

https://dspace.org/

Legislation of cleaner production in South Africa

Chewe, Victor

2008-06-25T12:15:50Z
http://hdl.handle.net/10539/4983

Downloaded from a DSpace repository. https://dspace.org/

LEGISLATION OF CLEANER PRODUCTION IN SOUTH AFRICAN

MSc (Eng) RESEARCH REPORT

AUGUST 2007



SHOOL OF CIVIL & ENVIRONMENTAL ENGINEERING

VICTOR CHEWE

SUPERVISOR: Prof. P. MARJANOVIC

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

LEGISLATION OF CLEANER PRODUCTION IN SOUTH AFRICA

VICTOR CHEWE

Research report submitted to the Faculty of Engineering and the Built Environment, University of the Witwatersrand, Johannesburg, in partial fulfillment for the degree of Master of Science in Engineering.

Johannesburg, 2007

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

DECLARATION

I declare that this research report is my own, unaided work. It is being submitted for the degree of Master of Science Degree in Engineering in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in any other University.

_____
(Signature of Candidate)

_____ Day of_____ Year_____

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

ABSTRACT

The objective of this research was to review legislation of Cleaner Production (CP) in South Africa. In achieving the objective, the study reviewed and analysed the relevant legislation, policies and projects. Identified gaps in legislation and policies, reviewed emerging issues related to CP, identified processes and activities that threaten the promotion of CP and evaluate the potential economic implications of application of CP

The gaps in policy and legislation lie in the lack of appropriate incentives (lack of effective economic instruments), the existence of disincentives for CP (such as low cost of electricity, water, effluent treatment and waste management), as well as the lack of enforcement of the legislations and implementation of policy. The lack of capacity tp implement CP-related legislation and policy is being addressed at a limited level, buy needs wider and more intensive efforts, in addition to the development of partnerships and voluntary agreements to assist the process. It should be noted, that the existence of strong legislation and enforcement is generally a pre-requisite to encourage a shift to self-regulation and information sharing on applied CP/SCP measures, and that they do not meet the requirements. In addition, it is easier to regulate an informed industry than to battle against an ignorant one and therefore, no legislation and policy will be effective without strategies to implement a significant effort in awareness raising, education and training on CP at all levels and in all sectors, including national and local governments.

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

ACKNOWLEDGEMENT

I wish to express my appreciation to all the government departments that contributed their time and data to this project. I am grateful for guidance and comments on the report by Professor P. Marjanovic (School of Civil and Environmental Engineering, University of the Witwatersrand).

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

CONTENTS

CHAPTER 1: INTRODUCTION 6
1.1 Introduction 6
1.2 Study Overview 6
1.3 What is Cleaner Production? 6
1.4 History of Environmental Progress in Industry 9
1.5 Historical steps towards Cleaner Production 10
1.5.1 Passive environmental strategies 10
1.5.2 Reactive environmental strategies: end-of-pipe approaches 11
1.5.3 Proactive environmental strategies: cleaner production 12
1.6 Rationale of the Study 13
1.7 Goal of Research Study 14
1.8 Objectives of Research Study 14
1.9 Outline of the Research Report 15
CHAPTER 2: LITERATURE REVIEW 16
2.1 Introduction 16
2.1.1 The Concept of Cleaner Production 16
2.1.2 Cleaner Production Techniques 17
2.6 History of CP in South Africa 19
2.7 CP Milestones in South Africa 20
2.8 CP Related legislation, Policy and Strategy 23
2. 9 Relevant International Legislation 23
Box 2.2 Multilateral Environmental Agreements and International Declarations 24
2.9.1 Rio Declaration on Environment and Development 24
J2.9.2 ohannesburg Plan of Implementation (WSSD) 25
2.9.3 The International Declaration on Cleaner Production 25
2.9.4 UN Framework Convention on Climate Change (UNFCCC) 25
2.9.5 Vienna Convention for the Protection of the Ozone Layer 26
2.9.6 Rotterdam Convention on Prior Informed Consent for Hazardous Chemicals 26
2.9.7 Stockholm Convention on Persistent Organic Pollutants (POPs) 26
2.9.8 Basel Convention on Trans-boundary Hazardous waste 26
2.10 Linkages to International and African Cleaner Production Initiatives 27

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

2.11 Review of Legislative Framework Relating to Cleaner Production 29
2.11.1 Constitution of the Republic of South Africa, Act 108 of 1996 29
2.11.2 National Environmental Management Act 107 of 1998 30
2.11.3 The Environment Conservation Act 73 of 1989 31
2.11.4 Occupational Health and Safety Act 181 of 1993 31
2.11.5 Regulations for Hazardous Chemical Substances (GN. R. 1179 GG16596 of 1995) published in terms of Occupational Health and Safety Act 181 of 1993 31
2.11.6 National Water Act 36 of 1998 31
2.11.7 Mineral and Petroleum Resources Development Act (Act no 28 of 2002) 32
2.12 Review of Policy Framework Relating to Cleaner Production 33
2.12.1 The White Paper on Integrated Pollution and Waste Management 2000 34
2.12.3 The White Paper on the Energy Policy of the Republic of South Africa 1998 36
2.13 The Law Reform Process 37
2.13.1 National Waste Minimisation Strategy 37
2.13.2 National Integrated Waste Management Bill (2003) 38
2.13.3 National Environmental Management: Air Quality Bill (2003) 38
CHAPTER 3: RESEARCH METHODOLOGY 39
3.1 Introduction 39
3.2 Research Objectives 39
3.3 Research Design 39
3.4 Data Processing and Analysis 40
CHAPTER 4: RESULTS AND DICUSSIONS 41
4.1 Introduction 41
4.1.1 Regulatory and incentive constraints: 43
4.1.2 Awareness constraints: 43
4.1.3 Operational constraints at the enterprise level: 44
4.2 Potential Drivers for the Adoption of CP practices in South Africa 45
4.3 Financial Support 47
4.4 Technology development and economic instruments 48
4.5 Employment issues 48
4.6 Effects on Domestic and Export Markets 49
4.6.1 Cleaner Technology and the EGS Sector 49

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

4.6.2 Environmentally Preferable Products 50
4.6.3 Taxes, fees and charges 51
4.6.4 Liability rules 52
4.6.5 Subsidies 52
4.7 Environmental Management Accounting 53
4.8 The Status Quo Review: Key issues and Gaps 54
CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS 59
5.1 Overview of policy 59
5.2 Recommendations of the UNEP CP Status reports: Implications for SA 66
5.3 General Implications for CP policy from Best Practice Review 69
5.5 CP Policy and Strategy options for South Africa 72
5.5.1 Initial awareness raising 72
5.5.2 Obtaining Political Commitment 73
5.5.3 Building National Capacity 73
5.5.4 Demonstrating CP 74
5.5.5 Establishing Information Networks 74
5.5.6 Forming Partnerships 75
5.5.7 Education and Training 75
5.5.8 Technology Development 76
5.5.9 Financing CP 76
5.5.10 The development of appropriate framework of CP Policies and Strategies 76
REFERENCES 86

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

LIST OF FIGURES

Figures Page

1.1 Cleaner production concept…….8

1.2 Shift towards Cleaner Production……10

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

LIST OF TABLES

Table Page

4.1 Prioritising the Barriers of CP in South Africa…….45

4.2 Summary of CP related legislation in South Africa……..59

5.1 UNEP Global Status Review of CP: Implications for South Africa Policy……..82

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

CHAPTER 1: INTRODUCTION

1.1 Introduction

This section serves as an introduction to the content of this chapter. It gives an overview of Cleaner Production (CP) definition and history.

The introductory chapter also covers historical development of environmental strategies and explains reasons for development of CP approach.

1.2 Study Overview

The rationale for this research study is that Cleaner Production (CP) should be an essential part of any comprehensive management system at an enterprise, provincial and national level [Habil, Staniskis, Stasiskiene and Arbaciaukas, 2004]. Whilst there are no legislative instruments to directly enforce Cleaner Production in South Africa at present, there are a number of policy initiatives in which this approach is proposed and which are likely to be incorporated into legislation in the near future [Hanks and Janisch, 2003]. The South African environmental legislative framework is generally fragmented, with no consolidated national statute relating specifically to waste management and the promotion of resource efficiency [Hanks and Janisch, 2003].

The study reviews, analysis and identifies gaps in current CP policy, strategy and practices and provides a framework for future development of policy and action plans.

1.3 What is Cleaner Production?

The concept of Cleaner Production was introduced by UNEP in 1989 as a response to the question of how industry could work towards sustainable development.

Cleaner Production means the continuous application of an integrated preventive environmental strategy to processes, products and services to increase overall efficiency [www.unepie.org/pc/cp/understanding_cp/home.htm]. This leads to improved environmental performance, cost savings, and the reduction of risks to humans and the environment.

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

- **For production processes,** CP includes conserving raw materials and energy, eliminating toxic raw materials, and reducing the quantity and toxicity of all emissions and waste before they leave the process.

- **For products,** CP focuses on reducing impacts along the entire life cycle of the product, from raw material extraction to the ultimate disposal of the product.

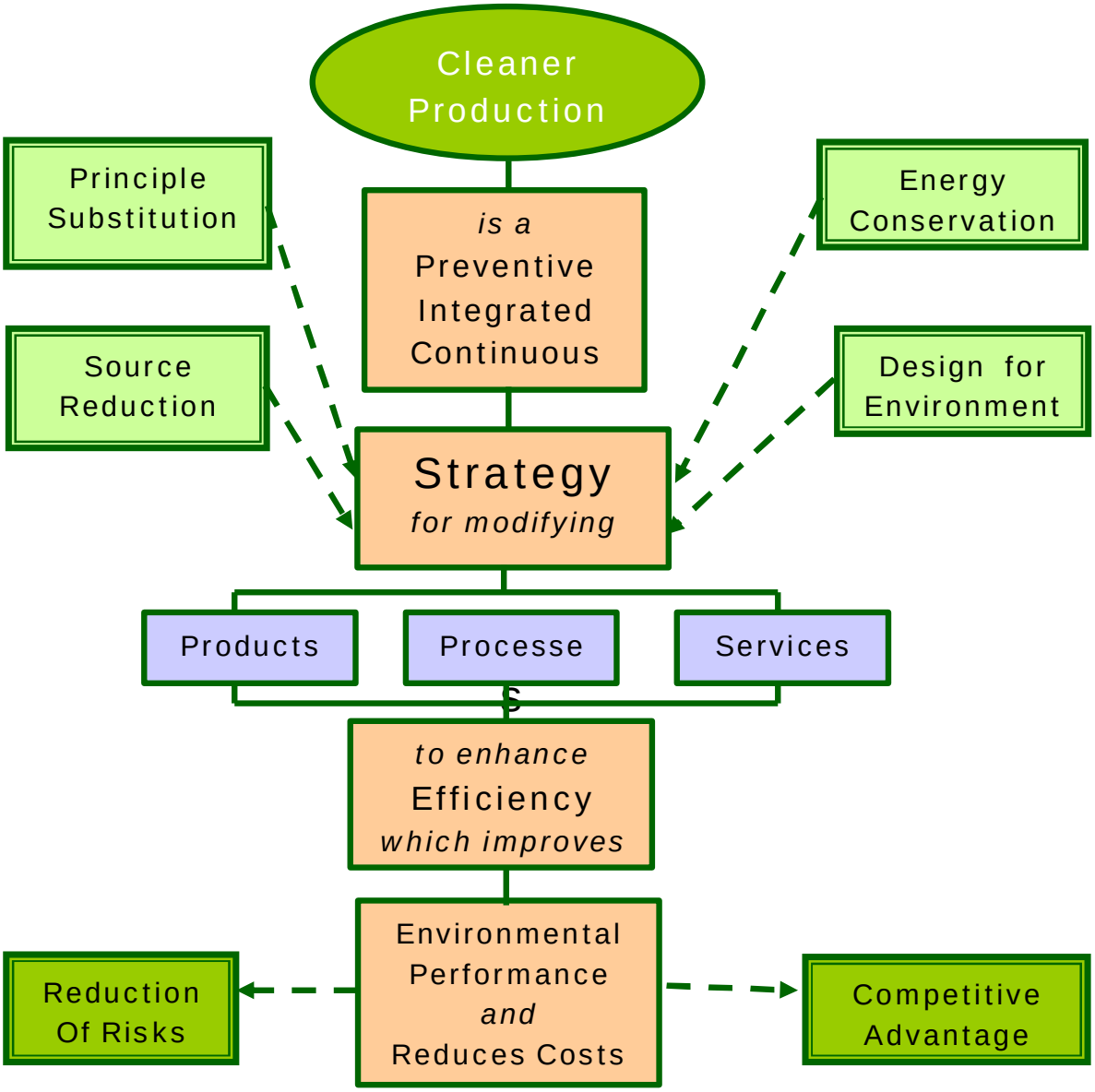
For services, using a preventive approach involves design issues, housekeeping improvement, and the better selection of material inputs (in the form of products)

Other concepts such as eco-efficiency, waste minimization and pollution prevention share a common emphasis on pollution/waste elimination/reduction at the source where it is generated [Barros, Bello, Roca and Casares, 2006]. However, CP strategy includes well-developed procedure for systematic assessment of pollution/waste generation causes and development of practical options aimed at solution of concrete problems. Additionally, CP strategy includes clearly defined CP management system, which ensures continuous improvement of environmental and economic performance [Wagner and Arnold, 2006].

CP should not be considered only as environmental strategy, because it also relates to economic considerations. In this context waste is considered as a “product” with negative economic value. Each action to reduce consumption of raw materials and energy, and prevent or reduce generation of waste, increases productivity and brings financial benefits to enterprise [Kliopova and Staniskis, 2006].

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

Fig. 1.1 Cleaner production concept



Data source: Habil, Staniskis, Stasiskiene and Arbaciaukas, Introduction to Cleaner Production Concepts and Practice (2004)

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

A preventive approach means that environmental problems are addressed before they arise when choices are made concerning processes, raw materials, design, transportation, services, and more [Jackson Tim, 1993]. Such an approach effectively addresses the wasting of natural resources since pollution not only leads to environmental degradation but is also a sign of inefficient production processes or management. In practice cleaner production means the following:

- avoiding or reducing the amount of waste produced;
- using energy and resources efficiently;
- producing environmentally sounder products and services;
- generating less waste, reducing costs and increasing profits.

1.4 History of Environmental Progress in Industry

The first United Nations Conference on the Human Environment was organised in Stockholm in 1972. As a result of this Conference the UN Environmental Program (UNEP) with its central office in Nairobi, and later the UNEP office in Paris which is oriented to industry and environment relations (UNEP IE) have been established. The conditions and changes in the global environment have been continuously observed and investigated by the UN Environment Program.

Twenty years after the UN Conference on the Human Environment, the World Summit in Rio de Janeiro issued a call for action on development and environment in the form of Agenda 21. Faced with one of the major challenges to replace unsustainable development patterns with environmentally sound and sustainable development, the world community has established the new UN Commission for Sustainable Development (CSD) [Habil, Staniskis, Stasiskiene and Arbaciaukas, 2004].

In the past 50 years the response of industrialised nations to pollutants and environmental degradation evolved as follows:

1. Relying on self-recovery of polluted nature;
2. Ignoring the pollution problems;
3. Diluting wastewater or dispersing the pollutants by constructing higher smokestacks to decrease pollution effects;
4. Trying to control the pollution by implementing the end-of-pipe technologies;

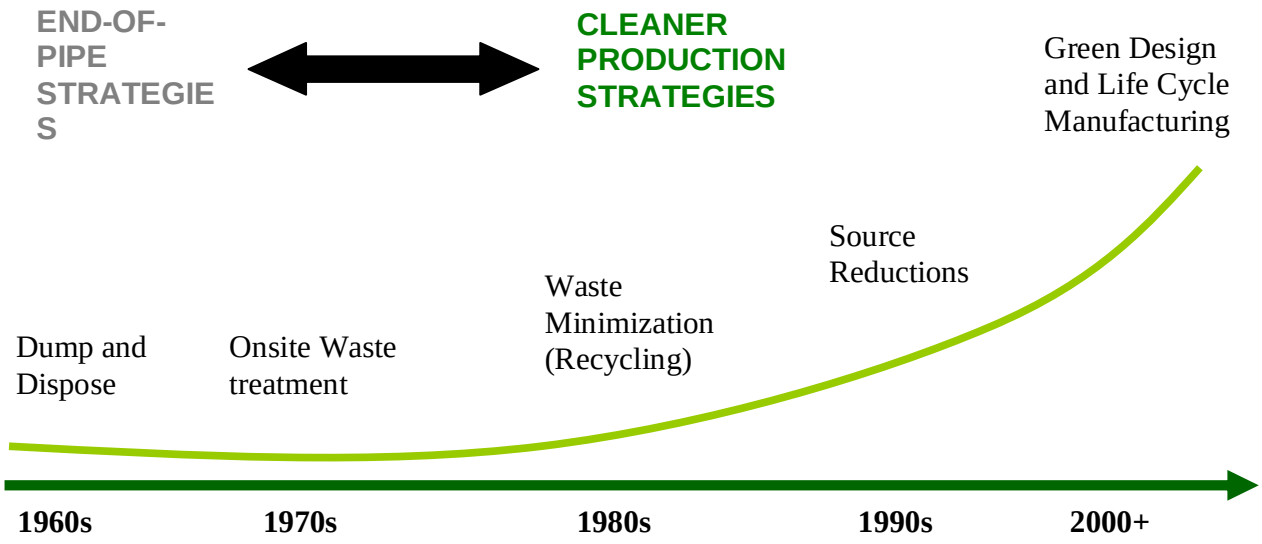
PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

5. Applying cleaner production approach – preventing or minimising pollution at the source where it is generated;
6. Applying sustainable industrial development concept –efficiently using non-renewable resources, conserving renewable resources, protecting the human environment and not exceeding the functional limits of the ecosystem.

1.5 Historical steps towards Cleaner Production

The awareness of the need for an integrated approach to environmental pollution and resource depletion problems is a step-by-step process. This process is sometimes slowed down by lack of knowledge and, more often by financial constraints or short-term policies [Stone, 2006]. However, analysis of the efforts during the last decades demonstrates a clear evolution in the general attitude of governments and industry regarding protection of the environment.

Fig 2.1 The shift towards Cleaner Production



Data source: Habil, Staniskis, Stasiskiene and Arbaciaukas, Introduction to Cleaner Production Concepts and Practice (2004)

1.5.1 Passive environmental strategies

The philosophy of an endless world with inexhaustible resources and an infinite absorption and dilution capacity for waste was the leverage for industrial development from the early industrial

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

revolution until deep in our century. This certainly doesn't mean that environmental problems never arose, but that the problems were avoided instead of fundamentally solved. These early environmental attitudes of avoiding the problem can be summarised under three categories: concentrate & contain and dilute & disperse (Jackson T., 1996).

Dilute & disperse, concentrate & contain. For some time, there has been no space left in Europe to foul & flee without getting into a war with your neighbours. Other short-term "solutions" for environmental problems were brought into practice. Dilute & disperse was the only waste management practice in pre-industrial society and was totally based on the assimilative capacity of the natural environment. Later, in the industrial society, dilute & disperse seemed to be adequate to make waste disappear in atmosphere and water ("the solution of pollution is dilution").

Concentrate & contain seemed to be successful as a treatment for waste disposal on land, e.g. controlled disposal of toxic or nuclear waste.

Both attitudes prove to fail in the long run. As to the concentrate & contain philosophy, due to deterioration of the containers and/or the control, it is impossible to guarantee storage without leakage during many generations. Concerning the dilute & disperse strategy, hydrosphere and atmosphere are not a black box. Heavy metals, PCB's and other diluted waste start to cycle and get accumulated in sediments or biomass, leading to contamination risks.

1.5.2 Reactive environmental strategies: end-of-pipe approaches

From the 1960s onwards, it became obvious that the dilute & disperse strategy was no longer effective for important point-source pollution. A complete technology and business was developed to install purification units at the end of the emission pipes of various production processes. Although effective to a certain extent the end-of-pipe approach is not the best solution.

The pollution control methods involve the addition of filters and other end-of-pipe technologies, which collect and treat pollutants and wastes after they have been generated. Although these methods can help reduce emissions, the pollutants and waste material generated must be disposed of properly, often at considerable costs to the producer.

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

This approach generally produces by-products like purification sludge, which has to be dumped or burned and consequently causes other environmental impacts. Additionally, the end-of-pipe approach is not successful at all for dispersed pollution sources. For example, the amount of nitrogen exported from a farmed field, over fertilised with cow dung or pig slurry, through ammonia volatilisation and nitrate leaching, is rather small [www.defra.gov.uk/environment/waste/health-report11.pdf. 2004]. The high number of fields under these conditions means that in certain areas of Europe nitrate concentrations in the groundwater systematically surpass drinking water levels and average atmospheric nitrogen depositions surpass 50 kg per year per ha.

1.5.3 Proactive environmental strategies: cleaner production

Only in the past 10 to 15 fifteen years, new ideas have emerged to reduce emissions to the environment at the source. These pollution prevention and waste minimisation strategies appeared to be necessary to reduce the enormous costs of clean-up actions, certainly from the moment that the polluter pays principle was brought into legislation [Lowell, 2000].

Cleaner Production is a way of attacking environmental problems at their source, rather than merely reacting to them. It involves a different way of thinking about environmental management issues, as well as a set of technical skills.

Originally developed in manufacturing industry to eliminate complicated problems of waste disposal and pollution control, Cleaner Production has now been extended to a wide range of activities in many sectors [Lowell, 2000]. Wherever an activity involves the use of significant amounts of energy/water or other resources, or results in the generation of wastes and emissions, cleaner production can be used to reduce environmental impact, and often to reduce costs. It offers great potential for companies to improve their environmental performance and gain community support, while increasing economic efficiency and productivity and improving competitive advantage.

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

Properly implemented CP:

always

- reduces long-term liabilities which companies can face many years after pollution has been generated or disposed at a given site;

usually:

- increases profitability, lowers production costs and enhances productivity by avoiding or reducing pollution control and waste treatment/ disposal costs;
- provides a rapid return on any capital or operating investments required;
- leads to the more efficient use of energy and raw materials;
- increases product yield, as waste generation along the production chain is minimised;
- results in improved product quality;
- increases staff motivation through reduced worker risks and relies on active worker participation in idea generation and implementation;
- reduces consumer risks associated with products containing hazardous substances;
- reduces the risk of environmental accidents;
- is supported by employees, local communities, customers and the public;

often:

- avoids regulatory compliance costs;
- leads to insurance savings;
- provides enhanced access to capital from financial institutions and lenders;
- is fast and easy to implement;
- requires little capital investment.

1.6 Rationale of the Study

During the last decade efforts by the South African government to formulate policies and promulgate regulation to steer the local industry towards CP have lagged behind the private initiatives that have taken place in the industrial sector, as well as those from academic and research. [Hanks and Janisch, 2003]

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

In South Africa, with its rapidly developing economy and industrialisation, natural resources are under pressure [Hanks and Janisch, 2003]. The World Summit on Sustainable Development (WSSD) presented an opportunity for the North-South cooperation to develop flexible mechanism to promote economic growth, environmental stewardship and social transformation. Following the WSSD, Cleaner Production (CP) is slowly emerging as one of the key flexible mechanisms.

DEAT has recognised the need to have a national CP strategy that will guide the promotion of CP and sustainable consumption in South Africa [Hanks and Janisch, 2003]. As South Africa works towards the status of an emerging economy, CP becomes an imperative for gaining competitive advantage through product differentiation and environmental stewardship. In order to meet the obligations of the national sustainable development agenda, CP will have to be encouraged and steered through national policy and strategy.

1.7 Goal of Research Study

The constitution sets the stage by declaring that everyone has a right to a clean environment and "*to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures' including those that 'prevent pollution and ecological degradation'* [NEMA, 1999].

Therefore the study reviews, analyses and documents the key legislative elements relating to cleaner production in South Africa and identify the gaps of the environmental legislative framework relating specifically to waste management and the promotion of resource efficiency. The significance of the impact on policy design of the different market conditions and activities of particular business sectors has been highlighted particularly well by a recent study that was undertaken in Europe [Clayton, Spinardi and William, 1999]

1.8 Objectives of Research Study

The following tasks constitute the scope of work for this study in order to achieve the aim and goals set above:

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

- Review relevant legislation, policies and projects
- Identify gaps in legislation and policies
- Review emerging issues related to CP
- Identify processes and activities that threaten the promotion of CP
- Evaluate the potential economic implications of application of CP

1.9 Outline of the Research Report

In this Chapter, CP has been discussed. In addition critical issues such as history and the development of CP have also been discussed. In closing this chapter, the goal and objectives of this study have been presented. In Chapter two, literature reviews of previous relevant publications to the research goals and objectives of this report are discussed.

Chapter three of the report presents the research Methodology. The last Chapter four and five presents Results and Discussions and Summary and conclusions based on the research findings respectively.

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This section outlines the concept of Cleaner Production and provides a brief historical overview of the implementation of Cleaner Production in South Africa.

2.1.1 The Concept of Cleaner Production

Cleaner Production is a general term that describes a preventive environmental approach, aimed at increasing resource efficiency and reducing the generation of pollution and waste at source, rather than addressing and mitigating just the symptoms by only technically "treating" an existing waste/pollution problem. In essence, Cleaner Production is about:

- Preventing waste and pollution at source
- Minimising the use of hazardous raw materials
- Improving water and energy efficiency
- Reducing risks to human health
- Saving money
- Improving efficient management practices
- Promoting sustainable development

Cleaner Production includes measures to conserve raw materials, water and energy and measures to reduce at source the quantity and toxicity of all emissions and wastes being emitted to air, land and water. Furthermore, this approach embraces the '*cradle-to-grave'* principle, the '*precautionary principle*' and the '*preventive principle'*. Because Cleaner Production addresses the problem at several levels at once, it is a holistic integrated preventive approach to environmental protection [Chinh, Gheewala and Bonnet, 2006]. The Cleaner Production approach is an integral part of South Africa's *Integrated Pollution and Waste Management Policy* [DEAT, 2000].

The term "Cleaner Production" describes a *comprehensive* preventive approach to environmental protection. It is a broad term, encompassing what is sometimes also referred to as *waste minimisation, pollution prevention, cleaner technology, waste reduction, non-waste technologies* and *source reduction*, which all form part of the Cleaner Production approach. *Waste minimisation* is a key concept driving CP and CP-related programmes and initiatives. Terms such as *industrial ecology, green business* and *eco-efficiency* similarly describe aspects of the CP

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

approach to business. All of the terms mentioned above, however, describe a proactive approach that embraces a forward-looking "anticipate and prevent" philosophy.

2.1.2 Cleaner Production Techniques

Cleaner Production can be achieved in many different ways. The most important are:

- *Changing attitudes* and finding a new approach to the relationship between industry and the environment.
- *Applying expertise and know-how* by improving efficiency, adopting better management techniques, changing housekeeping practices, and revising policies, procedures and institutions as necessary.
- *Improving technology* or simply rethinking an industrial process or product in terms of Cleaner Production may produce the required results without importing new technology.

The mechanism or tools used to implement CP include:

- Measuring and monitoring key performance indicators
- Waste, pollution & resource efficiency audits
- Environmental life cycle assessments
- Process integration
- Industrial symbiosis
- Green chemistry
- Dematerialisation
- Waste minimisation
- Design for Environment.

In a business, Cleaner Production should be seen as the responsibility of entire the company, starting from top management all the way to cleaning staff [Kliopova, Kazimieras and Staniskis, 2006]. While it is business itself that ultimately must implement CP, this needs to be supported by many external factors. These include: the policies of government, enforcement by local authorities, objectives of financial institutions, research and development of academic and research institutions, assistance of service providers, the commitment of business and industry associations, and the lobbying of NGOs.

The role of government is to lead by providing an environment conducive to accelerating the process and encouraging industry to initiate its own cleaner production programmes. The range

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

of tools available for governments trying to catalyse industry to adopt cleaner production is large and different countries will select those combinations of tools they regard as most suited to their needs. Such tools include: establishing cleaner production programmes, requiring cleaner production audits, publishing environmental performance data, providing technical assistance, revising existing laws and regulations, setting new regulations, changing permitting system, encouraging voluntary reduction schemes, making special enforcement provisions, changing use of technology standards, providing subsidies, offering grants for the development of cleaner production technology, and investing revenues from waste treatment and taxes in cleaner production development [www.cec.org/files/PDF/POLLUTANTS/CEC-Moving Forward_en.pdf]. All these and other tools can be classified in four main categories, namely: applying regulations, using economic instruments, providing support measures and obtaining external assistance.

In defining targets for action and policy implementation, towards *Sustainable Consumption* there is broad agreement that it must embrace:

- Poverty eradication
- Change pursued by all countries, with the developed countries taking the lead
- A mix of policies including regulations; economic and social instruments targeted to land use, transport, energy and housing; information; products and services
- Partnership between governments, relevant international organisations, the private sector and consumer groups
- Special attention to unsustainable consumption patterns among the richer segments in all countries.

Global business and industry – for example through the World Business Council for Sustainable Development (WBCSD) – has approached Sustainable Consumption as an extension of eco-efficiency approaches to include:

- Technological and social innovations to improve quality of life
- Provide and inform consumer choice and
- Improved market conditions through appropriate legislation and regulation.

The need to reduce resource consumption in production and products and to provide information to consumers, to improve the effectiveness and quality of product use, is also recognised.

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

Reducing end-of-life waste (usually through recycling) is also a common feature of product stewardship programmes across most industry sectors.

Box 2.1 Defining Cleaner Production

Although various definitions of Cleaner Production exist, the concept (as described above) is relatively straightforward. The definition used in this report is that proposed by the United Nations Environment Programme (UNEP) (www.unepie.org/pc/cp/understanding_cp/home.htm)for Cleaner Production as:

"The continuous application of an integrated preventive environmental strategy to processes, products, and services, to increase overall efficiency, and reduce risks to humans and the environment. Cleaner Production can be applied to the processes used in any industry, to products themselves and to various services provided in society. Specifically for:

- *Production processes: Cleaner Production results from one or a combination of conserving raw materials, water and energy; eliminating toxic and dangerous raw materials; and reducing the quantity and toxicity of all emissions and wastes at source during the production process;*
- *Products: Cleaner Production aims to reduce the environmental, health and safety impacts of products over their entire life cycles, from raw materials extraction, through manufacturing and use, to the 'ultimate' disposal of the product; and*
- *Services: Cleaner Production implies incorporating environmental concerns into designing and delivering services".*

The term *Cleaner Production* has recently been replaced by *Sustainable Consumption and Production (SCP)* by organisations such as UNEP, UNIDO and UN-Division of Economics and Society. Since *Agenda 21* the issues of unsustainable consumption have been addressed through a series of meetings, dialogues, research and publications from UN CSD, UNEP, UNDP and other business, consumer and research organisations. The idea of Sustainable Consumption has been developed and clarified through that process, emerging as an umbrella term bringing together various issues, such as:

"meeting needs, enhancing quality of life, improving resource efficiency, minimising waste, taking a life-cycle perspective and taking into account the equity dimension; integrating these component parts in the central question of how to provide the same or better services to meet the basic requirements of life and the aspiration for improvement, for both current and future generations, while continually reducing environmental damage and risks to human health. (UN CSD, 1995) (Clayton, Spinardi and William, 1999)

2.6 History of CP in South Africa

Cleaner Production is a subsidiary element of South Africa's commitment to sustainable development. The World Summit on Sustainable Development, held in South Africa during 2002, placed Sustainable Development high on international, regional and local agendas. The world and South Africa's commitment to sustainable development was concretised in the Summit Declaration, entitled the 'The Johannesburg Plan of Action [WSSD, 2002], which South Africa is in the process of implementing. This Plan encourages sustainable consumption and production. One of the outcomes of the Summit was the formation of the UNIDO National Cleaner Production Centre (NCPC), formed by an agreement between the Department of Trade and Industry**,** the CSIR, UNIDO and the donor countries of Austria and Switzerland. The objective of this Centre has been to stimulate wider use Cleaner Production in South Africa in

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

partnership between Government and other major role players, e.g. industry, agriculture, mining and the consumer.

However, prior to the establishment of the NCPC, a number of (not necessarily coordinated) CP initiatives – by Government, industry bodies, universities, research organisations, and donor agencies (most notably DANIDA and NORAD) – have taken place, mainly as the result of research and demonstration projects.

Overall, there has been a growing trend of CP related activities within the national economic development arena. Whereas the private sector is more focused on the practical industry based implementation of CP projects, the public sector has been actively involved in broad array activities including research, policy formulation, project financing and implementation. Moreover, local academic, research institutions and privately owned consulting firms are also actively conducting CP related research, creating awareness and documentation of local and international best practices regarding the emerging CP phenomenon and its potential benefits to the participating industries.

Some of the earliest CP-related initiatives were funded by the Water Research Commission (WRC). The work of the WRC on waste minimization and water management goes back a long way and with perhaps a more sustainable impact than the more recent and well-known DANIDA initiatives. The majority of these initiatives have been aimed at promoting Cleaner Production practices in South Africa through research and demonstration projects. While the focus thus far has arguably been most pronounced on the fisheries, metal finishing and textiles industries (largely as a result of the DANIDA intervention) other industrial sectors are also increasingly implementing Cleaner Production through initiatives such as the Waste Minimisation Clubs. There have been some activities that are not specifically CP initiatives, but fall within the scope of CP e.g. water and energy efficiency initiatives and improved environmental management initiatives that include elements of CP.

2.7 CP Milestones in South Africa

There are a number of significant milestones regarding the introduction of Cleaner Production in South Africa in recent years. These include in particular the following:

- The WRC funded research projects into water management and waste minimisation starting which included the first Waste Minimisation Clubs in South Africa. ()

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

- The Southern African Regional Conference on Cleaner Production, held in May 1997 with over 300 delegates from 12 African countries; this was hosted by DEAT and the Industrial Environmental Forum of Southern Africa (IEF) with core funding provided by DANCED.
- The inclusion of CP-related aspects into national policy and legislation on waste management, pollution control, water management & energy.
- DANCED's demonstration projects in the fisheries, metal finishing (electroplating and hot-dip galvanising), and textiles sectors [www.nu.ac.za/cleanerproduction]
- The establishment of Waste Minimisation Clubs in the Durban, Gauteng and Cape Town region and development of a WMC facilitator guideline document in 2002 (the latter was initiated by the Water Research Commission (WRC) [www.nu.ac.za/wasteminclubs]
- Development of CSIR (Green Buildings for Africa): Waste Minimisation Guideline document for Facility Management.
- Development of the DWAF water resources management strategy as an example of government's move towards cleaner production (See the Draft of Water Conservation and Water Demand Management)
- 1997-2000 UCT Chemical Engineering: Detailed CP assessments in 12 companies (textile and metal finishing sectors) in Cape Town and Durban as part of the Industrial Symbiosis Project.
- The publication of a waste minimisation guide for the textiles industry initiated by the WRC [www.nu.ac.za/wasteminclubs]
- The creation of a dedicated Cleaner Production unit in DEAT
- The establishment of the National Cleaner Production Centre (NCPC) in 2003 and the initiation of training activities by the Centre.
- The DANIDA Evaluation of CP activities in South Africa [Hanks and Janisch, 2003] and the publication of the Business Guide on Cleaner Production in South Africa [Heatherington A, DANIDA, 2003]
- "Embracing Sustainability Makes Good Business Cents", a conference held in Durban in March 2004, organized by the Durban Chamber of Commerce and Industry, in conjunction

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

with the National and Provincial Government, the NCPC and the Department of Trade and Industry.

- Publishing of cleaner production catalogue and client education poster (for wider industrial application) from the Electroplating industry
- Specific training of local authorities on Cleaner Production supported by the DANIDA CTPP as well as the publication of a Generic Guide for regulators on CP [Hanks and Janisch, 2004] as well as a sector-specific Guide for regulators on CP in the Textile Industry.
- The initiation of the WRC-funded research & implementation project on Cleaner Production in the Mining Industry in April 2004

The majority of these initiatives have been promotion, research and/or demonstration projects and there remains significant scope for the wider adoption of profitable CP practices within South African business and industry sectors. Although there have been a number of detailed assessments [Clayton, Spinardi and Williams, 1999] of the adoption of CP within Europe and the North America, until recently there have been few comprehensive reviews of the implementation of CP in South Africa.

One of the first major investigations into the state of Cleaner Production in South Africa was undertaken in 1993 by the Environmental Monitoring Group, an environmental NGO [Environmental Monitoring Group, 1993]. This study was based primarily on a review of secondary literature, with limited primary information being gathered from the responses of five companies to a mail-shot and the response of one company to a journal article. Their resulting report (*Clean Production)* included the following ranking of the sectors investigated in terms of their environmental impact (expressed as quantity of hazardous waste per contribution to GDP): metallurgical (basic metal production); chemical products; metal processing (fabricated metals); textiles; and pulp and paper. The report highlighted that that the use of Cleaner Production technologies was limited and that the environmental legislation and regulation needed to re-oriented to place greater specific emphasis on Cleaner Production practices and improved compliance.

The most recent major investigation into the state of Cleaner Production in South Africa was undertaken in 2003 for DANIDA [Hanks and Janisch, 2003]. Although the focus of this report was on the DANIDA CP projects, it also included an overview of other CP projects in South

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

Africa. The evaluation report includes an overview of most of the CP-specific initiatives undertaken since the 1993 EMG report. Other initiatives that may be considered CP but that were not *specific* CP projects that have been undertaken in South Africa. This report aims to expand on the findings of the DANIDA Evaluation and attempt to include some of these other initiatives.

2.8 CP Related legislation, Policy and Strategy

The potentially pivotal role of Cleaner Production (CP) was formally acknowledged by the Government in South Africa in 1993, when CP was incorporated into a national environmental development plan formulated by the Department of Trade and Industry (DTI) and the Department of Environment Affairs and Tourism (DEAT). (Buckley CA, 2004) Cleaner Production was further entrenched in national strategies through the Integrated Manufacturing Strategy of DTI and the National Research and Development Strategy of the Department of Arts, Culture, Science and Technology (DACTS). The National Advisory Council on Innovation (NACI) has built on these two strategies by identifying and developing specific themes that need to be undertaken for their successful fulfilment. These themes contribute to the National Advanced Manufacturing and Logistics Technology Strategy.

National Government, as well as a number of Provinces and Municipalities, are currently in the process of introducing policies and strategies to promote Cleaner Production. The Status Quo study forms a baseline and platform for the consolidation of fragmented policies and strategies currently in place, in order to develop an integrated strategy and implementation plan, These activities are in harmony with the stated goals of the UNEP International Declaration on Cleaner Production (www.ourpanet.com/imgversn/104/declare.html)

> *'We (the national signatories to the Declaration) understand Cleaner Production to be the continuous application of an integrated, preventative strategy applied to processes, products and services in pursuit of economic, social, health, safety and environmental benefits. To this end we are committed to …leadership … building capacity…encouraging the integration of preventative strategies …creating innovative solution…sharing our experience…and taking action to adopt Cleaner Production.'*

2. 9 Relevant International Legislation

There exist a range of international legislative mechanisms that have a bearing on clean production activities. These include for example:

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

- The Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes
- The Bamako Convention on Trans-boundary Movements of Hazardous Wastes
- The Stockholm Convention on Persistent Organic Pollutants
- The UN Framework Convention on Climate Change and the associated Kyoto Protocol
- The Convention to Combat Desertification
- The Vienna Convention (and Montreal Protocol)
- Agenda 21 (an outcome of The Rio Earth Summit in 1992)
- The Millennium Summit's Millennium Development Goals
- The UNEP International Declaration on Cleaner Production
- Convention for Protection, Management and Development of the Marine and Coastal Environment of the West African Region
- United Nations Convention on the Law of the Sea
- London Convention on the Prevention of Marine Pollution by Dumping of Wastes
- International Convention on Civil Liability for Oil Pollution Damage
- International Convention on Oil Pollution Preparedness, Response and Co-operation
- International Convention on the Establishment of a Fund for Compensation for Oil Pollution Damage, 1971
- Convention on Biological Diversity

A brief overview of some of the relevant international agreements is provided in the following Box 2.2

Box 2.2 Multilateral Environmental Agreements and International Declarations

In developing the South African policy on Cleaner Production (or Sustainable Production and Consumption), there should be effective integration in the policy with the relevant provisions of any multilateral environmental agreements (MEAs) and international declarations that South Africa (or South African organisations) have committed to. This box provides a brief overview of *some of the more pertinent* MEAs and Declarations that South Africa is a signatory to and/or that have a possible bearing on CP policy.

2.9.1 Rio Declaration on Environment and Development

The Rio Declaration on Environment and Development was one of the principal legal and political outcomes of the United Nations Conference on Environment and Development, held in Rio de Janeiro in June 1992 (the "Earth Summit"). Although a non-binding declaration, its statement of general principles is generally perceived as being reflective of customary international law. The Declaration is an important statement of principle relating to sustainable development, explicitly stating that "the right to development must be fulfilled so as to equitably meet developmental and environmental needs of present and future generations" (Principle 3). For sustainable development to be achieved, it maintains that "environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it." (Principle 4). Various CP elements are explicitly contained within Agenda 21, the non-binding action plan on sustainable development that emanated from the Rio Earth Summit. *(www.unep.org/unep/rio.htm)*

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

2.9.2 ohannesburg Plan of Implementation (WSSD)

The World Summit on Sustainable Development (WSSD), held in Johannesburg in September 2002, resulted in two key negotiated outcomes: the Johannesburg Declaration (a statement of principles similar to the Rio Declaration), and the Johannesburg Plan of Implementation. (*www.johannesburgsummit.org*)

The Plan of Implementation is a detailed set of commitments and targets for action aimed at achieving more effective implementation of sustainable development objectives. Together, these politically negotiated texts reaffirmed sustainable development as a central element of the international agenda and gave new impetus to global action to fight poverty and protect the environment. In addition to these two negotiated outcomes, the WSSD also resulted in a number of partnerships between governments, business and civil society.

The Johannesburg Plan of Implementation is a comprehensive text, containing more than 50 pages of undertakings. For the purposes of the proposed policy and strategy on Cleaner Production, following are some examples of commitments contained within the Plan of Implementation:

- Encourage and promote the development of a 10-year framework of programmes in support of regional and national initiatives to accelerate the shift towards sustainable consumption and production to promote social and economic development within the carrying capacity of ecosystems by addressing and, where appropriate, de-linking economic growth and environmental degradation through improving efficiency and sustainability in the use of resources and production processes and reducing resource degradation, pollution and waste
- Adopt and implement policies and measures aimed at promoting sustainable patterns of production and consumption, applying, inter alia, the polluter-pays principle described in principle 16 of the Rio Declaration on Environment and Development;
- Increase investment in cleaner production and eco-efficiency in all countries through, inter alia, incentives and support schemes and policies directed at establishing appropriate regulatory, financial and legal frameworks. This would include actions at all levels to: (a) Establish and support cleaner production programmes and centres and more efficient production methods by providing, inter alia, incentives and capacity-building to assist enterprises, especially small and medium-sized enterprises, particularly in developing countries, in improving productivity and sustainable development; (b) Provide incentives for investment in cleaner production and eco-efficiency in all countries, such as state-financed loans, venture capital, technical assistance and training programmes for small and medium-sized companies while avoiding trade-distorting measures inconsistent with the rules of the World Trade Organization; (c) Collect and disseminate information on cost-effective examples in cleaner production, eco-efficiency and environmental management and promote the exchange of best practices and know-how on environmentally sound technologies between public and private institutions; and (d) Provide training programmes to small and medium-sized enterprises on the use of information and communication technologies

2.9.3 The International Declaration on Cleaner Production

This International Declaration is a voluntary but public commitment to the strategy and practice of Cleaner Production. The Declaration outlines a set of principles, which when implemented will lead to increased awareness, understanding and ultimately, greater demand for Cleaner Production. For Cleaner Production advocates, the Declaration is a tool to encourage more governments, companies and organisations to adopt and promote the strategy. The Declaration was launched in October 1998 at Phoenix Park, South Korea, with 67 inaugural signatories. Signatories in South Africa include the Water Research Commission and Technikon Pretoria. (http://www.uneptie.org/pc/cp/declaration)

2.9.4 UN Framework Convention on Climate Change (UNFCCC)

This UN Framework Convention on Climate Change (UNFCCC) was signed at the 1992 Rio Earth Summit by more than 150 countries. The ultimate objective of the Convention is the "stabilisation of greenhouse gas (GHG) concentration in the atmosphere at a level that would prevent dangerous anthropogenic (human-induced) interference with the climate system." The treaty took effect in March 1994 upon the ratification of more than 50 countries. The UNFCCC establishes a framework of general principles and institutions, and sets up a process through which governments meet regularly to develop a more detailed blueprint for action to tackle climate change. The UNFCCC does not set any legally binding level of emissions, but states the aim that (developed) countries should return their emissions to 1990 levels by the year 2000. The more specific targets for reducing GHG emissions are contained in the Kyoto Protocol. Adopted in 1997 in Kyoto, Japan, the ***Kyoto Protocol*** requires developed countries to meet differentiated reduction targets for their emissions of a "basket" of six GHGs by 2008-2012, relative to 1990 levels. Although the Convention sets obligations on countries, rather than on companies, it is possible to identify certain general implications for business. These include for example:

- Monitoring and measuring the company's emissions of greenhouse gases and its provision of carbon sinks, and identifying opportunities for reducing GHG emissions and/or enhancing sinks
- Identifying opportunities for investing in CDM projects in developing countries

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

- Identifying opportunities for investing in JI activities in developed countries
- Identifying opportunities for participating in emissions trading activities

2.9.5 Vienna Convention for the Protection of the Ozone Layer

The 1985 Vienna Convention is a framework agreement and does not contain legally binding controls or targets. The Conventions encourages intergovernmental co-operation on research, systematic observation of the ozone layer, monitoring of CFC production, and the exchange of information. It commits its Parties to take general measures to protect human health and the environment against human activities that modify the ozone layer. The Convention entered into force in September 1988, and as of December 2003 had 185 ratifications, acceptances, approvals, or accessions. Following the discovery of the Antarctic ozone hole in late 1985, governments recognised the need for stronger measures to reduce the production and consumption of a number of CFCs and several Halons. The 1987 ***Montreal Protocol*** was designed so that the phase-out schedules could be revised on the basis of periodic scientific and technological assessments. The Montreal Protocol entered into force in January 1989, and as of December 2003 had 184 ratifications, acceptances, approvals, or accessions. (*www.unep.ch/ozone*.)

2.9.6 Rotterdam Convention on Prior Informed Consent for Hazardous Chemicals

The Rotterdam Convention on Prior Informed Consent (PIC) is a means for formally obtaining and disseminating information so that decisions can be made by importing countries as to whether they wish to receive future shipments of certain chemicals; and for ensuring compliance with these decisions by exporting countries. The Convention promotes shared responsibility between exporting and importing countries in protecting human health and the environment from the harmful effects of such chemicals, and provides for the exchange of information about potentially hazardous chemicals that may be exported and imported. A key goal of the Rotterdam PIC Convention is to provide technical assistance for developing countries and countries with economies in transition to develop the infrastructure and capacity necessary to implement the provisions of the Convention. The Convention entered into force on February 24, 2004. (*www.pic.int/*)

2.9.7 Stockholm Convention on Persistent Organic Pollutants (POPs)

The Stockholm Convention on Persistent Organic Pollutants (POPs) was adopted and opened for signature on 22 May 2001. Persistent Organic Pollutants are synthetic chemicals that are extremely resistant to natural breakdown processes, highly toxic and that build up (or bio-accumulate) in the fatty tissues of animals and humans. The treaty calls for international action on twelve POPs grouped into three categories: pesticides, industrial chemicals, and unintended by-products (dioxins and furans). The Convention seeks the elimination or restriction of production and use of all intentionally produced POPs, as well as the continuing minimisation and, where feasible, ultimate elimination of the release of unintentionally produced POPs. Stockpiles must be managed and disposed of in a safe, efficient and environmentally sound manner. The Convention imposes certain trade restrictions. (*www.chem.unep.ch/sc/*)

2.9.8 Basel Convention on Trans-boundary Hazardous waste

The Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal was adopted in 1989 and entered into force on 5 May 1992. It was created to address increasing concerns over the management, disposal and trans-boundary movements of hazardous wastes. The main principles of the Convention are that: trans-boundary movements of hazardous wastes should be reduced to a minimum, consistent with their environmentally sound management; hazardous wastes should be treated and disposed of as close as possible to their source of generation; and hazardous waste generation should be reduced and minimised at source. The Basel Convention covers hazardous wastes that are explosive, flammable, poisonous, infectious, corrosive, toxic, or eco-toxic. The categories of wastes and the hazardous characteristics are set out in of the Convention. (*http://basel.int*)

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

2.10 Linkages to International and African Cleaner Production Initiatives

The African region, as a whole, suffers from a wide range of environmental and social problems, political instability, devastation from natural disasters, poor health and poverty that have hindered economic growth and foreign investment and consequently, CP promotion in the region. Economic development aimed at solving the problem of poverty is itself partially responsible for the environmental pollution and degradation that is rampant in the region. The introduction of CP in the countries of the African continent has been relatively recent with the first NCPC (Zimbabwe) being launched as recently as 1995.

With recent initiatives such as the First, Second and Third African CP Roundtables, as well as a policy document called the New Africa Initiative; a regional commitment to sustainable development is gradually being forged amongst the countries of Africa. This regional commitment is expected to spark developments that will enable greater promotion of CP.

UNEP launched the International Programme on Cleaner Production in 1989 with the objective of applying integrated preventive environmental strategy to increase overall efficiency and reduce risks to humans and environment. In 1994, UNEP and UNIDO joined forces and launched the National Centre Production Centres (NCPCs) programmes for promoting Cleaner Production in developing countries and countries in transition. The Sustainable Consumption programme of UNEP started in 1998. The programme focuses on understanding the forces that drive consumption patterns around the world and how to translate those findings into tangible activities for Business, Governments and other stakeholders.

Over the last ten years, twenty-four National Cleaner Production Centres (NCPCs) have been established under the programme in developing countries and economies in transition out of which ten are in Africa, including the following: South Africa; Zimbabwe; Mozambique; Morocco; Kenya; Ethiopia; Tanzania; Uganda; Tunisia; and Nigeria

Several important conferences and workshops have been held in the African region including:

- A Regional Workshop on Ecologically Sustainable Industrial Development (ESID) for African Countries (October 1997)
- The Southern African Regional Conference on Cleaner Production (May 1998), a DANCED sponsored conference with the overall objective of promoting CP in southern Africa

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

- The First Africa Roundtable on Cleaner Production and Sustainable Consumption jointly organized in Nairobi in August 2000, by UNEP, Carl Duisberg Gesellschaft e. V. (Germany), the Government of Norway, the Government of The Netherlands, and UNIDO
- The Second Africa Roundtable on Cleaner Production and Sustainable Consumption in March 2002 organized by the Tanzanian NCPC and supported by Norway.
- Third African Roundtable on Sustainable Consumption and Production (ARSCP-3) was held in Casablanca, Morocco, during May 2004

These Roundtables are structured to attract participation and technology sharing by representatives of NCPCs, CP promoting institutions, Government agencies, industry associations, consumers' associations and youth associations. The First Africa Roundtable on Cleaner Production and Sustainable Development promoted information exchange between countries and also focused on increasing and improving networking amongst CP practitioners and developing a common agenda for the promotion of CP and sustainable consumption in Africa. At the Second Africa Roundtable on CP and sustainable development, participants (95 participants from 12 African Countries) called for an integrated approach to CP and sustainable development and appealed to UNEP and other international organizations to assist them with information and training on important issues such as life cycle analysis, consumer trend research, eco-design and marketing. This roundtable served as a forum for representatives of African governments, industry support organizations and businesses to discuss their approaches to sustainable business development and the challenges they foresaw.

The overall objective of the ARSCP-3 was to provide a forum for further strengthening of the activities on Cleaner Production and sustainable consumption in Africa. The specific objectives were to:

- Review the current status of activities on Cleaner Production and sustainable consumption in the region and facilitate experience sharing on best practices and strategies implemented in the region;
- Provide the basis for the institutionalisation of the Regional Roundtable on sustainable consumption and production; and
- Identify key areas of regional focus for the 10-year Framework plan on sustainable consumption and production.

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

The focus of the NCPCs in the African region has largely been on industrial pollution and waste management, and initiatives towards changing consumption patterns have been minimal. While the NCPCs in the region are relatively recent and still developing, the focus on municipal services and sustainable consumption at the African Roundtables indicates foresight and awareness of global developments in CP.

The "New Africa Initiative ", adopted by African Leaders in 2001 is a pledge based on a common vision to eradicate poverty in the region and to place African countries both individually and collectively, on a path of sustainable growth and development and could be an important vehicle for promoting CP in the region. The New Economic Partnership for African Development (NEPAD), launched in 2002, focuses on the role of the private sector and has the potential to become another important vehicle in promoting preventive strategies in the business community in the region, including sustainable consumption & production.

2.11 Review of Legislative Framework Relating to Cleaner Production

This section briefly reviews existing legislation most relevant to Cleaner Production in South Africa.

2.11.1 Constitution of the Republic of South Africa, Act 108 of 1996

In terms of the Bill of Rights (Chapter 2 of the Constitution), everyone has a right:

> *(a) to an environment that is not harmful to their health or well-being; and*
>
> *(b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that –*
>
> *i) prevent pollution and ecological degradation;*
>
> *ii) promote conservation ; and*
>
> iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development".

This right imposes an obligation on statutory bodies to promulgate legislation to give effect to this right. One aspect of this obligation is to prevent or at least limit anticipated negative impacts resulting from new developments.

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

2.11.2 National Environmental Management Act 107 of 1998

Section 2 of the National Environmental Management Act (NEMA) comprises a number of national environmental management principles, including the following which are of direct relevance to waste management:

- Avoid or, where it's not possible to altogether avoid, minimise and remedy pollution and degradation of the environment [Section 2(4)(a)(ii)].
- Avoid waste, or where it cannot be avoided, minimise and re-use or recycle where possible, and otherwise dispose of it in a responsible manner [Section 2(4)(a)(iv)].
- Use non-renewable resources in a responsible and equitable way, taking into account the depletion of the resource [Section 2(4)(a)(v)].
- Use renewable resources in such a way that it does not exceed the level beyond which their integrity is jeopardised [Section 2(4)(a)(vi)].
- The "precautionary principle", whereby a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions [Section 2(4)(a)(vii)].
- Responsibility for the environmental, health and safety consequences of a policy, programme, project, product, process, service or activity exists throughout its life cycle [Section 2(4)(e)].
- The "polluter pays" principle, whereby the costs of remedying pollution, environmental degradation, consequent health effects….must be paid for by those responsible for harming the environment [Section 2(4)(p)].

Section 24(7) of NEMA stipulates the minimum procedures for investigating, assessing and communicating potential impacts of activities where they may have a significant impact on the environment, and where such activities have to be authorised in terms of existing legislation. These minimum requirements include:

- Investigation of potential impact, including cumulative effects, of the activity on the environment [S24(7)(b)].
- Investigation of mitigation measures to keep adverse impacts to a minimum [S24(7)(c)].

Section 28(1) of NEMA states that every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

pollution or degradation from occurring, continuing or recurring, or, to minimise and rectify such pollution or degradation.

2.11.3 The Environment Conservation Act 73 of 1989

The EIA Regulations (R1182 and R1183 of 5 September 1997, promulgated in terms of this Act) require that specific procedures are followed, and reports (scoping and/or EIA reports) prepared, for those activities likely to have a "substantial detrimental effect on the environment".

2.11.4 Occupational Health and Safety Act 181 of 1993

In terms of this Act, an employer must minimise any substances on site that could be injurious to employee health (section 10 (2)(a)) and recycle all hazardous chemical substances waste wherever possible (section 15 (a)).

2.11.5 Regulations for Hazardous Chemical Substances (GN. R. 1179 GG16596 of 1995) published in terms of Occupational Health and Safety Act 181 of 1993

These regulations require that an employer must control the exposure of an employee to hazardous chemical substances (section 10.(2) (a)) by *"limiting the amount of an HCS used which may contaminate the working environment"* and as far as reasonably practical, *"recycle all HCS waste"* (section 15. (a)).

2.11.6 National Water Act 36 of 1998

With regard to excessive use of water, this Act states that:

> *"S22(2): A person who uses water as contemplated in subsection (1)- …(d) may not waste that water…."*.

This Act is administered by the Department of Water Affairs and Forestry but, as the approving authority, DEA&DP has an obligation to promote reduction in water wastage as and when appropriate.

The promulgation of the National Water Act, 1998 (Act 36 of 1998) saw a change in the legislative framework governing the use of water in South Africa. For the first time the Act recognised the need to integrate the management of water quality and quantity through the need to promote efficient, sustainable and beneficial water use in the public interest (Rossouw J. 2000)

The Act, in section 21, clearly defines the water uses to be controlled and the different methods of disposal of wastewater are dealt with as follows:

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

1. Sec 21(e): Engaging in a controlled activity as defined in terms of section 37(i) of the Act, namely the irrigation of any land with waste or water containing waste from an industrial activity (Sec 37(1)(a));

2. Sec 21(f): Discharging of waste or water containing waste into a water resource;

3. Sec 21(g): Disposing of waste in a manner which may detrimentally impact on a water resource; and

4. Sec 21(h): Disposing in any manner of water containing waste from, or which has been heated in, any industrial or power generation process.

The Act, in section 22, goes further and defines a permissible (legal) water use as a water use that is:

1. Exercised in terms of schedule 1 of the Act;

2. A continuation of an existing lawful water use as defined in section 32, or declared as such in terms of section 33 of the Act;

3. Generally Authorised in terms of section 39 of the Act;

4. Licensed in terms of section 22(5) of the Act; and

5. Exempted from the requirements of a licence, by the responsible authority, in terms of section 22(3) of the Act.

The responsibility for complying with these legal requirements lies solely with each individual water user. The Department has adopted a co-operative enforcement approach as opposed to a confrontational one in order to assist the different water users in complying with the legal requirements. However, the Department will take legal action where the water user(s) wilfully or negligently violate the requirements of the Act.

2.11.7 Mineral and Petroleum Resources Development Act (Act no 28 of 2002)

One of the objectives of the Act is to make provision for equitable access to and sustainable development of the nation's mineral and petroleum resources. Furthermore the Act affirms the

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

State's obligation to protect the environment for the benefit of present and future generations, to ensure ecologically sustainable development of mineral and petroleum resources and to promote economic and social development.

Although Cleaner Production is not explicitly stated as one of the intended objectives of the Act, the Act does make certain provisions to accommodate environmental management principles and public participation in the mining development processes. It is these provisions that will guide the mining industry towards the CP imperative.

- These principles have been included in the Act as clauses 37 – 47:
- Environmental management principles – Clause 37;
- Integrated environmental management and responsibility to remedy – Clause 38;
- Environmental management programme and environmental management plan – Clause 39;
- Consultation with State Departments – Clause 40;
- Financial provision for remediation of environmental damage – Clause 41;
- Management of residue stockpiles and residue deposits – Clause 42;
- Issuing of a closure certificate – Clause 43;
- Removal of buildings, structures and other objects – Clause 44;
- Minister's power to recover costs in event of urgent remedial measures – Clause 45;
- Minister's power to remedy environmental damage in certain instances – Clause 46;
- Minister's power to suspend or cancel rights, permits or permissions – Clause 47.

In line with the Government's 10-year strategy to reduce energy consumption by 12 percent the Minister for Minerals and Energy has released a draft proposal. The aim of the draft is to reduce energy consumption in the key demand sectors, which is a burden to the economy, thereby lessening the impact of greenhouse gas emissions and promoting sustainable development. (Cape Town Time, 2004)

2.12 Review of Policy Framework Relating to Cleaner Production

Whilst there are no legislative instruments to directly enforce Cleaner Production at present, there are a number of policy initiatives in which this approach is proposed and which are likely to be incorporated into legislation in the near future.

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

2.12.1 The White Paper on Integrated Pollution and Waste Management 2000

The White Paper emphasizes Cleaner Production and waste minimisation as essential components of the integrated waste management process. The *objectives* of the White Paper on IP&WM include:

- Promotion Cleaner Production and establish mechanisms to ensure continuous improvements in best practice in all areas of environmental management.
- Prevention, reduction and management of pollution of any part of the environment due to all forms of human activity, and in particular from radioactive, toxic and other hazardous substances.
- Setting targets to minimise waste generation and pollution at source and promoting a hierarchy of waste management practices, namely reduction of waste at source, reuse and recycling with safe disposal as the last resort.

The policy has various *goals*, *objectives* and *deliverables* which have direct relevance to Cleaner Production, i.e.

- *Goal 1:* Effective institutional framework and legislation: Short term deliverable: To develop regulations (or other appropriate legal instruments) to enforce coordinated, integrated waste management planning. The Department will also address the issue of delegating the responsibility for enforcing the regulations and standards to the appropriate sphere of Government. The legal instruments will address, *inter alia*, identification and removal of barriers for encouraging Cleaner Production in existing legislation.
- *Goal 2:* Pollution prevention, waste minimization, impact management and remediation: Short term deliverable: Waste minimisation and recycling*:* to adopt measures (in close cooperation with the private sector) aimed at facilitating and coordinating widespread implementation of existing successful waste minimisation and recycling initiatives. Specific outputs include, *inter alia*, developing mechanisms for promoting Cleaner Production technologies and innovative treatment and disposal options at source; developing mechanisms to set targets for minimising waste and pollution at source; and developing and implementing a programme for disseminating information by the Department on the techniques, opportunities and benefits associated with Cleaner Production, waste minimisation and recycling. Specific outputs include:
  - Establishment of Waste Minimisation and Recycling Centres;

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

- Dissemination of information on waste minimisation by developing a directory of case studies and sector-specific guides;
- Implementation of demonstration projects;
- Promotion of information and awareness campaigns about waste minimisation and recycling by the Department, in collaboration with Local Government; and
- Amending educational curricula to reflect Cleaner Production, waste minimization and recycling approaches to waste management.

One of the roles of Government is to develop regulatory instruments including market-based instruments. These could include economic instruments based on an incentive approach, through which investment in, for example, Cleaner Production technologies, is promoted. This type of instrument will be investigated in collaboration with the Department of Trade and Industry and may include investment credits, accelerated depreciation, product/service subsidies and basic needs subsidies (already in place in the form of a lifeline tariff for water services). In addition, policy development and decision making on pollution and waste management have to be supported by both applied and basic research. This research should be aimed at developing appropriate technologies and methodologies to ensure sustainable resource use, manage impacts and achieve Cleaner Production.

The White Paper emphasizes waste minimisation as an essential component of integrated waste management. This concept is carried forward in the *National Integrated Waste Management Bill, (Draft 9, November 2002)*, which incorporates numerous clauses regarding the need for, and mechanisms to develop and enforce, strategies for waste minimisation.

Of most significance are the following clauses, which stipulate the following functions for provincial Government, namely:

"6. Provincial Government

(4) For the purposes of giving effect to sub-clause (3) the following functions must be performed by the provincial Governments in regard to integrated waste management:

(e) develop provincial guidelines and standards regarding integrated waste management;

(f) develop and enforce provincial legislation regarding integrated waste management, including the permitting of all waste disposal facilities within the boundaries of the Province concerned;" (which includes provision for

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

waste minimisation, incorporating reduction, recycling and re-use activities, in the definition).……

(l) implement and enforce waste minimisation and reuse and recycling initiatives;

(m) promote the development of voluntary partnerships with industry in respect of waste minimisation, re-use and recycling initiatives;…"

2.12.3 The White Paper on the Energy Policy of the Republic of South Africa 1998

The current national legal framework for renewable energy is contained in the White Paper on the Promotion of Renewable Energy and Clean Energy Development, which was released in 2002. (www.gov.za/whitepaper) The White Paper notes, "The Constitution (Act No. 108 of 1996) requires that Government establish a national energy policy to ensure that national energy resources are adequately tapped and delivered to cater for the needs of the nation; further, the production and distribution of energy should be sustainable and lead to an improvement in the standard of living of citizens. The Government's overarching energy policy has been set out in its White Paper on Energy Policy of the Republic of South Africa (DME, 1998)."

The White Paper on the Promotion of Renewable Energy and Clean Energy Development: Part One – Promotion of Renewable Energy supplements the White Paper on Energy Policy, which recognises that the medium and long-term potential of renewable energy is significant. This Paper sets out Government's vision, policy principles, strategic goals and objectives for promoting and implementing renewable energy in South Africa. It also informs the public and the international community of the Government's vision, and how the Government intends to achieve these objectives; and informs Government agencies and organs of their roles in achieving the objectives. The White Paper on Energy Policy's position with respect to renewable energy is based on the integrated resource planning criterion of: Ensuring that an equitable level of national resources is invested in renewable technologies, given their potential and compared to investments in other energy supply options.

South Africa relies heavily on coal to meet its energy needs because it is well-endowed with coal resources; in particular, South Africa has developed an efficient, large-scale, coal-based power generation system that provides low-cost electricity, through a grid system that is being extended to rural areas, to millions of residential, commercial and institutional consumers. As a result, coal is and is likely to remain, from a financial viewpoint, an attractive source of energy for South Africa. At the same time, South Africa recognizes that the emissions of greenhouse gases, such

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

as carbon dioxide, from the use of fossil fuels such as coal and petroleum products has led to increasing concerns worldwide, about global climate change. While South Africa is well endowed with renewable energy resources that can be sustainable alternatives to fossil fuels, so far these have remained largely untapped. It is the intention of the Government to make South Africa's due contribution to the global effort to mitigate greenhouse gas emissions. For this purpose, the Government will develop the framework within which the renewable energy industry can operate, grow, and contribute positively to the South African economy and to the global environment.

On 10th May 2004 The DME launched The New National Energy Efficiency Strategy. The strategy is the first governmental document geared towards the development and implementation of energy efficiency practices in South Africa. The strategy takes its mandate from the White Paper on Energy Policy (1998) and it links the energy sector development and the national socio-economic development plans. The vision of the strategy is to contribute towards affordable energy for and to minimise the effects of energy usage upon human health and the environment. The strategy sets a national target for energy efficiency improvement of 12% by 2014. (www.dme.gov.za/energy/pdf/enegry_efficiency_strategy.pdf)

2.13 The Law Reform Process

A law reform process currently being undertaken under the auspices of the Department of Environmental Affairs and Tourism is likely to result in further legislation enforcing Cleaner Production in the near future.

2.13.1 National Waste Minimisation Strategy

To date, the NWMS has yet to be enacted, although there is a National Integrated Waste Management Bill in the pipeline. At present, local authorities are responsible for the collection and disposal of refuse and solid waste and are required to enact by-laws to regulate this function. Waste disposal, however, is regulated by the Environment Conservation Act (Act 73 of 1989). In terms of section 20 of that act, 'no person may establish, provide or operate a waste disposal site without a permit issued by the Minister of Water Affairs and Forestry'. In addition, no person may discard waste anywhere but at a waste disposal site or other facility approved by the Minister. Any person contravening these provisions is guilty of an offence and may be liable for a fine not exceeding R100 000 or imprisonment for up to 10 years or both.

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

2.13.2 National Integrated Waste Management Bill (2003)

The future National Integrated Waste Management Bill presents a long-term plan for addressing key issues, needs and problems experienced with waste management in South Africa. Key focus areas of the Bill is the development of National and Provincial Waste Information Systems (WIS) to obtain the information required for the stricter enforcement of the Polluter Pays principle. Following the waste management hierarchy as stipulated in the National Waste Management Strategy (NWMS) Action Plan documents the Bill's priority aim is to promote the reduction and minimisation of waste followed by re-use and recycling environmentally responsible waste treatment and-as the last desirable option disposal of waste at strictly regulated and controlled landfills

As a requirement of the National Integrated Waste Management Bill all South African Municipalities have been asked to submit an Integrated Waste Management Plan (IWMP) to DEAT. The IWMP discusses the strategies and actions that Local Authorities envisage in order to promote integrated waste management and planning aimed at waste reduction and landfill airspace conservation.

2.13.3 National Environmental Management: Air Quality Bill (2003)

The main aim of the National Environmental Management: Air Quality Bill 62a of 2003 is to reform the law regulating air quality in order to protect and enhance quality of air in the Republic, taking into account the need for sustainable development; to provide for national norms and standards regulating air quality monitoring, management and control by all spheres of Government; for specific air quality measures.

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

During the last decade efforts by the South African Government to formulate policies and promulgate regulations to steer the local industry towards Cleaner Production (CP) have lagged behind the private initiatives that have been taken place in the industrial sector, as well as those from academic and research. In order to be able to develop a National CP Strategy for South Africa, DEAT initiated this study to "Assess the Status Quo of CP activities in South Africa, 2004." This CP Status Quo report was intended to provide a baseline required for evaluating policy and strategy needs and to identify appropriate mechanisms to further stimulate the implementation of CP in South Africa.

3.2 Research Objectives

The literature review clearly indicated that DEAT has recognised the need to have a national CP strategy that will guide the promotion of CP and sustainable consumption in South Africa. As South Africa works toward the status of an emerging economy, CP becomes an imperative for gaining competitive advantage through product differentiation and environmental stewardship. The South African Government supports the approach that sound and sustainable business opportunities can materialise from the practical application of CP. In order to meet the obligations of the national sustainable development agenda, CP will have to be encouraged and steered through national policy and strategy. To this end, the Government is planning the development of a CP policy and strategy, which is seen as a crucial pro-active tool to address industrial pollution.

3.3 Research Design

The research approach included desktop studies and research of relevant documentation, limited visits to key stakeholders, and telephonic or written consultation with relevant stakeholders within the private public sector institutions (using a simple questionnaire for relevant CP data collection). The following specific activities where undertaken:

- Definition of study objectives for the establishment of project parameters and alignment with the client's work plan and objectives.
- Identification of information/data requirements and readily available data quality and quantity.

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

- Desktop review study of Cleaner Production initiatives in South Africa including relevant case studies undertaken in South Africa and benchmarking them with international best practice.
- Engagement of stakeholders for data collection through contact meetings, questionnaires and telephonic discussions.
- Performance of a gap analysis to assess the barriers and drivers of CP for South African businesses. This gap analysis addressed the following issues:
  - Review of international trends and best practice
  - Gaps in legislation
  - Successful approaches to promote CP
  - Threats, drivers and barriers to CP
  - Economic instruments currently applicable for the promotion of CP
  - Preliminary Assessments of all the current CP activities in South Africa

3.4 Data Processing and Analysis

To facilitate handling of information many government departments were approached for copies of various South African legislations on CP and consequently interviewed. The internet was also used extensively in gathering information. There after a summary of each legislation was compiled with gaps identified noted. The NCPC, CSIR database was also used to generate information from the pilot projects including case studies conducted in South African industries.

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

CHAPTER 4: RESULTS AND DICUSSIONS

4.1 Introduction

Based on the status quo review in chapter 2, this chapter undertakes a preliminary analysis and assessment of some of the key lessons learnt. The chapter provides a preliminary review of the following key issues.

- Current barriers and gaps in promoting CP
- General implications for the development of CP Strategy
- Initial inputs toward the identification of national Cleaner Production priorities
- A broad overview of the potential economic implications of application of Cleaner Production

Between June 1998 and March 1999, the CSIR undertook a survey of 26 firms in South Africa to examine the motivating factors for the adoption of cleaner technologies by South African firms. Due to limited resources the survey was limited to a smaller pilot study focusing only on certain firms that had adopted cleaner technology. The firms were spread across the following sectors: textiles (nine firms), chemicals (seven), food (four), metals (four), leather (one) and utilities (one). The sample represented a range of sizes, but was dominated by large firms, with three small, four medium, and 19 large firms [National Small Business ACT 192 OF 1996]. The survey probed the decision-making process undertaken by firms when adopting cleaner technologies. This included identifying and evaluating the factors that prompted the need to change technology, how different technology options were evaluated, and what impacts were experienced from introducing the new technology.

As part of the University of Capetown Industrial Symbiosis project a summary report was compiled in 1999 listing the "*Main Drivers and Barriers to Cleaner Production and Industrial Symbiosis for Small and Medium Sized Enterprises in South Africa"*.

In addition to these studies, a number of other studies have been undertaken. The most recent of which has been the 2003 DANIDA Evaluation Report which sought to summarise the barriers and drivers identified as a result of CP activities. These findings are summarised below?

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

Box 4.1 – Cleaner Production in South African SMMEs – Findings of Recent Study

In 1999 a comprehensive survey of the status of environmental management in SMMEs in South Africa was carried out by Danish researcher Soren Jeppesen with a team of fieldworkers from the University of Port Elizabeth. [Jeppesen en tal, 1999] The survey examined the nature of environmental management practices in 202 SMMEs in the following manufacturing sectors in the Port Elizabeth Metropolitan Area: food, beverages and tobacco; textile, clothing and leather; wood and wood production; printing; chemicals, rubber and plastics; non-metallic mineral product; basic and fabricated metals; electric machinery; transport equipment; and furniture. The survey found that the use of Cleaner Production techniques and environmental management systems in SMMEs is rather limited due to insufficient regulatory and market incentives. Although this survey was limited to a particular geographic area, it is nevertheless suggested that it provides a very useful indication of the possible status of CP practices throughout SMMEs more generally in South Africa. The cross-section of industry sectors that was examined in the study, and the distribution of company sizes, is broadly reflective of the national situation. Furthermore, the Port Elizabeth region has a very active programme of small business development, including nationally funded initiatives (such as the establishment of one of the country's first accredited Manufacturing Advisory Centres, PERMAC), as well as a variety of local programmes. Following is a summary of some of the key conclusions arising from this investigation:

- Most SMMEs have very low awareness of environmental costs, and moderate to low awareness of relevant environmental legislation;
- There is generally a very low level of legal enforcement and interaction, with less than 50% of SMMEs receiving any information from local Government;
- Many SMMEs are using old technology, are under severe economic pressure and are thus very cost and production focussed, with environmental performance generally being of a low priority;
- There is a very low level of interaction between the individual enterprises with only 25% of the SMMEs obtaining information from their colleagues;
- There is a strong correlation between the size of a company and the extent to which it uses Cleaner Production technologies and implements environmental management systems;
- Of the sectors that were analysed in the Port Elizabeth region, the transport equipment sector demonstrated the most widespread use of EMS; this is partly due to the fact that it forms part of a global supply chain. In the transport equipment sector nearly 70% of the companies were found to be using EMS, compared to 32% in the chemical, rubber and plastic sector and less than 10% in the remaining sectors;

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

- There appears to be increasing pressure on the medium sized companies, particularly in the automotive and the chemical, rubber and plastics sectors, to improve their environmental management practices and for example to implement EMS in response to international market demands; by contrast there seem to be limited driving forces on the micro and small enterprises to implement CP measures;
- There was no evidence of public pressure serving any impact on the environmental performance of the surveyed SMMEs.

These general findings are similar to the results of a detailed study undertaken in 1997 into the adoption of environmental management practices amongst SMMEs in the Western Cape automotive sector. [Coleman. A, 1997}

Despite the fact that Cleaner Production often pays, businesses (both locally and internationally) often fail to implement the cost-saving opportunities associated with Cleaner Production. The different reasons for this are generally well known, and have been identified by observers throughout the world. These barriers include:

4.1.1 Regulatory and incentive constraints:

- Tradition of poor enforcement of environmental regulations
- Lack of appropriate regulatory pressure
- Continuing shortage of capacity in key Governmental Departments
- Low resource and waste disposal costs
- Lack of consumer and shareholder pressure

4.1.2 Awareness constraints:

- Lack of knowledge and belief in the payback periods
- Lack of technical knowledge and awareness of CP options
- Perception of high risk involved in adopting unproven CP options
- Lack of awareness of the available financing options
- Lack of knowledge on environmental effects
- Prevalent perception that waste management is a cost factor

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

4.1.3 Operational constraints at the enterprise level:

- Lack of management commitment on internal and political will
- Low literacy rates amongst the workforce.
- Low business confidence
- Low business profitability
- Payback periods exceeding the investment frame of the company
- Close competitiveness resulting in a reluctance to share information
- Management structures that impact information

These barriers are well known and have been identified in a numerous similar studies locally and internationally. In terms of SMMEs the perceived risk in investing in a technology that the owner of a small enterprise does not understand. This and lack of enforcement of pollution controls, charges and monitoring at municipal level is a main obstacle to implementation of CP in SMMEs.

During a number of recent workshops and conferences in South Africa delegates were asked to identify and prioritise the most important barriers and drivers to Cleaner Production. A brief summary of the key results is presented in the following table.

Table 4.1 – Prioritising the Barriers to CP in South Africa

LIST OF TOP 4 BARRIERS FROM EACH VOTING EXERCISE			
WM Club meeting-June 1998	**Danced textiles workshop-June 1998**	**Danced MFI workshop-May 1999**	**UCT 2nd Industrial Symbiosis workshop-November 1999**
Lack of technical knowledge	Lack of awareness of CP	Don't know CP options	Lack of understanding of CP principles & lack of enforcement of legislation
Lack of finance	Lack of enforcement of legislation	No consistent enforcement of legislation	Low cost raw materials
Unclear legislation	Low business profitability	Don't know effects	Company culture/resistance to change
Lack of information	Lack of technical knowledge	Low price of water , raw materials, etc.	Perceived cost implications

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

LIST OF TOP 4 DRIVERS FROM EACH VOTING EXERCISE			
WM Club meeting-June 1998	**Danced textiles workshop-June 1998**	**Danced MFI workshop-May 1999**	**UCT 2nd Industrial Symbiosis workshop-November 1999**
Improved environmental performance	Reducing costs	Costs savings	Regulatory pressure from Government
Cost savings	New legislation	Effective legislation	Cost benefits
More stringent legislation	ISO 14000	Use economic instruments	External pressure
ISO 14000	Economic instruments	Introduction of environmental aspects	Economic instruments

4.2 Potential Drivers for the Adoption of CP practices in South Africa

There are a number of drivers that operate on individual firms to stimulate the implementation of Cleaner Production practices. These drivers may be divided for example as follows:

- *External regulatory and policy pressures*: most international studies into the motivating factors for corporate environmental performance, highlight the role of environmental regulation as the most significant influence on a firm's environmental behaviour, both directly and indirectly.
- *The organisational characteristics of the individual firm*: experience indicates that there are a number of characteristics of firms that may impact on the environmental performance of companies, including:
  - Company size, with larger firms more likely to adopt CP
  - Nature of Management and staff attitudes, including awareness and willingness to change
  - Ability to access and willingness to share information for example through industry networks
  - Nature of the firm's investment cycle noting implications for investment in CP technologies
  - Specific economic and market conditions for the individual firm:
  - Level of integration in the global economy, including impact of supply chain pressures e.g. from overseas markets such as Japan and the EU
  - Pressure for implementation of ISO 14001

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

- Comparative cost of raw materials, natural resources and energy
- The nature of the firm's investment cycle
- External structural issues relating to market certainty that may impact on investment decisions
- The nature of external consumer and community pressures
- Incomplete or incorrect allocations of costs during economic analyses of CP possibilities

In 1998/9 a study was undertaken by the CSIR to identify key drivers in South African firms for CP. The findings of this study are briefly reviewed below in Box 4.1.

Box 4.2 - CSIR Survey of Drivers for Cleaner Production

The survey probed the decision-making process undertaken by firms when adopting cleaner technologies. This included identifying and evaluating the factors that prompted the need to change technology, how different technology options were evaluated, and what impacts were experienced from introducing the new technology. The most strongly ranked factor for introducing new technology, was that of obtaining a competitive edge. This was followed closely by the need to reduce costs and to expand operations. The next most important factors included: taking advantage of a market opportunity; the need to comply with existing environmental regulations; and meeting the needs of export markets. Pressure from customers and other members of the public were each identified by one firm as the most important factor, but received low overall means. Firms in the study thus appeared to be most strongly motivated by 'pull' market-related factors when deciding to invest in a new technology. This contrasts strongly with the findings of similar surveys in the UK, where compliance with environmental regulation has a far greater impact.

The implementation of clean technologies has been shown by Environmental Risk Services, 2000, to reduce costs. A survey, undertaken in New York in 1985 and 1992 on waste reduction in 29 chemical manufacturing firms, found that for every dollar spent, there was an average saving of US$3.5. The cost reduction is generally due to better materials handling, improved energy and process efficiency, reduced waste management costs, and generally better 'housekeeping'. Furthermore, clean technology promotion provides an increased impetus for the development of an environmental goods and technology sector. Lastly, reduced costs and improved environmental profiles of both companies and their products will tend to improve their competitive position in world markets. Although this may be true as a indicator, CP investment

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

and their savings can not be compared between cultures without adjusting for different ratios of labour cost to materials, materials to waste cost etc. These adjustment factors has not been thoroughly investigated.

CP is an economic tool, because waste is considered a product with negative economic value. Each step to reduce the consumption of raw materials and energy and prevent or reduce the generation of waste, can increase productivity and bring financial benefits to an enterprise. Since CP involves minimizing or eliminating waste before any potential pollutants are created, it can also help reduce the cost of the end-of-pipe treatment that may still, in many cases, be necessary, albeit for lower quantities of emissions.

All in all, Cleaner Production is more cost-effective than pollution control. By minimizing or preventing waste generation, the costs of waste treatment and disposal are reduced. The improved efficiency of processes and better quality control result in economic savings and contribute to enhanced competitiveness. Finally, by reducing emissions, CP protects the environment. This is why it is a win-win situation. The recovery of wasted materials can be a crucial economic factor in some industries, where input materials are expensive [Manual on the development of cleaner production facilities, UNIDO].

Investment of Governmental organisations in Cleaner Production projects created an economic benefit in industry of 7-8 times the investment by the Government. The establishment of the six Waste Wise Waste Minimisation Clubs in Cape Town cost about R 2 million and the projected savings by the end of the first year were estimated to be around R 15 million [BECO – Institute for Sustainable Business]. The establishment of 2 WMCs in Durban, sponsored by the Water Research Commission, created 8 Rand economic savings in the participating companies for every Rand paid by the WRC for the implementation of the project [Susan Barclay, 2001, “Applicability of WMCs in SA: results from pilot studies, synthesis document”, Final report from WRC project 973.

4.3 Financial Support

Financial support for cleaner technology has tended to focus on supply side measures. Financial support schemes initiated seek to invest funds in projects that result in the rapid deployment of cleaner technologies, which would not have been implemented as effectively in the absence of financial support (mainly from Government). The supply side measures most often used are project grant mechanisms or favourable interest rate loans, although other mechanisms could possibly result in more effective clean technology innovation or cleaner technology deployment

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

in smaller businesses. Environmental Risk Services, 2000 noted a trend away from basic research and development funding, and toward support for the demonstration phase of cleaner technology projects. This is due to the increased financial and technical risk during early phases of technology research. Process changes in industry may require major capital investments.

In these instances, promotion of cleaner technology may be achieved through influencing capital investment decisions of private sector firms. This, in turn, requires environmental regulations to be sufficiently stable to encourage long-term investment strategies amongst South African firms. Experience internationally indicates that policies to promote cleaner technologies are limited unless they are integrated into existing industrial and technology policies, and coordinated with environmental policies. In other words, the support measures promoting clean technology (the supply side) need to be coordinated with complementary environmental measures requiring clean technology (the demand side). Experience has shown that the enforcement of the CP is more important than the integration at policy level; however the integration at policy level facilitates a smother enforcement and implementation.

4.4 Technology development and economic instruments

The relationship between technology development and economic instruments that promote environmental protection should be carefully examined, given the expressed policy commitment of DEAT and DWAF to such measures. Research indicates that while economic instruments may promote the use of cleaner technologies, these effects tend to be limited as charges are generally used primarily for raising revenue and are set too low for incentive purposes. Policy conflicts may also arise. Some economic instruments (such as low-interest loans for pollution control equipment) may encourage end-of-pipe approaches over process change investments. Economic instruments, including both the DTI supply side measures and those of other Government agencies, must be carefully examined to ensure that they do not directly or indirectly discourage investments in cleaner technology.

4.5 Employment issues

Employment concerns raised regarding cleaner technology relate to two areas. Firstly, cleaner technologies may displace other technologies or industrial sectors (a local composition effect). Renewable energies may affect the coal industry; a move towards recycled materials may decrease demand for virgin materials. The balance of employment changes will depend on the relative labour intensity of the two sectors. Although there are indications that many

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

environment-protective activities are more labour intensive that the ones which they displace, actual employment effects need to be assessed at a country, or even local, level.

A second concern is that even if the net employment change is positive, there may well be labour adjustment changes with associated social impacts. Employment created in environmental industries may be inferior to jobs in other sectors of the economy. For example, employment in the recycling and reclamation industry is often very low paid, low skill and hazardous work. New employment may also be seasonal or temporary such as in the eco-tourism industry.

The third problem area is that cleaner technologies may be more capital intensive than those they replace. Such technologies may be employed as part of a more general technology or capital stock improvement package, which effectively seeks a higher capital intensity and less demand for labour per unit of production. This potential conflict requires further attention to ensure that cleaner technology strategies do not undermine current employment objectives.

Experience from the MFI SA indicated that many costs in manufacturing are due to lack of knowledge and experience of staff. Government should subsidise industrial / vocational training programmes in order to keep the labour force on shop floor. The alternative automation elimination of human errors in robots, assembly lines and computer driven production is a fast growing trend all over the world. The process is only reduced by the investment in technology and the cheap labour costs.

On the positive side, research undertaken in the US indicates that investments in environment and energy efficiency create more jobs per dollar of investment than exist in highly polluting industries. Whether this pertains to South Africa remains to be seen. However, an unequivocal benefit may be attained from opportunities inherent in the market development and export growth of the environmental goods and services industry.

4.6 Effects on Domestic and Export Markets

4.6.1 Cleaner Technology and the EGS Sector

A close link exists between clean technology development and the environmental goods and services (EGS) sector. The market for environmental equipment and services will be affected by a shift away from conventional pollution control to pollution prevention and Cleaner Production processes. This shift will have repercussions for both environmental companies and manufacturing firms. Manufacturing firms using Cleaner Production processes will seek to reduce compliance costs and, in some cases, production costs. An EGS industry that develops

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

more cost-effective approaches to reducing pollution will fare better in both local and global markets.

South Africa's industrial development goals are predicated on increased exports, including expansion into African markets. The EGS sector appears to offer substantial opportunities in this regard. According to ERS (2000), demand in African countries for environmental goods and services is growing at about 10% per annum and demand in OECD countries remains high. South Africa has significant expertise in the water supply and wastewater management areas of the EGS sector, and much of this expertise is suited to African and developing country conditions. An assessment of the export promotion activities of the Water Institute of South Africa (WISA) could provide a useful study for further EGS export promotion.

In the long term, cleaner technology and production processes may have the potential to generate more export-related growth and jobs than conventional pollution control equipment. Government technology and export promotion policies aimed at strengthening environmental industries need to take into account the technical possibilities and commercial opportunities in Cleaner Production, as well as CP manufacturing costs, especially the gap between the quality of domestic produced goods and the specified quality for overseas markets.

4.6.2 Environmentally Preferable Products

Environmentally preferable products (EPPs) are those demanded due to an inherent environmentally preferred aspect of the product or of the way the product was made. There are numerous examples, including organically grown produce, wood products from sustainable forests, and low water use toilets. Growing environmental awareness in industrialised countries may create export opportunities for EPPs. This is however a particularly poorly defined segment of the market which requires careful market assessments. Products with eco-labels are more clearly identified, but many products – such as energy efficient appliances – incorporate the environmental component into the product itself and cannot be separated from other product characteristics determining market demand.

EPPs may create new export opportunities for South Africa. Firstly, by meeting environmental product standard (such as those of eco-labels) South African exporters may gain an advantage over competitors who do not meet these standards. In addition, meeting such standards is often seen as a mark of quality, enabling developing country exporters to overcome concerns regarding poor product quality. Secondly, product differentiation on environmental grounds ('green consumerism') may open up additional market opportunities. The scale and longevity of such

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

markets, however, is unclear in many consumer sectors. It is also important to investigate the overseas consumers' perception of the South Africa as a country of origin in the context of EGS. Without the creation of positive perceptions, the sales of EGS with not materialise.

On the other hand, the formulation of eco-labelling schemes and other environmentally related product standards (such as recyclability) can reduce market access. For example, even where agriculture may be organic by virtue of following traditional practices, it will not be accepted as 'organic' in importing countries unless it is certified by a recognised organisation. It is therefore important for South Africa, alone or with other developing countries, to attempt to influence international processes around eco-labelling schemes to ensure they reflect the interests of the exporting countries as well as the consuming ones. An important issue is how to make certification more affordable for small enterprises. For these businesses, certification is often a cumbersome and expensive process. The market for EPPs is both complex and highly competitive. The potential returns should be assessed in detail in developing strategy in this area.

4.6.3 Taxes, fees and charges

Taxes, fees and charges may be used to promote Cleaner Production practices by raising the costs of unwanted outputs, or by providing incentives to promote more efficient use of natural resources. In some instances it may be appropriate for the revenues from these instruments to be used to support Cleaner Production activities and thus to further stimulate preventative approaches (Buckley, 2004). The responsibility for environmental costs should be shifted to the discharger, thereby reflecting the true cost of production. The charge should thus serve as an incentive to encourage the optimal utilisation of resources and a reduction in waste in order to reduce the detrimental impacts on water resources.

Using the incentive potential of environmental charges comes with some additional issues:

- It leads economically to the optimal allocation of emission reduction/control, resulting in a least cost solution;
- It gives a continuous incentive to enterprises to look for more resource efficient/cleaner technologies;
- The money can be used to generate revenue to internalise external environmental costs;
- Way and possibility to measure / monitor the tax base, and linked with this administration and possible fraud (the higher the rates, the higher the stakes); and

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

- The use progressive increasing sampling charges as an administrative tool in effluent quality control.

4.6.4 Liability rules

Several countries have found that enforcing strict liability - in terms of which firms are held responsible for all the environmental damage they cause, even if they have fulfilled their legal obligations and have exercised *due diligence* - often leads companies to try to minimise their risks and take preventive measures (Buckley, 2004).

4.6.5 Subsidies

Financial subsidies, in the form for example of low-interest loans, direct grants, or preferential tax treatment, can be targeted to specific industries to stimulate technological development (Buckley, 2004).

Box 4.3 – Cleaner Technologies for Sustainable Development

Cleaner technologies are increasingly regarded as a key tool for achieving sustainable development.

Possible Concerns	Possible Opportunities
• Lack of single strategic approach to the development of cleaner technology in South Africa.	• Potential to promote locally-developed, appropriate, environmental technology
• No clearly designated responsibility or coordination mechanism within Government or parastatal organisations for the management of clean production and development.	• Potential for South African technology innovations to make inroads into the global EGS market
• Possible trade-offs between promoting the development of innovative local clean technologies and making importation of environmental protection equipment easier and less costly.	• Potential to take advantage of internationally-funded technology transfer promotion schemes, including mechanisms established under Multilateral Environmental Agreement
• No clearly designated responsibility or coordination mechanism within Government or parastatal organisations for the management of clean production and development.	• Intellectual property rights legislation affords protection to South African cleaner technology innovations.
• Expanding intellectual property rights regimes and international patent laws may hinder access	• Potential to link cleaner technology implementation to job creation.

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

to environmental technologies by increasing costs. • There is a low demand for cleaner technology at present in South Africa. • The effective evaluation of environmental technologies and dissemination of information to industry. • The potential for outdated 'control-based' technologies to be sold or 'dumped' into the South African market. • The potential for cleaner technologies to be highly capital intensive.	• Request from Government for Best International Practice provides CP opportunities

4.7 Environmental Management Accounting

A major barrier to a more widespread adoption of Cleaner Production or eco-efficiency and corporate responsibility is that organisations often do not know the internal environmental costs (and external social costs) of operating their business. While environmental costs are often very narrowly defined to include costs incurred to achieve compliance with environmental laws, the true costs to an organisation can be far broader. A tool to overcome this uncertainty is Environmental Management Accounting [www.bullion.org.za/UpcomingEvents/EnvEcon.pdf]. Even without the rigorous application of EMA, the strict application of a proper accounting discipline and regular cost analysis can assist a company to better assess the true environmental cost its operation. Environmental costs include items such as "raw material costs", "loss of added value" and waste related cost. The following diagram shows some of the 'hidden' costs related to poor business resource management and environmental accounting.

EMA is one of the most powerful tools to convince management to implement an integrated environmental management strategy. The main objective of EMA is to calculate environmental costs and expenditures and prove the costs savings linked to an effective environmental management system or program. Although the mining industry uses sustainable development as a basis for their environmental strategies, they seldom see the total picture regarding environmental costs and expenditures. This may be explained by the size of many of the mining companies, the lack of communication between different divisions and the need for EMA guidelines.

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

4.8 The Status Quo Review: Key issues and Gaps

While various CP related activities have (arguably) been undertaken by each level and most departments of government in South Africa, there is still a lack of more widespread activity, a key reason for this being the poor level of know-how and capabilities in the field. In addition some companies do not widely disseminate their SCP success stories to the public or to Government for competitive and strategic reasons. This is despite the fact that elements of South African legislation and policy on paper may be amongst the best in the world being inclusive of key principles such as the precautionary principle, the waste management hierarchy and the polluter pays principle.

The gaps in policy and legislation lie in the lack of appropriate incentives (lack of effective economic instruments), the existence of disincentives for CP (such as low cost of electricity, water, effluent treatment and waste management), as well as the lack of enforcement of the legislation and implementation of policy. The lack of capacity to implement CP-related legislation and policy is being addressed at a limited level, but needs wider and more intensive effort, in addition to the development of partnerships and voluntary agreements to assist the process. It should be noted, that the existence of strong legislation and enforcement is generally a pre-requisite to encourage a shift to self-regulation and information sharing on applied CP/SCP measures, and that both activities generally are not as effective without the threat of strict legislation if they do not meet the requirements. In addition, it is easier to regulate an informed industry than to battle against an ignorant one and therefore, no legislation and policy will be effective without strategies to implement a significant effort in awareness raising, education and training on CP at all levels and in all sectors, including national and local government.

Some of the key gaps identified in the study that are impeding the more widespread adoption of CP at policy and legislation level are summarised below:

- The lack of appropriate ***incentives***, in the form for example of appropriate economic instruments
- The existence of ***disincentives*** for CP, such as low cost of electricity, water, effluent treatment and waste management; the experience of some waste minimisation clubs in the Western Cape has demonstrated that inappropriate revenue structures in municipalities has been an important disincentive for local authorities to promote CP, underlining the need to ensure the provision of CP considerations with resource pricing and taxation policies at national and local level and to identify and remove potentially conflicting subsidies

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

- The lack of ***enforcement*** of the legislation and implementation of policy; a key constraint in this regard is the lack of sufficient capacity and resources to implement CP-related legislation and policy; while this is being addressed at a limited level, there is seen to be scope for wider and more intensive effort, including the potential for the development of partnerships and voluntary agreements to assist the process, as well as a greater focus on technical training and capacity building activities
- Insufficient ***integration and co-ordination*** of CP issues within and between the policy activities of the various organs of state that have an impact on CP related measures; related to this there is seen to be scope for more effective integration of CP requirements within existing licensing and enforcement activities, building for example on the experience of the eThekwini municipality
- There is a general need to improve the availability of *quantified data* on the environmental, economic and social costs and benefits of implementing CP practices; capturing such data will assist in motivating further CP practices, and will be a valuable means for providing effective training at tertiary level.
- There is scope for more effective integration of CP issues within ***EIA and licensing processes*** (building for example on the recent initiative of the Western Province), as well as ensuring provision for CP considerations within permit requirements. In this regard it is suggested that efforts should be taken to learn from and build on the policy and regulatory successes associated with the DANIDA projects, including for example the experience within the fishing industry project, where DWAF issues conditional licences with gradual adoptions of CP as a condition. The experience of the eThekwini municipality may be particularly instructive in this regard.
- There is significant scope for improving understanding and practical application of ***full cost accounting practices*** relating to environmental issues.
- There remains a continuing need for greater integration of CP issues at ***tertiary education*** level, not simply within engineering departments, but also at a multi-disciplinary level overseas (in Denmark) an environmental master of science has been implemented with success.
- There is potential for integrating CP considerations within the ***technical and financial assistance programmes*** aimed at SMMEs; these include working for example in co-

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

ordination with organisations such as the National Manufacturing Advisory Centre (NAMAC) and the various regional Manufacturing Advisory Centres (MACS)

- A number of the projects in South Africa have highlighted the importance of reaching further into the ***supply chain*** and (for example in the case of textiles) to ensure greater involvement of retailers and buyers who in turn may have an impact on consumers
- There is potential for pursuing practical CP initiatives within the ***energy sector***, which in turn could have a beneficial impact on other sectors; the potential for integrating with related energy initiatives, and for building on recent commitments to renewable energy, should be further investigated
- There is scope for raising ***consumer awareness*** on environmentally preferable products and services; while many companies are able to meet EU eco-label criteria at reasonable cost, there is currently insufficient demand to do so
- ***Technical training*** is required to build capacity amongst local authorities on how to practically implement and enforce CP; such training could include the provision of practical guidelines on CP and best available techniques. Training should be reinforced through greater knowledge and awareness amongst political leaders, regulators and decision-makers regarding the nature and potential of preventative environmental practices and the role of appropriate designed and effectively enforced policy.
- Related to this, there is seen to be scope for ***more active participation of key sectors*** that have an important potential influence on the supply chain, for example the retail sector, through their procurement practices, or the financial sector through their lending and investment activities.
- Linked to the above issues is the serious ***lack of a National Waste Information System***; such a NWIS is required urgently to pinpoint opportunities for CP/SCP measures in industries and to encourage industrial symbiosis projects.
- There is merit in developing focused ***CP guidelines*** for government officials; these should build on and are co-ordinated with similar initiatives; these include for example the recent development by the Western Cape province of CP guidelines for EIA reviewers.

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

Table 4.2 – Summary of CP-related legislation in South Africa

The following table provides a brief overview of some of the key elements of legislation pertinent to CP in South Africa.

Legal/Policy Instrument	Relevance to CP
The White Paper on Integrated Pollution and Waste Management 2000	• Promotion of Cleaner Production and establish mechanisms to ensure continuous improvements in best practice i management. • Prevention, reduction and management of pollution of any part of the environment due to all forms of human acti radioactive, toxic and other hazardous substances. • Setting targets to minimise waste generation and pollution at source and promoting a hierarchy of waste manage waste at source, reuse and recycling with safe disposal as the last resort.
National Environmental Management Act NEMA (1999)	• Section 28(1) of NEMA states that: 'every person who causes, has caused or may cause significant pollution or d take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, … or degradation'
The Environment Conservation Act 73 (1989)	• The EIA Regulations (R1182 and R1183 of 5 September 1997, promulgated in terms of this Act) require that spe reports (scoping and/or EIA reports) prepared, for those activities listed in Schedule 1 likely to have a "substantia environment"
National Integrated Waste Management Bill, (Draft 9, November 2002)	• Incorporates numerous clauses regarding the need for, and mechanisms to develop and enforce, strategies for was o 'implement and enforce waste minimisation and reuse and recycling initiatives'; o 'promote the development of voluntary partnerships with industry in respect of waste minimisation, re-use and • Includes the development of National and Provincial Waste Information Systems (WIS) to obtain the information of the Polluter Pays principle
National Water Act (1998)	• Management must accept total responsibility for waste and pollution arising from their industry. • Places responsibility on the user to purify effluent to an acceptable standard so it can be returned to its original so • Makes way for a more sustainable demand-management water pricing approach. • Internalisation of costs: Water pricing will now be set to value the resource according to its scarcity, and will also to a much greater extent than was done previously (i.e. all the costs in the provision of water will be incorporated effluent charge, including capital, operating, social and environmental costs).
Occupational Health and Safety Act 181 of 1993	• In terms of this Act, an employer must minimise any substances on site that could be injurious to employee health hazardous chemical substances waste wherever possible (section 15 (a)).
Regulations for Hazardous Chemical Substances (in terms of Occupational Health and Safety Act 181 of 1993)	• An employer must control the exposure of an employee to hazardous chemical substances (section 10. (2) (a)) by which may contaminate the working environment" and as far as reasonably practical, "recycle all HCS waste" (s
The White Paper on the Energy Policy of the Republic of South Africa 1998	• Ensuring that an equitable level of national resources is invested in renewable technologies, given their potential energy supply options.
Mineral and Petroleum Resources Development Act (Act no 28 of 2002)	• One of the objectives of the Act is to make provision for equitable access to and sustainable development of the n resources. Furthermore the Act affirms the State's obligation to 'protect the environment for the benefit of presen ecologically sustainable development of mineral and petroleum resources and to promote economic and social de

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

Legal/Policy Instrument	Relevance to CP
Air Quality Bill (2003)	• To reform the law regulating air quality in order to protect and enhance quality of air in the Republic, taking into development.

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

5.1 Overview of policy

Based on the review of best practice it is evident that there is a wide range of policy options that authorities can take to promote CP practices. The aim of these different instruments should be to provide businesses with:

- *Sufficient incentive* to implement CP – this can be achieved through appropriately designed and enforced regulatory and financial policy tools
- *Greater access to information* on CP benefits and tools – authorities can achieve this by disseminating best-practice information and facilitating networking
- *Effective capacity* to implement CP tools – this may be achieved by undertaking practical demonstration projects that teach CP tools and techniques through learning by doing

A general summary of the different types of available policy instruments for CP is provided in Box 3 below. This summary should be considered as potential opportunities that can be used to inform the development of the CP strategy in South Africa, with the aim of ensuring synergy and building on the waste minimisation strategy and action plan that forms part of the National Waste Management Strategy. In deciding which of the following instruments to apply, it is important to ensure that the instrument is appropriate within the context of the larger policy and regulatory context for the region and business sector being considered.

It is recommended that each of the available policy tools should be evaluated against the following points. The combined answers to these questions will assist in indicating if the particular instrument is appropriate for use by the relevant government authority, and also whether it will fit within larger national efforts to mainstream CP in public policy:

- How will it contribute to creating the conditions for change in behaviour toward CP?
- Will it provide the right incentive, build capacity and/or provide access to information?
- Will there be undesirable consequences of its use within or beyond the sector?
- Is it politically feasible?
- Are there sufficient human technical and financial resources to implement the instrument?
- Is it cost-effective in comparison to other instruments that might be used?
- Does it compliment or conflict with other measures used in the same sector?

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

The key is to provide *a mix of tools* which can be used by stakeholders to encourage cleaner production depending on their existing and future policy directions, programmes, resources and particular circumstances. Underlying the development and introduction of these legislative and policy instruments is the need to ensure that there is sufficient general capacity for effective implementation and enforcement of these initiatives. With this in mind, it is important that the strategy seeks to both enable capacity building and to build on existing opportunities for partnerships as effectively as possible.

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

BOX 5.1 – AVAILABLE POLICY INSTRUMENTS FOR PROMOTING CLEANER PRODUCTION IN SOUTH AFRICA

There are various different policy instruments that regulators may use with the aim of promoting cleaner production practices in companies. This box briefly reviews some of the key types of available policy instruments that local and/or provincial authorities may wish to consider implementing in South Africa. The different types of regulatory instruments may be broadly divided into the following four categories:

- Regulatory-based
- Financial and market-based
- Information-based
- Voluntary programmes

Selecting an appropriate policy instrument

In deciding which of the following instruments to apply, it is important to ensure that it is appropriate within the context of the larger policy and regulatory context for the particular region and business sector being considered. It is recommended that each available policy tool should be evaluated for a specific use on the following points. The combined answers to these questions will indicate if the particular instrument under consideration is appropriate for use by the relevant government authority, and also whether it will fit within larger national efforts to mainstream CP in public policy.

- How will it contribute to creating the conditions for change in behaviour toward CP?
- Will it either provide the right incentive, build capacity and/or provide access to information?
- Will there be undesirable consequences of its use, within the sector or beyond the sector concerned?
- Is it politically feasible?
- Are there sufficient resources (manpower, technical and financial) to implement the instrument?
- Is it cost-effective in comparison to other instruments that might be used?
- How does it compliment or conflict with other measures used in the same sector or with the same objective?

REGULATORY–BASED INSTRUMENTS

The predominant strategy for achieving pollution reduction has been through the use of regulatory instruments, in terms of which a public authority sets standards and then inspects, monitors and enforces compliance to these standards, punishing violations with formal legal sanction. These regulations may specify an environmental goal – such as the reduction of carbon dioxide emissions by a specified date – or they may mandate or limit the use of a particular technology or process. Such an approach gives the regulator maximum authority to control where and how resources will be allocated to achieve environmental objectives, and it provides the regulator with a reasonable degree of predictability as to how much the pollution levels will be reduced.

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

Following is a brief review of available regulatory instruments for promoting CP.

- **Discharge standards**, in which the producer is limited in the amount of waste that can be discharged into the land, water or atmosphere, are the most common type of regulatory approach.
- **Substance, product or technology bans** are an authoritarian means of promoting cleaner production practices. These may include for example the imposition of a ban or a defined phase-out schedule for a particular product or input substance or process. The most common form is a ban as input to a production process on use of a particularly toxic material or a material whose derivation has severe environmental consequences. More definitive forms are the banning of an entire product whose production, use or disposal has a strong environmental impact, or the use of an environmentally inefficient or toxic production process.

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

- **Including CP in Bylaws:** There is significant scope for including the implementation of cleaner production practices within existing bylaws. For example if a company shows evidence of implementing waste minimisation measures then this could result in reducing the number of sampling tests conducted by the municipality at the company. This would result in lower costs to the company.
- **Require cleaner production audits** as part of the permitting requirements. Firms may be mandated to undertake cleaner production audits of their plants and to implement some of the audit findings. In terms of integrated permit conditions, firms may be required to implement a structured environmental management system and to make public information on their environmental performance. Authorities may also achieve this end through a combination of requirements and tax rewards for compliance or exceeding requirement.

FINANCIAL AND MARKET-BASED INSTRUMENTS

Authorities may stimulate cleaner production measures by providing grants, loans and favourable tax regimes to relevant industrial enterprises. Before introducing any new economic instruments, governments should identify and evaluate any economic incentives that may already be in operation, either explicitly or implicitly. These include for example the use of subsidies to make local industries more competitive. Many of these policies lead to artificially low prices for resources, such as energy and water, as a result of which these resources may be overused, creating both pollution and shortages. Assessments of such policies are needed before some of the following instruments are applied:

- **Environmental taxes and charges** may be used to promote cleaner production practices by raising the costs of unwanted outputs, or by providing incentives to promote more efficient use of natural resources. Ideally these charges should be on an escalating scale per unit of discharge, increasing with discharge per unit of product in order to provide a strong incentive for the producer to reduce the intensities of its production. In some instances it may be appropriate for the revenues from these instruments to be used to support cleaner production activities and thus to further stimulate preventative approaches. The successful implementation of such instruments requires a system of monitoring, revenue collection, and enforcement, as well as measures to combat possible corruption.
- **Grants, subsidies and loans** for identifying and implementing CP methods provide an incentive for the producer to determine options for CP and to undertake improvement of the process when the

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

- changes required may not be proven profitable in a particular industry sector or region. Such grants and subsidies should be limited to early users and should be phased out when other means are available so as not to distort industry economics.
- **Financial subsidies**, for example in the form of low-interest loans, direct grants, or preferential tax treatment, can target specific industries to stimulate technological development. Harmful subsidies, such as for the import of used equipment or outdated and inefficient technology, or for the use of particular inputs to production should be removed.
- **Preferential government procurement** may offer extra weight in competitive bidding to firms that can demonstrate that they are engaged in a implementing a CP plan, are certified to ISO14001, or have in some other way demonstrated that they are pursuing cleaner production. Promote public procurement policies that encourage development and diffusion of environmentally sound goods and services.

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

INFORMATION-BASED INSTRUMENTS

In addition to creating an appropriate regulatory and financial framework for CP, authorities may further stimulate the adoption of cleaner production practices through the use of informational measures. These may be used to provide the right incentive – for example through the public disclosure of a firm's environmental performance – as well as to build capacity within industry, for example through disseminating case studies. Examples of strategies include:

- **Disseminating best industry practices** to provide firms with useful information for changing their own practices, and a reference point as to how they are doing relative to peers. The practices may be undertaken directly by a government agency, or the government may provide assistance to private sector institutes to identify and disseminate the practices.
- **Promoting waste minimisation clubs** is a potentially effective means of exchange for promoting CP practices. Authorities can encourage clubs by providing the right regulatory incentives, usually at local government level. The membership may be primarily representatives of firms, but it may also include a wider circle of concerned parties, especially when an industry has a significant effect on the welfare of a community.
- **Promoting demonstration projects** to highlight the techniques and cost-saving opportunities associated with cleaner production in selected plants. Authorities can promote CP through targeted, high profile demonstration projects in firms whose success will be credible to other firms in the sector. It is essential that there be effective mechanisms built into the demonstration for the publication of the results within the sector, and that the host of the demonstration be chosen appropriately to the intended market for the results.
- **Public recognition and awards** are an effective means to reward accomplishment by business, giving them visibility and a valuable public relations asset.
- **Requiring public disclosure of emissions** can be an effective means of changing the behaviour of firms. It can help managers to identify how inefficient their processes may have been, and can be an important competitive stimulus when performance is compared with industry peers.
- **Establishing an information & expertise network** is important to allow for easy access of CP options, case-studies & success stories.
- Including provision for **CP in education & training curricula** is an essential aspect to ensure the long-term capacity building for promotion & implementation of CP.

"VOLUNTARY" PROGRAMMES

With the growing appreciation of the limits of conventional policy instruments, many governments are encouraging the adoption of voluntary policy instruments for promoting cleaner production. These should not generally be used in isolation, but rather should form part of an integrated suite of policy instruments. These include for example:

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

- Entering into an **Environmental Management Co-operation Agreement (EMCA)** – an EMCA could for example include a commitment to implementing CP measures and reporting on performance, in response to certain incentives.
- **Environmental management systems (EMS)**, such as ISO 14001, are increasingly important in international trade. Authorities have a potential role in promoting effective EMS, for example by linking EMS adoption to permit requirements, and introducing related flexible penalty systems, especially where the EMS explicitly includes CP.
- **Public voluntary programmes** in terms of which companies agree to achieve CP goals, as well as to publicly report on their performance, in return for improved public recognition, possible access to governmental technical assistance, and the achievement of cost savings. [Hanks J and Janisch C, 2004]

5.2 Recommendations of the UNEP CP Status reports: Implications for SA

As part of the preparations for the World Summit on Sustainable Development, UNEP undertook a global review of the status of CP throughout the world. The review found that despite some significant progress in the last decade, much remains to be done in overcoming some of the continuing barriers. It is suggested that the recommendations emanating from this global review constitute a useful input into the development of CP strategy in South Africa. Table 6 at the end of this Chapter provides a comparison of South Africa's current status against the principal recommendations of the UNEP Global Status review of CP. These implications are presented as a basis for discussion and will be further developed during the stakeholder process.

As part of the Global Review, a series of Regional Reviews was undertaken. In assessing the spread of CP in the regions, the overview of CP was performed at two levels. The first level considered the maturity of existing CP activity in the region, and the extent and effectiveness of CP activities conducted. The second level assesses the enabling environment offered by the region for CP promotion, based on a belief that CP – or indeed any initiative relating to environmental management – is most likely to be accepted when preceded by a certain level of economic and social development.

The global review of CP in different regions revealed a discontinuity between the achievements made in CP and the existing situation of the enabling environment. In some regions, for instance, the enabling environment is rather weak and is plagued with significant barriers while at the same time, many CP-related initiatives are reported. It may be therefore concluded that the CP

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

sector is still not matured across the region and/or the Cleaner Production interventions are less mainstreamed or strategic and are limited to project/programme level interventions. This observation is applicable to Africa, Asia-Pacific, Central and Eastern Europe, and the Latin American and Caribbean regions. For regions such as the European Union and North America, such a discontinuity is not observed and the interrelationship between the enabling environment and the accomplishments in CP seem to be rather well structured and harmonious. More research is required into the enabling environment, and its influence on CP promotion in the different regions needs careful assessment.

The regional review also shows differences in the context and opportunities for accelerating the implementation of CP. The drivers for CP implementation are indeed different. CP activities should focus on identifying key drivers that will enable greater penetration. It is important to understand that these drivers may differ for each region, and this must be factored into processes for developing region-specific CP action plans. The global market for environmental technologies and services differs in the diverse regions and by composition is still influenced by end-of-the-pipe treatment technologies. By 2008, it is estimated that the US and EU countries will have nearly 70% of the global market share. If CP is to be promoted around the world, then the market must shift and change in composition, promoting CP solutions ahead of end-of-the-pipe approaches. This will require creation of enabling environments in all regions.

The global review suggests that the African region needs to focus more on the agricultural and natural resource management sectors, integrating health and safety in the CP approach and stressing the interrelationships between Cleaner Production and Sustainable Consumption. South Africa, Zimbabwe and Nigeria are two of the only African countries with a significant industrial manufacturing sector for CP initiatives. The implementation of CP in the mining sector is also highly relevant and necessary in the African region.

Box 5.2 – UNEP Regional Review of CP: Recommendations for African Region

The African countries, still in the process of developing and becoming industrialized, will be heavily dependant on international sources for assistance about CP. The need for basic infrastructure is still acute; investment and aid would still be diverted to fulfilling these. Internalization of CP innovations will take a very long time. To develop this, CP initiatives in the region will need to consider the following issues:

Alignment with trade organizations for increased penetration of CP

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

As improving trade performance is a prime objective across the region, there is a need for CP activities to be absorbed by trade related organizations such as SADC, ECOWAS, SACU, COMESA, etc. These trade organizations have the potential for dissemination of CP throughout the African region.

CP promoters would need to use a trade focus to;

- Develop manufacturing with integrated CP interventions;
- Use mechanisms like eco-labelling to steer firms towards greater market potential;
- Form alliances with trade associations, common market mechanisms, to promote CP.

CP activities should focus on resource extractive activities, given their dominance of over the regional economies. Most of the economies are going through the invariable shift to manufacturing and services, which makes imperative a need for strong CP focus in related sectors.

Emphasis on Health and Safety

Health is a major issue in the region as poor working environments compound the effects of chronic malnutrition, poor sanitation and vulnerability to communicable and vector transmitted diseases. Poor health depletes the workforce, reduces the expertise pool and leads to low productivity. CP intervention should thus, strongly emphasize labour welfare. Fair trade labels are a case where labour welfare has been raised to a competitive advantage in export markets, through labelling. Health and Safety of consumers should also receive emphasis as a first step towards initiating Sustainable Consumption.

Need and Importance of Indigenous Innovation

A fair amount of the small-scale manufacturing and production takes place in the rural areas of this region, but there has been a tendency to overlook these processes in conventional CP exercises. Rural innovation, in agriculture, dairy farming and mining is still an important tradition in the region and needs to be fostered by strategic interventions.

Agriculture and livestock rearing in some cases still use traditional methods. Some small-scale cotton farmers produce cotton of near-organic standards. These could be improved and promoted internationally through established mechanisms like eco-labels, organic cultivation certification, etc. Indigenous innovations are, often, the most sustainable as they address local situations best. These must find support in CP activities. Indigenous knowledge needs to be tapped and emphasized instead of the more mechanized innovations that are likely to be brought in through high technology transfers from the developed countries.

Focus on urban governance

The African region is already the site of several initiatives in urban environmental management, such as Local Agenda 21 and the Sustainable Cities programme. These are programmes with wide agendas, and CP could easily fill a significant niche to integrate the preventative concept into urban governance.

Funding CP investments

Targeted revolving loans or guaranteed funds for CP investments should be established for different regions in Africa. This was strongly requested at the Second Africa Roundtable on CP in Arusha in March 2002.

It is suggested that the above recommendations for the African region should be considered for input into the development of South Africa's CP Strategy.

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

5.3 General Implications for CP policy from Best Practice Review

The success of the preventive approach will to a large extent depend on the ability to *mainstream the cleaner production concept into major policy areas,* other than of environmental policies. Due to its broad ranging nature, CP cannot be facilitated by just one approach, or indeed, just one sector of the community. The Aims and Objectives of a CP Strategy therefore should *cover a wide range of issues and target various sectors.*

It is important to integrate cleaner production into the sectoral policies of "action" ministries, which directly influence the efficiency of specific processes. This includes, for example, industrial policy, agricultural policy, health care policy and energy policy. However, implementation of cleaner production is influenced by all ministries and therefore should also be integrated, for example, into educational and local development policy. This instrument can be considered to be an example of mainstreaming of cleaner production in South Africa. There is a need for the CP Strategy to mainstream the CP concept into major policy areas, not just environmental policy in South Africa.

There is significant opportunity to partner between departments to implement key aspects of CP Strategy. The Strategy should not be responsibility of DEAT/DTI only. For a truly nation-wide paradigm shift towards sustainable production and consumption, the national CP Strategy will need involve the activities of many departments in implementation. For example, the Departments of Labour and Education will have a key role to play in education and training activities of the strategy. The Department of Agriculture will have a key role to play a key economic sector and CP is highly relevant and implementable in this sector. The role of the Department of Minerals and Energy is obvious for CP Strategy development and implementation too.

Main relevance of CP Strategy for DWAF is that SA has used 80% of usable water resources. DWAF is working to extend usage from available resources with its policies. The relevance for sustainable consumption and production to this department is high and water must be a key focus for national CP strategy. The cost of water, internalisation of water costs and true cost of effluent all need to be addressed in the CP strategy.

There is also a need to look at how existing initiatives can be strengthened or extended for example through the DTI Sector Partnership Fund. Funding of training and information dissemination is as relevant as funding of technologies.

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

Best Practice companies include Policy and legislation with a strong basis in preventative environmental legislation, focusing on the upper levels of the waste management hierarchy as well as on resource efficiency.

South African legislation and policy is inclusive of key principles such as the precautionary principle, the waste management hierarchy and the polluter pays principle. The national legislation and policy can be considered to be amongst some of the best at the level of regulation. However, the problem lies in the lack of incentives (lack of economic instruments) and the existence of disincentives for CP (such as low cost of electricity, water, effluent treatment and waste management), as well as in the lack of enforcement of the legislation. The lack of capacity to implement CP-related legislation is being addressed, but needs wider and more intensive effort, in addition to the development of partnerships and voluntary agreements to assist the process. It must be noted, however, that the existence of strong legislation and enforcement is generally a pre-requisite to encourage a shift to self-regulation, and that self-regulation generally is not as effective without the threat of strict legislation if they do not meet the requirements.

> *"The hurdle is not a lack of physical or technical capability, but the lack of industrial and political will to implement cleaner production methods. Part of this inertia is due to the absence of public pressure. Governments and industry tend to act if they...feel some pressure from society" - UNEP Global CP Status Report, 2002*
>
> *"Business and industry should be encouraged to report annually on their environmental records, as well as on their use of energy and natural resources. as well as to adopt and report on the implementation of codes of conduct promoting the best environmental practice." – Chapter 30, Agenda 21*

Box 5.3 – Example of CP being integrated in the Regulatory Process

- The P2 enactment was made in the US as early as in 1990.
- CP Assessments are legislated in some countries such as Spain and the Netherlands. Spain has its own process called Minimizing Opportunities in Environmental Diagnosis (MOED), one aspect of which is a CP Assessment process.
- The Polish government has revised their Environmental Law (1997) recommending Cleaner Production as the strategy for the development of industrial activities.
- The European Union has already established the Industrial Pollution Prevention and Control (IPPC) Directive 61 and many of its member states are in the process of aligning their national CP related policies and strategies with the IPPC.

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

Increasing use is now made of *market and information based instruments in combination with the conventional regulatory instruments* of command and control. In this process, the regulatory instruments have matured (e.g. moving from concentration based, single media, emission standards to load based, multi-media, emission standards) and some of the more stable economies have started advocating negotiated environmental compliance. In contrast to specific compliance, this adopts a more co-operative approach between the regulators and the regulated in setting and enforcing standards. This "*shared responsibility*" between government and industry enhances the likelihood of a more open exchange of information among the parties, and allows greater flexibility regarding the means of meeting the standards.

A number of countries have started to develop regulations in which attainment of certain *targets* (e.g. recycling targets) is required while concrete means of achieving such targets are left to industries *(non-prescriptive regulation*s). This in turn may increase the economic efficiency of the regulations, and may be conducive to the adoption of innovative, preventative mechanisms of meeting the targets.

Markets have started *influencing both production and consumption* by building awareness on *eco-labels*, setting *environmental and social codes* for products throughout the supply-chain and requiring or urging the utilisation of *environmental management systems*. This has shown signs of catalysing a more integrated approach to CP implementation, encompassing process, product, services and consumption.

Areas that continue to resist, and hinder, CP implementation persist. These include issues such as subsidies, taxes, marketable permits, environmental charges, trade restrictions, and foreign direct investment related policies, and need focus.

To encourage creation of pressures from society, many governments have introduced information-based strategies in the existing policy and regulatory framework. Examples include:

- Reporting Requirements such as the Pollution Release and Transfer Registers in the USA, Canada, Australia and the UK; Mandatory environmental reporting in Denmark; and the PROPER initiative in Indonesia.
- Public Voluntary Programmes (such as the US EPA's 33/50, WasteWi$e, and Green Lights) enabling participating companies to benefit through improved public recognition, access to governmental technical assistance, and cost savings.

Implementation of CP within industry/agriculture is facilitated by regulatory instruments such as:

- The requirement for CP before granting of (initial/renewed) permits to operate

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

- The requirement for CP audits as mandatory reporting by companies.
- The requirement for CP to be implemented in order to reduce/eliminate a cash penalty for not meeting environmental standards
- Specific requirements for the reduction in use or elimination in use of certain (toxic) substances.

All of these options are applicable to South Africa and can be implemented provided a significant effort in awareness raising, training and capacity building is made to facilitate the process.

Product stewardship approaches, using instruments such as mandatory *labelling, eco-design and collection infrastructure* for wastes have also been implemented. The basic reason for the success of initiatives like *financial instruments* and *packaging policies* is their relative simplicity and because of the firm establishment of the polluter pays concept in the region.

Consumer-end environmental management is also important, and several successful initiatives have been launched with active community support in best practice countries. These are focused on promoting the market for environmentally-preferable and recycled products and materials.

5.5 CP Policy and Strategy options for South Africa

The following list is an initial set of general recommendations only based on issues that have been identified throughout this report. The issues for consideration have been set out using the framework of core activities. There are of course many other ways of presenting these suggestions, but it is suggested that the following may be seen as a coherent and logical framework.

5.5.1 Initial awareness raising

- While there have been some significant CP initiatives in South Africa that have contributed to increased awareness and understanding of the benefits and techniques of CP, there is nevertheless significant scope for further improving levels of general awareness within business and industry, government and amongst the general public.
- A key underlying objective of the national CP Strategy should be to increase levels of awareness of CP in South Africa, through the introduction of appropriate policy measures, the provision of support to relevant demonstration and capacity building projects, and facilitating the availability of relevant best practice case studies.

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

- These awareness raising campaigns should be supported by effective marketing activities. Government should investigate partnerships in marketing CP, by building the capacity of media as well as commercial service providers in their marketing abilities.
- There is seen to be particular scope to increase awareness of CP in a some of the traditionally less visible (but nevertheless environmentally significant) commercial sectors including retail and finance.

5.5.2 Obtaining Political Commitment

- There remains significant scope to increase political awareness of the benefits and techniques associated with Cleaner Production. Should South Africa become a signatory to the UNEP International Declaration on Cleaner Production, this Declaration would provide a mechanism for all ministries to commit to a common approach. Implementation of the Declaration by all relevant departments could then be used as the basis for a national strategy, which would provide a basis for clarifying the roles and responsibilities of the various departments. The strategy could also set out a range of instruments that could be used by specific departments to promote implementation.
- Future initiatives should build on the positive experience and lessons learnt in a number of more active local authority regions, such as eThekwini and Cape Town.

5.5.3 Building National Capacity

- There is scope to improve capacity within government and industry by building on the existing current initiatives (such as the DANIDA guidelines and capacity building workshops aimed at local authorities), as well as developing new initiatives across different government departments and at different levels (national, provincial and local).
- There is scope for improved co-ordination of CP capacity building activities; the NCPC (or similar) could play a key role in networking existing service providers.
- A centre of excellence in CP education could also be set up at a university.
- The accreditation of CP training courses with relevant SETA's would be beneficial.
- There is potential for integrating CP considerations within the technical and financial assistance programmes aimed at SMMEs; these include working for example in co-

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

ordination with organisations such as the National Manufacturing Advisory Centre (NAMAC) and the various regional Manufacturing Advisory Centres (MACS).

5.5.4 Demonstrating CP

- There has been (and still is) significant effort in developing and implementing demonstration projects that continue to generate success stories and lessons learnt. A key opportunity is the need to disseminate the results of these success stories on a wider scale, not just to key manufacturing sectors, but also to agriculture, transport, tourism and retail sectors; there is also scope to include the lessons learnt from the CP projects at tertiary education and secondary education level, and to further build on the approach of using students actively in these projects.
- In a recent review of the impact and effectiveness of the DANIDA CP demonstration in South Africa, [Hanks, J and Janisch, C, 2003] a number of key considerations were identified as having contributed to the success of these initiative; this assessment of the important lessons learnt (both positive and negative) from this experience should be used to guide any similar anticipated initiatives.
- The character, scope and mechanism of the demonstration projects should be on fostering multiplication, with the focus being on systems and life cycle thinking, and not merely on technical retrofitting.
- Initial demonstration projects had the advantage of offering *free* or *highly subsidised* assistance. As it is unlikely that will be the case in the future, provision will need to be made for greater marketing effort.

5.5.5 Establishing Information Networks

- Goal 2 of the NWMS specific outputs makes reference to the dissemination of information on waste minimisation by developing a directory of case studies and sector-specific guides. Although some sector-specific guides have been developed as part of the WRC and the DANIDA demonstration projects, and as part of the Western Province's Waste Minimisation EIA Guidelines, these are limited to very few sectors.
- There remains scope for establishing effective information networks to ensure the more widespread dissemination of readily available information and South African specific case studies, fact sheets, manuals and guides on the benefits and techniques of CP aimed at

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

specific economic sectors, as well as for cross-sector options such as water & energy saving. The *Generic Guide on CP* as well as the *Wet-Textile Guide for CP* (published by the DANIDA CTPP), and the Western Province's Waste Minimisation EIA Guidelines, are very useful models for further work.

- The National CP strategy could make provision for establishing a central information network where different organisations could be allocated responsibility for updating the information on specific industry sectors or cross-sectoral issues. (The US Pollution Prevention Resource Exchange is a useful model).

5.5.6 Forming Partnerships

- The Waste Minimisation Club concept in South Africa has proven successful and can be extended, for example to include voluntary agreement programmes for certain industry sectors
- A number of useful observations regarding the nature of these clubs has been made in a previous assessment of CP in South Africa and may be of value in informing the future development of similar initiatives.
- A number of the projects in South Africa have highlighted the importance of reaching further into the supply chain and (for example in the case of textiles) to ensure greater involvement of retailers and buyers who in turn may have an impact on consumers.

5.5.7 Education and Training

- There is significant scope to increase education on sustainable production and consumption within undergraduate engineering curricula as well as in more general environmental management, business, economics, marketing, and commercial areas including within B.Com and MBA curricula.
- Currently, education & training on the environment (where it exists) still focuses on the traditional approach to environmental management which to a large extent focuses on measuring problems and developing 'cures', rather than prevention.
- There is scope for more focused train-the-trainer activities.

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

5.5.8 Technology Development

- It is suggested that on the whole, environmental technologies and services are still predominantly influenced by end-of-the-pipe treatment technologies.
- There may be rural initiatives with respect to cleaner technologies (e.g. appropriate technologies using renewable energies) that could feed into a CP information network and assist with research, transfer & development of related technologies in urban areas.
- The EU Document for Best Practice on Cleaner Production in Textile Industry is already in the process of being reviewed and summarized into a useful form for the South African Industry. A similar approach could be used for other industry sectors.

5.5.9 Financing CP

- The reasons for the lack of success of the IDC CP fund should be understood and provided for in the design of any future similar initiative.
- South Africa has a robust banking sector and this has the potential to strengthen CP financing, if developed accordingly. There may be scope to build on the growing environmental awareness of this sector associated for example with the King II Code and with the London and Equator Principles.
- Cleaner Production must to be integrated in the standard project appraisal process as well as in the risk management framework when it comes to retrospective financing or operation of cluster loans.

5.5.10 The development of appropriate framework of CP Policies and Strategies

- At present the Department of Environmental Affairs and Tourism has taken the lead in the development of a vibrant National CP Strategy. However, there is a need at a national policy level for the adoption of an approach incorporating the concept of preventative strategies in *all* areas of relevant Government policy to make it uniformly supportive and favourable to the cleaner production concept. This will requires a shift from the reactive approach to a proactive preventative approach. The cleaner production approach should therefore be integrated into all relevant national policies and Government instruments, such as those dealing with the environment, industry, resource pricing, trade, fiscal, education and technology development. Hence, a successful cleaner production policy and strategy will require commitment from a range of Government departments.

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

- Current gaps in policy and legislation lie in the lack of incentives (lack of effective economic instruments), the existence of disincentives for CP (such as low cost of electricity, water, effluent treatment and waste management), as well as in the lack of enforcement of the legislation and implementation of policy.
- Experience of some members of waste minimisation clubs in the Western Cape has demonstrated that inappropriate revenue structures in municipalities has been an important disincentive for local authorities to promote CP; there is thus an important need to ensure the provision of CP considerations with resource pricing and taxation policies at national and local level and to identify and remove potentially conflicting subsidies.
- The lack of capacity to implement CP-related legislation & policy is being addressed at a limited level, but needs wider and more intensive effort, in addition to the development of partnerships and voluntary agreements to assist the process.
- There is a general need to improve the availability of quantified data on the environmental, economic and social costs and benefits of implementing CP practices; capturing such data will assist in motivating further CP practices, and will be a valuable means for providing effective training at tertiary level. This suggests that there is scope for ensuring focused provision of CP issues within the development of the Waste Information Systems, as well as for improving capacity and understanding for example on full cost accounting methodologies.
- The integration of CP requirements into EIAs as well as into new permits (and permit renewals) will be an important strategy for influencing future sustainable development. If Cleaner Production is to influence future development, and then it is necessary that Cleaner Production principles be explicitly integrated into planning and related anticipatory environmental management tools.
- There is seen to be significant scope for reviewing and building on recent policy experiences abroad, where there has been a shift towards developing more integrated legislative frameworks that encompass process, product, services and consumption, and that include demand-side and supply-side policy measures often as part of an Integrated Product Policy framework; many regions have developed National Cleaner Production Strategies that could inform the development of a similar approach in SA.

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

- A feature of many of the recent policy interventions abroad has been the increased use of "co-regulatory" policy instruments (such as industry agreements) on specific elements relating to CP (such as energy efficiency or the reduction of packaging). DEAT has recently disseminated the revised guidelines on Environmental Management Co-Operation Agreements (EMCAs) and has expressed a commitment to further development of this policy instrument. EMCAS are seen to be particularly pertinent for the fostering more widespread CP in industry and there is seen to be valuable scope for linking EMCAs with key CP initiatives.
- A framework for implementing appropriate policy measures for CP (based on a review of international experience) is been included in the existing Waste Minimisation Strategy and Action Plan components of the NWMS, where specific provision has been made for expanding on this as part of a national strategy for CP more broadly. The elements contained in this existing Action Plan should feed into the development of the proposed CP Strategy.

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

Table5.1 – UNEP Global Status Review of CP: Implications for South African CP Policy

The following table provides a comparison of South Africa's current status against the principal recommendations of the UNEP Global Status review

UNEP Global Status Review of CP Key Recommendations	Implications of these Recommendations for South African CP Policy
A formal integration between Cleaner Production and Sustainable Consumption may provide a concurrent framework that guides producers and consumer behaviour on lines more aligned with the long-term objectives of sustainable development.	• This is relevant for the development of the national CP Strategy in South Africa, which National Strategy for Sustainable Production and Consumption (in-line with international pro in terms of the nature of the various policy instruments and the focus of any target sector grou
Cleaner Production promoters must establish, document and communicate the Cleaner Production implementation principles and processes that can be commonly understood and applied across all sectors and by all stakeholders.	• Establishing a common language and a common institutionalization for CP will be highly results from the CP activities in South Africa can be, but have not yet been, pooled togethe build on existing ones, rather than reinvent new ones for each new sector. • It is critical to strengthen the global standing of Cleaner Production, by driving it through that are endorsed internationally. The IDCP has been a useful step towards obtaining the stakeholders at various levels including national governments. The implementation guideline step towards drawing up a plan to actively facilitate the implementation of the IDCP.
In such efforts, it may be strategic to establish a synergy between Cleaner Production and implementation of various Multi-lateral Environmental Agreements (MEAs) at the national level.	• The role of CP in each of the MEA's should be identified and promoted. There is a need t national policies and regulatory frame-work. In addition, it is necessary to operate in institutions, technology development agencies and consumer based environmental NGOs. • Strategies should focus on the expanded vision of CP that links explicitly with Sustainable C and national governments, businesses and communities to implement the various MEAs.
Given the global shift of economies to services and infrastructure, there is now a need for a corresponding shift in Cleaner Production focus as well.	• This is important for South Africa – not to limit CP activities to manufacturing industry, sectors, particularly services (tourism, hospitality) and infrastructure sectors (transport and mining. There is need for a concerted effort to implement the multiplier effect of demonstrat as focussing on sectors such as financing and retail sectors that have the potential for creating • Although the potential of CP has been proven beyond doubt via demonstration projects in div effect of demonstrations has been very poor. Again, in most of the cases, demonstratio

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

	demonstrations of equipment or technology, not of methods and management systems or inno
It is important to transform the character, scope and mechanism of demonstration projects to foster multiplication. Focus should be on systems and on life cycle thinking, and not merely on technical retrofitting	• The life-cycle focus of the DANIDA Textile Project has proven successful in South Africa i of supply-side and demand-side measures for CP, including cleaner agricultural production a the role of retailers. Effort should be made to foster multiplication of these demonstratio projects should endeavour to expand their scope in this way • Information exchange is important and several such initiatives have been taken world clearinghouses. However, most of these information clearinghouses have been supply driv actually assess and to stimulate the information demand related to CP. The quality and c clearinghouses in some cases could be questionable. Most information databases have t manufacturing sector and its needs. Information compilation must address issues of sustain sectors such as services and infrastructure, and resource management runs very deep

UNEP Global Status Review of CP Key Recommendations	**Implications of these Recommendations for South African CP Policy**
Future Cleaner Production information networks will have to move from information to knowledge, and support field-based counseling units, especially to meet the needs of the SMMEs.	• There is a need to both develop information networks in South Africa as well as stimula Perhaps the design and implementation of information networks should take into account t the beginning. This is specifically relevant for SMME assistance • Networks should not remain mere conduits of generic information; there is a need to offer stakeholders as a value addition on the information provided. Including local Cleaner Proc becomes essential. If local CP expertise is given access to these information networks and c networks, then the CP expertise can assist in developing demand for the information as well to individual stakeholders • A fair amount of economic activities related to small-scale manufacturing and services are ru the protection and management of natural resources as well as to sustain livelihoods of however, has tended to get overlooked in most CP initiatives, with CP appearing more as an u
Rural innovation, in agriculture, dairy farming, mining, forestry and fisheries are still vibrant traditions in many regions and must to be fostered	• This is particularly relevant to South Africa. The CP demonstration and skills transfer pro expertise with a focus on urban-based knowledge. There is a need to develop demonstration a in rural innovation. The inclusion of downstream agricultural activities in the DANIDA CTP

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

by strategic Cleaner Production interventions. There are also innovations made in recycling and reuse of wastes in urban areas, particularly in the informal sector that warrant some attention	effort could be made for example by including forestry in the proposed demonstration project • Indigenous innovations are the most sustainable as they best address local situations and sustainable consumption patterns. Consumer health and safety remain under-addressed issues
Cleaner Production could provide an excellent platform to address minimisation of health and safety-related risks while meeting the market demands of codes of conduct, brands and eco-labels	• Here the consumer interest organisations, trade unions and local governing authorities could economic and environmental benefits of Cleaner Production approaches. There is a need to eco-labels from consumers. It is the wealthy portion of the community that needs to shift consumption patterns and eco-labels will be more relevant in this regard. Partnerships organizations may be a key strategy for eco-labels. Studies on eco-labels in South Africa w the producers can meet the standards, but there is insufficient consumer demand • SMEs are the mainstay of many of the regional economies where there is a need to initia operation
In this regard, supply-chain based approaches may be more useful as they are driven through economy and competition, and will help to ensure participation of medium and large scale enterprises and can be more intricately linked with trade, health and safety. Private sector participation is a key element, and must be exploited for greater outreach across sectors, as well as in building multiplier effect of Cleaner Production	• Trade fairs can be influential avenues for information exchange and interactions between p conventionally under-emphasised Cleaner Production, despite its relevance in the promotio energy efficient. The business to business (B2B) interactions in CP must be catalysed to bo This may lead to increased CP-related consulting, and engagement of performance related co • This is a key strategy that e.g. the DTI could develop and implement. The aim is to identify information exchange and interactions and use these mechanisms as influential avenues to em

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

UNEP Global Status Review of CP Key Recommendations	Implications of these Recommendations for South African CP Policy
As a foundation to main-stream Cleaner Production and to ensure that it influences all the stakeholders, inclusion of Cleaner Production concepts is necessary in all forms of education. Unlike demonstration projects and industry based awareness programmes, Cleaner Production training in universities has traditionally received little investment from multilateral or international aid agencies. Further, these courses are currently developed and supported entirely by the university, with little or no involvement of local NCPCs or any other facilitating organisation.	• The local demonstration projects have endeavoured to involve tertiary institutions or at lea tertiary institutions, but there has been no coordinated or committed action to invest in c education in tertiary institutions. The national CP Strategy for South Africa will need to loc and implement CP education in key educational disciplines at tertiary level. The developmen also be useful for information exchange and curriculum development • The institutionalisation of CP must be formalised through education, and developmen culminating in certification, to build a credible accredited pool of Cleaner Productio Certification will provide a strong boost to developing a mature market for Cleaner Productio
Cleaner Production implementation would be accelerated if it were stressed through the national policy frame-work, as in the case of mandatory Cleaner Production assessments for critical aspects of appraisal and risk analyses	• Best practice policies on CP include mandated CP assessments. There is need for technic implement this, but the one stimulated the demand for the other. This type of policy inte South Africa, provided the education, training, awareness raising and capacity building el planned to support this. • Most financing activities have somehow not focused on widening outreach to small ente perhaps due to the high credit risks involved. Private sector participation in Cleaner Produ and most fund streams are donor driven.
Further, Cleaner Production must to be integrated in the standard project appraisal process as well as in the risk management framework when it comes to retrospective financing or operation of cluster loans	• The National CP Strategy should investigate ways to promote this. Programmes of financi emphasise technology uptake and building of local capacity. Cleaner Production is indeed a partnerships. In the last decade, a commonly established partnership for Cleaner Produ government-donor agencies and businesses. Many of these partnerships have, however, beer and usually whither away on the withdrawal of, donor support
It is critical that we build local level multi-	• Partnerships in demonstration projects have proven useful. Those of the DANIDA CTPP

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

stakeholder partnerships that can promote Cleaner Production on a self-sustaining basis. The increased role of the private sector and the community is necessary to ensure 'ownership' and on-going support of integrative, multi-stakeholder Cleaner Production implementation programmes.	project management that could then be capacitated to continue the CP activities in the fut setting up sustainable partnerships for CP promotion and implementation in South Afric business and training/education institutions will also be beneficial • Much of the experience in CP implementation has been in existing or given situations, to fi and economic performance through optimisation, modernisation/expansion or reengineering/ less used in developing land-use related and operational plans for guiding project siting an resource extraction or building infrastructure to support mobility, energy supply and human s
If Cleaner Production is to influence future development, and then it is necessary that Cleaner Production principles be explicitly integrated into planning and related anticipatory environmental management tools	• The integration of CP requirements into EIAs as well as into new permits (and permit renew influencing future sustainable development. The recent experience in the Western Provinc further development of similar initiatives in South Africa.

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

UNEP Global Status Review of CP Key Recommendations	Implications of these Recommendations for South African CP Policy
At the policy level, the presence of subsidies on natural resource extraction, as well as poor legislative enforcement will continue to hinder Cleaner Production absorption.	• Strategic interventions at the policy level must be made to enable greater success of Cleane few years, focus has been placed on the formulation of national policies and strategies frameworks for promotion of Cleaner Production. Here, experiences from countries and regio the Czech Republic and Australia have been encouraging. The use of innovative policy instr been evolving but these initiatives are restricted to developed economies. It is importa documented and applied within other developing countries
Many of the strategic interventions described above are interrelated and should not be independently considered. To develop and implement a Clean necessary to establish a situation specific operational framework by involving stakeholders, identifying needed pre-requisites and overcoming barrie Production along with Sustainable Consumption will perhaps show the way – by obtaining commitments at all levels and by establishing new partner and communities. Consumption does not provide an alternative approach, just 'the other side of the coin'. It is s*ystems* of production and consumption patterns of consumption requires an understanding of the complex features of such systems that shape particular modes of living, the markets for g which they are produced.	

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

APPENDICES

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

REFERENCES

1. Buckley CA (2004) *Cleaner Technologies For Process Industries*, Keynote Address at the Waste Management, Emissions & Recycling in the Metallurgical and Chemical Process Industries Conference, MINTEK, Randburg 18 - 19 March 2004

2. Clayton, A, Spinardi, G & Williams, R, 1999. Policies for Cleaner Technology: A New Agenda for Government and Industry. London: Earthscan

3. City of Johannesburg Metropolitan municipality: Waste management By – laws, 2003.

4. DEAT (2000): White Paper on integrated pollution and Waste Management for South Africa: A Policy on Pollution Prevention, Waste Minimisation, Impact Management and Remediation. May 2000.

5. Environmental Monitoring Group, 1993. Clean Production: a Preliminary Assessment of the Need and potential for the Introduction of Clean Technology in some Industrial Sectors in South Africa. Cape Town: Environmental Monitoring Group

6. Environmental Risk Services (2000): Sustanable Production Study: Discussion Document on the role of the Departmrnt of Trade and Industry in Promoting Sustanable Production in South Africa. Fridge/DTI Draft Discussion Document – 24 January 2000

7. http;//www.unepie.org/pc/cp/understanding_cp/home.htm

8. WSSD (2000) The Johannesburg Plan of Action, September 2002

9. http://www.nu.ac.za/cleanerproduction/;

10. http://www.nu.ac.za/watseminclubs/

11. Hanks, J and Janisch, C: Evaluation of Cleaner Production Activities in South Africa (with a particular focus on DANIDA supported initiatives), Evaluation Mission Report, DANIDA, Danish Embassy Pretoria, July 2003

12. Heatherington A, DANIDA, 2003, Cleaner Production in South Africa- Lessons learnt in environmental assistance

13. Hanks, J and Janisch, C. (May 2004): GENERIC GUIDELINE, Promoting Cleaner Production Practices in South African Businesses, for the DANIDA Cleaner Textile Production Project, Pretoria, South Africa.

14 Hanks, J. and Janisch, C (May 2004): Regulator's Guide on Cleaner Production – Sector – specific guide for the Wet-textile Processing industry, for the DANIDA Cleaner Textile Production Project, Pretoria, South Africa.

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

15. Hayward DJ et al. (2002) Practical Environmental Management in the South African Wine Industry. Water Institute of Southern Africa, Biennial Conference, ICC, Durban, South Africa, 19 – 23 May 2002.

16. Hillary R. Environmental Management systems and Cleaner production.- England 1997. - 345p

17. UNEP International Declaration on Cleaner Production, http://www.ourplanet.com/imgversn/104/declare.html

18. Rossouw, J (2000): Disposal of winery waste water: Regulator's perspective. Article published in Wynboer: A Technical Guide for Wine Producers (http://www.wynboer.co.za/recentarticles/1002disposal.php3).

19. Report from the South African Press Association published by the Cape Times (11 May 2004

20. http://www.gov.za/whitepaper

21. http://www.dme.gov.za/energy/pdf/energy_efficiency_strategy.pdf

22. http://www.csir.co.za

23. Moelesti M et al (2004) Strategy for Mitigating the impacts of Heavy Metals in Wastewater and the Economic and Environmental Implications for the City of Cape Town WISA Bi-annual Conference, Cape Town, 2 – 6 May 2004

24. National Strategy for the Development and Promotion of small Business in South Africa (White Paper of the Department of Trade and Industry; 20 March 1995)

25 . M.C. Barros, M.T. Torres Rodriguez, *P.M. Bello Bugallo, E. Roca, J.J Casares Long, Integrated pollution prevention and control in the surface treatment industries in Galicia. 2006

26 J. Wagner and J Arnold, " International Firm Activities and Innovation: Evidence from Knowledge Production Functions for German Firms, " 2006

27 Staniskis j, Stasiskiene Z, Kliopova I. Strategy for Sustainable Industrial development: Theory and Practice. , 2004. 504 p.

28 Jackson, T Clean Production Strategies: developing preventive environmental management in the industrial Economy. 143-164. 1993

29 Jackson, T. Material Concerns – pollution profit and quality of life, Routledge, London, 218p. 1996

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com

PDF Creator - PDF4Free v2.0 http://www.pdf4free.com