "plant expansions" and "increases in production throughput" have taken the place of energy efficiency measures does not address the question whether these "inherently" energy-intensive activities at the heart of industry in South Africa are able to be carried out more efficiently. Expansion of plants and increases in production are perfectly reasonable activities to pursue (and are in line with the overall societal goal of economic growth) unless one can prove that this is done in an unnecessarily inefficient way. The main reasons for South Africa's higher energy intensity have already been accounted for by Fine and Rustomjee (1996) and within the Strategy itself – the industrial processes undertaken by MEC-type firms are *inherently* energy-intensive. The Strategy adopts the notion of a "barrier" to the pursuit of energy efficiency that stems from South Africa's historically low price of electricity. This barrier is theorised to hold strong in many commercial and industrial settings, and arguments state that if energy efficiency is approached correctly and with the right emphasis, payback on investment is "...frequently less than three years" (DME, 2005a:11). Education and awareness programmes are proposed as the first steps to take towards overcoming this barrier (DME, 2005a:10). The claim of a three year payback period is not differentiated for different sectors, e.g., residential, commercial or industrial, nor is evidence for the claim presented. Such a claim seems overly optimistic in relation to industry, and to energy and capital-intensive industry in particular – as the costs involved in changing production processes in these industries are considerable. It is naïve to assume that education and awareness are what is needed to "overcome the barrier" that is theorised to prevent pursuit of energy efficiency with respect to the large users of power. Firms for whom energy is such a significant input into their production costs are likely to be familiar with what actions they can take to ensure their businesses operate better, and to have considerable internal resources to bring to bear on the issue of energy use within their activities. A more convincing argument, which is alluded to elsewhere in the Strategy but not adequately developed, is that as energy prices rise, so efficiency enhancing projects will progressively become economically viable, encouraging a wider range of firms to

more carefully consider the role of energy in their activities: "...with the prospects of higher energy prices in future...there is a growing concern in South Africa to promote energy efficiency (DME, 2005a:8).

## **Regulatory Solutions**

The "Industry and Mining Sector Programme" of the Strategy sets a target for energy demand reduction of 15% by 2015, and contains a limited number of recommendations on how to encourage energy efficiency amongst the largest users of energy in South Africa. These include combining a voluntary approach with limited command-and-control regulations for specific technologies. The voluntary component is described as follows:

A suite of "leadership by demonstration" programmes will be implemented. The DME will drive this activity, which, it is intended, will be actioned by voluntary initiatives within industry itself...These programmes are intended to build industrial capacity in the area of energy management and best practice, and to give incentive for replication nationwide (DME, 2005a:28)

There is evidence, presented in the chapter six, that provision for a voluntary approach included in the Strategy was motivated by industry. The voluntary approach specified here is the precursor to the formation of the Accord, which was established soon after.

The second component of the Industry and Mining programme involves introduction of technology-specific regulations for energy efficiency, which confirms the assumptions formulated in chapter three regards the scope that exists for a command-and-control approach in this area of economic activity:

A series of mandatory standards will be introduced in phases. The intention is to ensure that life-cycle costs are considered where the purchase of "horizontal technologies" is concerned. The term horizontal technology refers to any specific technology which is commonly used across many industrial sectors (DME, 2005a:28)

Background research on what constitutes these horizontal technologies was undertaken by the Capacity Building in Energy Efficiency and Renewable Energy (CaBEERE) initiative. CaBEERE is a collaboration between three consulting firms intended to

supplement the decision-making capacity of the DME in the areas of energy efficiency and renewable energy. Strategy documents were produced in 2005 covering, amongst other topics: industrial norms and standards for energy efficiency, and industrial energy management best practice. Consultation required by the DME in this instance suggests that the issues are complex and involve technology and management issues that the South African government is poorly positioned to understand. In the report, "Energy Efficiency: Industrial Norms and Standards" (DME, 2005b), the stated objective is to "...ensure that appropriate standards for energy efficiency are identified, adopted and adhered to by industry" (pg. 8). The report identifies a total of three technologies with a reasonably wide application in this respect, namely non-utility steam-raising boilers, AC electric motors, and thermal insulation of pipe-work. According to data presented in the report, costs of adopting the proposed technologies are high, requiring incentives in most cases to encourage adoption (DME, 2005b:22). The payback period for installation of a high-efficiency motor is given as 6-10 years, which contradicts the claim within the Strategy that many investments require less than three years to be paid back. That a comprehensive report by consultants with significant experience in the area of energy efficiency measures in industry contains such a limited number of recommended applications illustrates clearly the limits to intervening in this area of the economy due to the technological heterogeneity of industry.

### **Financial Incentives Offered**

Eskom's DSM programme is the official financial incentive scheme for energy efficiency, evidenced by its description in the Strategy. The programme falls within the administrative ambit of Eskom. Funds for the programme are obtained from an amount built into the national electricity tariff, approved by the National Energy Regulator (NERSA). The programme works as follows:

Energy efficiency and load management projects are implemented and managed via a third-party (the Energy Services Company, or ESCO) and savings resulting from the intervention are shared between the host site, Eskom and the ESCO in approximately equal proportions. Capital funds are currently gathered through supply tariffs and administered by Eskom. The National Energy Regulator is responsible for ensuring that Eskom meets its Energy Efficiency and DSM target. (DME, 2005a:23)

Whilst the scheme theoretically allows for any viable energy efficiency enhancing project within reasonable cost limits to be subsidised, there has been an almost exclusive focus thus far on retrofitting measures, such as replacement of light bulbs (NBI, 2006).

## **Recommendations for Conceptual Tools**

The CaBEERE reports do recommend a number of energy efficiency-related resources for integration at the firm-level. These include the adoption of an effective EMS, principles of energy savings programmes, and various energy modelling techniques. These recommendations have not found their way into the Strategy, and it is not within the scope of this study to evaluate these specific tools. However, arguments presented thus far point to the efficacy of firm-level resources at engaging with environmental problems, and the position adopted here is that any initiative aimed at encouraging the pursuit of energy efficiency should include efforts to integrate conceptual tools such as an EMS at the firm-level.

### **5.1 The Energy Efficiency Accord**

Support within industry for a voluntary approach to energy efficiency had been building since the draft version of the Strategy was released in April 2004. The Capacity Building Leadership and Action (CBLA) led project "Mitigating Greenhouse Gas Emissions in Southern African Industry" provided an initial grouping of individual industries and associations which approached the DME and Eskom to discuss the possibility of using a voluntary approach to pursuing the objectives for industry and mining contained in the Strategy (Chantraine, 2005:1). The National Business Initiative (NBI) and the CBLA co-hosted discussions in 2005 with these stakeholders, at which the newly released Strategy was discussed and stakeholders explored "...how voluntary, industry-run initiatives can both reduce the cost of energy use and mitigate greenhouse gas (GHG) emissions" (NBI, 2006:6). It was here that the experiences of the Canadian Industry Partnership for Energy Conservation (CIPEC) with a voluntary approach were presented as a potential model upon which to base a South African programme. The NBI played a coordinating function by bringing together stakeholders to discuss these issues, with all parties collaborating in drafting the Accord, signed in May, 2005 between 32 individual companies, associations and the DME (Chantraine, 2005:i). In 2007 the number of private sector members had increased to 39.

The Accord is a fairly typical example of a Voluntary Agreement. The commitments contained were elaborated through a process of bargaining between government and business. Responsibility for engagement with the environmental problem of energy efficiency is shared between government and business. Governments commitments include to “build a relationship of trust and cooperation with signatories” and “encourage and enable information sharing and network activities with the private sector” (NBI, 2005a:3). Business commitments include to “promote the development of strategies and targets, in partnership with Government, that will contribute to the achievement of the overall energy efficiency target set by government” (NBI, 2005a:2). The remainder of commitments for industry relate to the means of measuring energy use and savings, designed in service of measuring progress towards the energy savings targets. There are no recommendations for specific technologies or for integration at the individual firm-level of environmental or energy management practices. The implication is that firm-specific human and technological resources are to be brought to bear on the problem of energy efficiency. In terms of accessing funding for energy efficiency projects, the Accord promotes accessing Eskom administrated DSM funds. At the outset, it is made clear that the Accord is motivated by the same set of interrelated issues established in the White Paper and Strategy. These are concerns around energy security, increasing industrial competitiveness, anxieties over future rises in energy prices and the links between energy production and use and the environment:

Both South African business and the Government recognise that improvements in energy efficiency are needed if the country is to remain competitive internationally whilst dealing effectively with potential electricity capacity shortages, environmental concerns and the steadily rising price of all energy sources (NBI, 2005b:1)

The Accord also links itself directly to government policy, specifically to the provision within the Strategy for “...business-led, voluntary initiatives to improve energy efficiency” (NBI, 2005b:1). The Accord is intended to “...support this specific objective of the Energy Efficiency Strategy” (NBI, 2005b:1). The overall objective of the Accord is to aid in the achievement of the final energy demand reduction target for mining and industry established in the Strategy of 15% by 2015. One striking comment within the Accord text reads: “The Parties recognise the national imperative to achieve higher economic growth rates and agree that energy efficiency improvements need to be considered



within the context of this overarching imperative” (NBI, 2005b:2). This is a clear indication of the non-enforceability of commitments and tacit recognition that the energy savings target may not in reality be achieved. The Energy Efficiency Technical Committee (EETC) is the key institutional mechanism of the Accord whereby members meet regularly to discuss various issues. It brings together representatives of industry, government and the power utility to discuss policy proposals and other developments in the area of energy efficiency. The NBI acts as secretariat to the EETC which meets once a month.

## Chapter 6: Presentation of Findings

### Review of Arguments and Areas to Investigate

The first task of interview material analysis is to establish whether arguments for the complexity and difficulty of regulating for energy efficiency in industry are valid. This relates to the case for the narrowing down of regulatory options for energy efficiency in these settings, and for firm and government motivations to seek out alternative regulatory arrangements. For this task, perceptions are gauged around the scope for regulating heterogeneous industry, and the effectiveness of DSM funding at encouraging energy efficiency in industry.

The second task is to elaborate on the motivations, or advantages, to pursuit of a Voluntary Agreement approach to regulating for energy efficiency in this case. Motivations are organised around the following themes; First, '*Energy-Intensity*' explores the specific interests energy-intensive firms have in energy and energy-related developments within the economy, and their motivations to pursue related opportunities; Second, '*Price Matters*' addresses the role that energy price is perceived to play in driving energy efficiency; Third, '*External Pressures and the Wider Set of Environmental Issues*', deals with the set of expectations applied to both firms and governments to take action on environmental problems, including energy efficiency. The origins of these expectations are examined, as well as how pressures are captured within the structure of the firm. Here, the assumption is tested that, particularly large energy and capital-intensive firms, have existing environmental objectives and capabilities which allow for issues such as energy efficiency to be both conceptualised and pursued. The intention here is to narrow down the possible set of motivations for participation to exclude the need for conceptual tools or technical information. This would strengthen the argument that there are limited environmental and economic benefits to these firms of participation, and that participation is politically expedient; Fourth, '*Influence Over the Form of Regulation*' responds to assumptions in the Voluntary Agreement literature that firms are motivated to influence the forms of regulation enacted if possible to ensure that they are beneficial to the firms interests. Evidence of influence brought to bear in this regard is evidence of preference for the voluntary approach; Finally, fifth, '*Developing Relationships with other Actors*' analyses the role of developing and maintaining relations between key stakeholders, such as government, the power utility and firms in motivating participation.

## **6.1 Arguments Against Effective Regulation of Energy Efficiency in Industry by Traditional Means**

### **The Limits Imposed by Technological Heterogeneity**

The argument made in chapter three that technological heterogeneity of production processes in industry makes it difficult to formulate regulations for energy efficiency is confirmed by responses. Respondents from industry explained that their firms were engaged in complex activities which bureaucrats were poorly equipped to understand and regulate for. The issue of unfamiliarity of government officials and policy makers with these industrial processes was repeatedly made by respondents: “Our industry employs technological and production processes unique in the world, so I don't see a government official being able to effectively regulate our industry” (Petro-Chemicals Industry Respondent). Differences between sectors and individual firms was referred to as another limitation on the effectiveness of industry-wide regulations: “Sometimes those who make regulations don't understand the needs of your company or industry. Many regulations are generic and aimed at an entire industry. They don't suit your particular company” (Cement Industry Respondent). One industry respondent described how increasing energy efficiency within firms required the latest advances in technology to be continuously incorporated into production processes – a process which regulation would interfere with:

Regulation follows technology, and energy efficiency is at the leading, if not the bleeding, edge of technology. There's no way that regulation can lead or encourage energy efficiency because it always lags behind developments, it will only get in the way (Ian Langridge, Anglo American).

The petro-chemicals industry respondent referred directly to the heterogeneity of industrial activities to argue for why regulations which specified technology standards for energy efficiency had limited scope within industry:

Regulation is more appropriate for standards governing appliances or key pieces of technology such as electric motors. In industry, every plant is different, every situation is different. You can't really regulate industry at that level (Petro-Chemicals Industry Respondent).

## **DSM Funds a Poor Incentive for Process Change**

Respondents' assertion that process change is the only way to achieve significant energy saving, and that this entails significant financial outlays, confirm arguments made in chapter three:

If you want to save 15 or 20%, you have to look at your fundamental processes to see what modifications you can make. For a 10-20% improvement in efficiency you are out of the DSM league (Petro-Chemicals Industry Respondent).

This respondent argued that DSM funding did not play a role in financing of process change as the monetary amounts are too large. One industry respondent suggested that the current incentive scheme should be modified to take this into account:

For us, financial incentives that would actually work would revolve more around process orientation, because the major [energy] savings possible would relate to the whole production process. That involves major financial commitments from the company (Ian Langridge, Anglo American)

Even for smaller-scale energy savings projects, certain industry respondents felt there was a lack of understanding on the part of government and the power utility of the technically innovative ideas developed within firms, and a focus instead on energy savings activities better suited to household or commercial settings:

In the cement industry we have projects that are quite technically innovative in order to achieve energy efficiency savings. Unfortunately they don't fall into the categories that Eskom has created to fund these projects, such as changing light bulbs (Cement Industry Respondent).

This was echoed by the respondent from the petro-chemicals industry: "We've come up with many innovative ideas only to not have them approved by Eskom because they don't seem to understand the technologies or benefits" (Petro-Chemicals Industry Respondent).

## **6.2 Outlining the Motivations for Firms to Take Action on the Environment and Participate in Accord Activities**

### **Energy-Intensity**

The respondent from the DME described a historical interest on behalf of the more energy-intensive firms and industry-associations in South Africa in energy-related issues, including energy efficiency. This interest is consistent with current patterns of industry interest in the Accord:

The mining sector and processed manufacturing are areas where energy use is intensive and there is a need for person or persons responsible for energy matters. These players take more interest in and participate more in something like the Energy Efficiency Accord. There is a history of their involvement in policy negotiations and high-level decisions related to their industry (Tony Golding, DME)

Consistent with this observation, associations which do not engage in energy-intensive activities are seen to be generally disinterested in the activities of the Accord:

Certain industry associations, such as the National Automobile Association of South Africa are not involved in energy-intensive activities, they haven't been interested in becoming more involved in the regular meetings. Whenever they have come they've said "well, we're not sure what this is all about" (Tony Golding, DME)

### **Price Matters**

The majority of respondents were confident that an increase in electricity prices would automatically lead to an increase in energy efficiency generally within the country. The Eskom respondent stated that "...a shift upwards in electricity prices will naturally encourage energy efficiency" (Vashna Singh, Eskom). The respondent from the cement industry argued that a rise in electricity price would assist any efforts by government to encourage energy efficiency in industry:

Because there are now signs that the electricity price will go up, and is likely

to continue to do so, it should become easier for government to convince companies of the value of implementing energy savings projects. The driving force behind business is to make the business viable and profitable. You are not going to go for a project unless it makes sense to the business (Cement Industry Respondent)

This response illustrates the understanding that control over what measures are taken for energy efficiency reside within the firms decision-making ambit and that these measures are particularly responsive to price signals. Whilst this attitude and the concept behind it may seem fairly obvious, it speaks to the ethos underlying the adoption of a voluntary approach. This is encapsulated in this response: “Companies work with the bottom line, if your bottom line can be significantly improved by doing energy efficiency projects, you will most definitely do that” (Dr. Elsa du Toit, Central Energy Fund). Two of the respondents expressed some doubt however that the increases in electricity price predicted over the medium-term in South Africa would lead to significant changes in the way businesses made their decisions. The respondent from the National Energy Regulator argued that “Higher tariffs will, to some extent, shift behaviour. Our low prices don't encourage sparing use of energy, but I'm not convinced that tariff increases of the order planned will have a huge impact on the plans of industry” (NERSA Respondent). Another respondent reasoned that “...the issue of demand management cannot be addressed by price structures only. My view is that it may discourage wasteful behaviour by some customers but I don't think it will fundamentally shift behaviour” (BUSA Respondent). These responses, whilst not ruling out the link between energy prices and efforts to increase efficiency, seem to confirm the argument made by Jaccard (2005) that energy prices need to increase significantly to usher in a period of sustained pursuit of energy efficiency.

### **External Pressures and the Wider Set of Environmental Issues**

The respondent from the DME described the sentiment in South Africa related to environmental issues as one characterised by high levels of interest in and desire on the part of government, business and the public to take action: “...there has been no time when there has been more interest in the areas of energy efficiency, climate change and a range of environmental issues as there is at the moment. So, this is a good time for all parties to be taking action on these issues” (Tony Golding, DME). Pressure experienced by firms to take action on environmental issues did not necessarily

originate in South Africa or coincide with events such as the release of the White Paper or Strategy. In tracing the origins of their firm's interest in and familiarity with environmental issues, one industry respondent placed more emphasis on the need to adapt their activities to international contexts in which they operated, than to any measures taken by the South African government: "To roll out our technology for other settings such as China and other parts of the world requires meeting high environmental standards. These standards in fact exceed those in South Africa so we have had to be aware of these things for some time now" (Petro-Chemicals Industry Respondent). For another, efforts to respond to environmental issues preceded any pressure brought to bear by the South African government: "One of Anglo American's objectives, which started in 2003, was we began looking at what opportunities presented themselves in terms of mitigating carbon emissions through energy efficiency for environmental reasons...I don't think at that time carbon emissions played a significant part in government's thinking" (Ian Langridge, Anglo American). All industry respondents mentioned the importance of enhancing and maintaining the corporate image of the firm by taking action on environmental problems, and how these pressures have had direct bearing on their development of environmental capabilities. "There is a huge amount of pressure on a company of the size of ours to display that they have the right structures in place. It is becoming more and more related to corporate social responsibility" (Cement Industry Respondent). The Petro-Chemicals Industry respondent argued that their firm had advanced systems in place to mitigate the environmental impacts of firm activity, with these directly linked to the need to be responsible corporate actors:

[Our firm] has, for a long time, been one of the leading companies in terms of Corporate Social Responsibility, looking at things like CO<sub>2</sub> emission reductions and carbon footprint reductions based on international protocols and has been really good at measuring and decreasing their emissions (Petro-Chemicals Industry Respondent)

In these instances, motivation to take action on energy efficiency is not as an isolated aspect of the firms' activities. Rather there was evidence that energy efficiency issues were integrated into a broader set of environmental objectives. Most industry respondents described their approach to energy efficiency as bound up with a number of other issues which include waste reduction, alternative fuels, CO<sub>2</sub> emissions reduction, and more generally, how this set of environmental issues are bound up in and driven by

the corporate culture of the firm:

Businesses have signed the Accord because they have corporate cultures that define the use of technology, or environmental objectives they aspire to. Where the Accord is in line with existing corporate culture or objectives, businesses sign and this provides the impetus for the Accord to function. At present there aren't any significant incentives from government to drive the process (Ian Langridge, Anglo American)

What these responses imply is that these firms had systems in place prior to their participation in the Accord both to conceive of and to pursue energy efficiency. These systems are developed within the context of the corporate cultures of firms, and the overall vision of their environmental responsibilities and objectives. Participation in the Accord fits with these plans: "We have developed a long-term vision with regards sustainability and participation in the Accord fits into these plans and principles, it's aligned with our values" (Petro-Chemicals Industry Respondent). Elaborating on this point, the respondent from the petro-chemicals industry was clear that pursuit of energy efficiency takes place within a well established framework specific to the firm:

We have a long-term target to reduce our carbon footprint substantially, and a number of other targets around zero-flaring. So the energy efficiency targets are part of a broader set of targets that are all aimed at achieving the same thing at the end of the day. We have our own systems in place for this that are a little more advanced [than those contained in the Accord]. We have a very thick ground-rules book (Petro-Chemicals Industry Respondent)

The organisational structure related to pursuit of energy efficiency bears testimony both to the ways it is pursued, and to the fact that this is not done in an isolated way: "Electricity issues fit into the portfolio of that type of person who minimizes fuel costs. This person is also usually responsible for a range of environmental issues at the company" (Cement Industry Respondent). This view is echoed by another respondent: "Depending on what a company does, it may give the responsibility for alternative fuels and efficiency to one person and call them the energy manager" (Ian Langridge, Anglo American). What these responses suggest is that the firms do not require the resources of the Accord to assist them with their pursuit of energy efficiency as they have



sophisticated means in place with which to do so themselves. These firms view energy efficiency as part of an integrated set of environmental objectives, closely aligned to their existing corporate culture. The assumption that energy savings amongst these active participants during the course of their participation in the Accord would have been achieved even in the absence of this regulation, is reinforced by statements such as this: "For us, the Accord has not played a role in guiding our approach to energy savings, we would have pursued the measures contained in the Accord anyway" (Ian Langridge, Anglo American).

### **Influence over the form of Regulation Enacted**

There was evidence that these firms had exerted some influence over the policy-making process to ensure that a voluntary approach to regulation was recommended in the first place:

After the draft Strategy came out in 2004, we had a workshop with the industrial sector, and they said, "We don't like the idea of all these mandatory standards and an over-regulatory approach. If you're looking at trying to save energy and stick to targets etc we would prefer a voluntary approach" (Tony Golding, DME)

Once the final version of the Strategy had been released, in which a voluntary approach was recommended, business drove the process of operationalising such an approach:

I think we were probably formative in getting an Accord going, driven by large industry, the chamber of mines and a group of other organisational groupings, onto which the NBI then latched onto as an organisation representing business interests (Ian Langridge, Anglo American)

This impulse from industry is in keeping with assumptions of the Voluntary Agreement literature regards the desire to avoid environmental regulations that may hamper business activity: "The level of commitment from signatories has something to do with them being scared that government may introduce too many regulations that they don't like" (Cement Industry Respondent). Industry respondents were clear that they preferred a voluntary approach to pursuit of energy efficiency: "We would always prefer a voluntary approach" (Petro-Chemicals Industry Respondent). Similarly, the business

advocacy respondent stated: “There must always be a component of self-regulation in place” (Business Advocacy Respondent). A final example comes from the cement industry respondent: “Pursuit of energy efficiency in the private sector in South Africa has to be voluntary” (Cement Industry Respondent). The type of industry driving the process towards adoption of a voluntary approach – here large, energy-intensive industry and industry associations – suggests that this grouping feel they stand to lose from a more restrictive approach to regulation, and would find a voluntary approach more acceptable.

### **Building and Maintaining Relationships with other Actors**

There was evidence that firms were motivated to participate in Accord activities by the need to build and maintain good relations with both government and the power utility. This is evidenced by the somewhat conflicted attitudes some industry respondents held towards other stakeholders, which they conceal in order to maintain good relations. This incongruity is captured in the following statement with regards the need to maintain good relations with the sole energy supplier:

It's important to remain on good terms with the utility. However we find that we get very little in return. You find with the smaller firms in our sector, they are a lot more negative about the supplier and don't try to work with Eskom, but [our firm] has always tried to be a partner with the utility. We are getting to a point where we aren't getting much assistance from Eskom for our projects and ideas. The problem though is that you're still dependent on Eskom so you can't go and rub their faces in the dirt and ostracise your sole supplier (Cement Industry Respondent)

A description of relations with government in the context of the Accord suggests the importance of relationship elements of participation over technical compliance:

The minister of Minerals and Energy approves of firms participation in the Accord as it shows they are aligned in some way with government's energy objectives. My understanding is that government wants everyone to show clear intent to become more energy efficient. If all members to the Accord measure their energy use and efficiency differently, and engage in different types of projects, it's OK (Petro-Chemicals Industry Respondent)

Participation was described by one respondent as “You get publicity, you get to show that you are a good corporate citizen and that your business or industry is committed to working together with government” (Petro-Chemicals Industry Respondent).

### **The Technical Committee as a Forum for Relationship-Building**

The Energy Efficiency Technical Committee (EETC) is the regular forum arrangement where actors from industry, government and the power utility meet. This is the space within which relationships amongst stakeholders would be formed and maintained, and influence over policy and regulation enacted. Most industry respondents were appreciative of the opportunities provided for networking and sharing of information: “We serve on the NBI Technical Committee on energy efficiency. This way we meet other industry role players and share ideas” (Leon Willemse, RBCT). This view was echoed by the respondent from Anglo American: “The Accord has presented us with a forum to enable us to share and share in energy efficiency related activities. It has played a role in bringing like-minded entities together so that sharing of achievements can take place” (Ian Langridge, Anglo American). Certain respondents saw significant opportunity provided by the EETC for influencing regulations: “The advantage of being visible and of lobbying to generate good will and being represented at a forum like this is you are more able to ensure that the regulation is fair to your company” (Cement Industry Respondent). An example provided was of the opportunity to urge the electricity utility, Eskom, to review their approach to DSM funding: “We have tried to get everyone on board and push Eskom to understand that energy savings in industry are not just about changing light bulbs, it's about process improvements” (Cement Industry Respondent). The respondent from the utility reinforced this view: “The feedback we have received from the NBI on DSM funds and other issues have really helped us and given us guidelines on how to adapt our policies to better suit the needs of business” (Vashna Singh, Eskom). There was also evidence of EETC participation allowing for preferential and early access to information on developments in the energy sector: “When Eskom first came out with their power-rationing proposals in January, they came to the EETC and presented this to us before it became public and asked for comments” (Cement Industry Respondent)

### 6.3 Testing the Assumptions

The validity of assumptions formulated in chapter three as elements of a conceptual framework are tested here based on evidence from the interview material. The assumptions are restated, followed by an analysis of related evidence. *Assumption 1: Environmental problems can be complex in ways which make regulation for them by conventional means difficult and costly.* Many industry respondents are sceptical of government's ability to formulate technical regulations for energy efficiency. There is an understanding that to realise energy efficiency savings requires familiarity with the latest advances in technology and the means at the firm-level to upgrade capital machinery. Certain respondents expressed the view that government would simply "get in the way" of the activities the firm needed to engage in to pursue energy efficiency. This illustrates the belief held by industry respondents that intervention by government in this area would introduce unnecessary constraints. Also apparent from responses is that motivations to pursue energy efficiency present at the firm-level. This speaks to the question of whether or not it is necessary to regulate to encourage energy efficiency amongst large, energy and capital-intensive firms. For the kind of firms studied here, the imposition of a conventional command-and-control approach seems to be unnecessary and would interfere with the processes firms themselves would enact to address this particular environmental problem. *Assumption 2: Because Voluntary Agreements allow for firm-specific human and technological resources to be brought to bear on an environmental problem, individual firm responses will be different and informed by their existing environmental capabilities and objectives.* Firm's environmental capabilities and objectives are influenced by a range of factors, from their operation in international contexts in which environmental regulations are more extensive than in South Africa, to the need to enhance corporate profiles, and as forming a part of the long-term vision for fulfilling environmental responsibilities. The majority of firms interviewed have developed fairly sophisticated environmental capabilities which, importantly, are not restricted to energy efficiency, but extend to a range of competencies, including pollution reduction, carbon mitigation and the use of alternative fuels. The impression created from responses is that any advance towards environmental objectives, including those related to energy efficiency, takes place within a firm-based framework which emphasises action on environmental issues and provides resources in the service of these ambitions. The heterogeneity of industry also illustrates the difficulty of formulating a standard approach to regulating for energy efficiency in this type of heavy industry, and

points to the utility of an approach which is flexible enough to allow for firm-led efforts to engage with environmental problems, including energy efficiency. *Assumption 3: Particularly larger, more visible firms, are motivated to improve their standing with key stakeholders such as government through participation in voluntary initiatives, irrespective of the cost or technical utility of such participation.* Certain firms revealed a definite strategy of improving and maintaining relations with government and the power utility through participation in the Accord. Especially pertinent is the observation that these relations are pursued in some cases despite privately held negative views of the other party. Also pertinent is the impression that participation in the Accord does not necessarily provide firms with guidance on energy efficiency per se, due to existing environmental objectives and capabilities independent from the Accord. The motivation to improve and maintain relations with stakeholders therefore takes on extra significance. This development of relations is seen to provide further advantages in terms of opportunities to influence energy efficiency policy and regulation. This is theorised to be important for large, energy-intensive firms in the South African context.

I argue that the evidence presented here is sufficiently persuasive to validate these assumptions.

## Chapter 7: Conclusions

The central question which this research has sought to answer is: What motivates stakeholders to pursue the Voluntary Agreement form of regulation to encourage energy efficiency within industry in South Africa? Two main sub-questions have also been posed. These are: 1) What differentiates Voluntary Agreements from other forms of environmental regulation in the case of energy efficiency? And 2) What motivates active participation in the Energy Efficiency Accord?

To answer these questions this research has examined the arguments against the efficacy of more conventional forms of regulation when applied to the problem of energy efficiency in industry. The difficulty of prescribing technologies within a heterogeneous industrial landscape characterised by rapidly changing technology presents the greatest barrier to formulation of effective command-and-control regulation. Significant financial outlays required for realising efficiency gains amongst the largest users of power, and little motivation for smaller firms to pursue energy efficiency barring higher energy prices, reduce the effectiveness of incentive schemes. These factors conspire to reduce both the effectiveness and attractiveness of more conventional forms of energy efficiency regulation, and serve to position the Voluntary Agreement approach as a regulatory option with more appeal to the actors involved. A voluntary approach could be described as allowing business-as-usual to continue as its adoption essentially means that firms may continue to do as they choose. If it makes sense to the firm to enact changes to production processes which result in greater energy efficiency, they will do so. Conversely, the option still remains for firms in the South African case to enact changes which may reduce energy efficiency whilst fulfilling other objectives of the business – as evidenced by the Accord's proviso which prioritises economic growth over reduction in energy use. The setting of national targets, high-level pronouncements on the importance of energy efficiency and initiatives such as the Accord are all public-supported attempts to alter the set of considerations firms take into account when making their decisions.

It may seem anathema to hold back from passing more stringent regulations to control for energy efficiency, particularly considering the link between energy production and serious environmental problems such as climate change, and the need to continue

developing economically in a progressively resource-scarce world, yet such are the inherent characteristics of energy use in industry that it may be prudent to do so. It is at the firm-level that energy use issues get decided – which at once denotes both influence and the lack thereof. Societal pressures to take action on environmental problems, communicated through government policy, consumer preferences and demands, are all forces which have influence in this decision making space. The adoption of and commitment to a Voluntary Agreement form of regulation in this instance reflects the power of these pressures to influence firm's activities, and further encourages a sensitivity to acting responsibly on environmental issues.

The role of energy price is another significant factor which shapes decisions and motivates the pursuit of energy efficiency. This factor is argued to be crucial in determining the range of firms which are actively involved in pursuit of energy efficiency, and as the factor which will determine the nature of participation in Accord activities as an example of Voluntary Agreement for energy efficiency in industry. At present, energy prices are relatively low in South Africa (although recently increased), and the lack of interest in the Accord by all but a small group of very large and energy-intensive firms is argued to illustrate the importance of energy price in determining interest in energy efficiency issues. If energy prices rise rapidly and for an extended period, more firms may join and participate based on a need to acquire technical information and environmental management resources with which to enact efficiency improvements and other changes they may have been ill prepared to make. At present, I argue that active participants are motivated more by a desire to ensure their already advantageous positions in the economy, and by their corporate cultures which insist on action on a range of environmental issues. Interactions amongst stakeholders at the Energy Efficiency Technical Committee on a regular basis provides these opportunities for relationship forming and strengthening. These firm motivations are in turn influenced by historical factors extant in South Africa which have served to encourage the dominance of large, capital and energy-intensive firms capable of ensuring their advantageous positions. These types of firms make efficiency adjustments as a matter of course, and have developed highly sophisticated capabilities with which to do so. Therefore current patterns of participation in the Accord are not driven by a need to enhance energy efficiency capabilities, but by strategies for positioning in the economy and in relation to government and the power utility.

Smaller and medium sized firms which may not be familiar with energy efficiency and other environmental issues, may stand to gain the most from participation in an information sharing initiative such as the Accord. Should energy price rises accelerate in the future (and signs are that they will), and pressures on a wider range of firms to pursue environmental objectives increase, such firms may be motivated to join and the nature of Accord activities may evolve accordingly. Such a change may represent a shift from motivation based on developing relationships, to include technical guidance and information sharing. The Canadian experience with a Voluntary Agreement approach to regulating for energy efficiency seems to have benefited in terms of funding and the breadth of activities from its wider membership and the greater demand which exists for information sharing and provision of conceptual tools. A large number of firms clamouring for such resources would provide the best argument for greater government support and funding for the Accord. As current patterns of participation in the Accord are motivated by non-technical factors such as developing and maintaining relationships amongst stakeholders, the potential for information gathering and dissemination on the technical aspects of pursuit of energy efficiency are likely to remain nascent. A potential danger is of the difficulty in securing funding and support for the Accord based on a lack of demand for these information services.

It is unlikely that technology-specific regulations will in the future encroach on the functionality and usefulness of the Accord. The limited set of energy efficiency-enhancing regulations currently tabled represent the sum of industry-wide or "horizontal" technologies for which regulation can be practically enacted. The Voluntary Agreement approach to regulating for energy efficiency in industry is argued here to be the most appropriate choice from the universe of environmental regulation and should therefore remain at the centre of efforts to regulate for and encourage energy efficiency in South Africa.



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