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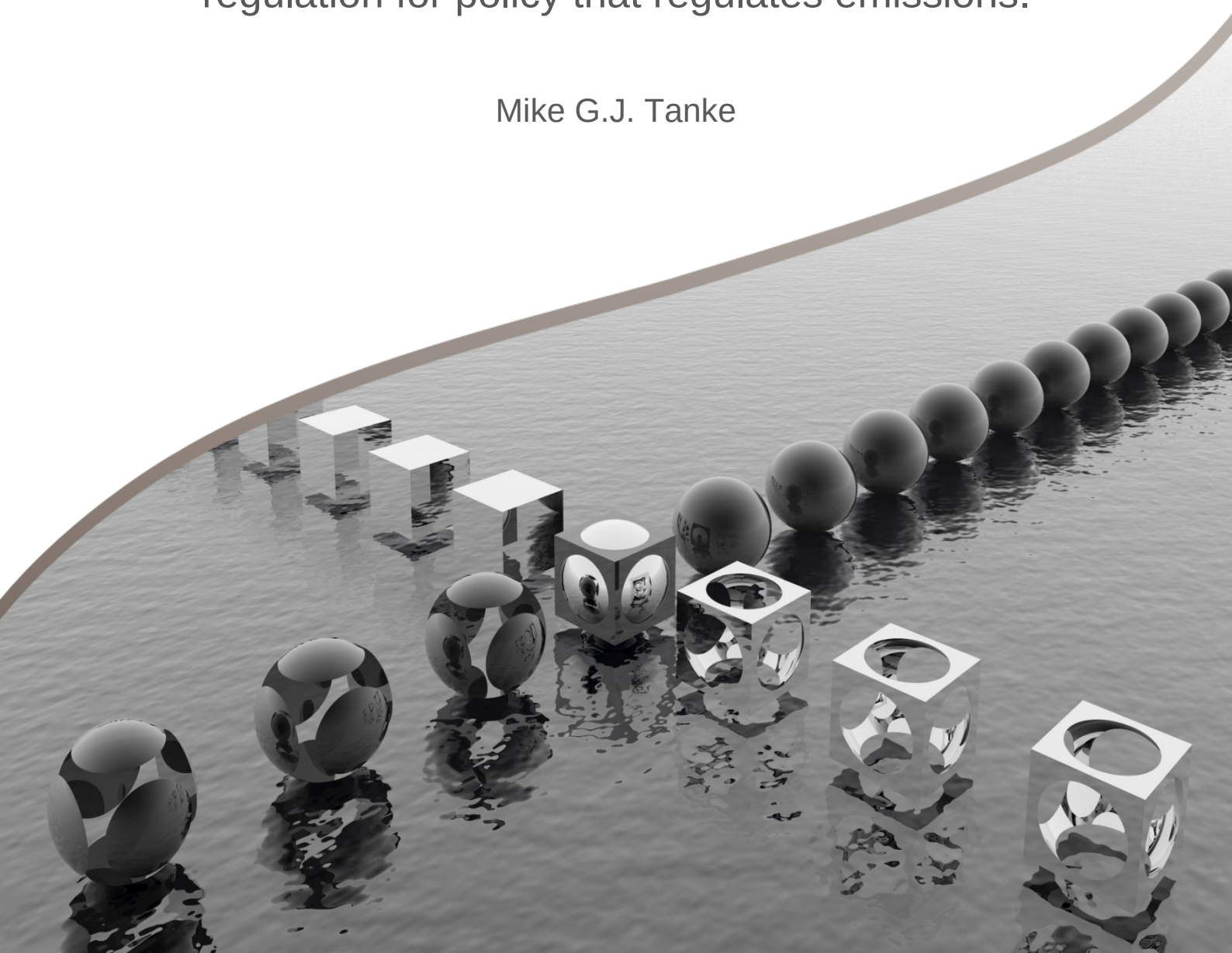
Mike G.J. Tanke



# Investigating a new policy model: principles based regulation.

## A case-study on the effects of principles based regulation for policy that regulates emissions.

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# Preface

Policy is an instrument that is used for the pursuit of particular purposes. It is a way of organizing a framework of beliefs and perceptions which justifies certain organizational practices and provisions. According to H.K. Colebatch (2002) – a renowned academic on policy making – policy is a way of exercising control by focusing attention on some aspects while other aspects are disregarded, considered less important. With the rise of new preferences and demands of people, policy is adjusted and attuned to changing circumstances. Policy is subject to a continuous process of social construction in which people interact and choices are made to exert new policies. Alternative policies are therefore investigated for their alleged higher effectiveness to reach particular goals. This should be taken into account when reading this report, because it provides the underlying explanation of why this research has been conducted.

This research has been conducted as part of my study Public Administration at the University of Twente. The publication of this report concludes the research I have conducted throughout the past year and – above all – finalizes my master Public Administration. The report can thus be considered as a keystone of my academic career so far. Hopefully it opens up a new phase with opportunities for me to expand and increase my knowledge.

Throughout my research I received assistance and guidance from multiple people. I therefore want to express my gratitude to each of them. First of all, I thank my supervisors from the University of Twente. Dr. P.J. Klok and Dr. K.R.D. Lulofs have provided me with guidance and support during the entire research. They have been very critical during the process which enhanced the overall quality of my study.

I am also very grateful for the guidance of my supervisor at Capgemini, dr. ir. R.G. Mierop. He exerted his network and opened doors of people for me that would otherwise be very hard to open for a graduate student.

Finally, I would like to thank all experts that have cooperated in this research.

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Mike G.J. Tanke

## Abstract

This research has been conducted as part of the master Public Administration at the University of Twente. An alternative style of policy making – principles based regulation – is explored in this study that is more in line with current societal tendencies of reallocating responsibilities, budget cuts and an information asymmetry between the regulator and norm subjects.

The research can be characterized as a case-study on emissions regulation. The main research question is formulated as: *"What are the expected effects in terms of incentives for entrepreneurs to innovate when applying a principles based approach to policy that regulates emissions?"*. Multiple experts from the emissions domain have been interviewed in order to examine multiple relevant variables that have been identified from theory.

The key conclusion of this study is that two conditions for innovation are positively affected by principles based regulation. First of all, the role and responsibilities of an actor is – in principles based regulation – better attuned to the amount of knowledge an actor possesses. Secondly, norm subjects will demand innovation in order to reduce the risk of non-compliance and acquire an acceptable rate of uncertainty. In the short term, principles based emissions regulation is unlikely to enhance innovation, because the market of technology suppliers in which system innovations occur is mature and oriented on the global market. The focus of principles based regulation on future emission requirements does however provide a necessary condition for innovation in the medium and long term. Principles based regulation allows room for an integrated approach in which a comprehensive environmental assessment leads to more cost-effective decisions. Nevertheless, multiple risks have to be reduced and preconditions should be settled before principles based emissions regulation can actually become successful in practice.

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# Chapter 1. Introduction

## 1.1 Background of the Problem

In October 2010, cabinet Rutte took office in the Netherlands and started to execute its coalition agreement "Freedom and Responsibility" containing the general plans and positions of the Dutch government in important societal issues for a four year governing period. This coalition agreement emphasizes the intention of the cabinet Rutte to increase the effectiveness of governmental policy, to reduce the size of the civil service, and to merge several departments so that a smaller, more responsive government is established (Boonstra 2010; Regeerakkoord VVD-CDA 2010). Major savings have to be implemented to reorganize the public finances. The apparatus of government should function more efficient, realizing more effective policies while employing fewer civil servants.

Part of this apparatus is the department of Infrastructure and Environment – the governmental department responsible for the development of strategic environmental policy in the Netherlands. This department thus also faces the challenge to reorganize itself in order that more effective environmental policies are being implemented. According to the coalition agreement, this should be achieved by developing sustainable solutions for environmental pollution in air, water and soil. Emphasis in the agreement "Freedom and Responsibility" is on a collaborative approach between the government and the private sector. The government and the private sector should cooperate to achieve both effective environmental policy and additional economic opportunities (Regeerakkoord VVD-CDA 2010). According to cabinet Rutte, the key in realizing this is innovation – "a process of turning opportunities into new ideas and putting these into widely used practice" (Tidd & Bessant 2009). Innovation should yield both opportunities for economic gain and increased effectiveness of regulation in terms of establishing sustainable solutions for environmental pollution.

Besides the far reaching consequences of cabinet Rutte's coalition agreement, the department of Infrastructure and Environment also faces other challenges that have to be taken into account for future environmental regulation. These challenges can best be expressed as tendencies (Vries & Boonstra 2010).

A first tendency the department is confronted with is that of rapid and significant developments in technology. The previous decade showed many improvements in existing techniques and the development of new technologies. For example, the market for biotechnology, nanotechnology and synthetics has grown substantively in the previous years and is expected to do so in the future (Min. van ELI 2008). As a result of fast changing technology, an information-asymmetry has emerged between the private sector and the department of Infrastructure and Environment. The department is unable to keep track on all changes, and can therefore not anticipate what the consequences will

be for the environment. As a result, it has become more difficult for the department of Infrastructure and Environment to design effective environmental policy (Vries & Boonstra 2010).

A second tendency the department has to take into account concerns changes of civil society in addressing contemporary problems. Many environmental problems transcend national borders and therefore require an international approach if they are to be effective. Problems such as air and water pollution do not stop at national borders, but transgress to nearby states which then in turn suffer the consequences. International operating companies, non-governmental organizations, and environmental advocacy networks have taken an important position in deliberation on possible solutions for these problems. These organizations have an increased hold on decision making processes – both at the national and transnational level (Keck & Sikkink 1998: p. 121). It is thus evident that the department of Infrastructure and Environment should both recognize the influence of these organizations and utilize their knowledge in order to make effective environmental policy.

A last tendency that is identified is the change in the allocation of responsibilities in society. More emphasis is put on taking responsibility of one's own actions. This is also one of the core notions of the coalition agreement "Freedom and Responsibility". It implies more room for a person's or organization's own judgment in determining their actions to achieve its interest. Subsequently, this entails less government interference in terms of prescribing society what they should do. Especially in environmental regulation it is claimed that the regulatory pressure is too high for organizations, because a dense set of rules is to be taken into account (Vries & Boonstra 2010).

The department of Infrastructure and Environment is both an agent of, and subject to the described tendencies and cabinet Rutte's coalition agreement. It is an agent of this process, because the department of Infrastructure and Environment is established in 2010 by a merger between the department of Transportation and the department of Housing, Spatial Planning and Environment. Moreover, since June 2011 the Directorate-Generals (DG) – the operational units inside the department – have been brought back from five to three DGs (Min. van I&M 2011). These reorganizations have been implemented to reduce the organizational costs and establish a smaller government conformable to the coalition agreement. As a subject, the department has to acknowledge the presence of these tendencies in order to be able to anticipate on the consequences for policy making. The department should be aware of the effects of these tendencies for future policy making, because only then will the department be able to develop effective environmental regulation.

In light of the plans of cabinet Rutte and the above mentioned tendencies, interest inside the department of Infrastructure and Environment is raised for a different direction in policy making: principles based regulation. This interest is evident from several governmental documents[1][2] and initial exploratory talks with officials from the department of Infrastructure and Environment. The current regulatory style for environmental policy – described as rules based regulation – entails in short that the government prescribes very specific and detailed rules to its norm subjects. Norm subjects can exactly retrieve information from regulation on how they should act and run their organization. In contrast, principles based regulation entails that the government directs norm subjects based on a general outline. Principles specify very broadly what the outcome of regulation is, but leaves the actual interpretation and proceedings up to the norm subjects themselves. Principles therefore focus on the ultimate goals that have to be achieved, whereas rules exemplify the means that have to be applied by norm subjects. It should be duly noted that principles based regulation is not so much a new direction in policy making but a different direction, since regulation focusing on goals dates back approximately twenty years ago. An example of previous regulation focusing on the goals is the acidification covenant of 1990 for Dutch electricity companies stating the goals for SO2 and $NO_x$ control for the next decade (EnergieNed 2003).

Interest inside the department of Infrastructure and Environment for principles based regulation is raised because it fits well into the described tendencies and plans of the cabinet Rutte. In principles based regulation the norm subject is left with more discretionary room than in rules based regulation. Norm subjects get more responsibility in developing a plan of action to comply with regulation. In doing that, norm subjects are able to take specific knowledge and circumstances of their organization into account. As a result, norm subjects should be able to decide upon more appropriate measures to achieve compliance with principles. This in turn implies significantly more room for organizations and entrepreneurs to utilize (new) opportunities and to establish innovations that enable compliance with regulation. Innovation is thus a side-effect of the selected regulatory style.

To recapitulate, this research focuses on the effects of two regulatory policy styles – principles based and rules based – in environmental regulation. Since innovation is considered to be the core process that can establish effective environmental policy and therefore a sustainable environment in the

[1] Vries, E. de and Boonstra, H. (2010). Signalering "Principle Based" milieubeleid. *Ministerie van Volkshuisvesting Ruimtelijke Ordening en Milieubeheer*. Working Paper. Not Published.

[2] Boonstra, H. (2010). Principle Based Milieubeleid. *Ministerie van Volkshuisvesting Ruimtelijke Ordening en Milieubeheer*. Working Paper. Not Published.

future, this is the main effect that will be studied. For organizational purposes the decision was made to conduct a pilot case study focusing on a specific part of environmental regulation, because environmental policy per se is too broad for this study. Therefore one specific environmental topic will be studied – that is, emissions regulation. Emissions regulation has been chosen for this case study because of two reasons. First of all, much discussion has taken place in recent years on emissions standards. It thus is a very actual topic that the department of Infrastructure and Environment is confronted with. Secondly, there is much reliable information on emissions that enables me to determine the effect of current policy on innovations and effectiveness (emission reduction). If the results of the research yield interesting findings, other domains of environmental policy might also become interesting to study.

## 1.2 Research questions

This research investigates whether a principles based regulatory style is more effective for emission regulation than a rules based regulatory approach. Are there (m)any constraints that make it less suitable to be adopted in emission regulation? What are the advantages and disadvantages that should be taken into account? With a view to the future, it has been acknowledged that innovation is the key process for enabling future compliance with objectives. Emission standards are becoming more stringent in order to reduce emissions such as carbon dioxide and sulphur. Innovation is imperative in ensuring that these emission reductions can be achieved now, and in the future. The important question is, whether innovation benefits most from rules or principles? The key notion of this research can be translated into the following research question: *"What are the expected effects in terms of incentives for entrepreneurs to innovate when applying a principles based approach to policy that regulates emissions?"*

In order to answer the main research question, I will start with discussing the relevant policies that have an effect on emissions. These policies will first have to be identified, after which analysis can take place. The aim is to determine the balance or proportion of rules and principles in these regulatory policies. Hence, a complete understanding of rules based regulation and principles based regulation is needed. This comprehension will be based on a theoretical framework, which allows for a distinction of rules and principles on formal grounds. Theory provides the tools that enable us to identify the properties that characterize rules and principles. Consequently, the first specific research question is formulated as follows: *"To what extent is current policy on emissions characterized by rules or principles based regulation?"*.

The next step in the research concerns an assessment of the experiences with current regulatory policies. This part specifically focuses on identifying the effects of current policies in terms of

effectiveness (emission reduction) and innovation. An important question that will be addressed is whether entrepreneurs are stimulated by the regulatory style to innovate. Thus, the relationship between the regulatory style (i.e. rules or principles) that is adopted and the corresponding effectiveness and innovation will be analyzed. This implies both empirical research in terms of interviewing stakeholders for their knowledge, and studying documents and papers that contain data on emission reduction and innovation. The second sub-question this research addresses then is: *"What is the rate of innovation that contributes to emission reduction and what problems and opportunities do entrepreneurs encounter in the current regulatory policy when considering the introduction of innovations to reduce emissions?"*.

The final step in the research focuses on the feasibility of principles based regulation in emission policy as an alternative to rules based regulation. This part addresses the question whether principles are a more effective form of regulation than rules, especially regarding innovation that fosters emission reduction. Relevant topics that will be addressed are the expected effects of a principles based regulatory system, and the necessary conditions that make principles based regulation a success. Besides the formal presence of principles in regulation, it takes more for such a regulatory style to work in practice. Are such conditions already present? If not, what should change to make it a success? Hence, the third specific research question is stated as: *"To what extent can principles based regulation contribute to more incentives for entrepreneurs to innovate and reduce emissions?"*.

## 1.3 Relevance of the thesis

In recent decades, people have become more aware of the vulnerability of the environment. It has been argued that the industrialization and the rise of the modern welfare state have put an enormous burden on the environment. One indicator for this increased awareness is the rise in donations and memberships of environmental protection organizations in recent years (Milieuloket 2007). Relating to this are the discussions that are taking place on the effects of the modern economy for the environment. Especially the debate about the greenhouse effect is a "hot topic", for it has scientifically been proven to be caused by harmful emissions (i.e. exhaust fumes). As a result of this discussion, emissions reduction is put high on the political agenda, both national and international. Concrete examples are the Kyoto protocol of 1997 and the European Climate Change Program of 2001, both aiming to significantly reduce emissions beneath emission-levels of 1990. In the Netherlands, the target for CO2 emission reduction has been set at a 30% reduction in 2030 compared to the emission-level of 1990 (Min. van VROM 2007).

Innovation contributes to cost reduction of new technologies, strengthening the competitiveness of companies and therefore cost-effectively complying with emission objectives (Min. van VROM 2007). Exploring new opportunities that enhance innovation then become very relevant in enabling the department of Infrastructure and Environment to develop effective policy that can accomplish these objectives by reducing harmful emissions and preserving the environment. This makes the research a fortiori relevant, because it is imperative to know whether principles based regulation can potentially contribute in fostering more innovation.

## 1.4 Structure of the thesis

The thesis unfolds as follows. The first chapter gives an introduction and overview of the research. A short background of the perspective of the department of Infrastructure and Environment is provided, in which the significance of innovation for establishing a sustainable environment is explained. In addition, the main research question and specific sub-questions are presented in this chapter that help to structure the thesis.

The second chapter of the thesis provides the theoretical basis that contributes to answering the research questions of the study. The first paragraph of this chapter addresses the formal differences in the regulatory styles – rules based regulation and principles based regulation. Subsequently, four main advantages and seven apparent risks of a principles based approach to regulation are highlighted. In the last paragraph, a set of preconditions will be discussed that need to be present if principles are to work in practice. The second paragraph of the theoretical framework focuses on the relation between regulation and innovation. The concept of innovation and its significance for both the market and society are explained. Four main conditions are presented that foster or restrict innovation. Subsequently, the consequences of rules and principles in terms of these conditions are discussed.

The third chapter of the thesis concerns the scientific justification of the methods that are used in answering the research questions. The topics that are addressed in this chapter are the research strategy, the data collection and the methods for data analysis.

The fourth, fifth and sixth chapter address consecutively the first, second and third research question. In the fourth chapter the current regulatory style of emissions regulations regulation for combustion plants is examined. Three variables assess whether the legal norms of governmental regulation (Decrees) can be characterized as rules based regulation or principles based regulation. In the fifth chapter the effects of the current regulatory style in terms of emission reduction and innovation are determined. In the sixth chapter, multiple variables are discussed that explain

whether and how principles based regulation can contribute to more innovation and emission reduction.

Subsequently, the last two intrinsic chapters address the conclusion and discussion of this research. The main research question will be answered and the findings of the research will be discussed including recommendations for consecutive steps that should to be taken.

At the end of this paper a bibliography and appendix have been included that list the references and additional information for this study.

# Chapter 2. Theoretical Framework

A review of relevant literature will be conducted in this chapter in order to compose a theoretical framework for this study. It is the objective to study previous research related to the research questions. This chapter is divided into two paragraphs, which in turn are also divided into a number of sub-paragraphs. The first paragraph discusses concepts of regulatory approaches in policy making that are relevant for this research. Theory with regard to the independent variable of this study is central in this paragraph. Subsequently, the second paragraph will discuss theory concerning the dependent variable – that is, the incentives for entrepreneurs to innovate. It is intended to make clear how regulatory approaches in policy making can influence the incentives for entrepreneurs to innovate.

## 2.1 Principles based regulation vs. Rules based regulation

Central in this paragraph is theory with regard to the independent variable: regulatory approaches in policy making. This paragraph is divided into five sub-paragraphs which together should provide a substantive basis for the research. First of all, in sub-paragraph 2.1.1 a first exploration will be conducted of the concept regulation. Subsequently, the characteristics of principles based regulation will be discussed in the second sub-paragraph. In this sub-paragraph we will pay due regard to the differences between rules based regulation and principles based regulation. In the third and fourth sub-paragraph the potential benefits respectively the risks of principles based regulation will be discussed.

### 2.1.1 Conceptualizing Regulation

Box 2.1 Defining regulation.

*"Regulation is the sustained and focused attempt to alter the behaviour of others according to defined standards or purposes with the intention of producing a broadly identified outcome or outcomes, which involve mechanisms of standard setting, information gathering and behaviour modification."*

*Black (2002, p. 20)*

Black (2002) emphasizes that there are multiple definitions of regulation, each with their own theoretical and/or empirical assumptions. The definition Black (2002) uses for regulation – which is cited at the top of this paragraph – sees regulation as an intentional problem solving activity, which tries to alter behavior of others by the application of a variety of mechanisms. Regulation is the promulgation of rights and obligations by the legislator accompanied by mechanisms for monitoring and enforcement with the aim to keep the behavior of others within some preferred subset of all potential states. In doing that, regulation has three functions according to Black (2002) – those are: standard setting, information gathering and behavior modification. First of all, regulation has to be

simple, straightforward and consistent in its application. Regulation should set clear standards which can be applied consistently. Secondly, regulation should facilitate the regulator to gather relevant information that is necessary for assessing the behavior of norm subjects. Thirdly, regulation should be able to smoothly modify behavior of norm subjects in that it complies with the specified standards and objectives. Important is the congruency of regulation with its purpose. Regulation is often over-inclusive or under-inclusive. Over-inclusive in terms of including situations that the regulator might not want to include, or under-inclusive in terms of not including situations that the regulator might want to include. Thus, if regulation is to be congruent with its purpose it should optimize inclusiveness by optimizing behavior modification.

### 2.1.2 What is principles based regulation?

In the early years of the 21st century, many policy makers were convinced that principles based regulation was the answer they had been looking for to solve their problems in regulation. Rules have been unable to prevent misconduct of norm subjects in multiple sectors. Examples are the sales of improper financial products and the major transgression of deadlines in air pollution regulation. Another problem policy makers face is the inability to keep pace with regulation in sectors with rapid technological improvements. In the environmental sector this discrepancy of not being able to design optimal regulation is sometimes seen as a chasm, this at the expense of the congruency or inclusiveness of regulation (Farber 1999). A third problem is that of high implementation, supervisory and enforcement costs that are the result of vast administrative burdens resulting from rules (Black 2010).

Principles provide the framework in which norm subjects (i.e. organizations) can organize their own (internal) system of management and control to achieve the outcome the regulator seeks. Principles based regulation therefore strengthens the image of the responsible and self-conscious norm subject which is a central aspect of governance (Black, Hopper & Band 2007; Black 2010). Later on in the 21st century – approximately 2008 – there was a clear counter movement in the debate. Due to the causes of the financial crisis and the effects it had on society, many policy makers believed that norm subjects should be regulated more strictly. This group obviously favored a more rules based approach to regulation. Because the vast preference for a single one approach to regulation has subsided in the last years, the debate about the need for regulation, and the role for the regulator and the norm subject will become more prominent on the political agenda in the near future (Black 2008; Ojo 2010).

Both rules based regulation and principles based regulation have different implications. In general, the difference between both approaches is that rules based regulation implies that the regulator

relies *more frequently* on detailed, prescriptive rules that set the standards for norm subjects, whereas principles based regulation implies that the regulator relies *more frequently* on high-level, broadly stated principles. Emphasis should be placed on the words "more frequently", because regulation normally contains a mixture of rules and principles (Burgemeestre, Hulstijn & Tan 2009). Principles based regulation and rules based regulation are in fact not that black-and-white applied in practice. Regulatory systems usually are predominantly rules based or principles based. There is not a 'one size fits all' solution in regulation, but rather, multiple types of regulation in policy making will be used to achieve desired objectives (Black, Hopper & Band 2007).

In order to be able to distinguish rules from principles, we need a complete understanding of principles based regulation. What follows in the next section is a discussion of the formal characteristics of both principles and rules.

***Formal principles based regulation.***

Formally, principles based regulation means that *general, broadly stated* norms – that are called principles – are used to set the standards for norm subjects. As opposed to principles based regulation, rules based regulation uses *detailed, prescriptive* norms – that are called rules – in setting standards. Principles express the fundamental obligations, or norms, that all norm subjects should observe (Black 2008). To illustrate, Black, Hopper & Band (2007) refer to the eleven Principles for Business of the Financial Services Authority (FSA) in the United Kingdom. The eleven principles express the fundamental obligations that all norm subjects should observe. All other rules and guidance of the FSA stem from these principles. These rules are therefore operationalizations of the principles.

It is, on the other hand, sometimes argued that some rules are as general as principles, and that the difference between rules and principles is minimal. In strict legal terms there is indeed no real difference between principles and rules. From a juridical point of view, both detailed rules and broad principles have the same legal status. However, the debate about principles based regulation and rules based regulation is more a debate about the role and design of regulation and the expected effects, than a debate about the legal status of norms (Black 2008). Therefore it is nevertheless possible to distinguish different dimensions of regulation that enables us to characterize rules and principles on the formal level.

Ruiter (1987) specifies in his book on administrative law, how regulation is designed to modify behavior of norm subjects. A legal norm in regulation is a conditional judgment of the regulator as to what conduct is permissible. A legal norm contains an obligation or permission (c.q. right) for a

person or a number of persons regarding a type of behavior. Most policies are formulated in terms of obligations for norm subjects, but this does not necessarily have to be the case. For instance, competition implies the right of free entrance to the market. An obligation implies that norm subjects are compelled to unfold, or refrain from, certain behavior. Obligations therefore result in exclusive behavioral motives whereas permissions do not (Klok 1991). Whether regulation exerts obligations or permissions depends primarily on the domain and scope of the issue at hand. Another characteristic of legal norms is that they apply when one or more specified conditions are satisfied.

As a result, legal norms have a structure in formulation in which four dimensions can be distinguished. First of all, a legal norm should contain a so called *norm operator*. This means that a norm should contain a description of the implications it has on the behavior of the norm subject. Two different norm operators are distinguished: "must" and "may". The norm operator "must" implies an obligation of the norm subject, whereas the norm operator "may" results in a permission or right to conduct certain behavior. It is imperative to acknowledge that regulation concerns relationships between people. Therefore a right for one person results in an obligation for someone else. Subsequently, a legal norm should contain a description of the *norm subject*. The norm subject is a person, a group of persons or a legal person that regulation intends to affect. Regulation should specify clearly what entity is obliged to follow the requirements set by law. Thirdly, a legal norm should contain a *norm object*. This means that it must become clear in the formulation of regulation what behavioral conduct is assessed, and subsequently, what *norm conditions* are relevant in its assessment (Ruiter 1987).

Black (2008) distinguishes an overarching dimension that incorporates the dimensions specified by Ruiter, and is essential in characterizing principles and rules: the content. There are three factors that have an effect on the content and explain why a legal norm is either a rule or a principle. The first factor concerns the *generality of formulation*. Has a legal norm been formulated either very specific or very general (c.q. norm conditions and norm object)? The second factor concerns the content of the requirements that are set in a legal norm. Does a legal norm exert *quantitative or qualitative requirements* (norm conditions)? The third factor that explains the content is whether legal norms determine *the means or the goals* that norm subjects should pursue (norm object). Is the norm object described as a behavioral action or an outcome of regulation? Whether a norm is a principle or a rule is determined by the content – thus by these three factors. The norm object and the norm conditions get a different interpretation – or have a different content – in principles and in rules. As such, there are different gradations of rules and principles depending on the concrete presence of the three factors. This implies that in order to qualify a legal norm as a principle or rule

not all factor characteristics of the ideal principle of rule need to be present. As has been stated previously, regulation is always a mixture of both rules and principles in order to get the required outcome.

**Figure 2.1: Norm types illustrated (Black 2008)**

| Type 1: Bright line rule | Type 2: Principle | Type 3: Complex/detailed rule |
|---|---|---|
| A firm must execute all orders of under 10,000 securities within one business day. | A firm must pay due regard to the interests of its customers and treat them fairly. | A firm must execute all orders for customers within one business day in the following circumstances (definition of customer; definition of order; restriction as to whether discretionary dealing or execution only; circumstances where orders may be worked over a longer period, etc.). |

Figure 2.1 sets out three different categories of norms in which *the content* differs. The first type is the "bright line rule". This type of norm specifies one single quantitative norm condition which has to be satisfied for the rule to apply (i.e. "an order of under 10,000 securities"). A bright line rule is specific, simple and clear in its application, because the norm operator and the norm object leave little room for ambiguity. In the example of figure 2.1, a firm must unfold behavior (norm operator) when the norm condition is met. The behavioral conduct that is being assessed (norm object) is the speed in which orders are executed. A bright line rule can however be unsuccessful in achieving the objective of regulation (i.e. "fair treatment of customers"), because it prescribes the means that norm subjects should pursue. For instance, in certain situations fair treatment of customers might be better served by executing orders of 10,000 securities or more in one business day.

The second category that is distinguished in figure 2.1 is the principle. The principle is very general and broadly formulated, and in this case expresses the intention or goal of the regulator: fair treatment of customers. A principle communicates the regulatory objectives and promotes behavior that will achieve those objectives. Principles have a norm object that is formulated in qualitative terms specifying a behavioral standard by using words as "fair", "reasonable" and "prudent" as opposed to more quantitative terms (i.e. "executing orders within one business day"). The norm condition of principles therefore include multiple factors, because what for instance constitutes "paying due regard"? Multiple factors might be relevant in determining whether due regard is paid to customers interests. Principles thus determine the goals or outcome that norm subjects should pursue without specifying the exact means to get there. As a result, principles take a wide range of conduct of norm subjects into account, because the norm condition and norm object have been

formulated very general (Black 2008). Important in principles based regulation is the interpretation of principles by norm subjects. The norm object (i.e. “fair treatment”) in principles can be interpreted in different ways. Hence, there should be a shared understanding between the regulator and the norm subjects with regard to the way regulatory requirements should be interpreted and applied (Ojo 2010).

The detailed rule has to a large extent the same content as the bright line rule. The difference is that a detailed rule specifies a list of norm conditions that have to be met for the rule to apply. It is thus specific by prescribing the means, but at the same time general by aggregating them into one detailed rule. The norm operator (must unfold behavior) and the norm object (the speed in which orders are executed) are precise and clear. The possibility that detailed rules – but also bright line rules – are misinterpreted by norm subjects is minimal. There is a shared understanding of what the rules imply. Detailed rules though can be very complex to apply in practice, because the conditions in detailed rules try to take diverging circumstances and situations into account. This means that a detailed rule, with the appropriate conditions, can potentially reach the equivalent of a principles generality (Black 2008).

Burgemeestre, Hulstijn en Tan (2009) observe another aspect that underlies the discussion above and enables us to distinguish rules based regulation from principles based regulation. Bright line rules and the detailed rules identify the boundaries for what conduct is permissible *ex ante*. The boundaries in rules based regulation are known before norm subjects conduct any relevant behavior. It is clear and certain, referring to the single quantitative requirement in bright line rules or the list of conditions in detailed rules, what conduct is allowed and what conduct is prohibited in advance. A principle in contrast, leaves this open to the judgment of the actors whose behavior is to be regulated. An *ex post* evaluation by the regulator will assess whether or not norm subjects have complied with regulation. Compliance with regulation becomes clear after the norm subject conducted a certain kind of behavior. This *ex-post* evaluation will be made on the basis of jurisprudence containing more detailed specifications of the interpretation of principles.

### 2.1.3 The potential benefits of principles based regulation

In the previous paragraph, we pointed out that principles based regulation and rules based regulation differ in terms of their content. The next step is to determine what principles based regulation has to offer. What benefits does principles based regulation have over rules based regulation? Black (2008) characterizes the potential advantages of principles based regulation in four categories. These are effectiveness, durability, comprehensibility and substantive compliance.

In chapter 2.1.2 we discussed the characteristics of rules and principles. An important finding was that rules are specific and focus on the means, whereas principles are general and focus on the outcomes of regulation. As a result of different contents, principles have a higher congruency with the purpose of regulation than rules. Congruency is the ability of a legal norm (either a principle or a rule) to arrive at an outcome the regulator wants to realize with regulation. In order to make it more tangible I will give an example (see figure 2.1) of a bright line rule: If the objective of regulation is fair treatment of customers and the rule is to execute orders of under 10,000 securities within one business day. Is it still fair treatment of customers if someone with an order of slightly over 10,000 securities has to wait more than one business day, whereas an order of slightly under 10,000 securities of someone else gets executed the same day? It seems that at least in some situations this rule is unable to provide adequate guarantees that customers are treated fairly. A principle on the other hand specifies the outcome of regulation: “paying due regard with customers’ interests”. As a result of the content, more situations are included because the norm condition and norm object are very general. Therefore, the general norm condition of principles will more likely be applicable in specific situations, than the norm condition of a bright line rule. The congruency of detailed rules totally depends on the apprehended norm conditions. Detailed rules can be equally congruent as principles if the correct norm conditions have been included.

It has also been argued that detailed rules have been unable to prevent misconduct of norm subjects. For instance, it is easy to behave opportunistically or “creatively comply” with the rule when you aggregate orders in that they will not exceed 10,000 securities. Box 2.2 depicts the concept of “creative compliance”.

Box 2.2 Creative Compliance: the case of Enron (Schilder 2008).

Enron was an American energy company at the end of the 20th century and in the early years of the 21st century that became well-known by its bankruptcy. Enron's accountants were subject to the rules based accountancy standard of the United States of America and, subsequently, met all the detailed requirements established by law. Nevertheless, Enron's accountants succeeded in manipulating their financial position. They concealed a completely different economic reality of the company by not consolidating hundreds of 'off-balance-sheets' and ignoring large amounts of liabilities. It led to one of the largest bankruptcies in the history of the Unites States. "Creative compliance" means, acting according to the letter of the law, but disregarding the initial objective – or spirit – the law was established for. The accountants of Enron complied with the requirements set by law, but did not meet the objective the rules were established for: ensuring corporate social responsibility.

Principles are unlike rules very hard to manipulate by "creative compliance" and rule out opportunistic behavior of actors to a certain extent. Principles are formulated in general, qualitative terms using words as 'truthfully', 'prudent' or 'fair' which makes it broader in its application to situations. In that respect, it makes it more likely to cover diverse aspects that would be overlooked or not included in rules based regulation. Principles based regulation has a smaller margin of error when it comes to over-including situations that should not be regulated or under-including situations that should be regulated, than rules based regulation. In the case of Enron there was a lack of congruency, because not all relevant situations were included which made it possible for Enron' accountants to behave opportunistically. A principle is perfectly congruent with the objective of regulation because it explicitly communicates the regulatory objectives and promotes behavior that will achieve those objectives. All behavior that does not comply with the objective of regulation can therefore be sanctioned. Consequently, principles based regulation has the potential to be highly *effective* in achieving the objective of regulation, when the preconditions for it to function have been sufficiently satisfied (Black, Hopper & Band 2007; Black 2008; Schilder 2008). These preconditions will be discussed in chapter 2.1.5.

A second advantage of principles concerns the durability of a legal norm. Norm subjects expect that regulation is consistent in its application and that it is clear how compliance can be achieved (Black 2002). Because principles are very general and broad compared to rules, they will be more capable to adapt to a rapidly changing market environment than rules are. There are still some laws dating back to the first half of the 20th century (i.e. "Warenwet" of 1935) because of their general character. Rapid changes due to, for instance, technological improvements may lead to new

problems that have to be regulated. In the rules based approach the regulator will have to study all aspects of the problem, to enable him to make new rules that address the problem appropriately. In contrast, a principle covers a diverse range of contingent circumstances because the outcome of a principle is connected to the objective of regulation. Technological changes leads to changes in the behavior of norm subjects, which implies a change in the underlying conditions. It is thus more likely that the general norm condition of principles still applies to the changed circumstances, whereas the specific norm condition of a rule does not suffice. Principles are flexible and durable, whereas rules are strict and rigid. In a rapidly changing environment, the rules based approach will lag behind since the regulator will first have to make new rules that apply to new conditions and behavior of norm subjects. This means that it takes some time before the regulator can solve the problem. Principles on the other hand, are more durable because it is likely they already apply in these circumstances. Principles therefore prevent adverse effects of taking place at all, or give the opportunity to the regulator to enforce regulation right away to minimize harm (Black 2008; Schilder 2008).

A third potential benefit of principles based regulation is that principles are more *comprehensible* for senior management, and for norm subjects that are less capable to oversee all regulation, than pages full with detailed requirements (Black 2008). There is a difference in the way that rules based regulation and principles based regulation affect the decision making process within the organizations of norm subjects. Principles provide a framework for norm subjects to organize their own system of management and control, in that the outcomes the regulator seeks are achieved. Senior managers are experienced in running their organizations and are therefore able to anticipate the effects of different types of policy. Prescribing detailed requirements does not take advantage of that knowledge because norm subjects will have little discretionary power in internalizing regulation in the internal system of management and control. Principles on the other hand, provide senior managers a relatively large discretionary power (Burgemeestre, Hulstijn & Tan 2009). Principles give room for senior managers to come up with their own approach to achieve the outcomes of regulation. Principles based regulation gives room for senior managers to optimize the relation between the outcome the regulator seeks and the outcome the norm subject seeks (which usually is maximizing profit). As for norm subjects that are less capable in overseeing all regulation, principles might also be more comprehensible than detailed rules. Principles based regulation will de-clutter the handbook and simplify standards making it less complex and more accessible for norm subjects. Norm subjects with smaller organizations that lack resources to understand all requirements will be able to develop an approach to realize the outcome of regulation that simultaneously pays due regard to the specific circumstances of their own organization.

A fourth potential advantage of principles is that it fosters greater *substantive compliance* of norm subjects with regulation. Large amounts of detailed rules can divert the attention of norm subjects in that they will display "box-ticking" conduct (Black 2008). There is limited incentive for norm subjects to help devise an approach that can achieve the outcome the regulator seeks. As long as the detailed requirements that have been established by law are met, norm subjects are in the clear. In that sense, (substantive) compliance – if substantive at all – limits itself to ticking the appropriate boxes. Principles however, have different implications. They require norm subjects to think through how the outcome of regulation can be achieved. A common view of regulation as a burden imposed by the regulator can then be replaced by one that assumes a co-operative and an educative relationship (Black, Hopper & Band 2007). A potential advantage of principles based regulation is that it can open up a dialogue between the regulator and the norm subject which fosters substantive compliance to regulation (see chapter 2.1.5). In such dialogue the regulator can guide and supervise the interpretation of principles by communicating what the implications are for norm subjects. Through communication will norm subjects be able to retrieve additional information that helps to develop a strategy in terms of translating the implications of regulation for their own organization. As such, uncertainty about the interpretation of regulation will reduce which enables norm subjects to adopt adequate changes in their system of management and control. The communication between the regulator and the norm subject is thus a positive consequence of a negative aspect – that is, uncertainty – of principles based regulation. In principles based regulation norm subjects acquire a greater degree of substantive compliance with the purpose of regulation, and are therefore more motivated to achieve the outcome of regulation (Schilder 2008; Black, Hopper & Band 2007).

### 2.1.4 The risks of principles based regulation

In the literature on principles based regulation, academics distinguish seven risks for effectiveness that illustrate the difficulty and complexity involved in attempting principles based regulation. These risks for effectiveness simultaneously also jeopardize innovation. All seven risks will be outlined in this sub-paragraph.

#### *1. The interpretive risk*

We determined in the previous paragraphs that the difference at the formal level between principles and rules is characterized by their content. Principles are formulated in general, broadly stated terms, whereas rules are detailed and prescriptive. This is meant to give flexibility to principles in that they apply under a wide range of specific circumstances. A risk is that the regulator and the norm subject communicate very specific interpretations to enable compliance of norm subjects (see "enhancing interpretation" in paragraph 2.1.5) by minimizing the uncertainty of the meaning of

principles. A risk arises, when these interpretations become as specific as a detailed rule. Moreover, in practice, it is also possible that regulators or norm subjects interpret principles differently. This means that there is a risk of an increasing gap between the published principles and the bureaucratic interpretation they receive (Black 2008). Consequently, uncertainty as to what principles mean and unpredictability as to the response of the regulator, are increased by ambiguous interpretation of principles (Black, Hopper & Band 2007). It should also be taken into account that norm subjects can have different mindsets and may be managing uncertainty and risk from interpreting principles in different ways.

### *2. The communicative risk*

A key characteristic of principles based regulation is that principles express the fundamental obligation that all norm subjects should comply with. Principles state the outcome the regulator seeks with policy (for example, fair treatment of customers), and therefore leaves room for communication between regulator and norm subject with regard to their responsibilities. There is however a risk that principles based regulation obstructs communication, because of a risk of guidance proliferation. The regulator or a third party (as in network forms of principles based regulation) can guide norm subjects with for instance regulatory conversations, speeches, policy documents, communication documents or best practices. This communication is specific for principles based regulation in order to reduce uncertainty of the meaning of principles for norm subjects. A communicative risk arises when this regulator or third party is undisciplined in the provision and proliferation of guidance. An abundance of communication makes it hard for norm subjects to realize what the regulator requires from them. The formal status of these communiqués is ambiguous which in turn leads to much uncertainty, because norm subjects do not know what to follow (Black 2008). The opposite, too much certainty, implies that the regulator clearly specifies the boundaries of the principles and by that introduces prescriptive rules. Unless the regulator takes great care in providing guidance to norm subjects, it could simply mean reintroducing detail and prescription in a much less transparent and accessible way (Black, Hopper & Band 2007).

### *3. The compliance risk*

It has been made clear that principles provide more discretionary power to norm subjects for compliance than rules do. Hence, norm subjects are stimulated to improve compliance with regulation by taking advantage of their discretionary power. This implies developing new methods that are more effective in achieving the outcome expressed by principles, and also optimizes the outcome the norm subject seeks (which is usually profit). The compliance risk, contradicts this line of

reasoning. It states that uncertainty as to the meaning of principles will lead to conservative and/or uniform behavior of norm subjects despite the discretionary power they hold. This behavior might be the consequence of the fact that the regulator acknowledges only certain practices as compliance; or because norm subjects use guidance of principles as it were detailed requirements. When these conditions do not apply, it is still possible that behavior of norm subjects is uniform. Especially in network forms of principles based regulation, where third parties (for instance advisors) advise norm subjects. Institutional isomorphism that is transmitted and mediated by these third parties lead to the convergence of a homogeneous set of compliance practices (Black 2008).

#### *4. The supervisory and enforcement risk*

In the literature two different styles of enforcement are distinguished: the "deterrence" model and the "compliance" model. Neither styles of enforcement are favorable for principles based regulation. The deterrence model is a punitive enforcement style that implies a system that sanctions every non-complier. In that case, norm subjects will demand more specific norm conditions and norm objects in order to get more certainty. In that way, a system of principles based regulation will obtain more characteristics of rules based regulation. A negotiating enforcement system on the other hand will lead to non-compliance of norm subjects in any regulatory system (both rules and principles) since there is a small chance of getting sanctioned. Consequently, principles based regulation needs enforcement to give it credibility and for it to gain the advantages of principles, but on the other hand over-enforcement will lead to its downfall. This is called the supervisory and enforcement risk. Moreover, the style of enforcement that is used can be compromised by the political support the regulator has. Because principles based regulation facilitates retrospective – *ex post* – interpretation of principles it is possible that the regulator concludes that a principle is breached, while the regulator did not mention any problem with the conduct before. If the regulator lacks political support, norm subjects will be more likely to contest imposed sanctions based on immorality of enforcement actions. Subsequently, the regulator will be more likely to adopt a softer enforcement approach (i.e. "compliance" model) to avoid conflict, than when the regulator had strong political support (Black 2008). Another problem of *ex post* enforcement of principles arises when the consequences are irreversible. For instance, enforcement ex post cannot prevent or undo the damage of a nuclear meltdown. Consequently, the risks of *ex post* enforcement are significant.

#### *5. The internal management risk*

Rules based regulation and principles based regulation both have different implications for the role the regulator and the norm subject have in ensuring compliance. In a principles based regulatory

approach, both the regulator and the norm subject have to make judgments as to what compliance with principles entails. It requires a different mindset and skill set from regulator and norm subject than in rules based regulation (Black, Hopper & Band 2007). Instead of complying to specified requirements drafted by the regulator ("box-ticking" conduct), norm subjects have to develop interpretations of principles, develop a strategic vision and internalize this vision in the system of management and control. In this respect, principles based regulation empowers substantive compliance, because it provides flexibility for norm subjects to devise internal control systems. There is however a limitation: the internal management risk. It is argued that flexibility and increased discretionary power only enhances compliance of norm subjects if there is enough expertise and capacity available in an organization. Norm subjects with a less competent and underdeveloped internal management can become overloaded with work, since they themselves have to come up with plans for what they should do to comply with regulation. A job for which they lack resources and knowledge (Black 2008). A possible solution for this problem might be network forms of principles based regulation. A branch organization, an advising organization or some other third party can facilitate norm subjects with direction and instruction. By supporting norm subjects in translating the implications of principles for their organizations compliance can be better safeguarded (Black, Hopper & Band 2007; Black 2008).

#### *6. The ethical risk*

In the previous paragraph it was made clear that principles based regulation has the potential to foster greater substantive compliance of norm subjects with regulation. Because principles explicate the outcome of regulation, norm subjects remain focused on the purpose of regulation and should therefore be motivated to achieve the outcome (see paragraph 2.1.3). There is however a catch, because in order to interpret principles and come up with a plan to comply by them, the norm subject has to calculate the risk of getting it wrong. Principles based regulation can lead to norm subjects becoming risk managers – calculating the interpretive risk. How big is the risk that we get it wrong and what will the consequence(s) be? The ethical risk arises when compliance with regulation turns out to be an issue of risk management, because non-compliance with regulation will become an option. Norm subjects will assess the risk of them getting caught by the regulator while non-complying, and the potential costs of sanctions (for instance: financial costs or reputational damage). Norm subjects will then decide what level of non-compliance they are prepared to risk. The greater the interpretive risk for norm subjects, the greater the risk that ethics are being compromised (Black 2008).

#### *7. The trust risk*

The notion of principles based regulation entails a relationship between the regulator and the norm subject based on trust, mutuality and responsibility. Regulators communicate the outcome they seek to norm subjects in principles, and norm subjects subsequently translate these outcomes to concrete practices that are internalized in the system of management and control of the norm subject' organization. This new relationship in regulation should then create trust, mutuality and responsibility between the regulator and norm subjects, because both the regulator and the norm subjects aspire the same goal – which is, achieving the outcome specified in regulation. Critics of principles based regulation however, argue that there is a trust risk. Principles based regulation can help the relationship between the regulator and the norm subject develop in terms of trust, mutuality and responsibility. However, before a system of principles based regulation can work at all, there already needs to be a certain amount of trust, mutuality and responsibility between the regulator and the norm subject. This is certainly so because *ex post* enforcement of principles can have huge risks and consequences, because damage might be irreversible. The trust risk is possibly the ultimate risk that principles based regulation has to overcome. Trust in turn, can help in solving the other six risks identified in this paragraph (Black 2008).

### 2.1.5 Preconditions for successful principles based regulation

Besides the formal presence of principles in legislation, it takes more for a system of principles based regulation to function in practice. Formal requirements alone do not give enough guarantees that the regulator and the regulated will adapt their behavior accordingly. There are also a number of preconditions that have to be satisfied if a system of principles based regulation is to work at all. These preconditions are among other regulatory practices aimed at fostering substantive compliance with regulation, and a barrier that has to be taken into account when considering principles based regulation. In total, six preconditions are identified and will be discussed in this section.

#### *Enhancing Interpretation*

A first regulatory practice that is distinguished is the enhancement of the interpretation of principles by the regulator and the norm subject. This enhancement in interpretation is reached by enabling regulators and norm subjects to interact in for instance "regulatory conversations". The purpose of principles and the application of them in specific circumstances will become more clear and comprehensible when a dialogue is created. This prevents misinterpretation of the meaning of principles and decreases the uncertainty that may exist. A dialogue also opens up the possibility for the norm subjects to assist the regulator in developing interpretations of principles. Norm subjects

will have to take responsibility for thinking through the application of principles in specific circumstances, and the regulator will have to guide and direct the process to ensure the objective of regulation is preserved (Black 2008).

### *Enforcement Style*

It should be clear now that principles based regulation entails a greater risk of misinterpretation of regulation than rules based regulation. Whereas rules specify the condition(s) that are used in the assessment, principles do not (Burgemeestre, Hulstijn & Tan 2009). To minimize this uncertainty, norm subjects will try to get additional instructions from the regulator. In the absence of these instructions, the style of enforcement to deal with non-compliers is critical for the success of principles based regulation. Two models of enforcement are distinguished in the literature: the "deterrence" and "compliance" model. In the deterrence enforcement style, every non-complier will be prosecuted. Every infraction on the law will be sanctioned, resulting in a punitive enforcement system. The effect of sanctioning all non-compliers in principles based regulation is that norm subjects will demand detailed requirements to provide them with clear boundaries. Norm subjects do not want to risk getting a penalty, only because it was unclear to them how they should comply with the principle. Furthermore, due to the punitive approach it is also likely that more cases will be contested and resolved in front of a judge. Court rulings (i.e. jurisprudence) will take the same position as detailed rules. Consequently, principles based regulation will not survive in a punitive enforcement system. The second model of enforcement – the "compliance model" – implies that the regulator takes a more cooperating stance to non-compliers. If a norm subject fails to comply, the regulator and the norm subject will discuss what the possibilities are to improve compliance. This could however mean that there is no formal enforcement at all. A regulator that keeps negotiating and hardly ever sanctions non-compliers might lose control as it promotes non-compliant behavior. A norm subject can do as he likes since there is a small chance of being sanctioned. It should be clear that neither "deterrence" nor "compliance" models of enforcement works in principles based regulatory systems. Black (2008) argues that it should be a combination of both and calls this approach "responsive enforcement". At first, the regulator should try to negotiate with non-compliers, and help them in improving their compliance with principles. If this has no effect the regulator should move up to a more deterrence style of enforcement, starting with small sanctions that increase in severity. The aim is to adjust the style of enforcement to the norm subject. If a norm subject fails to comply with regulation for some reason but normally always complies, the regulator should negotiate as to improve compliance. If a norm subject intentionally and/or structurally fails to comply with regulation, the regulator should use punitive sanctions. This way the system of

enforcement responds to different norm subjects and different circumstances – making it responsive. (Ojo 2010; Black 2008).

### *Outcomes-based*

All regulation – bright line rules, principles and detailed rules – is ultimately designed to reach a particular outcome. However, a substantive characteristic of principles based regulation is that very general outcomes are defined. A precondition is that principles state the ultimate goal that is to be reached by norm subjects. This implies the use of qualitative terms that specify a behavioral standard using terms as 'fair', 'integer' and 'reasonable' as opposed to quantitative terms. But this does not necessarily have to be the case as has been discussed in chapter 2.1.2. It is also possible that a principle states a quantitative outcome. For example, a 70% reduction of emissions within five years. Emphasis is on the outcomes – or the ends – that are to be achieved with policy rather than the processes – or the means – that are carried out to get there (Black, Hopper & Band 2007; Black 2008).

### *Reallocating Responsibilities*

The regulator does not always have enough specific knowledge to regulate the (internal) organizational processes of norm subjects effectively. Principles based regulation implies that norm subjects themselves are better able to determine what needs to be done in their organization to achieve a certain outcome. Consequently, this implies a reallocation of responsibilities for ensuring that the objectives of principles are met. The norm subject receives greater discretion to enable him to come up with solutions to address the problem. The regulator in turn will take a more leading role in the regulatory process by giving directions. How far this shift in responsibility exactly reaches depends on the specific policy domain. At a substantive level, reallocating responsibilities involves that the regulator and the norm subject will have to acquire entirely different sets of skills in monitoring regulation respectively complying with regulation (Black, Hopper & Band 2007; Black 2008).

### *Meta-regulation*

The fifth precondition is the focus of the regulator on the norm subject' internal system of management and control. It is apparent that adopted regulatory requirements – be it principles or rules – have to be translated and internalized in the system of management and control of norm subjects. A plan of action and protocols have to be set up to enable the norm subject to comply with regulation. In rules based regulation it is relatively clear and easy how requirements have to be translated and internalized. Norm conditions are specified in bright line rules or detailed rules, which

give clear guidance to the norm subjects what they have to do to comply. Principles however do not, and that's why the regulator in principles based regulation should focus its attention on ensuring that norm subjects translate principles appropriately. By providing help and guidance norm subjects are enabled to adapt the internal system of management and control in such a way that it complies with the principles in regulation. This is also referred as meta-regulation. It is important to note that it might be very difficult to unite the goals of the regulator and the norm subject. The regulator might for instance want sustainable (operational) management, whereas norm subjects want profit. Hence, meta-regulation is limited because values do not always coincide. This is however, a presupposition of meta-regulation; meta regulation would not have been necessary if the regulator and the norm subject both have the same goals (Black 2008).

#### *European Regulation*

It is also necessary to identify an important barrier of principles based regulation. It is possible that principles based regulation in a certain policy area is in conflict with European Union regulation. The European Union is a supranational institute that has primacy when it comes to regulation. It is therefore evident that member states have to take this into account when developing new policy. In some sectors the European Commission harmonizes standards between member states by laying down detailed rules in a European provision. This type of requirement is a typical example of rules based regulation. Especially in sectors where a uniform policy is preferred (for instance immigration) this type of regulation is adopted. However, the European Commission often uses European Directives. These directives are high-level requirements – similar to principles – that have to be translated into national regulation by the member states. The risk of misinterpretation of principles then expands to the supranational level. Regulators across Europe might interpret EC principles differently and implement regulation – be it principles or rules – which frustrates harmonization and international comparability between member states (Black, Hopper & Band 2007; Schilder 2008). Whether a system of principles based regulation is successful in practice therefore also depends on the European regulation precondition.

## 2.2 The impact of Regulation on Innovation

The next step in building the theoretical framework of this study is to review literature that explains how these different types of regulation – principles based or rules based – influence innovation. Hence, the relationship between the independent variable and the dependent variable of this study. This paragraph starts with a conceptualization of innovation. What is it and why does it matter? Subsequently, a conceptual perspective will be put forward that illuminates the relation between regulation and innovation.

### 2.2.1 Conceptualizing innovation

People have different interpretations of the concept innovation, often confusing it with invention. To get a preliminary understanding of innovation, I refer to the Latin term *innovare*, which means "to make something new". The definition of innovation has however developed in something more comprehensive. A commonly shared view by academics, according to Tidd & Bessant (2009: 16), "assumes that innovation is a process of turning opportunity into new ideas and of putting these into widely used practice." Innovation differs from invention, in terms of going beyond creating something new; it also implies that new ideas have to be exploited. Implicit to this definition is that innovation can be managed. It is a process of searching potential innovation space, selecting a space with most prospects, developing strategic plans and implementing them in practice (Tidd & Bessant 2009).

Innovation is important because it is a determining factor for national economic growth. Research showed that there is a strong correlation between market performance and the introduction of new products. Next to introducing new products to the market – which is called product innovation –, the literature distinguishes three other dimensions of innovation. These are process innovation, position innovation and paradigm innovation. Process innovations are changes in the way products and services are produced and delivered. Position innovation – also called marketing innovation – refers to changes in how products and services are positioned in the market (i.e. focusing products on children instead of adults). Paradigm innovations – also called organizational innovation – are changes in framing what the organization does (i.e. moving away from producing certain products to offering high quality services on products) (Tidd & Bessant 2009). Innovation can therefore be technological and non-technological, and take place at any point in the value supply chain of organizations. There are multiple reasons why organizations innovate. One of them is to get a competitive advantage in existing markets compared to competitors. Innovation can also enable organizations to gain access to new emerging markets that are profitable. Other reasons for organizations to innovate are to comply with new regulation that is issued by the government, or to reduce costs for compliance with regulation (BERR 2008).

Innovation can have benefits for market actors and/or for society in general. *Market innovation* therefore means that the four dimensions of innovation benefit the market actors. This can be achieved by selling new profitable products and services, more efficient organization of internal business processes, focusing on a specific group with high demand, or a re-framing of what the business does which could lead to unique products or services. Subsequently, it is also possible that innovation benefits society in general. This is called *social innovation.* Innovation can for instance decrease health risks, security risks or environmental hazards (Stewart 1981). Consequently, it

should be clear that innovation is important, since it has the potential to foster huge benefits for the market and for society. This is also the reason why many states develop policy that regulates innovation. The next paragraph continues on the conditions for successful innovation.

### 2.2.2 The conditions for successful innovation

In this section the conditions that are needed for successful innovation will be outlined. Many variables that are relevant for determining innovation are known and identified in literature. Coyle & Childs (2008) have conceptualized the innovation process and came up with four general conditions that foster or restrict innovation. These conditions will be discussed in this section.

#### *Knowledge*

The first condition that is important in promoting innovation in organizations is the availability of knowledge and skills among personnel. A certain amount of knowledge and skills is needed in an organization in order to have sufficient grounds on which innovation can take place. This is especially relevant for organizations that operate in branches that are involved in high-technology industries. Innovating in these organizations implies the utilization of very sophisticated and advanced knowledge in order to put opportunity into new ideas and subsequently putting these ideas into practice (Coyle & Childs 2008). Many of these opportunities emerge from scientific research that fosters new types of knowledge. As a result, a so called “knowledge push” can lead to new innovations to products, processes, positions or paradigms. Education of personnel and a “knowledge push” are therefore important conditions for successful innovation (Tidd & Bessant 2009).

#### *Market Structure*

A second condition for innovation that should be taken into account is the market structure. Specifically it is about the degree of competitiveness that characterizes the market structure. It has been claimed by some academics that a competitive market structure is the main condition that is needed if innovation is to take place within an organization. Only through innovation will competitors be able to maintain themselves in the market and stay ahead of their competitors. For instance, by coming up with qualitative enhanced products, exploring new markets and reducing total costs of production. In contrast, in a monopoly market structure the monopolist will have limited incentives to innovate, because there is no fear of competition of rivals.

The relationship between competition and innovation is not a linear one; Increasing competition does not unilaterally mean more innovation. Rather, it can be characterized by a U-shaped relationship, meaning that too much competition in a market will restrict innovation. Too much

competition will result in many bankruptcies of organizations, because they will simply outcompete each other. Key indicators for characterizing competitiveness in a market is free entrance to the market and the number of organizations in an industry (Coyle & Childs 2008).

In certain situations the market is not able to come up with an efficient allocation of resources or a Pareto optimal allocation – that is, an allocation of resources where no economic agent can be better off without making another economic agent worse off. In three different situations market fails to adequately respond with a(n) (Pareto) efficient allocation of resources. First of all, market failure arises when the market is characterized by imperfect competition. Organizations may fail to meet demand at the lowest level (i.e. natural monopoly), or competition between organizations may be extremely destructive. Secondly, market failure arises when there is a lack of transparency on the market. For instance, clients might lack product or service information which evokes unfair opportunistic behavior of organizations (i.e. poor quality products, higher prices). A third market failure occurs when the market advances certain externalities. An example of such an externality, discussed by the transaction cost economist Ronald Coase, is that of forest fires that are the result of railway steam trains. Sparks from train engines regularly caused fires and damage to the surrounding forests. This negatively affected the welfare position of the forest owners, because they were not part of the transactions made by the railway organizations and their clients (Lévêque 1996).

#### *Regulations and Standards*

A third condition that is imperative for successful innovation in organizations are the legally binding regulations and standards issued by the government. Regulation and standards set by the government can both restrict innovation but also foster innovation depending on the form and substance of the regulatory requirements. Factors that are relevant are the stringency of outcomes, and the time that norm subjects have for compliance with regulation (BERR 2008).

Regulation and standards can place a great amount of restrictions on norm subjects by specifying which behavior has to be performed by norm subjects or which behavior may not be performed. Norm subjects will then have limited discretionary room, because deviation from the specified norm conditions and norm objects means non-compliance. The discretionary room that norm subjects are able to exert to achieve innovation therefore depends on the formulation of norms. In contrast, regulation and standards that avoids clear barriers by not specifying concrete norm conditions and norm objects that are assessed can lead to negative externalities. A well-known example is environmental damage as the result of market failure. It is therefore critical that an optimal balance

should be found for adopting regulation and standards that both optimizes innovation and reduces the risk for negative externalities.

Two categories of regulation are distinguished by Leveque (1996): economic instruments and command-and-control. I distinguish a third a category – that is, legal instruments. Economic instruments are market based incentives that stimulate actors' economic activities into desirable directions. Examples are subsidies for research and development to cleaner technology, and taxes on certain environmental hazardous operations. A legal instrument uses legal based incentives to influences an actor's behavior. An example of a legal instrument that affects innovation is patent law. If everyone is permitted to utilize and exploit newly developed technologies, innovation will be severely discouraged, because the costs associated with innovation cannot be recouped. Patent law protects the actor that came up with a new idea by exclusively giving him/her the monopoly to exploit the innovation for a certain period. The last category of regulation that is distinguished is command-and-control. This category consists of regulatory instruments of standard setting. There are a number of factors that are relevant for determining the effect on innovation: the stringency of outcomes set in regulation, the time norm subjects have to comply with regulation, and the amount of behavior and actions that is either prohibited or prescribed. In the next sub-paragraph the consequences of these factors in terms of innovation for both rules and principles will be illustrated. Despite the fact that both economic instruments and legal instruments are relevant for innovation, the aim of this research is on the command-and-control category of regulation and its consequences for innovation (Lévêque 1996).

#### *Demand/Diffusion Processes*

The last condition that is important is the demand for innovation. Simply having a bright idea is no guarantee for actual innovation and adoption. There also has to be a "market pull", a need or demand for innovation. Actors have to become aware that innovation is necessary and action is needed to alter the situation in order to enable innovation to take place. For instance, actors should be aware of the relative benefit of the innovation compared to the already existing alternatives. The benefits of the innovation should exceed the initial investment, and on a larger timeframe, transcend the cost-benefit ratio of the existing alternatives. The return on investment and the perceived risk are the two underlying factors. Figure 2.2 displays the relationship between these two factors and the consequences they have for investments.

Figure 2.2: The risk-return relationship for investment in an entrepreneurial venture (Wickham 2006, p. 263)


A trade-off must be made between the perceived risk and the demanded return. Risk has to be taken by committing resources to a venture. When the risk is high investors demand a higher rate of return. When the risk is relatively low, investors will be satisfied with a lower return. A positive return on investment is therefore an important condition for entrepreneurs to innovate (Wickham 2006).

### 2.2.3 Conceptualizing the relation between Regulation and Innovation

The previous sub-paragraph stated that the command-and-control category of regulation is subject of this research. This means that the focus is on regulation that does not explicitly intends to foster or stimulate innovation. Rather, in command-and-control-regulation innovation can be considered as a side-effect of a specific norm type (see figure 2.1). In this paragraph this relation between regulation and innovation will be discussed in a conceptual model. Both rules and principles have certain effects on the four conditions – discussed in the previous sub-paragraph – for successful innovation. Relevant aspects of rules and principles that influence these four conditions will be highlighted. Subsequently, the implications of the four conditions in terms of innovation for both rules based regulation and principles based regulation can be explained. Innovation thus takes place as a direct or indirect consequence of changes in knowledge, competition, regulation and investment. In order to conceptualize this relationship several empirical studies will be used that provide practical examples on this topic.

### *Knowledge*

One of the conditions of innovation that have been mentioned in the previous sub-paragraph is an alleged “knowledge push” – a development in knowledge that results in the emergence of new opportunities for innovation. The question whether innovation benefits more from rules or principles then becomes relevant. In characterizing principles based regulation and rules based regulation it was concluded that the actual interpretation of principles is left up to the norm subject, whereas rules prescribe the relevant norm conditions *ex ante*. Rules can specify in advance which behavior or technology is forbidden, but can also prescribe which technologies or conduct should be used or adopted by norm subjects (Black, Hopper & Band 2007). The former can restrict innovation, depending on the total amount of limitations set by rules. The latter is most relevant when it comes to the consequences for the incentives of norm subjects to innovate. When rules prescribe certain behavior or technology, the rule simultaneously also excludes all other deviating types of behavior or technology because this simply means non-compliance to regulation. Rules provide all the information of the process that is to be taken to comply. As a result, norm subjects receive few incentives to go beyond existing procedures to find more effective and efficient methods for enhancing their performance. This means that less knowledge is “being pushed” which in turn affects the knowledge condition that is a significant factor for explaining innovation. It is however possible, depending on the amount of limitations for the norm subject, that a structural shift in technology takes place as a result of rules based regulation. If the regulatory pressure becomes too high, norm subjects will be inclined to circumvent the dense set of rules.

An important factor that is tangential to the condition knowledge is the informational advantage of norm subjects compared to the regulator. According to Lévêque (1996), the regulator may lack information in certain situations to set the optimal policy for norm subjects. The regulator is typically less informed than the norm subject about organizational abatement costs and aspects of relevant technologies. Unnecessary costs arise in situations where uniform rules and demands are applied in diverging circumstances, for instance when there is considerable cost heterogeneity between norm subjects. Therefore decision making about the allocation of improvement efforts should be done at the level where the knowledge about the cost heterogeneity and the knowledge about the fitting solutions is highest (Lulofs 2001). Especially in fast changing environments characterized by utilization of advanced technology this knowledge is most likely greatest at the local level – the organizations of the norm subjects. Exerting this knowledge would help in minimizing the costs of norm subjects, and creating more space for innovation.

An example that clarifies the concept of cost-heterogeneity is provided by the research of Lulofs (2001) on the implementation of EU regulation on garbage incineration. In 1989, the EU executed a directive that regulates garbage incineration in incinerator installments. The directive obligated member states to adopt measures that ensure environmental cleaner incineration. Because especially France was afraid of the high costs of cleaning technology, the directive was split into two separate directives – one for new installments (89/369/EEC) and one for existing installments (89/429/EEC) – that allows differentiation to an installments' capacity and age. Member states were left with the choice to either decide upon uniform requirements or differentiated requirements. From the states that were included in the analysis, France was the only one to make full use of differentiating requirements, certainly so because the capacity and age of French installments varied considerably. This implied that the costs involved in installing cleaning technology in small installments were relatively high. In Germany and the Netherlands, the directives hardly had any impact, because the existing uniform requirements for incinerator installments were already very stringent. The United Kingdom adopted a more stringent set of requirements than the directive initially required. A number of observations were made in the analysis performed by Lulofs (2001). France was the only state that realized huge cost savings. Unfortunately, due to their low ambition, their weak enforcement system and an ambiguous political system, the emission reduction was relatively low. Uncertainty about future policy thwarted innovation (i.e. expansion) in France. Germany and the Netherlands both had high ambition and realized high emissions reduction. However, both states gave little attention to efficiency. An important question in this is whether costs minimization would have been greater when they had adopted differentiating requirements for incinerator installments. The United Kingdom is a good example of the importance of an integral waste policy in terms of adverse effects. The United Kingdom choose to dump garbage, because the costs of dumping were smaller than incineration. Consequently, there was limited reliable information on the United Kingdom that could be compared with the other states. The analysis confirms the assumption that uniform requirements leads to unnecessary costs. France was the only state in the analysis that took the cost-heterogeneity into account by differentiating its requirements. France used its informational advantage on the French incinerator industry and realized huge cost savings. In general, these cost savings would imply that norm subjects have more capital to invest in innovation. However, in this particular case, innovation and emission reduction in France was limited, because of political uncertainty, a lack of ambition and a weak enforcement system. This displays the importance of the situational circumstances in which a regulatory system functions.

Principles exploit the informational asymmetry by giving norm subjects discretionary power to come up with an approach that can achieve the outcomes defined in regulation (BERR 2008). Norm subjects can benefit from their informational advantage over the regulator to develop more effective and efficient practices that enable norm subjects to comply with regulation (Lévêque & Nadaï 2000). Important is to acknowledge the fact that norm subjects have more knowledge of the specific circumstances of their organization than the regulator. In the case of the directive on garbage incineration, the national government (norm subject) is more suited to make adequate policy than the European Commission (the regulator). For developing adequate rules based regulation, the regulator will need to collect all relevant knowledge itself in order to develop effective policy. This involves very high costs of collecting information concerning organizational abatements costs, relevant technologies, and the costs and values connected to the problem that needs to be regulated. When the regulator attempts to collect such information, problems of hidden information and adverse selection arise. Accurate knowledge is needed to set the optimal policy, but it is against the interest of the norm subject to provide information for it may reduce revenues and profits of the organization. Therefore abatements costs may be overestimated and adverse effects (for the environment) as a result of the operations of the organization may be underestimated which ultimately results in inaccurate knowledge to set the optimal policy. An incentive system that makes organizations reveal their true information should be adopted in order to reduce information costs (Lévêque 1996). Only then will the knowledge condition be satisfied and is the regulator able to make an optimal policy upon which innovation is more likely to advance. In principles based regulation the norm subject will actively be engaged in achieving compliance with principles. In order to set the optimal policy for their organization, they are required to reveal their organizational information.

#### *Market Structure*

In the previous sub-paragraph, three market failures were identified: imperfect competition, lack of transparency, and negative externalities. The first and second market failure are most relevant when it comes to the consequences for the market structure, and in specific for the competition and innovation that characterizes an industry. Regulation issued by the government is set to remedy these failures. It is the aim to modify the market structure in that it meets the desired elements of the conditions for innovation specified in the previous sub-paragraph. Considering the argument made in sub-paragraph 2.2.2, it is imperative to stimulate competition in the market by reducing the barriers of entry and organizational expansion. This way the market will have an open character upon which competition and transparency is endorsed, which in turn contributes to the conditions

for successful innovation. Principles are in contrast to rules better able to minimize these barriers of entry and organizational expansion. Rules based regulation implies that the regulator prescribes in detail which behavior is prohibited, or which behavior should be adopted by the norm subject. This automatically entails that the market will obtain barriers, because deviation from these rules means non-compliance. For instance in the case of incinerator installments, the regulator prescribes sophisticated cleaning technology that involves high investment costs. The result is an additional barrier, because norm subjects that want to enter the market or expand will need to have financial liquidities to purchase cleaning technology. Principles on the other hand, define the general outcome that is to be achieved with regulation without prescribing the detailed means to get there. As a result, there are no given barriers *ex ante* that restrict norm subjects to enter the market or expand. *Ex post* the behavior of norm subjects will be assessed and, if necessary, enforced.

The Financial Services Authority (FSA) (2000) adds by claiming that it is impossible to achieve a so-called "zero failure regime" – or rules regime – under volatile circumstances (i.e. fast changing technologies, political instability). Such a regime would be excessively burdensome for norm subjects and result in uneconomic situations from cost-benefit perspective in which competition and innovation is stifled (FSA 2000). Eames (2001) provides an example in his case study of a policy area that can be characterized by volatile circumstances. Eames composed a list of all regulatory provisions affecting sulphur emissions in France, Germany, the Netherlands and the United Kingdom. In total seventeen different provisions have been identified in less than two decades (1979-1996). During these decades the stringency of the objectives has increased considerably, as a result of technological advancement and political/public awareness of the environmental damage caused by sulphur pollution. These provisions have led to a complex regulatory system in which there is much uncertainty for norm subjects about future regulatory requirements.

#### *Regulations and Standards*

Lévêque (1996) observes that two different steps are taken in regulation. The first step is the choice of the regulatory objective, and the second step is the choice of the best instrument (i.e. rules based or principles based) that can achieve this objective. Two aspects of this instrument are important in anticipating the effect on innovation: the stringency of outcomes and the time for compliance (BERR 2008).

Innovation is influenced by the objectives that are set in regulation. How complicated and expensive is it for norm subjects to achieve those objectives? Can norm subjects use existing ideas, technologies and internal organizational processes, or are they not sufficient in enabling the norm

subject to comply with regulation? New regulatory policies are considered stringent when norm subjects have to radically change their behavior, or when existing technologies and organizational processes are inadequate to comply with regulation. Regulation with stringent outcomes is therefore also called technology-forcing regulation. Norm subjects are forced to innovate and come up with new approaches to comply with these ambitious objectives. If the outcome of regulation lacks stringency, norm subjects may be able to diffuse existing technologies and make incremental changes to comply with regulation. In that case there will be limited incentives to innovate (BERR 2008; Ashford, Ayers and Stone 1985).

The influence of stringent outcomes on innovation can be illustrated with an example of a study on the impact of the 1970 Clean Air Act in the United States[3]. This act set the ambitious outcome of 90% reduction of tailpipe emissions in a period of five years. The Environmental Protection Agency (EPA) supervises compliance of norm subjects with environmental regulatory objectives. The EPA concluded that the objective of the Clean Air Act was very stringent and therefore technology-forcing. Norm subjects were unable to realize the complete 90% reduction objective within five years, but did however manage to develop two new revolutionary techniques: the catalytic converter in 1975 and the three way catalyst in 1981. These techniques significantly reduced emission in a growing economy with increased mobility. The 90% reduction norm can be characterized as a principle. Two out of the three factors that determine the content match that of a principle. First of all, the norm has been generally formulated; it does not specify detailed information regarding the type and quantity of harmful substances that should be reduced. Secondly, the norm specifies a clear quantitative outcome which is a characteristic of rules based regulation. Thirdly, 90% reduction of tailpipe emission is the goal of regulation. The Clean Air Act did not prescribe the means norm subjects should apprehend to achieve the goal. If the means would have been specified, the norm would be characterized as a rule. Norm subjects would in that case be severely restricted in terms of innovation because deviation from prescribed means equals non-compliance in rules based regulation. Important here are the different gradations of rules and principles depending on the presence of the free factors that determine the content in norms (see paragraph 2.1.2).

The amount of time that norm subjects have for achieving the objectives of regulation – and thus complying with regulation – also has an impact on innovation. Problems arise when norm subjects

[3] Study done by: Gerard, D. and Lave, L.B. (2003). Implementing Technology-Forcing Policies: The 1970 Clean Air Act Amendments and the Introduction of Advanced Automotive Emissions Controls. *Technological Forecasting and Social Change*. 72 (7), 761-778.

are given to little time or too much time to comply. Too little time to comply with ambitious and stringent regulation, may result in inferior innovation with limited benefits for technology, economy and society. Norm subjects need the time to understand the purpose of regulation, the content of regulation and the impact and implications it has for their own organizations. Subsequently, norm subjects need the opportunity to internalize appropriate changes to their system of management and control. This involves the development of new techniques and/or changes in the internal organizational processes. Referring again to the example of the 1970 Clean Air Act. Norm subjects had to reduce 90% of the emissions their products emitted within a period of five years. As a result, norm subjects searched for a quick solution: the cataclysmic convertor. The effect of the timeframe of this policy is that most superior technologies – such as, fuel-efficient technology and lean-fuel engines – were excluded, because they took too long to develop. Superior technologies were put aside, which ultimately led to a less optimal reduction in emissions on the long term. Despite the fact that long timeframes can have the benefit of more superior innovation, it does have some disadvantages. It is evident that a long timeframe of regulatory policy implies that it can also take a long time before the outcomes specified in regulation will be reached. Benefits of regulation will not be observable in the short term, because norm subjects do not have an incentive to comply immediately. The timeframe norm subjects receive to comply should therefore correspond with the stringency of outcomes specified in regulation meaning that ambitious objectives need a longer timeframe than less stringent objectives (BERR 2008).

Rules and principles are both capable of specifying stringency of outcomes and time that is given for compliance. An ideal rule will for instance – taking the case of the 1970 Clean Air Act again – state: "a reduction of X% nitrogen dioxide (NO2), X% sulfur dioxide (SO2) and X% particulate matter (PM10) on products within a period of five years by means of incorporating (…) in your organization". An ideal principle may state for example: "a significant reduction of emissions on products within a reasonable period of time". There is however a substantive difference in terms of the consequences of rules and principles for innovation. In rules based regulation, the exact stringency and time for compliance are known *ex ante*. In the example, the rule very specifically states the means in quantitative terms, whereas the principle states the regulatory goal very generally using qualitative terms. Compliance with the principle will be determined *ex post* by the regulator. The result is that rules are very rigid whereas principles are highly flexible, able to respond to changing circumstances. Principles enable norm subjects to exploit opportunities that are the result of changing circumstances. It is for instance possible that during these five years, new and high quality technologies have become available, or existing technologies can be applied more cost-effectively. This connects to the definition presented by Tidd & Bessant (2009: 16): innovation is "a

process of turning opportunity into new ideas and of putting these into widely used practice". This can either be the development of new technologies or the introduction of already existing technologies. Rules on the other hand do not allow room for incorporating changed circumstances.

Lévêque (1996) argues that the regulatory process is not a static game. It is a repeated game of which the outcome and the consequences (i.e. innovation) are not determined *ex ante*. Much depends on the strategic actions of relevant actors in the arena. Based on that, the regulator can decide where to draw the line in terms of (*ex post)* compliance of norm subjects. As long as the preconditions of principles based regulation are sufficiently satisfied (see paragraph 2.1.5), principles can optimize the desired outcome of regulation. In doing that, principles based regulation has the potential to foster greater innovations, as a side-effect of regulation.

#### *Demand/Diffusion Processes*

In the previous sub-paragraph the importance of a demand or market need for innovation was discussed. The risk-return relationship has been outlined, and the importance for continuity of organizations is connected to the need for innovation. If an organization wants to stay ahead of its competitors in the market, and meet the requirements set by regulation, it will have to innovate. The risk-return relationship is a concept that helps us understand how return on investment is linked to the risks and uncertainty that organizations experience.

Regulatory uncertainty arises when political pressures are ambiguous, meaning that it is uncertain for norm subjects to predict how the regulator is applying and enforcing regulatory requirements in the future. Regulatory uncertainty can be beneficial but also inauspicious for the incentive of norm subjects to innovate. Excessive uncertainty will lead to rigidity in respect of the innovative behavior of norm subjects, because it is too risky for norm subjects to invest time and money in the development of new technology. When there is much uncertainty as to what compliance with regulation means, it is possible that norm subjects develop new products and processes that do not match the outcome the regulator was looking for. Norm subjects might then have invested a lot of resources in innovation which eventually was unnecessary or inadequate in achieving the objective of regulation. This in turn will lead to less innovation by the norm subject, because – according to BERR (2008: 30) – "the opportunity cost of allocating limited resources to complying with regulation can imply "*lost"* innovation". Ashford, Ayers and Stone (1985) state that in an uncertain regulatory environment norm subjects will make incremental changes to already existing technologies to minimize the risks. This hampers innovation. On the other hand, too much certainty will give norm subjects complete understanding of the intention the regulator has with regulation. Ashford, Ayers

and Stone (1985) envisage that norm subjects will only be stimulated to innovate in that they achieve minimum compliance with regulation. Norm subjects will be able to get all information out of regulation to – for instance – develop technologies that enable norm subjects to achieve minimum compliance. There are limited incentives for norm subjects to exceed the standards defined in regulation, because there is a high risk that the costs are greater than the initial benefits especially when competing organizations keep to minimum compliance.

The complex nature of market demand for innovation is illustrated by the study conducted by Eames (2001). In 1988 the Large Combustion Plant Directive (88/609/EEC) was implemented, including sulphur emission limits for new combustion plants and national emission limits for existing plants. The countries that were part of the study all showed significant over-compliance compared to the objectives set in the Large Combustion Plant Directive. Achieved emission reductions were in some countries twice the amount that was initially required. Eames (2001) concluded that the directive hardly had an impact on the eventual environmental outcomes. Rather, the over-compliance was the result of a number of factors. A small selection of these factors is political and public awareness of the necessity of change, the use of additional negotiated agreements with the industry, and anticipation of further regulation. These factors have thrived the market need for innovation to go beyond the objectives set in the Large Combustion Plant Directive.

It has been substantively argued in this theoretical framework that the nature of principles involves more uncertainty than rules. Following the argument stated above, uncertainty has a negative effect on innovation. There are however additional arguments that should be taken into account, focusing on the cooperative relationship between the regulator and the norm subject. An example of cooperation between regulator and norm subjects is the packaging waste recycling issue in Germany. The German government set in 1990 a stringent objective of 80-90% recycling by 1995, including a mandatory returnable system for certain kinds of packaging, and a deposit system that organized the collection of used packages. The industry strongly opposed the stringent objectives and measures, but took the initiative to make a more appropriate counter proposal on the measures that should be taken to achieve the objective. The regulatory process was characterized by two features: First of all, *shared uncertainty* in terms of not knowing future regulation, not knowing the future state of technology, and not having all information at their disposal. Secondly, by the impending threat of public regulation, industry was much more inclined to cooperate. The industry can profit from cooperation for it ensures much more cost-effective measures. As a result, the fact that the industry came with a counter proposal implies that the objective of regulation is accepted. It does not seem possible that the industry is able to both obstruct the objective set by the

government, and at the same time be able to help devise more cost-effective measures to reach the objective. The advantage of a cooperative relationship is thus that norm subjects are stimulated to develop a market demand for innovation. Principles based regulation generates such a relationship when the preconditions are sufficiently met. Substantive compliance to achieve the regulatory objective plays an important part in this, because it motivates norm subjects to help devise an optimal approach for regulation. Leveque (1996) adds by saying that the regulator and the norm subject are two entities that revolve around each other in a so-called regulatory game by searching for the most effective way to achieve their objectives.

## 2.3 Conclusions and Relevance of the Theory

The theoretical framework that is presented in this chapter serves as a basis for answering the research questions. The chapter started by addressing the independent variable of this study: the regulatory style. The formal differences of rules based regulation and principles based regulation have been discussed extensively. The formal structure of legal norms differs for rules and principles which led to the conclusion that three factors – generality of formulation, quantitative or qualitative requirements, mean or goal oriented – are imperative for distinguishing rules from principles in regulation. These factors will be used to assess current regulation on emissions and enable me to answer the first specific research question: *"To what extent is current policy on emissions characterized by rules or principles based regulation?"*.

Subsequently, the theoretical framework continues with four main advantages for principles based regulation. These main advantages that are summarized in literature provide direction for identifying the main bottlenecks in current governmental policy. The second paragraph of this chapter – 2.2 The impact of Regulation on Innovation – presents a more extensive overview of the literature on innovation and the relevant conditions that either foster or restrict innovation in emission reduction. By determining the presence or absence of these four conditions (knowledge, market structure, regulations and standards, demand/diffusion processes) it is possible to identify the problems for emissions reductions in terms of innovation. This should then result in an answer to the second specific research question: "*What is the rate of innovation that contributes to emission reduction and what problems and opportunities do entrepreneurs encounter in the current regulatory policy when considering the introduction of innovations to reduce emissions?"*.

In the first paragraph of this chapter, six preconditions of principles based regulation were summarized. These preconditions are imperative for exploring the possibility of a principles based regulatory system to work for emissions regulation. Relevant is to study whether there are sufficient guarantees that these preconditions are satisfied. It then also becomes possible to identify relevant

aspects of preconditions, or complete preconditions, that need to be addressed for successful principles based regulation in emissions regulation. Subsequently, the four advantages and seven risks for principles based regulation combined with the conceptualization of the relationship between regulation and innovation, provide the basis for discussing the expectations for innovation in emissions regulation. It is then possible to answer the third specific research question: "*To what extent can principles based regulation contribute to more incentives for entrepreneurs to innovate and reduce emissions?"*.

# Chapter 3. Methodology

This chapter presents an overview of the research methodology that will be used for answering the research questions of my study. The structure of this chapter has been designed in such a way that it gives a clear understanding to the reader *what* it is I will exactly be studying, *why* I have chosen for this specific research methodology, and *how* I am going to design and conduct my study. At the end of this chapter, the reader should have received a clear explanation which methodology is used in order to answer the main research question and its specific sub-questions. This chapter is divided in four paragraphs each addressing specific methodological topics. In sequential order these paragraphs discuss the research strategy, the method of data collection, the data analysis, and the concluding remarks.

## 3.1 Research Strategy

The first step in discussing the research methodology is determining the research strategy that will be used for the study. It is relevant to discuss a strategy for it gives a general outline of the research that will be conducted. This strategy should be a logical result from the research questions formulated in the first chapter of this thesis.

In social science, scientific research can have three different research purposes – that is, exploration, description and explanation (Babbie 2007, p. 87). Exploratory research sets out to gather preliminary information on a new interest or on a topic that is relatively new. Descriptive research aims to describe and summarize all relevant information about a certain situation. In the social sciences, this information is often used to make empirical generalizations, or to describe detailed information of specific events or cases. Explanatory research goes beyond description and incorporates the explanation of causal relationships (Punch 2006; Babbie 2007).

This study combines both description and explanation. This research is descriptive, because the research questions imply that the current policy on emissions should be described. Is the current regulatory system characterized by rules or principles? What is the rate of innovation and what problems are encountered in the current regulatory system? Next to being descriptive this research is also explanatory, because the study addresses the question how principles based regulation can contribute to more innovation. This includes demarcating the factors that determine whether it will be successful in the case of emissions regulation. What will have to change in order to make it a success? This study can therefore be characterized as a prospective analysis of principles based regulation. Typically, prospective analysis is used by policy analysts to examine different policy alternatives and decide upon policy actions (Dunn 2009). All relevant information of the current

regulatory system will be synthesized in order to assess the consequences of a principles based regulatory approach in emissions regulation.

### *Case-study methodology*

In the first chapter it was already mentioned that multiple officials of the department of Infrastructure and Environment are interested in principles based regulation for environmental policy. Since environmental policy is too large a domain to study for a master thesis, the choice was made to focus by selecting one sub-domain – that is, emissions regulation. In the domain of emissions regulation there are multiple legislative provisions that regulate different emission substances (for instance, regulation on carbon dioxide and nitrogen oxide) and regulation addressing different target groups and applications (for instance, regulation on the emissions trading system or on industrial emissions). For this study the choice was made to focus on legislative provisions that regulate emissions standards for combustion plants.

The research strategy that will be used in this study can therefore be characterized as a *case-study*. Case-study methodology is an in-depth investigation of a single case of some social phenomena (Babbie 2007, p. 298). The aim of this research is to examine current and alternative emissions regulation for combustion plants, and generate causal conclusions for the effect on innovation. Considering that case-studies are qualitative research methodologies the research will be non-interventional; this means that the research situation will not be manipulated by means of an experimental incentive/stimuli. Rather, the case will be studied naturalistically combining both observation and reasoning. Subsequently, the empirical findings will be connected to the theoretical framework in order to generate conclusions (Punch 2006; Shadish, Cook & Campbell 2002).

In selecting the case for the case-study there are usually two strategies: random sampling and purposive sampling (Babbie 2007). This study used the latter strategy because it allows for sampling based on interest rather than on randomness. The choice to select emissions regulation on combustion plants was made based on three considerations. First of all, emissions regulation per se is one of the most topical subjects in environmental policy. I refer here to chapter 1.3 where the relevance of emissions regulation is discussed extensively. Since combustion plants are large polluters of multiple harmful emissions, this research becomes a fortiori important. The second consideration for choosing this case is that the data that exists on emissions, emission reduction and innovation is relatively accurate compared to other environmental domains; reliable information supports and enables me to answer the research questions properly. The third consideration concerns the fact that emissions regulation on combustion plants can be characterized by regulatory

instruments of standards setting, whereas – for instance – the emission trading system (ETS) for carbon dioxide or nitrogen oxide is an economic instrument to reduce harmful emissions. Therefore, legislative provisions that regulate emissions for combustion plants fits perfectly into the command-and-control category (see chapter 2.2.2: Regulations and Standards) that is the subject of this study.

To complement this methodological discussion, some attention should be directed towards possible risks of case-studies. I will here suffice by stating the most important one – that is, making generalizations based on a single case study (Babbie 2007). The important question in this is whether findings of this case-study are also valid in other cases. Since this study will be restricted to the case of emissions regulation for combustion plants it may be difficult to generalize results to other legislative provisions that regulate emissions. In the terminology of Shadish, Cook & Campbell (2002) this is described as a threat for the external validity.

For this study this threat/risk is non-pervasive. It is not the intention of this study to generalize findings of the case emissions regulation for combustion plants to other cases. Rather, it is the aim to examine the theoretical concepts that have been discussed in the theoretical framework. The primary goal of case-study research is to gain a better understanding of the phenomena under study. Because the case-study is an in-depth investigation, it is well able to assess theoretical concepts and locate any misconceptions (Flyvbjerg 2006). As a result, the variables that have been identified in the theoretical framework may also be valid for other cases.

## 3.2 Data Collection

The next step in the methodological discussion is to address the data that will be used. In the first paragraph of this chapter it was already mentioned that this research qualifies as a case-study – a qualitative research method. In order to answer the research questions, I will draw from two types of different data sources – that is, *written documents* and *in-depth interviews.*

A first method of data collection that will be applied in this research is the study of written documents. There are two different types of written documents that will be studied. First of all, official legislation issued by the government. Different legislative provisions that are relevant for our case will be investigated – those are, the Decree Waste Incineration (also: Bva), the Decree Emission Standards for Combustion Plants A (also: Bees A), and the Decree Emissions Standards for Medium-sized Combustion Plants (also: Bems). These legislative documents are needed to assess the current regulatory system and characterize it as predominantly rules based regulation or principles based regulation. Secondly, multiple documents will have to be studied to get a complete understanding of regulatory policy executed by the government and its effects on innovation. Examples of documents

that will be examined are that from the department of Infrastructure and Environment, the department of Economic Affairs, Agriculture and Innovation, and the Dutch Emissions Authority.

A second method of data collection for this study will be in-depth face-to-face interviews. Instead of a standardized set of questions which is often carried out in surveys, qualitative interviewing implies that a set of topics will be discussed in-depth with a respondent. Different methods of structuring an interview are distinguished in literature. Structured interviews include pre-determined questions and closed response categories. In unstructured interviews the interview questions are not pre-established; the researcher formulates questions during the interview itself. This type of interview typically includes open-ended response categories (Punch 2006). For this study a combination will be made characterizing the interviews as semi-structured. A pre-determined set of questions that touches upon all relevant topics of the case will serve as a starting point. Subsequently, I allow myself the freedom to adopt or come up with new questions during the interview as a response on the answers and reactions I receive from respondents. This way I can connect to the ideas and views that respondents hold in regard of emissions regulation.

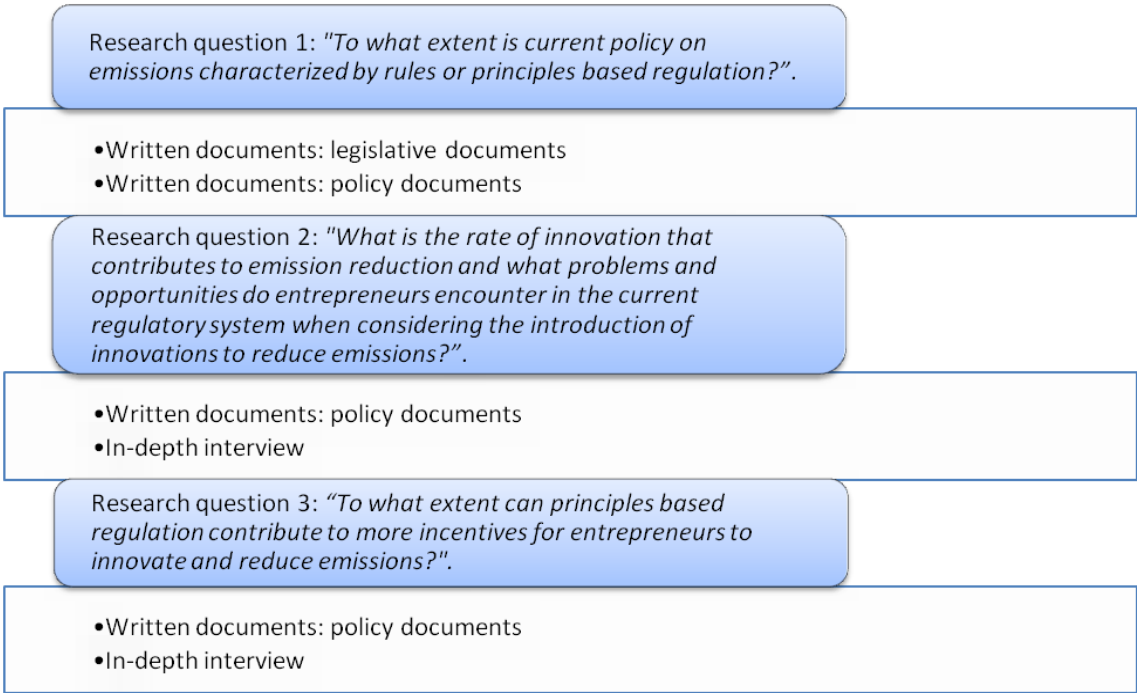
I will conduct approximately ten interviews in total with respondents from different backgrounds and functions. The research includes respondents such as, policy makers (governmental departments), policy advisors, policy supervisors (inspection organization), and norm subjects (private actors). Each of these actors experiences the implications of regulation differently, and can therefore add very relevant context-dependent knowledge. These interviews will take place during working hours at the offices of the respondents. The initial intended duration of an interview will be roughly one hour, apart from exceptions. The interviews will be audio recorded (with the consent of the respondent) to enable me to focus more on the dialogue and less on keeping notes manually. I will only have to take note of non-verbal observations such as, posture and enthusiasm of the respondent. Audio recording will also facilitate me to replay the conversation afterwards for data analysis. The language of communication for the interviews will be Dutch. At the end of this document two appendices are enclosed providing additional information on the interviews[4].

Figure 3.1 sets out which data are to be collected for which specific research question. The first specific research question addresses the subject whether current regulatory policy can be characterized as predominantly rules based or principles based. In order to determine this, the content of legislative documents and written documents are to be studied. The second specific

[4] Appendix A contains the names, organizations and functions of the interviewees. Appendix B contains the interview questions.

research question goes into the effects of current policy on innovation and the problems that are encountered. Answering this research question can be done by studying multiple policy documents from different actors. Next to that, the perspective of the interview respondents should add very specific knowledge that can increase and deepen our understanding. The third specific research question engages into the question what the consequences for innovation will be if a principles based regulatory style is implemented. Will it be successful if such a regulatory style is implemented? If not, what will have to change for it to become successful? This research question will be answered by means of the interviews. In addition, the policy documents serve as a basis and facilitate me to identify relevant aspects that determine the consequences for a system of principles based regulation for emissions policy.

**Figure 3.1 Data collection per research question**




## 3.3 Data Analysis

After data collection has taken place it is evident that the data should be analyzed in order to answer the research questions. Babbie (2007, p. 378) defines data analysis in qualitative studies as "the non-numerical examination and interpretation of observations, for the purpose of discovering underlying meanings and patterns of relationships". A characteristic feature of case-study methodology is that data collection and data analysis frequently overlap each other. During the process of collecting data it is very important as a researcher to be aware of all proceedings and to make notes of all relevant impressions. Analysis of data therefore already commences during data collection by for instance reflecting what the data are telling about possible relationships between concepts. Many

researchers therefore argue in favor of joint data collection, coding and data analysis (Glaser & Strauss 1967; Eisenhardt 1989).

Huberman and Miles (1994) have written an expanded sourcebook supporting researchers to design qualitative data analysis, including case-study methodology. They describe the different approaches that can be taken by a researcher to design a proper case-study. In the first chapter of their book they present their view on qualitative data analysis. They identify three steps that have to be followed in any qualitative data analysis. The first step is to find a way to *reduce the data* that have been collected throughout the study. Collecting multiple policy and legislative documents on emissions and conducting a dozen interviews with relevant actors will quickly result in a large amount of data that is hard to keep track of. By "selecting, focusing, simplifying, abstracting and transforming" the data that have been collected, it is possible to organize the data in such a way that valid and reliable conclusions can be drawn from it. Qualitative data reduction can take the form of summarizing, quantifying, selecting, paraphrasing, classification and such. The next step in Huberman and Milles' view is *data display*. Displaying data implies organizing and compressing the data in order to give a clear overview of information. In qualitative studies this often takes the form of extended texts with or without graphs, matrices and charts. After displaying the data relevant information should be easily accessible in order to *draw and verify conclusions* – the third step. Through the entire process of data collection the researcher should already be exploring possible causations, regularities, patterns, and theoretical assumptions. According to Huberman and Miles these conclusions are vague and tentative at first, but become specific and explicit when data collection is finished. These conclusions can then be verified during data analysis based on the previous steps – data reduction and data display – which enables the researcher a more comprehensible data set that verifies the findings.

The strategy of data analysis that will be used in this study can be characterized as *variable oriented analysis*. It implies that the data collected in a case will be compared to relevant theoretical propositions. For this study it means that the data on the case of emissions regulation for combustion plants will enable me to choose values for the concepts that have been discussed in the theoretical framework (see chapter 2). It is the aim to identify patterns and relationships in the data that either confirms or refutes these theoretical propositions. In addition, it is also possible that the case study clarifies certain aspects other researchers have not found or overlooked.

All the information that will be collected in this study will be organized and structured in order to keep track of all the data. Figure 3.2 demonstrates the analytic scheme that serves as the underlying principle of the data analysis in this study. By connecting the information that I will collect

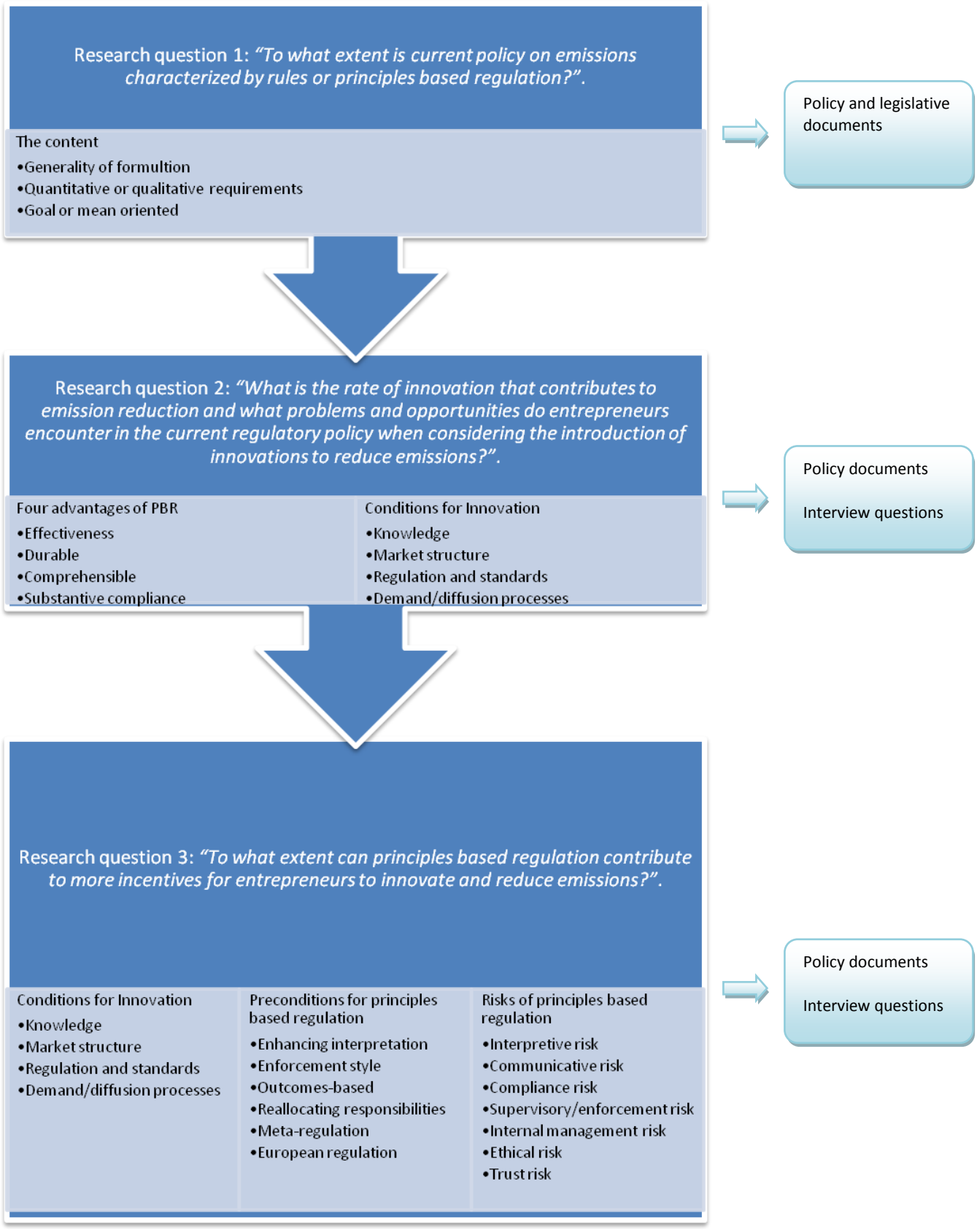
throughout the study with the concepts of the theoretical framework I will be able to answer each specific research question. I will process and analyze the data by coding – "classifying or categorizing individual pieces of data" (Babbie 2007, p. 384) – it according to different variables (c.q. topics). This enables me to reduce the amount of data to only the relevant and necessary set, and to compress the data to clear, detailed information on the case. Consequently, I should have a substantial basis to verify data and draw conclusions.

The first step in the analytical scheme of the data analysis (see figure 3.2) will be answering the first specific research question. This question addresses the regulatory style of current policy on emissions. It comes down at determining whether emissions regulation can be characterized as predominantly rules based or principles based regulation. The theoretical framework provides the tools that enable me to answer this research question. In the theoretical framework the formal distinction between principles and rules are discussed. It was concluded that it is the content of legal norms that determines whether regulation can be characterized as rules or principles. Three variables are relevant in this assessment: the generality of formulation, quantitative or qualitative requirements, and goal or mean oriented.

The second specific research question addresses the relationship between current regulatory policy and innovation. In the previous question it was determined that current policy is either rules based or principles based. In this question it is relevant to determine the effects of that policy in terms of innovation and emissions reduction. Important here are – first of all – the possible advantages of principles based regulation, because they provide me with guidelines of studying problems and opportunities of current policy. In addition, the conditions for innovation that have been discussed in the theoretical framework are also relevant. These conditions for innovation can be assessed based on their presence or absence in the emissions case.

The third specific research question examines the conclusions on these conditions for innovation, and assesses whether principles based regulation could contribute to more incentives for entrepreneurs to innovate and reduce emissions. The theoretical framework also includes risks and preconditions of principles based regulation that have to be taken into account. In total seven risks have been identified that need to be examined. Are these risks serious threats for the success of principles based regulation in this case? Connected to this are the preconditions of principles based regulation that have to be satisfied before it can actually be successful in practice. Based on this assessment it is possible to determine problems and bottlenecks for implementation of principles based policy in emissions regulation for combustion plants.

**Figure 3.2 Analytical scheme of data analysis**



## 3.4 Conclusion

In this chapter I discussed three topics of the methodology of this research: the research strategy, data collection, and data analysis. Together they should have provided a clear understanding *what* it is I will be studying, *why* I chose this specific research methodology, and *how* I am designing and conducting my study.

The strategy of the research can be characterized as a case-study. By an in-depth investigation of the case on emissions regulation for combustion plants I will be able to describe the problems of the current regulatory style for innovation, and subsequently, explain the effect of principles based regulation on innovation. The data that will be collected throughout this study will be written documents (both legislative and policy documents) and interviews with relevant actors in the field of the emissions case. The interviews provide me with very relevant context-dependent knowledge that enables me to add more profundity to the analysis and generate conclusions that are valid and reliable. In the process of data analyzing I will use the theoretical framework as a foundation for comparing the data from the case. The aim is to find regularities and patterns in the case that either confirm or refute the theoretical propositions described in the theoretical framework. Consequently, I should be able to answer the research questions of this study and make a conclusion about the question whether principles based regulation results in effective emissions regulation.

# Chapter 4. Emissions regulation: rules based or principles based?

Central in this chapter will be the first step in the data analysis, or in other words answering the first specific research question of the thesis: *"To what extent is current policy on emissions characterized by rules or principles based regulation?"*. This chapter starts by giving a general overview of emissions regulation, followed by relevant and specific regulation of the case that will be studied. In the second paragraph, this regulation will be analyzed based on the distinction between rules based regulation and principles based regulation. Three variables that determine the content of regulation will enable me to make that distinction. These have been discussed extensively in chapter 2.1.2. This chapter ends with a conclusion to the abovementioned research question.

## 4.1 Background of emissions regulation

One of the first important international steps to reduce emissions throughout the world was taken in 1979 at the United Nations Economic Commission for Europe (UNCECE) in Geneva. In total, 51 states have signed the Convention on Long-Range Transboundary Air Pollution (CLTRAP) and made the commitment to prevent anthropogenic damage to the environment by limiting and gradually reducing air pollution. The CLTRAP is a framework that sets out the broad objective of the participating countries to cooperate in air pollution abatement. This cooperation takes place in annual meetings where the signatories discuss policies and scientific research. The CLTRAP provided the foundation for eight future UNECE agreements in which more specific measures and reduction standards were set (Eames 2001).

In the European Economic Community there were already concrete actions to reduce emissions in the early 1980's. The first directive introduced by the European Commission was the Air Framework Directive (AFD) (84/360/EEC) in 1984. The AFD did not specify any reduction standards for member states. Rather, it addressed the conditions under which combustion plants were authorized to operate. The AFD introduced the term best available technology not entailing excessive costs (BATNEEC) for plants. This concept implied that new combustion plants were to conform to BATNEEC, whereas existing plants were required to upgrade their technology to obtain the equivalent of BATNEEC before 1987.

The Large Combustion Plant Directive (88/609/EEC) (LCP-directive) of 1988 was the first European legislation to set emission standards for new and existing large combustion plants. It is therefore considered to be a daughter directive of the AFD. The LCP-directive sets out the task for national

governments to limit large combustion plants[5] emissions of nitrogen oxide ($NO_x$), sulphur dioxide ($SO_2$), and particulate matter (PM). These are major air pollutants causing acid rains and atmospheric particulates, threatening animal welfare (including humans), plants and complete habitats. The LCP-directive contained emissions ceilings and reduction targets for the abovementioned substances, and differentiated between plant size and fuel type (Eames 2001). Table 4.1 gives an overview of the LCP reduction norms for existing combustion plants in the Netherlands.

**Table 4.1 LCP-directive $S0_2$ and $NO_x$ emission reduction targets for existing plants in the Netherlands.**

| | Emissions by large combustion plants in 1980 ktons | Emission ceiling (ktons/year) | | | % reduction over 1980 emissions | | |
|---|---|---|---|---|---|---|---|
| | | 1993 | 1998 | 2003 | 1993 | 1998 | 2003 |
| $SO_2$ emissions | 299 | 180 | 120 | 90 | -40 | -60 | -70 |
| $NO_x$ (as $NO_2$) emissions | 122 | 98 | 73 | | -20 | -40 | |

The requirements set in the LCP-directive had to be translated into national regulation of member states before the end of June 1990. Member states were free to adopt policy instruments to accomplish these emissions reductions in existing plants. For new combustion plants, the LCP-directive included uniform requirements that connected the emission limit values of nitrogen oxide ($NO_x$), sulphur dioxide ($SO_2$) and particulate matter (PM) to the thermal capacity of a plant (European Commission 2001). According to Eames (2001) the LCP-directive is a classic form of command-and-control regulation – that is, regulatory instruments of standard setting[6].

In the Netherlands, air pollution and acidification already received a great deal of attention in the late seventies. Awareness about the importance of air-quality has risen among the Dutch public, and resulted in the Indicative Multi-Year Program Air Pollution 1985-1986 including national reduction targets for emissions that cause acidification[7]. During the eighties the overall awareness of harmful

[5] The LCP-directive applies "to combustion plants, the rated thermal input of which is equal to or greater than 50 MW, irrespective of the type of fuel used (solid, liquid or gaseous)." (LCP Directive 88/609/EEC)

[6] The command-and-control category of regulation was discussed in chapter 2.2.2 (theoretical framework).

[7] Acidification emissions: Nitrogen oxide ($NO_x$), Sulphur dioxide ($SO_2$), Volatile Organic Compounds (VOC) and ammonia ($NH_3$).

emissions (including greenhouse gasses[8]) for the environment increased even further. Lulofs (1999) gives the example of the attention given to the massive "waldsterben" in Germany as a result of acidification emissions. In 1992, the United Nations Conference on Environment and Development (UNCED) was organized and resulted in the United Nations Framework Convention on Climate Change (UNFCCC). As of May 2011, 194 states (including the Netherlands) made the commitment to prevent anthropogenic damage to the climate by stabilizing greenhouse gasses in the earth's atmosphere (Ministerie van VROM 2007: A).

The Indicative Multi-Year Program Air Pollution 1985-1986 set the foundation for the Decree Emission Standards for Combustion Plants (In Dutch: Besluit emissie-eisen stookinstallaties, Wet Luchtvaart (short: Bees WLV act) – the first national legislation of the Dutch government aimed at reducing air pollution and fighting emissions that cause acidification. Stringent uniform emission limits were formulated for nitrogen oxide ($NO_x$), sulphur dioxide ($SO_2$), and particulate matter (PM) including upgrading timetables for compliance for existing plants. In 1991, the Bees WLV act was revised in order to implement the LCP-directive (88/609/EEC) adopted by the European Economic Community. This concerned only minor changes, because the Bees WLV act was already very ambitious in terms of emission limits. Lulofs (2001) also concludes in his study that the Netherlands are very ambitious and set additional emission standards besides those specified in the EU-directives. The Bees WLV act as of 1991, differentiated between the size (also thermal capacity) of plants, the fuel of plants, and the construction date of combustion plants. New combustion plants received uniform emission limits for the abovementioned substances, differentiated to the thermal capacity of a plant (50MW-300MW; 300+ MW). Existing plants[9] received lower emissions limits than new plants, but were required to comply to the emission standards of new plants by 1994 respectively 1999 (Lulofs 1999; Eames 2001). The Dutch vigor to reduce these harmful emissions results in the Bees WLV setting more stringent requirements to combustion plants than the LCP-directive requires (Ministerie van I&M 2009).

In the first decade of the 21st century a number of important steps are taken to reduce emissions. The LCP-directive has been amended twice (in 1994 and 2001) for revising and updating the directive. The European Union has produced a new directive on National Emission Ceilings (NEC-directive (2001/81/EC)) in 2001 determining emission ceilings for 2010 per nation state for $NO_x$, $SO_2$,

[8] Greenhouse gasses: Carbon dioxide ($CO_2$), methane ($CH_4$), nitrous oxide ($N_2O$), sulphur hexafluoride ($SF_6$), hydrafluorocarbons, and perfluorocarbons.

[9] Existing combustion plants are plants permitted before May 29th 1987. Plants are considered new when they have received their permit after May 29th 1987, or when the burners and ovens are renewed (Lulofs 1999).

VOC, and $NH_3$. On a more extensive timetable the NEC-directive also prescribes emission ceilings of the mentioned substances and particulate matter (PM) for the year 2020. This directive resulted in the implementation memorandum of the Dutch government “Erop of eronder” containing the emission ceilings per sector for 2010. Table 4.2 displays the emission ceilings for the sector industry, energy and refinery – the sector that includes combustion plants (Ministerie van VROM 2003).

**Table 4.2 Emission ceilings 2010 (in ktons/year) for the sector industry, energy, and refinery.**

| Substance | Forecast 2010 | NEC ceiling | Deficit |
|---|---|---|---|
| $NO_x$ | 71 | 65 | 6 |
| $SO_2$ | 59 | 39,5 | 19,5 |
| VOC | 81 | 61 | 20 |
| $NH_3$ | 4 | 3 | 1 |

Initially it seemed that the emissions in the Netherlands would exceed the emission ceilings specified in the NEC-directive. However, as a result of the economic recession that started in 2009, emissions of harmful substances reduced approximately 5%-35%, meaning that the emission ceiling of 2010 would not be exceeded. Long term goals however will not be reached considering the current measures that are taken (PBL 2009).

In 2005, two emission trading systems were implemented in the Netherlands introducing economic incentives for the private sector to reduce harmful emissions. A European regulated emission trading system for $CO_2$-emissions was implemented, and a national regulated emission trading system for $NO_x$-emissions. These emission trading systems were based on the United States trade system of sulfur dioxide emission permits. The emission trading systems imply that pollutants will have to purchase additional emission rights if their emission cap is reached. Burtraw (2000) states that flexibility in compliance that is offered with this economic instrument, provided the main cause of the cost savings achieved in the U.S. emission trade system. By giving organizations the choice to either purchase additional emission rights or to innovate, the regulatory flexibility increased and enabled norm subjects to achieve emission reductions in the least costly manner. Especially the increase in regulatory flexibility led to noticeable technological innovations among firms.

The most recent development in emission regulation is the integration of seven environmental EU-directives into one integral directive for industrial emissions (IE-directive 2010/75/EU). This EU directive among other assimilates the LCP-directive and the Integrated Pollution Prevention and Control (IPPC)-directive of 1996, which introduced the concept of Best Available Technique (BAT) for installations that produce emissions (Ministerie van VROM 2007: B). On a similar note, the

department of Infrastructure and Environment has stated the intention to simplify, modernize and retrench the General Environmental Provisions Act (In Dutch: Wet Algemene Bepalingen Omgevingsrecht (WABO)). Minister Schultz van Haegen announced that national environmental regulation will be connected to that of EU regulation, meaning that no additional requirements will be added by the national government besides those already set by the EU. The current trend in environmental policy (including emissions regulation) on both national and EU level is thus making regulation more transparent, and more flexible (TK 2010/2011).

The next step is to identify relevant legislation that will have to be studied in order to answer the first research question. As was already stated earlier in this paragraph, the Bees WLV act is the Dutch national legislation that regulates emission standards for combustion plants. Currently, three different decrees regulate emission standards for $NO_x$, $SO_2$, and particulate matter (PM) of combustion plants. The Decree Waste Incineration (In Dutch: Besluit verbranden afvalstoffen (short: Bva), the Decree Emission Standards for Combustion Plants A (In Dutch: Besluit emissie-eisen stookinstallaties A (short: Bees A), and the Decree Emission Standards for Combustion Plants B (In Dutch: Besluit emissie-eisen stookinstallaties B (short: Bees B). Bva regulates combustion plants that incinerate, gasify or pyrolyze waste, with or without the use of fuel. Bees A regulates emission standards for combustion plants with a thermal capacity of 50 MW and more. Bees B regulates emission standards for combustion plants with a thermal capacity between 1 MW and 50 MW. As of April 2010, Bees B has been replaced by the Decree Emission Standards Medium-sized Combustion Plants (In Dutch: Besluit emissie-eisen middelgrote stookinstallaties (short: BEMS). Apart from a few exceptions, Bees B will remain applicable until the year 2017 for combustion plants that received a permit before April 1st 2010. Bems can be considered as a modernization of the outdated Bees B. More detailed regulatory requirements for combustion plants are set in lower level ministerial regulation (in Dutch: ministeriële regeling). Three ministerial regulations[10] set additional requirements to combustion plants.

In appendix C, a decision tree is presented that helps determining which legislative Decree applies in which situation. For combustion plants with a thermal input of less than 1 MW the Decree type approval (In Dutch: Besluit typekeuring) applies. The Dutch emission Directive (In Dutch: Nederlandse emissie Richtlijn (short: NeR)) applies primarily to plants where emissions can be characterized as process emissions, and not combustion emissions. Both the Decree type approval

[10] Regeling meetmethoden verbranden afvalstoffen; Regeling meetmethoden emissie-eisen stookinstallaties milieubeheer A 2005; Uitvoeringsregeling emissie-eisen middelgrote stookinstallaties milieubeheer.

and the Dutch emission Directive are beyond the scope of the research, and will therefore not be included in this study.

## 4.2 The content of emissions regulation

In the end of the previous paragraph, multiple Dutch legislative decrees and ministerial regulations were identified that regulate combustion plants. These laws will be analyzed in this paragraph in order to determine whether current emissions regulation of combustion plants can be characterized as rules based regulation or principles based regulation. In chapter 2.1.2 it was concluded that regulation can be characterized as rules based or principles based by assessing *the content*. Three variables are relevant in this assessment: the (1) generality of formulation, (2) quantitative or qualitative requirements and (3) means or goals oriented. For each legislative decree and ministerial regulation that regulates combustion plants, these variables will be examined. Appendix D presents the values on these variables per article of every Decree.

### Decree waste incineration (Bva)

In the general provisions of the Decree waste incineration (Bva) the reach is determined by specifying the norm subjects that are affected by this decree (art. 1). The Decree Bva distinguishes between two types of combustion plants[11] that are addressed by means of this decree: incinerator plants, and garbage incinerator plants. In the second and third article the reach of the Decree excludes plants that incinerate specific substances (i.e. vegetable substances) or hazardous combustible liquid substances (i.e. waste oil).

In the second paragraph (art. 4-7), a number of general requirements concerning plants are specified. These requirements have a compulsory disposition implying that the norm operator can be characterized as “must”. Issues that are addressed in this paragraph are the license to operate and the registration of substances. Next to that, two articles in this paragraph refer to the appendix submitted at the end of the decree for prescriptions on emission standards, measurement requirements, and a number of remaining requirements (art. 6, 7). In this appendix, the general provisions of paragraph two are elaborated in depth. The appendix includes multiple conditions for emission standards, a formula for calculating emissions, four different tables specifying among other

[11] A technical unit in which fuel is oxidized in order to use the generated heat, not including incinerator plants that utilize combustion products in their manufacturing process, piston engines, gas turbines on offshore platforms, and technical units for purification of flue gasses by combustion which are not operational as an independent plant.

(daily and monthly) average emissions differentiating to substances ($NO_x$, $SO_2$, PM, VOC), thermal capacities of plants, and detailed measurement parameters.

The third – and last intrinsic – paragraph (art. 8-10) of the Decree Bva addresses a number of assignments that the authority has to execute. In article eighth and nine the authority receives the assignment to indicate to a plant in their permit which substances are allowed to be processed, the minimal and maximum allowed concentration values for these substances, and further specific information concerning operational conditions.

The ministerial regulation measurement methods for waste incineration (In Dutch: Regeling meetmethoden verbranden afvalstoffen) has been based on the appendix of the Decree Bva. This ministerial regulation has been set by the minister of Housing, Spatial Planning and the Environment in 2004 and addresses measurement procedures for combustion plants that are regulated by the Bva. The ministerial regulation prescribes the methods that supervisors of combustion plants have to adopt in measuring emissions. The ministerial regulation among other sets requirements for measurement equipment, the frequency of measurements, the parameters for measurement, and the registration of measurements. The ministerial regulation also refers to different European and national documents (NEN-EN sheets, NEN sheets[12]) that specify detailed steps for measurement and calculation of substances.

The Decree Bva and the related ministerial regulation both indicate very specifically which activities (c.q. behavior) are assessed. In most cases the legal norms have a compulsory character and prescribe the supervisor of a combustion plant how to operate – ultimately resulting in many obligations. The norm object and norm conditions are very *specific* and give guidance to norm subjects in terms of how to achieve compliance with regulation. The decree and – to a lesser extent – the ministerial regulation formulate requirements in *quantitative terms*. It is especially the appendix of the Decree Bva that sets quantitative emission standards for combustion plants. In terms of *goal or mean oriented*, it should be acknowledged that the emphasis for this study is on emissions standards – and not for example on measurement requirements – for combustion plants. As such, it can be determined that the emission standards specified in the Decree Bva are predominantly *oriented on the goals*. Norm subjects may decide for themselves how to comply with the emission standards specified in the Decree Bva. Other requirements (i.e. measurement of emissions) specified in the Decree and the ministerial regulation are predominantly *oriented on the*

[12] NEderlandse Norm (NEN) is a document containing agreements between Dutch national stakeholders. NEderlandse Norm – Europese Norm (NEN-EN) is a document containing agreements between European stakeholders.

*means*, because these provide detailed proceedings that have to be performed by norm subjects. There are for example strict and uniform requirements as to how emissions should be measured and calculated. However, these requirements are less relevant than the emission standards in the Bva, because their purpose is not to reduce emissions.

### Decree Emission Standards for Combustion Plants A (Bees A)

The Decree Bees A has a total of 50 articles that are divided into five different chapters. The first chapter concerns the general provisions of the Decree and among other determines the reach of the Decree. The Decree applies to combustion plants (norm subjects) that combust gasoil or gaseous fuel with a thermal capacity of at least 50 MW. In the sections that follow approximately ten different exceptions are made for combustion plants that do not employ piston engines in their combustion process. Furthermore, the general provisions of the Bees A describes the calibration of calculating the discharge of emissions from combustion plants (art. 4), some general proceedings in case of plant malfunctioning (art. 7, 7a), and the requirements concerning combustion plants that use various fuels (art. 8, 9).

The second chapter of Bees A contains fifteen articles on emission standards for combustion plants. The first three articles specify emission standards based on the authorization date of a plants' permit, and differentiate to substances, thermal capacities and fuels. These emission standards contain quantitative, very specific, maximum limits that may be emitted. In the second paragraph (art. 14-17) the emission standards for existing combustion plants[13] are elaborated. Comparing the emission standards specified in these articles with articles 11-13, it is evident that existing combustion plants receive less strict emission standards than new combustion plants. Paragraphs three and four address emission standards for sulphur oxide from refineries (art. 18) respectively emission standards for nitrogen oxide from gas combustion plants (art. 19-23a). The fifth paragraph contains formulas and practical information for the emission standards set in paragraphs one and two of this chapter. An overall observation is that the legal norms in this chapter are very specific and contain many quantitative requirements. The norm objects in these legal norms leave little room for misinterpreting the emission ceilings.

The following chapter – chapter two-A – contains two articles (art. 25a, 25b) that specify requirements on inspection and maintenance. Supervisors of combustion plants can retrieve specific information from these articles on the frequency of inspections. Section four of article 25a states

[13] A combustion plant is considered to be "existing" if it has received its permit before May, 29th 1987, and burners and ovens have not been renewed after that date.

that the minister sets additional requirements for carrying out maintenance and inspection in a ministerial regulation. Here the proceedings of inspecting safety, optimal combustion and energy efficiency are elaborated in depth. The procedure – or the means – of inspecting a combustion plant are thus completely amplified.

Chapter three of the Decree Bees A addresses the possibility of the authorities to deviate from the emission standards for combustion plants specified in the second chapter. Articles 26 to 29 state that the authorities are allowed to set more stringent (art. 27) or less stringent (art. 28) emission standards for combustion plants. There are however a whole range of norm conditions that have to be taken into account before authorities may actually modify emission standards for combustion plants.

The Decree Bees A also includes methods for measuring emissions, as to prevent diverging methods of calculating emissions. Articles 30 to 45 of chapter four extensively regulate emission measurement in combustion plants. The ministerial regulation measurement methods emission standards combustion plants A 2005 (In Dutch: Regeling meetmethoden emissie-eisen stookinstallaties milieubeheer A 2005) is affixed to this chapter and sets additional requirements. Comparable to the ministerial regulation on measurement methods for waste incineration, the Bees A also refers to European NEN-EN norms and national NEN norms containing methods for measuring and calculating emissions.

Based on the analysis of the legal norms in the Bees A and the related ministerial regulation, the values on the three variables could be determined. The Bees A is an act that is characterized by multiple detailed and bright line rules. The concrete emission standards that follow from the Bees A are very specifically formulated in quantitative terms (i.e. applying to a specific substance under a certain condition), and oriented on the *goals*. The emission standards are maximum values that may not be exceeded by large combustion plants. The concrete methods of emission containment are left up to the norm subject – the supervisor of the combustion plant. In the remaining chapters of the Bees A and the ministerial regulation, the procedures for inspection, maintenance and measuring emissions are elaborated. These are also very specific, using quantitative requirements to set procedural steps for supervisors of combustion plants. These legal norms are thus oriented on the *means*, by specifying concrete actions that have to be taken to comply with the Bees A and the ministerial regulation.

### Decree Emission Standards Medium-sized Combustion Plants (Bems)

The Decree Bems contains six chapters of which five have intrinsic value and implications for medium sized combustion plants. The first chapter states the general provisions of the Decree Bems – both the definitions used, and the scope of the Decree. Norm subjects that are addressed by the Decree Bems are, with a few exceptions, all combustion plants with a thermal capacity of 1 MW or more, excluding the combustion plants to which the Decree Waste Incineration or the Decree Emission Standards for Combustion Plants A are applicable (art 1.2, 1.3).

In the second chapter the emission standards for the norm subjects are elaborated. The structure of this chapter is comparable to the emission standards chapter of the Decree Bees A. The first paragraph contains emission limits for new combustion plants, stating quantitative emission limits for different emission substances, different fuels, and different combustion installations. The second paragraph addresses emission limits for existing combustion plants[14] by referring to the former Decree Bees B which emission standards will remain applicable until 2017. The content of these emission standards is also quantitative and very specific, stating maximum emission limits for substances, fuels, and combustion installations. The last paragraph of this chapter contains remaining provisions on emission standards (i.e. emission limits and procedures in case of plant malfunction).

The third chapter of the Decree contains methods for measuring emissions. Topics that are addressed are the frequency of measurement under different conditions, and procedural steps in calculating emissions. The Decree Bems and the ministerial regulation for medium sized combustion plants both refer for the methods of measuring and calculating emissions to different national and European norm sheets (NEN sheets, NEN-EN sheets) (art 3.1.4). The legal norms on measuring and calculating emissions are clearly oriented on the means, and state the procedure that has to be taken by norm subjects in emissions measurement and emission calculation.

The fourth and fifth chapters address respectively the topics inspection and maintenance, and the preservation of documentation. Chapter four specifies a number of legal norms that contain requirements for inspection of combustion plants, and timeframes for maintenance that follows the inspection. The fifth chapter orders norm subjects to preserve data that are needed for determining compliance with emission standards.

[14] Those combustion plants that already received a permit before the implementation of the Decree Bems on April, 1st 2010.

In conclusion, the values of the Decree Bems on the three variables can be determined. The legal norms in the Decree Bems and the ministerial regulation have been formulated very *specifically* (i.e. containing multiple norm conditions). The legal norms leave little room for misinterpretation for the norm subject, because it is clear what activities (c.q. behavior) are being assessed. The legal norms primarily adopt *quantitative requirements* in their formulation, for instance in terms of specifying emission ceilings and timeframes for compliance. As for the question whether the Decree Bems focuses on the means or on the goals, the findings are split in two. Especially the emission limits are formulated in maximum allowed concentrations (goals) that may not be exceeded. In contrast, the legal norms concerning methods for emission measurement, emission calculation, inspection and maintenance are clearly oriented on the means and specify detailed procedures that have to be apprehended by the norm subjects. However, considering the fact that the emission standards provide the exclusive behavioral motives why norm subjects should reduce emissions, more emphasis should be put upon these. Therefore the general conclusion is that Decree Bems is predominantly *oriented on the goals*.

## 4.3 Conclusion

Central in this chapter was the first specific research question of this study: *"To what extent is current policy on emissions characterized by rules or principles based regulation?".* The first step in answering this question has been to study emissions policy throughout the years. Since the early eighties of the previous century , the European Economic Community (later the European Union) and the Dutch government have been dedicated to reduce emissions. This resulted in multiple EU-directives to reduce emissions such as the LCP-directive, the NEC-directive and the IE-directive. The Netherlands was one of the most ambitious member states thriving stringent emission standards set in the national Bees WLV act. This resulted in the Dutch specifying in some cases even more stringent emission standards than the European Union required. However, an annotation should be placed to the fact that the current government has indicated to conform, and not to surpass, the emission requirements specified by the European Union.

The second step was to identify the relevant legislative acts and characterize them as rules based or principles based regulation. Three different Decrees (AMvB's) were identified that apply to combustion plants: the Decree Waste Incineration (Bva), the Decree Emission Standards for Combustion Plants A (Bees A), and the Decree Emission Standards Medium-sized Combustion Plants (Bems). Subsequently, the Decrees and affixed ministerial regulations were analyzed based on three variables (1) generality of formulation, (2) quantitative or qualitative requirements and (3) mean or goal oriented. Table 4.3 displays the values of the Decrees on the three variables that comprise the content of regulation. All Decrees predominantly contain legal norms with multiple norm conditions.

Next to that, the norm objects are formulated very specifically, stating what behavior or activity will be assessed for compliance. The legal norms in the Decrees mainly specify quantitative requirements (i.e. emission limits, timeframes). Because this study addresses regulation that aims to reduce emissions of combustion plants more emphasis should be placed on the legal norms that specify emission standards. Therefore these parts of the Decrees are more important for determining the values on the variables. This certainly applies for the third variable: oriented on the means or on the goals. Whereas the emission standards are formulated as goals, other requirements (i.e. measurement, calculation, inspection) – especially those in the ministerial regulation – involve detailed procedures that have to be performed by norm subjects to comply. Consequently, the general conclusion is that the emission standards in the Decrees are oriented on the goals. Based on the values of the three variables it can be concluded that the Decrees that regulate emission standards for combustion plants can be characterized as predominantly rules based regulation.

**Table 4.3 The content variables for the decrees Bva, Beems A and Bems.**

| **Decrees** / **Content Variables** | Decree Waste Incineration (Bva) | Decree Emission Standards for Combustion Plants A (Beems A) | Decree Emission Standards Medium-sized Combustion Plants (Bems) |
|---|---|---|---|
| Generality of formulation | Specific formulation of legal norms | Specific formulation of legal norms | Specific formulation of legal norms |
| Quantitative or qualitative requirements | Quantitative requirements | Quantitative requirements | Quantitative requirements |
| Mean or goal oriented | Goal oriented | Goal oriented | Goal oriented |

# Chapter 5. Emission reduction and innovation under the current regulatory policy.

In the previous chapter the focus was on the form – or content – of emissions regulation for combustion plants. This was primarily a more technical analysis of current regulation. The analysis concluded that emissions regulation for combustion plants is predominantly characterized by rules based regulation. In this chapter the effects of this regulatory style in terms of emission reduction and innovation are reported. This assessment has been based on the interviews with relevant actors/experts in the domain of emissions regulation for combustion plants, and the study of relevant documentation. The research question that will be answered in this chapter is: "*What is the rate of innovation that contributes to emission reduction and what problems and opportunities do entrepreneurs encounter in the current regulatory system when considering the introduction of innovations to reduce emissions?*". Two sets of variables identified in the theoretical framework (see figure 3.2) are relevant in this assessment. The first paragraph addresses four criteria for emission reduction, and the second paragraph turns to the conditions that foster or restrict innovation.

## 5.1 Criteria for emission reduction

In the theoretical framework presented in chapter two, the potential advantages of principles based regulation were discussed. In total four different categories were identified: effectiveness, durability, comprehensibility and substantive compliance. These advantages are considered criteria in this study that need to be assessed in order to determine the effect of current regulatory policy on emission reduction and innovation.

### Effectiveness

Effectiveness means the extent to which goals are reached. It is about the ability of a legal norm – in this case the specified Decrees Bva, Bees A and Bems – to arrive at an outcome that the regulator wants to realize with regulation. Two aspects of effectiveness will be discussed in this section. First of all, the effectiveness of the Decrees in reference to the National Emission Ceilings (NEC), and secondly, the effectiveness in terms of compliance of norm subjects with the Decrees.

In general, there are three basic underlying assumptions that are pursued by the government in emissions regulation. The first assumption is that the best available technologies are to be implemented in combustion plants to realize emission reduction. Secondly, the air quality of a region is monitored by measuring emission concentrations. Thirdly, the Netherlands have received absolute emission concentration values from the European Union. These emission concentration values are

specified in the National Emission Ceilings and include multiple goals for different harmful substances ($NO_x$, $NH_3$, $SO_2$, VOS) that have to be reached by the Netherlands in 2010. It is expected that the European Union will announce the emissions ceilings for 2020 in the near future. The Dutch government will have to ensure that these emission ceilings are not exceeded. This is done by determining in which sector (transport, industry etc.) emission reductions can be achieved in the most cost-effective way. As such, the Decrees, Bva, Bees A and Bems have to achieve the necessary emission reduction for combustion plants.

It then becomes relevant whether or not the current policy for combustion plants is effective in terms of emission reduction. The Environmental Assessment Agency (In Dutch: Planbureau voor de Leefomgeving (in short: PBL)) publishes reports on a regular basis about emissions, including the emissions from combustion plants. In the 2009 PBL progress report, the PBL stated that the emissions of harmful substances ($NO_x$, $PM_{10}$, $SO_2$) are decreasing with 5% to 35% over the period between 2007 and 2010 (PBL 2009). This significant reduction in emissions is primarily caused by the economic recession that started in 2009. The economic recession resulted in smaller productions because the overall demand for products decreased. The recession affected the industry as a whole but especially the export related industries such as chemistry. Consequently, the economic recession made compliance to governmental regulations and the National Emission Ceilings more feasible, because the lower production accounts for fewer emissions. Nevertheless, the PBL also concludes in this report that medium and long term emission goals will not be reached considering the current policies to reduce emissions. Additional adjustments in regulation will have to be put in place in order to ensure that future goals for emissions will be achieved. The PBL expects that $NO_x$-emissions[15] and $SO_2$-emissions[16] from the industry and energy sector will increase between 2010 and 2020 due to economic recovery – that is, an increased demand for products. The 2020 emission ceilings – which are unknown at the time this thesis is written, but the tendency is that emission standards become more stringent – for the Netherlands might thereby be jeopardized. One expert states that – in accordance with the Gothenburg Protocol – the expectation is that the $SO_2$-ceiling for the Netherlands will be very ambitious. The current emission ceiling for $SO_2$ is at 50 kilotons and that for $NO_x$ is at 260 kilotons. It is expected that the 2020 emission ceilings will be somewhere around 32 kilotons for $SO_2$ and 168 kilotons for $NO_x$. The Dutch government will therefore have to determine in which sectors additional emission reductions can be achieved in order to comply with the 2020 emission ceilings. According to a governmental official that was consulted for this study there is still

[15] http://themasites.pbl.nl/balansvandeleefomgeving/klimaat-lucht-en-energie/lucht/nox-emissie-2010

[16] http://themasites.pbl.nl/balansvandeleefomgeving/klimaat-lucht-en-energie/lucht/so2-emissie-2010

room for additional emission reduction in combustion plants if the National Emission Ceilings for 2020 turn out to be more stringent.

The conclusions of the PBL (2009) are also confirmed by the experts that have been consulted for this study. The experts acknowledge that the Decrees Bva, Bees A and Bems are effective in reducing emissions of combustion plants. There are few norm subjects that are unable to comply with the requirements set in the legal norms of the Decrees. This is also due to the fact that the government does not set requirements that are impossible to comply with. The process leading to adoption of emission standards in the Decrees is characterized by interaction with branch organizations about what is technically feasible and economically feasible. However the experts emphasize that the government will have to anticipate on more stringent National Emission Ceilings for 2020. It is possible that emission standards for combustion plants will have to be adjusted in order to contribute to the necessary emission reduction resulting in compliance with the National Emission Ceilings. In the current regulatory system this most likely involves setting lower – more stringent – concentration values for emissions. The legal norms in the Decrees Bva, Bees A and Bems are characterized by a great amount of detail and specification, and are said to be "boarded up" by emission specialists leaving little room for creative compliance to regulation. These specialists have taken multiple situations into account and made it practically impossible for norm subjects to behave opportunistically. Even if there are situations that might not be addressed by the Decrees, the government has the Dutch Emission Directive (In Dutch: Nederlandse emissierichtlijn (NeR)) to fall back on. The NeR provides general agreements about emission concentrations and exemptions for specific activities or sectors.

According to four experts that have been consulted for this study, the major problem in emissions regulation for combustion plants is the lack of an integral vision. This can be made clear by pointing to the three underlying assumptions that have been identified in the beginning of this section. First of all, the observation of emission concentration values and preservation of air quality in different regions is especially problematic in regions (i.e. Rotterdam Rijnmond) with a dense industry. Simply, applying the best available technologies in combustion plants will in some cases fail emissions to remain at an acceptable level. Despite the fact that the best available technologies are applied, additional activities will not be allowed in a region. Secondly, the rules in the Decrees are extremely rigid meaning that it is not possible to deviate from them. For example, in practice there are large firms that exploit about twenty combustion plants. Situations have occurred that from the twenty combustion plants only the smallest and oldest plant did not suffice to the requirements set in Bees A. The Decree Bees A then required the firm to invest in an expensive new combustion plant or to

revise the older plant so that it complies with Bees A. This investment might have mounted up to millions of Euros while the smallest plant only accounts for 1-2% percent of the total emissions of a firm. It would have been more cost-effective if the authorities would have lowered the entire allowed emissions ceiling of a firm. By pooling the total amount of emissions of the twenty combustion plants the emissions per combustion plant would have remained below acceptable levels. Thirdly, the Decrees Bva, Bees A and Bems do not have a direct connection to the National Emission Ceilings. As a result, there is a discussion at the moment between the department of Infrastructure and the Environment and norm subjects about Bees A being too stringent in reference to these emission ceilings. Taking these underlying assumptions together it can be concluded that there is a lack of congruency in emissions regulation for combustion plants. There is a discrepancy between the intended outcome the regulator wants to achieve and the actual outcome that the regulator does achieve.

#### Durable

Legal norms are considered to be durable when adjustments to the norm are very incremental and occur sporadic. In chapter 2.1.3 it was concluded that from a theoretical point of view, rules are less durable than principles. In order to determine whether this is true in emissions regulation for combustion plants – more specifically for the Decrees Bva, Bees A and Bems – it is necessary to assess the frequency and substance of adjustments[17]. For every Decree both the frequency and substance of adjustments will be assessed after which a more general argument about durability of current emissions regulation for combustion plants will be put forward.

The Decree Bva dates from April 2004 and has been modified five times since. The first modification was made in 2007 because a change in EU regulation required an adjustment in the Bva. In 2008 the Bva included more stringent emission standards for IPPC installations. In 2010 and 2011 there were technical changes to the Bva addressing references to expired legislative provisions. More recently another change has been made in 2011 addressing the requirements for accreditation and market surveillance. This also included a number of changes to emission standards.

The Decree Bees A has been established in April 1987 under the Dutch WLV act. It was the first national decree targeting emissions for large combustion plants. Hitherto, Bees A has been adjusted

[17] The Dutch government keeps track of all changes in legislation on the Internet website wetten.overheid.nl. “Besluit verbranden afvalstoffen”; “Besluit emissie-eisen stookinstallaties A”; “Besluit emissie-eisen middelgrote stookinstallaties”.

twenty-five times with both small revisions and larger revisions. For the most part it are smaller revisions addressing implementations of EU-related requirements and updates of technicalities. Larger adjustments (i.e. 1998, 2000, 2009) have also taken place throughout the years, modifying the substance (i.e. stringency) of emission standards.

The Decree Bems is a relatively new decree established in 2009 and replaces the old Decree Bees B. The Bems itself has only been adjusted with minor changes. For instance, with the implementation of the new law Wet Algemene Bepalingen Omgevingsrecht (WABO) some changes had to be made to Bems and the other Decrees. More interesting is the change from Bees B to Bems. In the explanatory memorandum of Bems it acknowledged that Bems has been established to simplify and update the rules for medium sized combustion plants. The Decree Bems sets new rules on emissions of $NO_x$, $SO_2$ and $PM_{10}$ for medium sized combustion plants.

A governmental expert acknowledges that major changes in the emission standards of these Decrees are rare and do not occur every few years. Especially because major changes in emissions regulation (more specifically: in emission standards) involve far greater stakes that are at risk. For example, a major change in the stringency of emission standards might mean that norm subjects will have to invest a significant amount of money in emission abatement techniques. This will lead to much more resistance of norm subjects. If the government decides that emission standards do need to change, an entire process follows in which norm subjects interact with the department of Infrastructure and the Environment. Even if consensus is reached and an agreement is made MPs will ask questions in parliament about the proposals. This process is very time-consuming and makes changes to the Decrees very difficult in practice. This is also why durability of legislation is considered to be positive. On another note, it should be acknowledged that the National Emission Ceilings are set for a number of years. As such, the Dutch government can anticipate and take measures that can hold for multiple years. For instance, it is expected that the European Union will present the National Emission Ceilings of 2020 in the coming year(s). Subsequently, the government can anticipate the consequences and take measures that remain applicable until the next National Emission Ceiling.

If the department decides that the emission standards of the Decrees do have to change, this is usually done based on two considerations. First of all, technological changes lead to new practices and applications of emission abatement techniques. By making the emission standards more stringent, norm subjects will be forced to use similar emission abatement techniques that have the same effect. Due consideration is taken by assessing the economic feasibility for the norm subject. Secondly – and more importantly, adjustments to the National Emission Ceilings will make the government search for opportunities in domains where emissions can be reduced further. If the

government perceives that there is an opportunity to reduce emissions in the domain of combustion plants the Decrees Bva, Bees A and Bems are adjusted. Technological improvements might create or enhance these opportunities. Emission standards will then become more stringent by specifying lower emission concentration values that combustion plants may emit.

### Comprehensible

Comprehensibility is the third criteria that has been identified in the theoretical framework. In assessing this variable two questions were of great importance for determining the value. First of all, how much discretionary room do norm subjects have to organize requirements of the Decrees in their own internal system of management and control? The second question investigates the capability of norm subjects to oversee the Decrees and act accordingly.

The emission standards for harmful substances that are specified in the Decrees Bva, Bees A and Bems are maximum allowed concentration values. As was already concluded in chapter four the emission standards can therefore be characterized as quantitative specified goals. Norm subjects will simply have to conduct their business and operate without exceeding the maximum allowed emission concentration values. How norm subjects exactly approach this is – in theory – entirely up to themselves. In practice however, it seems that there is relatively less discretionary room for norm subjects to comply with emission concentration values. To a certain extent the emission standards are also considered by experts to be concealed prescriptive regulations. Emission standards in the Decrees Bva, Bees A and Bems are valid for every singular combustion plant, and address specific parts of the combustion process. The discretionary room in practice is then limited, because norm subjects can only choose from a selection of approaches (i.e. techniques, technologies) that really comply with all the (specific) requirements set out in the Decrees. The emission standards are based on state-of-the-art technologies and include specifications of emissions that these specific technologies are able to realize. Most approaches (i.e. techniques, technologies) that do comply with the emission standards are not unworldly. These have already been discussed in interactive processes that lead up to the adoption of NEN-norms. Nonetheless, it remains possible for a norm subject to develop their own approach that meets the requirements of the Decrees.

If we then move on to the second question – the ability of a norm subject to oversee the Decrees – a clear segregation can be made between norm subjects. On the one hand, there are large firms subject to Bees A and Bva exploiting multiple combustion plants with a relatively high aggregate thermal capacity (i.e. DSM, Shell, AkzoNobel). On the other hand, there are small firms subject to Bems and Bva exploiting a singular combustion plant with a relatively low thermal capacity (i.e. horticultural business). Large firms are much better capable to oversee the requirements set in the

Decrees than smaller firms. Large firms have entire research and development departments and regulatory affairs departments that interpret governmental policies and translate these to more concrete practices. Large firms therefore participate more intensively in branch organizations than smaller firms. Smaller firms lack knowledge, expertise and other relevant resources to effectively interact with other firms. Because large firms have multiple combustion plants they will have greater stakes that are at risk, and will therefore organize themselves more quickly than a smaller firm. It should be noted that the complexity of emission standards in a permit also increases with the size of a combustion plant.

Furthermore, the core business of a firm is also important for the ability to oversee regulation. A horticultural business that has a relatively small combustion plant will most likely not be occupied with juridical features of aspects that are of minor importance to the core business of a firm. These firms are more focused on the present instead of the future. This is entirely different in large firms (i.e. AkzoNobel) where the core business revolves more frequently around the combustion plant and the process of combustion itself. Moreover, it should be noted that the relation between government and norm subject is not that simple. The consulted experts acknowledge that the technology suppliers (i.e. Siemens, Bosch, Hitachi) are also relevant actors, and provide the norm subjects with the relevant technology. Especially the smaller firms that exploit combustion plants will outsource most aspects related to combustion plants to their supplier. Next to that, firms can also rely on their branch organizations that communicate requirements to their members.

#### Substantive compliance

The last criteria for emission reduction that was identified is substantive compliance of norm subjects with regulation. Substantive compliance means that besides the fact that norm subjects receive exclusive behavioral motives from regulation (i.e. the Decrees Bva, Bees A and Bems), norm subjects also perceive regulation as necessary in order to remedy certain problems. For the case on emissions regulation for combustion plants, it results in the question whether norm subjects perceive the Decrees Bva, Bees A and Bems as a burden imposed by the regulator or the opposite. Subsequently, the relation between the government and norm subjects is relevant to assess because it provides a more thorough indicator for the attitude of norm subjects and affixed substantive compliance.

Seven experts that have been consulted for this study agreed upon the assumption that norm subjects perceive governmental obligations in general and the Decrees Bva, Bees A and Bems in specific as a burden imposed by the regulator. The Decrees result in multiple restrictions for norm subjects, something that it negatively experienced by norm subjects because their discretionary

power is limited. According to a consulted official at the department of Infrastructure and the Environment it is especially emissions regulation of all domains in environmental policy that is not well understood by norm subjects. Norm subjects succeed to comprehend that penetrating stench and other forms of noticeable inconveniences are undesired and need to be tackled. Emissions however are invisible for sensory perceptions which make them more diffuse. Next to that, the amount of detail in emissions regulation can also lead to a lack of understanding by the norm subject. An example of that has been made clear under the section effectiveness. Norm subjects do not comprehend the fact that the Decrees can result in very cost-ineffective measures to reduce emissions. If a firm has one main state-of-the-art combustion plant and one older backup combustion plant – that does not entirely meet all legislative requirements – with hardly any operational time, the Decrees result in forcing the norm subject to invest in a contraption that has hardly any operational time. Norm subjects would much rather have preferred that the emissions of both combustion plants would be pooled.

In accordance with Leveque (1996), five experts that have been consulted perceive the interaction between the government and norm subjects as a dynamic game in which strategic positions are occupied. When for instance changes are made to the Decrees norm subjects interact and negotiate with the government about the substance of the new regulatory provisions and the instruments that are used. It is in the best interest of the norm subjects to minimize the stringency of these new emission standards and to avoid costs involved in making adjustments in their organizations in order to comply with new standards. An often forwarded argument in these discussions is the level playing field vis-à-vis other European competitors. If the Dutch government maintains more stringent emission standards and more stringent enforcement than other member states in the European Union – which is the case, norm subjects will have a competitive disadvantage. As such, norm subjects are trying to prevent this from happening by influencing the policy making process and – if necessary – the political decision making. Norm subjects pursue a harmonized system of regulatory requirements for emissions that is comparable to emissions standards in other countries.

It is also possible that norm subjects themselves are attempting to obtain a competitive advantage. Norm subjects can negotiate with the designated authority (i.e. a province or a municipality) about certain emission standards that are included in the permit of a combustion plant. In certain situations the authorities can differ from Bva, Bees A and Bems, and set less stringent emission standards (see chapter 4.2). If there is an opportunity to negotiate for less stringent emission standards norm subjects will try to exploit this. Nonetheless, most experts do acknowledge that the main attitude of norm subjects is cooperative. Norm subjects are trying to be constructive towards

policy proposals by putting forward the consequences it will have for firms that exploit a combustion plant. They can merely be seen as a stakeholder protecting its interests.

## 5.2 The conditions that foster or restrict innovation

In the previous paragraph, problems and opportunities of the current regulatory system were assessed and the values on the variables of the criteria for emissions reduction were determined. In this paragraph, the focus is on innovation in the current regulatory system. By examining the conditions that foster or restrict innovation it should become clear what the rate of innovation is that contributes to emission reduction. In total four conditions have been identified in chapter 2.2.2: knowledge, market structure, regulations and standards, and demand/diffusion processes.

### Knowledge

The first condition that was distinguished in the theoretical framework is knowledge. If knowledge is present in the organizations of norm subjects and/or knowledge is present in the government, policy has a greater chance of being more successful in terms of innovation and emission reduction provided that this knowledge is used. Multiple aspects are relevant to examine for the variable knowledge. Firstly, it should be determined whether or not there is an information-asymmetry between the government and norm subjects. Secondly, is the available knowledge exerted in regulating emissions from combustion plants? Thirdly, what are the costs involved in developing emissions regulation for combustion plants.

Four different parties should be identified in order to highlight the informational asymmetry in emissions regulation for combustion plants. The government can be divided into two parties: policy makers and local authorities. Next to norm subjects, the suppliers of technology (i.e. Siemens, Bosch, Hitachi etc.) also have an important role. According to all consulted experts there is an informational asymmetry between these four parties. The policy makers at the department of Infrastructure and the Environment develop policies such as the Decrees Bva, Bees A and Bems in an interactive process with branch organizations and with due consideration of the current state of technology. Nonetheless, the policy makers are more generic and lack specific knowledge on emissions and organizational aspects of norm subjects. There is a division within the department that is predominantly occupied with emissions regulation, but this division is – according to one consulted expert – relatively small compared to the knowledge of other parties. In developing policy, policy makers contact technology suppliers concerning technical possibilities and new innovations that have occurred recently. For example, developments that are made in gas turbines are public and can be monitored by policy makers. By contacting technology suppliers, policy makers retrieve most information about what is possible in terms of emission reduction. Technology suppliers in turn

attempt to ensure that their latest products receive a market by persuading policy makers to raise specifications of products to emission standards.

As for the local authorities, it can be concluded that there is a clear segregation between institutions in terms of knowledge. Local authorities can be municipalities, provinces or monitoring agencies. Smaller municipalities are often incapable of entering into a dialogue with a firm that exploits combustion plants, because they lack knowledge. Larger municipalities and provinces are better able to do this but currently there is a tendency to aggregate jurisdiction and authority to monitoring agencies such as DCMR Milieudienst Rijnmond. These organizations employ highly qualified experts in the domain of industrial emissions and are therefore able to engage into a dialogue with norm subjects. Knowledge in the organizations of norm subjects is also scattered. In accordance to the section comprehensibility in the previous paragraph, it are the medium and large firms that employ professionals and experts. The smaller firms (i.e. a horticultural firm) do not have knowledge about emissions and how to reduce them. These norm subjects typically rely on technology suppliers and branch organizations.

Since the information-asymmetry between the four parties has been highlighted, it is now possible to determine whether the available knowledge is exerted in regulating emissions from combustion plants. As was discussed in the previous paragraph under the section comprehensible, it was concluded that the emission standards in the Decrees are formulated as maximum allowed emission concentration values (milligrams per cubic gas) that may not be exceeded. In theory, norm subjects are free to adopt any technology or conduct any behavior as long as these emission values are not exceeded. In that sense norm subjects can exert their knowledge and develop an approach that is most cost-effective for their own organization. However, in practice it seems that this freedom is restricted because the emissions standards are attuned to technological specifications of approved technologies. For instance, if an emission standard specifies a maximum allowed concentration value of 200 $NO_x$ mg/$m^3$, a de-$NO_x$ burner is the only technology that can comply with this standard.

The government as a whole does exert the knowledge of technology suppliers. In the process leading to the establishment of emission standards, interaction with businesses that create combustion plants leads to a clear vision about the possibilities in technology. This also includes the research activities of technology suppliers and expected enhancements of technology in the future. As for the local authorities, it seems that there is little discretionary room to differ from current emission standards. Because Decrees such as Bva, Bees A and Bems are formal legislative provisions there is no room to take an alternative route, besides the limited possibilities provided in the Decrees themselves. As such, it may lead to situations where cost-ineffective investments must be

made that lead to incomprehension of norm subjects with emissions regulation. This also leads to an infringement of the relationship government and norm subject. In these cases knowledge of local authorities in context dependent situations is not exerted to its maximum potential.

The costs that are involved in developing emissions regulation for combustion plants is relatively limited. Despite the theoretical assumptions that rules based regulation involves more costs of setting the optimal policy, this does not apply in the case of emissions regulation for combustion plants. Experts acknowledged that costs of emissions measurement are resigned to norm subjects. The government requires this information from norm subjects for assessing compliance with regulation but also for developing new emission standards. Next to that, the technology suppliers (i.e. Siemens, Bosch, Hitachi etc.) provide information about technologies and affixed specifications to the government for free. Suppliers of technology attempt to raise emission specifications of their products to standards, and by that force firms with combustion plants to buy new contraptions. Consequently, the government is informed about the exact possibilities in terms of emission reduction of combustion plants. As such, there are few problems with hidden information in terms of technology. In contrast, norm subjects will not provide sensitive company information about their production process. The costs that do incur are those involved in the interactive process where the government discusses new emission standards with relevant parties (i.e. branch organizations).

#### Market structure

The market structure in which organizations function helps to provide an answer for the degree to which organizations are stimulated to innovate. In chapter 2.2.2 it was discussed that competition in a market stimulates norm subjects to keep ahead of their competitors. The indicators that are relevant to assess are the number of organizations present in the market and the restrictions for entering the market.

There are two relevant markets to examine for this case: the market of technology suppliers and the market in which norm subjects that exploit combustion plants function. This distinction must be made, because innovations occur in both markets but have different gradations. The system innovations where combustion plants are significantly transformed and upgraded occur in the market of technology suppliers. The norm subjects that exploit the combustion plants make incremental changes to their installation. Their engineers will maximize the effectiveness of combustion plants by readjusting minor features of the installment.

The market in which technology suppliers are functioning is international. Examples are Siemens, Bosch and Hitachi that produce and sell technology and contraptions for combustion plants across

the world. Dutch technology suppliers for combustion plants have all been outcompeted in the 20th century. The market is now characterized by a number of internationally oriented suppliers that have acquired a lot of knowledge and influence. In that sense innovation power is relatively centralized in the hands of a few large players. Based on these observations the market can be characterized as an oligopoly. Nevertheless, these technology suppliers are competing with each other and innovate by developing new emission abatement techniques for combustion plants. An example of new innovative technology are the ultralow $NO_x$-burners that have been developed for combustion plants. An example of competition between technology suppliers is that of cogeneration technology (in Dutch: warmtekrachtkoppeling) where technology suppliers of gas turbines heavily compete with technology suppliers of gas engines.

As for the market of norm subjects, there are a lot of organizations that exploit combustion plants. These organizations can be large (i.e. AkzoNobel) or small (i.e. horticultural firm), and are active in different sectors that are open to competition(i.e. energy, chemistry etc.). Both the market for norm subjects and the market for technology suppliers are characterized by relatively little transparency. Norm subjects will – for instance – not communicate production processes and technology suppliers will not publish about technical features of their technology. This is considered sensitive information from which organizations gain a competitive advantage.

Norm subjects of the Decrees Bva, Bees A and Bems operate in different sectors. In principal there is no restriction for new organizations to enter the market of chemistry or energy. For the market of technology suppliers however, there is a serious barrier for new organization to accede the market. To enter the market of technology suppliers one needs a substantive amount of knowledge and expertise to maintain in such an advanced technology industry. The fact that there are a relatively small number of internationally oriented large concerns that develop technology already indicates that it is hardly impossible to enter the market. Most smaller technology suppliers have left the market, because the competition was too strong. Also, the fact that most technology suppliers have established a reputation of being a trustworthy partner makes entering the market difficult. The fact that the goal is to create even more advanced technologies makes this barrier a fortiori more serious.

#### Regulations and standards

The values on the four conditions of innovation are connected to the apprehended regulatory style. Because regulations and standards also directly influence innovation the theoretical framework distinguished regulations and standards as a separate condition. A number of factors have been identified in paragraph 2.2.2 that are relevant for determining the effect of regulations and

standards on innovation. These are the stringency of emission standards, the time that is given for compliance, and the amount of behavior that is either prohibited or prescribed.

The first two factors concern the level of ambition of current emissions regulation for combustion plants. Do the emission standards require norm subjects and technology suppliers to innovate – or rather, are the emission standards technology forcing? Six experts that have been consulted for this study are convinced that the emission standards specified in the Decrees are not technology forcing at all. The most important argument that is used is that norm subjects are per definition able to comply with emission standards specified in the Decrees. The emission standards are not impossible for norm subjects to meet. The technologies that can fulfill the requirements in the Decrees Bva, Bees A and Bems are already available for adoption in the organization of norm subjects. Consequently, there is no need to innovate and develop new technologies that are needed in order to comply with emission standards. Moreover, there are still technological opportunities that can realize further emission reduction. The fundaments of these technologies are currently known, however the process of development and introduction is still far from being complete. The problem is to organize emissions regulation for combustion plants in such a way that norm subjects and technology suppliers are triggered to go beyond present applications. It should however be duly noted that without (current) emissions regulation there would be no innovation. Firms would then not be subject to emission requirements and the market for technology suppliers (and emission abatement techniques) would not exist.

Another argument that is supplied by an expert from the PBL is that the present ambition level has decreased compared to the ambition level of the Netherlands in the last two decades of the 20$^{th}$ century. The Netherlands went from being the leading nation in terms of emission reduction in combustion plants, to a nation that wants to conform to other member states of the European Union. This also becomes evident from the intention of the current government to remove Dutch emission standards for large combustion plants (Decree Bees A) that go beyond European requirements. Ambitious initiatives to reduce emissions are therefore left to be taken by individual norm subjects. The problem in this is that there is a lack of codification, meaning that the same rules and standards should be valid for all norm subjects. Otherwise the chance for free riding behavior is significant, which implies that the norm subjects that do have ambition get a competitive disadvantage compared to those norm subjects that do not have ambition.

In some sectors emission standards are considered by norm subjects to be too stringent and ambitious. With the implementation of the Decree Bems in 2009, more stringent $NO_x$ requirements were set for combustion plants that combust wood. According to the norm subjects the emission

standards were too stringent, because it was not possible anymore to combust wood that contains remnants of glue (i.e. chipboard). Glue has a high concentration of nitrogen oxide implying that it is not possible for norm subjects to combust these kinds of wood and still comply with the $NO_x$ requirements set in the Decree Bems. The investments of filter installations that filter $NO_x$ were unfeasible from an economic perspective. It was too expensive to do such an expensive investment in medium sized combustion plants. From that perspective, these norm subjects perceived the emission standards of the Decree Bems to be far too stringent.

The relationship between emission standards and innovation is a complex one. On the one hand, innovation results in more stringent emission standards. New technologies that emit less harmful substances enable the government to set more stringent emission standards, because the technology that can reduce these emissions is available. All norm subjects are then forced to adopt this technology or a similar kind of technology in their organization. Once an alternative is clear and readily available, requirements become more stringent. For example, desulphurization and chlorofluorocarbon (CFC) requirements became more stringent after new filter technologies were available. Another example is that of measuring instruments of particulate matter (PM). Emission requirements for PM became much more stringent after instruments became available that were much more precise in measuring small amounts of PM in emissions.

On the other hand, emission standards also result in innovation. An example of that were the stringent dioxin standards that resulted in new emission abatement techniques, because no technology existed yet that could make norm subjects comply with these requirements. Next to that, technology suppliers keep innovating to ensure continuity of their organization and to keep a competitive position by anticipating on future more stringent regulation. However, specifying ambitious emission standards that requires technological innovation also results in much resistance from norm subjects. If it is unclear whether emission standards can be met, norm subjects will deter the stringent requirements.

In chapter four, it was concluded that the Decrees Bva, Bees A and Bems are oriented on the goals. This implies that norm subjects are entirely free to develop an approach as to comply with the requirements in regulation. However, in the section comprehensible (chapter 5.1) it was discussed that this freedom in compliance is limited in practice. The amount of detail that is used in formulating goals implies that to a certain extent the Decrees can be characterized as prescribing certain technologies and/or techniques. Few technologies are able to fulfill all the specific requirements. For example, the Decrees include very specific requirements for $NO_x$ emissions implying that a norm subject is forced to use a de-$NO_x$ burner. Consequently, there are multiple

restrictions that limit the discretionary room of norm subjects. Emissions regulation for combustion plants is therefore rigid, because it prevents norm subjects to exert new opportunities and to find better practices to reduce emissions.

#### Demand/diffusion processes

The last condition for innovation that was discussed in the theoretical framework is demand/diffusion processes. A market pull or demand for innovation and change by norm subjects is imperative in order to enhance emission reduction of combustion plants. Norm subjects should acknowledge the importance of emission reduction and take action in terms of investments. In that sense, this condition is connected to substantive compliance of norm subjects.

According to the experts, norm subjects are aware of the context in which emissions regulation is formulated. It is acknowledged that regulation is needed in order to reduce emissions. However, norm subjects do not approve the consequences of current emissions regulation for combustion plants. First of all, as was already stated in this chapter, emission standards in the Decrees can result in cost-ineffective investments. Secondly, norm subjects perceive that the emission standards disrupt the level playing field of the European market. Thirdly, emissions of $NO_x$ and $SO_2$ have been significantly reduced in the past thirty to forty years. The major advancements in emissions reduction have been realized. The question that becomes relevant is whether emissions can and should be reduced any further. Important in this is that the marginal costs for reducing every extra emission increases. This implies that the risk of investments also increases whereas the return on investment decreases (see figure 2.2). Norm subjects therefore perceive that their relatively large investment yields relatively little emission reduction.

Two different contrasting arguments are supplied by experts considering whether or not norm subjects are prepared to demand emission reduction by setting higher standards than those specified in the Decrees. One argument is that norm subjects have no benefit of setting higher standards. Air quality is a public good that cannot be provided by the market. It is impossible to exclude people from using public goods, and usage of these public goods does not reduce the total available amount of a public good (Hajer 2011). As such, norm subjects will not set more ambitious norms, because their investments cannot be recouped. Regulation is therefore necessary to ensure that emissions are reduced and air quality is preserved.

A contrasting argument is made by five other experts from among other norm subjects and the department of Infrastructure and the Environment. There are norm subjects that do try to actively reduce emissions. Essent for instance, has the largest biomass combustion plant in Europe that emits

significantly less than the emission standards in the Decree Bees A. Another example is DSM that shifted a part from its activities from petro chemistry to bio chemistry. These higher ambitions can be the result of strategic choices of norm subjects. Continuity of a company is ensured by anticipating that coal combustion will be substituted for sustainable fuels. Next to that, a number of experts have also commented that norm subjects innovate and reduce emissions in light of their corporate social responsibility. The general public, and local residents in particular, prefer environmental friendly combustion and products which may also imply a competitive advantage for the companies that are responsive to these preferences.

Norm subjects and to a larger extent technology suppliers do anticipate on future more stringent regulation as long as there is certainty that certain advancement are made. For instance, technology suppliers anticipate that the 2020 national emission ceilings will become more stringent which requires technology with less emissions. Norm subjects such as DSM anticipate that the future lies in bio fuels, not in fossil fuels. However a few experts do emphasize that this anticipation is not on the long term (i.e. 30 years) but is limited to the short and medium term (i.e. 5-10 years). Another example of anticipation is that the department of Infrastructure and the Environment choose to exclude an emission standard in the Decree Bems at the time it was being established. The emission standard was considered to be unfeasible and a lot of discussion took place with norm subjects. Therefore an annotation was included in the explanatory memorandum of the Decree Bems stating that this emission standard was the next step for future regulation. Suppliers were therefore enabled to anticipate on this future regulatory provision and take adequate steps. Nevertheless, it should be duly noted that these technology suppliers function in an international market and the Netherlands is only a small part of that market. As such, the department of Infrastructure and the Environment is trying to find support for emission standards in other countries to put more pressure on the internationally oriented technology suppliers.

According to figure 2.2 in the theoretical framework, the amount of risk is important for the decision to invest. Uncertainty of what the government expects from norm subjects therefore has an adverse effect on the decision to invest in a combustion plant. Some examples have been made during the interviews that imply that there is uncertainty among norm subjects. For instance, the discrepancy between the underlying assumptions (see effectiveness) implies that despite the best available technologies are applied in combustion plants, it is still possible that emission concentrations in a particular region are exceeded. Another example is that the Dutch government has set additional, more stringent emission requirements on top of European emission requirements. Investments are then made by norm subjects to comply with these emissions requirements. Currently, the

government has taken the position of removing most additional national requirements and to harmonize and conform to EU regulation (TK 2010/2011). A last example of uncertainty lies in the execution of emissions regulation. Application processes for permits can take up to two years after which an entire juridical process follows. Experts state that uncertainty leads to cautious behavior in terms of investment. If an investment is made, norm subjects want to be assured of a certain return on investment.

Norm subjects are attempting to influence and are influencing emissions regulation for combustion plants via multiple ways. First of all, norm subjects are organized in branch organizations and employers organizations. These organizations discuss the technical and economic feasibility of recent developments with the department of Infrastructure and the Environment. Next to that, the Steering Committee Air, consisting of norm subjects from different sectors, reacts on new policy proposals of the department of Infrastructure and the Environment (VNO-NCW 2011). In this committee, every sector may react on the proposals by highlighting the consequences of the plans. Another path that is often taken is influencing politics by lobbying. For instance, norm subjects notify the secretary of state by letter or attempt to influence MPs to ask questions in parliament. Also the media is used to influence politics and opinions. The main emphasis is on ensuring that no peculiar decisions are made that have negative effects on the operational management of the organization of norm subjects.

## 5.3 Conclusion

In this chapter two sets of variables have been assessed. Four criteria for emission reduction and four conditions that foster or restrict innovation have been examined for the case emissions regulation for combustion plants. These variables together have provided an answer to the second research question of this study: "*What is the rate of innovation that contributes to emission reduction and what problems and opportunities do entrepreneurs encounter in the current regulatory system when considering the introduction of innovations to reduce emissions?*". Especially the interviews with actors/experts of emissions regulation have provided very relevant information.

The Decrees Bva, Bees A and Bems are *effective* in terms of achieving compliance of norm subjects with the emission standards. Next to that, emissions of harmful substances remain below the National Emission Ceilings of 2010. This is explained by the economic recession that reduced demand for products. The expectation is that the emissions will increase once the economy recovers. That combined with more stringent National Emission Ceilings for 2020 will require additional measures to be taken by the government. According to the consulted experts there is a more fundamental problem in emissions regulation. There is a lack of congruency between the

different underlying assumptions that are pursued by the government. An integral vision needs to be developed which connects the outcome the regulator wants to reach with the instruments that are exerted.

The Decrees Bva, Bees A and Bems have been modified multiple times, some larger changes but most insignificant. Strictly speaking, that means that the Decrees are relatively *durable*, because few modifications are made that do have significant consequences for emission standards. However, it should be taken into account that with larger changes to emission standards higher values are at stake, and the norm subjects will interfere and interact. This interactive process that leads to new, more stringent emission standards is very time consuming, making it practically not feasible to change emission standards every few years.

Despite the fact that the emission standards in the Decrees are output specified goals, the amount of detail in the legal norms limits the discretionary room of norm subjects. Some experts argue that the emission standards sometimes even prescribe technology. The Decrees are *comprehensible* for norm subjects that have larger organizations with a regulatory affairs divisions. For norm subjects with smaller companies and a non-related core business emissions regulation is less comprehensible. Fortunately, these norm subjects can fall back on their technology supplier and branch organization.

According to seven experts emissions regulation is considered by norm subjects as a burden. It implies restrictions and costs of making expensive investments to solve a problem that is more diffuse than other environmental nuisance (i.e. stench). Combined with the fact that the Decrees are specific and rigid, this can lead to very cost-ineffective situations that are not well understood. Norm subjects therefore influence policy proposals and politics in order to safeguard their interests. Consequently, there is limited s*ubstantive compliance* of norm subjects with emission regulation.

There is an information-asymmetry between policy makers that have developed the Decrees and the designated authority, norm subjects and technology suppliers. Policy makers contact technology suppliers concerning technical developments, and norm subjects for economic feasibility. Policy makers therefore have relatively little *knowledge* compared to the other actors in the arena. The result is that the Decrees are very rigid and to a certain extent limit the discretionary room. This implies that there is less room to diverge from the Decrees and exploit knowledge of other actors and make more effective decisions in specific situations.

Norm subjects of the Decrees Bva, Bees A and Bems function in different competitive markets (i.e. energy, industry etc.). More importantly is to characterize the *market structure* of technology

suppliers, because this is where the large system innovations occur. This market is internationally oriented, and only a few technology suppliers are active. Knowledge of technology and innovation power is therefore centralized to a few large concerns. These suppliers are well able to fulfill demand and develop new technologies. The advanced technology that is developed also implies that there is technological barrier of entering the market.

The *regulations and standards* of emissions regulation are not considered to be ambitious. Compliance with requirements can take place without innovating and developing technology. It is thus not technology forcing which has a negative effect on innovation. Moreover, the fact that the Decrees are very specific means that the discretionary room is limited resulting in less freedom for norm subjects to comply with regulation.

*Demand for innovation* varies per norm subject. There are norm subjects that do set higher standards then those specified in the Decrees. This can either be from a strategic perspective (for example continuity) or from their corporate social responsibility. Other norm subjects perceive that the risk of investing cannot be recouped because emission reduction is a public good. As such, there are also norm subjects that conform solely to governmental regulation. Demand of innovation is therefore scattered.

# Chapter 6. The feasibility of principles to regulate emissions of combustion plants.

The data analysis started with describing and characterizing current emissions regulation for combustion plants in terms of rules and principles. In the previous chapter four criteria for principles based regulation and four conditions for innovation were examined. Multiple variables have been assessed in order to determine problems and opportunities in innovation and emissions reduction. In this chapter the consecutive step is made by analyzing the feasibility of principles based emissions regulation for combustion plants. At the end of this chapter the last specific research question can be answered: *"To what extent can principles based regulation contribute to more incentives for entrepreneurs to innovate and reduce emissions?"*. This chapter is divided into four paragraphs. Each of these paragraphs addresses a set of variables that have been identified in the theoretical framework (see figure 3.2). The first paragraph addresses the applicability of the risks of principles in emissions regulation. The second paragraph examines the preconditions that need to be sufficiently satisfied. The third paragraph proceeds on the expectations of innovation in principles based emissions regulation for combustion plants. In the last paragraph conclusions are made and the third research question will be answered. It should be noted that there is some redundancy between the sections that are discussed throughout this chapter. This is however necessary in order to systematically discuss all relevant variables identified in the theoretical framework.

## 6.1 Risks of principles based emissions regulation.

In total seven different risks have been identified in the theoretical framework. These risks have been based on theoretical arguments that may be applicable in the case of emissions regulation for combustion plants. If (a number of) these risks are apparent decision makers should take this into account and – if possible – develop methods that minimize these risks.

### 1. The interpretive risk

In the theoretical framework it was discussed that principles based regulation involves an interpretive risk, because principles are formulated in general terms. This leaves more room for interpretation of principles by norm subjects, and implies that the risk of misinterpretation is also higher. Two aspects are relevant: (1) whether or not principles in emissions regulation will be clear and understandable for norm subjects, and (2) the amount of risk norm subjects take in emission abatement investments.

A fundamental problem of principles based regulation that is identified by experts is the pressure on norm subjects. In rules based regulation clear quantitative emission concentrations are specified that have to be reached within a certain amount of time. In the absolute form of principles based regulation[18], principles do not specify the time for compliance, nor do they quantify what emission concentration is acceptable. The problem is then that too many aspects of emission regulation are unknown, and there is no visible line between compliance and non-compliance. From that perspective there are two different arguments from experts that have been consulted.

Two experts of the PBL argue that principles based emissions regulation for combustion plants will not be effective, because emission reduction is of secondary importance of norm subjects. Norm subjects are not focused on environmental aspects but on achieving economic gain. As such, norm subjects are not prepared to take much risk when it comes to investing in emission abatement techniques. If a governmental policy – in this case emission regulation – is unclear this leads to inactive behavior of the norm subject. Norm subjects do not want to invest in emission abatement techniques if it proves out to be unnecessary. Fickle and easy changeable emissions regulation implies that norm subjects may not regain their investment. Next to that, technology suppliers will not be stimulated to develop new technologies, because they have to be assured that their new emission abatement techniques can be sold. Principles are then too vague and do not provide enough certainty that there is a market.

A different line of argumentation made by seven experts is that the absolute form of principles based regulation may be too unsophisticated, but a more nuanced form of principles based regulation can be effective. In accordance to Black, Hopper & Band (2007) these experts perceive that a combination of characteristics of rules based regulation and principles based regulation is more pragmatic. Additional certainty about the interpretation of regulation can then be provided to norm subjects. A principle should then also be able to make certain quantifications and provide more certainty about compliance practices. More solid indicators for compliance will benefit and minimize the interpretive risk of principles based emission regulation. The next paragraph of this chapter will address the different possibilities to enhance interpretation of principles.

### 2. The communicative risk

In the theoretical framework it was concluded that communication in principles based regulation between the regulator and norm subject is very important. The regulator should provide additional

[18] The absolute form of principles based regulation implies that a legal norm is formulated in general, qualitative terms, and is oriented on the goal of regulation.

information to norm subjects with regard to their responsibilities. This communication should be disciplined by clearly elaborating on principles without giving too much certainty to norm subjects by reintroducing detail and prescription via communication. In emissions regulation for combustion plants there are already multiple forms of communication between the regulator and norm subjects. First of all, the department of Infrastructure and the Environment publishes large memorandums that specify the structural vision on the environment, and in particular about emissions. These memorandums are mostly incidental and specify broader, more general long term goals that are going to be pursued by the government. Secondly, the department of Infrastructure and the Environment has regular contact (i.e. briefings about policy proposals) with branch organizations. An example of that is a briefing where the department informs branches how the Decree Bva is aligned with the Industrial Emissions-directive of the European Union. A third form of communication is the Internet website InfoMil[19]. InfoMil is part of the governmental organization AgentschapNL and is the focal point of information for norm subjects and designated authorities about environmental regulation. A helpdesk consisting of experts can help to answer questions, complaints are gathered, and multiple documents (i.e. "Leidraad Bems") are published containing description of regulation. InfoMil can be considered as the connection between policy and implementation. A last form of communication are the European BREF documents that specify the best available techniques per application. There is a BREF for large combustion plants and a BREF for waste incinerators (InfoMil 2011). Bems does not have a BREF, because medium sized combustion plants are regulated on the national level.

Not all of these communication lines are considered to be clear or helpful. For instance, the large memorandums have lost a great deal of their function, because environmental problems are currently often tackled on the European level. Developing a national structural vision has little effect if it is not embraced by other member states. Also given the fact that emissions are a cross-border environmental problem, a common approach (or vision) should be apprehended. Five experts are satisfied with the communication of regular briefings between the regulator and branch organizations. However, it should be taken into account that not all norm subjects will become fully informed of the content of these briefings. Briefings on regional levels will according to an expert of DCMR Rotterdam Rijnmond in that case be more effective in terms of reaching a larger public of norm subjects. A new development that enhances the communication is the plan to aggregate different environmental counters into the counter of the environmental permit (In Dutch: Loket voor de omgevingsvergunning). This counter has been established to facilitate norm subjects to smoothly

[19] More information on InfoMil.nl

deal with all permits via one governmental body instead of separate non-interlined counters. According to two experts from a firm, especially larger firms experience much bureaucracy in dealing with these separate counters.

The communicative risk of principles based regulation can be minimized if regulation is clear and straight forward. An important step in this is the aggregation of multiple separate counters into the counter of the environmental permit. This should provide clear and integral communication to norm subjects in terms of their permit. Next to that, InfoMil serves as a helpdesk where environmental experts can facilitate comprehensible information about the implementation of emission regulation. Especially the communication of the department of Infrastructure and the Environment with branch organization needs revising so that the message on the goals and responsibilities in principles based regulation comes across. Important is to differentiate between norm subjects that have large organizations and those that are relatively small. As was pointed out in the section comprehensible (chapter 5.1), the difference is that larger organizations have more expertise and knowledge which makes comprehension to principles more feasible than in the case of a smaller organization.

### 3. The compliance risk

In the notion of principles based regulation, norm subjects should apprehend their discretionary room to comply to the principles. This implies that new methods may be developed or existing opportunities may be exerted that are much more effective in achieving the outcome expressed in principles. However the compliance risk might arise when the meaning of principles leaves too much room for interpretation (see interpretive risk). Norm subjects might then comply conservatively without taking adequate actions, or they might conform to compliance practices of colleague norm subjects which implies limited variation in compliance. For emissions regulation of combustion plants, the experts state that the threat for conservative behavior is much more viable then the threat for uniform behavior. Norm subjects will always integrate legal norms – either rules or principles – in their organization' system of management and control as they see fit. Some norm subjects have the belief that the future lies in bio fuels and act accordingly, whereas others make changes in their production process from a different believe. Different investments lead to different compliance practices and consequently prevents uniform behavior of norm subjects.

Seven experts do expect that norm subjects will conduct conservative behavior. This is among other due to the interpretive risk of not knowing what to do to comply. Increased uncertainty of principles might lead to cautious and inactive behavior of norm subjects. Conservative behavior would also be caused because norm subjects will keep to minimum compliance. If a norm subject overinvests in

emission abatement techniques this might lead to a competitive disadvantage if their competitor keeps to minimum compliance. According to these experts, emission reduction is not the core business of these norm subjects; making a profit out of selling products is. Emission reduction is therefore a secondary issue. Especially smaller firms with a combustion plant will have little benefits of setting high ambitions when it comes to emission abatement. According to an expert from the PBL, principles based regulation can work if there is a rewarding system for norm subjects where additional investments can be recouped. For example, in the emission trading system the excess emission rights yield financial compensation for the investment.

On the other hand, it was emphasized by an expert from DCMR Rotterdam Rijnmond that principles are able to create multiple possibilities that can prevent conservative behavior. For instance, norm subjects and the designated authority can make an agreement upon compliance practices that are valid and robust for the next decade. This agreement will then result in norm subjects investing in sustainable and advanced emission abatement techniques for the long term. During this time norm subjects will be free from government interference. If norm subjects decide to keep to minimal compliance, the authorities will more frequently assess compliance to regulation. Depending on the beliefs of the norm subject, the decision will be made to make a more long term investment and minimize government interference, or to keep to minimal compliance and be subject to continuous government interference. It should be taken into account that this is more likely going to work for larger firms with combustion plants than for smaller firms. The scale of activities of norm subjects is related to the possibility and benefit to make such an agreement.

#### 4. The supervisory and enforcement risk

Three different types of enforcement are open for use in case a norm subject does not comply with current rules based emission standards. The first option with the least consequences is a letter containing an ultimatum. Within specified time the norm subject needs to organize its combustion plant in that it complies with the emission standards. It should be noted that in practice these periods can be specified in months to years. A second option is a penalty imposed on a provisional basis in case of non-compliance. In practice, this enforcement option implies additional months in which norm subjects can comply. The last and most pervasive option is an administrative penalty such as shutting down the combustion plant of a company.

Despite the availability of different enforcement options there are relatively few enforcement processes in the Netherlands. Non-compliance to emission standards is not a very common practice. This can mainly be explained by the fact that current emission standards are very clear, leaving no

room for misinterpretation. Next to that, the small amount of enforcement processes in the Netherlands is also connected to the perceived lack of ambition in terms of emission standards. As was concluded in chapter 5.2, the *regulations and standards* that are used in emissions regulation for combustion plants can be realized by applying technology that is already available. In that sense norm subjects should be able to comply without many difficulties. If an emission standard is in fact infringed, the Dutch authorities (i.e. municipality, province or DCMR) often collaborate with norm subjects conform the polder model. The fact that norm subjects themselves are not always aware of the cause of the excess emission is also taken into account by the authority. Additional investigation will then be required.

Principles based emissions regulation will result in changes that affect supervision and enforcement. As was already discussed, principles imply a greater interpretive risk and enables the regulator to increase ambition levels more easily. The line between compliance and non-compliance will be less clear-cut in principles based regulation which will – according to all consulted experts – result in more enforcement processes. Besides negotiating with norm subjects, the regulator will then more frequently apply punitive and deterrent instruments to coerce compliance. It is also noticed by an expert from the department of Infrastructure and the Environment that society demands more stringent enforcement in case of non-compliance. Norm subjects should not be given too much time for compliance. Certainly considering that currently some non-compliers are given timeframes of years to comply with emission standards. Principles based emissions regulation thus implies that next to negotiation also the deterrence style of enforcement will be applied more frequently. The supervisory and enforcement risk in principles based regulation is kept to a minimum when both enforcement styles are used interchangeably based on the case of non-compliance at hand. Severity of non-compliance and recidivism of norm subjects should determine whether the authority negotiates or uses punitive sanctions. Important is that the designated authority remains independent and objective to prevent nepotism.

#### 5. The internal management risk

The internal management risk addresses the issue of the competence of norm subjects' internal management to translate principles to a concrete plan of action. As was mentioned, principles provide more discretionary room to a norm subject. This discretionary room can be used to comply to the regulatory requirements – the principles – while at the same time also allowing for economic consideration of alternatives. An underlying condition and therefore a risk is that norm subjects need to have the expertise and knowledge in their organization to develop such an approach. If the

internal management is underdeveloped and lacks expertise and knowledge, principles based regulation might become a too demanding task.

In the case on emission regulation for combustion plants this risk is valid and should be taken into account. A myriad of organizations operating in different sectors employ combustion plants and are therefore subject to emission standards specified in the Decrees Bva, Bees A or Bems. If these specific emission standards would be replaced by principles this would require a different commitment of norm subjects. Large companies that exploit multiple large combustion plants have significantly more expertise and knowledge within their organization than a modest company with a small combustion plant. An example that has been given in the previous chapter is the horticultural company employing a few gardeners. None of these employees have any experience or knowledge of a combustion plant, nor are they occupied with it.

Consequently, norm subjects that are subject to the Decree Bems and exploit a relatively small combustion plant lack this knowledge and expertise to adequately interpret principles and translate these into a plan of action. Norm subjects that are subject to the Decree Bees A for large combustion plants and Bva for waste incinerators, are larger companies containing – for instance – environmental departments, regulatory affairs department and a research and development department. These larger companies will therefore be far better able to cope with principles based regulation by interpreting their meaning and devising a plan of action that suits their interests as well. In addition, the role of the technology supplier should not be underestimated in this process. It are especially the suppliers of emission abatement techniques that innovate and enable norm subjects to comply with emission standards. They can play a major role in facilitating both smaller and larger companies to comply to principles.

### 6. The ethical risk

In principles based regulation principles specify the broader outcome that the regulator intends to reach with regulation. As was discussed in this chapter, this implies that principles entail an interpretive risk. The underlying assumption – and the ethical risk – is that norm subjects will calculate the interpretive risk of them interpreting the principles wrong. In the case on emissions regulation for combustion plants this risk is also viable. If the interpretive risk of principles is high, the ethical risk is also high. Norm subjects of emissions regulation for combustion plants will take into account what the consequences will be if they interpret principles wrong. This implies that norm subjects will become risk managers by considering how much risk that they will take in compliance to regulation. This is also connected to the question whether or not there is a rewarding system. If

additional investments cannot be recouped norm subjects will be much more likely to move towards minimum compliance, which in turn makes the ethical risk more apparent.

The fact that principles based regulation does not specify what conduct is allowed and what conduct is prohibited in advance, might also have consequences for the ethical risk. Also in emissions regulation there is the risk that *ex post* evaluation by the regulator will be too late considering that large amounts of harmful air pollutants may already have been emitted to the air. *Ex post* evaluation of compliance is then incapable of undoing the environmental damage. Experts however disagree with this assumption, because there are other aspects that need to be taken into account. First of all, combustion plants cannot be compared with for instance nuclear installations. A combustion plant cannot have a meltdown and does not have immense consequences such as radioactive contamination. Secondly, combustion plants are bought from technology suppliers that provide a list of specifications. As such, in advance it is known by norm subjects what the emissions are of their abatement technique. In that sense, the domain of combustion plants is entirely different characterized by aspects that reduce the ethical risk of *ex post* enforcement. Suppliers of technology ensure that their emission abatement techniques meets legal requirements, and execute maintenance on the combustion plant.

### 7. The trust risk

The conclusion in the theoretical framework concerning the trust risk is that it may possibly be the ultimate risk that principles based regulation has to overcome. Before principles based regulation can enhance trust, mutuality and responsibility between norm subjects and the regulator, there already has to be a certain amount of trust between them. In turn, trust can help to overcome the other risks.

According to all experts, trust in principles based (emissions) regulation within the government is scattered. Some governmental officials are obviously interested with the notion of principles based regulation. However, there is a relatively large group of officials that have less confidence in principles based regulation. These officials do not think that increasing the discretionary room for norm subjects will benefit emissions regulation. This primarily becomes evident from the large amount of national and international documents that specify technologies (for instance the BREF documents) that enable compliance with emissions regulation. These documents specify relevant information for norm subjects about costs and effects of emission abatement techniques. As such, it befalls as if the government does not trust that norm subjects are able to organize emission abatement themselves.

Nevertheless, seven experts do entrust more discretionary power to norm subjects, taking into account a number of nuances and preconditions (that will be discussed in the next paragraph). It is realized by most experts that the current regulatory system where dense rules are limiting the discretionary room for norm subjects do not safeguard societal ambitions. The lack of an integral vision in emissions regulation results in situations where less optimal (for instance: cost ineffective investments) decisions are made. Next to that, norm subjects should be able to take on an increased responsibility, with due consideration to the internal management risk. These experts consider smaller companies to be incompetent to properly deal with principles. Rather, these norm subjects should be handed clear rules based emission requirements. Larger organizations however are capable of interpreting principles and translating these to their organization' internal management and control. Experts have confidence in principles based regulation, because there have been previous successful experiences where norm subjects obtained a more dominant and active role in emission reduction. An example of that is the "Doelgroepmanagement voor Industrie" (DMI), a congregation of business representatives that set goals and made arrangements concerning emissions.

If principles based regulation is implemented in emissions regulation and norm subjects receive more discretionary room to comply to emissions regulation, the expectation of experts is that the relationship between the government and the norm subject will change. A number of experts expect that there will be more understanding for each other's interests. The regulator will be able to deviate from certain emission requirements if there are better options that realize more emission reduction against less costs. This will have a positive effect on the substantive compliance of norm subjects. Moreover, the willingness to move in each other's perspective will enhance the trust between the regulator and the norm subject. An example is given by referring to the financial system where principles have also been introduced. The introduction of principles led to a more transparent financial system and repelled most forms of usury policies. Consequently, trust in the financial regulatory system increased with the introduction of principles. Nevertheless, a valid remark is also made by an expert that strict requirements can also lead to trust, because it is clear what is expected from norm subjects.

### Conclusion

In order to present a brief, comprehensive overview the main arguments about the risks of principles based emissions regulation are set out in bullet points. For each risk the risk magnitude is indicated accompanied with relevant remarks.

- The interpretive risk in principles based emissions regulation is high. Norm subjects will need additional certainty about indicators and compliance practices.
- The communicative risk in principles based emissions regulation is moderate. Additional developments in existing communication practices will further help to reduce the communicative risk.
- The compliance risk in principles based emissions regulation is moderate. Uncertainty about principles will lead to conservative behavior of norm subjects. Reducing the interpretive risk and rewarding norm subjects with less government interference will reduce this risk.
- The supervisory and enforcement risk is principles based emissions regulation is low. Currently, enforcement is predominantly characterized by negotiation. The increased uncertainty of principles will result in more deterrent enforcement practices. By combining both styles this risk is minimized.
- The internal management risk in principles based emissions regulation varies for norm subjects. For large companies this risk is small, because they have knowledge and expertise to translate principles and develop compliance practices. This risk is high for small companies that lack these resources.
- The ethical risk in principles based emissions regulation is low. The chance that principles based regulation results in severe pollution is small.
- The trust risk in principles based emissions regulation is high. There is limited trust within the government to provide norm subjects discretionary room. This may be the ultimate risk, because trust is needed if principles based regulation is to work at all.

## 6.2 Preconditions of principles based emissions regulation.

The risks of principles based regulation in the domain of emissions policy for combustion plants have been identified in the previous paragraph. In general it can be said that some risks are more apparent and serious than others. The preconditions that were discussed in chapter 2.1.5 are to a large extent connected to these risks. The preconditions address regulatory practices that increase the chance for a principles based regulatory system to become successful in emissions regulation. By assessing six preconditions it is possible to determine the bottlenecks for principles based regulation.

### Enhancing interpretation

The conclusion that was made in the previous paragraph about the interpretive risk is that principles based regulation in its ultimate form is to general and leaves too much room for interpretation. If principles based regulation does want to work there needs to be an enhancement in interpretation. This implies that in principles based regulation charters that indicate compliance and non-compliance have to become more tangible. A frame of reference is needed to determine whether or not norm subjects have achieved the outcome specified in principles. The question is then how the government should enhance the interpretation of principles by norm subjects in emissions regulation for combustion plants.

An interesting example that has been provided by one expert (from the government) during the interviews is that of principles based regulation in the Dutch financial sector. Financial products that were sold in the Netherlands resulted in multiple problems with usury policies. Especially people who did not have any knowledge about these financial products and its high risks became victims. In total, 5000 financial intermediaries were active in the financial sector and sold these products. Especially this large amount of intermediaries made it very hard for the government to regulate with classic rules based regulation. Therefore the Dutch government decided to move to a more principles based regulatory style. In these principles it was determined that the financial intermediaries were obligated to take responsibility for their customers. Subsequently, the Authority financial Markets (In Dutch: Autoriteit financiële markten (AFM)) operationalized these principles with a code of conduct which made the interpretation of principles more tangible. Shortly after implementation the first case on an usury policy came before a judiciary court. The question is then whether or not the financial intermediary has breached the code of conduct and therefore the principles. In this case the ruling was to the detriment of the financial intermediary. Via jurisprudence the first case of non-compliance – also a bottom line – became known. Moreover, as a result, the Rabobank – a large bank in the Netherlands – scratched 25% of its financial products, because they could not assure that they would not be in breach with the principles.

The example of the financial system gives an indication that specifying indicators for principles can provide for the enhancement in interpretation. However, it should be taken into account that financial regulation and emissions regulation are entirely different domains. Simply specifying that norm subjects of emissions regulation should take responsibility and provide for maximal emission reduction, is too extreme and leaves too much open for interpretation. In the financial system there is for instance an ethical factor of not selling improper products to customers. In emissions regulation these considerations are much more difficult, and therefore require more solid indicators.

This however does not imply that principles should become rules by stating very specific norm conditions and a very specific norm object, such as emission concentration values per chimney. In contrary, principles can specify very general which emissions should be reduced in the long term. For instance, a principle may state that in a period of 10 years emission x needs to be decreased with an average of x% per year. Another principle is that the best available technologies should be implemented in new combustion plants. Also a principle can state that the emission requirements set in different EU-directives may never be infringed. These indicators are already more specific and provide a frame of reference.

It is also possible that – similar to the example of the financial sector – a designated authority operationalizes principles for norm subjects. For instance, what does an average emission reduction of x% per year entail for norm subjects? This implies that the designated authority communicates possible interpretations to norm subjects and provides clear and coherent guidance. This decreases the interpretive risk, but still provides discretionary room to norm subjects in compliance to principles. Specific requirements that are included in the Decrees Bva, Bees A and Bems can then become more general. Arrangements about obligations between the designated authority and a particular norm subject can still be included in a plants permit. This implies that next to the norm subjects also the designated authority receives more discretionary room and can apprehend this to allow for more optimal situations concerning economic and environmental interests. Because of this increased discretionary room, experts expect that branch organizations will also get a more prominent role in facilitating the exchange of best practices and benchmarks. This may however breach the level playing field, because increased discretionary room will lead to different compliance practices, and different enforcement. Additional investigation is therefore needed to determine the checks and balances of principles in emissions regulation for combustion plants.

#### Enforcement style

In general it can be concluded that the enforcement style in emissions policy is adequate in coping with principles based regulation. As was discussed in the previous paragraph there are multiple enforcement instruments that can be apprehended to ensure compliance to regulation. Both soft approaches and more deterrent enforcement approaches can be taken by the designated authorities. An example of a soft approach are letters containing an ultimatum for norm subjects to comply with emission standards within a substantial time span. Administrative penalties can follow if this ultimatum is not reached, or even possibly a plant shut-down. Multiple instruments are thus at the disposal of the designated authorities, which contribute to enabling responsive enforcement of principles based emission regulation.

More importantly however is the enforcement culture that is characteristic for the Netherlands. What is the attitude of the designated authorities towards non-compliers, and what kind of enforcement instruments are used in case of non-compliance? In general, the reaction of the consulted experts is that the enforcement culture in the Netherlands can be characterized as cooperative towards norm subjects. The well known poldermodel corresponds to the "compliance" model of enforcement discussed in the theoretical framework. If norm subjects fail to comply, the designated authorities will try to improve compliance by communicating directions. Large financial fines are very rare in the Netherlands, whereas in other countries – such as the United State of America – this enforcement instrument is applied more often and in relatively rapid pace. Despite that, it is argued by multiple governmental experts that a difference is made between norm subjects that are notorious troublemakers and regular norm subjects. Those norm subjects that are deliberately searching for the edge of compliance and by that infringe upon requirements are already dealt with more fiercely.

It can thus be concluded that multiple instruments are available to the authorities in supervising and enforcing emissions regulation. The basic foundation for responsive enforcement is present, considering the enforcement culture (c.q. attitude) that is characteristic for the Dutch authorities. Pro-active behavior in emission reduction can easily be rewarded by a less fierce enforcement style. Though it should be duly noted – according to some experts – that principles based regulation in the beginning requires a more strict, deterrent enforcement system. Because principles based regulation is a new situation, norm subjects should become aware of the consequences of non-compliance. A metaphor illustrates this. In a classroom of youngsters, a new teacher should start out with a more deterrent style of enforcement. By drawing clear borders a teacher keeps in control of the class.

#### Outcomes based

Principles in emissions regulation for combustion plants will be able to simplify the emission concentration requirements specified in the Decrees Bva, Bees A and Bems. Instead of addressing very specific aspects of emissions from combustion plants, more general goals will be defined in principles focusing on the final outcome that the regulator wants to reach. In doing that it is still possible that some quantifications are made in order to visualize the outcome. A principle for instance may state that in a period of 10 years emission x needs to be decreased with an average of x% per year. Next to that, it was discussed that a governmental body (for instance, the designated authority) can elaborate on more specific requirements that arise from these principles. This way the interpretation of principles by norm subjects is enhanced. Especially the fact that no prescriptive

regulatory requirements would be included in principles based emissions regulation, will result in the outcome becoming the focal point of attention.

In chapter 5.1 the effectiveness of current regulation was discussed. Three different underlying assumptions of current emissions regulation for combustion plants were identified in that section: applying the best available technology, monitoring the air quality of regions and remaining beneath the NEC emission ceilings. The method of realizing this – the Decrees Bva, Bees A and Bems – however fails to coincide these assumptions into an integral vision on emission policy (see chapter 5.1). According to an expert of DCMR Rotterdam Rijnmond, principles can provide an integrated perspective that incorporates both environmental aspects and economic aspects. The discretionary room for norm subjects and the designated authorities provides more guarantees that the most optimal outcome is apprehended, because they are much closely involved than policy makers that make very specific rules that are valid for everyone. The drawback however is that there are more possibilities for arbitrariness, resulting in a threat of the level playing field both at the national level and European level. Certain bandwidths are needed that indicate how far reaching the discretionary room for designated authorities is.

#### Reallocating responsibilities

Principles based regulation requires a significant change in responsibilities for both the norm subject and the regulator. Both actors will have to acquire a different mind and skill set in order to make principles based emissions regulation work in practice. In the introduction of this thesis it was already stated that there currently is a tendency in civil society that supports this precondition. A person or organization should receive discretionary room in determining its actions to achieve a particular interest.

The responsibilities in the current regulatory system are relatively classic. The European Union provides a number of more universal provisions on emissions regulation for all member states. The Dutch government translates these provisions into national legislation – the Decrees Bva, Bees A and Bems – and adds additional Dutch requirements to it. Subsequently, the local authorities issue permits to organizations that exert combustion plants and supervise them. In this system there is relatively little discretionary room for the local authorities and norm subjects. An often pending complaint is that the regulator does not listen to the interests and comments of norm subjects. This allocation of responsibility evokes – according to a consulted expert from the government – the tendency of norm subjects to problematize the requirements “that are imposed on them”. In that sense norm subjects move into the role of victim, whereas the opposite should be done. A joint

strategic purpose would be much more effective in achieving effective emission reduction in a cost-effective way.

All experts emphasize that responsibilities in principles based emissions regulation would indeed be allocated differently. The discussion between the department of Infrastructure and the Environment and norm subjects will not be about specific emission requirements. Rather, the discussion will take place on a higher, more aggregate level. What is the outcome we want to reach with emissions regulation and what aspects are important to regulate? Norm subjects will then have the autonomy to work with these principles and translate them to compliance practices that can be integrated in their system of management and control. The designated authorities also obtain more discretionary room, because they can advice and formulate guidelines based on these principles. The department of Infrastructure and the Environment in turn will have to refrain from controlling the situation by formulating specific and quantitative – rules based – emission requirements.

A relevant aspect that was mentioned in a number of interviews is that the designated authorities will have to be competent to engage into a discussion with its norm subjects. In chapter 4.2 it was concluded that there is an information-asymmetry between the government and norm subjects. In principles based emissions regulation norm subjects will enter into a dialogue with for instance the designated authority about emission requirements for their own organization. This designated authority then needs to be sufficiently capable to match these organizations in terms of knowledge and expertise. If the designated authority lacks knowledge and expertise, norm subjects may attempt to benefit from their informational advantage to reduce their compliance costs at the expense of environmental interests. This is of course only valid if norm subjects themselves have knowledge and expertise. Especially the smaller companies do not have these resources and are therefore not capable to have this discussion, and take on the responsibility norm subjects have in principles based regulation (see chapter 6.1: the internal management risk).

Principles based regulation requires a professional authority which is highly competent to engage into a dialogue. According to several governmental experts, not every designated authority (municipality or province) is competent to adequately do that. Though multiple experts do perceive the tendency that municipalities and provinces are aggregating resources into regional monitoring agencies such as DCMR. These agencies can afford to employ highly qualified experts, because the workload is aggregated. Moreover, these regional monitoring agencies can and should be unbiased, by acting as an independent and neutral actor. Municipal or provincial interests (i.e. employment) can then be excluded from decision making. This compensates the smaller role of the department of Infrastructure and the Environment which typically looks after the public interest in general.

### Meta-regulation

The fifth precondition that was distinguished in the theoretical framework is meta-regulation. Because principles are broad and can be interpreted in multiple ways, the regulator should help and guide norm subjects to adopt appropriate compliance practices that realize the outcomes specified in principles. This precondition is strongly connected to that of enhancing interpretation, which was discussed earlier in this chapter.

Based on the arguments that were put forward by experts, principles in emissions regulation alone are too general. The fact that in ultimate principles based regulation no hard indicators are formulated will result in norm subjects taking emission abatement very lightly. Norm subjects will be tempted to think they already complied to the principles whereas the regulator thinks additional effort is required for compliance. Enhancing interpretation of principles is then one aspect to see to it that norm subjects understand the meaning of principles. Meta-regulation in turn should see to it that this understanding results in effective compliance practices. The experts that were consulted do agree that principles need to be operationalized and supervised. Providing help and guidance to norm subjects would be a good starting point in meta-regulation. Interaction between the norm subject and a highly competent authority ensures that compliance practices are monitored.

However, it was emphasized by all experts that meta-regulation should not result in intensive government interference. On the one hand, you present norm subjects more discretionary room in principles based emissions regulation to effectively reduce emissions. This autonomy should therefore not be infringed by developing a new intensive supervisory system to remain in control. Constant administrative reporting on plans and proceedings are absolutely negating the advantages of principles. Meta-regulation could – for instance – be organized by making a norm subject submit concise proposals for emission management, and by system monitoring – assessing a norm subjects management and control. Meta-regulation should mainly be focused on localizing risks; for instance, compliance practices that are absolutely inadequate to comply to principles. To an extent this also reduces the risk of *ex post* enforcement in principles based regulation. Malpractices can be identified early on in meta-regulation which means that environmental negligence can be prevented. The main point remains trust between norm subjects and the regulator. If you provide norm subjects the discretionary room, the regulator should minimize their interference in execution. The regulator should instead monitor norm subjects and judge them upon the outcome specified in principles – for instance, the total emissions of harmful substances.

### European regulation

The last important precondition that was distinguished is the barrier of European regulation. The central question in this section is whether principles based emissions regulation is in conflict with European regulation. As was already pointed out in chapter 4.1, multiple international agreements and European directives on emissions reduction have been established. Examples of European directives that have been enacted throughout the years are the Large Combustion Plant (LCP) directive, the International Plant Protection Convention (IPPC) directive, and – most recently in 2010 – the Industrial Emissions (IE) directive. These directives have implications for activities from large plants that are regulated by the Decree Bva and the Decree Bees A. Medium sized combustion plants are exclusively regulated by the national government. Consequently, the Decree Bems is not confronted with a barrier of European regulation.

The IE-directive has integrated seven existent EU-directives that regulate industrial emissions and therefore contributed to providing more transparency. The IE-directive already contains multiple principles that govern the basic obligations of the plant operators. Examples are: “all the appropriate preventive measures are taken against pollution”, “the best available techniques are applied”, and “no significant pollution is caused” (European Commission 2010). Next to that, the IE-directive also establishes the foundation for a more integrated approach in emissions regulation. Besides emissions to the air, also other environmental aspects such as energy efficiency, nuisance and waste generation should be taken into account in a plants permit. This taken together signifies that the IE-directive does have multiple underlying aspects that coincide with principles based regulation.

Nevertheless, the IE-directive does specify detailed emission concentration/limit values that may not be exceeded. According to a consulted governmental expert these emission concentration values are based and attuned to available emission abatement techniques. As such, there remain multiple rules based requirements in the IE-directive that oppose principles based emissions regulation. On top of that, the Dutch government affixes additional, more stringent emission requirements that make emissions regulation even more rules based. As for the Decrees Bva and Bees A, there are multiple requirements set in European regulatory provisions that might obstruct principles based regulation. However, several experts of companies do claim that a one-on-one implementation of the IE-directive[20] in the Netherlands leaves room for further development and adjustment of national emissions regulation – the Decrees Bva and Bees A.

[20] The Industrial Emissions Directive should be transposed into Dutch national legislation by 7 January 2013

The experts did unanimously agree that the European Union plays a vital role in realizing emission reduction. There are still immense differences between member states. For instance, in the United Kingdom there are still large coal combustion plants without downstream technology such as de-NOx burners. Compared to these states the combustion plants in the Netherlands are much environmental friendly. Though the Netherlands experiences the environmental consequences of foreign installations. According to the experts this taken together with the argument of the level playing field, makes a common European approach in reducing emissions imperative. On a more extensive note, it is expected by two experts of the department of Infrastructure and the Environment that the Decree Bees A will be entirely integrated in EU regulation within the next five years. This would imply that the European Union becomes the sole regulator of large combustion plants, and restricts the ability to implement principles based emissions regulation for larger companies.

### Conclusion

Six bullet points state the main conclusions of the six preconditions in principles based emissions regulation.

- In order to enhance interpretation of principles in emissions regulation, additional indicators are required to reduce uncertainty and clarify the boundary between compliance and non-compliance.
- The basic foundation for responsive enforcement is present. Enforcement in the Netherlands is currently characterized by negotiation, but deterrent instruments are available and will have to be used more often in principles based emissions regulation.
- The final outcomes that are intended to be accomplished will be central in principles based emissions regulation. Principles can integrate both environmental and economic aspects.
- The designated authority should aggregate authority and resources to be able to enter into a discussion with norm subjects. Especially small companies are incapable of taking on the responsibilities involved in principles based emissions regulation.
- Meta-regulation should not result in intensive government interference. Risks should be identified early on in the process – for instance – via system monitoring.
- A one-on-one implementation of the IE-directive in Dutch regulation provides sufficient room for developing principles based emissions regulation on the national level. The potential barrier of European regulation can then be averted.

## 6.3 Innovation in principles based emissions regulation.

Four conditions that foster or restrict innovation have been assessed under the current regulatory system of emissions regulation. The subsequent step that will be made in this paragraph is answering the question how principles based emissions regulation influences each of these factors, and whether or not innovation is actually stimulated.

### Knowledge

In the previous chapter, knowledge in the current – predominant rules based – regulatory system of emissions regulation was discussed. One conclusion was that the Decrees specify maximum allowed concentration values that are attuned to technological specifications. To a certain extent the emission requirements therefore limit the possible choices for norm subjects in terms of emission abatement. This taken together with the rigidity of the Decrees Bva, Bees A and Bems implies that norm subjects receive little incentives to go beyond existing compliance practices. Context specific knowledge of norm subjects and local authorities is therefore not exploited which implies that there is a limited knowledge push in the current regulatory system.

In principles based regulation, a shift would be made that implies a significant change in policy making. The information asymmetry that was highlighted in chapter 5.2 between the four parties (norm subjects, local authorities, policy makers, and technology suppliers) would then be used to develop more effective emissions regulation. The norm subjects and the local authorities are the actors with high context specific knowledge. Especially these actors possess knowledge on organizational abatement costs, regional factors, and developments in technologies. In principles based regulation these actors will get more responsibilities in determining a plan of action to comply to the outcomes specified in principles. Policy makers at the department of Infrastructure and the Environment should in turn be occupied with devising more aggregate outcomes in principles that will have to be achieved based on societal interests. This way the legal norms in regulatory provisions will remain pure goal oriented requirements that need to be achieved, without prescribing the means to get there.

From this perspective of principles based emissions regulation, norm subjects and local authorities will obtain a much more significant position in realizing effective emission reduction, than in the current predominant rules based system. Knowledge about cost heterogeneity of installations and knowledge about the fitting solutions is highest at the local/organizational level – and not at the national level. If needed norm subjects can contact technology suppliers for additional support on emissions abatement techniques. Unnecessary costs can therefore be prevented, because specific circumstances of the organization of norm subjects are taken into account. For example, a principle

may state that a company's total emission is the key in the compliance assessment of the designated authority. By pooling emissions of norm subjects cost ineffective investments can be prevented. For instance, the smallest combustion plant that does not entirely suffice to the requirements set in Bees A can be compensated with the emission levels of other combustion plants that are also owned by the same company.

The higher flexibility of principles based regulation also provides room for an integrated approach in environmental regulation. As has been indicated in the IE-directive, it is the intention of the European Union to develop an integrated environmental assessment that reaches beyond emissions regulation alone. This is consistent with the voluntary management tool Eco-Management and Audit Scheme (EMAS) that also focuses on the entire environmental performance, but it reaches further. Other environmental problems – such as, waste generation, noise, use of raw materials and energy efficiency – will be included in the assessment of a plants permit and compliance to regulation. In contrast to rules based regulation, principles based regulation provides more discretionary room to norm subjects and local authorities that can be apprehended to make this integrated environmental assessment. The fact that this can lead to more cost-effective decisions with an optimal benefit for the environment, implies that norm subjects will be stimulated to reveal their true organizational information.

By more optimally exerting the knowledge of the four parties in the information asymmetry unnecessary costs can be prevented. Limited resources can therefore be allocated more efficiently and effectively. These resources and opportunities, can then be apprehended by norm subjects together with technology suppliers to innovate. According to a governmental expert, companies are inventive and will search for new compliance practices. Norm subjects will primarily exert already existing opportunities to make incremental innovations in terms of emission abatement. Technology suppliers together with norm subjects will deliberate on the possibilities for system innovations. Because principles based emissions regulation will not be attuned to technological specifications of approved emission abatement techniques, there are less restrictions for technology suppliers to innovate. The outcome in terms of emission reduction (but also environmental performance in general) is what counts.

#### Market structure

In chapter 5.2 two different markets were identified: the market of technology suppliers and the market of norm subjects. The market for technology suppliers is characterized by a relatively small amount of organizations that are active in the market. Norm subjects in turn are spread out over multiple markets (i.e. energy, chemistry etc.) characterized by large companies (i.e. energy) and

small companies (i.e. horticulturist). Especially the larger companies are active in markets with few players, whereas markets with small companies are much more open for competition. Especially in markets with few players there is no perfect competition. A governmental expert states that the market for technology suppliers can be characterized as an oligopoly – a small number of relatively large suppliers that are active in the market. Experts acknowledge that especially the market for technology suppliers is very important for determining innovation, because these organizations have a core business in developing new enhanced emission abatement techniques for combustion plants.

In principles based regulation the market structure of technology suppliers is not likely to change into a perfect competition. Experts have commented that the market for emission abatement techniques of NOx and $SO_2$ is relatively mature. For the past forty years the government has been regulating these emissions, and technology suppliers and norm subjects have been engaged in innovation of new emission abatement techniques for combustion plants. The total amount of available emission abatement techniques for NOx and $SO_2$ are in comparison to emission abatement techniques of $CO_2$ less numerous. $CO_2$ can be reduced in multiple ways whereas the means to reduce NOx and $SO_2$ are less variable. This implies that norm subjects and technology suppliers will be forced to fall back on similar abatement techniques. Take for instance the example of co-generation, where gas turbines compete against gas engines. Competition as such is therefore limited to the variations in emission abatement techniques. Principles based regulation will not change this economic organization. The market structure will remain an oligopoly where a relatively small amount of suppliers try to exploit the limited possibilities. The technological barrier of entry and organizational expansion is therefore of limited relevance.

In chapter 5.2 it was also concluded that the market of technology suppliers and norm subjects is not transparent. Both actors do not share essential information on emission abatement techniques, because it can provide a competitive advantage. According to the discussed theory in chapter two, a disadvantage of limited transparency could be that there is room for opportunistic behavior. Technology suppliers may behave opportunistically towards norm subjects that purchase emission abatement technology, by selling poor quality products or by withholding information. Principles based regulation will – according to the consulted experts – not enhance the transparency. Neither is this considered to be a problem, because there are certain precautions that are taken via contractual agreements. For instance, technology suppliers guarantee that their installment will meet regulatory emission requirements for a specified period. Next to that, maintenance contracts are self-evident to ensure a high performance of a combustion plant. Both technology suppliers and norm subjects want continuity of their business. Technology suppliers have a reputation to keep,

and norm subjects will turn to the technology suppliers that suit their needs. All in all, the condition market structure of the emissions domain will not be affected by principles based regulation, and will therefore not result in an enhancement in terms of innovation.

#### Regulations and standards

The degree of ambition of governmental regulation is explained by two indicators: the stringency of outcomes and the time that is given for compliance. In chapter 5.2 it was concluded that current emissions regulation is not ambitious. Six experts have stated that it is possible to comply with emission standards without actually having to innovate and develop new emission abatement techniques. Consequently, the Decrees Bva, Bees A and Bems are not technology-forcing. As was already discussed in chapter 2.2.3, both rules and principles can specify stringency and time for compliance. Rules simply quantify ambitious requirements ex ante. In principles based regulation, stringency will be specified *ex post* – during the process of enhancing interpretation and meta-regulation.

The expectation of experts is that principles based regulation – similar to current rules based regulation – will not be technology forcing. The main reason for that is that the level of ambition is a rational choice based on the perception of the severity of the problem. The Dutch government has in previous decades been relatively ambitious compared to other countries by specifying stringent outcomes that have to be reached within a limited time. Currently, there is much attention for the level playing field in Europe. Because the Netherlands still has more stringent emission standards in the Decrees than is required from the European Union, Dutch companies are said to have a competitive disadvantage compared to foreign companies. Two experts from the government and the PBL however consider the fact that the Netherlands is one of the most densely populated countries of high importance. Industry is therefore located nearby populated areas. The demographic composition of – for instance – Norway with its vast areas and sparsely populated areas is totally different. From that perspective, it is justified to set additional more stringent emission requirements in the Netherlands. Principles based regulation can in this case offer a more deliberate approach that acknowledges both perspectives. The flexibility of principles and the discretionary room that is resigned to local authorities and norm subjects should be better able to respond to both arguments. Densely populated areas with much industry can receive more ambitious requirements, whereas sparsely populated areas receive less stringent emission standards. Also when economic considerations become more vast then environmental considerations, a custom approach can be embedded that balances the arguments of the level playing field and emissions in densely populated areas.

As was discussed in the previous section “market structure”, it should also be taken into account that emissions regulation is relatively mature. Experts stated that the major advancements in emission reduction have already been made. From this point in time it will become harder to innovate and develop much better emission abatement techniques. As such, simply setting ambitious requirements that require a radical change in the behavior of norm subjects is no guarantee for success. It is highly unlikely that a similar technology – such as the catalyst convertor in the example of the Clean Air Act (see chapter 2.2.3) – will be developed after forty years of innovation. Very ambitious requirements that intend to be technology-forcing might then “suffocate” norm subjects. The conclusion is thus that principles based regulation does offer more opportunities to find cost-effective approaches, but that the remaining room to innovate is limited. It is therefore unlikely that simply setting ambitious regulations and standards will actually result in innovation of emission abatement techniques.

#### Demand/diffusion processes

In the previous paragraph, a section was included that elaborated on the current market demand for innovation. It was concluded that norm subjects do understand the underlying assumption of emissions regulation. There were however some considerations whether this understanding actually leads to a demand for innovation. In particular the consulted experts from companies perceived negative implications connected to current rules based regulation. This influences the perception of norm subjects concerning the market demand for innovation. Imperative is to acknowledge that substantive compliance of norm subjects to legal norm is related to the demand for innovation that is exerted. If norm subjects understand the purpose of regulation and approve the legal norms that are taken to achieve this purpose, norm subjects will be more likely to demand innovation in order to achieve emission reduction.

In principles based regulation, demand for innovation of norm subjects will be enhanced, because negative implications of current rules based can be prevented. First of all, it has been thoroughly discussed under the condition knowledge that principles based regulation is able to prevent cost-ineffective investments. The rigidity of the rules based approach sometimes leads to decisions that do not effectively contribute to realizing the outcome – emission reduction. Secondly, the department of Infrastructure and the Environment translates EU requirements to Dutch regulation, and – on top of that – places additional more stringent national requirements. Companies in the Netherlands are therefore subject too much more stringent emission standards than their competitors overbroad. This infringes upon the level playing field with other member states. In the previous section on “regulations and standards” it was mentioned that it would be much more

comprehensible to exclusively differentiate emission standards between regions where industry (and therefore emissions) are highly centralized and regions where there is hardly any industry. From the perspective of norm subjects the outcome that is pursued in emissions regulation and the regulatory style that is adopted are then better to reconcile. Principles based emissions regulation is able to improve the congruency and attune emissions regulation to the outcome that is to be reached.

The risk-return relationship is also of vital importance for the demand for innovation. One feature is that principles can (depending on the principle) prevent cost-ineffective investments from being taken. A second is whether principles enhance the actual investment behavior of norm subjects. Principles based regulation will be able to optimize the risk-return relationship and thereby increase the market demand for innovation. Uncertainty with regard to future regulatory emission requirements is a fundamental indicator in that relationship. Too much certainty results in minimum compliance, whereas too much uncertainty will lead to rigid and inactive behavior. Principles based regulation is able to optimize this relationship by providing the regulator the flexibility to modify certainty/uncertainty of emissions regulation. Certainty can be increased or decreased by specifying more or less concrete indicators (enhancing interpretation), and by the amount of help and guidance norm subjects are offered (meta-regulation). According to the consulted experts from companies, certainty is especially needed by norm subjects for the short term to safeguard that emissions regulation is not infringed. In the medium and long term, norm subjects should receive less certainty about emission requirements. The possibility that principles turn out to become more stringent than expected will require norm subjects to demand more return in terms of emission reduction. As long as the consequences of non-compliance are severe enough, norm subjects will have to reduce the risk of non-compliance by demanding innovation. Pressure in terms of severe consequences (i.e. deterrence: penalties) in case of non-compliance is necessary to foster demand for innovation. This is also connected to the precondition *enforcement style* of principles based regulation. The discretionary room that is provided in principles based regulation can then be exerted by developing compliance practices that provide an acceptable level of uncertainty with future emission requirements, without being cost-ineffective. In contrast, rules based regulation does not have this flexibility; when emission requirements are published they leave no room for interpretation, because they are very specific and exactly quantify compliance. This results in norm subjects adopting compliance practices that signify minimum compliance to regulation.

## 6.4 Conclusion

In this chapter three sets of variables have been discussed in order to answer the third research question of this study: *"To what extent can principles based regulation contribute to more incentives*

*for entrepreneurs to innovate and reduce emissions?"*. The risks and preconditions of principles based regulation have assessed the implications that principles would have for emissions regulation. The conditions for innovation subsequently provided a more thorough analysis of the innovation conditions that might be affected by principles based regulation.

If a principles based regulatory style is applied in emissions regulation for combustion plants there are multiple (connected) risks and preconditions that have to be taken into account. First of all, simply applying principles (general, qualitative, and goal oriented legal norms) will leave too much room for interpretation. There needs to be pressure on norm subjects that can only be provided by quantifying goals and providing more certainty about indicators and compliance practices. Reducing the interpretive risk is done by enhancing the interpretation of principles by norm subjects, by communicating the meaning of principles towards norm subjects, and by providing guidance and help to norm subjects during the process of meta-regulation. The compliance risk is then also affected, because the risk for conservative behavior is connected to the interpretive risk of principles. If the interpretation of principles is enhanced the risk to misinterpret principles is reduced which implies that norm subjects can make better informed decisions about their investment. Secondly, it was concluded in this chapter that the supervisory and enforcement risk in the Netherlands is of minimal importance. The enforcement style of the Netherlands contains the fundaments for a responsive style of enforcement. Thirdly, principles based emissions regulation will imply a significant change in the responsibilities of norm subjects, policy makers and designated authorities. Policy makers at the department of Infrastructure and the Environment will simply have to formulate outcomes in principles considering societal interests. Norm subjects will subsequently have to develop proper compliance practices, which are assessed by designated authorities. The internal management risk is especially relevant in terms of reallocating responsibilities for norm subjects. Large companies that are regulated by the Decrees Bva and Bees A have supporting departments, whereas smaller companies that are regulated by the Decree Bems do not have this kind of knowledge or expertise to develop proper compliance practices. Fortunately, it is possible for these norm subjects to fall back on branch organizations and technology suppliers. The ethical risk of the consequences of misinterpreting principles is therefore low. Fourthly, the most pervasive risk of principles based regulation is the trust risk. Before trust can be enhanced between the regulator and norm subjects there already needs to be a certain amount of trust, and this trust is – according to the consulted experts – not present. Fifthly, there are multiple European directives that regulate emissions of large combustion plants – the latest being the Industrial Emission directive. A one-on-one implementation of the IE-directive in Dutch regulation is needed to safeguard that European regulation does not become a barrier for principles based emission regulation.

Principles based regulation will have consequences – either to a greater or lesser extent – for a number of conditions that influence innovation. First of all, the knowledge condition will be positively affected in principles based regulation and foster innovation, because context specific knowledge of norm subjects and designated authorities will be better exploited. Secondly, the market structure of technology suppliers will remain an oligopoly. The fact that system innovations of emissions abatement techniques requires very sophisticated knowledge implies that the knowledge and expertise is naturally more centralized. The market structure will not change in principles based regulation implying that this condition will not affect innovation. Thirdly, the condition regulations and standards address the level of ambition. Principles based emissions regulation will not be technology forcing, because the level of ambition in emissions regulation is a rational choice based on the perception of the problem. Emissions regulation is relatively mature after forty years of innovation which implies that it is not expected that entirely new emission abatement techniques will be invented. Principles will in that case not positively affect the condition regulations and standards. Fourthly, principles enhance substantive compliance of norm subjects, because they are more flexible and can prevent certain negative external effects (i.e. cost-ineffective investment) of rules based regulation. Principles will enhance demand for innovation, because principles provide more uncertainty about future emission requirements. In order to reduce the risk of non-compliance norm subjects will anticipate on future, more stringent emission requirements and demand innovation. The consequences of enforcement in case of non-compliance with principles should be severe enough to provide sufficient pressure on norm subjects.

# Chapter 7. Conclusions.

Rapid developments in knowledge, transnational problem solving, reallocation of responsibilities and budget cuts have led to interest in a different method of policy making for emissions regulation – principles based regulation. The main research question was formulated as: *"What are the expected effects in terms of incentives for entrepreneurs to innovate when applying a principles based approach to policy that regulates emissions?"*. In this chapter the main findings are presented along with a more critical reflection. The conclusions are organized in four different sections.

### Problems in current emissions regulation for combustion plants

1. Current emissions regulation for combustion plants lacks an integral vision, because no comprehensive assessment is made. Especially the additional emission requirements that are set by the Dutch government on top of the EU-requirements disrupt the level playing field vis-à-vis other European states. Current emissions regulation is extremely rigid and does – in some situations – lead to cost-ineffective investments that hardly reduce emissions. It is therefore that norm subjects consider emissions regulation as burdensome.

2. The three governmental Decrees (Bva, Bees A and Bems) that regulate emissions of combustion plants are characterized as rules based regulation, because they specify quantitative emission concentration limits. Formally, these concentration limits are oriented on the goals. However, the high specificity in the formulation of the emission requirements limits the total discretionary room in which compliance to goals can be realized by norm subjects. Next to that, emissions regulation is not ambitious, because the emission requirements are not technology forcing. As such, current regulation provides limited incentives to innovate and few opportunities to exploit considering the discretionary room.

### Principles based emissions regulation will positively affect two conditions for innovation.

3. *Knowledge* in the information asymmetry between policy makers, norm subjects, designated authorities and technology suppliers will be better utilized in principles based regulation. Specific context relevant knowledge of designated authorities and norm subjects can be taken into account. Policy makers will focus more on the general outcomes of emission regulation. Norm subjects and designated authorities will – supported by technology suppliers – deliberate on compliance practices respectively enforcement of principles. This way the responsibility that an actor has in emissions regulation is attuned to the amount and substance of knowledge that an actor possesses.

4. *Demand for innovation* will also be enhanced in principles based emissions regulation. Combining the uncertainty of principles concerning emission requirements and compliance practices with a more stringent enforcement style will enhance demand for innovation in emission abatement techniques, because norm subjects will want to reduce the risk of non-compliance. Principles based emissions regulation allows more discretionary room for norm subjects and technology suppliers to innovate, and enables the contemplation of both specific organizational (i.e. economic) and environmental circumstances. The better utilization of *knowledge* together with an increased *demand for innovation* makes innovation in emission abatement techniques easier and contributes to more effective emission reduction – that is, higher compliance and lower costs.

**Innovation: the key to future emission reduction**

5. A critical remark should be placed on the factual improvement in innovation. In current rules based regulation, emission standards are attuned to the best available emission abatement technologies. Emissions regulation does not include future emission standards that are – with current technology – unrealistic. The question arises whether Dutch emissions regulation in general is able to coerce innovation. Given the fact that the emission abatement market is relatively mature after forty years of innovation, it is likely that principles – too – will simply refer to these best available techniques. Consequently, innovation in the short term as a result of principles based regulation is unlikely.

6. In order to actually realize innovation the technology suppliers are the key players. Because the technology suppliers are engaged in system innovations of emission abatement techniques for a global market, Dutch national regulation will have a minor influence on actual innovation. Principles based emissions regulation will primarily result in a faster implementation of best available emission abatement techniques in Dutch combustion plants. The focus of principles on future emission requirements does provide a necessary condition for innovation in the medium and long term.

**The cohesion of the risks and preconditions in principles based regulation is important for actual effectiveness and innovation.**

7. The EU exclusively regulates emissions of large combustion plants via the Industrial Emissions (IE) directive. Multiple rules based characteristics (i.e. emission concentration limits) are included in the IE-directive that are difficult to reconcile with principles based regulation. A one-on-one implementation of the IE-directive in Dutch regulation is necessary

to safeguard that there is sufficient room for a principles based regulatory style. Because especially these larger organizations contain *knowledge* and expertise to successfully translate principles into compliance practices this precondition is a serious barrier for the success of principles based emissions regulation. Moreover, the larger organizations are capable of realizing more emission reduction than smaller organizations, which would significantly contribute to the effectiveness of this regulatory style.

8. There need to be concrete indicators upon which norm subjects are judged for compliance. Enhancing interpretation and clear communication of the meaning of principles is imperative in order to reduce uncertainty and provide the required pressure on norm subjects to *demand innovation*. Through meta-regulation (i.e. regulatory conversations), the regulator offers help and guidance to norm subjects to adopt proper compliance practices. The ethical risk of irreversible consequences caused by incorrect interpretation, and the compliance risk concerning conservative behavior with developing compliance practices (which involves innovation) can then be prevented. The underlying assumption is that the regulator involved in meta-regulation is required to have sufficient knowledge and expertise to enter into a discussion with norm subjects. A logic advantage is reserved for monitoring agencies (i.e. DCMR Rotterdam Rijnmond) that employ highly qualified experts that are able to have this dialogue with norm subjects.

9. The internal management risk has far reaching implications for the *knowledge* condition of innovation. Responsibilities can certainly be reallocated between the regulator and larger organizations that employ highly qualified experts. Principles based regulation would enable these norm subjects to exploit their informational advantage. Smaller organizations – mostly regulated by the Decree Bems – in contrast do not have sufficient knowledge to take on the responsibility of translating principles to compliance practices. One difference is for example the availability of real-time measurement data of emissions. Also the fact that smaller organizations have a different core business that does not relate to emission reduction, and are hardly influenced by reputational damage negatively affects *demand for innovation*.

10. Few government officials entrust norm subjects more discretionary room to give substance to emission reduction. The main argument for that is that the increased discretionary room in principles based regulation would infringe upon the level playing field both at the national and the European level. Principles based emission regulation will enhance trust and mutual understanding between the regulator and norm subjects, but some trust is already needed to implement this regulatory style and make it successful.

## Discussion

During the interviews one expert made an interesting statement that provides input for this discussion. “As (environmental) policy is becoming more mature, the regulator is becoming more competent, and norm subjects are taking on more corporate social responsibility, a policy model such as principles based regulation is likely to be more effective.” This general statement seems – at least – to be valid and in accordance with the risks and preconditions of principles based regulation that have been identified in this case study research on emissions regulation for combustion plants. A different expert has commented likewise by stating that “allowing norm subjects more responsibility will also result in norm subjects taking this responsibility”. One important development that should be carried on – despite the regulatory style that is apprehended – is the establishment of a competent regulator. The tendency that municipalities and provinces are aggregating authority in regional monitoring agencies (i.e. DCMR) should be continued. By centralizing resources such as knowledge and expertise, it is possible to organize supervision and enforcement much effectively in terms of creating a competent regulator.

One of the preconditions that have been found imperative for implementing a principles based regulatory style in emission policy is European regulation. Considering that the European Union has the primacy when it comes to regulation, the department of Infrastructure and the Environment will have to commit to making sure that the IE-directive is implemented[21] in such a way that it leaves room for a principles based regulatory style. It are especially the larger organizations that contain much knowledge and expertise that should be apprehended to effectively reduce emissions. It is therefore evident to investigate how the IE-directive can be implemented in the Netherlands and what the consequences are for establishing a principles based regulatory style for policy that regulates emissions. Due consideration should be given to the level playing field vis-à-vis other member states of the European Union.

This research focused primarily on identifying and assessing conditions that explain whether or not principles based regulation would be successful in emissions policy that regulates combustion plants. In the conclusions presented in the previous chapter, one of the major points of attention was allocated towards the uncertainty involved in principles and the pressure on norm subjects. It was concluded that multiple risks (i.e. interpretive risk, communicative risk, internal management risk) need to be reduced and preconditions (i.e. enhancing interpretation, meta-regulation) have to be settled. Additional research about the checks and balances is therefore needed to assess how

[21] The Industrial Emissions Directive should be transposed into Dutch national legislation by 7 January 2013.

principles based emissions regulation should be organized. Especially the polycentric forms of organization – such as networks – yields an interesting starting point for further study. It is important that this research is conducted in close collaboration with relevant actors (i.e. policy makers, designated authority, norm subjects) in order to retrieve a complete representation of affairs, but also because the conclusions will more likely be supported by all stakeholders if they have been involved in the process.

Typically the discussion chapter of a research report is also a place where some critical reflection takes place on the strengths and weaknesses of the research, and on the scientific contribution. A weakness of this study is the fact that the identified effects of principles based regulation for innovation are expected effects based on an experts' perception on the variables for innovation. Whether or not these perceptions are veracious and principles based emissions regulation actually does foster innovation cannot be verified. It should however be taken into account that a prospective policy analysis per definition entails that a (new) policy type is being examined of which effects are yet unknown. Another weakness of this study is that there is no variation in values on the independent variable. The three different governmental Decrees that have been assessed are all very specific, oriented on the goals, and formulate quantitative requirements. As such, it has not been possible to do a cross case analysis to explain the effect of variation on the independent variable.

One of the strengths of this study is that the experts that have been consulted have different backgrounds. Consequently, variation has been included that accounts for different perspectives and thus for a more complete and reliable representation of relevant arguments. Experts that were both optimistic as experts that were more pessimistic have been heard and have put forward their arguments. Another strength – and also an essential contribution of this study to scientific research – is that at the start of the research process it was fairly unclear and undefined what principles based regulation entailed and how innovation could be effected by it. By extensive literature research a theoretical framework has been constructed that provides answers to multiple questions concerning principles based regulation in general: how can rules be distinguished from principles? What risks should be taken into account? Which preconditions should be sufficiently satisfied? Next to that, the connection of the regulatory style to the conditions for innovation completed the theoretical framework for this case-study, but still makes it very suitable to be applied for different domains.

# Bibliography


Ashford, N.A., Ayers, C. and Stone, R.F. (1985). Using regulation to change the market for innovation. *Harvard Environmental Law Review*. 9 (2), 419-466.

Babbie E. (2007). *The practice of Social Research*. Belmont: Thomason Wadsworth.

Black, J. (2002). *Critical reflections on regulation*. London: London school of Economics and Political Science.

Black, J. (2008). Forms and paradoxes of principles-based regulation. *Capital Markets Law Journal*, 3 (4), 425-457.

Black, J. (2010). The Rise, Fall and Fate of Principles Based Regulation. Working Paper. Retrieved on 25-01-2011, from www.lse.ac.uk/collections/law/wps/wps.htm and the Social Sciences Research Network electronic library at: http://ssrn.com/abstract=1712862.

Black, J., Hopper, M. and Band, C. (2007). Making a success of Principles-based regulation. *Law and Financial Markets Review*. 1 (3). pp. 191-206.

Boonstra, H. (2010). Principle Based Milieubeleid. *Ministerie van Volkshuisvesting Ruimtelijke Ordening en Milieubeheer*. Working Paper. Not Published.

Burgemeestre, B., Hulstijn, J. and Tan, Y. (2009). *Rule-based versus Principle-based Regulatory Compliance*. In Governatori, G. (Eds.), Proceeding of the 2009 conference on Legal Knowledge and Information Systems: JURIX 2009: The Twenty-Second Annual Conference. Amsterdam: IOS Press.

Burtraw, D. (2000). *Innovation under the Tradable Sulfur Dioxide Emission Permits Program in the U.S. Electricity Sector.* Resources For the Future (RFF), discussion paper 00-38, retrieved from http://www.rff.org.

Colebatch, H.K. (2002). *Policy, second edition*. Berkshire: Open University Press.

Coyle, D. and Childs, M.B. (2008). *NESTA Innovation Index: Mini-Project 3 Wider Conditions for Innovation*. Retrieved on 20-04-2011, from http://nestainnovation.ning.com/forum/attachment/download?id=2132323%3AUploadedFi38%3A1666

Department for Business Enterprise and Regulatory Reform (BERR) (2008). *Regulation and innovation: evidence and policy implications*. Retrieved on 26-01-2011, from http://www.bis.gov.uk/files/file49519.pdf

Dunn, W.N. (2009). *Public Policy Analysis: An Introduction*. Prentice Hall: Upper Saddle River.

Eames, M. (2001). The Large Combustion Plant Directive (88/609/EEC): An Effective Instrument For Pollution Abatement? In Glachant, M. (Ed.), *Implementing European Environmental Policy*. Cheltenham: Edward Elgar Publishing.

Eisenhardt, K.M. (1989). Building Theories from Case Study Research. *The Academy of Management Review*, Vol. 14 (4), pp. 532-550.

EnergieNed (2003). *10 jaar Verzuringsconvenant. Resultaten van de bestrijding van SO2 en NOx door de Nederlandse elektriciteitsproductiebedrijven*. Retrieved on 28-06-2011, from http://www.energiened.nl/_upload/bestellingen/publicaties/00000081.pdf

European Commission (2001). Directive 2001/80/EC on the limitation of emissions of certain pollutants into the air from large combustion plants. *Official Journal of the European Communities*. L309/1.

European Commission (2010). Directive 2010/75/EU on Industrial Emissions. *Official Journal of the European Union*. L 334/17.

Farber, D.A. (1999). *Taking Slippage Seriously: Noncompliance and Creative Compliance in Environmental Law*. Harvard Environmental Review, vol. 23, 297-328.

Financial Services Authority (FSA) (2000). *A new regulator for the new millennium*. Retrieved on 04-05-2011, from http://www.fsa.gov.uk/pubs/policy/p29.pdf

Flyvbjerg, B. (2006). Five misunderstandings about case-study research. *Qualitative Inquiry*, vol.12 (2), 219-245.

Gerard, D. and Lave, L.B. (2003). Implementing Technology-Forcing Policies: The 1970 Clean Air Act Amendments and the Introduction of Advanced Automotive Emissions Controls. *Technological Forecasting and Social Change*. 72 (7), 761-778.

Glaser, B. G. & Strauss, A. L. (1967). *The discovery of grounded theory: Strategies of qualitative research*. London: Wledenfeld and Nicholson.

Hajer, M. (2011). *De energieke samenleving. Op zoek naar een sturingsfilosofie voor een schone economie*. Alblasserdam: Haveka.

InfoMil (2011). *BREFs per IPPC categorie*. Retrieved on 14-09-2011, from http://www.infomil.nl/onderwerpen/duurzame/bbt-ippc-brefs/brefs-per-ippc/

Keck, M. and Sikkink, K. (1998). *Activists beyond borders: advocacy networks in international politic*s. New York: Cornwell University Press.

Klok, P.J. (1991). *Een instrumententheorie voor milieubeleid. De toepassing en effectiviteit van beleidsinstrumenten*. Enschede: FEBO.

Lévêque, F. (1996). The regulatory game. In Leveque, F. (Ed.), *Environmental Policy in Europe: industry, competition, and the policy process*. Cheltenham: Edward Elgar Publishing.

Lévêque, F. and Nadaï, A. (2000). A firm's involvement in the policymaking process. In Folmer, H. and Gabel, H.L. (Eds.), *Principles of Environmental and Resource Economics.* Cheltenham: Edward Elgar Publishing Limited.

Lulofs, K. R.D. (1999). *Adjustments in the Dutch electricity producing sector in the context of the European Directive 88/609/EEC*. IMPOL case study report.

Lulofs, K.R.D. (2001). Schonere afvalverbranding: zijn de Europese richtlijn en de nationale regimes kosteneffectief? *Beleidswetenschap*, 15 (4), 333-355.

Miles, M.B. and Huberman, M.A. (1994). *Qualitative data analysis. An expanded sourcebook*. Londen: SAGE publications Ltd.

Milieuloket (2007). *Natuur- en milieu- organisaties hebben vier miljoen leden*. Retrieved on 14-06-2011, from http://www.milieuloket.nl/9353000/1/j9vvhurbs7rzkq9/vhr1ksj7uavr?ctx=vhurdyxqumzx

Ministerie van Economische zaken, Landbouw en Innovatie (ELI) (2008). *Actieplan Nanotechnologie*. Retrieved on 08-06-2011, from http://www.rijksoverheid.nl/bestanden/documenten-en-publicaties/rapporten/2008/07/04/1-actieplan-nanotechnologie/8079721-bijlage.pdf

Ministerie van Infrastructuur en Milieu (I&M) (2009). Nationaal samenwerkingsprogramma Luchtkwaliteit. Retrieved on 15-07-2011, from http://www.rijksoverheid.nl/bestanden/documenten-en-

publicaties/brochures/2009/11/01/nationaal-samenwerkingsprogramma-luchtkwaliteit/nationaal-samenwerkingsprogramma-luchtkwaliteit.pdf

Ministerie van Infrastructuur en Milieu (I&M) (2011). *Ministerie Infrastructuur en Milieu concentreert activiteiten*. Retrieved on 08-06-2011, from http://www.rijksoverheid.nl/ministeries/ienm/nieuws/2011/06/06/ministerie-infrastructuur-en-milieu-concentreert-activiteiten.html

Ministerie van Volkshuisvesting Ruimtelijke Ordening en Milieubeheer (VROM) (2003). *Erop of eronder.* Uitvoeringsnotitie emissieplafonds verzuring en grootschalige luchtverontreiniging 2003. Retrieved on 15-07-2011, from http://www.infomil.nl/publish/pages/70388/uitvoeringsnotitie_emissieplafonds_dec2003pdf1.pdf

Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer (VROM) (2007: A). *Nieuwe energie voor het klimaat: werkprogramma schoon en zuinig.* Retrieved on 14-06-2011, from http://www.rijksoverheid.nl/bestanden/documenten-en-publicaties/kamerstukken/2007/09/18/werkprogramma-schoon-en-zuinig-nieuwe-energie-voor-het-klimaat-werkprogramma-pdf/kvi2007088495a.pdf

Ministerie van Volkshuisvesting Ruimtelijke Ordening en Milieubeheer (VROM) (2007: B). *Geschiedschrijving $CO_2$-emissiehandel. de voorgeschiedenis, ontwikkeling en implementatie van een EU richtlijn*. Retrieved on 05-07-2011, from http://www.emissieautoriteit.nl/

Ojo, M. (2010). *Building on the trust of management: overcoming the paradoxes of principles based regulation*. Retrieved on 13-01-2011, from http://mpra.ub.uni-muenchen.de/22500/1/Building_on_theTrust_of_Management_Overcoming_Paradoxes_of_PBR.pdf

Planbureau voor de Leefomgeving (PBL) (2009). *Realisatie Milieudoelen. Voortgangsrapport 2009*. Retrieved on 15-07-2011, from http://www.rivm.nl/bibliotheek/rapporten/500081014.pdf

Punch, K.F. (2006). *Developing Effective Research Proposals*. London: SAGE publications ltd.

Regeerakkoord VVD-CDA (2010). *Vrijheid en Verantwoordelijkheid*. Retrieved on 18-12-2010, from http://www.kabinetsformatie2010.nl/dsc?c=getobject&s=obj&objectid=127446

Ruiter, D.W.P. (1987). *Bestuursrechtelijke wetgevingsleer*. Assen: Van Gorcum

Schilder, A. (2008). Rule-based versus principle-based: Het perspectief van de toezichthouder. In Bos, A. de, Coebergh, P.H. , Olden, H. van (Eds.), *Regels voor de toekomst: Kansen voor een duurzaam ondernemend Nederland*. Schiedam: Scriptum.

Shadish, W., Cook, T. & Campbell, D. (2002). *Experimental & Quasi-Experimental Designs for Generalized Causal Inference*. Boston: Houghton Mifflin.

Stewart, R.B. (1981). Regulation, Innovation and Administrative Law: A Conceptual Framework. California Law Review. 69 (5), 1256-1377.

Tidd, J. and Bessant, J. (2009). *Managing Innovation. Integrating Technological, Market and Organizational Change*. Chichester: John Wiley & Sons Ltd.

TK 2010/2011. *Kamerstuk Vernieuwing omgevingsrecht: eenvoudig en beter*. ref. 2011041481

VNO-NCW (2011). *Commissielijst met taken januari 2011*. Retrieved on 13-09-2011, from http://www.vno-ncw.nl/SiteCollectionDocuments/Statisch/commissielijst_met_taken_januari_2011.pdf.

Vries, E. de and Boonstra, H. (2010). Signalering "Principle Based" milieubeleid. *Ministerie van Volkshuisvesting Ruimtelijke Ordening en Milieubeheer*. Working Paper. Not Published.

Wickham, P.A. (2006). *Strategic Entrepreneurship*. Essex: Pearson Education Limited.

# Appendix A List of interviewees

**Interviewees: Name, Organization, and Function**

1. **Name:** Ben Geurts.
   **Organization:** Department of Interior and Kingdom Relations. Previously: department of Housing, Spatial Planning and the Environment.
   **Function:** Management Team member Knowledge and Strategy directorate BZK/WWI. Previously: director of Central Strategy and Knowledge.

2. **Name:** Diederik de Jong.
   **Organization:** Department of Infrastructure and the Environment.
   **Function:** Director Sustainable Industry.

3. **Name:** Cees Braams.
   **Organization:** Department of Infrastructure and the Environment.
   **Function:** Expert industrial emissions.

4. **Name:** Frank Dietz.
   **Organization:** Environmental assessment Agency (Planbureau voor de Leefomgeving (PBL)).
   **Function:** Head of the department of sustainable development.

5. **Name:** Herman Vollebergh.
   **Organization:** Environmental Assessment Agency (Planbureau voor de Leefomgeving (PBL)).
   **Function:** Senior research fellow.

6. **Name:** Maarten de Hoog.
   **Organization:** Dienst Centraal Beheer Rijnmond (DCMR).
   **Function:** Director industry.

7. **Name:** Joost Pellens
   **Organization:** Essent
   **Function:** Regulatory affairs officer.

8. **Name:** Harm Mous

   **Organization:** Essent

   **Function:** Regulatory affairs officer.

9. **Name:** Geert Brummelhuis

   **Organization:** Electrabel

   **Function:** Regulatory affairs advisor

# Appendix B Interview questions

Het interview zal beginnen met een aantal vragen over het huidige emissiebeleid ten aanzien van stookinstallaties. Er zijn verschillende wettelijke regelingen die emissie-eisen stellen aan bedrijven die een stookinstallatie exploiteren. De eerste set met vragen betreft daarom de kenmerken van het huidige emissiebeleid voor stookinstallaties.

1. Effectiveness
    a. Worden de emissie-eisen die de overheid stelt (in onder meer, AMvB's) aan stookinstallaties gehaald?
    b. Waar komt het door dat deze emissie-eisen wel/niet gehaald worden?
    c. Laat het huidige emissiebeleid van stookinstallaties veel ruimte over voor bedrijven om het eigen belang te laten prevaleren boven gestelde emissie-eisen?
    d. Zijn er mazen in de wetgeving die emissie-eisen stellen aan stookinstallaties? Zo ja, worden deze wel eens opgezocht door bedrijven?
2. Durability
    a. Hoe vaak is wetgeving met betrekking tot emissie-eisen voor stookinstallaties veranderd in het verleden?
    b. Waar komt het door dat deze wetgeving veranderd is? (Te denken valt aan een update van de wetgeving doordat er technologische veranderingen hebben plaatsgevonden die buiten de bestaande wetgeving valt.)
    c. Verwacht u dat wetgeving voor stookinstallaties in de toekomst regelmatig veranderd moet worden?
3. Comprehensibility
    a. Hebben bedrijven ruimte om zelf invulling te geven aan de manier waarop emissie-eisen voor stookinstallaties gehaald mogen worden? Zo ja, welke onderdelen wel en welke niet?
    b. Zijn de emissie-eisen die de overheid stelt (in onder meer, AMvB's) aan stookinstallaties begrijpelijk voor bedrijven?

**4.** Substantive compliance

**a.** Ervaren bedrijven de emissie wetgeving voor stookinstallaties als een last? Waar blijkt dit uit?

**b.** Hoe vertaalt dat zich door naar de relatie tussen bedrijven en de overheid? Werken en denken bedrijven met de overheid mee om emissies te reduceren?

5. Communicative risk

a. Welke communicatiemiddelen gebruikt de overheid om emissie-eisen voor stookinstallaties te specificeren of toe te lichten? Heeft deze communicatie een formele basis en zijn daar rechten aan te ontlenen?

b. Is deze communicatie helder en verschaft deze zekerheid met betrekking tot wat de overheid verwacht van bedrijven?

6. Supervisory and enforcement risk

a. Wat zijn de consequenties voor stookinstallaties als emissie-eisen niet gehaald worden? Dreigen er direct sancties opgelegd te worden, of wordt er onderhandeld over opties voor verbetering?

De volgende set vragen gaan over mogelijke effecten van het huidige emissiebeleid voor stookinstallaties op innovatie. Aan de hand van verschillende voorwaarden die innovatie stimuleren of belemmeren zijn deze vragen opgesteld.

7. Knowledge

a. Wordt in de huidige wetgeving voor stookinstallaties vooraf aangegeven wat bedrijven moeten doen om te voldoen aan emissie-eisen? Worden er bepaalde technologieën of methoden voorgeschreven die gebruikt moeten worden? Zijn bepaalde technologieën of methoden verboden?

b. Beschikken bedrijven die een stookinstallatie exploiteren over meer informatie (m.b.t. relevante technologieën en organisatiekosten die gemoeid zijn bij emissiereductie) dan de overheid? Waar blijkt dit uit?

c. Zijn er hoge kosten bij het verzamelen van relevante informatie die nodig is voor de totstandkoming van emissiebeleid voor stookinstallaties?

d. Is er voldoende kennis aanwezig bij bedrijven om in hun eigen stookinstallatie effectief de emissies terug te dringen?

8. Market structure

    a. Hoe is de markt te karakteriseren waarin stookinstallaties functioneren? Is er veel concurrentie? Is de markt transparant?

    b. Is de markt stabiel of zijn er veel veranderingen (innovaties) met grote consequenties voor de markt?

    c. Zijn er onder het huidige emissiebeleid voor stookinstallaties veel barrières/beperkingen voor de toetreding van nieuwe bedrijven en de uitbreiding van bestaande bedrijven? Wat is het effect hiervan op innovatie (algemeen)?

9. Regulations and standards

    a. Zijn de emissie-eisen die de overheid stelt aan stookinstallaties ambitieus?

    b. Leiden deze emissie-eisen tot innovatie? Zo ja, resulteren de emissie-eisen in baanbrekende innovaties, of worden er relatief kleine veranderingen aangebracht in reeds bestaande werkwijzen?

    c. Zijn de emissie-eisen haalbaar binnen het tijdsbestek dat er voor staat? Heeft een kort tijdsbestek waarin emissie-eisen voor stookinstallaties gehaald moeten worden consequenties voor de innovaties die worden uitgevoerd? (Te denken valt aan korte termijn innovaties en relatief kleine innovaties.)

10. Demand/diffusion processes

    a. Zien bedrijven die stookinstallaties exploiteren de noodzaak in van stringente emissie-eisen voor emissie reductie?

    b. Zijn bedrijven bereid om hogere ambities te stellen om emissies terug te dringen dan de wettelijk vastgestelde emissie-eisen?

    c. Anticiperen bedrijven alvast op toekomstige meer stringente emissiewetgeving voor stookinstallaties? Wat is het effect hiervan op innovatie?

    d. Is er onzekerheid bij bedrijven die stookinstallaties exploiteren met betrekking tot de emissie reductie die de overheid verwacht te zien?

e. Proberen bedrijven invloed uit te oefenen op het emissiebeleid van stookinstallaties? Zo ja, in welke vorm? (Te denken valt aan gesprekken met de overheid of het opstellen van rapporten over emissiereductie.)

De huidige emissie wetgeving voor stookinstallaties bestaat uit specifieke emissie-eisen voor verschillende emissies/stoffen. Daarbij wordt er gedifferentieerd naar de grote van een stookinstallatie, naar het gebruik van verschillende brandstoffen, en naar emissie-eisen in specifieke situaties. Het beleid ten aanzien van stookinstallaties kan daarom gekarakteriseerd door kwantitatieve doelstellingen voor specifieke emissies. Bent u het eens met deze karakterisering van het emissiebeleid voor stookinstallaties? Aan de hand van deze omschrijving is het huidige beleid te typeren als overwegend op regels gebaseerd.

Een alternatief voor het huidige emissiebeleid zou een op principes gebaseerd beleid kunnen zijn. Dit type beleid houdt in dat er in plaats van specifieke gedetailleerde regels, algemene breed geformuleerde principes worden gesteld. Er wordt daarbij gebruik gemaakt van kwalitatief geformuleerde doelstellingen waarin de uitkomst van wetgeving (emissiereductie) centraal staat. De manier waarop deze doelstellingen vervolgens gehaald worden, wordt geheel overgelaten aan bedrijven. Het uitgangspunt daarbij is dat bedrijven zelf het beste weten hoe zij emissies het meest kostenefficiënt en effectief kunnen reduceren in hun organisatie, en dat zij daar geen inmenging van de overheid voor nodig hebben.

Om het verschil tussen beide typen beleid aan te geven volgt een voorbeeld. Een op regels gebaseerd beleid stelt bijvoorbeeld meerdere kwantitatieve uitkomsten voor specifieke emissies gedifferentieerd naar verschillende situaties. Een op principes gebaseerd beleid wordt gekenmerkt door enkele algemene kwalitatief geformuleerde principes zoals: “een stookinstallatie moet er zorg voor dragen zo min mogelijk emissies uit te stoten”, of “een stookinstallaties moet de best beschikbare technologieën aanwenden om emissies maximaal terug te dringen”. In plaats van vooraf specifiek aan te geven waarop de bedrijven worden beoordeeld, houdt een op principes gebaseerd beleid in dat achteraf de gekozen aanpak en de bewerkstelligde emissie reductie beoordeeld wordt op naleving. Een op principes gebaseerd beleid veronderstelt daarom een andere relatie tussen de overheid en het bedrijfsleven. De overheid neemt meer een toezichthoudende rol op zich en laat het bedrijfsleven komen met oplossingen om het uiteindelijke doel te bewerkstelligen.

De volgende vragen gaan over meerdere aspecten van een dergelijk op principes gebaseerd beleid voor emissiewetgeving voor stookinstallaties.

11. Interpretive risk

    a. Zal het voor bedrijven duidelijk zijn wat van hun verwacht wordt bij een dergelijk op principes gebaseerd beleid?

    b. Hoe gaan bedrijven om met risico's van investeringen die tot doel hebben de emissies te reduceren? Zijn zij risicomijdend of bereid om risico's te nemen?

12. Compliance risk

    a. Verwacht u dat een op principes gebaseerd emissiebeleid voor stookinstallaties zal leiden tot conservatief/voorzichtig gedrag bij bedrijven?

    b. Verwacht u dat een op principes gebaseerd emissiebeleid voor stookinstallaties zal leiden tot uniform gedrag bij bedrijven?

13. Internal management risk

    a. Hebben bedrijven voldoende kennis en middelen om principes in emissiebeleid voor stookinstallaties te vertalen naar een concreet plan van aanpak? Hoe zit dat bij kleinere stookinstallaties?

14. Ethical risk

    a. Is het aanvaardbaar om stookinstallaties achteraf te beoordelen op behaalde resultaten? Tenslotte zou het mogelijk kunnen zijn dat grote hoeveelheden emissies al in het milieu zijn terechtgekomen.

15. Trust risk

    a. Denkt u dat er bij de overheid voldoende vertrouwen is om bedrijven de ruimte te bieden zelf invulling te geven aan principes (en dus aan emissiereductie)?

    b. Heeft u zelf voldoende vertrouwen dat bedrijven in een dergelijk op principes gebaseerd beleid hun best blijven doen om emissie-eisen te halen?

    c. Verwacht u dat een dergelijk op principes gebaseerd beleid voor stookinstallaties het vertrouwen tussen de overheid en bedrijven zal doen toenemen?

16. Enhancing interpretation (in navolging van the interpretive risk)

    a. Hoe zou de overheid bedrijven die een stookinstallatie exploiteren kunnen faciliteren om principes te vertalen naar een concreet plan van aanpak?

17. Enforcement style (in navolging van the supervisory and enforcement risk)

    a. Verwacht u dat een responsief handhavingsysteem in emissiebeleid haalbaar is? Dat wil zeggen dat de overheid handhaving afstemt op de situatie. Overleggen waar het kan, sancties opleggen waar het uit de hand loopt.

18. Outcomes-based

    a. Verwacht u dat een dergelijk op principes gebaseerd beleid zal leiden tot een daadwerkelijke effectieve reductie van emissies voor stookinstallaties? Waarom wel of waarom niet?

19. Reallocating responsibilities

    a. In hoeverre verwacht u dat de rolverdeling tussen de overheid en de bedrijven zal veranderen bij principles based beleid ten opzichte van het huidige beleid? Is het te verwachten dat de overheid zich voornamelijk gaat richten op monitoren, en de bedrijven op het invullen en behalen van principes?

20. Meta-regulation

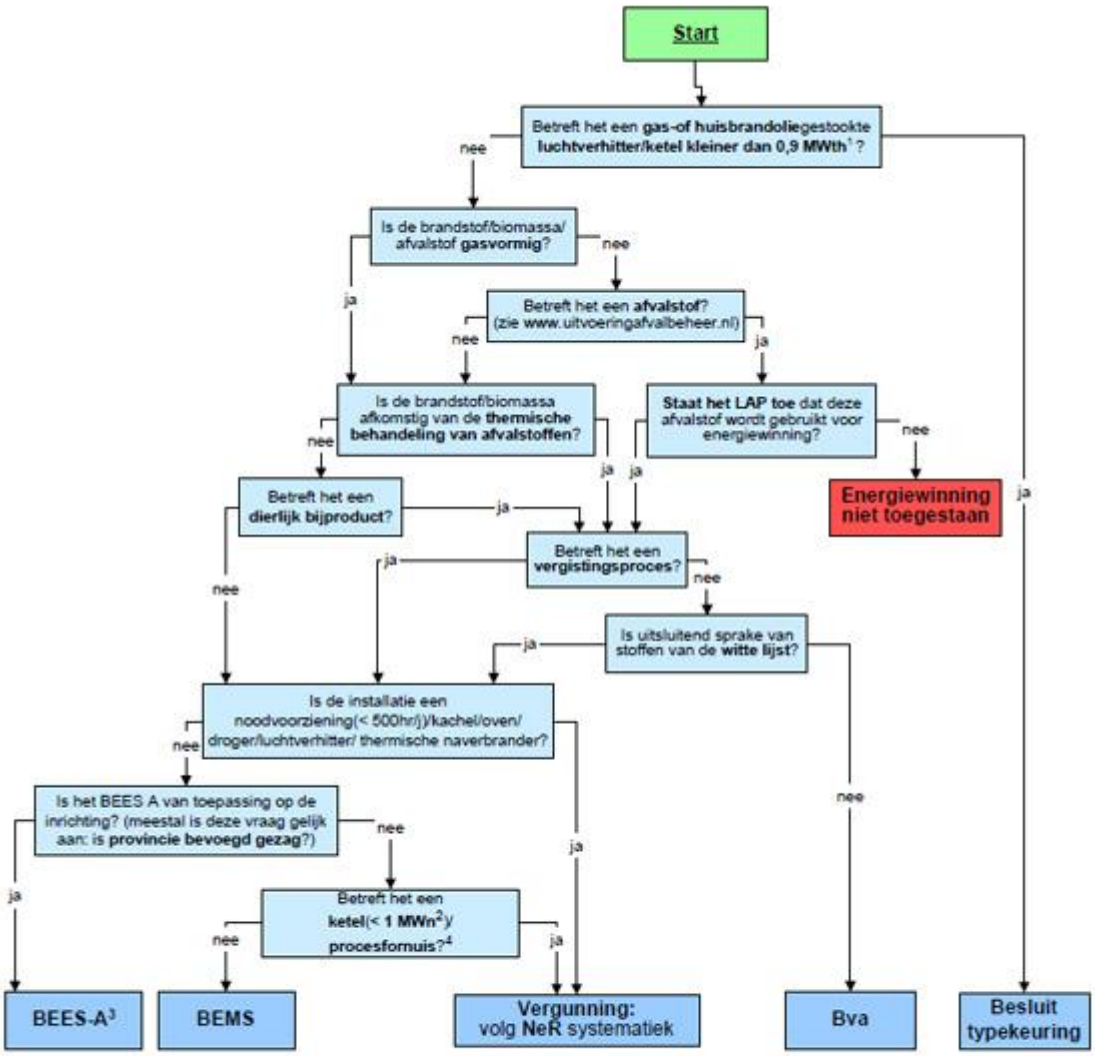
    a. Zou de overheid toezicht moeten houden in bedrijven op de vertaling van principes naar een concreet plan van aanpak? Zo ja, hoe zou dit toezicht eruit kunnen zien?

21. European regulation

    a. Zijn er vanuit de Europese Unie richtlijnen en/of verordeningen die een principles based emissiebeleid voor stookinstallaties belemmeren?

# Appendix C Legislation on combustion plants

Decision tree presenting relevant legislation for combustion plants.




[1] MWth: thermisch vermogen (op basis van brandstofinput) uitgedrukt in MW

[2] MWn: nominaal vermogen uitgedrukt in MW

[3] Mits thermisch vermogen boven ondergrens besluit

[4] Keuringplicht in het kader van het Bems geldt vanaf 20 kW

Retrieved on 20-07-2011, from http://www.infomil.nl/onderwerpen/klimaat-lucht/stookinstallaties/bems/informatieblad-bems/bijlage-ii/

# Appendix D Variables for the governmental decrees

**Decree waste Incineration (Bva)**

| | | | |
|---|---|---|---|
| art. 1 | N.A. | | |
| art. 2 | Specific | Qualitative terms | N.A. |
| art. 3 | Specific | Quantitative terms | N.A. |
| art. 4 | General | Qualitative terms | Means |
| art. 5 | Specific | Quantitative terms | Means |
| art. 6 | Specific | Qualitative terms | Means |
| art. 7 | Specific | Qualitative terms | Means |
| art. 8 | Specific | Qualitative terms | N.A. |
| art.9 | Specific | Qualitative terms | N.A. |
| art. 10 | Specific | Qualitative terms | N.A. |
| art. 11-14 | N.A. | | |
| art. 15-21 | N.A. | | |
| Appendix 1.1 | Specific | Quantitative terms | Goal |
| Appendix 1.2 | General | Quantitative terms | Means |
| Appendix 1.3 | General | Qualitative terms | Means |
| Appendix 1.4 | Specific | Quantitative terms | Goal |
| Appendix 1.5 | Specific | Qualitative terms | Goal |
| Appendix 1.6 | Specific | Qualitative terms | N.A. |
| Appendix 1.7 | Specific | Quantitative terms | Means |
| Appendix 1.8 | General | Qualitative terms | Means |
| Appendix 2.1 | Specific | Qualitative terms | Means |
| Appendix 2.2-2.7 | Specific | Quantitative terms | Means |
| Appendix 2.8 | Specific | Qualitative terms | Means |
| Appendix 2.9 | Specific | Quantitative terms | Goal |
| Appendix 2.10 | Specific | Quantitative terms | Means |

| | | | |
|---|---|---|---|
| Appendix 2.11 | General | Quantitative terms | Means |
| Appendix 2.12 | Specific | Quantitative terms | Means |
| Appendix 2.13 | Specific | Qualitative terms | Means |
| Appendix 2.14 | General | Qualitative terms | Means |
| Appendix 2.15 | Specific | Quantitative terms | Means |
| Appendix 2.16 | General | Qualitative terms | Means |
| Appendix 3.1 | Specific | Quantitative terms | Goal |
| Appendix 3.2 | Specific | Quantitative terms | Means |
| Appendix 3.3 | Specific | Qualitative terms | Means |
| Appendix 3.4 | Specific | Quantitative terms | Means |
| Appendix 3.5 | Specific | Quantitative terms | Means |
| Appendix 3.6 | Specific | Qualitative terms | N.A. |
| Appendix 3.7 | General | Qualitative terms | Goal |
| Appendix 3.8 | General | Qualitative terms | Goal |
| Appendix 3.9 | General | Qualitative terms | Means |
| Appendix 3.10 | General | Qualitative terms | Means |
| Appendix 3.11 | General | Qualitative terms | Goal |
| Appendix 3.12 | Specific | Qualitative terms | Means |
| Appendix 3.13 | General | Qualitative terms | N.A. |

**Decree Emission Standards for Combustion Plants A (Bees A)**

| | | | |
|---|---|---|---|
| art. 1 | N.A. | | |
| art. 2 | Specific | Quantitative terms | N.A. |
| art. 3 | General | Qualitative terms | Goal |
| art. 4 | Specific | Quantitative terms | Means |
| art. 5 | General | Qualitative terms | N.A. |
| art. 5a | General | Qualitative terms | Means |

| | | | |
|---|---|---|---|
| art. 6 | Specific | Qualitative terms | N.A. |
| art. 7 | Specific | Quantitative terms | Means |
| art. 7a | Specific | Quantitative terms | Means |
| art. 8 | General | Qualitative terms | N.A. |
| art. 9 | Specific | Quantitative terms | Goal |
| art. 10a-10c | Specific | Qualitative terms | N.A. |
| art. 11-13 | Specific | Quantitative terms | Goal |
| art. 14 | N.A. | | |
| art. 15-17 | Specific | Quantitative terms | Goal |
| art. 19 | N.A. | | |
| art. 20-23 | Specific | Quantitative terms | Goal |
| art. 24 | Specific | Quantitative terms | Means |
| art. 25 | Specific | Quantitative terms | Goal |
| art. 25a-25b | Specific | Quantitative terms | Means |
| art. 26-29 | Specific | Quantitative terms | N.A. |
| art. 30-30b | Specific | Qualitative terms | Means |
| art 30c-43 | Specific | Quantitative terms | Means |
| art. 43a-44 | Specific | Qualitative terms | Means |
| art. 45-50 | N.A. | | |

**Decree Emission Standards for Medium-sized Combustion Plants (Bems)**

| | | | |
|---|---|---|---|
| art. 1.1 | N.A. | | |
| art. 1.2, 1.3 | Specific | Qualitative terms | N.A. |
| art. 2.1.1-2.1.4 | Specific | Quantitative terms | Goal |
| art. 2.1.5 | Specific | Qualitative terms | N.A. |
| art. 2.2.1 | Specific | Qualitative terms | Goal |
| art. 2.2.2 | General | Qualitative terms | Means |

| | | | |
|---|---|---|---|
| art. 2.3.1, 2.3.2 | Specific | Quantitative terms | Means |
| art. 2.3.3 | Specific | Quantitative terms | Goal |
| art. 2.3.4 | Specific | Quantitative terms | Means |
| art. 3.1.1 | General | Qualitative terms | N.A. |
| art. 3.1.2 | Specific | Qualitative terms | Means |
| art. 3.1.3 | Specific | Quantitative terms | Means |
| art. 3.1.4 | Specific | Qualitative terms | Means |
| art. 3.2.1-3.2.4 | Specific | Quantitative terms | Means |
| art. 3.3.1 | Specific | Qualitative terms | Means |
| art. 3.3.2 | General | Quantitative terms | Goal |
| art. 3.3.3 | Specific | Qualitative terms | Means |
| art. 3.3.4 | Specific | Quantitative terms | Means |
| art. 3.4 | N.A. | | |
| art. 4.1 | Specific | Quantitative terms | Means |
| art. 5.1 | General | Qualitative terms | Means |
| art. 6.1-6.8 | N.A. | | |