A close-up photograph of a hand moving a dark wooden chess king piece on a light-colored board. The hand is positioned at the top left, with fingers gripping the piece. The piece is being lifted and moved towards the right. In the foreground, another chess piece (a pawn) is visible on the left, and a king piece stands on the right. The background is softly blurred, showing other chess pieces on the board. The lighting is dramatic, with strong highlights and deep shadows, creating a sense of focus and strategic movement.

Magda Smink

Incumbents and institutions in sustainability transitions

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Incumbents and institutions in sustainability transitions

Gevestigde organisaties en instituties
in duurzaamheidstransities

(met een samenvatting in het Nederlands)

Proefschrift

ter verkrijging van de graad van doctor aan de Universiteit Utrecht op gezag van de rector magnificus, prof. dr. G.J. van der Zwaan, ingevolge het besluit van het college voor promoties in het openbaar te verdedigen op vrijdag 20 november 2015 des middags te 12.45 uur

door

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A close-up, high-contrast photograph of a hand moving a chess piece. The hand is positioned at the top, with fingers gripping a dark chess piece. The background is bright and out of focus, showing other chess pieces on a board. The lighting creates strong shadows and highlights, emphasizing the texture of the skin and the wood of the pieces.

It ought to be remembered that there is nothing more difficult to take in hand, more perilous to conduct, or more uncertain in its success, than to take the lead in the introduction of a new order of things. Because the innovator has for enemies all those who have done well under the old conditions, and lukewarm defenders in those who may do well under the new. This coolness arises partly from fear of the opponents, who have the laws on their side, and partly from the incredulity of men, who do not readily believe in new things unless they have tested them by experience.

Niccolò Machiavelli, *The Prince*

Chapter

1

Introduction



1.1 BACKGROUND

The world faces a multitude of sustainability problems related to the provision of basic needs such as food, energy, and transport. For instance, these problems include loss of biodiversity, scarcity of resources, and traffic congestion. Fundamental changes are required in order to solve these sustainability problems. Therefore, a transformation is required of the socio-technical systems that provide these basic societal needs. Such transformations are labeled sustainability transitions (Geels, 2004; Smith et al., 2005).

The energy system is a crucial element of both the food and transport systems. The energy system literally drives transport and facilitates food production through energy-intensive agriculture. Therefore, the energy system is the focus of this thesis. This system is largely based on fossil fuels, which create a number of increasingly pressing sustainability problems: fossil fuels are the largest contributor to climate change (IPCC, 2014) and fossil fuels cause local air pollution (WHO, 2015). Moreover, especially oil resources are finite (Leggett, 2014) which is problematic due to the wide range of ubiquitous materials that are based on oil, such as plastics. In sum, the current system in which we use fossil fuels (hence: fossil fuel system) for the purpose of energy and materials production is in need of a transformation.

Governments have recognized the need to reduce the use of fossil fuels and to stimulate renewable energy technologies in order to address the above mentioned issues. This shift from fossil fuels towards renewable energy technologies and towards more efficient use of energy is called the energy transition. As a first step, governments have agreed to prevent dangerous human-induced climate change in the 1992 UN Framework Convention on Climate Change (UNFCCC, 1992). The European Commission issued a climate and energy package in 2009, including targets for renewable energy production, CO₂ emission reduction, and energy efficiency (European Commission, 2009b). To fulfill these targets, several renewable energy sources are available, such as solar energy, wind energy, geothermal energy, biomass, and hydro power.

However, while the production of renewable energy increases (IEA, 2015), this does not mean the role of fossil fuels in energy and materials production automatically decreases. In fact, the fossil fuel industry is still expanding (Hansen et al., 2013) and in recent years has started exploring and exploiting more polluting and more dangerous unconventional fossil fuels, such as tar sands, shale gas, deep sea oil reserves, and Arctic oil. Exploiting these fossil fuels does not only imply relatively higher CO₂ emissions, but also involves increased risks of accidents given the difficult production circumstances. Serious accidents have already happened with deep sea

drilling (Gulf of Mexico in 2010) and with oil trains coming from the Canadian tar sands (Lac Mégantic in 2013).

In sum, we are presented with a paradox: despite the societal need, the targets set by policy makers, and the availability of renewable energy technologies, the fossil fuel system keeps expanding into increasingly unsustainable directions. This raises the question of why it is so difficult to move away from fossil fuels.

One part of the explanation lies in the essential role fossil fuels play in the functioning of our society. The fossil fuel system is not just a part of society, but literally fuels almost all of society's activities. Besides, fossil fuels serve as feedstock for many basic materials such as plastics, solvents, asphalt, and lubricants, which are then turned into countless products. Fossil fuels are characterized by a very high energy density: an enormous amount of work can be done with the energy contained in one unit of coal, gas, or oil. Thus, the abundance of conventional fossil fuels has greatly contributed to our welfare.

What is more, the very fabric of our industrial society has co-evolved with the development of fossil fuels. Since the industrial revolution, a close alignment has been formed between the rules that guide our society and economic system, and the fossil fuel system. Laws and regulations are aligned with a centralized fossil fuel system that depends on large supplies of oil, coal, and gas. The rules that both enable and constrain our behavior and give structure and stability to our society are also referred to as *institutions* (Scott, 2014). Regulatory institutions such as energy taxation, fuel quality norms, and safety standards for central heating systems have been set in accordance with the fossil fuel system. Normative institutions are also aligned with fossil fuels. Exploitation of fossil fuels is perceived as a legitimate means to pursue national wealth, employment, and economic growth. In addition, fossil fuels bear less scrutiny than alternative energy technologies. Cultural-cognitive institutions are also in line with the fossil fuel system. Fossil fuels are perceived as the logical or taken for granted way of energy provision. They are commonly believed to be cheap and efficient.

Due to our institutions' alignment with the fossil fuel system, the energy transition is not only a technological problem, but also requires the transformation of an enormous amount of institutions. However, institutional change is a difficult process (North, 1990; Battilana et al., 2009).

Furthermore, the prevalence of established organizations in the fossil fuel industry forms another part of the explanation why it is so difficult to move away from the fossil fuel system. These so-called *incumbents* have traditionally been part of the fossil fuel system and therefore have extensive vested interests. These entail for instance infrastructure assets and competencies related to fossil fuel exploration, production, distribution, and sales. Incumbents mostly benefit from the current system and stand

to lose a large share of their potential profits when energy production shifts towards renewable energy technologies. Given the impact of the energy transition on fossil fuel incumbents, it is likely that companies will attempt to protect their fossil fuel interests (cf. Policy Studies Institute, 2015).

Moreover, the sheer economic value of the fossil fuel system and its strategic importance for society make that incumbents are also actors with substantial political influence. Seven out of ten of the world's largest companies are related to fossil fuels: Shell, Exxon Mobil, BP, Glencore as well as three Chinese state owned companies (Fortune, 2014). Oil, gas, and coal companies are worth nearly 5 trillion dollar (Bloomberg, 2014). Due to energy's strategic importance, there is strong political involvement in energy markets. Fossil fuel incumbents' close ties with the political system may help incumbents to influence the regulatory institutions that protect their interests. For instance, Shell lobbied the European Commission to remove renewable energy targets so as to benefit natural gas development (The Guardian, 2015).

This thesis focuses on both institutions and incumbents in the energy transition. We study the interaction between institutions and incumbents in both ways. Given that institutions guide behavior, we investigate how incumbents' behavior is being influenced by existing institutions. Given that incumbents are powerful actors, we also extensively investigate how incumbents actively influence institutions in the context of the energy transition.

The field of sustainability transitions focuses on fundamental change processes of socio-technical systems towards more sustainable configurations (e.g. Geels, 2004; Smith et al., 2005; Van den Bergh et al., 2011; Markard et al., 2012). Socio-technical systems consist of both social and material structures, such as policies, culture, technologies and markets. These elements are interdependent and have co-evolved over time into stable configurations that fulfill societal needs such as energy provision (Fuenfschilling & Truffer, 2014).

Transitions therefore unfold along multiple dimensions: technological, material, organizational, institutional, political, economic, and socio-cultural (Markard et al., 2012). Transitions are complex processes that span extended time periods (Geels, 2002; Van den Bergh et al., 2011; Markard et al., 2012). Multiple actors are involved by reproducing, maintaining, and transforming the system elements (Geels, 2002; 2004; 2011; Smith et al., 2005). Another characteristic of sustainability transitions is that they are goal-oriented or purposive (Smith et al., 2005; Geels, 2011). The aim of creating more sustainable socio-technical systems requires changes in regulative

institutions and thus requires the active involvement of public authorities (Smith et al., 2005; Geels, 2011; Van den Bergh et al., 2011).

The multi-level perspective (MLP) is the main framework in the sustainability transitions field and states that transitions happen as a consequence of interactions between three analytical levels: the socio-technical regime, the niche, and the landscape (Geels, 2002). Each level presents a different measure of structuration (Geels, 2011) or degree of institutionalization (i.e. persistence) (Fuenfschilling & Truffer, 2014).

The socio-technical regime ‘forms the ‘deep structure’ that accounts for the stability of the socio-technical system’ (Geels, 2011:27; Markard & Truffer, 2008). The regime consists of a semi-coherent set of rules that guide actors’ behavior, such as cognitive routines and shared beliefs, competencies, user practices, regulations, and legally binding contracts (Geels, 2004; 2011). These rules are highly institutionalized and therefore enjoy a high degree of stability. This stability is related to low dissent and controversy, invulnerability to social resistance, and path dependency (Fuenfschilling & Truffer, 2014).

In contrast, niches are alternative socio-technical configurations where novelty develops (Geels, 2002). They are characterized by a weak degree of institutionalization. In order to mature and transform the regime, niches need to be protected from regime pressures (Markard & Truffer, 2008), e.g. through regulatory support in the form of subsidies or research grants (Fuenfschilling & Truffer, 2014). Finally, the landscape provides an external context to both niche and regime dynamics. The landscape includes factors that change only slowly and cannot be influenced by actors in the short term, such as demographical trends, political ideologies, societal values, and macro-economic patterns (Markard & Truffer, 2008; Geels, 2011). Against a background of landscape developments, the niche–regime interface is where systemic change occurs. Thus, the MLP conceptualizes transitions as interaction processes between multiple socio-technical configurations with different levels of institutionalization and hence, stability.

In sum, a core MLP insight is that rules are at the heart of the stability of socio-technical regimes (Geels, 2004). These rules are synonymous with *institutions*: ‘regulative, normative and cultural-cognitive elements that, together with associated activities and resources, provide stability and meaning to social life’ (Scott, 2014:56)¹. Institutions guide actors’ behavior by enabling some activities and constraining other activities. Moreover, they ‘resist change’ (Scott, 2014:57). Regulative institutions include formal rules, laws, and sanctions. Normative institutions are more informal

1 This definition excludes organizations and focuses on ‘the rules of the game’ (North, 1990:3), in accordance with the MLP literature (e.g. Geels, 2004).

and consist of binding expectations about what is legitimate or appropriate behavior. Finally, cognitive institutions are constitutive schema or common beliefs that influence how actors perceive the external world and ‘through which meaning is made’ (Scott, 2014:67).

The focus on institutions is especially relevant for the field of sustainability transitions, because of transitions’ purposive nature and their dependency on policy support (van den Bergh et al., 2011; Geels, 2011, Meadowcroft, 2011). As a consequence, actors willing to influence sustainability transitions need to direct an important part of their attention to the institutional environment. It is essential to understand that institutions reflect interests from the past: ‘Institutions are not necessarily or even usually created to be socially efficient; rather they, or at least the formal rules, are created to serve the interests of those with the bargaining power to devise new rules’ (North, 1990:16).

The MLP literature has also widely acknowledged the role of incumbents in transition processes (Geels, 2004, Smith et al., 2005, Markard & Truffer, 2008). *Incumbents* are established organizations in a sector. Due to the co-evolution of technology and institutions (Geels, 2004; Brown et al., 2013), incumbents’ interests are supposed to be aligned with current regime institutions. Thus, incumbents generally (financially) benefit from regime institutions. The term ‘incumbents’ is sometimes used synonymously with ‘regime actors’ (e.g. Berggren et al., 2014) or ‘powerful regime actors’ (e.g. Kern et al., 2014), signaling that incumbents are not only perceived as established actors, but also as powerful actors.

Geels and Schot (2007) elaborated on possible pathways for incumbents’ interaction with niches. When incumbents’ practices come under pressure they can defend themselves by investing heavily in the current technology or by (partially) adjusting to niche pressure through redirection of their technological development. Furthermore, incumbents are assumed to defend regime institutions and engage in ‘power struggles’ with newcomers (Geels & Schot, 2007, p. 410).

Adjacent innovation and sustainable innovation literature has also addressed incumbents’ role in change processes. A central theme is whether incumbents are able to pursue the radical innovations needed for a sustainability transition. Radical innovations involve substantially different technologies compared to existing products. Therefore, they require different knowledge and competences and render obsolete existing knowledge and competences. In contrast, incremental innovations build on the existing knowledge and competences (e.g. McDermott & Colarelli O’Connor, 2002). Incumbents are often assumed to have no interest in radical technological innovation, because they are ‘restricted by their existing assets, which reflect past investments’ (Hockerts & Wüstenhagen, 2010: 487). Studies show how incumbents use the various means they have at their disposal to hinder or slow down radical

sustainable innovation (Wesseling et al., 2014; Stenzel & Frenzel, 2008). However, literature also suggests that incumbents can in fact escape the ‘incumbents’ curse’ of incremental innovation (e.g. Chandy & Tellis, 2000; Ahuja & Lampert, 2001; O’Reilly III & Tushman, 2008, Hill & Rothaermel, 2003). Stenzel & Frenzel (2008) show that in Spain, the traditional utilities have become the leading players in wind energy. The authors argue that if a firm’s resource base matches with future developments, ‘incumbents can be drivers of transformations of the energy system both in terms of technological development and regulatory adaptation’ (p. 2655).

The literature discussed above has contributed to our understanding of socio-technical change processes. In addition, it provides us with some first insights into the role of incumbents in these change processes. However, understanding the role of incumbents in transition processes requires more development. While it has been acknowledged that agency plays an important role in transitions, *how* exactly actors behave and *why* they do so has remained largely understudied (Markard & Truffer, 2008; Geels, 2011; Smith et al., 2005; Farla et al., 2012, Markard et al., 2012; Smith et al., 2005). This is related to the MLP’s focus on meso-level *processes* instead of micro-level *actor behavior*. Also, MLP studies so far have paid most attention to the niche level, resulting in an *innovation bias* (Geels, 2014). So apart from overlooking actor behavior, especially regime actors and their behavior have been widely disregarded (Hess, 2014). Lastly, little attention has been paid to how incumbents influence institutions. This may be a crucial relationship in transition processes. Namely, if institutions provide stability to socio-technical regimes and incumbents are powerful actors, able to influence these very institutions, this implies that the stability of the regime is also partially dependent on the active support of powerful actors. Therefore, we cannot fully understand transitions by accepting institutions as ‘given’, but we need to investigate the how exactly incumbents contribute to the stability and change of those institutions.

Building on the centrality of the interaction between institutions and incumbents in transition processes, this thesis asks the question:

- How do incumbents and institutions interact in sustainability transitions?

On the one hand, given the importance and persistence of institutions, we study how incumbent behavior is influenced by institutions. On the other hand, actors do not only react to institutions, they also shape them. Reflecting this two-way relationship between incumbents and institutions, two sub-questions have been formulated:

- How do incumbents influence institutions?
- How are incumbents influenced by institutions?

The following section presents the theoretical framework of this thesis. We draw on insights from institutional theory for more insights into how actors influence institutions and how institutions influence actors in turn.

1.2 THEORETICAL FRAMEWORK

The research question above relates to the structure-agency dilemma (e.g. Scott, 2014:92). This discussion stems from assumptions on the relationship between actors and their environment (e.g. Seo & Creed, 2002). Some institutional scholars emphasize how institutions structure and constrain the behavior of actors. This deterministic view contrasts with the view of authors that highlight agency: ‘an actor’s ability to have some effect on the social world’ (Scott, 2014:94). The framework of ‘structuration’ (Giddens, 1984) is a contribution that aims to solve this dilemma. This framework sees actors as embedded in social structures, but nevertheless enjoying an amount of freedom to go beyond the existing social structures and act differently. Social structures are ‘both the medium and the outcome’ of social action (Giddens, 1984:25).

1.2.1 Institutional work: how incumbents influence institutions

A starting point for understanding actors’ agency is the growing recognition that while institutions are often presented as influencing actors’ behavior, they themselves also depend on actors’ support for their continuity. After all, institutions are constructed by the very same actors. Lawrence and Suddaby (2006, p. 217) therefore emphasize that to survive ‘[institutions] require the active involvement of individuals and organizations in order to maintain them over time’. These maintenance activities are a part of a wider range of activities that actors employ to create, maintain, and disrupt institutions. These activities are labeled ‘institutional work’: ‘the purposive action of individuals and organizations aimed at creating, maintaining and disrupting institutions’ (p. 215). Institutional work emphasizes actors’ abilities to go beyond the existing institutions as it ‘highlights the awareness, skill and reflexivity of individual and collective actors’ (p. 219). Institutional work activities are mostly discursive in nature: they involve ‘practices of speaking and writing’ (Lawrence & Suddaby, 2006:239).

Institutional work aimed at maintaining institutions includes the more or less conscious reproduction of ‘social mechanisms that ensure compliance’ (Lawrence & Suddaby, 2006: 230). *Maintenance work* ‘often occurs as a consequence of change in the organization or its environment’ (Lawrence & Suddaby, 2006: 234). When initia-

tives for institutional change threaten to disrupt institutions favoring particular powerful interests, actors engage in the 'conscious and strategic' version of maintenance work: 'defensive institutional work' (Maguire & Hardy, 2009:169). These activities are partially aimed at 'reproducing existing norms and belief systems' (Lawrence & Suddaby, 2006, p. 230) and involve 'the authoring of texts that contest problematizations of practices by (a) countering assertions of negative impacts of practices; (b) countering categorizations of practices as unethical, undesirable, or inappropriate; and (c) countering calls for regulatory change' (Maguire & Hardy, 2009, p. 169). As a consequence, proponents of institutional change have to overcome 'opposition and resistance from insiders whose interests are threatened by the abandonment of existing practices' (p. 150). Actors aiming to create institutions have been studied extensively under the heading of *institutional entrepreneurship*, which entails '... activities of actors who have an interest in particular institutional arrangements and who leverage resources to create new institutions or to transform existing ones' (Garud et al., 2007:957). These activities include e.g. cooperation, framing, and political tactics (Pacheco et al., 2010). Finally, actors may strive to disrupt existing institutions through *disruptive institutional work*. Few studies dedicated to this type of institutional work exist. Nonetheless, based on a literature overview, Lawrence & Suddaby (2006) present a tentative list of three activities that are part of disruptive institutional work: disconnecting sanctions/rewards, disassociating moral foundations, and undermining assumptions and beliefs.

The term 'incumbent' in institutional theory also entails the notion of 'powerful' (e.g. Van Wijk et al., 2013), similar to the use in transition studies. Moreover, the term 'incumbents' is used synonymously with 'field dominants', as opposed to 'field challengers' (Levy & Scully, 2007). This suggests that also in institutional theory incumbents are expected to protect the status quo, by maintenance work. In contrast, field challengers or niche actors are expected to engage in creating and disrupting institutions that change the status quo, via institutional entrepreneurship and disruptive institutional work, respectively (e.g. Greenwood & Suddaby, 2006). However, this thesis does not only investigate incumbents' maintenance work, but is also particularly interested in how incumbents create and disrupt institutions.

1.2.2 Institutional logics: How incumbents are influenced by institutions

The institutional work approach provides insight into the behavior of actors in relation to institutions, especially into *how* they influence institutions. This section takes a step back from actors' purposive actions to influence institutions and focuses on how these actors are also being influenced by institutions. The institutional logics approach highlights the consequences of institutions for actors' behavior (Thornton

et al., 2012). This approach is a relatively new and growing body of literature within institutional theory.

Institutional logics are defined as ‘the socially constructed, historical patterns of material practices, assumptions, values, beliefs, and rules by which individuals produce and reproduce their material subsistence, organize time and space, and provide meaning to their social reality’ (Thornton & Ocasio, 1999:804; Zilber, 2013). In other words, the concept includes both practices (the typical way of operating) and the underlying belief system (ideas and guidelines) that influence individual actors’ acting and thinking. Thus, institutional logics influence ‘How actors make sense of and act upon reality’ (Fuenfschilling & Truffer, 2014:774). While the institutional logics approach recognizes that actors ‘have the capacity to innovate and thus transform institutional logics’ (Thornton et al., 2012:3), its emphasis lies with how institutional logics influence actors’ behavior.

Research on institutional logics focuses on the different institutional orders of society, i.e. family, religion, state, market, profession, and corporation (Thornton et al., 2012). Each of these orders is characterized by a set of ‘ideal-type’ institutional logics. Here we highlight the main goal and operating principles for the relevant ideal-type institutional logics. The *state* aims to increase the community good and does so by bureaucratic mechanisms. Under the *profession* logic, people strive to increase personal reputation by relying on personal expertise and quality of craft. The *family* is geared towards increasing family honor by mechanisms of loyalty, household position, and patriarchal domination. The *market* logic dictates a focus on increasing profit through the mechanism of transaction. The *corporation* aims at increasing the size of the firm and operates according to actors’ status in the hierarchy. Finally, *religion* aims at increasing religious symbolism of natural events by using priesthood charisma and association with deities.

In practice, organizations or sectors are shaped by *field-level specific* institutional logics. These specific institutional logics are combinations of the ideal-type institutional logics mentioned above (Thornton et al., 2012). The characteristics of field-level specific institutional logics depend on a sector’s particular opportunities, restraints and resources. The six institutional logics provide a yardstick to analyze and explain sector-specific institutional logics.

The institutional logics concept offers not only an understanding of how actors behave under the influence of a particular set of institutional logics, but also *why* actors behave the way they do. This concept will therefore improve our understanding of why incumbents engage in certain types of behavior during transition processes. This includes for example their preferences for particular (technological) solutions, given that ‘... institutional logics determine what answers and solutions are available and appropriate in controlling economic and political activity in organizations’ (Thornton

& Ocasio, 1999:806). Moreover, the institutional logics approach emphasizes that institutions have both symbolic and material elements, and recognizes that these are 'intertwined and constitutive of one another' (Thornton et al, 2012:10). This emphasis on the material element (Zilber, 2013:82) distinguishes institutional logics studies from studies employing the general concept of institutions. While materials are mentioned in the definition in the form of 'resources' (Scott, 2014:56), in practice most studies focus on the symbolic aspects of social life, i.e. the regulative, normative, and cultural-cognitive elements (Scott, 2014: 57; Geels, 2004).

The inclusion of social and material elements in the institutional logics approach matches with the alignment of social and technical elements in a socio-technical regime (Fuenfschilling & Truffer, 2014). Infrastructure plays an important role in the energy transition. For instance, the material and long-term nature of regime infrastructure contributes to the stability of a regime (cf. Markard, 2011). Due to its attention for material elements, the institutional logics approach is very well suited to highlight the role of physical infrastructure in transition processes. The institutional logics approach is able to shed light on how the physical infrastructure influences actors' behavior. In addition, the approach will show what the underlying motivations for this behavior are and why this behavior is logical from the actors' point of view.

1.3 CASE SELECTION AND THESIS OUTLINE

The research question of how incumbents and institutions interact is set against the background of the fossil fuel system transition that proceeds more slowly than we aspire, given the (recognized) necessity of such change processes, the technologies available, and knowledge on how to promote change. This thesis therefore uses purposive sampling and conducts case studies in a country that meets two criteria. The first is that the country is characterized by a relatively slow energy transition compared to EU renewable energy production targets as well as to other EU Member States. The second criterion is that the country has incumbents that will be affected by this energy transition. In such a situation we expect to observe incumbents actively protecting their (vested) interests as well as incumbents being influenced by institutions during this transition process.

The Netherlands fulfills both criteria. The Netherlands is among the lowest performing EU Member States when it comes to the production of renewable energy (Eurostat, 2015). Of the total energy produced in the Netherlands, only 4,5% was renewable energy in 2013 (Eurostat, 2015). Only Malta and Luxemburg score lower, with 3,8% and 3,6%, respectively (Eurostat, 2015). Dutch production of renewable energy shows only a minimal increase compared to previous years, raising doubts

about whether the Netherlands will meet its 14% target by 2020. This result contrasts sharply with the achievements of nearby countries Germany (12,4%) and Denmark (27,2%) where the share of renewable energy in gross final energy consumption is on track to fulfill the 2020 EU renewable energy target (Eurostat, 2015).

Secondly, a distinct characteristic of the Netherlands is the vital importance of fossil fuels for the Dutch economy as well as the government. According to the International Energy Agency (2014a:3), the Netherlands has one of the largest fossil fuel and CO₂ intensive economies of Europe. Activities in the energy sector (e.g. production, processing and transport of oil, gas and electricity) account for 6% of GDP (Ministry of Economic Affairs, 2011) and a striking 20% of the annual government budget (e.g. through taxation) (TNO, 2013). The country's enormous natural gas reserves contributed between 10 and 15 billion euros and 6 to 9% to the government budget annually, in the years 2006-2012 (Algemene Rekenkamer, 2014:15-16). It is home to the oil and natural gas company Shell and the energy seaport of Rotterdam (e.g. crude oil and coal). Taxes on oil products alone generate 5% of total government revenues (CBS, 2011a). With the domestic gas production that started in the 1960s, the Netherlands has supported several energy intensive industries (e.g. oil refineries, steel, chemicals, paper, and concrete). The scale of these fossil fuel activities is visible on an international level. The Netherlands currently provides 2,5% of the world's total gas production, making it the world's 8th largest producer of natural gas, and the 7th largest exporter of natural gas (IEA, 2014b:13). Dutch harbors, especially Rotterdam, and its refineries make it the 9th largest importer of crude oil in the world (IEA, 2014b:11).

In fact, despite efforts to meet EU targets the Netherlands has recently invested and plans to invest in new fossil fuel projects. Recently, three new coal-fired power plants have been opened. The government has invested substantially in gas infrastructure, so as to become the 'Gas Roundabout' of Northwestern Europe (Ministry of Economic Affairs, 2006; 2011:16-19; Algemene Rekenkamer, 2012). Shale gas exploitation is being promoted by the government as well as new conventional gas exploitation in the Wadden Sea, a world heritage site. Damaging earthquakes in the province of Groningen caused by natural gas exploitation have been no reason for the government to substantially reduce the gas production (Algemene Rekenkamer, 2014:13).

Previously, several authors have already shown that incumbents have been able to (partially) capture the Dutch energy transition initiatives, which has reduced the potential for change (Avelino, 2009; Kern & Smith, 2008; Scrase & Smith, 2009; Voß et al., 2009). Generally, the Netherlands has been characterized as an economy top heavy with dominant large firms, resulting in too little pressure to innovate (Raad van Economisch Adviseurs, 2005:7). Vested interests have been protected 'too much and too often' (p. 7). In the current setting of EU renewable energy targets combined with

the large amount of various types of incumbents with vested interests that may be affected, we expect to see interactions between incumbents and institutions relevant for sustainability transitions.

Four case studies have been conducted which highlight the relationship between incumbents and institutions in the context of the transition of the fossil fuel system. The thesis analyses incumbent behavior regarding the institutions supporting biofuels, LED lighting, biomethane, and the bottle deposit system. Each case study features a transition process in which institutions and institutional change are a focal element. On the one hand, we selected cases so as to represent incumbents' influence on insti-

Table 1.1 Overview of Chapters

	Sub-question	Institutional theory stream	Case
Chapter 2	How do incumbents influence institutions?	Maintenance work & Defensive institutional work	Biofuels, LED
Chapter 3		Disruptive institutional work	Bottle deposit
Chapter 4		Institutional entrepreneurship (i.e. creating institutions)	Biomethane
Chapter 5	How are incumbents influenced by institutions?	Institutional logics	Biomethane

tutions. We investigated three cases that each highlight one of the three categories of institutional work: maintenance work, institutional entrepreneurship, and disruptive institutional work. These are addressed in Chapters 2, 3, and 4, respectively. On the other hand, the fourth case study presented in Chapter 5 has been selected to show the influence of institutional logics on incumbents' behavior. See Table 1.1 for an overview of the analytical and empirical focus of each chapter.

Chapter 2 features an exploratory study into how incumbents influence institutions. It shows how incumbents engage in a specific form of maintenance work: defensive institutional work. The empirical cases presented are LED lighting and biofuels. Both the lighting and oil incumbents defend existing institutions when LED lighting was introduced to the market and when biofuel blending was mandated by government, respectively. The results shows how in both cases, incumbents employed multiple defensive institutional work activities to slow down the introduction of the new technology. The Chapter elaborates on how incumbents lobby policy makers and influence the public debate.

Chapter 3 showcases how incumbents engage in disruptive institutional work. The Dutch bottle deposit system provides the empirical context in which incumbents

aim to disrupt existing institutions. The packaging industry employs disruptive institutional work to fulfill its longstanding wish to eliminate from their operations the inconvenience and costs of running the bottle deposit system. Core elements of this type of institutional work are framing, conducting research, and negotiation in order to undermine the cultural-cognitive, normative, and regulatory pillars of the bottle deposit system.

Chapter 4 illustrates how incumbents create institutions through institutional entrepreneurship. In this case, Dutch gas incumbents promote the development of biomethane, the upgraded version of biogas. Where previously, biogas farmers had been largely unsuccessful in creating supporting institutions for biogas, incumbents' institutional entrepreneurship resulted in substantial institutional change stimulating biomethane development. Both incumbents and new entrants (biogas farmers) engaged in cooperation, framing, and political tactics. However, we observe important differences and find that incumbents' activities display a much higher level of sophistication.

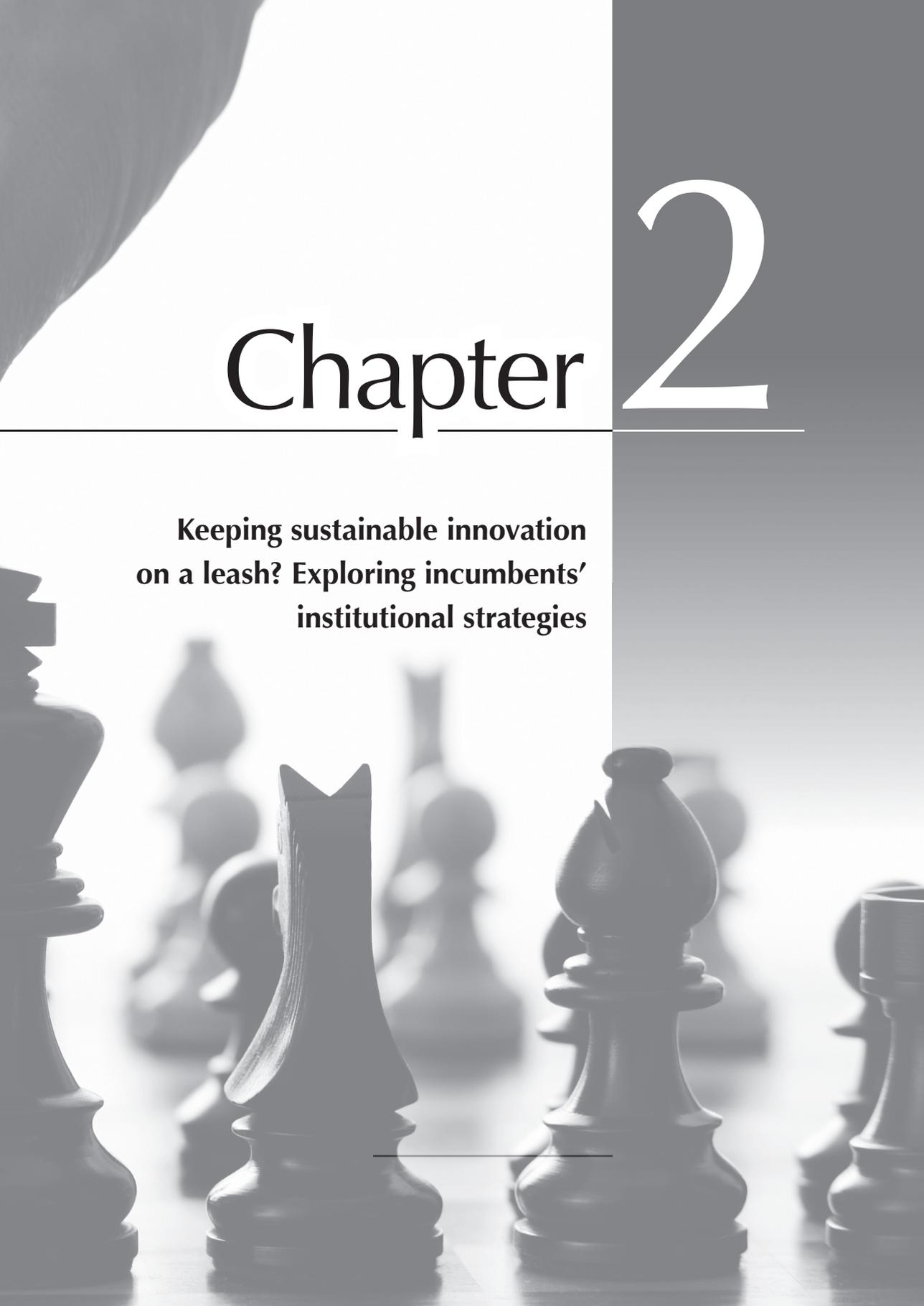
Whereas Chapters 2, 3, and 4 predominantly focus on *how* incumbents behave, Chapter 5 pays explicit attention to *why* incumbents behave in a certain way. This increases our understanding of why transitions are slow processes. To add a different perspective to the relation between incumbents and institutions, we apply another analytical perspective within institutional theory. Chapter 5 studies the above mentioned biomethane case through the lens of institutional logics. The Chapter focuses on the problematic interaction between gas network operators and biomethane producers. The institutional logics perspective shows that much of the difficulties that arise in the cooperation between network operators and biomethane producers stems from a mismatch in institutional logics. Whereas network operators function under a hierarchy logic, biomethane producers operate under a largely divergent entrepreneur logic. The hierarchy logic that guides network operators steers their behavior towards prioritizing safety and reliability of the gas provision, hierarchical and formal decision-making, and large-scale infrastructural arrangements. Due to the mismatch with the biomethane producers' entrepreneur logic, it is extremely difficult for network operators to accommodate biomethane in their infrastructure.

A grayscale photograph of a hand moving a chess piece on a board. The hand is positioned at the top, with fingers gripping a dark chess piece. The background is bright and out of focus, showing other chess pieces on the board. The overall mood is contemplative and strategic.

He was a brilliant talker, and when he was arguing some difficult point he had a way of skipping from side to side and whisking his tail which was somehow very persuasive. The others said of Squealer that he could turn black into white.

The mystery of where the milk went to was soon cleared up. It was mixed every day into the pigs' mash. ... 'Comrades!' [Squealer] cried. 'You do not imagine, I hope, that we pigs are doing this in a spirit of selfishness and privilege? Many of us actually dislike milk and apples. I dislike them myself. Our sole object in taking these things is to preserve our health. Milk and apples (this has been proven by Science, comrades) contain substances absolutely necessary to the well-being of a pig. We pigs are brain-workers. The whole management and organization of this farm depend on us.

George Orwell, *Animal Farm*



Chapter 2

**Keeping sustainable innovation
on a leash? Exploring incumbents'
institutional strategies**

ABSTRACT

This research aims to identify the institutional strategies of incumbent firms with regard to sustainable energy innovations that threaten their interests. This exploratory study contributes to the multi-level perspective by providing new insights into niche–regime interaction. The focus on actor behavior in transitions is informed by literature from institutional theory and strategic management. Based on semi-structured interviews with actors and on documents related to LED lighting and biofuels in the Netherlands, this study identified a preliminary set of empirical strategies: providing information and arguments to policy makers and the general public, as well as strategically setting technical standards. Incumbents are in a position to significantly influence the innovation's development by employing these strategies; thus temporarily *keeping sustainable innovation on a leash*.

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2.1 INTRODUCTION

The past decade has shown a growing interest in the study of sustainability transitions. The multi-level perspective (MLP; Geels, 2002) is one of the main approaches related to this issue: conceptualizing transitions as interactions between niche, regime and landscape levels. Its insights have informed management and policy strategies, such as transition management (Rotmans et al., 2001). The MLP has shown that transition processes require changes in technologies and technical artifacts as well as in user practices, policies, markets, industrial structures and supporting infrastructures (Geels, 2002).

Due to the stability of the regime, sustainability transitions tend to be slow and difficult. The path dependence of the regime is 'a powerful incentive for incremental innovations in socio-technical systems' (Geels, 2004, p. 911). Part of this can be explained by lock-in into the current system, due to economies of scale (David, 1985). Apart from economic lock-in, existing institutions also favor stability and thus hamper change (Unruh, 2000). However, 'Institutions are not necessarily or even usually created to be socially efficient; rather they, or at least the formal rules, are created to serve the interests of those with the bargaining power to devise new rules' (North, 1990, p. 16). While institutions tend to be presented as influencing the behavior of agents, they cannot survive without the support of agents (Beckert, 1999; Lawrence & Suddaby, 2006). Especially when contested, institutions need to be actively supported to stay in place (Lawrence & Suddaby, 2006; Maguire & Hardy, 2009). Therefore, we cannot fully understand transitions by accepting institutions as 'given', but we need to investigate the power and interests that maintain those institutions. This implies that the stability of the regime is also partially dependent on the active support of powerful actors. To date, the existence of power in transitions has been acknowledged (Avelino & Rotmans, 2009; Voß et al., 2009; Smith & Stirling, 2010; Walker & Shove, 2007; Meadowcroft, 2009; Smith et al., 2005; Pinkse & Kolk, 2010). Powerful actors will be affected by shifting actor configurations and therefore power will play an important role in transitions. However, how exactly power manifests itself has remained understudied.

In addition, the MLP has been criticized for its lack of attention to the micro-level unit of analysis as well as an insufficient conceptualization of strategies at the actor level (Smith et al., 2005; Markard & Truffer, 2008a; Stenzel & Frenzel, 2008). Farla et al. (2012), for example, stress that 'If we understand the struggles of actors with competing interests... we will better be able to assess the conditions for sustainability transitions to materialize'. A similar call is made in the field of environmental management: more attention should be paid to the pervasive trade-offs in terms of

profit, people and planet that firms face when deciding on their strategy (Hahn et al., 2010; Pinkse & Kolk, 2010; Winn et al., 2012).

Therefore, to explain the stability of a regime, we need to investigate the strategies of powerful regime actors that are threatened by the process of change. Namely, innovations with significant sustainability gains tend to be non-incremental and are therefore likely to have adverse effects on the business interests of regime actors. We focus on the behavior of incumbents: the firms that mainly have competencies related to the current technological regime, and that (financially) benefit from existing practices. The innovations can be threatening to incumbents' interests for various reasons. For instance, the innovation can be competence destroying for the incumbent or increase risk of claims due to technical problems, or the innovation can create additional competition for adjacent markets. As a consequence, these regime actors are expected to engage in strategic behavior to safeguard their interests (Meadowcroft, 2009; Geels, 2010; Walker & Shove, 2007).

More specifically, we are interested in incumbents' institutional strategies: 'the patterns of action that are concerned with managing the institutional structures within which firms compete' (Lawrence, 1999, p. 162). Institutions include both 'hard' regulative institutions (e.g. laws, regulations, technical standards) and 'soft' normative and cognitive institutions (e.g. binding expectations, common beliefs) (Scott, 1995). Firms can influence these institutions by interacting with policy makers, the general public and social movements (Penna & Geels, 2012). Geels (2010, p. 502) indicates that these strategies matter in transition processes: 'The problem for sustainability transitions is that many unsustainable industries have many economic resources and good political contacts, which may hinder, delay or water down strict environmental regulations'. Despite the explicit acknowledgement of possible resistance to niche development by regime action, it is unclear what shape this resistance takes. Instead, niche level processes have been the main focus of MLP studies (Markard & Truffer, 2008b). Also, research on firms' environmental strategies is predominantly focused on how these actors *react to* the changing institutional environment (e.g. sustainability reporting or greening the value chain; e.g. Kolk, 2008; De Marchi et al., 2013), thereby excluding the activities firms may undertake to *influence* the structure of this very institutional environment to their benefit. We would like to explore this gap.

Therefore, this paper aims to provide a first overview of institutional strategies employed by incumbents whose short-term interests are threatened by sustainable energy innovation. With sustainable energy innovation we mean those new products and technologies that produce renewable energy or result in energy savings. Consequently, the research question is: *What are incumbents' institutional strategies with regard to sustainable energy innovations that threaten their business interests?*

Both incumbents and new entrants may introduce sustainable energy innovations. According to the literature, most innovations that deviate from existing practices are introduced by new entrants. In this paper we focus on strategies of incumbent firms that are confronted with the latter situation.

Institutional strategies are directed towards influencing the external environment of the firm (cf. Pfeffer & Salancik, 1978) and should be viewed as complementary to technology or innovation strategies by which incumbents develop a technology themselves (cf. Bergek et al., 2008, 2009; Karltorp & Sandén, 2012). The importance of this type of strategy in sustainability transitions was also observed by Farla et al. (2012): '...the observed strategies... all reach out to the broader environment (or system) the actors are part of'. This focus is relevant for the field of sustainable innovation, because sustainable innovations are likely to be more dependent on policy support than 'regular' innovations (van den Bergh et al., 2011; Geels, 2011, Meadowcroft, 2011). As a consequence, actors willing to influence sustainable innovations need to direct an important part of their attention to the institutional environment.

The Netherlands provides a relevant case for this research because the Dutch economy is characterized by large vested interests in the fossil energy system as well as a very slow and tedious energy transition. It is home to oil and gas company Shell and the energy port Rotterdam, has large gas reserves and harbors several energy intensive sectors (e.g. oil refineries, steel, chemicals, paper and concrete). Activities in the energy sector (e.g. production, processing and transport of oil, gas and electricity) account for 6% of GDP (Ministry of Economic Affairs, 2011). Taxes on oil products alone generate 5% of total government revenues (CBS, 2011a). This percentage goes up to 20% when including tax on income and profits from the energy and energy intensive industries (TNO, 2013). In terms of the energy transition, the country performs poorly. The Netherlands produced only 3.8% renewable energy in 2010 (missing its 10% goal) and consequently ranks very low on lists that compare European countries in terms of their relative production of renewable energy (Euro-Stat, 2010; CBS, 2011b). Moreover, the country is known for its consensus-oriented government–business relationship (the *poldermodel*). If we are to study institutional strategies, these factors suggest we are likely to find them in the Netherlands. Several authors show that incumbents have been able to (partially) capture the Dutch energy transition initiatives, which has reduced the potential for change (Avelino, 2009; Kern & Smith, 2008; Scrase & Smith, 2009; Voß et al., 2009).

The strategies identified in this research show by which means regime actors are able to defend their interests and maintain regime stability. This paper has an exploratory and inductive nature due to the limited amount of empirical literature available on institutional strategies aimed at maintaining or disrupting institutions in the field of sustainability transitions. This gap in the literature may be related to the sensitivity

of the issue: because of actors' interests, disclosure of information is limited. We use relevant theory from institutional theory and strategic management to complement the transitions literature. This paper will show a first indication of strategies aimed at sustainable innovation.

The paper is organized as follows. The following section describes the selection of literature that forms the theoretical framework for this research. In the next section the case selection and methodology is explained. The fourth section 4 presents the institutional strategies of incumbents in the cases of LED light and biofuel. The analysis in the fifth section reflects on the results in light of the theoretical framework and the sixth section concludes.

2.2 MULTI-LEVEL PERSPECTIVE AND INSTITUTIONAL STRATEGIES

The interaction between niche and regime levels is central to the MLP. Against a background of landscape developments, the niche–regime interface is where systemic change occurs. It is acknowledged that incumbents are involved in this interaction, but insight into their exact role needs further elaboration. Geels and Schot (2007) elaborated on four possible pathways such niche–regime interaction can take, by distinguishing two dimensions: the *timing* of interaction and the *nature* of interaction. First, when landscape pressures create windows of opportunity, is the niche innovation sufficiently developed to influence the regime? Second, is the relationship between niche innovation and regime of a symbiotic or competitive nature? These two dimensions result in the following transition pathways: transformation, reconfiguration, technological substitution and, finally, de-alignment and realignment. In the latter case, incumbent actors lose faith in the regime due to much landscape pressure, and no longer defend the regime.

Incumbent actors do play a role in the other three pathways. In terms of technology strategies, incumbents can defend themselves by investing heavily in the current technology or by (partially) adjusting to niche pressure by redirecting their technological development. In terms of institutional strategies, the authors point out that incumbents defend regime rules and engage in 'power struggles' with newcomers (Geels & Schot, 2007, p. 410). However, it remains unclear what specific type of behavior incumbents display when defending regime rules, or engaging in power struggles.

To learn more about the types of strategy that incumbents can employ, we need to draw upon literature beyond (sustainability) transitions research. However, knowledge on strategic behavior is not covered by a coherent body of literature; it is dispersed amongst a wide variety of literature and often labeled differently. It

is beyond the scope of this paper to provide a full literature overview of relevant incumbent strategies. Instead, we will present a selection of relevant literature from institutional theory and strategic management. Given that institutions are at the heart of regime stability, institutional theory is assumed to provide valuable insights. Not only does it cover the effects of institutions on society; this literature also addresses how actors shape institutions. In turn, the strategic management field is a very logical source to draw from when studying strategic behavior of firms, because it focuses on the strategies that firms employ in order to maintain their competitive advantage. Attention for transition issues is limited in either of the two fields.

As stated in the introduction, we are interested in institutional strategies that are directed towards the external environment of the firm. This focus is based on the idea that firms not only *adjust* to their environment, but also are able to *influence* their environment (see, e.g., Pfeffer & Salancik, 1978). Penna & Geels (2012) show that indeed a range of strategies exists beyond innovation and technology strategies. Despite the centrality of institutions in transition processes, institutional strategies have received limited attention in the field of transition studies. This knowledge gap is recognized not only in transition studies, but also in a wider set of literatures. For instance, in their 2003 introduction, Pfeffer & Salancik (1978) state that 'Unfortunately, the use of political means' by firms to improve their performance 'is not often investigated' (p. xviii).

2.2.1 Institutional strategies

The rationale behind institutional strategies is that firm performance depends not only on dynamics in the market, but also on institutions such as 'government policies that affect the structure and functioning of markets and the competitive advantages of its participants' (Baron, 2001, p. 47). In other words, successful institutional strategies influence the (market) environment of the firm through the public policy process or the public debate. Indeed, 'Policy frameworks (regulations, taxes, policy programs) that influence economic frame conditions form an important dimension for struggle and conflict in socio-technical transitions. Incumbent regimes are often stabilized by corporatist networks with mutual dependencies between industry and policy makers' (Geels, 2010, p. 502, based on Meadowcroft, 2005).

An important part of the stability of regimes can be explained by the persistence of institutions, i.e. 'the rules of the game' (North, 1990, p. 3). While institutions are often presented as influencing actors' behavior, institutions also depend on agency. After all, institutions are constructed by the very same actors. In other words, 'The fact that a constraint exists indicates that sufficient social support has been mustered to bring it into existence. In the social context of organizations, behind every constraint

there is an interest group that has managed to have that constraint imposed' (Pfeffer & Salancik, 1978, p. 18).

Research on agency within institutional theory offers important insights in this respect. Lawrence & Suddaby (2006, p. 217) emphasize that '[institutions] require the active involvement of individuals and organizations in order to maintain them over time'. These activities are called 'institutional work': 'the purposive action of individuals and organizations aimed at creating, maintaining and disrupting institutions' (p. 215). In the following we highlight such purposive action aimed at influencing the public policy process and at influencing technical standards, which are a form of self-regulation among market actors.

When institutions are threatened, actors engage in 'defensive institutional work' (Maguire & Hardy, 2009). As a consequence, proponents of institutional change have to overcome 'opposition and resistance from insiders whose interests are threatened by the abandonment of existing practices' (p. 150). These activities are partially aimed at 'reproducing existing norms and belief systems' (Lawrence & Suddaby, 2006, p. 230) and involve 'the authoring of texts that contest problematizations of practices by (a) countering assertions of negative impacts of practices; (b) countering categorizations of practices as unethical, undesirable, or inappropriate; and (c) countering calls for regulatory change' (Maguire & Hardy, 2009, p. 169).

Literature on corporate political activities (CPA; a subfield of strategic management) provides us with more insights of how corporate actors get their messages across to policy makers and the wider audience. CPA is defined as 'corporate attempts to shape government policy in ways favorable to the firm' (Hillman et al., 2004, p. 838).

Hillman & Hitt (1999) show that, first, actors provide information to the political decision maker by 'lobbying, both by internal or external professionals and executives; reporting research and survey results; commissioning research/ think tank research projects; testifying as expert witnesses in hearings or before other government bodies; and supplying decision makers with position papers or technical reports' (p. 834). The core of this information strategy for firms is to link their interests or activities to the interests of the decision maker and to phrase them 'in terms of some national policy benefiting the common good' (Pfeffer & Salancik, 1978, p. 192).

A specific type of information strategy is described by Oreskes and Conway (2010) in their book *Merchants of Doubt*. Vested interests such as the tobacco industry have been confronted with consensus amongst scientists that their products are harmful to people and/or the environment. To counter the development of government regulation that would address these problems, the industries create an artificial debate about the very existence or cause of the problem. Oreskes and Conway show that they do so by focusing on the small uncertainties that remain. They establish this 'information' through pseudo-scientific journals and conferences, and diffuse it to

their political connections and public media. Thus, many industries have managed to postpone government regulation for years (cf. Ruers, 2012, on Dutch asbestos regulation). Similarly, Kolk & Pinkse (2007) conclude that, by using the information strategy, multinationals facing climate change policies try to push policy makers towards market-based solutions (e.g. self-regulation), which are less threatening to firm interests than government regulation.

Second, corporate actors attempt to convey their messages to the general public (Hillman & Hitt, 1999). To reach out to the wider audience, the (mainstream) media are an essential instrument. Ways of communicating are ‘advocacy advertising, wherein a particular policy position is advertised to the public; public image or public relations advertising; press conferences on public policy issues; and economic or political education’ (p. 834). These tactics are aimed at gaining the support of individual voters and citizens, expecting them to express their policy preferences to political decision makers. This may also include ‘constituency building’: ‘grassroots mobilization of employees, customers, suppliers, retirees, or other individuals linked to the firm’ (p. 834). The above strategies can also be aimed at more generally improving the industry’s perceived legitimacy, which is necessary to maintain public and political support (Pfeffer & Salancik, 1978; Geels & Verhees, 2011).

These strategies can be employed in four different arrangements. First, the approach can be relational (long term) or transactional (ad hoc). In addition, businesses can organize these activities individually or collectively (Hillman & Hitt, 1999).

Apart from influencing the institutional environment through the public policy process, firms can also shape their environment by engaging in the formulation of technical standards. Technical standards prescribe the technical specifications (e.g. related to quality or safety) that a product needs to fulfill in order to be accepted to the market (Mattli, 2001). The setting of standards is a form of self-regulation (Blind, 2010) in which relevant market actors develop standards in standard development organizations or firm consortia. The effects of standards can be significant. Strict quality or safety standards can raise the production cost of a particular product or even exclude it from the market: technical standards thus shape the respective market (Bekkers & Martinelli, 2010).

Standardization issues are especially relevant for sustainability transitions, because sustainable technologies often differ significantly from existing technologies and thus require new standards. However, existing standards reflect dominant designs (Bekkers & Martinelli, 2010) and so ‘present hurdles for new technologies and products’ (Blind, 2010, p. 226). The standardization process is characterized not only as a technical process, but also as a political process offering room for strategic behavior (Werle & Iversen, 2006). As a consequence, ‘influential actors may use standards to block potential competitors’ or ‘hamper innovation’ (Abbott & Snidal, 2001, p. 350).

They may also complicate technological change by slowing down the standardization process (David & Shurmer, 1996). In sum, the literature provides insights into how a firm can influence its institutional environment in order to defend its interests in the face of a threatening innovation or a supporting policy. Firms can attempt to influence public policy by engaging with policy makers and the general public through various channels. Specific information and messages are conveyed via lobbying, research reports and position papers, as well as via grassroots mobilization, various forms of advertising, contact with the media and educational activities. Furthermore, firms can engage with other market actors in the setting of technical standards.

We acknowledge that large incumbent firms cannot be regarded as unitary actors, due to e.g. the diversity of their business units. However, the main interest of the research is to identify actual behavior; it does not attempt to reconstruct the plans underlying strategic behavior.

2.3 METHODOLOGY

The research question was applied to the empirical fields of biofuels and LED lighting. Both innovations are relevant in the context of the energy transition: they produce renewable energy and/or result in energy saving. With these two cases we explore the supply side of the energy system (biofuels) as well as the demand side (LED). Second, both biofuels and LED are relatively radical substitutes for the current technology and therefore interfere with the interests of specific large incumbent firms, whose behavior we can study. LED lighting is especially interesting because it is a high-profile innovation that gets a lot of media attention and has large energy saving potential. Biofuels are specifically relevant because they make up for a large part of sustainable energy production in the Netherlands (CBS, 2012), so we expect data to be available. Finally, to help identify the type of strategy in which we are interested, we chose innovations that are policy driven and that are beyond the R&D phase (both factors making strategies towards the institutional environment more likely).

Data was collected from interviews and documents, following an iterative approach. Semi-structured interviews were conducted with 17 people (LED, five; biofuels, 12) from various backgrounds in order to obtain a variety of perspectives on the issue, in the period February 2010 through March 2012. We interviewed eight entrepreneurs, two policy makers, two standardization agents, two members of the Dutch Energy Transition Platform and one scientist. These interviewees were asked to describe the behavior of the relevant incumbent with regard to the particular innovation. Subsequently, we interviewed two incumbents (both managers of external affairs) asking them to describe their response to the development of the innovation

and to react to statements made by the other interviewees. Most interviews were conducted in person; a few were conducted by phone. Interviews were recorded if the interviewee granted permission.

Analysis of the interview data was performed by open coding (Boeije, 2010). By labeling, categorizing and constant comparison of the data based on the theoretical framework, we identified recurring patterns of behavior of incumbents, i.e. their strategies.

Information from documents was used to prepare for the interviews and to triangulate interview data. In both cases, a preliminary timeline of incumbent behavior was constructed on the basis of newspaper articles and the incumbents' annual reports. Other documents included websites, government documents and incumbents' position papers.

Due to the sensitivity of the topic under study, disclosure of strategic behavior is limited. Therefore, all interviewees are anonymized. Moreover, it is important to keep in mind that the data used for the case studies is based on the interviewees' view on reality. Since there are no impartial players in this game, triangulation does not always provide decisive results. Therefore the aim of this study is to provide indicative insights into incumbents' strategies that will function as a starting point for further research. The findings of this study are not directly generalizable (e.g. to other sectors): more research is required. However, the information provided in the case studies allows the strategies to be understood in their context.

2.4 THE CASE OF LED LIGHTING

LED light makes use of a fundamentally different technology to produce light as compared with traditional light bulbs or compact fluorescent light (CFL). Light emitting diodes (LEDs) have existed since the 1960s. Continuous development in terms of color and light intensity followed in the next decades, making the LED a competitor for conventional household lighting starting from the mid-2000s. The energy efficiency of LEDs is up to 80% higher than that of traditional light bulbs. Other advantages are the absence of toxic materials such as mercury and the dimming possibilities (Milieu Centraal, 2010; CE, 2006). In addition, the LED produces a different type of light, so-called 'mesopic' light² (Taskforce Verlichting, 2008). LED lights with standard fittings (retrofit) for domestic use were introduced to the consumer market by a start-up firm in 2006. This represented a competence destroying innovation for a

2 Within the spectrum of light that is visible to the human eye, mesopic light has a shorter wavelength than traditional light sources.

European lighting incumbent, which was very much focused at CFL production and promotion (Elsevier, 2009) and did not yet produce a comparable LED product (de Volkskrant, 2006; Het Financieele Dagblad, 2007). Simultaneously, the incumbent started an initiative for a European ban on traditional light bulbs (entrepreneur 1, 2010; Taskforce Verlichting, 2008; Elsevier, 2009) in order to favor the sales of more profitable CFLs (Elsevier, 2009). However, a fast introduction of LED products (by others) might put the sales of CFLs at risk.

2.4.1 Institutional strategies related to led lighting

In order to delay the introduction of retrofit LED lamps, one strategy of the incumbent was to continuously make statements in the media that retrofit LEDs for domestic lighting would only be available after 2018 (entrepreneur 1, 2010; NRC Handelsblad, 2007). Similarly, it claimed that the LED does not yet provide a good alternative for the fluorescent tube (entrepreneur 2, 2011; De Telegraaf, 2009, 2010; ANP, 2010a).

In meetings with the Minister of Environment, the incumbent repeatedly claimed that the entrepreneur's LED light was not ready for the market. During Taskforce Lighting meetings (issued by the Ministry to increase energy efficiency), the incumbent brought along scientists who supported this claim. The minister only learned that this 'authoritative' statement was false when the entrepreneur actually demonstrated the functioning of the LED light in person during a meeting (entrepreneur 1, 2010).

In the same Taskforce Lighting, the incumbent made a fierce attempt to prevent any reference to the concept of mesopic light in their advisory report (entrepreneur 1, 2010). Namely, the different nature of mesopic light leads to bad scores on light intensity when following the lumen and lux measurement standard, even though people experience similar light intensity to traditional lighting (entrepreneur 2, 2011; Trouw, 2009). As a compromise, mesopic light was mentioned in an appendix (Taskforce Verlichting, 2008, p. 45). The absence of an explanation of this concept would set back LED light compared with standard light bulbs and CFL (entrepreneur 1, 2010).

Incumbents are strongly represented in the organizations that set these (measurement) standards (entrepreneur 3, 2010; standardization agent 1, 2010). The incumbents insist on the lumen and lux measurement standard, thus creating a barrier for the entrepreneur to prove the performance of the innovation (entrepreneur 1, 2010). In addition, an initiative to develop a comprehensive quality standard for LED lighting is stalled by the lighting incumbents (entrepreneur 2, 2011). This standard would reduce uncertainty by ensuring that only high-quality LED lighting is sold. However, for incumbents this standard would be disadvantageous for two reasons. First, they will no longer be able to claim that high-quality LED lighting is not yet available.

Second, because the incumbents are not at the technological forefront of LED, their own products may not meet the requirements (entrepreneur 2, 2011).

While the above mentioned institutional strategies indicate that the incumbent tried to postpone LED market development, the incumbent also recognized the excellent market opportunities for this innovation. This becomes clear from a range of large acquisitions by the incumbent (LEDs Magazine, 2005, 2006, 2007), leading to the incumbent's involvement in all parts of the LED value chain.

2.4.2 Incumbent's perspective

Incumbent 1 (2011) confirms that LEDs hardly contributed to the company's sales in 2006. Moreover, incumbent 1 (2011) states that CFL sales have 'only really taken off in the last 10 years, partially due to the attention for energy and climate, and the ban on traditional light bulbs in the latter 5 years'. This indicates that the incumbent still has large interests related to the sales of CFL and thus may benefit from prolonged CFL sales, as opposed to a fast market development of LED lighting.

However, incumbent 1 (2011) does not confirm that the introduction of LED light represents a threat to the sunk investments related to CFL. Instead, incumbent 1 (2011) states that the company 'has always taken all lighting technologies into account' and that, in general, companies should never limit themselves by 'perceived interests in the old technology'. More specifically, their LED related activities are driven by the efficiency and price development of LED technology (incumbent 1, 2011).

Nevertheless, incumbent 1 (2011) confirms they have made statements that retrofit LED does not provide an adequate alternative yet for traditional light bulbs and fluorescent tubes. These statements are said to aim at informing the consumer about the quality and efficiency of products and to protect them from 'buying products that do not meet future standards or do not deliver the efficiency promised' (incumbent 1, 2011).

2.5 THE CASE OF BIOFUEL

The main initial driver for the biofuel market is the EU Biofuel Directive of 2003 (European Commission, 2003). Aiming to reduce greenhouse gas emissions from transport, this directive prescribes the blending of biofuels with fossil fuel. Table 2.1 shows the sharp increase in the blending of biofuels from the year 2007, when the blending obligation took effect.

The use of biofuels affects at least two sectors, namely the fossil fuel industry and the international commodity industry, which are both characterized by large incum-

Table 2.1. Blending of biofuels in the Netherlands. Data: CBS, 2012, 2013.

Year	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011
Volume (in mln liters)	N.A.	N.A.	N.A.	N.A.	67	463	449	586	399	529
Percentage of total gasoline and diesel (on energy basis)	N.A.	N.A.	N.A.	N.A.	0.38	2.78	2.56	3.42	2.09	N.A.
Energy (in TJ)	Nil	Nil	Nil	100	1.766	13.031	12.048	15.606	9.577	13.438

bent firms. For fossil fuel companies, blending biofuel first of all means a decrease in sales of fossil fuels (in mature markets) (policy maker 1, 2011). It requires additional effort and money to buy the biofuels from firms in the agricultural and commodity sector. Moreover, if fossil fuel companies want to produce biofuels themselves, they need to acquire a new set of competences related to biobased products.

The commodity sector is affected by biofuel use in an indirect manner. Biofuel production causes increased competition on markets for agricultural raw materials such as palm oil. This leads to higher input prices for the food industry, which reduces the margin on their products.

Multiple interviewees state that the above mentioned incumbents aim to keep the biofuel market as small as possible (platform member 1, 2010; platform member 2, 2010; entrepreneur 4, 2010; entrepreneur 5, 2010; policy maker 1, 2011; policy maker 2, 2012). Moreover, a major oil company was convinced it could prevent the blending obligation in the Netherlands. 'They could not believe it when this obligation was set' (entrepreneur 6, 2010). This corresponds to media statements of the VNPI, an association representing nine companies of the Dutch oil industry, which advocated persistently against policy support for biofuels (e.g. de Volkskrant, 2003a; De Telegraaf, 2003a).

2.5.1 Institutional strategies related to biofuel

The oil industry has been involved in discussions concerning biofuels for about the past ten years. They pursued their interests through the provision of various arguments, focusing on the disadvantages of biofuel blending (entrepreneur 6, 2010). These arguments changed over time and were aimed at the general public and/or policy makers.

One type of strategy was to emphasize the technical disadvantages that are related to biofuel use. When the EU Biofuel Directive was in preparation, the European oil industry (united in CONCAWE) published a study together with the European auto-

motive industry (represented by EUCAR) and the EU Joint Research Centre, which showed that the use of biofuels would lead to higher emissions compared with conventional fuels (standardization agent 2, 2010). Remarkably, the methodology of this research remained unclear (policy maker 2, 2012) and biofuel producers were not allowed to participate (standardization agent 2, 2010). According to policy maker 2 (2012), CONCAWE tried to create a picture of biofuels that was 'not very positive'. Nevertheless, the outcomes of this study became the basis for the default values with regard to biofuel emissions in the EU Renewable Energy Directive (European Commission, 2009a) (standardization agent 2, 2010; policy maker 2, 2012).

Moreover, at the time the Dutch government had to transpose the Biofuel Directive into national law, the Dutch oil industry provided a study that concluded that CO₂ reduction could be obtained more efficiently by co-firing biomass than by blending biofuels (de Volkskrant, 2003a, 2003b).

Finally, oil companies expressed their concerns about technical problems with cars caused by blending biofuel. The incumbents stated their concerns that consumers will hold them accountable in case of damage (policy maker 2, 2012).

A second type of strategy was to focus on the disadvantages of the policy support for government and society. For this strategy, incumbents use the media and the general public as intermediaries between them and the government. The analysis of news articles shows that, when a policy window exists, many publications on the topic appear in the mainstream media. In contrast, when there are no policy developments, biofuels are barely covered. Thus, the VNPI argued that:

- EU targets will cause Dutch tax money to flow abroad due to biofuel import (de Volkskrant, 2003c);
- the necessary tax exemptions on biofuels are too costly for the government (De Telegraaf, 2003b);
- policy measures should be cost efficient (Algemeen Dagblad, 2003; De Telegraaf, 2003b; NRC Handelsblad, 2004; FEM Business, 2004); and
- first generation biofuels do not contribute to the knowledge economy (NRC Handelsblad, 2004; FEM Business, 2004).

A third and important strategy was to demand that biofuels be sustainable. In 2006, environmental NGOs initiated a debate about possible competition for raw materials between food and fuel (policy maker 1, 2011; policy maker 2, 2012; scientist 1, 2012). The oil industry took up this concern and contributed to formulating sustainability criteria for biomass.

In response to the food versus fuel debate, the VNPI emphasized to 'take it easy with the development of biofuels' (policy maker 1, 2011). Their arguments concerned the availability of sustainable biomass and the availability of a certification scheme (policy maker 1, 2011; policy maker 2, 2012). Platform member 1 (2010) points to

the enormous and persistent efforts of the oil industry to supply Dutch policy makers with information showing that not enough sustainable biomass was available. These efforts are said to take place in direct contact with the minister (policy maker 2, 2012) and within the Cramer Committee and the Corbey Committee (policy maker 1, 2011) that had been installed by the Dutch minister to investigate sustainability questions related to biomass. In 2008, the Netherlands indeed lowered the prescribed blending target for 2010 from 5.75% to 4% (NEA, 2012a).

Furthermore, the food industry demanded sustainability criteria for biomass, more specifically for palm oil. Using palm oil for biofuels would lead to deforestation, especially in Indonesia (platform member 2, 2010). However, this conceals the fact that only a few percent of the world's palm oil is converted into biofuels, whereas the lion's share is used for the production of food and detergents (platform member 1, 2010; policy maker 1, 2011; policy maker 2, 2012). The real concern for Unilever seemed to be the increasing price for palm oil (policy maker 1, 2011; policy maker 2, 2012; NRC Handelsblad, 2008), which their European Director of External Affairs also acknowledged (nrc.next, 2007).

A fourth strategy was to advocate policy support for second generation biofuels (i.e. biofuels based on raw materials that do not compete with food production) (VNPI, 2006; IEA Bioenergy, 2008, p. 8; entrepreneur 6, 2010, platform member 2, 2010). Unilever proposed that part of the blending obligation be fulfilled with second generation fuels (policy maker 1, 2011). This would mean less competition in the commodity markets. Moreover, since second generation biofuels are still largely in the R&D phase, supporting these biofuels is likely to go at the expense of learning effects and further market development of first generation biofuels (platform member 2, 2010; entrepreneur 7, 2010; entrepreneur 8, 2010).

The fifth strategy is one that involves market actors and is to strategically set technical standards. Once the biofuel support programs were in place, attention shifted to specific technological characteristics of biofuels (entrepreneur 6, 2010; standardization agent 2, 2010). These technical details are worked out by a dedicated committee at the European standards development organization CEN. A majority of the committee participants comes from the fossil fuel industry, the automotive industry and the military industry. One example of how incumbents can influence the development of biofuels through technical standards is highlighted here.

Biodiesel tends to have some problems at low temperatures (i.e. in winter). Fossil fuel companies and car manufacturers took the lead on this issue and proposed solutions. However, the proposed solution tends to require extra investments from the biofuel producer, thereby raising the cost of biofuels (standardization agent 1, 2010). Interestingly, the incumbent itself did not produce biodiesel. Since biodiesel is used as a blend with fossil diesel, the other option would be to change the characteristics

of the fossil diesel. However, that option was out of the question (standardization agent 1, 2010).

Despite the defensive institutional strategies mentioned above, some incumbents are also actively pursuing research in the field of biofuels or even producing biofuels. A notable example is Shell, which has been investing in various technology partnerships (e.g. Iogen, Codexis, Virent, Choren) over the years, focusing on second generation biofuels. Interestingly, in 2010, Shell entered into a joint venture with Cosan and thereby became a large scale producer of first generation bioethanol from sugar cane (platform member 2, 2010), thereby acting in contradiction with earlier statements condemning first generation biofuels.

2.5.2 Incumbent's perspective

Incumbent 2 (2012) confirms that the idea of adding biofuels to their fossil fuels was received with resistance within the company: this obligation would disturb their smoothly running fossil fuel operations. Subsequently, the incumbent engaged in regular contact with the Dutch government, providing arguments why blending would be disadvantageous. Incumbent 2 (2012) confirms the use of the above mentioned arguments but emphasizes that these are real concerns for the company. For instance, the debate on the sustainability of biofuels was likely to get the incumbent caught between NGOs' sustainability demands and the governmental blending obligation. Whenever the government hints at increasing the blending percentage, the incumbent will again point at these arguments (incumbent 2, 2012). Furthermore, incumbent 2 (2012) confirms that the distinction between first and second generation biofuel has been 'oversimplified' in communication with the general public.

2.6 ANALYSIS

In this section, the strategies mentioned with regard to LED and biofuels will be reflected upon in terms of the theoretical framework and in terms of their contribution to the MLP. First of all, both case studies show that incumbents indeed employ a variety of strategies aimed at the external environment, as suggested by Pfeffer & Salancik (1978). By strategically influencing their environment, incumbents try to promote their interests. They address different parts of this external environment: the case studies show strategies aimed at policy makers, the general public and other firms. The main strategies are providing information and arguments to policy makers and the general public, as well as strategically setting technical standards.

Moreover, we observed that incumbents indeed make substantial efforts in terms of institutional strategies. This is in line with our expectation that institutions are an important target for incumbent strategies, due to the importance of policy support for the development of sustainable innovations. We will now discuss the strategies mentioned above.

The main institutional strategies concern influencing the public debate and lobbying policy makers. These strategies focus on bringing a message across and subsequently convincing the target group of this message. These observations are in line with the central tenet of institutional work and corporate political activities: firms mainly exert their influence by providing information to political actors and the general public. We have seven further remarks about this strategy.

First, the two cases also seem to indicate that lobbying is predominantly based on content-related arguments and not so much on the firm's power position. However, 'content related' does not mean that incumbents' arguments are necessarily objective or consistent. In their communication, incumbents seem to emphasize the disadvantages of the new technology (or policy), while staying away from the rationale behind supporting this technology. For instance, the arguments related to biofuel blending all focus on the disadvantages of the policy program or biofuel technology itself (risk of damaged cars), whereas the problems of climate change and energy security are ignored. This selection of arguments resembles 'defensive institutional work', except that the work is directed against a new institution, instead of in defense of an existing institution. Just as Maguire & Hardy (2009) stated, incumbents make 'assertions of negative impacts of practices' and 'categorize practices as unethical, undesirable, or inappropriate' (p. 169). Also in the LED case, in its communication the incumbent focused on the said disadvantages or limitations of the new technology (e.g. 'LED does not provide a good alternative yet for the fluorescent tube'). In sum, the arguments incumbents provide do not draw a complete picture of the issue, but are a selection that suits their interests best.

Second, we observed that incumbents' arguments concern not only the particular innovation (as in the example above), but also broader societal beliefs that influence the environment in which the innovation has to develop. For instance, the VNPI emphasizes time and again that the Dutch government should not subsidize technologies that 'cannot compete yet' (Algemeen Dagblad, 2003; NRC Handelsblad, 2004; FEM Business, 2004). This statement conveys the idea that the government should let the market do its job and thus policy intervention is not desirable. This is another example of 'institutional work', which takes the form of 'reproducing existing norms and belief systems' (Lawrence & Suddaby, 2006, p. 230). Thus, the argument reinforces the belief that the market will bring about the energy transition. Because

most sustainable innovations need policy support (see, e.g., van den Bergh et al., 2011), this statement helps preserve the stability of the regime.

Third, incumbents tailor their arguments to general policy goals: they express their interests in terms of socially legitimate goals. For instance, the lighting incumbent makes negative statements about competitors' products, based on the premise that consumers should be protected against products that do not meet efficiency or other standards. Although this is a praiseworthy aim, it is not a logical task for an actor with related and conflicting commercial interests. Similarly, the oil incumbent states that it is very important that biofuels used for blending are produced from sustainable biomass. In itself, this is a legitimate argument. However, this criterion slows down the development of the biofuel market, due to the certification system that has to be put in place. This delay suits the oil industry: they were against the blending obligation in the first place. Now that the blending obligation has been coupled with compulsory sustainability criteria, it follows that enough sustainable biomass should be available to meet the blending target. However, it is difficult to determine the world's quantity of available sustainable biomass. This uncertainty allows oil incumbents to stress that not enough sustainable biomass is available, every time it is suggested to raise the prescribed blending target. In sum, a socially legitimate goal (biomass should be sustainable) seems to function as a tool to slow down a transition to alternative fuels. This translation of private interests into societal goals (an example of framing) is of central importance for firms that aim to influence policy makers or public opinion, as was also highlighted by Pfeffer & Salancik (1978).

Fourth, incumbents use media channels to convey their arguments to the general public. In the LED case, the negative statements about LED light quality seem to be aimed at directly postponing consumers' decisions to buy LED products. Thus, these statements may slow down the development of a mainstream LED market. However, the statements related to biofuels that were played out in the media are not so much aimed at individual consumers' decisions, but are aimed at indirectly influencing public policy through the general opinion. For instance, if the general opinion is that biofuels should be sustainable (also backed up by environmental NGOs), government will have less room to decide otherwise. The use of mainstream media for the above mentioned aims differs slightly from the literature, since they are not meant to really build a constituency around the issue (Hillman & Hitt, 1999) or to increase the general legitimacy of the firm (Pfeffer & Salancik, 1978; Geels & Verhees, 2011).

Fifth, the complexity of many sustainability issues is central to the type of strategy discussed here. It is precisely the uncertainty and complexity that allow for a good deal of framing: incumbents are able to construct a discourse that provides much wanted order in these complex situations. However, this discourse aims to influence the general debate in such a way that it serves their interests. For example, the

distinction between first and second generation biofuels was used consciously in communication with the general public, while the incumbent knew these categories were oversimplified. Leaving out nuances in the public debate may serve strategic purposes.

Sixth, in their communication, incumbents may apply double standards. Whereas sustainable energy technologies are obliged to meet the highest sustainability criteria, existing and polluting products and technologies remain outside the scope of these criteria. In this respect it is remarkable that sustainability criteria for biomass form such a central concern for the incumbent, while they do not apply such strict criteria to their other unsustainable production processes (e.g. tar sands). Partially, the incumbent's attention for the sustainability of biomass may have been induced by campaigns of environmental NGOs. However, the predominance of sustainability concerns related to biofuels contrasts sharply with other operations, such as increased exploitation of tar sands. The use of different sustainability 'yardsticks' for energy technologies may serve to defend existing practices.

Finally, the strategies identified in this research seem to be mostly of a long term nature, given the continuous efforts incumbents in the LED and biofuel cases put in lobbying and participating in governance structures. The long term character may be the essence of these strategies. In contrast, the use of media channels to express certain arguments to the general public seems related to the presence of a policy window. It thus forms an additional ad hoc approach to the continuous lobbying efforts. Furthermore, the case studies indicate that incumbents interact with policy makers both individually and collectively. In the biofuel case, the incumbent was represented by lobby organization VNPI, but simultaneously also engaged with policy makers individually. Interestingly, the arguments put forward by the branch organization did not necessarily match those of the individual incumbent. Whereas the VNPI lobbied openly against biofuel blending, the incumbent took on a more constructive approach. The incumbent did not perceive this as problematic, probably because, if the VNPI were to succeed in averting the blending obligation, the incumbent's interests would be served as well. Moreover, the incumbent was able to remain a cooperative partner for the government. In sum, these findings correspond with the proposition of Hillman & Hitt (1999) that strategies can be relational (long term) or transactional (ad hoc), as well as individual or collective.

In accordance with the literature on technical standard-setting, it becomes clear from the case studies that this is not only a technical but also a strategic process (cf. Werle & Iversen, 2006). Decision making by consensus together with the predominance of incumbent firms in the standard setting committees create opportunities for incumbents to define standards that favor existing technologies. This study shows that incumbents can do so by passing on necessary adjustments of the fuel mix to

the producers of biofuel, thereby raising costs of the new product. In relation to LED lighting, incumbents seem to stick to outdated measurement standards and are said to postpone a dedicated LED quality standard, which is in line with the strategy of postponing mentioned by e.g. Abbott & Snidal (2001) and David & Shurmer (1996). The resulting standards are likely to be a compromise of the various interests involved in the committee. However, newcomers tend to be underrepresented and do have to follow the incumbents' agenda setting.

The first insights into these standardization strategies show that incumbents are able to influence a technology's development through a process that is largely beyond the control of government institutions, but nevertheless plays an important role in shaping the market for a new technology. This situation enables incumbents to promote their interests, even after major political choices have been made, such as the EU biofuel blending obligation.

2.6.1 Effects of strategies and changes in strategies over time

The strategies incumbents employ with regard to the threatening innovation are logical and understandable from their point of view. However, very often the strategies negatively influence the innovation's development. In other words, the strategies originate from regime actors and also lead to outcomes that reaffirm regime structure and practices.

While the innovations in our cases are threatening to the incumbents in the short run, the incumbents do see business opportunities for these innovations in the long run. This is visible in their investments in the technology. So whereas incumbents' institutional strategies often do not support the development of the new technology, their cooperative efforts do contribute to the innovation.

Interestingly, our cases show that the supporting and the restraining behavior take place simultaneously. This observation suggests that incumbents attempt to constrain the formation of a new market as long as they do not have their own production capacity for the new technology in order. (This moment may come later for the incumbent than for entrepreneurs, due to the risk averseness and the preference for large scale production of the former.) This means that the constraining strategies are likely to be temporary and will be employed as long as the incumbent needs to prepare for the new technology, provided the incumbent sees a viable business case. This shows that incumbent strategies are not uniform, but vary over time and depend on the actors they target. Once the incumbent quits the defensive behavior, the implementation of the innovation is expected to speed up significantly.

Indeed, in both of our cases the incumbents get involved in the new technology through various forms of cooperation. Regarding biofuels, the incumbent enters into

multiple technology partnerships and finally participates in a joint venture. The lighting incumbent also invests in the new technology by acquiring multiple LED related companies.

2.6.2 Contribution to transition studies

The MLP asserts that innovation comes about through interactions on and between the landscape, regime and niche levels (Geels, 2002). It is assumed that the regime resists innovative pressures from the niche by defending regime rules or engaging in power struggles. However, it remains unclear what exactly this type of behavior by regime actors entails in practice.

The main contribution of this study is the identification of a number of strategies that incumbent firms employ with regard to innovations that threaten their interests. These insights show how regime actors try to prevent a fast development of the niche innovation. The knowledge of this micro-level behavior will help to understand processes on the system level. Generally speaking, this research shows that the agency of incumbent actors plays an important role in transitions. As a consequence, we need to keep our eyes open for issues of power if we want to understand transition processes. The literature on institutional work and on corporate political activities provides useful insights in this regard.

The two case studies show two different types of incumbent behavior in the face of a threatening innovation. Whereas both initially try to slow down or obstruct the development of the new technology alongside exploratory behavior into the innovation, the incumbent in the LED case later passes a tipping point and actively supports the new technology. The transition to LED lighting seems inevitable, but the incumbent needs time to build up the necessary capacities and therefore tries to restrain market development. On the other hand, the oil incumbent keeps promoting the status quo. If the incumbent is involved in the technology primarily because of society's demands, it is unlikely that the company's involvement will accelerate the transition. Whereas the incumbent appears to contribute to the transition, in reality they may promote the status quo by cleverly phrasing their interests in terms of societal goals. Further research may show us whether this might have to do with the nature of the new technology. If the incumbent would be able to exploit the technology itself in the future and expects the new technology to be their core business in the (near) future, the incumbent may speed up the transition considerably. In such a case, the firm will also be a valuable partner for public policy makers. Further research into these questions is a promising avenue for better understanding transition processes.

2.7 CONCLUSION

This study shows that incumbents use a variety of institutional strategies when they are confronted with a sustainable innovation that threatens their interests. By strategically influencing their environment, incumbents try to promote their interests, often at the expense of the new technology. They address different parts of this external environment: the case studies show strategies aimed at policy makers, the general public and other firms. The main strategies are providing information and arguments to policy makers and the general public as well as strategically setting technical standards. With these strategies, incumbents are able to influence the environment in which the innovation has to develop and diffuse, at least for a while. In other words, incumbents are able to temporarily keep sustainable innovation on a leash.

Existing innovation and strategic management literature emphasizes the innovative capacity of firms. However, this research demonstrates that firms do not always behave in ways that support the new technology. Defensive strategies of firms that see their interests threatened have to be acknowledged as an important aspect of innovation and transition processes. More research is required into this much overlooked area. An integration of innovation and transition literature with insights from corporate political activities and institutional work will be beneficial.

Public policy makers can also benefit from the insights into defensive firm behavior. For large socio-technical processes of change, policy makers often rely on studies highlighting the technical potential of innovations. This leads to overly optimistic projections, because the defensive strategies of affected firms decrease the real potential for change. This article shows that, when trying to stimulate a transition, policy makers should pay ample attention to the socio-political potential of new technologies, which is lower than the technical potential due to the above mentioned firm strategies.

A black and white photograph of a hand moving a chess piece. The hand is positioned at the top, with fingers gripping a dark chess piece. The piece is being lifted from a chessboard. The background is bright and out of focus, showing other chess pieces. The lighting is dramatic, highlighting the texture of the hand and the piece.

On Sunday mornings Squealer, holding down a long strip of paper with his trotter, would read out to them lists of figures proving that the production of every class of foodstuff had increased by 200 per cent, 300 per cent, or 500 per cent, as the case might be. The animals saw no reason to disbelieve him, especially as they could no longer remember very clearly what conditions had been like before the Rebellion. All the same, there were days when they felt that they would sooner have had less figures and more food.

George Orwell, *Animal Farm*

Chapter

3

**Disruptive institutional work.
Deinstitutionalization of an icon:
the Dutch bottle deposit system**



ABSTRACT

Regime destabilization is a new strand in the sustainability transitions field, focusing on the process of weakening reproduction of core regime elements. Because institutions are central to regime stability, this study analyzes this process through the lens of disruptive institutional work. Contrary to the transition literature, we focus on the disruption of institutions that were designed from a sustainability perspective. Our case study entails the Dutch bottle deposit system, a longstanding institution contributing to sustainability. The introduction and rapid sales growth of small plastic bottles in the mid-1990s is a catalyst for government to extend the bottle deposit system to these small bottles. In contrast, the packaging industry first opposes this extension and later aims to abolish the bottle deposit system altogether. Based on analysis of public data sources such as policy documents and a database of newspaper articles, we show how the packaging industry engages in disruptive institutional work through framing, conducting research, and negotiation. These activities undermine the bottle deposit system by emphasizing its negative and unethical aspects. Moreover, industry creates an alternative system to collect plastic waste, which ultimately leads the government to decide to abolish the bottle deposit system. A lesson for the sustainability transitions field is that to promote sustainability, it is also required to protect institutions contributing to sustainability against disruptive institutional work.

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3.1 INTRODUCTION

A key insight from the sustainability transitions field is that the growth of sustainable innovations alone is not enough to achieve a socio-technical transition (Ottosson & Magnusson, 2013; Lovell, 2007, Smith et al., 2005; Turnheim & Geels, 2012; Kivimaa & Virkamäki, 2014; Weber & Rohracher, 2012). The existing socio-technical regimes have proven rather stable and regime actors increasingly engage in active resistance against some outsider-driven sustainable innovations (Smink et al., 2015; Wesseling et al., 2014; Geels, 2014; Hess, 2014). This means that the old does not automatically give way to the new.

A new strand within the sustainability transitions field specifically focuses on regime destabilization: ‘the process of weakening reproduction of core regime elements’ (Turnheim & Geels, 2012:35). It is the opposite of stability, which entails ‘the reproduction of core elements of the industry regime’ (Turnheim & Geels, 2012:35). The key question in this strand of literature is how existing regime elements can be destabilized in order to accelerate the transition towards a more sustainable way of living (cf. Bosman et al., 2014).

Similar to building up something radically new, deliberately destabilizing existing practices is difficult. This is due to the high degree of stability that characterizes regimes (e.g. Geels, 2004; Fuenfschilling & Truffer, 2014). An important part of this stability stems from institutions (Turnheim & Geels, 2012; Fuenfschilling & Truffer, 2014; Unruh, 2000). Institutions have been defined as ‘the rules of the game’ (North, 1990:3) as they guide actors’ behavior by enabling some activities and constraining other activities. Because institutions are so central to stability, they also play a crucial role in destabilization.

Therefore, we take an interest in how institutions can be destabilized. In institutional theory this issue is addressed in the literature on deinstitutionalization (e.g. Oliver, 1992). Deinstitutionalization concerns the process of ‘existing set of beliefs, norms, and practices [coming] under attack, [undergoing] delegitimation, or [falling] into disuse’ (Scott, 2014:114).

Furthermore, institutional theory features a dedicated body of literature on actors aiming to influence institutions, called ‘institutional work’ (e.g. Lawrence & Suddaby, 2006; Maguire & Hardy, 2009). Institutional work entails ‘the purposive action of individuals and organizations aimed at creating, maintaining and disrupting institutions’ (Lawrence & Suddaby, 2006:215). For the purpose of studying deinstitutionalization, we focus on disruptive institutional work. This concerns the activities of actors aimed at deliberately undermining existing institutions. Little is known about disruptive institutional work, compared to institutional work aimed at creating and maintaining

institutions. As Lawrence et al. (2009:9) state: 'the practices associated with actors attempting to undermine institutional arrangements are not well documented'.

Given that institutions tend to reflect powerful interests (North, 1990; Pfeffer & Salancik, 1978), we expect powerful actors to be more successful in disruptive institutional work. If institutions can be supported by powerful actors, powerful actors can also discontinue their support or even disrupt these institutions.

In this paper, we therefore study a case in which powerful actors engage in disruptive institutional work to slowly undermine and finally completely abolish a longstanding and well-embedded institution. Contrary to the transition literature we do not focus on studying change towards sustainability. Instead we focus on the disruption of institutions that were designed from a sustainability perspective. The case concerns the purposive activities of the packaging industry to undermine the Dutch bottle deposit system. In the mid-1990s, the small plastic bottle (maximum 500 ml) is introduced and sales grow dramatically in the following years. Because the small bottle is not part of the deposit system, it leads to environmental loss and increased litter in the streets. Therefore, in the year 2000, the Minister of Environment wishes to extend the bottle deposit system to small plastic bottles. The Minister faces fierce opposition from the packaging industry. In fact, through disruptive institutional work, the packaging industry not only managed to prevent an extension of the bottle deposit system, but also greatly contributed to the abolishment of the complete deposit system by 2015. Based on this remarkable sequence of events, we ask: *How did the packaging industry engage in disruptive institutional work regarding the Dutch bottle deposit system?*

This case shows how an institution that ensures reuse and high-grade recycling of materials is being undermined. The abolishment would result in lower environmental performance and is therefore not an example of deinstitutionalization contributing to a sustainability transition.

Nonetheless, this very well documented case provides us with detailed insights into how disruptive institutional work works. Understanding how institutions can be broken down on purpose is of utmost importance. This knowledge may contribute to the deliberate deinstitutionalization of institutions that hamper the implementation and scaling up of sustainable practices and thereby accelerate sustainability transitions.

3.2 DISRUPTIVE INSTITUTIONAL WORK

Part of regime stability stems from institutions (Geels, 2004; Turnheim & Geels, 2012; Fuenschilling & Truffer, 2014). Even more so, institutions 'resist change' (Scott, 2014:57). Institutions come in three types: regulative, normative, and cognitive.

Regulative institutions include formal rules, laws, and sanctions. Normative institutions are more informal and consist of binding expectations about what is appropriate behavior. They include both values, which are 'conceptions of the preferred or the desirable', as well as norms that define goals and 'legitimate means to pursue [these]' (Scott, 2014:64). Finally, cognitive institutions are constitutive schema or common beliefs that influence how actors perceive the external world and 'through which meaning is made' (Scott, 2014:67).

In the multi-level perspective (MLP), the concept of rule-sets is treated synonymously with institutions (Geels, 2004). A regime is defined as a 'semi-coherent set of rules' (Geels, 2004; Geels, 2011). Rule-sets provide stability by structuring actors' activities (Geels, 2004). For instance, regulative institutions are important for the functioning of a regime, because they '[shape] both the direct support for industries (e.g. subsidies) and economic frame conditions (taxes, import restrictions, regulations)' (Turnheim & Geels, 2012:46).

An important characteristic of institutions is that they often reflect the interests of powerful actors (North, 1990; Pfeffer & Salancik, 1978). More precisely, 'Institutions are not necessarily or even usually created to be socially efficient rather they, or at least the formal rules, are created to serve the interests of those with the bargaining power to devise new rules' (North, 1990:16). Institutions thus favor the status quo.

However, while institutions favor stability, the continuity of institutions themselves is not a given: '[institutions] require the active involvement of individuals and organizations in order to maintain them over time' (Lawrence & Suddaby, 2006:217). This means that the stability of institutions in part depends on the efforts of (powerful) actors to maintain these institutions.

If institutions are not actively maintained, they may be subject to a process of deinstitutionalization. Deinstitutionalization can be the result of dissipation: 'a gradual deterioration in the acceptance and use of a particular institutionalized practice', or of rejection: 'a more direct assault on the validity of a longstanding tradition or established activity' (Oliver, 1992: 566-567).

The literature on disruptive institutional work focuses exactly on the activities of actors that wish to undermine institutions. Few studies dedicated to disruptive institutional work exist, with the exception of Lawrence & Suddaby (2006) and Maguire & Hardy (2009). In contrast, the creation of institutions has gained considerable attention under the similar heading of institutional entrepreneurship (Lawrence & Suddaby, 2006:220; Lawrence et al., 2013).

Disruptive institutional work activities are mostly discursive in nature (Lawrence & Suddaby, 2006:238) and entail problematization: 'the production of texts that include claims, arguments, stories, examples, statistics, anecdotes, and so forth' (Maguire & Hardy, 2009:151) that emphasize the negative and unethical effects of existing

practices. The persuasiveness of problematizations increases by using ‘various rhetorical strategies, or particular collective action frames’ (Maguire & Hardy 2009:151). Language thus has an instrumental function in institutional change, because it shapes ‘the strategies and rules by which we can speak about and act on a domain ... in such a way that certain possibilities and outcomes are realized rather than others’ (p. 150). As a consequence, for disruptive institutional work it matters how actors frame their issues. Framing is the act of meaning construction for a particular issue (Benford & Snow, 2000). An issue can be framed in different ways, ‘reflecting diverse ideas about what the issue is about, what should be done, and by whom’ (Metze, 2014:3).

A tentative list of three activities that are part of disruptive institutional work is presented by Lawrence & Suddaby (2006): disconnecting sanctions/rewards, disassociating moral foundations, and undermining assumptions and beliefs. These activities are aimed at weakening the regulative, normative, and cognitive pillars of institutions, respectively.

3.2.1 Disconnecting sanctions/rewards

Actors aiming for deinstitutionalization attempt to disconnect sanctions and/or rewards connected to specific types of behavior or results. They do so by ‘defining and redefining sets of concepts’ (Lawrence & Suddaby, 2006:236). These activities relate to the regulative pillar of institutions.

In their study of the deinstitutionalization of DDT use, Maguire & Hardy (2009) point at the call for regulatory change. In this case, DDT opponents called for new procedures to determine which pesticides are allowed as well as for legal restrictions on DDT use.

When disruptive institutional work originates from actors inside the field (i.e. ‘insiders’), one or a few elite members are sufficient to achieve regulatory change. In contrast, deinstitutionalization driven by outsiders requires a ‘wider and heterogeneous set of actors’ (Maguire & Hardy, 2009:169).

3.2.2 Disassociating moral foundation

To weaken the normative pillar, actors aim to disassociate the moral foundation of the particular institution (Lawrence & Suddaby, 2006). They will question the moral grounds by portraying the institution as unethical, undesirable, or inappropriate within the specific cultural context (Maguire & Hardy, 2009:168).

In the DDT case, Maguire & Hardy (2009) show how the pesticide was presented as ‘inappropriate because everyone has the right to full benefit, use, and enjoyment of the national natural resource treasure ... without degradation or diminution in value

resulting from the use of the broad spectrum, persistent, chemical biocide DDT' (p. 162). Moreover, actors referred to 'intergenerational equity' to undermine the moral foundation of DDT use (p. 162).

In the case of insider driven deinstitutionalization, powerful actors gradually undermine the moral foundation rather than attempting to achieve a wholesale turnover (Lawrence & Suddaby, 2006). Outsiders tend to engage in direct attacks, mostly targeting powerful actors (Maguire & Hardy, 2009:169)

3.2.3 Undermining assumptions and beliefs

The cognitive pillar is weakened by undermining assumptions and beliefs. The cognitive pillar entails our knowledge about e.g. the impact of a specific institution. There are two ways to undermine the assumptions and beliefs: emphasizing negative impacts and engaging in contrary practice.

When outsiders assert the negative impact of institutions, the discourse about the related practices changes and subsequently, the strength of the cognitive pillar is reduced (Maguire & Hardy, 2009:168). The problematization of DDT use entailed the contestation of 'previously taken-for-granted facts underpinning DDT's presumed safety for the environment' and over time the replacement of these facts by new ones (Maguire & Hardy, 2009:160). For instance, actors emphasized 'DDTs environmental impacts: persistence in soil, accumulation in organisms, and biological magnification via food chains' (p. 157).

Outsider driven deinstitutionalization focuses on the negative impacts and increasing costs, especially social, of continuing the practice (Maguire & Hardy, 2009:168). On the contrary, insider driven deinstitutionalization is often a result of 'growing awareness of economic advantages afforded by new practices' (Maguire & Hardy, 2009:168). We expect part of the institutional work to be geared towards these new practices.

Contrary practice is a second way to undermine assumptions and beliefs (Lawrence & Suddaby, 2006:237). Moving away from an existing institution comes with a price tag. The costs associated with setting up a new institution and with actors moving away from taken-for-granted patterns of practice help to keep institutions in place (Lawrence & Suddaby, 2006:237). Therefore, part of effective disruptive institutional work is aimed at decreasing the perceived costs and risks of institutional change. This can be done by 'facilitating new ways of acting that replace existing templates' (Lawrence & Suddaby, 2006:237). In sum, to achieve deinstitutionalization it is not sufficient to portray existing practices as inappropriate, actors 'must also construct alternative practices as acceptable' (Maguire & Hardy, 2009:172).

3.3 METHODS

We conduct our analysis on the basis of a single case study, thus gaining deep insights into actors' disruptive institutional work activities (Yin, 2003). The bottle deposit system case fits our theoretical focus, because it shows how an industry is able to disrupt a legitimate and longstanding institution at the very moment the environmental burden and litter caused by the rapid growth of small plastic bottles provide reasons to extend it. We refer to this industry as the 'packaging industry', which consists of companies that package their products and retailers (i.e. supermarkets). In this research, the packaging industry does not include companies that produce packaging materials, such as plastic bottles (Ministry of the Environment, 1991). Companies that package their products are represented by branch organization FNLI (Federatie Nederlandse Levensmiddelen Industrie), while retailers are represented by branch organization CBL (Centraal Bureau Levensmiddelenhandel). Basically, all businesses use packaging material. Therefore packaging policy affects virtually the whole business community and government is likely to face fierce opposition when changing packaging policies.

3.3.1 Data collection

Following Lawrence & Suddaby's (2006) observation that disruptive institutional work activities are largely discursive, we expect framing to play an important role in this case. Therefore, we mostly draw on written discourse. A starting point for our research is that industry arguments being voiced in newspaper articles are by and large consistent with the arguments used by industry in the policy or negotiation process (cf. Smink et al., 2015).

Firstly, we studied different types of public data sources, such as policy documents and legislation, accounts of Parliamentary debates, and letters from Ministers and Secretaries of State informing Parliament. Furthermore, we had access to an extensive archive of documents related to the deposit system. These documents go back to the late 1980s and often are either not public or no longer available. These include covenants, minutes of meetings, and research reports. This enabled us to gain more detailed insights into the processes behind the official policy documents.

Secondly, we collected a database of 323 news articles, based on a LexisNexis search in five nation-wide Dutch newspapers (De Telegraaf, de Volkskrant, Het Financieel Dagblad, NRC Handelsblad, and Trouw) using the terms 'statiegeld (*deposit*)', 'statiegeld AND recycling', 'statiegeld AND PET', and 'statiegeldsysteem AND PET' for the period 1990-2012.

3.3.2 Data analysis

Based on the newspaper articles database we created a timeline, starting in 1995, when small plastic bottles were introduced to the market. The rapid growth of small bottles, and the resulting problems, are the catalyst for both government and industry's activities related to the bottle deposit system.

We divided the period 1995-2012 into seven phases, based on key topics discussed and related major policy decisions. Table 3.1 lists these seven phases.

Table 3.1. Key events dividing the deposit system discussion in seven phases

Phase	Key topic	Time period
1	Industry reflection on deposit system and research on reusable bottle	1995-2000
2	Covenant III negotiations	2000-2002
3	Abolishment of reusable bottle	2002-2004
4	Introduction of producer responsibility	2004-2005
5	Industry-municipalities negotiations	2005-2007
6	Setting targets for plastic packaging collection	2006-2007
7	Roll-out of Plastic Heroes and abolishment of deposit system	2007-2012

Data analysis for this paper followed an inductive approach: we used open coding (Boeije, 2010) to define industry's disruptive institutional work activities. We categorized and constantly compared the data and arrived at three categories of activities: framing, conducting research, and negotiation.

For our findings section, we used multiple sources (news articles, policy documents, etc.), thus assuring triangulation of the data. A key actor in the deposit system discussion verified the timeline for accuracy of the data and missing data, thereby enhancing the inter-observer consistency (Bryman, 2008).

3.4 BACKGROUND

The bottle deposit system was introduced in 1962 by the regulatory body for producers and retailers of beer, soda and water (Staatscourant, 1995). At that time, bottles were predominantly made of glass and were valuable items worth reusing.

The introduction of the new plastic material PET (polyethylene terephthalate) (Ministry of the Environment, 1987) marked the beginning of profound changes in the

soda and water market. Starting in the mid-1980s, glass bottles were rapidly replaced by PET bottles (Chappin et al., 2005). This shift was part of a larger transformation in the industry towards standardized bottles.

At the end of the 1980s, the Ministry of the Environment (hence: Min. I&E) aimed to reduce the negative effects of packaging on the environment (Min. I&E, 1989; Bureau B&G, 1990). In 1986, the Lansink 'waste hierarchy' (see Figure 3.1) became the guiding principle in Dutch Law for packaging and waste policies (Kemp et al., 2007). The higher the position of an activity in the hierarchy, the higher the environmental score. In practice, the hierarchy prescribes that first, waste needs to be prevented as much as possible. The next best option for waste management is product reuse, then material recycling, followed by incineration with energy recovery and incineration without energy recovery. Landfilling is an option of last resort. Material recycling and incineration with energy recovery fall in the category of 'useful application' of waste, while incineration and landfilling are categorized under 'disposal'.



Figure 3.1: The Lansink waste hierarchy.

To promote product reuse (second best option in Figure 3.1), the deposit system was included in the 1991 Covenant on packaging policy between government and the packaging industry (Min. I&E, 1991: article 9 and Annex 1, sub C, article 1). The Covenant states that the packaging industry is responsible for the collection and recycling of both glass and plastic bottles. Essentially, the producer or retailer remains the owner of a bottle throughout its lifetime. The consumer pays a deposit on each bottle (€0,25), which is refunded when the bottle is returned to the supermarket. At this point, the producer or retailer is responsible for collecting, and refilling or recycling of the bottle (Stichting Retourverpakking Nederland, 2015). Moreover, the deposit system includes mandatory reuse of plastic bottles, i.e. refilling of used bottles (Min. I&E, 1991: article 8). The costs related to these activities are paid by the packaging industry.

Apart from being a formal institution, returning bottles to the supermarket is regarded as the appropriate thing to do. Driven by the deposit amount as a financial incentive, the deposit system has enjoyed a steady response rate of 95% (e.g. Min. I&E, 2005d). Opinion polls show that around 70% of the public supports an extension of the deposit system to small bottles (TNS NIPO, 2006; 2011) and over 70% of the public opposes abolishment of the deposit system (TNS NIPO, 2011).

The introduction of small plastic bottles (maximum 500 ml) in the mid-1990s (Chappin et al., 2005) is the catalyst that puts the longstanding bottle deposit system under pressure. Covenant I prescribes a deposit on all reusable and disposable bottles (Min. I&E, 1991). Nevertheless, in a gentlemen's agreement in the mid-1990s, government and industry agree to exempt small bottles from a deposit because they form such a marginal part of the market (Echte Held, 2015). Government and industry agree that the share of small bottles should not exceed 2% of total plastic bottles sales.

However, by the end of the 1990s, the market share of small plastic bottles has increased dramatically. In the year 2000, sales have increased up to 150 million bottles annually (de Volkskrant, 2001c). These small bottles are neither reusable nor subject to a deposit. An environmental loss is incurred by not returning these bottles to the supermarket for recycling. Moreover, the increased sales of small bottles is related to increased litter in the public space (Min. I&E, 2002a).

The introduction of the small bottle prompts the packaging industry to reconsider the deposit system. A government-imposed extension of the deposit system with small bottles would be a logical step, given the increase in sales of small bottles and the related environmental and litter problems. However, for the industry such an extension of their responsibilities would be undesirable.

The packaging industry's main arguments are that the deposit system is expensive and burdensome (e.g. de Volkskrant, 2001a; NRC Handelsblad, 2012). First, given that industry is responsible for operating the deposit system, industry wishes to minimize their responsibilities and the related costs. In fact, already in 1990, supermarkets indicate that they find the deposit system and the reusable bottle too expensive (NRC Handelsblad, 1990). Second, industry portrays the deposit system as burdensome. The system affects their operations in several ways: it requires additional logistic and administrative efforts (e.g. de Telegraaf, 2012). Furthermore, the deposit system and especially the mandatory reuse of bottles limits the industry's packaging and marketing options (e.g. NRC Handelsblad, 2006). This last point is essential for an industry in which image is of strategic importance. Retailers, in turn, oppose the additional store space required for collection of bottles (e.g. Trouw, 2001a).

An underlying but less outspoken argument is the potential loss of turnover (NRC Handelsblad, 2001). Apart from the deposit amount, the price of drinks in small

bottles will increase due to the operation costs of the deposit system (Trouw, 2001b). Industry wishes to prevent turnover loss on small bottles, which are among their most lucrative products (de Volkskrant, 2001c; De Telegraaf, 2003c).

3.5 TIMELINE

Phase 1: Industry reflection on deposit system and research on reusable bottle (1995-2000)

In 1995, the packaging industry anticipates a deposit system extension and expresses its preference for an alternative deposit policy for disposable bottles, which should be returned to other parties than the industry (Staatscourant, 1995). They emphasize that “the purpose is not to burden industry and retail with the collection and sorting obligation of disposable packaging” (Staatscourant, 1995).

The first concrete step by the packaging industry to undermine the bottle deposit system concerns the obligation to reuse (refill) bottles. In 1997, bottlers and retailers commission two research reports on the environmental impact of switching from a reusable bottle to a recyclable one (TNO, 1997a; TNO, 1997b). Covenant II states that the industry is allowed to replace the reusable bottle with a disposable one on the condition that it is demonstrated that the disposable bottle leads to the same or a lower environmental loss than a reusable bottle (Min. I&E, 1997: Bijlage II Protocol producthergebruik). Covenant II thus provides an opportunity to end part of the deposit system based on environmental reasons.

However, the research concludes that a reusable bottle is more environmentally friendly than a disposable and recyclable bottle (TNO, 1997a). In sum, the reusable bottle cannot be abolished on environmental grounds.

Phase 2: Reducing litter 2000-2002

In the year 2000, government and the packaging industry negotiate about a follow-up to Covenant II. To address the environmental loss caused by the rapid growth of small bottle sales, the Minister of the Environment aims to extend the bottle deposit system. The packaging industry opposes this plan. Nevertheless, both parties agree that it is necessary to address small bottles, because they now present an environmental loss. Moreover, they agree that a solution is needed for collection and reuse of plastic packaging waste in general. A joint research report by industry and government investigates how plastic packaging material in domestic waste could be recycled cost-efficiently and with the highest environmental gain (CE, 2001a). It concludes

that recycling of small bottles is not efficient: environmental gains are low compared to the costs. Rather, in the long run it is best to collect domestic plastic waste and separate it at the plant afterwards.

The Minister now shifts his main argumentation from environmental gain to reduction of the litter problem. To curb the amount of litter in the streets, not only small bottles but also cans and small drink cartons should be included in the deposit system. Another joint research project compares three alternative systems to reduce small bottles, cans, and drink cartons in litter: a deposit system; collection outside the retail channel supported by a small financial incentive; and the industry's proposal of preventing litter through awareness campaigns, more waste bins, and increased fining of litterers (CE, 2001b). The report finds that a deposit system leads to the largest reduction: twice as high as from the industry's proposal. The costs of the deposit system are more than twice as high as the industry's proposal. In other words, to reduce litter it is best to extend the deposit system.

At this point industry threatens to withdraw from the covenant negotiations altogether if the Minister holds on to the extension of the deposit system. While the packaging covenants are the domain of the Ministry of the Environment, it is overruled by the more powerful Ministry of Economic Affairs (De Telegraaf, 2001; Trouw, 2001c). By the summer of 2002, Covenant III is concluded (Min. I&E, 2002c). In a dedicated sub covenant, it adopts the industry's proposal to address litter (awareness, bins, fining). With this approach, industry needs to have reduced the amount of small bottles in litter by 80% in 2005. If this goal is not achieved, government will extend the deposit system to small bottles.

Phase 3: Abolishment of reusable bottle (2002-2004)

At the end of 2002, industry and the newly elected and more business-oriented government and Secretary of State make a secret deal about the abolishment of the mandatory reuse of bottles by 2006 (Min. I&E, 2002d; 2006d; de Volkskrant, 2004). Recycling bottles instead of reusing them implies one step down the waste hierarchy. This agreement is documented in a secret side-letter to Covenant III. In fact, this deal violates Covenant III, which contains an obligation to use reusable bottles (Min. I&E, 2002c: Bijlage II, Protocol Producthergebruik).

In 2002, as part of a standard procedure, the European Commission voices its concerns regarding the mandatory reuse of bottles. This obligation potentially violates the principle of free movement of goods within the EU (Min. I&E, 2002b). Around that time, the European Commission also receives a complaint from a market actor regarding the mandatory reuse of bottles in the Netherlands (Min. I&E, 2004a). A policy discussion follows between the European Commission and the Dutch govern-

ment (Min. I&E, 2004b), with government initially (summer 2002) strongly defending the mandatory reuse of bottles. However, before this discussion and a related case at the European Court of Justice reaches closure, the Secretary of State decides to search for alternatives for the mandatory reuse of bottles (Trouw, 2004). At this point in 2004, the secret deal about the abolishment of the reusable bottle becomes public (de Volkskrant, 2004).

To compensate for the environmental loss, industry pledges to start collecting and recycling small bottles (NFI, 2004a; 2004b). New research (CE, 2004) indicates that in order to compensate for the environmental loss, 55% of small plastic bottles need to be collected and recycled, together with the use of 25% recycled materials in new bottles.

Phase 4: Introduction of producer responsibility (2004-2005)

To prevent the extension of the deposit system to small bottles, industry promised to have reduced the amount of small plastic bottles in litter by 80% by 2005. However, good measurements are absent (Min. I&E, 2004a; CE, 2005). Nevertheless, various studies indicate that the total amount of litter has increased (e.g. CML, 2005). This means that government, as a sanction, should extend the deposit system as agreed in 2001.

Instead, the Secretary of State argues that he wishes to address all litter, not just a few subcategories. He prefers to cooperate with industry rather than to enforce rules unilaterally. In 2005, the Secretary of State announces his plan to implement the principle of 'producer responsibility' by 2006, following the 'polluter pays' concept (Min. I&E, 2005a; 2005b). This means that individual producers and importers are responsible for the collection and recycling of waste streams: paper, cardboard, and plastic bottles. So besides recycling of plastic bottles, firms will have an additional responsibility to collect all plastic household waste. This is a major change in packaging policy. The Secretary of State's plan entails a packaging tax for consumers which will be allocated to waste collection and reducing litter. Parliament votes in favor of his plan (Min. I&E, 2005c). As a consequence, the sanction of extending the deposit system to small bottles is not implemented.

Phase 5: Industry-municipalities negotiations (2005-2007)

Municipalities are responsible for collecting domestic waste. Therefore, to fulfill their producer responsibility, industry must rely on the waste collection infrastructure of municipalities. However, to reduce litter, municipalities wish to extend the deposit system. Moreover, they state that industry offers too little money to arrange the sepa-

rate collection of packaging waste. Industry commissions a study that investigates three options to fulfill their responsibility. The study by TNO (2005) concludes that only separation after collection leads to CO₂ reduction. Abolishment of the deposit system by 2010 will even lead to environmental gains.

At the end of 2005, the negotiations between municipalities and industry are in a deadlock. The Secretary of State sets a deadline for the negotiations and employs a mediator (Min. I&E, 2005d). Early 2006, industry leaves negotiation to the very influential national employers' organization VNO-NCW (Trouw, 2006). Ultimately, the Minister himself leads the negotiations between industry and municipalities. All parties agree that litter should be addressed as a whole and extension of the deposit system would not be sufficient to reduce litter (Min. I&E, 2006a; 2006b). The Secretary of State argues that the majority of litter consists of other elements than cans and bottles. Moreover, he argues that the recycling level of cans is already high (Min. I&E, 2006a); it is the mentality of the public that is the problem (Min. I&E, 2006b).

In July 2007, the parties reach an agreement to reduce the litter problem (Min. I&E, 2006c). The program runs from 2007 to 2009 and consists of increasing awareness, addressing consumers' mentality, and physical cleanup. Industry pays 33 million euros to municipalities to reduce litter (Min. I&E, 2006e).

Phase 6: Setting targets for plastic packaging collection (2006-2007)

Industry targets for the collection and recycling of plastic waste are: 95% of large bottles (>0,5 liter) (based on the response rate of the deposit system), and 55% of small plastic bottles (compensation for abolishment of reusable bottle). A third target of 27% addresses other types of plastic packaging waste (Min. I&E, 2005b). The consumer is meant to separate plastics at home and bring it to special collection bins in the streets, similar to the glass bin (Min. I&E, 2007a).

To facilitate efficient collection, industry proposes to aggregate the three goals into one goal. This would result in an integral goal of 30% of all packaging material. The Secretary of State argues that if industry accepts a target of over 40%, he will agree with one integral goal. Furthermore, the Minister will drop the possibility of extending the deposit system (Min. I&E, 2007d). Both parties agree on a target of 38% in 2009 and 42% in 2012 and document this in Framework Agreement I (Min. I&E, 2007c). In addition, if these goals are reached, the Minister is willing to abolish the deposit system (Min. I&E, 2007b). Namely, at that point, the only reason for the deposit system would be the separate goal for collection and recycling of large bottles. The performance of the industry will be evaluated by 2010, after which a decision on the deposit system will be made.

Phase 7: Roll out of 'Plastic Heroes' and abolishment of deposit system (2007-2012)

In 2007 and 2008, industry conducts a pilot study with collection bins in the street. This study builds on the industry's earlier promise to collect small bottles as compensation for the abolishment of the reusable bottle. The collection initiative carries the name 'Plastic Heroes' and is rolled out over the country in 2009 and 2010 (Min. I&E, 2010). A specialized separation plant is built in Rotterdam and starts running in mid-2011 (FNLI, 2012).

In 2010, the Inspection of the Ministry of the Environment concludes that industry data about the percentage of collection and recycling of domestic plastic waste is unreliable (Min. I&E Inspection, 2010; Trouw, 2011a; 2011b). In 2011 the Inspection again concludes the data is not reliable (Trouw, 2012). Framework Agreement I ends in 2012 and negotiations start for Framework Agreement II. In March 2012, the Secretary of State announces that government and industry have agreed to abolish the deposit system (Min. I&E, 2012). The Secretary of State relies on data provided by the industry for his decision to abolish the deposit system (Trouw, 2012). Abolishment is possible, he states, because an alternative collection infrastructure now exists. Moreover, the deposit system covers only a small part of all plastic packaging waste, and at higher costs than Plastic Heroes.

In sum, the switch to the disposable bottle implies lower grade use of the plastic material, given that bottles are no longer reused, but only recycled (Rouw & Worrell, 2011; see also Lansink waste hierarchy, Figure 3.1). The plastic waste in the Plastic Heroes system, in turn, is of lower grade than the plastic in the deposit system. While both streams are recycled, the Plastic Heroes stream consists of many types of plastic (also lower-grade) and contains more pollution. The switch to the disposable bottle and the Plastic Heroes system both result in an environmental loss.

3.6 DISRUPTIVE INSTITUTIONAL WORK REGARDING THE DEPOSIT SYSTEM

This section describes the three categories of disruptive institutional work that were distinguished in the bottle deposit case: framing, conducting research, and negotiation. Moreover, this section shows for each category of disruptive institutional work which institutional pillars are addressed.

3.6.1 Framing

Industry uses the same framing elements during different phases: when contesting the extension of the bottle deposit system (Phase 2 and 5), and when advocating

the abolishment of the reusable bottle (Phase 1 and 3) and the bottle deposit system (Phase 7).

The industry's framing addresses the cognitive and normative pillar. The framing that addresses the cognitive pillar weakens the assumptions and beliefs regarding the effectiveness, and the costs and cost-efficiency of the bottle deposit system (see Table 3.2 for examples).

Table 3.2. Framing addressing the cognitive pillar

	Regarding deposit system (extension)	Regarding industry alternative: Plastic Heroes
Effectiveness regarding litter reduction	'Only 5 to 15% of litter consists of beverage packaging' (de Volkskrant, 2001b)	[not addressed]
	'Deposit bottles form only 5% of the total plastic packaging waste stream' (de Volkskrant, 2012a)	
	'It is unlikely that large plastic bottles will end up as litter' (de Volkskrant, 2012a)	
Effectiveness regarding environmental gain	'The bottle deposit system hardly results in environmental gain' (Het Financieele Dagblad, 2001)	'You shouldn't just look at those bottles, you should look at all plastic [packaging]' (de Volkskrant, 2012b)
	'The additional transport required for small PET-bottles will only increase the environmental burden' (Trouw, 2001a)	'We want to increase recycling from 43% to 52%, compared to other European countries this is very high' (de Volkskrant, 2012b)
		'Adding PET bottles to other plastic packaging increases the value [quality] of the plastic waste stream' (de Volkskrant, 2012b)
Costs & cost-efficiency	'The bottle deposit system costs a lot of money' (Het Financieele Dagblad, 2001)	'We aim for the highest environmental performance against minimum costs' (de Volkskrant, 2012a)
	'The question is not whether a deposit system works, but whether it is the most efficient and least market distorting method to restrict litter. The answer is: no' (de Volkskrant, 2001d)	'Wouldn't it be logical to include large PET bottles in the [Plastic Heroes] system, in order to create one efficient system for all plastic packaging?' (de Volkskrant, 2012a)
	'For this mere 5% [of small plastic bottles in litter] we run a complex and very costly deposit system' (de Volkskrant, 2012a)	

The effectiveness is questioned for two reasons. On the one hand, industry argues that the deposit system is not an effective method to reduce litter, thereby separating the issue of small plastic bottles from the litter issue. They also increase the problem definition by arguing that not only small bottles should be addressed, but all plastic waste (Phase 2) or all litter (Phase 5). On the other hand, industry states that the proposed extension will lead to only limited environmental gain.

Furthermore, industry highlights the costs and low cost-efficiency of the deposit system for industry. All three arguments weaken the foundation for the extension or continuation of the bottle deposit system. In Phase 7, industry frames the Plastic Heroes system as the alternative with the highest environmental gain against the lowest cost. This frame highlights the environmental performance and cost-efficiency of the Plastic Heroes system and thus builds assumptions and beliefs for this contrary practice.

The normative pillar of the bottle deposit system is undermined by questioning industry's responsibility for plastic bottles in litter and by pointing at the undesirability of the deposit system in the context of a competitive (EU) market (see Table 3.3).

Table 3.3. Framing addressing the normative pillar

	Regarding deposit system (extension)	Regarding disposable bottle
Responsibility	<p>'Litter is a societal issue. It has to do with norms and values. It is too easy to make industry responsible for litter' (Het Financieele Dagblad, 2006)</p> <hr/> <p>'We are not responsible for litter. It is the responsibility of citizens that throw their waste on the streets. ... Unfortunately, government is not very active in imposing fines [on litterers]' (de Volkskrant, 2012b)</p>	[not addressed]
Competitive market	<p>'Mandatory reuse of bottles distorts competition [within the EU market]' (de Volkskrant, 2004)</p> <hr/> <p>'We fight for equal treatment of all types of packaging and products. We are obliged to refill bottles, others are not' (Het Financieele Dagblad, 2004)</p> <hr/> <p>'Reusable bottles increasingly have to compete with juices and flavored dairy products that are allowed to be sold in disposable packaging' (NRC Handelsblad, 2006)</p>	<p>'The disposable PET bottle has many advantages. Producers can offer many more sizes, colors and types of bottles. ... It is now easier to respond to trends and we have more marketing possibilities.' (NRC Handelsblad, 2006)</p> <hr/> <p>'We [supermarkets] will be able to offer discounts on soda drinks and we expect to offer numerous new drinks' (De Telegraaf, 2004)</p> <hr/> <p>'The disposable bottle has a fresher look. A bottle that has already been used fifteen times gets a bit shabby' (NRC Handelsblad, 2006)</p>

Industry emphasizes that it is the consumer that is responsible for the growing litter problem, not the industry. Therefore, the industry claims that the mentality of the consumer is the real issue. Concerning the reusable bottle (Phase 1 and 3), industry presents the bottle deposit system as unfair. It causes a trade barrier in the EU market and a non-level playing field with water. In contrast, the disposable bottle is presented as desirable within the context of a competitive market: it offers more marketing and packaging options and allows retailers to import cheaper drinks from abroad and sell a larger product range. This frame provides a moral foundation for the disposable bottle as a contrary practice.

In sum, the industry frames the deposit system in terms of effectiveness (litter reduction and environmental gain), costs and cost-efficiency, responsibility, and a competitive market.

3.6.2 Conducting research

Research plays a central role in the industry's disruptive institutional work. The reports serve to influence the cognitive pillar of the deposit system. They address the assumptions and beliefs about the current system and construct new ones for their proposed contrary practice: the Plastic Heroes initiative. Research underpins the industry's framing and negotiation activities. Six major reports have been published in total during Phase 1, 2, 3, and 5. The two reports in Phase 2 are joint research projects by government and industry. In Phase 1, 3 and 5, the research is commissioned by industry.

The reports have different purposes: the three reports in Phase 2 and 5 (CE, 2001a; 2001b; TNO, 2005) are conducted to evaluate different policy options and thus to inform the policy making process. Each report contains two main elements: the system's performance and the related costs. For instance, the first report investigates 'How plastic packaging material in domestic waste could be recycled cost-efficiently at the highest environmental gain' (CE, 2001a). In contrast, the report in Phase 3 serves to determine the compensation necessary to justify the abolishment of the reusable bottle. This research was conducted after the decision to abolish the reusable bottle had been taken.

Cost-efficiency is the dominant decision criterion, except for the first two reports about the environmental performance of the reusable bottle (TNO, 1997a; 1997b). This resonates with government's decision making which generally follows a market approach. However, the determination of costs and benefits is not self-evident, leaving room for a particular representation that highlights some costs and benefits, and downplays others (cf. Stone, 2012; Rossi et al., 2004).

Performance

The choice of selection criteria (CO₂ emissions), definitions (useful application), baseline scenario (incineration without energy recovery), and compensatory measures (25% recycled material) influence which alternative scores best. We observe that with the research setup chosen in these three reports, the alternative proposed by industry outperforms the government's proposal for deposit system extension.

The three reports that inform policy making (CE, 2001a; CE 2001b; TNO, 2005) measure a system's performance in terms of CO₂ emissions. This is peculiar, given that the guiding principle for packaging policy is the Lansink waste hierarchy and not CO₂ reduction. Working with CO₂ as a selection criterion means many choices about assumptions have to be made, which are all opportunities influence the research outcome. Moreover, measuring CO₂ emissions is disadvantageous for the deposit system, because it involves more transport in order to refill and recycle the bottles, whereas the high quality reuse and recycling is not being measured. Benefits of the recycling system are thus being undervalued.

The choice of definition also matters for the outcome of the research. In the CE (2001a) report, 'useful application' of waste is defined as 'recycling' or 'incineration with energy recovery'. This very broad definition means that the environmental gain of these two very different options are valued equally in terms of CO₂ emissions and final waste. However, recycling scores higher on the waste hierarchy than incineration with energy recovery. Now that recycling and incineration with energy recovery are valued equally in terms of environmental gain, the relative costs of each system will be decisive.

In the reports that favor the industry alternative (CE, 2001a; CE, 2004; TNO, 2005), that particular alternative scores best due to a bonus that the other alternatives do not have. In Phase 2 and 5, the industry alternative wins due to the energy recovery bonus compared to the baseline scenario with no energy recovery from incineration. The deposit system does not benefit from this bonus, because it recycles the plastic material instead of burning it. In Phase 3, the industry option is superior only due to the use of 25% recycled material, which is not included in the other options. These bonuses overrate the industry alternative compared to the deposit system option.

Costs and reliability of the data

During the period 1995-2012, costs become increasingly important in the policy process. Whereas in the beginning, environmental gain was the main criterion for a new system (CE 2001a), in Phase 5 the emphasis lays on how to process plastic packaging material at the lowest cost (TNO, 2005).

While costs are key in the deposit case, reliable data about the exact cost of the existing system and alternative options is lacking. Because industry is responsible for running the deposit system, data on the costs of the deposit system are supplied by the industry (e.g. CE 2001b). This means government is dependent on data supplied by actors with a large stake in the outcome of the policy process. The lack of reliable information on costs is a serious flaw in the policy discussions on the deposit system.

Link with framing and negotiation

The three reports that mean to inform an agreement between industry and government or municipalities (CE, 2001a; 2001b; TNO, 2005), do not at first lead to policy decisions. The discussion continues after they are published. In Phase 2 the outcomes are unfavorable to and therefore ignored by the industry and in Phase 5 the outcomes are not accepted by municipalities.

When reports support the industry's proposal, industry uses the findings in their framing and negotiation activities. However, when the research indicated the inferiority of the industry alternative (TNO, 1997a; TNO, 1997b; CE, 2001b), the industry resorted to threatening to boycott the negotiation process and to arranging the involvement of the powerful Ministry of Economic Affairs.

3.6.3 Negotiation

Through negotiations, industry aims to change regulative institutions. This section presents five observations on how industry engaged in disruptive institutional work to abolish the bottle deposit system.

First, the packaging industry engages in a gradual undermining of the deposit system. Rather than confronting the complete deposit system at once, they negotiate with government about smaller parts of the system, also called 'salami tactics'. Industry thus undermines the deposit system one small step at a time while simultaneously constructing a contrary practice. They do not argue for the abolishment of the deposit system until the moment they have designed an alternative system (Phase 6 and 7). In the meantime, industry prevents deposit system extension, abolishes the reusable bottle, and offers the Plastic Heroes system. The erosion of the high-grade deposit system facilitates the switch to the lower-grade Plastic Heroes system. When these two systems perform equally well, industry suggests the more expensive one can be abolished.

Moreover, in this process of gradual undermining the burden of proof is reversed. In Phase 4, the Secretary of State introduces the concept of 'producer responsibility': collection and recycling of all domestic plastic waste by industry becomes the guid-

ing principle. At this point the burden of proof shifts from the proposed alternative system to the existing deposit system. This is remarkable, given that generally new practices have to meet higher standards than existing practices.

Second, the blurry nature of the policy-making process is noteworthy. The case shows several in-between interventions in agreements that have not yet reached the end of their term. For instance, while the deposit system extension has been agreed upon as a sanction for not achieving 80% reduction of small bottles in litter (Phase 2), in the meantime the existing deposit system is undermined by abolishing the reusable bottle (Phase 3). These in-between interventions obstruct the use of sanctions and thus the means for government to address their policy goals, e.g. reducing litter.

Moreover, industry compensates for hollowing out the deposit system with measures that will soon be mandatory anyway. Specifically, industry commits to compensatory measures for the abolishment of the reusable bottle: collection and recycling of 55% of small bottles. However, the next year the government introduces producer responsibility, which entails that the industry has to collect and recycle all plastic waste. This means that the above mentioned compensation overlaps with the producer responsibility introduced shortly afterwards. Thus, the industry effectively does not compensate for the abolishment of the reusable bottle.

Negotiations regarding the deposit system also include an 'evaluatory trap'. This entails decision-making based on promises, which in the end are not met. The evaluatory trap results in a system build on empty promises. The deposit system is eroded through the abolishment of the reusable bottle and is to be abolished in favor of the Plastic Heroes system. A well-functioning system is traded for promises by an industry that often does not meet its targets (e.g. CML, 2005).

Industry operates under continuously changing entities. Since the first covenant, the body in which the packaging industry is united has changed identity five times. It is now known under the name of Afvalfonds, but was previously organized in organizations called Stichting Verpakking en Milieu (SVM), SVM-Pact, Stichting Nederland Schoon, and Nedvang. This implies that it is problematic to hold the industry accountable for previous (non)performance; they are not liable.

Evaluation of the industry's performance is problematic because no reliable data exists or data is missing altogether. In Phase 4, reliable measurements to conclude whether industry fulfilled the target of 80% reduction of small plastic bottles in litter were lacking. For the Minister this is a reason not to sanction industry, even though the existing measurements indicate an increase of litter (CML, 2005). In 2010 and 2011, the Inspection of the Ministry of the Environment concluded that the data industry presents is not reliable. Nevertheless, the Secretary of State relies on data provided by the industry for his decision to abolish the deposit system (Trouw, 2012). In contrast to Phase 3, this time the lack of reliable measurements leads to Secretary

to offer the industry the reward: the abolishment of the deposit system. While in both cases it was unclear whether industry delivered, a lack of numbers ultimately resulted in government decisions that were favorable to industry (Phase 4: no deposit system extension (i.e. sanction); Phase 7: deposit system abolishment (i.e. reward)).

Finally, while industry makes consistent efforts to undermine the deposit system, Ministers and Secretaries of State come and go. In the period 2000-2012, the Netherlands has known six governments and four cabinet members responsible for packaging policy. This lack of political stability provides opportunities for industry. Every newly installed government creates a policy window to renegotiate previous agreements and thus avoid sanctions.

Third, the construction of a contrary practice is an essential part of the industry's negotiations. In Phase 7 we see how industry builds an alternative collection and recycling system, called Plastic Heroes. This alternative is central in explaining the end of the deposit system. It is the very existence of an alternative that provides the Secretary of State the justification to abolish the deposit system. It is salient that the Plastic Heroes system builds on previous promises to compensate for the abolishment of the reusable bottle. So the compensation for reducing the deposit system ultimately helps to argue against this very deposit system. The compensation operates as a Trojan horse.

Throughout the case, industry always has an alternative solution to the one government proposes, such as addressing litter through enforcement, collecting small plastic bottles in exchange for abolishment of the reusable bottle, and setting up Plastic Heroes in exchange for the abolishment of the deposit system. In fact, the choice between a deposit system for plastic bottles and the Plastic Heroes system for all domestic plastic waste is a false dilemma. In principle it is possible to operate both systems simultaneously; thus achieving high quality recycling of plastic bottles *and* collecting all other domestic plastic waste. But when cost-efficiency is the dominant decision criterion, the option of operating two systems is not likely to be the best performing alternative.

Fourth, on a few occasions, industry's negotiation entails escalation of the discussion to a higher level of authority. In Phase 2, industry concludes the negotiation process by boycotting the negotiations and leveraging the help of the Ministry of Economic Affairs. This powerful Ministry overrules the Ministry of the Environment. In Phase 5, abolishment of the deposit system is a condition for industry to fulfill producer responsibility (Nederlands Dagblad, 2015). Moreover, it charges the influential employers' organization to negotiate for them. Negotiation at a higher level offers the possibility to bring in other, more powerful actors that support industry's case and to overrule environmental concerns.

There is also a form of escalation in Phase 3. The industry refers to a discussion between the European Commission and the Dutch government on the reusable bottle. By referring to the Commission’s concerns about the reusable bottle in terms of potentially creating a trade barrier, the industry makes its plea for the abolishment of the reusable bottle more powerful. The discussion with the European Commission legitimizes the secret abolishment of the mandatory reuse of bottles.

Relatedly, the history of the deposit system abolishment also includes at least one backroom deal. The abolishment of the reusable bottle is agreed upon in a secret side-letter to Covenant III (Min. I&E, 2002d) and kept secret for two years. The switch from the reusable to the disposable bottle is very important for the ultimate abolishment of the deposit system. The unique feature of product reuse is lost and opens up avenues to recycle materials in another way.

Finally, the industry uses the media to gather support for their preferred regulative institutions. Figure 3.2 shows how media attention for the deposit system increased sharply from 2000 onwards. In phase 2, 3, and 7, the number of newspaper articles increases sharply towards the end of each phase. In Phase 4, 5, and 6 media attention does not increase within the phase, but is nevertheless at a much higher level than before the year 2000. The more salient the issue, the more newspaper articles appear. This is likely to be an effect of the industry using the media to gather public support for their position during policy-windows.

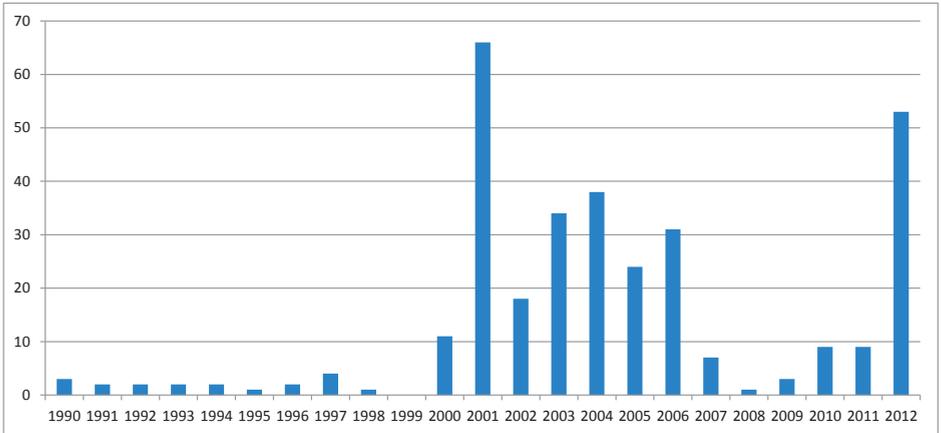


Figure 3.2. Number of newspapers articles related to bottle deposit system in time period 2000-2012.

3.7 CONCLUSION & DISCUSSION

The core elements of the packaging industry's disruptive institutional work in the abolishment of the bottle deposit system are framing, conducting research, and negotiation. Framing influences the cognitive and normative pillars of the bottle deposit system and industry's proposed alternative. Main themes in the framing are effectiveness (litter reduction and environmental gain), costs and cost-efficiency, responsibility, and a competitive market. Framing is characterized by emphasizing the disadvantages of the unwanted system and highlighting the advantages of the proposed alternative system. Thus, the environmental gains of the deposit system are downplayed, while the Plastic Heroes system is heralded for its cost-efficiency.

The research conducted by industry addresses the cognitive pillar of the bottle deposit system and focuses on the performance and costs of each alternative system. By choosing specific performance criteria and definitions, the relative score of the various options can be influenced. Because of the setup of the studies, the industry alternatives score best, even though they lead to less reuse of products and lower-quality recycling of materials. Outcomes favorable to industry interests are important input for industry's framing and negotiation. However, if outcomes are not in line with industry interests, industry resorts to threatening to boycott the negotiation process and to involving the more powerful Ministry of Economic Affairs or the influential employers' branch organization to overrule the Ministry of the Environment.

In terms of negotiation, we have observed that industry engages in a virtually continuous effort to hollow out the regulative pillar of the deposit system. This is in line with the expectation that field insiders engage in a gradual undermining of institutions rather than in a direct attack (cf. Lawrence & Suddaby, 2006). A crucial element in the industry's disruptive institutional work is the creation of the Plastic Heroes system to collect and recycle plastic waste. This contrary practice indeed lowers the cost of moving away from the established bottle deposit system, as suggested by Maguire & Hardy (2009:168).

Furthermore, the abolishment of the deposit system is also due to the blurry policy-making process. The process is characterized by in-between policy interventions and continuous renegotiation of agreements, both resulting in the industry evading sanctions from government. The packaging industry also leveraged more powerful actors such as the Ministry of Economic Affairs and the main employers' branch organization to influence policy outcomes in their favor. Government allowed the packaging industry to get away with not meeting targets and delivering unreliable data on their performance. Government traded the established deposit system for promises by an industry that has often not fulfilled its targets. Had government been persistent in following up on its agreements, the very existence of the bottle deposit system would

not have been a subject for political debate. Part of the industry's success at disruptive institutional work is therefore due to shortcomings of government.

In sum, disruptive institutional work in the deposit system case entails several iterations of breaking down (parts of) the deposit system, compensating for the resulting environmental loss and litter, building up an alternative system, and supporting this industry alternative by research and framing. Thus, industry moves towards their alternative system step by step until the point that the alternative system is deemed sufficient to replace the existing deposit system. At this moment the deposit system is abolished.

3.7.1 Contribution to the field of sustainability transitions

This study addresses the deliberate destabilization of institutions that matter for sustainability. This study shows that the problematization of current practices and the construction of contrary practice are essential elements of disruptive institutional work. For actors wishing to accelerate destabilization of socio-technical regimes this implies that apart from emphasizing the negative and unethical aspects of current regime practices it is of utmost importance to propose and legitimize an alternative solution.

The insights into disruptive institutional work that this study presents hold in particular for field insiders or regime incumbents. Therefore, to provide more specific recommendations for outsiders wishing to destabilize institutions, additional research into outsider-driven disruptive institutional work is necessary. Maguire & Hardy (2009) provide a first clue by suggesting that outsider-driven disruptive institutional work requires a wider set of actors.

Furthermore, this study shows that institutions meant to promote sustainability can be disrupted. This means we have to be aware that sustainability transitions do not only move forward, but can also move backwards. Therefore, apart from creating new institutions, it may also be necessary for sustainability transitions to protect existing institutions, e.g. against the disruptive institutional work of powerful regime actors. This insight is important for the field of sustainability transitions, which mostly looks at the creation of institutions (i.e. institutional entrepreneurship) promoting sustainability. Future research should also look at how institutions contributing to sustainability can be protected through institutional work aimed at maintaining institutions.

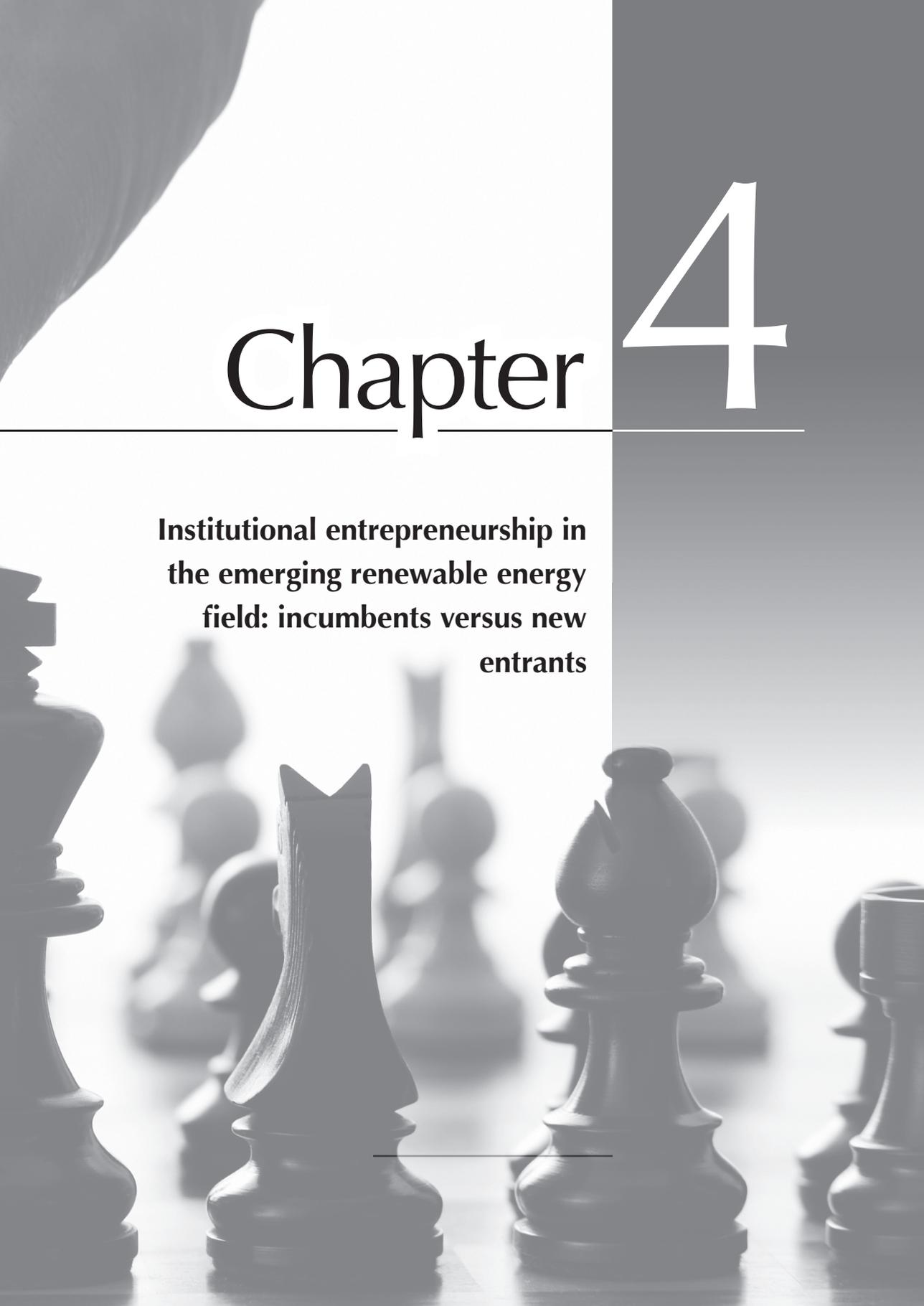
3.8 EPILOGUE

In June 2015, the Ministry of the Environment unexpectedly announced that the bottle deposit system would not be abolished at that moment. This decision was taken because the packaging industry did not meet all conditions required for this abolishment. Furthermore, in a few months' time the deposit system became a much discussed topic in the public debate and many citizens spoke out against abolishment. However, at the time of writing this article it seemed unthinkable that the bottle deposit system would continue to exist. In March and April 2015 still, newspaper articles expressed the expectation that the deposit system would soon cease to exist (e.g. *Nederlands Dagblad*, 2015; *de Volkskrant*, 2015). Given that our data collection runs from 1995 till 2012 and given government's decision to conditionally abolish the bottle deposit system in 2012, we have documented the case as if the deposit system would be abolished.



If you are not at the table, you will be on the menu

Unknown



Chapter

4

**Institutional entrepreneurship in
the emerging renewable energy
field: incumbents versus new
entrants**

ABSTRACT

An underexplored issue in the institutional entrepreneurship (IE) literature is the difference between incumbents and new entrants in promoting institutional change for innovative technologies. We study the IE activities: cooperation, framing, and political tactics in the case of biomethane development in the Netherlands, during 2006-2012. While for decades biogas farmers have been unable to build a supporting institutional framework, incumbents recently arranged substantial government support. Our theoretical contribution lies in defining dimensions of the three core IE activities. We present empirical evidence that new entrants and incumbents employ all three activities, but in distinct ways. Thus, the incumbents' IE activities lead to more substantial institutional change than new entrants' activities. As a consequence, production shifts from electricity to gas and the scale of installations increases. We conclude that incumbents can accelerate institutional change, however their focus on large-scale installations makes it difficult for biogas farmers to contribute to biomethane production.

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4.1 INTRODUCTION

Climate change and the depletion of conventional fossil fuels require societies to go through a transition towards a low-carbon economy (e.g. Blühdorn, 2011; Okereke et al., 2012) and a sustainable energy system (IPCC, 2014:28). Such an energy system requires the development and diffusion of new energy technologies. Institutional change is an indispensable element in the emergence of new technologies (e.g. Hargrave & Van de Ven, 2006). Institutions are ‘the rules of the game’ (North, 1990, p. 3) and structure behavior by enabling and constraining certain types of activities. Existing institutions tend to hamper the diffusion of innovations, and therefore, innovation requires the de-institutionalization of existing institutions, and the theorization and institutionalization of new ones (Greenwood et al., 2002). It entails the process of ‘existing set of beliefs, norms, and practices [coming] under attack, [undergoing] delegitimation, or [falling] into disuse, [being] replaced by new rules, forms, and scripts’ (Scott, 2014:114).

The field of sustainability transitions (e.g. Van den Bergh et al., 2011) traditionally focuses on new entrants as the agents of change, while incumbents are often found to defend the status quo (e.g. Smink et al., 2015; Stenzel & Frenzel, 2008; Wesseling et al., 2014; Sarasini & Jacob, 2014). Incumbents are believed to be ‘restricted by their existing assets, which reflect past investments’ (Hockerts & Wüstenhagen, 2010: 487). However, Stenzel & Frenzel (2008) argue that if a firm’s resource base matches with future developments, ‘incumbents can be drivers of transformations of the energy system both in terms of technological development and regulatory adaptation’ (p. 2655). The benefit of incumbents promoting sustainable innovation is their ‘promise to achieve a broader impact, since they have the potential to reach out to a mass-market audience’ (Hockerts & Wüstenhagen, 2010:486). In sum, literature indicates that not only new entrants but also incumbents are able to be agents of change.

Actors aiming to change institutions can engage in institutional entrepreneurship, which entails ‘... activities of actors who have an interest in particular institutional arrangements and who leverage resources to create new institutions or to transform existing ones’ (Garud et al., 2007:957). We may expect that new entrants and incumbents have distinct starting positions in terms of resources, skills, and networks (e.g. Greenwood & Suddaby, 2006:43, Levy et al., 2009). Therefore, incumbents’ institutional entrepreneurship as well as the related institutional change is expected to differ from those of new entrants. For instance, incumbents may engage more with policy-makers, due to their stronger connections with the political system (e.g. Lalor & Hickey, 2014; Lin, 2014; Sühlsen & Hisschemöller, 2014). Furthermore, due to their stronger position in terms of resources, we expect incumbents to be more

successful in creating supportive system structures (e.g. Maguire et al., 2004: 658; DiMaggio, 1988:13).

However, the difference between incumbent and new entrant behavior is a relatively unexplored area. Levy & Scully (2007) state that 'the strategic implications of their differential resources and locations have not been thoroughly explored' (p. 975). With this paper we address the above knowledge gap. We aim to analyze institutional entrepreneurship activities by incumbents as compared to new entrants. Therefore, we build on the framework of Pacheco et al. (2010), which presents cooperation, framing, and political tactics as three main activities of institutional entrepreneurship.

We focus on the renewable energy case of biogas in the Netherlands. Negro et al. (2007) have shown that biogas producers have failed to create momentum for the development of biogas in the Netherlands in the time period 1970-2004. During this time span, actors were mainly new entrants to the energy market, in particular farmers with small co-digestion plants. Ever since the first production subsidy for electricity production from biogas was allocated in 2004, the profitability of biogas installations has been a concern (e.g. Boerderij Vandaag, 2009a; 2011a). From 2008 onwards, dramatic improvements occurred in the institutional framework for biogas and its upgraded version, biomethane (see Table 4.1). Firstly, financial support increased sharply, mostly in the form of a production subsidy and R&D tenders. Its pinnacle was the allocation of a striking 1 billion euros production subsidy to biomethane in 2011 (NEA, 2012b). Secondly, government offered regulatory support (e.g. the setup of a sustainability certification scheme). Thirdly, government statements indicate that biomethane turned into a government priority. This watershed coincided with the entrance of large incumbents from the Dutch natural gas sector into the field of biomethane (NAM, 2005:17), which is complementary to the biogas value chain.

This case study provides an excellent opportunity to study incumbent and new entrant institutional entrepreneurship and their respective impact on the institutional framework for biomethane. We will also discuss how the institutional change affects changes in the number and scale of biomethane installations. Due to the government's central role in the development and diffusion of new energy technologies (cf. Stoddart et al., 2012), we focus on formal institutions. Our research question is: *How do incumbents and new entrants engage in institutional entrepreneurship to promote biomethane, and what are the effects on the formal institutions as well as impact on biomethane development?*

This study has the form of a case study covering the time period 2006-2012. Our analysis is based on a newspaper database including 250 news articles; policy documents; various other relevant publications; 15 expert interviews; and observations from gas industry conferences.

Our findings contribute to the institutional entrepreneurship (IE) literature by defining dimensions of the three main IE activities, on the basis of our distinction between incumbents' and new entrants' institutional entrepreneurship activities. Furthermore, our case study shows that activities of cooperation, framing, and political tactics build on each other to have an impact on institutional change.

4.2 INSTITUTIONAL ENTREPRENEURSHIP

In a review of 100 institutional entrepreneurship studies, Pacheco et al. (2010) discuss the activities through which institutional entrepreneurs contribute to institutional change. These are: cooperation; framing; and political tactics. We take this categorization as the basis for our analytical framework, complementing it with innovation literature.

4.2.1 Cooperation for institutional change

Pacheco et al. (2010) show that to achieve institutional change, actors need to cooperate. Cooperation is defined as 'sustaining a collective identity and finding ways to bring together the interests of different groups' (Fligstein, 1997 cited in Pacheco et al., 2010:989). The resulting cooperation between actors is a crucial building block to create institutions that support institutional and technological change (Alexandrescu et al., 2014; Hahn & Pinkse, 2014; Bled, 2010). Namely, the framing and political tactics discussed below will be carried out mostly on behalf of these associations.

Successful cooperation also requires institutional entrepreneurs that are perceived as '[occupying a legitimate position] by diverse stakeholders and that [...] bridge those stakeholders, allowing the groups to access dispersed sets of resources' (Maguire et al., 2004:674). The creation of legitimacy is a central element in institutional change, because legitimacy provides the social acceptance of and support for institutions (Bergek, 2008; Driscoll, 2006). Cooperation can increase actors' legitimacy and thus increase the likelihood of achieving institutional change (Hahn & Pinkse, 2014). For instance, sociopolitical legitimacy is obtained by organizing 'endorsements and the support of key constituents, such as financial investors, government officials, consumers, and others who play key roles in developing and implementing an innovation' (Hargrave & Van de Ven, 2006: 875).

4.2.2 Framing for institutional change

A second activity of institutional entrepreneurs is framing, according to Pacheco et al. (2010). Framing is defined as '[depicting a] preferred institutional arrangement as appealing to the widest possible audience' (p. 990). Institutional entrepreneurs do so 'by closely integrating new ideas and processes with commonly accepted narratives' (p.990). A narrative (Welcomer, 2010) or story usually begins with a particular problem definition (e.g. Alexandrescu et al., 2014), which "brings into focus a set of solutions associated with that type of problem" (Bartel & Garud, 2009: 112). For example, Garud et al. (2010) show that when climate change became a prominent concern, the nuclear energy sector reframed nuclear energy from a low-cost to a carbon-free technology. A specific form of framing is 'theorization': the issuing of research documents that justify new institutions in terms of their benefit to society (cf. Pacheco, 2010; DiMaggio, 1988). Framing builds on the cooperation activities discussed above. Frames put forward on behalf of associations are likely to have more traction than those presented by individual actors.

If the frame is perceived as relevant to the realities of key audiences' experiences and aligned 'to the projects of their targeted groups', Hung & Whittington (2001:528) speak of 'frame resonance'. If a frame resonates with its audience, the proposed institutional arrangement obtains legitimacy. A specific form of legitimacy is cognitive legitimacy: 'the taken-for-granted assumption that an innovation is desirable, proper, and appropriate within a widely shared system of norms and values' (Hargrave & Van de Ven, 2006: 875). Furthermore, Klein Woolthuis et al. (2013) have found that positive frames are more effective. Actors 'sell their ideas by attaching positive emotions to the endeavor of sustainable development (more beautiful, profitable, etc), rather than referring to negative reasoning (e.g., environmental degradation)' (p. 95).

4.2.3 Political tactics for institutional change

In Pacheco's overview, political tactics are a broad category of activities. Since we focus on political tactics aimed at changing formal institutions, the government plays an important role in bringing about institutional change. The literature on corporate political activities deals exactly with how actors get their frame across to policy makers and the wider audience (e.g. Scherer et al., 2014; Dahan et al., 2013). Corporate political activities are defined as: 'corporate attempts to shape government policy in ways favorable to the firm' (Hillman et al., 2004:838). There are two, related, types of activities: namely lobbying policy makers and influencing the wider audience, e.g. through the media. The latter activity influences public policy making indirectly.

Lobbying policy makers includes ‘employing internal or external professionals and executives; reporting research and survey results; commissioning research/think tank research projects; testifying as expert witnesses in hearings or before other government bodies; and supplying decision makers with position papers or technical reports’ (Hillman & Hitt, 1999:834). In their empirical study of the German energy transition, Sühlsen & Hisschemöller (2014) conclude that ‘regular and personal contact with politicians’ is the single most important element of an effective lobby (p.6). Moreover, having access to politicians in top positions (top-down lobbying) is more effective than contacting only Members of Parliament and the working-level of Ministries (bottom-up lobbying) (p. 5).

The framing activity discussed above is a key element in influencing policy makers. The same is true for influencing public opinion, mostly via mainstream media. This happens through: ‘advocacy advertising, wherein a particular policy position is advertised to the public; public image or public relations advertising; press conferences on public policy issues; and economic or political education’ (Hillman & Hitt, 1999:834).

4.4 BACKGROUND ON BIOMETHANE AND ACTORS’ MOTIVATIONS³

Biogas is the product of a co-digestion process of manure and other organic materials, such as corn (step 1-3 of Figure 4.1). Traditionally, biogas is turned into electricity and heat by burning it in a cogeneration plant (not depicted in Figure 4.1). Often, more than half of the energy content is lost with cogeneration because there is insufficient heat demand at the production location (NEA, 2011a:11). Since 2004, the electricity produced receives a renewable energy production subsidy.

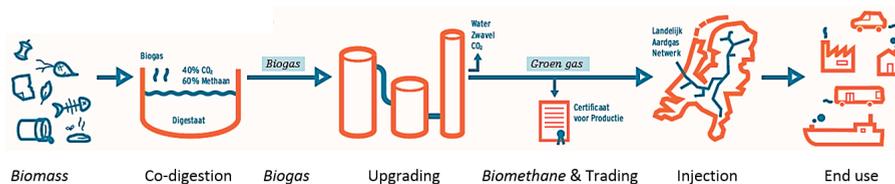


Figure 4.1. Biomethane value chain (adapted from Nieuw Gas Krant, 2010:4)

Another possibility is to upgrade biogas to Dutch natural gas quality by extracting CO₂ (step 4 and 5 of Figure 4.1). The resulting biomethane can be injected into the

3 For more information on the Dutch gas sector and biomethane, see Smink et al. (in press)

natural gas grid (step 6 of Figure 4.1). Using the existing infrastructure, biomethane can be transported to locations with sufficient heat demand (step 7 of Figure 4.1). Thus, if there is a useful application of heat at the end user, biomethane has a higher energy efficiency than biogas cogeneration (NEA, 2007:3). Moreover, biomethane can be used for the purpose of (centralized) electricity production and transport (step 7 of Figure 4.1).

New entrants are actors that are new to the energy sector and include farmers and a few firms from the food industry that by producing electricity or biomethane enter the energy sector. New entrants' motivation to do so is to create value from available waste streams (Smink et al., in press). Most biogas installations are small-scale. Therefore, new entrants strive to create beneficial conditions for small-scale biomass digestion.

Incumbents are actors that are part of the energy sector traditionally and include energy trading companies and gas network operators. Network operators consist of two parts: a regulated natural monopoly that manages the network and a business unit that is allowed to engage in commercial activities such as building biogas pipelines or offering services for biomethane injection (see also Smink et al., in press). In addition, waste companies are categorized as incumbents because they often used to be part of the integrated energy companies (before liberalization). The gas incumbents do not produce biomethane themselves, but will trade and transport it (step 5 of Figure 4.1).

Incumbents have a broader goal than the new entrants, they aim to build up a biomethane value chain, including production, injection, trading, and using it for heat and electricity production and transport. By focusing on biomethane as an energy carrier, incumbents open up multiple ways of producing and consuming biomethane. Moreover, incumbents very deliberately focus on increasing cost-efficiency by promoting large-scale installations (PNG, 2007; PNG, 2010; Rijksoverheid, 2012). Producing biomethane through co-digestion is a prelude to large-scale biomass gasification. By 2050, gasification technology should produce large amounts of biomethane and should be complemented by large-scale biomass and/or biomethane import (PNG, 2007:14-16). The incumbents' ultimate motivation to promote biomethane is to maintain the central role of gas in the Dutch energy system (PNG, 2007:9-10; GasTerra, 2010:7-8). The gas sector is under pressure given the decline of the giant Groningen gas field (Ministry of Economic Affairs, 2014:10) and the negative impact of fossil fuels on climate change (PNG, 2007).

From the above it follows that new entrants and incumbents have partially overlapping and partially different goals. Their goals are complementary in that they cover different parts of the value chain: new entrants are involved in the first steps of producing biogas and biomethane from biomass, while incumbents cover the latter steps such as trading, injection, and transport of biomethane. Thus, increasing sup-

port for biomethane would be beneficial for new entrants. However, the incumbents' strategy to promote large-scale biomethane production does not fit with the needs of new entrants operating small-scale installations. Therefore, new entrants continue their own IE activities, next to those of incumbents.

An important characteristic of the Dutch gas sector is its historic intertwinement with the Dutch Government (Schippers & Verbong, 2000). In the period 2006-2012, gas production from the Groningen reserve and other fields has contributed between 10 and 15 billion euros to the Treasury annually (Algemene Rekenkamer, 2014:15). This equals 6 to 9% of Government's annual revenues (Algemene Rekenkamer, 2014:16). Biomethane is meant to contribute to the Government's policy to make the Netherlands the 'Gas Roundabout' of Northwestern Europe by capitalizing on existing skills and infrastructure (Rijksoverheid, 2012:3).

4.5 METHODS

Given that institutional change is a complex process evolving over time and given our wish to give a rich description of institutional entrepreneurship, a qualitative research method best suits our research question (Bryman, 2008). Our analysis is based on a single case study, allowing us to shed light on the complex relations between actors' activities and institutional change (Yin, 2003). We chose the biomethane case, because the pronounced differences between incumbents and new entrants make it an excellent case to study and compare institutional entrepreneurship.

Our data consists of, firstly, a database of 250 news articles, based on a LexisNexis search in Dutch newspapers using the terms 'biogas', 'biomethane', and 'gas network' for the period 2006-2012. From this database we set up a timeline, starting in 2006, when the incumbents first showed their interest in biomethane and biomethane injection was first discussed in public, and ending in 2012. We complemented this database with archival data from NEA, the Netherlands Enterprise Agency (the Ministry of Economic Affairs' executive agency) on the number of subsidized biomethane projects and their production in terms of electricity or biomethane. Secondly, we analyzed policy documents and other sources such as branch organizations' publications, business publications, websites, newsletters, etc. Thirdly, one researcher attended the gas industry conference Energy Delta Convention in Groningen in 2011 and 2012, obtaining background knowledge on that sector. Fourthly, 15 semi-structured expert interviews were conducted with organizations identified in the Background section. For each organization we interviewed the people that worked closely on the promotion of biomethane. These include four new entrants on the energy market: the biogas producers association (BGPA), biomethane producers association (BMPPA), a sugar

producer, and a regional sustainability consultant. Incumbents include: national biomethane association (BMNL) (4 interviews), regional energy association (ENNL) (1 interview), network operators (4 interviews) and their business development sections (3 interviews). Finally, two interviews were conducted with relevant Dutch government officials. We asked interviewees how their organization first reacted to the idea of biomethane production, what issues need(ed) to be addressed to increase biomethane production, and how they contribute(d) to a supporting institutional framework for biomethane. Many interviewees, especially incumbents' employees, have double roles, e.g. working for a network operator and an incumbents' association. This inter-relatedness characterizes the gas sector, as the overview of interviewees in Annex I shows. Interviews were predominantly face-to-face and took place between September 2012 and March 2013, with the exception of one follow-up phone interview in October 2014. Interviews lasted between 1-2 hours each, and were fully transcribed.

Data analysis for this paper followed a deductive approach, categorizing data according to the theoretical framework. NVivo was used to this end. Once the data was categorized in the three groups of IE activities we used an open coding approach (Boeije, 2010) to define the dimensions. We labeled, categorized and constantly compared the data, so as to identify the dimensions on which incumbent and new entrant IE activities differ. For each Findings section, we used multiple sources, thus assuring triangulation of the data. See Annex II for the types of sources per Results section. Two key actors in the biomethane field, employed at NEA, have checked both Table 4.1 and the rest of the Results section for (missing) data and validity of argumentation, enhancing the inter-observer consistency (Bryman, 2008).

4.6 FINDINGS

In this section we show how new entrants and incumbents engage in IE and how the combination of these activities contributes to institutional change. In section 5.1 we will first outline the main institutional changes related to biomethane in the period 2006-2012. Section 5.2 relates these institutional changes to proposals for institutional change by new entrants and incumbents, respectively. In the three subsequent sections we will describe and analyze the differences in IE between new entrants and incumbents based on the three activities identified by Pacheco et al. (2010): their style of cooperation; the way they frame their message; and the way they engage the wider audience and policy-makers (political tactics). The latter section on activities aimed at policy makers shows how the combination of cooperation, framing, and political tactics culminates in the institutional change presented in section 5.1. Sec-

tion 5.6 presents an analysis of the effects of IE on institutional change, while section 5.7 ends with the impact on biomethane development.

4.6.1 Institutional change 2006-2012

The formal institutions studied in this paper are set by the Ministry of Economic Affairs and are implemented by its executive branch NEA. The changes that occurred in the formal institutional framework for biomethane mostly relate to financial support, regulatory support, and government statements indicating the priority of biomethane. In terms of financial support, biomethane is added to the renewable energy subsidy scheme while subsidy for electricity from biogas is reduced. Moreover, biomethane receives support in the form of funding for scientific research, biomethane gas stations, and a biomethane knowledge center; two tenders for R&D; and the inclusion of biomethane hubs (large scale collection and upgrading locations) in subsidy schemes. Regulatory support regarding biomethane includes the adoption of the Biomethane Action Plan of an incumbents' association; a change in measurement method for renewable energy favoring gas over electricity; active government support for a biomass certification scheme; and expansion of the list of substances that can be used as feedstock in biomass digesters, i.e. the 'positive list'. Finally, government statements on biomethane have also changed considerably: whereas in 2008, biomethane was judged 'too expensive' (Boerderij, 2008a; Boerderij Vandaag, 2008a), in 2009 it was 'a logical next step' (ANP, 2009a), and in 2011 it was presented as 'sustainable, efficient, and offering plenty of economic opportunities' (Rijksoverheid, 2011a). Table 4.1 presents the main institutional developments. Each instance of institutional change will be numbered (IC X), to be able to link it to actors' IE activities in the next paragraphs.

Table 4.1: Institutional change 2006 – 2012

IC #	Year	Institutional change
1	Aug 2006	A subsidy for electricity production from biogas (MEP) was introduced in 2004, providing a fixed amount of subsidy per kWh. In 2006 this program was suddenly stopped because the aim of 9% renewable electricity had been achieved (Boerderij, 2006a).
2	Mar 2007	The Minister of Economic Affairs states that it has not been decided yet whether biomethane will be subsidized. While biomethane contributes to lowering CO ₂ emissions, the subsidy costs have to be compared with those of other forms of renewable energy (Reformatoisch Dagblad, 2007).
3	Jun 2007	Farmers that already invested in production capacity before obtaining the MEP subsidy will still receive a subsidy under the new OVMEP program (Boerderij, 2007a).

Table 4.1: Institutional change 2006 – 2012 (continued)

IC #	Year	Institutional change
4	Jul 2007	A new subsidy program called SDE is set up, in which the market price for conventional energy will be complemented by a subsidy up to a fixed amount. In case of higher energy prices, the government will lower the subsidy, and vice versa. Each type of renewable energy has its own category and total budget (Boerderij, 2007b).
5	Feb 2008	The Minister of Economic Affairs decides that biomethane will not obtain a category in the SDE 2008 subsidy scheme because biomethane is 'too expensive' (Boerderij, 2008a; Boerderij Vandaag, 2008a). Subsidy for electricity from biogas will be lowered to 12 cents/kWh. The Minister aims to temper co-digestion development because no sustainability criteria for biomass exist at the moment (Boerderij, 2008a).
6	Mar 2008	A majority in Parliament supports the motion to pay 15 cents/kWh for electricity from biogas, following the official advice (Boerderij Vandaag, 2008b).
7	Jun 2008	Nevertheless, the Minister of Economic Affairs decides to pay 12 cents/kWh for electricity production from biogas (Boerderij, 2008b).
8	Jul 2008	As a result of negotiations between government parties, renewable gas is added to the scope of the SDE subsidy program (Boerderij Vandaag, 2008c).
9	Feb 2009	The SDE 2009 subsidy tariff for electricity production from biogas is increased to a range of 15-17 cents/kWh (Boerderij, 2009a).
10	Apr 2009	The Ministry of Economic Affairs charges the national network operator with setting up a biomass certification scheme (ANP, 2009b).
11	July 2009	The Minister of Economic Affairs states that 'We are now accustomed to green electricity. Green gas [biomethane] is a logical next step' (ANP, 2009a).
12	Oct 2009	The Ministry of Economic Affairs allocates 10 million euro to a scientific research program on the role of gas in a sustainable energy system (including biomethane) (Leeuwarder Courant, 2009a).
13	Dec 2009	A number of Ministries establish an interdepartmental 'Acceleration team' to deal with cross-departmental biomethane issues (Platform Nieuw Gas, 2010:10).
14	Dec 2009	The Ministry of Economic Affairs promotes the use of gas for transport purposes by allocating 4,1 million euro to gas stations that are to sell natural gas and biomethane (ANP, 2009c).
15	Jan 2010	Due to pressure from Parliament, the SDE 2010 subsidy tariff for electricity production from biogas is increased to a range of 16,5 to 19 cents. This is still below the official advice of at least 20 cents. The Minister explains this step by stating that co-digestion is not always cost effective and has limited potential for the future (Boerderij Vandaag, 2010a).
16	Jan 2010	The government sets up two tenders to subsidize research into increasing the efficiency of the digestion process as well as the construction of gasification demonstration plants (PNG 2010:4). The budgets are 7 million (Staatscourant, 2010) and 12 million euro (NEA, 2009), respectively.
17	Oct 2010	The executive branch NEA of the Ministry of Economic Affairs publishes a Biomethane Action Plan to create a biomethane market (NEA, 2010:13)
18	Dec 2010	The Ministry of Economic Affairs announces a new design for the SDE subsidy scheme, called SDE+. Energy technologies no longer have separate categories; there is one tariff for gas and one for electricity. Electricity receives a maximum of 15 cents/kWh. Given the rising prices for co-digestion materials, this reduction means production of electricity from biogas is no longer profitable (Boerderij, 2010a). By contrast, the minimum subsidy for biomethane increases from 63 to 79 cents/m ³ (Boerderij, 2010b). The new design aims to stimulate innovation and competition between different types of renewable energy by allocating money to the cheapest options first (Boerderij, 2010a). The Minister aims to 'focus exclusively on an efficient approach to meet the EU target of 14% renewable energy in 2020' (Rijksoverheid, 2010)

Table 4.1: Institutional change 2006 – 2012 (continued)

IC #	Year	Institutional change
19	Dec 2010	Simultaneously, the government changes its measurement method for renewable energy production from based on primary energy to based on final energy (Ministry of Economic Affairs, 2010:5; Government 1, 2012) following the European Directive 2009/28/EC on renewable energy (European Commission, 2009a). The new method favors gas and heat production over electricity production (Ministry of Economic Affairs, 2010:5) by a factor 2,4 (Harmsen, 2014; European Commission, 2007:6). Biomethane now turns out to be the cheapest renewable energy option. The Ministry of Economic Affairs supported the new method, because it allows the government to subsidize more renewable energy based on the same budget. The Ministry now states that biomethane is an 'attractive option' to speed up renewable energy production (Ministry of Economic Affairs, 2010:5).
20	Jan 2011	Biomethane hubs now qualify for the EIA program, which offers a favorable tax regulation for energy investments (Dagblad van het Noorden, 2011) (I4, 2012). Biomethane hubs are central locations where biogas from multiple producers is collected and upgraded.
21	May 2011	The Ministry of Economic Affairs expands the 'positive list' with 23 products that can be co-digested and simplifies the procedure for adding new materials to this list (Boerderij Vandaag, 2011a).
22	Aug 2011	The new SDE+ subsidy scheme results in 1 billion euro for biomethane projects, or 2/3 of the total budget (NEA, 2012b). Due to the large number of applications, the Ministry of Economic Affairs transfers 250 million euro initially allocated for renewable electricity, to biomethane (Staatscourant, 2011; Energiegids, 2011:17)
23	Aug 2011	In the SDE+ 2012, biogas projects running under the old MEP scheme can apply for a subsidy extension. Moreover, the new subsidy scheme will include subsidy for heat production, in accordance with the EU Renewable Energy Directive. Biogas projects can now only apply for subsidy for gas or heat production, there is no longer a category for electricity. However, the subsidy for heat is insufficient for small-scale biogas projects to run break-even (Boerderij Vandaag, 2011b).
24	Sep 2011	The government concludes 'Green Deals' with private parties to speed up sustainable innovation. The focus is on removing institutional barriers. The Ministry of Economic Affairs strikes a 'Green Deal' with actors working on biomethane and will include the sustainability certification scheme Vertogas into the Gas law. This means that every producer needs to register its production at Vertogas and that subsidy payment will occur through this mechanism. Biomethane Netherlands will monitor the implementation (Rijksoverheid, 2012).
25	Sep 2011	Moreover, as part of the Green Deal, the newly established Biomethane Netherlands receives 400.000 euro from the Ministry of Economic Affairs to start a knowledge center for biomethane (ANP, 2011). The Minister states that biomethane is 'sustainable, efficient, and offers plenty of economic opportunities' (Rijksoverheid, 2011a). According to him, the knowledge center called Biomethane Netherlands is a 'dream scenario' in which various organizations work together to achieve a biomethane market (Groen Gas Nederland, 2011; De Volkskrant, 2011a)
26	Nov 2011	In the SDE 2012, also biomethane hubs qualify for the SDE+ subsidy (Boerderij, 2011c).
27	Apr 2012	The Ministry of Economic Affairs puts another 87 substances on the positive list (Boerderij Vandaag, 2012a).

4.6.2 Proposed institutional change implemented by the government: incumbents vs. new entrants

This section relates the institutional changes that were implemented by the Ministry of Economic Affairs and the NEA (as listed in Table 4.1) to proposals for institutional change by both the new entrants and the incumbents, respectively. Tables 4.2 and 4.3 illustrate that a large number of the actual institutional changes are in line with the preferences and proposals of the incumbents, especially when compared to the relatively lower number of new entrants' preferences translated in institutional change. In addition, Table 4.2 shows that the majority of new entrants' proposals for institutional change do not result in institutional change.

Table 4.2. Institutional change proposed by new entrants and institutional change implemented by government

	Proposed institutional change by new entrants (2006-2012)	Institutional change implemented by government as of Dec. 31st, 2012 (1)
1	Reintroduction of MEP subsidy program (Boerderij Vandaag, 2006)	IC 3
2	Increase in subsidy tariff for electricity from biogas (Boerderij Vandaag, 2008b; Boerderij, 2009a; 2010a)	IC 9, 15
3	Expansion of number of co-products on positive list (Boerderij, 2009a; Boerderij Vandaag, 2010a; 2010b; 2010c)	IC 21, 27
4	Level playing field in Europe (i.e. Germany) regarding subsidy tariff and substances on positive list (Boerderij, 2009b; Boerderij Vandaag, 2010d; 2012b)	-
5	Easing of digestate policy (Boerderij, 2009b; Boerderij Vandaag, 2010a)	-
6	Certification of co-products (Boerderij Vandaag, 2010a; 2010e)	-
7	Alternative for allocation through lottery in SDE scheme (Boerderij Vandaag, 2010d; 2010f)	-
8	Level playing field regarding subsidy tariff for new and existing biogas installations (Boerderij Vandaag, 2010d)	-
9	Leftover SDE subsidy should flow back into next SDE subsidy round (Boerderij Vandaag, 2010d)	IC 18
10	Inclusion of heat in SDE subsidy scheme (Boerderij, 2010a)	IC 23
11	Level playing field regarding small and large-scale biogas installations (Boerderij, 2010a; Boerderij Vandaag, 2012c)	-
12	Increase in subsidy tariff for heat from biogas (Boerderij Vandaag, 2012d)	-
13	Inclusion of mono-digestion (only manure) in SDE subsidy scheme (Boerderij, 2012)	-

(1) Numbers refer to Table 4.1

Table 4.3. Institutional change proposed by incumbents and institutional change implemented by government

	Proposed institutional change by incumbents (2006-2012) (PNG, 2007: 8, 18; PNG, 2010:11-13)	Institutional change implemented by government as of Dec. 31st, 2012 (1)
1	Exploitation subsidy for biomethane	IC 8, IC 9, IC 14, IC 18, IC 22, IC 26
2	Level playing field for biomethane and renewable electricity in terms of subsidy (Taskforce Energie Transitie, 2006: 36)	IC 14, IC 19, IC 20, IC 22
3	Formulation of uniform quality requirements for biomethane injection into the grid	IC 12, IC 13
4	Establishment of biomethane certificates of origin	IC 10, IC 24
5	Ensure the sustainability of biomass	IC 10, IC 24
6	Facilitation of biomethane for transport purposes	IC 14
7	Useful application of digestate	IC 16
8	Start research into biomass gasification	IC 16
9	Form consortia that cover relevant sectors and organizations along the value chain	IC 13, IC 16, IC 25
10	Exchange knowledge and experiences	IC 25

(1) Numbers refer to Table 4.1

Table 4.2 shows that most of the new entrants' proposals have not been implemented by the government by the end of 2012. In contrast, Table 4.3 shows that all of the incumbents' proposals have been implemented by the government by the end of 2012. Moreover, incumbents do not only see *more* of their proposals addressed, the institutional change that they promote also entails more *fundamental* change. The two most impactful institutional changes are the introduction of the SDE+ subsidy scheme (IC18) and the new measurement method (IC19); together these caused a major shift of government subsidy towards biomethane. In addition, the two tables show that new entrants often propose institutional change that addresses details of the existing institutional framework (e.g. proposal 1, 2, and 3 in Table 4.2), whereas incumbents rather propose institutional change that transforms and goes beyond the existing institutional framework (e.g. proposal 2, 4, 6, 8, and 9 in Table 4.3).

In short, the incumbents have been more successful in translating their proposals into formal institutions. In the next sections we describe how incumbents have contributed to institutional change with their IE activities and how these compare to the activities of new entrants.

4.6.3 Cooperation for institutional change

This section discusses the first element of institutional entrepreneurship: cooperation. Cooperation in the biomethane case entails the formation of associations by new entrants and incumbents, respectively. It is the first step towards contributing to institutional change. Table 4.4 presents a summary of the differences between incumbents and new entrants in their cooperation activities.

Table 4.4. Cooperation by incumbents and new entrants

	Incumbents	New entrants
Actor variety	Public-private	Only producers
Members' interests	Different interests	Shared interests
Relation to external environment	Continuous	Ad hoc
Management	Professional	Voluntary
Funding	Substantial	Limited

Incumbents

The most important feature of the incumbents' associations is that they are public-private arrangements. The incumbents joined forces in three associations: Platform New Gas (PNG), its successor Biomethane Netherlands (BMNL), and the regional energy organization Energy North Netherlands (ENNL). They involve a variety of actors: energy trading companies, gas network operators, waste companies, agricultural associations, the Ministry of Economic Affairs with its executive agency NEA, regional governments, and knowledge institutes. In PNG, the national government played an important role, while in BMNL and ENNL regional governments are more prominent. The gas incumbents increase their influence on policy makers by teaming up with organizations from the food and waste sector, thus creating an association that spans multiple sectors. The support of these various actors results in a high level of socio-political legitimacy.

Actors have different interests due to their different roles in relation to biomethane. Energy trading companies will trade it, gas network operators will transport it, government agencies will subsidize and facilitate it, while knowledge institutes will research it. In fact, very few members (3-4) actually produce biomethane (Groen Gas Nederland, 2014; New entrant 3, 2012). Therefore, the aim of PNG, BMNL, and ENNL is not to promote the interests of specific actors, but to focus on promoting biomethane as an energy carrier. They aim for the broader goal of building up a

biomethane value chain, including production, injection, trading, and using it in electricity and heat production or transport. BMNL and ENNL summarize this aim in targets of 300 and 200 million m³ biomethane production in 2014, respectively (Groen Gas Nederland, 2013:7, 17; Rijksoverheid, 2011b).

Because of the broad range of actors that participate, most cooperation takes place *within* the association. The associations form a broad 'front' and therefore encounter little external opposition. Instead of contacting government bodies on specific issues when necessary, the private actors cooperate continuously with public actors in the three associations. Objectives and efforts get aligned in a very early phase of policy making, which increases the potential for policies that benefit biomethane development.

Finally, BMNL and ENNL are professional associations operating with substantial funding. BMNL employs 21 people (Groen Gas Nederland, 2013:9) and ENNL has 19 fte (Hogeweg, 2013:24-26). Funding is drawn from national and regional government as well as from private actors. Members deciding on BMNL's strategy contribute 100.000 euro each, whereas others primarily provide input in terms of identifying bottlenecks (Platform Nieuw Gas, 2011:12). None of the paying members are producers of biomethane. BMNL has a budget of 1,6 million euros for 2,5 years (Platform Nieuw Gas, 2011) and ENNL has a budget of 11,5 million euros for 2012-2015 (Energy Valley, 2011:21).

New entrants

Cooperation by new entrants takes the form of associations that bring together one specific type of actor with specific and shared interests. Biogas producers' association BGPA promotes the interests of *biogas* producers, whereas biomethane producers' association BMPA promotes the interests of *biomethane* producers.

BGPA has around 70 members, predominantly farmers with co-digesters as well as a sugar producer (New entrant 1, 2014). BMPA represents all biomethane producers in the Netherlands (14), which are small- and large-scale producers from the food industry, waste sector, and agricultural sector (New entrant 2, 2014). Due to this narrow focus, members of BMPA express this association best promotes their specific interests (New entrant 1, 2014; New entrant 3, 2012). Some overlap with incumbents exists: a number of individual members of BMPA, as well as the association BGPA became partners of BMNL (Groen Gas Nederland, 2014).

The new entrants' associations relate to their external environment on an ad hoc basis: solving issues with the relevant actors, such as government, one by one. Due to the narrow member base, BGPA and BMPA cannot easily draw on the socio-political

legitimacy or resources of other types of actors. Management of these two associations is carried out voluntarily by their members, next to their core business (e.g. farming). Their funding is limited: member contributions are the main source.

4.6.4 Framing for institutional change

Table 4.5. Framing by incumbents and new entrants

	Incumbents	New entrants
Alignment	Emphasis on growth opportunities for Dutch (regional) economy	Emphasis on benefits for agricultural sector
Problem definition	Strong	Weak
Tone	Positive	Negative
Level of abstraction	High: competitive biomethane market	Low: financial effects for new entrants
Summary narrative	'You have a problem, we have a solution to help you'	'We have a problem, we deserve your help'

This section analyzes the framing by incumbents and new entrants. Cooperation and framing reinforce each other in contributing to institutional change. A frame is stronger when backed by an association. Table 4.5 summarizes the different framing styles of new entrants and incumbents.

Incumbents

First, incumbents strongly emphasize the need for biomethane to meet national sustainability goals (PNG, 2007:9; PNG, 2011; GGNL, 2013; Topteam Energie, 2012; ANP, 2010b; Brabants Dagblad, 2011; ANP, 2007; De Stentor, 2009; Almere Vandaag, 2009; Het Financieele Dagblad, 2009). Incumbents then emphasize that building on the strengths of the gas sector (PNG, 2007; PNG, 2005; PNG, 2008:5; Het Financieele Dagblad, 2009) is a national interest. Incumbents thus align biomethane with new growth opportunities for the Dutch economy (Topteam Energie, 2012). Therefore, the government should (financially) 'safeguard' biomethane development (Het Financieele Dagblad, 2009; Dagblad van het Noorden, 2009a; Leeuwarder Courant, 2009b). Moreover, there is a specific regional twist to the framing: the Northern part of the Netherlands is supposed to become the center of biomethane, due to the presence of the natural gas industry and the agricultural sector in the region (Het Financieele

Dagblad, 2009; Dagblad van het Noorden, 2009a). This frame is particularly powerful because the Northern provinces have long lagged behind in economic development.

The goal for biomethane is to become a substantial contribution to a sustainable energy system, and thus to provide a strong competitive position for Netherlands Inc. regarding knowledge, technology, innovation, and trade (Topteam Energie, 2012).

We have a reservoir of applications for biogas projects in the Northern part of the Netherlands. Right now there is no money for implementation. It is a wonderful opportunity to lead the way and to prove ourselves as gas region (Dagblad van het Noorden, 2009a).

Second, the incumbents' problem definition is multifaceted. On the one hand, it emphasizes the importance of the gas sector for the Dutch economy, while on the other hand it points at the necessity of continued use of the Dutch gas infrastructure, and the necessity of low-carbon energy technologies (Platform Nieuw Gas, 2007:7-10). This problem definition logically leads towards a solution that takes the current gas sector as a point of departure, thus benefiting the Dutch economy. Biomethane is then presented as an indispensable solution for all the above mentioned problems (Platform Nieuw Gas, 2007; ANP, 2010b; Brabants Dagblad, 2011; De Volkskrant, 2011b; Het Parool, 2011).

Third, the tone of the framing is very positive. The incumbents emphasize the large potential production of biomethane (Taskforce Energie Transitie, 2006:39). Furthermore, it is stressed that biomethane hardly requires changes to the gas system⁴ (Taskforce Energie Transitie, 2006:39; PNG, 2008:4) and that biomethane is a second-generation biofuel, thus avoiding discussions about possible competition between food and energy production (PNG, 2007:10).

In 12 years time, the Netherlands can replace 8 to 12 percent of natural gas [use] by biomethane, and in 2050 this can mount to 50 percent (ANP, 2007).

Fourth, the abstraction level of incumbents' framing is high: they use an abstract 'market' frame. Biomethane is presented as a cost-effective way of meeting the renewable energy target (Rijksoverheid, 2011a; De Volkskrant, 2011b; Dagblad van het Noorden, 2009a), and more so than wind energy (Het Financieele Dagblad, 2009). Incumbents emphasize they are creating a 'biomethane market' (PNG, 2007); build a 'competitive

4 Biomethane injection into the natural gas grid turns out to be one of the main bottlenecks (Smink et al., in press).

sector' (Leeuwarder Courant, 2007a); a 'well-functioning market mechanism' (Dagblad van het Noorden, 2009b); will 'bring down the price of biomethane' (Leeuwarder Courant, 2009b; De Volkskrant, 2011a; Brabants Dagblad, 2011); and in time biomethane will be 'profitable without government subsidies' (Het Parool, 2011; De Volkskrant, 2011b). These types of arguments are likely to appeal to a large audience.

The incumbents make clear that something is to be won from biomethane for the government, as it addresses government's concerns related to the renewable energy target and economic growth. Therefore, incumbents' framing towards the government can be summarized as: 'You have a problem, we have a solution to help you'.

New entrants

First, framing by new entrants emphasizes the benefits of biogas to the agricultural sector. Similar to the incumbents, new entrants claim that biogas and biomethane contribute to CO₂-reduction (Biogas Magazine, 2008b) and are necessary to meet the national renewable energy targets (e.g. Boerderij Vandaag, 2008b). However, new entrants' framing is most elaborate on how biogas helps develop a sustainable rural economy (Boerderij Vandaag, 2010a) and the agricultural sector by increasing the value of manure, byproducts and rest materials (Boerderij Vandaag, 2008b); (New entrant 4, 2012), as opposed to the Dutch economy as a whole.

Second, new entrants have not formulated a clear problem definition to which biomethane production provides the answer. Rather, their problem definition is that many biogas producers are in financial trouble and that government should act to prevent producers from going bankrupt (BBO, 2011). The incumbents' problem definition is stronger, because it shows why biomethane is beneficial for the Dutch economy. New entrants only show why biogas is beneficial for the agricultural sector, which relates to a more limited audience.

Third, the tone of new entrants' framing is strikingly negative. Attention is drawn to problems, such as negative effects of new regulation. Typically, new entrants sketch a scenario of what will be lost e.g. in terms of production capacity, and then make a request for government support.

The end of the MEP subsidy means 900 jobs are put on the line and over 16 million euros spent in vain. ... BGPA makes an urgent request to restore the MEP (Boerderij Vandaag, 2006).

If front runners [first biogas producers] have no choice but to stop production ... this means a large destruction of capital [about 100 MW capacity] (BBO, 2011)

Fourth, the abstraction level is very low. Issues are very practical and take the producers' perspective. Effects of certain measures are expressed mostly in financial terms.

The biogas sector is in dire straits. Three quarters of installations run at a loss (Boerderij, 2009b).

A bonus for heat [use] yields on average 60.000 euro and that is not sufficient (Boerderij Vandaag, 2012d).

In contrast to the incumbents' positive framing, new entrants focus on what will be lost if government does not provide more support for biogas installations. Therefore, new entrants' framing towards the government can be summarized as 'We have a problem, we deserve your help'.

4.6.5 Political tactics for institutional change

This section analyses how the actors that are involved in cooperation activities engage in political tactics to get their framing across to the wider audience and to policy makers, with the ultimate aim of contributing to institutional change. In section 5.5.1 we first discuss what channels new entrants and incumbents use to convey their framing to the wider audience. In section 5.5.2 we show how new entrants and incumbents engage with policy makers.

4.6.5.1 Political tactics aimed at wider audience

We observed that new entrants and incumbents adopt distinctly different approaches

Table 4.6. Political tactics aimed at wider audience by incumbents and new entrants

	Incumbents	New entrants
Media outlet	Regional and national newspapers	Agricultural newspapers
Contact with wider audience	Magazine, biomethane day, sport clubs and schools	Magazine
Media purpose	Create legitimacy by presenting milestones	Inform peers about policy outcomes
Media timing	Policy window	After policy decision
Response to criticism	Discuss behind closed doors	Defend in public

to communicating with the wider audience. Whereas new entrants mainly inform

biogas producers of policy outcomes, incumbents target a national audience to create legitimacy for their plans. Moreover, incumbents are active in the media before policy decisions, rather than afterwards, and engage much more frequently in process communication. Table 4.6 sums up the findings of new entrants' and incumbents' political tactics aimed at a wider audience.

Media outlets

The incumbents and their associations focus on both regional and national newspapers, reaching a larger audience than the new entrants. Especially the national network operator and ENNL are active in addressing biomethane in the media. In the period 2006-2012, the national network operator appeared 75 times in the two main newspapers of the Northern provinces and about 35 times in national newspapers. ENNL appeared 82 times in the Northern newspapers and about 15 times in national newspapers. PNG's vision document 'Stepping on the gas!' (PNG, 2007) received considerable media attention in 2007. Incumbents send out press releases to multiple media outlets (e.g. ANP, 2007; ANP, 2009b). Apart from a few exceptions in regional newspapers, new entrants are only visible in agricultural newspapers. BGPA has 50 articles in the agricultural newspaper in the time period 2006-2012. BMPA is not visible in the media at all, but rather focuses on direct interaction with policy-makers (New entrant 2, 2012).

Contact with wider audience

The incumbents make strong efforts to engage with a wider audience. This ranges from publishing a 'New Gas Newspaper' (PNG, 2010), organizing a 'National Biomethane Day' (Dagblad van het Noorden, 2012), and advertising biomethane through sports clubs and at schools (Energy Valley Topclub, 2013; I5, 2012). Conversely, new entrants' contacts with the wider audience are limited. Since 2007, BGPA publishes a newsletter called 'Biogas Magazine' to inform members and regional governments about (the importance of) biogas (Biogas Magazine, 2007; New entrant 1, 2014).

Media purpose & timing

Incumbents proactively reach out to the wider audience to create support for their plans, and advocate certain policy decisions in the media, e.g. for more subsidy for biomethane and biomethane hubs (Dagblad van het Noorden, 2009a; Het Financieele Dagblad, 2009; Leeuwarder Courant, 2009b). However, once the government made biomethane a priority, incumbents were much less active in advocating policy preferences in the media. Incumbents now provide input for the policy process through the

Interdepartmental Acceleration Team (Government 1, 2012). Furthermore, incumbents are strong in process communication: highlighting every milestone related to biomethane, adding to the optimism in their framing (e.g. Dagblad van het Noorden, 2009b; Dagblad van het Noorden, 2011; Forum, 2011; Leeuwarder Courant, 2009a). For instance, incumbents increase biomethane's socio-political legitimacy by having well-known public figures perform the opening ceremony of new biomethane installations (BN De Stem, 2011; Forum, 2011; ANP, 2010c; Dagblad van het Noorden, 2012). In contrast, the media is not a tool to create support for policy options for BGPA. Their strategy is to engage with policy makers directly: they believe this is the best approach for an emerging sector (New entrant 1, 2014). Therefore, BGPA's news articles can be characterized as after-the-fact status updates about new policies and its consequences for agricultural peers (Boerderij, 2007b; 2009a; 2010a).

Response to criticism

Incumbents receive little criticism due to the broad network they created (e.g. Het Financieele Dagblad, 2010). Once, biomethane was openly criticized for being a 'very expensive right-wing hobby' (De Pers, 2012) after which BMNL invited the critic for a meeting (Groen Gas Nederland, 2013:21). Instead, when biogas is criticized, new entrants defend themselves in the media. Regarding the use of illegal substances in co-digestion, BGPA replies that "We don't want to collect the agricultural sectors' trash" (Boerderij Vandaag, 2012e).

4.6.5.2 Political tactics aimed at policy-makers

Cooperation, framing, and political tactics aimed at the wider audience all build up towards lobbying policy makers and contributing to institutional change. Changes in formal institutions are decided upon by the government, and therefore the political tactics aimed at policy makers are the culmination of the IE activities. Regarding political tactics, two very different pictures emerge. New entrants have limited access to the government, with which they have an antagonistic relationship. Moreover, they aim to solve problems ensuing from the current framework. In contrast, incumbents have excellent access to top-level representatives of government, with whom they work in synergy. Incumbents provide input when opportunities for policy exist, presenting plans for a new institutional framework while simultaneously addressing government's concerns.

Table 4.7 presents the different characteristics of new entrants' and incumbents' political tactics aimed at policy makers. We observed six dimensions of contact with policy makers: access to the political system, relation to the policy makers, timing of lobbying efforts, scope of proposals, style of lobbying, and lobbying tools.

Table 4.7. Political tactics aimed at policy makers by incumbents and new entrants

	Incumbents	New entrants
Access	Excellent, top-level	Limited, civil-servant level
Relation	Synergetic	Antagonistic
Focus	Opportunity-related	Problem-related
Scope of proposals	Change of framework structure	Change of framework parameters
Style	Provide a plan incl. funding solution	Request/ showing disappointment
Tools	Commissioned research	Third-party research

Access to political system

The incumbents' access to the political system is excellent, which is reflected in the public-private nature of their associations. The easy access is due to the interrelations and revolving door (GasTerra, 2014; ICE Endex, 2014; Onderzoeksraad voor Veiligheid, 2015:75) between the Dutch government and the gas sector, the incumbents' intimate knowledge of the policy making process and various subsidy schemes (Incumbent 4, 2012), and the political connections of regional politicians from BMNL and ENNL (Government 1, 2012). For instance, ENNL established a dedicated 'Taskforce Biomethane' (Energy Valley, 2010; Energy Valley, 2011:15) with regional politicians that lobby the national government, e.g. for subsidized biomethane hubs (Incumbent 4, 2012; Government 1, 2012). Furthermore, ENNL used existing procedures to request the inclusion of biomethane hubs into the EIA tax deduction scheme (IC 20) (Dagblad van het Noorden, 2011; Incumbent 4, 2012) and the SDE+ subsidy scheme (IC 26) (Het Financieele Dagblad, 2009; Incumbent 4, 2012).

New entrants' access to the political system is limited, which shows in their late involvement in the policy process and their dependence on formal meetings. For instance, they attempt to influence policy-making by lobbying individual Members of Parliament (MPs) (IC 6, IC 15) and by visiting political parties' conventions (Biogas Magazine, 2008d). Moreover, they meet civil servants in recurring meetings with the Ministries of Economic Affairs and Infrastructure & Environment (New entrant 1, 2014; New entrant 2, 2012). Moreover, in 2010, the Ministry of Agriculture merged with the more influential Ministry of Economic Affairs. New entrants are no longer represented by the Minister of Agriculture, but need to compete with the economic agenda of the new Ministry.

Relation to policy-makers

The incumbents' interaction with policy makers is harmonious: they share an interest in building a biomethane value chain (Government 1, 2012). This shared priority shows in the establishment of the Interdepartmental Acceleration Team (IC 13) and makes that their activities get interwoven. In fact, it becomes unclear who is the driving force behind the biomethane agenda: who proposed what and who actually writes policy? For instance, PNG helps to write the design of new subsidy programs, such as the Tender Digestion and the Tender Gasification (IC 16) (PNG, 2011:4). Moreover, incumbents take up the coordination and monitoring of the implementation of the Green Gas Green Deal (IC 24) (Incumbent 4, 2012), an agreement between government and incumbents to speed up biomethane development.

The most obvious sign of the interrelatedness of government and incumbents' goals is that the PNG 2010 Biomethane Action Plan (PNG, 2010:9) is literally adopted by NEA, the executive agency of the Ministry of Economic Affairs in 2010 (IC 17) (NEA, 2010). This means that a public-private proposal turns into a government action plan. In general, it hardly happens that incumbents are dissatisfied with institutional change. Discussions about the level of the subsidy tariff are non-existent.

In contrast, government and new entrants often seem to have opposing interests, with the Ministry not answering to new entrants' requests (e.g. New entrant 1, 2012, 2014). New entrants react to this situation by denouncing the government's decisions, e.g. stating that the government is 'cheap and narrow-minded' (Boerderij, 2009b; also Boerderij Vandaag, 2008d; 2010b).

Focus of proposals

The incumbents' strategy is very proactive and is driven by opportunities. They link broader (inter)national developments, such as CO₂ policies, to the opportunities that policy windows offer. They combine these elements in their vision document 'Stepping on the gas!' (PNG, 2007), which is opportunity focused instead of problem focused. Instead, new entrant lobbying focuses on (potential) problems arising from the existing institutional framework, e.g. the financial viability of their installations (Biogas Magazine, 2007a; 2008a; BBO, 2011; New entrant 1, 2014). BGPA's recurring meetings with the Ministry concern existing practical concerns, such as setting up a certification scheme for co-digestion substances (New entrant 1, 2014). In short, lobbying does not build on a comprehensive vision document, but rather proceeds problem by problem.

Scope of proposals

The incumbents' aim is not to solve current problems, but to make sure the institutional framework suits their needs. For instance, the incumbents suggest that renewable energy should be measured in terms of final energy (Incumbent 4, 2012). This measurement improves the position of gas and heat production compared to electricity production (Harmsen, 2014), thus paving the way to subsidize biomethane on a large scale (IC 19). Moreover, they made a plea for spending more money on the cheapest forms of energy (IC 18). Both pleas contributed to ample opportunities for renewable gas production. Thanks to their strong connection with political actors and their early involvement in the policy process, incumbents are in a position to propose policy changes of a higher order: changing the structure of the framework itself instead of adapting the parameters of the system.

New entrants' proposals have a limited scope (see also Table 4.2). Whereas the incumbents have been particularly strong in creating visions and higher-order institutional change; new entrants are involved with solving practical shorter-term issues, such as the specifics of regulation. Given their focus on problems within the existing institutional framework (Biogas Magazine 2007; 2008a; BBO, 2011, New entrant 1, 2014), proposals are aimed at optimizing this framework, such as higher subsidy per kWh produced (IC 6, 9, 15) or permission for more substances to be digested (IC 21, 27). So while new entrants are proactive in solving potential problems within the institutional framework, their ability to fundamentally adapt the framework itself is limited. This may be a consequence of new entrants being involved in the policy process at a later stage than incumbents.

Style of lobbying

Incumbents propose a plan to the government (or devise a plan together with the government). PNG's Vision Document (2007) and its follow-up report (PNG, 2010) outline such a comprehensive plan for biomethane development. Furthermore, plans are usually accompanied with a 'recipe' on how to organize the funding. For instance, to increase the subsidy for biomethane production, money should be transferred from wind power to gas (Dagblad van het Noorden, 2009a) (IC 18 and IC 19).

Incumbents employ professionals that know how to translate their ideas into the language of policy makers (Incumbent 4, 2012). They know which arguments influence policy makers: e.g. a plan should be efficient or more efficient than current programs and should concern innovative forms of technology or cooperation (Incumbent 4, 2012).

Instead, new entrants' lobbying messages most often have the form of a request. They ask for government attention and support because of a problem at hand (e.g. increasing price of resources). More desperate attempts to make their voice heard are the organization of a petition in 2006 (Boerderij, 2006b) and BGPA's encouragement to farmers to withdraw their grant application to send a clear signal to the Minister that the subsidy is too low (Biogas Magazine, 2008d).

Tools for lobbying

To support certain points in their argumentation, incumbents conduct studies or commission research at renowned research institutes. For instance, on the basis of their own research, ENNL claimed that gas is cheaper to produce per kWh than wind energy. Therefore, it would be more efficient to subsidize gas instead of wind energy (Het Financieele Dagblad, 2009) (IC 18 and IC 19). Research institute ECN presented a study emphasizing that biomethane is indispensable to meet the renewable energy targets (ANP, 2010b). This research was commissioned by waste company HVC.

To support their lobby message, new entrants rely on research reports carried out by other organizations such as Rabobank (Boerderij Vandaag, 2012b) and Raadhuysgroep (New entrant 1, 2012).

4.6.6 Effects of institutional entrepreneurship on institutional change

This section links the institutional entrepreneurship activities of new entrants and incumbents to the institutional change mentioned in Table 4.1, thus illustrating how institutional entrepreneurship contributes to institutional change. We also describe these activities according to the institutional entrepreneurship dimensions we identified above. Table 4.8 concerns incumbents' institutional entrepreneurship and Table 4.9 deals with new entrants' institutional entrepreneurship.

Table 4.8: Incumbents' institutional entrepreneurship activities linked to institutional change

Incumbents' institutional entrepreneurship activities	IE dimension	IC #	Institutional change
Vision document 'Stepping on the gas' (PNG, 2007) argues for subsidy for biomethane production (p. 8).	Change of framework structure.	IC 8	Category for biomethane in SDE subsidy scheme
Vision document 'Stepping on the gas' (PNG, 2007) proposes certificates of origin (p.8). National network operator proposes to set up certification system (Gasunie, 2008:51) High-level meeting between government and national network operator ([2]; I3, 2012)	Change of framework structure. Opportunity related. Excellent access.	IC 10	National network operator charged with setting up biomass certification scheme (later Vertogas)
Vision document 'Stepping on the gas' (PNG, 2007) discusses biomethane's sustainability, efficiency and related economic opportunities (p. 9-13) Related framing in newspaper articles: e.g. [2; 46; 53; 54; 56; 57; 60]	Positive tone. Creating legitimacy during policy window.	IC 11, IC 18, IC 25	Government adopts incumbents' framing: biomethane is sustainable, efficient, and provides economic opportunities
Vision document 'Stepping on the gas' (PNG, 2007) urges all parties involved in biomethane to cooperate and solve remaining issues (p. 7).	Public-private cooperation.	IC 13	Government establishes Interdepartmental Acceleration Team
Vision document 'Stepping on the gas' (PNG, 2007) proposes facilitation of biomethane for transport purposes (p. 8).	Opportunity related.	IC 14	Subsidy for gas stations selling natural gas and biomethane
Vision document 'Stepping on the gas' (PNG, 2007) pleads for biomass gasification research (p. 8). PNG helped to set up the two tenders (Platform Nieuw Gas, 2010:4)	Opportunity related. Synergetic.	IC 16	Government sets up two tenders for research into biomass digestion and gasification. National network operator and waste company were eventually granted 4 million euro (Politiek Archief, 2014).
PNG publishes follow up to its 2007 vision document, including a Biomethane Action Plan, including actions regarding regulatory barriers, grid access, R&D, hubs, and knowledge center (PNG, 2010:9).	Provide plan.	IC 17	Executive agency NEA adopts PNG's Biomethane Action Plan a few months later
ENNL argues subsidy for wind should be transferred to biomethane [46]. ENNL lobbies for more subsidy for biomethane. Their research shows that biomethane is cheaper than wind [56]. Waste company commissions study at research institute ECN. Study states that biomethane is indispensable to meet renewable energy target [6].	Provide plan & funding solution. (Commissioned) research.	IC 18	New SDE+ subsidy scheme favors cheapest renewable energy technology

Table 4.8: Incumbents' institutional entrepreneurship activities linked to institutional change (continued)

Incumbents' institutional entrepreneurship activities	IE dimension	IC #	Institutional change
Vision document 'Stepping on the gas' (PNG, 2007) prioritizes a level playing field for biomethane and renewable electricity in terms of subsidy (p. 8), thus improving biomethane's relative position. ENNL argues that measurement method should be changed in favor of gas (I2, 2012).	Change framework structure. Change framework structure.	IC 19	New measurement method favors gas over electricity production, making biomethane the cheapest option
Following a standard procedure, ENNL requests government to include biomethane hubs into favorable tax regulation ([49]; I2, 2012) Lobby by ENNL and its Taskforce Biomethane to include biomethane hubs in SDE+ subsidy scheme, justified by lower costs ([56]; I2, 2012). ENNL presents plan to build 4-5 biomethane hubs [48]	Change framework structure. Change framework structure. Create legitimacy through milestones.	IC 20, IC 26	Biomethane hubs apply for favorable tax regulation and SDE+ subsidy
PNG (and later BMNL) chairman argues Green Gas Green Deal needs to be implemented by dedicated organization to ensure swift development of biomethane (I2, 2012)	Public-private cooperation. Synergetic.	IC 24	BMNL charged with implementation of government-industry Green Gas Green Deal
PNG's follow-up document (PNG, 2010) mentions that Vertogas should be included in the Gas Law (p. 7), so that no biomethane can be sold without certificate (also I3, 2012).	Change framework structure.	IC 24	Certification scheme Vertogas becomes mandatory for biomethane producers
PNG's vision document (2007) makes a case for forming consortia and exchanging knowledge (p. 8) PNG's follow-up document (PNG, 2010) proposes the establishment of a biomethane knowledge center (p. 9).	Provide plan. Provide plan.	IC 25	The newly established knowledge center BMNL receives 400.000 euro from the Ministry of Economic Affairs

Tables 4.8 and 4.9 show that incumbents and new entrants engage in institutional entrepreneurship activities in a different way. Incumbents work together with the government in a proactive, positive and synergetic way. New entrants rather react to problems, use a negative tone and are the governments' antagonist. This different style of institutional entrepreneurship is related to different outcomes in terms of institutional change. The incumbents' institutional entrepreneurship activities are related to a higher number and degree of institutional change.

Table 4.9: New entrants' institutional entrepreneurship activities linked to institutional change

New entrants' institutional entrepreneurship activities	IE dimension	IC #	Institutional change
Lobbying policy-makers for continued subsidy for biogas: pointing at investments put at risk (Boerderij Vandaag, 2006) Publicly denouncing government (Boerderij, 2006a) Offering petition to Prime Minister (Boerderij, 2006b)	Problem related. Negative tone. Antagonistic Antagonistic	IC 3	OVMEP subsidy for farmers that already invested in production capacity before the MEP subsidy was discontinued
Lobbying MPs (Biogas Magazine, 2008b, 2008d) and at political parties' conventions (Biogas Magazine, 2008d) for higher subsidy tariff, justified by biogas' contribution to agricultural sector (e.g. Boerderij Vandaag, 2008b, 2010a) and renewable energy target (e.g. Boerderij Vandaag, 2008b). Publicly denouncing government and emphasizing biogas' difficult circumstances (Boerderij, 2009b, Boerderij Vandaag 2008d) Survey amongst BGPA members and symbolic withdrawal of grant applications by biogas producers (Biogas Magazine, 2008d)	Limited access. Antagonistic Negative tone. Problem related. Antagonistic	IC 6, IC 9, IC 15	Parliament accepts two motions to increase subsidy for electricity production from biogas, which is translated into SDE scheme
Recurring meetings with Ministry of Economic Affairs (Boerderij, 2009a; Boerderij Vandaag, 2010b) Publicly denouncing government (Boerderij Vandaag, 2010b)	Limited access. Antagonistic	IC 21, IC 27	New substances added to positive list
Lobby for extending SDE+ subsidy scheme with heat production (Boerderij Vandaag, 2010b)	Problem related. Request.	IC 23	SDE+ subsidy scheme will include heat production

4.6.7 Effects of institutional change on biomethane development

This section discusses the influence of the institutional changes on biomethane development, in terms of the actual amount and scale of biomethane installations. The institutional change effectuated between 2006 and 2012 had a profound influence on biogas and biomethane development. Before incumbents got involved in promoting biomethane, the institutional framework provided subsidy for the production of electricity from biogas. With the SDE+ 2011 subsidy scheme, the institutional framework's focus changed towards cost-efficient production of biomethane. Table 4.10 shows that by the end of 2013, new installations that produce biomethane had been constructed. All biomethane installations had a capacity of more than 1 MW, with 50% of the installations having a capacity between 1 and 5 MW. In fact, 36% of installations had a capacity between 5 and 10 MW, while 14% went beyond 10 MW.

Table 4.10. Number and percentage of biomethane installations operating at the end of 2013 according to capacity class (NEA, 2015)

Biomethane production capacity (MW)¹	< 0,5 MW	0,5 – 1 MW	1 – 5 MW	5 – 10 MW	> 10 MW	Total
Number of installations	0	0	7	5	2	14
Percentage of installations	0%	0%	50%	36%	14%	100%

¹ Biomethane production capacity has been calculated based on data of production in nm³/h and the calorific value of Groningen gas (35,17 MJ/nm³ or 9,77 kW/nm³; GTS, 2015). For readability, some capacity classes have been rounded off to whole numbers.

In contrast, Table 4.11 shows that by the end of 2013, 57% of biogas installations had a capacity smaller than 1 MW. More specifically, 21% of the total number of installations had a capacity of less than 0,5 MW. The remaining installations had a capacity between 1 and 2 MW (26%) or above 2 MW (17%).

Table 4.11. Number and percentage of biogas installations operating at the end of 2013 according to capacity class (NEA, 2015)

Electricity production capacity (MW)	< 0,5 MW	0,5 – 1 MW	1 – 2 MW	> 2 MW	Total
Number of installations	30	52	38	24	144
Percentage of installations	21%	36%	26%	17%	100%

In sum, the institutional change had two consequences. First, biogas is no longer only turned into electricity, but also into biomethane. Second, biomethane installations operate on a larger scale than biogas installations. Thus, in the Dutch institutional context, a shift from electricity to gas production is combined with an increase in the scale of installations. This implies that the recent changes in this industry are not favorable for the participation of farmers, with their small-scale installations, in biomethane production.

4.7 DISCUSSION

Our contribution to the institutional entrepreneurship literature entails an analysis of how institutional entrepreneurship activities differ between incumbents and new entrants. We propose a set of dimensions for cooperation, framing, and political tactics on which incumbents' and new entrants' institutional entrepreneurship activities differ. We propose five dimensions for cooperation: actor variety, members' inter-

ests, relation to external environment, management, and funding. Framing can be described according to alignment, problem definition, tone, and level of abstraction. For political tactics we distinguished five dimensions of engaging with the wider audience: media outlet, contact with wider audience, media purpose, media timing, and response to criticism; and six dimensions of contact with policy makers: access, relation, focus, scope of proposals, style, and tools.

Our findings correspond with insights from case studies in the scientific fields on institutions, innovation, and sustainability transitions. Incumbents perform exactly the activities that are suggested to contribute to institutional change, in contrast to new entrants. In terms of cooperation, incumbents are strong in bridging stakeholders and accessing dispersed sets of resources (cf. Maguire et al., 2004) and in collecting endorsements of key constituents to obtain socio-political legitimacy (cf. Hargrave & Van de Ven, 2006). Incumbents' framing creates cognitive legitimacy (cf. Hargrave & Van de Ven, 2006) by presenting biomethane as 'building on the strengths of the gas sector' and 'contributing to Netherlands Inc.'. Incumbents also keep their framing positive (cf. Klein Woolthuis et al., 2013), in contrast to new entrants. Regarding political tactics aimed at policy makers, 'regular and personal contact with politicians' and preferably 'politicians in top positions' are important for an effective lobby (Sühlsen & Hisschemöller, 2014). Incumbents meet these criteria, whereas new entrants do not. Studies in the sustainability transitions field also highlight the importance of alignment between public and private actors as a condition for institutional change (Kern et al., 2014; Araposthatis, 2013; Klein Woolthuis et al., 2013). In terms of influencing policy through the media, Hillman & Hitt (1999) speak of advertising, press conferences, and economic and political education. In our case, incumbents also tried to influence institutions through newspaper articles. The implication of the incumbents' institutional entrepreneurship activities that participation in biomethane production is difficult for small-scale installations, corresponds with Kern et al.'s (2014) findings in the UK offshore wind development: large incumbents became the dominant actors, replacing small new entrants (Kern et al., 2014: 639).

The data we collected comes with a number of limitations. Firstly, of the new entrant associations, most data was available on the biogas producers association BGPA. Therefore, this association is represented more strongly than other new entrant associations, which may have a slightly different approach. Secondly, our results are derived from a Dutch case study with its particular characteristics and are therefore not necessarily generalizable to other contexts. Nevertheless, our case study in the Dutch context proposes a theoretical contribution by offering a new and detailed categorization of institutional entrepreneurship activities, which future research may generalize to other contexts.

Future research can also investigate to what extent institutional entrepreneurship activities are linked to actors' relative power position. In other words, would new entrants be able to copy incumbents' institutional entrepreneurship activities and enhance their influence on institutions? Or does the new entrants' relative power position force them to fulfill institutional entrepreneurship activities differently? In addition, it would be worthwhile to study the extent to which incumbents are successful in fulfilling their biomethane production goals. After all, institutional change does not automatically lead to increased production. To what extent are incumbents able to promote biomethane production by ways other than government-level institutional change?

4.8 CONCLUSION

In this paper, we set out to investigate the differences between new entrants' and incumbents' institutional entrepreneurship and the subsequent effects on formal institutions as well as on biomethane development.

We show that incumbents fulfill the activities of cooperation, framing, and political tactics differently than new entrants. Regarding cooperation, incumbents form public-private associations that bridge different interests and that operate professionally and with substantial funding. In contrast, new entrants build associations with actors that share strictly the same interests (i.e. producers) and operate on a voluntary basis and with limited funding. Incumbents use a proactive and positive framing that emphasizes biomethane's benefits to the Dutch economy. New entrants rather focus on problems of individual biogas installations and ask the government for help. Another difference is that incumbents use the (national) media to create legitimacy for their policy preferences and to show their milestones, whereas new entrants use the agricultural media to inform peers about policy outcomes. Incumbents build their political tactics on a comprehensive plan, supported by commissioned research reports, and take place in a synergetic relationship with top-level policy makers. New entrants, instead, focus on problems and request help from the government, while having limited access and being in an antagonistic relationship.

The incumbents' institutional entrepreneurship activities to promote biomethane correspond with more substantial institutional change than new entrants' activities. Incumbents have achieved changes in the setup of the policy framework itself, not just in the parameters of the existing framework. As a result there is a shift from electricity to gas production, and an increase in the scale of installations. This implies that the new institutional framework is not favorable for the participation of farmers with their small-scale installations in biomethane production.



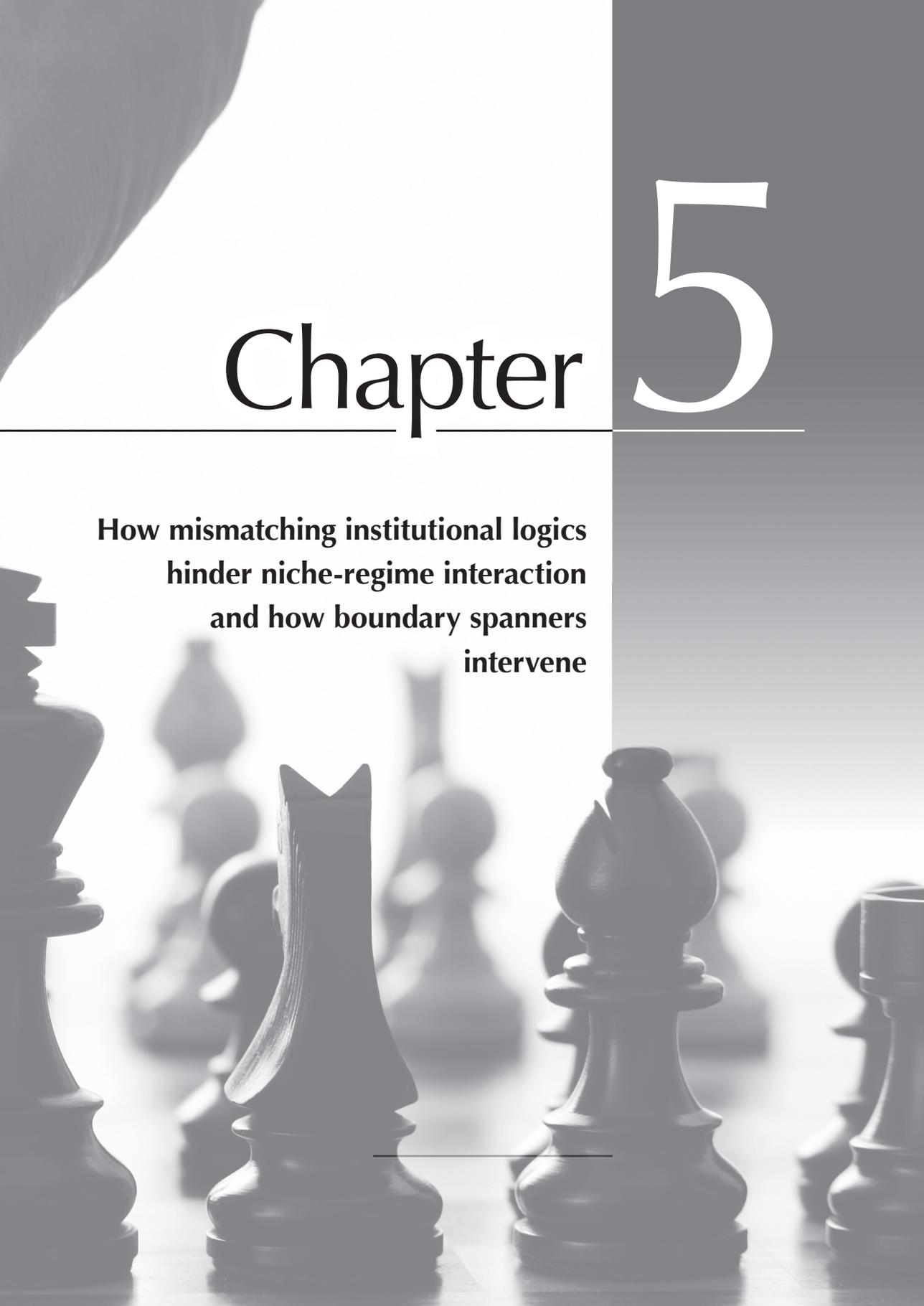
We don't see the world as it is, we see it as we are

Anais Nin

Chapter

5

**How mismatching institutional logics
hinder niche-regime interaction
and how boundary spanners
intervene**



ABSTRACT

The promotion of renewable energy production requires the cooperation of previously unrelated actors. In the Netherlands, a government subsidy pushes biomethane producers into a relationship with operators of the gas network. However, this cooperation proved to be very difficult. This research analyses the problematic interaction between producers and network operators in the case of biomethane injection in the Dutch natural gas grid. We draw on the concept of 'institutional logics' to improve our understanding of this interaction and to identify divergent practices and belief systems. This research contributes to the multi-level perspective on socio-technical transitions, in particular to insights into the interaction between the biomethane niche and gas regime. Based on interviews and secondary data sources we find diverging logics for biomethane producers and network operators. The differences regarding the goals pursued, decision-making style, and the scale of operations hamper productive cooperation. We also observe that 'boundary spanning' individuals step in to increase mutual understanding and to forge productive working relationships. However, the existing logics leave very little room for maneuvering, given the embeddedness and stability of logics in thinking, acting, and physical infrastructure. Mismatching institutional logics form a serious hurdle for successful biomethane injection, and thus hinder the transition towards more renewable energy production.

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5.1 INTRODUCTION

Since 2008, the Dutch government subsidizes the production of biomethane and injection of this renewable gas into the natural gas grid. In an effort to meet the EU renewable energy target of 14% in 2020 in a cost-efficient way, the government has sharply increased the subsidy budget for biomethane production and injection to 1 billion euros, or 2/3 of the total budget for renewable energy production in 2011 (NEA, 2012b). This subsidy encourages the food and agricultural sector to produce biogas, upgrade it to biomethane and inject it into the natural gas infrastructure. Thus, biomethane producers are pushed into a relationship with operators of the gas network. However, these two types of actors did not deal with each other before and come from very different worlds. Cooperation between the producers and network operators proved very difficult: only 13% of the proposed biomethane production capacity that was allocated subsidy in 2011 has been realized (NEA, 2014:53). Therefore, the promotion of renewable energy technologies that requires the cooperation of previously unrelated actors merits further attention. Insights into interaction between different types of actors will enable the transition to more renewable energy production. In this research, we set out to map the problematic interaction between biomethane producers and network operators, and to describe the way in which these problems are addressed.

The interaction between biomethane producers and network operators can be conceptualized as an interaction between niche actors and regime actors, respectively. The interaction between niches and regimes is central to the process of societal transitions (Geels, 2002; van den Bergh et al., 2011). A niche is supposed to expand to the point where it is strong enough to break through and substitute or transform parts of the regime. However, several authors have pointed out that the exact form of this interaction between niche and regime has received insufficient attention (Smith, 2007; Elzen et al., 2012a; Elzen et al., 2012b; Diaz et al., 2013). As Diaz et al. (2013) state: 'initiating a transition is not a matter of simply 'scaling-up' a technology that has been developed in a niche, but is a complex and often messy process' (p. 63). This knowledge gap at the heart of transition theory needs to be urgently addressed.

So far, most multi-level perspective case studies describe the indirect interaction between a niche and a regime, e.g. through changes in relative prices or policy (e.g. Raven, 2004; Raven & Verbong, 2009). This indirect interaction is also expressed by the fact that niche, regime and landscape developments are often presented in separate sections (e.g. Geels, 2002; Geels, 2005; Geels, 2006; Geels, 2007; Verbong & Geels 2007). Few case studies focus on niche-regime interactions where actors have to cooperate directly, bringing about a real confrontation (cf. Raven, 2007 on symbiotic multi-regime interaction).

A few examples of these case studies include those by Smith (2007), Elzen et al. (2012a), Elzen et al. (2012b), and Diaz et al. (2013). Smith (2007) provides an analysis of niche-regime interaction in the housing sector; Elzen et al. (2012b) study innovation in the horticulture sector; whereas Elzen et al. (2012a) and Diaz et al. (2013) investigate transitions in farming. Each of these studies focus on the social interaction between niche and regime, on how niches manage to establish links with and influence the regime and thus show the complexity of up scaling. In addition, Wirth et al. (2013) specifically address the culture-gap by studying the role of regional professional cultures in explaining spatial variety in diffusion of biogas installations. An important phenomenon in these studies is the presence of actors that actively facilitate communication and cooperation between niche and regime actors (Elzen et al., 2012a; Elzen et al. 2012b; Diaz et al., 2013).

Despite the fact that some work has been done on this issue, a deeper insight in how niches interact with regimes is necessary. A specific knowledge gap remains with regard to physical infrastructure: a core element of regimes (Loorbach et al., 2010). In the context of the water sector, Lieberherr & Truffer (2015) call them the 'gate-keepers for the introduction of any novelty in the sector' (p.2). Especially the gas infrastructure has been under researched (with the notable exception of Arapostathis et al., 2013; Arapostathis et al., 2014). Certain niches depend on existing infrastructure, such as electricity and gas networks, for their operation (cf. Goldthau, 2014). As niches grow, access to infrastructure becomes increasingly important (van der Vooren et al., 2012; van der Vooren & Alkemade, 2012). However, the material and long-term nature of regime infrastructure make accommodations extremely difficult (cf. Markard, 2011). Therefore, focusing on niche interaction with a regime characterized by rigidity will teach us about a core element of the transition problem: how the most stable arrangements can or cannot be transformed (cf. Fuenfschilling & Truffer, 2014).

A key problem for the uptake of niches in the regime is that they each operate according to a different set of rules and routines (Rip & Kemp, 1998; Geels, 2004; Fuenfschilling & Truffer, 2014), and thus a different set of institutions (Elzen et al., 2012b).

Given our focus on the role of infrastructure in transition processes, we need a theoretical approach on institutions that includes both social and material elements. The institutional logics approach (e.g. Thornton & Ocasio, 2008) emphasizes that institutions have both symbolic and material elements, and recognizes that these are 'intertwined and constitutive of one another' (Thornton et al, 2012:10). This combination of social and material elements matches with the alignment of social and technical elements in a socio-technical regime (Fuenfschilling & Truffer, 2014). Institutional logics are the practices and underlying belief systems that guide actors' behavior and thinking. 'How actors make sense of and act upon reality is contingent on prevailing

institutional logics' (Fuenfschilling & Truffer, 2014:774). Thus, institutional logics help to understand why actors behave in a certain way and how they perceive their interests (cf. Bosman et al., 2014). Two actors can perceive and act upon the same situation very differently due to the different institutional logics they operate under. We will show that a mismatch of institutional logics is an important feature of the transition towards integration of biomethane in the existing gas infrastructure. Moreover, applying institutional logics we are able to show how existing infrastructure shapes actors' thinking and acting.

The aim of this paper is to characterize the institutional logics under which niches and regimes operate and analyze to what extent the difference in institutional logics can help explain why transitions are such slow processes. Furthermore, we investigate how the problem of mismatching institutional logics is addressed. Institutional theory offers the relevant concept of 'boundary spanners': actors that engage in strategies to connect different worlds (e.g. Zietsma & Lawrence, 2010:194). We apply the institutional logics lens to how the niche of biomethane confronts the natural gas regime regarding the issue of biomethane injection and investigate boundary spanners' strategies aimed at creating productive working relationships. This leads to the following research question: *How do the different institutional logics that gas network operators and biomethane producers operate under influence biomethane injection into the Dutch natural gas grid, and how do boundary spanners intervene?*

Several types of actors may supply biomethane, e.g. farmers, the waste sector, and large food production companies. In our case study we zoom in on the contact between *farmers* and network operators, because there the difference in institutional logics is most outspoken. So what happens when farmer Johnson meets the network operator? We will show the confrontation between the 'hierarchy logic' that guides the network operator and the 'entrepreneur logic' that guides the farmers. We think that insight in this clash of logics will teach us about an essential issue in transition processes: the cumbersome interaction between parties coming from different backgrounds. Focusing on the underlying institutional logics brings us to the heart of the problem. It will create insight into whether these institutional logics are incompatible, and into how the institutional logics' mismatch may be addressed.

5.2 THEORY

In this section we introduce the concept of institutional logics and describe different types of logics. Then we elaborate on conflicting logics and on how the gap between different logics can be bridged.

Institutional logics is a relatively new and growing body of literature within institutional theory. It is similar to the concepts of logics of action (Bacharach et al., 1996), cognitive schema (Seo & Creed, 2002), and logics, forms, and practices (Sine & David, 2003). Institutional logics (in short: logics) are defined as ‘the socially constructed, historical patterns of material practices, assumptions, values, beliefs, and rules by which individuals produce and reproduce their material subsistence, organize time and space, and provide meaning to their social reality’ (Thornton & Ocasio, 1999:804). In other words, the concept includes both practices (the typical way of operating) and the underlying belief system (ideas and guidelines) that influence individual actors’ acting and thinking. This concept offers a comprehensive understanding of why and how actors behave the way they do. Furthermore, Thornton & Ocasio (2008) emphasize that institutions develop and change as a result of the interplay between their material and cultural foundations (p. 105). So while logics have a social dimension, they are also constrained by material artifacts.

Moreover, ‘... institutional logics determine what answers and solutions are available and appropriate in controlling economic and political activity in organizations’ (Thornton & Ocasio, 1999:806). However, while institutional logics condition actors’ choices, ‘[actors] also have the capacity to innovate and thus transform institutional logics’ (Thornton et al., 2012:3).

In relation to transition processes, the logics concept enables us to observe more closely how niche and regime behavior differs as well as what the underlying motivations for this behavior are. The concept includes both cultural and material aspects and acknowledges the duality of agency and structure. As such it is able to capture the complexity of transition phenomena. We believe it to be a suitable concept that will increase our understanding of why transition processes tend to be slow.

5.2.1 Different types of logics

Logics also enable us to characterize different types of organizations. Existing research on institutional logics focuses on the different institutional orders of society, i.e. family, religion, state, market, profession, and corporation (Thornton et al., 2012). Each of these orders is characterized by a set of ‘ideal-type’ institutional logics. In turn, organizations or sectors are shaped by field-level specific logics depending on their particular opportunities, restraints and resources. These specific logics are combinations of the ideal-type logics mentioned above (ibid.). The six institutional logics provide a yardstick to analyze and explain sector-specific logics. Here we will highlight the main goal and operating principles for the relevant ideal-type logics. The *state* aims to increase the community good and does so by bureaucratic mechanisms. Under the *profession* logic, people strive to increase personal reputation by relying on

personal expertise and quality of craft. The *family* is geared towards increasing family honor by mechanisms of loyalty, household position, and patriarchal domination. The *market* logic dictates a focus on increasing profit through the mechanism of transaction. The *corporation* aims at increasing the size of the firm and operates according to actors' status in the hierarchy. Finally, *religion* aims at increasing religious symbolism of natural events by using priesthood charisma and association with deities.

Despite differences in theoretical backgrounds, cultural theory shares with institutional logics the idea that a rational-choice perspective misses out on the social and cognitive aspects that influence what is perceived as rational. For example, in their highly influential book on cultural theory, Schwarz & Thompson (1990: 6-7) distinguish three ideal-type 'rationalities' related to three groups: the individualists, the hierarchists and the egalitarians.

In the individualists' market culture (similar to the market logic) people strive to exploit opportunities by engaging in market transactions. They focus on optimization of the end-product and on generating profit: they have a substantive rationality. In contrast, hierarchists operate according to orderly and fixed procedures (resembling the state and corporate logic). Following these procedures is more important than obtaining the most efficient outcome: they are guided by a procedural rationality. Moreover, since people are organized in orderly and ranked relationships there are differences in status. Finally, the egalitarians provide a critical rationality: they 'reject both the individualism of the market and the inequalities of the hierarchy' (p. 7). Instead they '[stress] the importance of fraternal and sororal cooperation, and therefore [strive] for social relationships that are voluntaristic and egalitarian' (p. 7).

When confronted with new developments, each rationality has a distinctive 'engineering aesthetic': its own definition of the 'good, the beautiful and the socially desirable' (ibid. p.11). Schwarz & Thompson (1990) argue that each actor is perfectly rational within its own rationality (p. 6). However, the different rationalities are not compatible with each other. This poses a challenge for (policy) debates, because the argumentations do not fit with one another. In terms of transitions, where different actors of the niche and the regime meet, we can see now why it is difficult to agree on a common problem definition, let alone select a solution.

5.2.2 Conflict between logics

While the logics that guide each organization or sector provide a (semi-)coherent package of practices and belief systems, two different sets of logics are not necessarily aligned (e.g. Thompson, 2013). Contradictions in logics between organizations 'form the bases of political conflicts' (Thornton & Ocasio, 1999:805). Such a situation is called 'institutional contradiction': a misalignment of institutional logics creates pres-

sure on the existing arrangements. Several studies show how organizations that used to work under logic A, are pushed to work under logic B (e.g. Reay & Hinings, 2009; Thornton & Ocasio, 1999). In other words: 'Some of the most important struggles between groups, organizations, and classes are over the appropriate relationships between institutions and by which institutional logic different activities should be regulated' (Friedland & Alford, 1991: 256).

A specific form of institutional contradiction is 'structural overlap', in which 'individual roles and organizational structures and functions that were previously distinct are forced into association' (Thornton & Ocasio, 2008:116). For instance, Reay & Hinings (2009) describe how health care professionals in Alberta, Canada had to move away from the dominant logic of 'medical professionalism' towards 'business-like health care'. Instead of the physicians using 'their professional knowledge to determine appropriate care for their patients', they now had to start working based on the principles of 'cost-effective treatment, lowest-cost provider and customer satisfaction' (p. 630). When niches need existing infrastructure, niche and regime actors are forced into association and structural overlap occurs.

5.2.3 Boundary spanning

When organizations with diverging logics are forced into association, how do they make things work (to some degree)? Institutional theory mentions the phenomenon of 'boundary spanning actors' that engage in 'strategies to manage cross-boundary connections' (Zietsma & Lawrence, 2010:194). Traditionally, this research was geared towards science-practice cooperation and other forms of knowledge co-production (e.g. Guston, 1999; Miller 2001; Carr & Wilkinson, 2005; Tribbia & Moser, 2008). Here we apply this literature to a situation of structural overlap. By addressing the activities of boundary spanners we add to the research on agency in transitions (e.g. Markard et al., 2012; Farla et al., 2012; Smink et al., 2015; Wesseling et al., 2014; Wesseling et al., in press).

For the purpose of this research we focus on the micro-level of boundary spanning individuals and exclude the literature on systemic intermediaries (e.g. Van Lente et al., 2003; Klerkx & Leeuwis, 2008; Klerkx & Leeuwis, 2009; Kivimaa, 2014). Boundary spanning individuals are found to be 'pivotal' in the management of inter-organizational relationships (Williams, 2002), especially in situations of 'no contact, disturbed or otherwise dysfunctional contact' (Klerkx et al., 2010:398).

Boundary spanning strategies directed at actors operating under different logics may involve the establishment of boundary organizations (O'Mahony & Bechky, 2008). Boundary organizations "perform tasks that are useful to both sides and involve people from both communities in their work but play a distinctive role that would

be difficult or impossible for organizations in either community to play" (O'Mahony & Bechky, 2008:426). They 'stimulate collaboration by articulating how the organizations' interests diverge and by reinforcing their convergent interests' (Jolink & Niesten, 2012:155) and thus, they 'help actors collaborate across different worlds' (O'Mahony & Bechky, 2008:452).

Four essential tasks that boundary organizations perform are presented by Tribbia & Moser (2008). In the first place, *convening*: organizing face-to-face contact between stakeholders to 'foster trust-building and mutual understanding' (p. 317). Secondly, *translation* of information and resources to assure that all communication is comprehensible for co-operating individuals and organizations. Thirdly, *facilitating collaboration* by bringing together co-operating groups for frank and transparent dialogue geared at establishing productive working relationships. Fourthly, *mediation* to ensure the fair representation of the various interests of stakeholders.

Boundary spanning is deemed successful if 'productive working relationships [have been created] despite divergent interests' (O'Mahony & Bechky, 2008:455). Other authors define success in terms of increased mutual understanding (Franks, 2010:286). O'Mahony & Bechky (2008) emphasize that not all conflicts will be resolved and that divergent interests will remain.

Furthermore, boundary spanning also happens within organizations and is labeled 'boundary shaking' (Balogun et al., 2005). Boundary shakers are change agents that implement 'change initiatives across *internal* organizational boundaries', mostly initiatives originating from the upper ranks of an organization. Boundary shaking practices involve: finding out the agendas and issues of others; convincing people of the merits of the initiative by framing the initiative to be fit with their agendas; stage management such as using experts to reinforce particular points; aligning measurement systems with the change initiative; lobbying for help from more senior managers (Balogun et al., 2005:267). Kislov (2014) remarks that top-down boundary spanning may be less successful than initiatives emerging in a bottom-up fashion, given communities' resistance to external influence and control.

A prerequisite for boundary spanners is to be exposed to multiple or even contradictory logics, prompting reflection on these logics (Greenwood & Suddaby, 2006). Boundary spanners 'transpose ideas' (Greenwood & Suddaby, 2006:38) and thus increase actors' 'awareness of alternatives' (Greenwood & Suddaby, 2006:38, emphasis in original). Klerkx et al. (2010) found boundary spanners to be 'specific and dedicated actors', often being present in the function of consultant (p. 398). Common characteristics of boundary spanners are: good networking skills, effective interpersonal competencies, and ability to create trust (Williams, 2002).

Seen from the logics angle, skillful boundary spanners are an essential ingredient to enable the successful cooperation between previously unrelated organizations.

This phenomenon is also recognized in transition studies: ‘pragmatic system builders [are required] who make compromises and help translate some niche practices into forms amenable to actors in the regime’ (Smith, 2007:447). Such translation activities in a face-to-face setting provide ‘stepping stones’ between niche and regime. Other transition studies speak of ‘intermediaries’ (Elzen et al., 2012a) and ‘hybrid actors’ (Elzen et al., 2012b; Diaz et al., 2013; Kivisaari et al., 2013).

In this study we will identify the sector-specific logics guiding network operators and farmers; analyze how these different sets of logics ‘meet’ and whether some boundary spanners manage to close the gap.

5.3 METHOD

Fitting our aim to understand a complex social phenomenon we have conducted a case study. A case study design allows the phenomenon to be studied in its context (Yin, 2003). Our focus on institutional logics requires us to gain a comprehensive understanding of the functioning of biomethane producers and network operators in their context; something which other research methods offer to a lesser extent. Several data sources have been used. First, a database of over 250 news articles related to biomethane injection in the Netherlands during the period 2003-2012 served to identify the most important actors and activities that occurred in this period. In addition, relevant policy documents, annual reports, and research reports were analyzed to get an overview of (unsolved) technical and regulatory issues with regard to biomethane injection, and to prepare for the interviews. One researcher visited the 2011 and 2012 editions of the Energy Delta Convention in Groningen. This industry and science conference largely focuses on gas issues and provided insights into the current topics and culture of that sector.

Furthermore, 14 semi-structured interviews were conducted with relevant organizations in the field of biomethane injection. Interviewees were those people in the organization that worked closely on the issue of biomethane injection. Interviews were conducted with the national network operator (3 interviewees) and the three major regional network operators (4 interviewees). Five interviews were arranged with biomethane producers and boundary spanners. Since producers mostly hire a boundary spanner to organize part of the biomethane production, these boundary spanners could tell us most about the contact with the network operators. Due to this close connection between producers and boundary spanners we mention them as one group. We interviewed all boundary spanners that were identified in the news articles and within the network operators. Finally, interviews were conducted with two principal government representatives on the issues of biomethane injection and

gas quality. These groups will be indicated in the results as 'Nat. network', 'Reg. network', 'Boundary spanner', and 'Government', respectively. Some interviewees have a double role, e.g. they work for the network operator as a boundary shaker. We indicate them as e.g. 'Reg. network/ boundary shaker'.

The interviews took place between September 2012 and March 2013 and mostly lasted one to two hours each. Interviewees were asked to describe how their organization dealt with the introduction of biomethane injection, what their motivations are to work on it, and what issues have to be solved (and how) to make biomethane injection successful. Interviews were fully transcribed and analyzed in NVivo to create a description of the different types of sector-specific institutional logics, and for examples of competing logics, as well as boundary spanning activities. We checked for intercoder reliability as a co-author also analyzed part of the interviews in NVivo. Interview quotes have been translated to English. We aimed to conscientiously convey the meaning and speech style of the interviewees, while staying as close to the original text as possible (Bryman, 2008:454).

5.4 BACKGROUND ON GAS SECTOR AND BIOMETHANE

The lion's share of Dutch gas comes from the large *Groningen* field, in the northern province of Groningen. The composition of Groningen gas is: 81% methane, 14% nitrogen, a small percentage of higher hydrocarbons, and finally some CO₂. Compared to natural gas from other sources, it has a relatively low methane content and therefore is called 'low-calorific gas'. The calorific value of gas indicates how much energy one unit of gas contains. The calorific value is related to the Wobbe index: a measure to compare energy content for gases with different density. Gas from so-called 'small fields' in the North Sea and on land as well as imported gas (e.g. from Russia) has a higher methane content and is therefore blended with nitrogen to match the composition of Groningen gas (Gas Transport Services, 2013:17).

Biomethane is produced from biogas, which is the product of a co-digestion process of manure and other organic materials (e.g. corn). By extracting CO₂ from the biogas, the relative percentage of methane increases and the Wobbe index of natural gas is met (Platform Nieuw Gas, 2009). However, chemically, it does not have exactly the same composition. For instance, biomethane can contain some biological components related to the resources from which it is produced, which need to be filtered out (Platform Nieuw Gas, 2009). Figure 5.1 shows the value chain of biomethane. It also indicates that injection is a necessary step to provide biomethane to the end user.

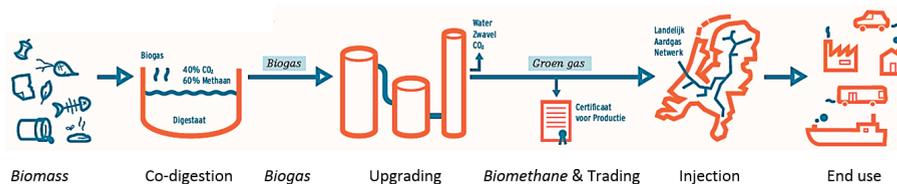


Figure 5.1: Biomethane value chain (adapted from Nieuw Gas Krant, 2010:4).

The organizational structure of the gas sector is as follows. The Groningen field serves as the starting point in terms of physical infrastructure as well as in legal terms. Natural gas is ‘produced’ by the NAM (Nederlandse Aardolie Maatschappij). It enters the network of the Gasunie, which transports the gas to the regional network operators. One can compare the gas network with the roads of a country. The highways transport large quantities of gas at high pressure (80, 67, and 40 bar), whereas the regional and local grids transport smaller quantities at lower pressure (maximum 8 bar) (KEMA, 2010:5-6). Gas traditionally flows only one way, from Groningen to the customer, and therefore supply and demand should be in balance at all times (KEMA, 2010:7).

The Dutch Gas Law has been built on this arrangement and is therefore quite simple: it contains very little specifications about the gas quality (most notably the Wobbe index and the pressure; Government 2, 2012), because there used to be only one source (the Groningen field). Gasunie is responsible for the gas quality (which involves some blending and fine tuning), whereas regional network operators transport it to the customer. Gasunie is used to deal with large energy intensive industrial players that are directly connected to the 80 bar network (Schipper & Verbong, 2000:215) and not with small parties. Conversely, regional network operators have more local contacts, but have limited knowledge about gas quality (other than Groningen gas). In this monopoly arrangement everything was relatively simple. “In case there were any questions, Gasunie was the answer” (Government 2, 2012).

The introduction of biomethane injection to the gas system represents a fundamental change. It means that the gas no longer flows exclusively from upstream to downstream, but that gas can be added into the downstream ‘nerves’ of the system, and by new and different parties. This practice breaks the monopoly of Gasunie on supplying the Netherlands with gas. Moreover, it raises many technical, legal, administrative, and safety related questions. While the government pushes biomethane injection by allocating to it a large part of the renewable energy subsidy budget, no final regulation exists on a few essential issues (Platform Nieuw Gas, 2007:22, 25; Boerderij Vandaag, 2009b; NEA, 2011b). The biomethane projects that inject into the natural gas grid run on the basis of provisional regulation (ACM, 2009). Disagreement on final regulations covering these essential issues continues. There-

fore, no new regulation has been introduced until at least July 2014. In fact, only 13% of the proposed biomethane production capacity that was allocated subsidy in 2011 has been realized (NEA, 2014:53), partly because of the problems related to cooperation with the network operators. The essential issues concern firstly, the gas quality and safety: what should be its calorific value (energy content) and what should be its composition to ensure flame stability in boilers and furnaces? Secondly, who is responsible in case of damage or accidents due to biomethane injection: the producer or the network operator? And finally, the Gas Law does not contain provisions that allow network operators to invest in infrastructure adjustments to facilitate biomethane injection. This is relevant, because farms are usually located near the most downstream part of the network, where gas consumption is relatively low. This limited injection capacity could be increased by connecting this particular network to a network with higher gas consumption, or by making adjustments to the network to enable the gas to flow upstream.

Two landscape changes influence the relation of network operators with biomethane. Firstly, due to the EU and Dutch liberalization agenda, in 2005 Gasunie was separated into a network operator (called Gasunie) and a sales company (called GasTerra) (*Eerste Kamer der Staten-Generaal*, 2012:345). The same happened with the regional network operators in 2008-2009. As a consequence, network operators were in principle free to transport gas from any producer. This opened up new possibilities for other types of sources. This landscape change also affects the regime level as the liberalization program allowed network operators to set up a business development section that executes activities in the commercial domain. Such activities include the building of pipelines, upgrading gas, monitoring gas quality etc. The business approach of the business development unit now starts to cause friction with the regulated part of the network operator. As a result of these new incentives, pressure on the network operator to accept biomethane injection increased.

Secondly, societal concerns about the impact of gas on CO₂ emissions as well as the eventual depletion of fossil resources force the network operators to consider more sustainable types of gases to maintain their 'license to operate'. For network operators to remain a viable business, it is essential that their network will continue to be used for gas transport. A related regime factor is that gas extraction from the Groningen field is expected to decline sharply in the next two decades (Gas Transport Services, 2013:14-15). This supply needs to be substituted. Imports will increase, which means that gases with a different composition (high-calorific gas) will be transported (e.g. from Russia). In the long run, the gas quality standard needs to be adapted (Ministry of Economic Affairs, 2012).

5.5 CASE DESCRIPTION AND ANALYSIS

Firstly, we will describe the sector-specific institutional logics that guide the network operators and the producers, which we will summarize under the heading of ‘hierarchy logic’ and ‘entrepreneur logic’, respectively. These two logics will be compared to the ideal-type institutional logics as well as the three rationalities. Secondly, the mismatch of the institutional logics will be described in detail. Thirdly, we will show how various actors try to bridge the gap between the institutional logics. Quotes are used to show remarkable differences in logics.

5.5.1 Institutional logics guiding network operators

The most basic institutional logic influencing network operators is their operation according to the Gas Law and all its subsequent *codes and norms*. Since network operators are public entities, these documents prescribe whether they are allowed to undertake certain activities as well as how and with which type of materials they should do it. The codes and norms also need to safeguard non-discriminatory access to the network: all parties need to be treated uniformly. For new developments, prescriptions are often lacking and leave the network operator without guidelines about how to proceed. New developments either have to meet existing norms, or new norms have to be decided upon. In short, network operators are governed and constrained by a legal framework.

A network company is driven by codes and norms. So, very simple, if something is not mentioned in a norm, people don't know it. (Regional network 1, 2013)

In terms of decision-making, network operators are organized *hierarchically and formally*. The hierarchy starts with the technician that checks the pipelines in a certain area, and runs via the administrative middle management layer, to end with the top management. Procedures tend to be extensive and relatively slow. Interactions with other parties have a formal character.

Secondly, network operators traditionally deal with *large-scale arrangements*, for infrastructure as well as administrative systems. They are tuned to work with large quantities of gas. Any change to the system is bound to come with (extremely) high overhead costs.

A connection to the national network has a fixed price of 300.000 euro. You actually have nothing then. You only have somebody making a hole

in the pipeline where you can connect, but all the rest you need to do yourself. ... For this we are engineering for months to see what are the consequences for the transport network. All sums, plusses, minuses are made three times. Everything that happens needs to meet all standards. (National network 1, 2012)

Network operators are also characterized by their preference for *order and control*. This is closely linked to their preference for large-scale operations. They like to keep both the infrastructure and the administrative system simple, they attempt to perfectly manage this system and tend to resist changes to it. A telling illustration is that network operators battle with each other for a yearly ‘operational excellence’ prize, awarded to the most smoothly and efficiently operating organization.

Thirdly, for network operators, it is of utmost importance that the gas supply meets the highest standards for *safety and reliability*. For instance, occurrences of odorless gas or incorrectly burning flames are unacceptable for them, due to the risk of explosions. This concern partially stems from the network operators’ responsibility for the gas quality. From the preoccupation with safety and reliability follows a strong tendency of risk-averse behavior. Network operators prefer to know and cover all possible risks of new activities before getting started.

Finally, network operators are pledged to make decisions that are *optimal from a societal perspective*. Given that their costs will be divided over energy users, network operators need to consider whether activities are efficient from a societal point of view.

These elements of the sector-specific logics under which network operators function are a combination of the ideal-type state logic and profession logic as characterized by Thornton et al. (2012). Network operators are influenced by state logic because they are state-owned. This results in a high degree of regulation and bureaucratic decision-making, and a prescribed focus on the increase of the community good (e.g. optimal and safe supply of gas for all). Moreover, network operators also draw on the profession logic, which shows in the high value that is being placed on expertise and quality of craft in managing the gas infrastructure.

We also recognize the profile of a hierarchist as described by Schwarz & Thompson (1990). Network operators operate on the basis of ‘orderly and ranked relationships’ (p. 6) and follow a ‘procedural rationality’ (p. 7), meaning that the procedure is the guiding principle rather than the outcome. Moreover, the preference for large-scale and centralized arrangements matches the typical ‘engineering aesthetic’ (p. 11) of the hierarchist. We summarize the sector-specific logics under which the network operators function under the heading of ‘hierarchy logic’.

5.5.2 Institutional logics guiding biomethane producers

The institutional logics biomethane producers operate under are quite different from the hierarchy logic related to the network operators. First of all, for farmers, biomethane production is a *supplement to their core business*: their hearts really are with their cows and crops. Secondly, producers are private organizations and therefore only invest in a project if they expect it to be profitable. This is an essential condition for their involvement. They *strive for efficiency* and therefore share an interest in making optimal use of their resources. They try to create value from the waste streams they have. For farmers, biomethane production is a piece in a larger puzzle of closing nutrient cycles. By digesting manure they reduce surplus manure (which is expensive to get rid of) and turn it into a valuable product that can be used as fertilizer.

And for these farmers, it is not about the gas, it is about the minerals. From that moment on we have always emphasized it is about the link between minerals and gas (Boundary spanner 1, 2012)

Third, the farmers and the related boundary spanners are *focused on regional development*. They believe their activities can be a stimulus for the local economy.

A simple example: we are now busy to think of a new green economy for regions in decline, because that's where you want a new economy. (Boundary spanner 1, 2012)

Fourth, producers wish to *contribute to the production of renewable energy* and more generally, sustainability. They are intrinsically motivated.

Certainly, it was an economic opportunity, but if it hadn't been for sustainability, we wouldn't have taken the initiative. So sustainability was our priority, that was absolutely clear, reasoned purely from the heart. (Boundary spanner 2, 2012)

Finally, the operating style of producers is to *decide quickly and act pragmatically*. For instance, they do not participate in biomethane related organizations or platforms unless they all pursue the same concrete goals.

In sum, producers are influenced by both the market and family logic as described by Thornton et al. (2012). Increasing efficiency and thereby profits is one of the main concerns of farmers, fitting the commercial market logic. Elements of the family logic are visible in pragmatic, family-based decision-making (see also section 5.3.1) and

an extension of the family loyalty to their region. Farmers also have much in common with the individualists' market rationality as depicted by Schwarz & Thompson (1990). Their main concerns are the results on the ground; procedures are only the means to that end. Moreover, the producers share some of the egalitarian logic too: it shows in their emphasis on contributing to the local community and their more small-scale and regional engineering aesthetic. We summarize the sector-specific logics that guide the biomethane producers under the new heading of 'entrepreneur logic'.

5.5.3 Institutional logics mismatch

From 2008 onwards, a large subsidy creates a boost in the number of biomethane projects and, as a consequence, network operators are confronted with requests for injection of this gas into their grid. This is an example of 'structural overlap': previously unrelated organizations are forced into association (Thornton & Ocasio, 2008). Below we describe how the mismatch of logics unfolds in practice for three clusters of competing logics: hierarchical vs. pragmatic decision-making; large-scale vs. small-scale arrangements; and safety vs. efficiency focus.

Hierarchical vs. pragmatic decision-making

A first clash of logics happens between the operation of network operators according to codes and norms on the one hand, and the quick and pragmatic operating style of the producers on the other. Network operators have to explain to producers the rules that govern the gas sector.

Welcome to this world, you are now a gas producer. That also means you now need to have an emergency service, you need to properly settle payments, monitor quality, have a standby service for Sunday morning 4 am. Somebody needs to sit there who can take action. (Nat. network 2, 2012)

From the network operators' first reactions to biomethane injection, it shows that the current system is taken as a given. This means that any new development should meet the standards of this current system.

Biomethane needs to be equal to grey gas. So in the beginning, colleagues wanted to demand that biomethane could only contain those elements that are present in natural gas. (Reg. network/ boundary shaker 1, 2013)

Initially, employees of network operators respond to the idea of biomethane injection by pointing out all the possible problems it could create.

An enormous mountain of objections emerged, of why we shouldn't get involved in all of this. (Reg. network/ boundary shaker 1, 2013)

This rather conservative way of reasoning leads to statements such as: "It is not possible"; "It is not allowed"; "We have always done it this way"; "We do not do things that way"; "I do not have personnel for that" (Reg. network/ boundary shaker 1, 2013). Moreover, new opportunities are at first not taken seriously. Employees expected the interest in biomethane injection to "go away" (Reg. network/ boundary shaker 1, 2013). At the national network operator it was practice for a long time to "hold off biomethane injection". People were afraid biomethane would corrode the pipelines (Nat. network 2, 2012).

There was a time that when you said we were going to inject biomethane, you would pretty much be shot here in the hallway. "We don't want this; it is dangerous for our network." (Nat. network 2, 2012)

Once a number of biomethane injection projects were running on the basis of provisional regulation (ACM, 2009), network operators turned to create protocols and guidelines to standardize this new development. Biomethane had to be completely integrated into the current system and should be treated as any other 'commodity'. As indicated in the Background section, this does not mean that from the farmer's perspective all problems have been solved. The integration of biomethane into the network operators' system could be seen as a form of the 'centralized direction' that characterizes the hierarchist's profile.

In accordance with the policy of Netbeheer Nederland [branche organization of Dutch network operators] we formulated the criteria in such a way that in terms of calorific value and safety, biomethane is no more or less than natural gas. In this way, our people on the ground can just do their job with standard decisions and standard safety equipment, they will not notice anything. (Reg. network/ boundary shaker 2, 2013)

However, the formal decision making style of network operators is at odds with the informal way of operating of producers. The large cultural difference really hampers progress on the projects, because it creates distrust among the parties. A farmer usually uses his family capital to set up his activities and therefore needs to trust his partners before he will invest.

I am at the kitchen table and try to get a taste for what are the issues. At a certain moment, the wife comes in with coffee and the agrarian says “come sit here with us”. Then you know this is a very important moment, because he is putting his private money into this initiative. I have learned this is a very important moment, because somebody talking on behalf of a large company, talks about the company’s money. But a small entrepreneur speaks about his own money. So, if Mother doesn’t want it, it won’t happen. (Reg. network/ boundary shaker 1, 2013)

If the network operators, those energy guys visit the farmer, they arrive with three big lease cars on the property, all three in grey suits. No way the farmer will do business with them. He really doesn’t feel like it. (Boundary spanner 2, 2012)

Both parties’ decision-making system show a mismatch too. Producers like quick decisions on the basis of concrete numbers. However, network operators have extensive structures and protocols to follow, before taking a decision. So producers complain about the complicated and slow, or even ineffective way of decision-making.

They were all enthusiastic and next we got a bedlam⁵ and then it wasn’t fun anymore. Network operators are really strong in this; whenever you make an appointment with one person, you will get six of them. (Boundary spanner 2, 2012)

For example, [reaching agreement about] contracts and prices with energy companies takes months. Whereas for a farmer it is like “shall we do this, yes or no?” (Boundary spanner 2, 2012)

In contrast, this is how a network operator describes their procedures:

5 In Dutch: Poolse landdag

We have an account manager who takes care of client contact and the offer trajectory. And we have a technical team. Every once in a while I discuss the progress with them. Next to that there is a judicial specialist to monitor especially the legal side of the issue. Furthermore, the technical people are also in a national group to help establish coordination in the sector. Also Netbeheer Nederland [branche organization for Dutch network operators] engages in coordination on this issue. (Reg. network 3, 2012)

Meanwhile, network operators prefer to work with a professional organization, instead of a farmer whose core business is not biomethane production.

I find the agricultural sector more difficult and more challenging. For example, in the waste sector organizations have a business development department with a manager. And the manager will come by some time, ask for an offer, you discuss what you are going to do, and what you are not going to do, everybody organizes their own thing. But these small entrepreneurs, for them it is much more difficult to deliver. They are not so organized, or they are organized, but well, during the day he is working with his cows. So you need to help them a bit more, they need more attention. (Reg. network/ boundary shaker 1, 2013)

To improve the interaction, network operators appoint someone as “account manager” (Reg. network 3, 2012). This person is meant to specialize in biomethane projects so that the network operator can learn faster. Moreover, biomethane producers should now have a clear contact point. This response is in line with the hierarchy logic: the account manager has a formal position matching the hierarchical decision-making structure. This is an example of how logics determine the type of answers and solutions that are perceived by the actors (cf. March & Olsen 1976 quoted by Thornton & Ocasio, 1999: 806). However, this approach is not likely to provide a solution for the culture differences and trust issues with biomethane producers, who are used to work in an informal way.

Large-scale vs. small-scale arrangements

Network operators are used to dealing with large scale infrastructure and large quantities of gas. Biomethane projects produce relatively small amounts of gas. This is where a lot of resistance to biomethane injection comes from: “It is much work for very little quantities with potentially many risks” (Nat. network 3, 2012). This is

especially true for the national network operator. The focus on large scale operations precludes fitting in biomethane projects easily and efficiently.

When we step into this type of projects, it just gets too expensive. Whenever we make something according to our standards, it is always meant to be very large, very big quantities, and meant to last for a very long time. (Nat. network 1, 2012)

We had a discussion with the NAM. The idea was to use their pipelines of the small fields for biogas. Can't we transport biogas through those pipelines? "What are you talking about concretely?" Well, about 30 million cubic meters. Answer of the NAM: "Per day?" No, per year. Just to indicate the difference in order of magnitude. That is also what we see with these farmers. (Nat. network 1, 2012)

Moreover, the administrative systems of the network operators are also extensive, especially for the three large regional network operators. Incorporating the physical changes of the gas flow into these systems is another hurdle for biomethane injection.

Same for billing. It sounds simple, gas is being injected and somebody buys it. Easy peasy. Just add and deduct. But when you speak about systems with 3 million clients, such a change is not only very expensive, but also very vulnerable for mistakes. You have to do it right for all your clients at once. That is not so easily done. It is a disadvantage of large companies. You cannot forget anything. So the colleagues who deal with this, these changes caused them quite some stomach aches. (Reg. network/ boundary shaker 1, 2013)

This section shows how the large-scale infrastructure and its accompanying practices influence people's ideas about what is possible or not. The physical infrastructure of the gas sector determines to a large extent the scope of the logics under which network operators function. But apart from the physical possibilities, this section also displays a dislike for small projects and diversity, and conversely, an attachment to large-scale systems. We see here how the material and cultural aspects of the logics are interrelated.

Biomethane projects not only produce relatively small quantities of gas, they are also dispersed geographically. Furthermore, most projects feed into the smallest, local grid. For network operators, this means that their carefully streamlined physical and administrative systems are disturbed. Gas used to flow from the *Groningen* field

all the way down to the customer. Biomethane breaks the monopoly of Gasunie by injecting at the downstream level and by introducing new producers to the system. As a consequence, the traditional gas transporter (Gasunie) no longer wants to be responsible for the gas quality.

Gasunie's sole responsibility for the gas quality could no longer be maintained. Because Gasunie says "well, if farmer Johnson is going to mess around, we are no longer responsible. You know, gas is a craft". (Reg. network/ boundary shaker 1, 2013)

If all biomethane could be injected upstream in the gas grid, there would be no problem. This is what happens with the natural gas from small fields, that also has a different composition than the Groningen gas. It is really the local element that clashes with the current large scale and one-way character of the system. This is another example of how logics determine the type of answers and solutions that are perceived by the actors (cf. March & Olsen 1976 quoted by Thornton & Ocasio, 1999: 806).

I think the big difference is that [small fields] happen upstream, so at the beginning of our network. Then it doesn't matter so much, because you put everything together, it mixes partially and then finally it passes our treatment facilities. ... So that is completely part of our network. And it is also very manageable, those small fields. Whereas [biomethane] happens somewhere in a back alley, so to speak. (Nat. network 3, 2012)

If all biomethane producers would just upgrade the gas and would hand it over at 67 bar in Ommen [upstream point in the grid], there would be no problem whatsoever (Nat. network 2, 2012)

Given their preference for order and control, it seems they resist changes that make their system more complicated. This is true for both the number of grid connections and the (natural) variability of biomethane.

Then you also get statements here like "we don't want to make a porcupine of our network". In other words, our gas network only has a limited number of connections. And if we have to make a connection for everyone that wants to inject in or draw from [the network], that requires a totally different way of managing the gas network. (Nat. network 1, 2012)

Biomethane projects also require the planners of the gas flow to think differently. Whereas their biggest challenge used to be ensuring maximum gas supply on a cold winter day due to very high gas demand for household heating (avoiding a shortage), they now have to ensure the grid does not blow up on a hot summer night (avoiding a surplus) due to too much biomethane injection in combination with too little demand.

This section shows that apart from infrastructural and economic limitations for biomethane injection, the hierarchy logic feeds network operators' resistance. In line with the bureaucratic decision making (Thornton et al., 2012) or procedural rationality (Schwarz & Thompson, 1990), they seem to dislike new things, having to change their ways, to disturb the current order or streamlined system. The hierarchy logic naturally slows down new developments.

Safety vs. efficiency focus

One of the most important goals for network operators is to guarantee the safety and reliability of the grid. Biomethane is perceived as a threat to these principles. The national network operator seems most concerned about the integrity of the grid, i.e. the prevention of damage to their infrastructure (Gasunie, 2006; Leeuwarder Courant, 2007b), whereas the regional network operator seems to be most concerned about the safety of customers.

Network operators sometimes state very boldly, "well, my CEO says: rather go to court 10 times than one dead body". (Government 1, 2012)

In order to facilitate biomethane projects, the network operators came up with provisional regulation (ACM, 2009) based on knowledge available at that point. The criteria in this regulation are rather strict, so as to be 'on the safe side'. These are the criteria that the current projects operate under. In the meantime, the network operators continued to research and fine tune this list of criteria. Some parameters will be relaxed, whereas others are likely to be narrowed down. Also the current projects will have to meet this new set of criteria. This fine tuning is an annoyance to the producers, who object to this moving target.

We decided to play it safe. We demand sterilization of the gas and also a biological filter. Now we are busy checking a number of these filters to see how much bacteria they catch and whether all this is necessary

or whether we could be a little bit more relaxed about it. (Nat. network 3, 2012)

Interesting to observe is that for 'safety' no objective measure or threshold exists. This makes it a very difficult concept for negotiation. However, it is a central concept in this case.

Moreover, producers and network operators disagree on who is responsible for the gas quality at the customer (called 'exit specs'). Network operators want entry specs for biomethane to be equal to the exit specs the customer is used to. Producers think it is the responsibility of the network operator to balance potential differences between entry and exit specs. Moreover, they also explain that gas flows blend and therefore entry specs can be broader than exit specs. Here we see very clearly the mismatch between operation according to codes and norms and applying the strictest criteria versus a type of pragmatic reasoning aiming to secure efficient operations. As Friedland & Alford (1991) wrote, it is a struggle over 'by which institutional logic different activities should be regulated' (p. 256).

A very simple example. The gas from my installation has a temperature of 30 degrees. That is easy, because like this I don't have to cool it down. Then I put it in the network, which is under the ground, and 100 meters later the gas is no longer 30 degrees but 5 degrees. The norm at the customer is, [the temperature] has to be below 20 degrees. So I say, "I can easily inject the gas at 30 degrees, because 100 meter later it has already cooled down". What does the network operator say? "No, not allowed, 20 degrees". (Boundary spanner 2, 2012)

In the end the injection requirements needs to be such that the gas can be transported directly to the people who use it. (Nat. network 2, 2012, emphasis added)

Finally, network operators have difficulties trusting the measurements that farmers share with them (Boerderij Vandaag, 2009c). They are very much aware of the different goals they each pursue and fear that the profit driven producer will jeopardize their own dedication to safety and reliability.

What is difficult is that the whole surveillance mechanism is with the producer and that we need to trust the blue eyes of the producers that all is well and that he works neatly according to the rules. Well, this is

*quite hard, especially when the producer has a strong financial drive.
(Reg. network/ boundary shaker 2, 2013)*

5.5.4 Boundary spanning

Despite the incompatible logics, the pressures to make biomethane injection work are still present, e.g. in the form of a 1 billion euro subsidy grant. We observed that both boundary spanning and boundary shaking activities are employed to create productive working relationships between producers and network operators. We first discuss boundary spanning activities between the different logics and then proceed with boundary shaking activities within the network operators.

Boundary spanning between producers and network operators

We found two different types of boundary spanners. Both boundary spanning initiatives originate within consultancy firms and are led by a consultant. This role of consultants was also observed by Klerkx et al. (2010). We first discuss boundary spanner 1, whose activities include convening, translation, and facilitating collaboration (cf. Tribbia & Moser, 2008). Boundary spanner 1 engages in *convening* and describes what happened when the farmers and network operators first met each other:

The first thing I did,[...] I will never forget. On the right were all the people of the network and energy companies and on the left were the farmers. I could have done my complete presentation naked⁶: they totally didn't see me. They thought, "well, those are the men that have to produce the biogas. Well, and if they don't produce, we don't have a business case. So we need to trust them that they will produce and do it right". And the farmers thought, [...] "well, they need to pay us, otherwise we have a problem". [...] It was not distrust, but they both have such a different focus, such a different core business. And with such a focus it is difficult to sympathize with somebody else's core business and focus. (Boundary spanner 1, 2012)

Due to the differences between the two parties, the next activity of boundary spanner 1 is to literally *translate* the communication.

6 Original quote: *in m'n blote kont*

We were hired to keep everybody together, [...] because an energy man can speak the same language as a farmer, but they don't always understand each other. (Boundary spanner 1, 2012)

In some cases, literally being the translator, really. The farmer talks to me and I translate it into energy language for the energy company, and the other way around. In most cases I was the person overseeing the letters and the communication of the energy company to the farmer. And during conversations, when the energy company worked with abbreviations like specs and Wobbe, then I would translate like "they are talking about this and that". (Boundary spanner 1, 2012)

Finally, boundary spanner 1 aims at achieving productive working relationships by *facilitating collaboration*. Each organization should stick to their trade and when cooperating, these organizations should openly share information and make sure they constantly communicate.

It is also a matter of every man sticking to his trade. A dairy farmer is not a gas guy. That's a very big difference there. And a gas guy is not a dairy farmer, you shouldn't have him hug a cow. It won't work out, so stick to your trade and involve the others. (Boundary spanner 1, 2012)

Boundary spanner 2 has a different approach, including the creation of a boundary organization as well as engaging in translation and mediation activities. From the start, boundary spanner 2 intended the boundary organization to be a bridge between the large-scale arrangements that characterize the energy sector on the one hand and small scale energy projects on the other. Moreover, according to boundary spanner 2 this organization should have a commercial basis, given that it operates between commercial parties. The boundary organization buys biogas from its producer (the farmer) and takes care of the upgrading process. It then sells the resulting biomethane of multiple farmers to the energy company. Thus, boundary spanner 2 aims to remedy the hierarchical vs. pragmatic decision-making gap and the large-scale vs. small-scale gap.

The core of our business plan is that we start a company which will fill the void between biomass and the big energy world; a link between the small scale and the large scale. And moreover, it needed to be a commercial firm. Energy is a commercial world, so you shouldn't put

something like the State in between the biomass business and the energy business. (Boundary spanner 2, 2012)

So whereas boundary spanner 1 aims to bring the various parties together and attempts to ensure a smooth process, boundary spanner 2 circumvents direct interaction between farmers and network operators. The new boundary organization stands between the two parties and the boundary spanner contacts each side separately. Farmers and network operators no longer meet each other in person.

The *translation* activities that boundary spanner 2 engages in go beyond the literal translation mentioned above. The boundary spanner adapts to each actors' way of doing business, taking on a different attitude and outfit for every actor. This includes very down-to-earth things such as matching clothing style and car brand as well as knowing how the farmer makes his calculations. These activities are underpinned by a thorough understanding of the different socio-cultural part of the logics.

What I enjoy very much, when I go to our customers, to our farmers, then I look like this [comfortable pullover]. When I go talk with the network operator, I get my grey suit out from the closet. (Boundary spanner 2, 2012)

I have a space wagon, a Chrysler Voyager, and that is a big car, but luckily a bit indefinable for people, it is not a Mercedes. I have experienced a farmer passing by my car, looking, and saying "Chrysler". And I had seen his car and said "Mercedes". That was all we needed to say about this topic. Just those two words. Energy firms don't have this understanding of the agricultural sector. You need to be willing to connect these two worlds. You need to be able to turn the switch: now I am like this and now I am like that. (Boundary spanner 2, 2012)

Boundary spanner 2 also aims to achieve productive working relationships through *mediation*. By presenting the network operators with the entrepreneur logic guiding the producers, the network operators are challenged to reconsider their practices or at least to provide arguments for these practices.

In terms of success, both boundary spanners increase the amount of mutual understanding. At the same time, this seems to be a more important aim for boundary spanner 1 than for boundary spanner 2. Because it is not expected to solve the logics conflict once and for all (cf. O'Mahony & Bechky, 2008), both boundary spanners more realistically aim for a productive working relationship. Both types of boundary

spanning seem to have created such a relationship. However, various contentious issues remain.

The interview quotes above show that in-depth knowledge of the two parties' institutional logics and strong interpersonal competencies are required for successful boundary spanning. These enable the boundary spanners to translate, facilitate collaboration, and mediate between the different logics.

Boundary shaking within the network operator

We also found boundary spanning activities *within* the network operators' organizations, resulting from the ambition of their top-management to integrate biomethane into the grid. Both network operators employed professional change managers with experience in the energy sector to address the issue of biomethane injection. While network operators present a very male-dominated technical environment, in both cases the change managers were women. For two network operators it proved crucial to work closely with their technicians on the ground to make the implementation of biomethane injection successful. Whereas one boundary shaker started by interviewing all kinds of people in the organization to gather a bottom-up view of all issues to be tackled, the other boundary shaker's innovation department designed top-down instructions for their employees. The latter boundary shaker eventually had to take a more bottom-up approach too, to guarantee a successful incorporation of biomethane injection into the organization. This is in accordance with Kislov's (2014) remark that top-down boundary spanning may be less successful than bottom-up initiatives.

The bottom-up project dealt with finding out the technicians' *agendas and issues* (Balogun et al., 2005).

I really sat down next to people to see how things are being done. And ask: how do you do that, how does it work, why can't we do it this way? It was not sufficient to ask: hey, organize that for me. I went to get coca cola many times. I really visited these people, sat next to them. Until the point they would do what I asked of them. (Reg. network/ boundary shaker 1, 2013)

The next step involved *convincing people* that the change initiative was not in contradiction with their agendas, but could be accomplished within the set of limitations they faced. Therefore, the boundary shaker helps people to become aware of alternative options (Greenwood & Suddaby, 2006).

People say: I don't have personnel for that, or I first need to organize time for that. And then I say: well, then you hire people. That is something people often don't think about. (Reg. network/ boundary shaker 1, 2013)

Getting everybody along and moving towards pragmatic thinking instead of just mentioning all the risks and trying to cover them all. But really consider, which risks do we really face, what is the probability of that effect and which risks do we then need to tackle? (Reg. network/ boundary shaker 2, 2013)

The help of a senior expert was required to convince people of the change initiative. It must be someone who believes in the new development and will convey the story to the employees. This is an example of *stage management* (Balogun et al., 2005).

The boundary shakers presented above show all important characteristics of boundary spanners: good networking skills, effective interpersonal competencies, and ability to create trust (Williams, 2002). The creation of trust might be the crucial element in this case, as the following quote demonstrates.

I think it works when you emphasize the soft side, I think that is the key. If people don't feel like it, they won't do it; when people feel trust, they will do it. That's why I put a lot of attention to this soft side. I mean, anybody can find numbers. (Reg. network/ boundary shaker 1, 2013)

In sum, we have observed different types of attempts at bringing the different sectors and logics together. Our observations show that the logics that people operate under have some latent flexibility and that people can become enthusiastic about new initiatives. However, a convergence of logics is unlikely to occur and the result of the boundary spanning will be partial truces and settlements. Still, these results go beyond what can be achieved by just bringing people together and exchanging 'factual' information. Therefore, 'pragmatic system builders' may indeed be necessary to create 'stepping stones' between niche and regime (Smith, 2007) to skillfully address conflicting logics. Transitions may require people to get in touch with other logics, change their mind and practices, and so open up new avenues for change.

5.6 CONCLUSION

This study shows that mismatching institutional logics between gas network operators and biomethane producers complicate the integration of biomethane into the grid.

Whereas network operators function under a hierarchy logic, biomethane producers operate under a divergent entrepreneur logic. Forced into association through a renewable energy subsidy, difficulties arise when the two parties get into direct contact. So when farmer Johnson meets the network operator, friction occurs regarding the goals pursued, decision-making style, and the scale of operations. These frictions slow down biomethane injection projects. Moreover, the frictions contribute to the fact that a very large part of the allocated subsidy is not spent, because many biomethane projects have not been realized.

We observed that boundary spanners address this situation of mismatching logics. With their activities they help to bridge the gap between logics. Essential elements of their strategy are convening, translating, facilitating collaboration, and mediation. In one case this involved the creation of a boundary organization. While increased mutual understanding between biomethane producers and network operators is part of the result, this does not automatically lead to productive working relationships. The logics mismatch will probably never be solved completely.

Moreover, we found 'boundary shaking' occurs within the organization of the network operator. This involves finding out employees' agendas and issues, convincing the employees of the change initiative, and using stage management strategies. Here, the creation of trust is a crucial element. Both boundary spanners and boundary shakers are people that have a thorough understanding of the logics guiding all parties involved and that employ effective interpersonal competencies.

5.6.1 Contribution to the sustainability transitions field

With this research we address the question what niche-regime interaction looks like. For this purpose we used the institutional logics approach, which proved a valuable approach to study the confrontation of niche and regime actors. This approach is different from most other studies that have taken a more meso-perspective. Putting on a logics lens enhances our understanding of why transition processes tend to be slow. The existing logics influencing the different actors may leave very little room for the change that is necessary for a transition, given the embeddedness and stability of logics in both thinking and acting. The institutional logics approach is particularly useful to study how physical infrastructure shapes actors' thinking and acting, and vice versa. The dynamics of logics over time and the factors that contribute to convergence or divergence are a topic for future research. Moreover, research with a longer timeframe can investigate to what extent the changes in the regime are temporary or are being institutionalized (Fuenfschilling & Truffer, 2014).

Our analysis of boundary spanning activities adds to insights into agency in transition processes, a prominent topic in the sustainability transitions field (e.g. Farla

et al., 2012). Boundary spanning activities are one way in which individuals can purposefully contribute to change processes. The boundary spanning activities we identified play a central role in the contact between niche and regime. Boundary spanning may encourage the opening up of the regime to novelty. The case shows that when different sectors are forced into association, boundary spanning happens at multiple points in the socio-technical system. The subsidy that causes the structural overlap sets in motion a 'ripple effect': it creates frictions both between sectors with different logics and within organizations. For each of these ripples dedicated boundary spanning or shaking activities are necessary. Future research can identify fruitful strategies to create productive working relationships between new and old actors as well as institutional change. More research into boundary spanners' activities, skills, and challenges will increase practitioners' ability to create and exploit transition opportunities.

This study also shows the crucial role of infrastructure in the energy transition. Previous research has called for more attention to the role of infrastructure in the development of new technologies (Loorbach et al., 2010). This paper shows that the gas network operator functions as a 'gate keeper' (Lieberherr & Truffer, 2015) and therefore is an actor that merits more attention. The case discussed here adds insights into the functioning and challenges of the gas sector when it comes to integrating renewable energy technology (see also Goldthau, 2014).

5.6.2 Policy recommendations

In the case discussed in this paper, we perceive a clear mismatch between the subsidy policy and the socio-technical system. The subsidy sets in motion various biomethane projects, but due to the characteristics of the gas network a substantial part of the subsidy will not result in increased biomethane production. Therefore we claim that to increase renewable energy production, policies should not only be aimed at the new technology. Additional policies should be directed at the existing regime actors that need to accommodate the new technology. This asks for dedicated policies and for this a comprehensive understanding of the sector at hand is necessary. However, while a dedicated regulatory framework that stimulates the integration of biomethane into the grid will facilitate niche-regime interaction, it will not erase all logics mismatches. To deal with these issues, boundary spanners are essential. Therefore we expect a large demand for skilled actors and smart boundary spanning strategies to forge productive working relationships during the phase that renewable energy technologies are scaling-up and are confronting regime actors.

A black and white photograph of a hand moving a chess piece. The hand is positioned at the top, with fingers gripping a dark chess piece. The piece is being lifted from a chessboard. In the foreground, a white chess piece is visible, and other pieces are blurred in the background. The lighting is soft, creating a contemplative mood.

Niet alles kan veranderen, niet alles kan hetzelfde blijven
(Not everything can change, not everything can stay the same)

Freely adapted from Luuk van Middelaar

Chapter

6

Conclusion & discussion



6.1 CONCLUSION & DISCUSSION

This thesis creates a comprehensive understanding of the interaction between incumbents and institutions in transition processes by applying two streams within institutional theory to this interaction. The stream of institutional work highlights agency: the ability of actors to influence institutions. The institutional logics stream focuses on how these actors are also being influenced by institutions. Both streams of institutional theory highlight a different side of the interaction between incumbents and institutions. The following sections in turn address how incumbents influence institutions, and how incumbents are influenced by institutions.

6.1.1 How incumbents influence institutions: institutional work

An overall finding of this thesis is that incumbents engage in all three types of institutional work: maintaining/defending, creating, and disrupting institutions. This contrasts with various bodies of literature which suggest that incumbents predominantly aim to defend the status quo, while new entrants typically are responsible for change (Geels & Schot, 2007; Hockerts & Wüstenhagen, 2010). Accordingly, we expect incumbents to engage in maintenance work and new entrants to engage in institutional entrepreneurship or disruptive institutional work (Greenwood & Suddaby, 2006; Levy & Scully, 2007, Van Wijk et al., 2013). Furthermore, incumbents' institutional work activities contribute to institutional change that is aligned with incumbents' institutional preferences.

In Chapter 2, 3, and 4, this thesis has analyzed in detail how incumbents maintain, create and disrupt institutions through institutional work. In this section, we synthesize the most important findings of these three chapters, illustrating that in all cases incumbents employ similar institutional work activities to influence institutions.

Firstly, incumbents closely participate with government to influence institutions. In all cases we find that incumbents take part in the relevant governmental decision-making structures. Incumbents also tend to be involved in policy making from a very early stage. In the biofuels case (Chapter 2), incumbents actively participate in the establishment of sustainability criteria for biofuels in the Cramer Committee and the Corbey Committee. The lighting incumbent in the LED case (Chapter 2) works on efficient lighting through the government issued Taskforce Lighting. The bottle deposit case (Chapter 3) shows how government and industry together conduct research into the various options available to address the litter and plastic waste issues. Gas sector incumbents in Chapter 4 explicitly state that their aim is to 'think along with government about stimulating policy' (Platform Nieuw Gas, 2005). They do so in the Platform New Gas, in its successor organization Biomethane Netherlands, and

in the Interdepartmental Acceleration Team. In short, incumbents act as a partner of government.

To accentuate the characteristics of incumbents' institutional work activities, we compare them to those of new entrants. Chapter 4 shows that in the field of biomethane, new entrants rather relate to the government on an ad hoc basis: solving issues one by one. Moreover, they enter the policy process at a much later stage. This diminishes their influence on the process, e.g. to the specifics of one particular regulatory decision as opposed to influencing the broader regulatory framework.

Secondly, incumbents always provide an alternative institutional setup to the current or proposed setup in order to influence institutions in their favor. We observe that in all three types of institutional work incumbents take initiative and propose their preferred plan or solution to government. For institutional entrepreneurship this is the main part and main goal of the activities; for maintaining and disruptive institutional work, providing an alternative is a means necessary to either maintain or disrupt existing institutions. The provision of an alternative institutional setup in all three types of institutional work underlines the crucial importance of incumbents' proactive stance in achieving institutional change. It is not sufficient to argue against a new or existing institution, an alternative plan is required to foster institutional change.

On several occasions, the gas incumbents in Chapter 4 provide action plans to foster a biomethane market, including proposals on how to fund these plans. In Chapter 2, the lighting incumbent proposed a ban on traditional light bulbs, while pointing towards compact fluorescent light (CFL) as more energy efficient. In the same Chapter, the oil incumbent strongly encouraged the formulation of sustainability criteria for biofuels. It is also the packaging industry (Chapter 3) that proposed to set up the Plastic Heroes system to collect all plastic waste from households. This initiative created an alternative to the existing bottle deposit system and thus contributed greatly to the abolishment of the bottle deposit system.

Incumbents have a much more proactive approach than new entrants. In the biomethane case (Chapter 4), new entrants' input into policy making often has the form of a request. They direct government's attention towards a particular problem they experience and ask for support, rather than providing a comprehensive alternative institutional setup.

Thirdly, incumbents very skillfully frame their interests in order to influence institutions. Framing entails '[depicting a] preferred institutional arrangement as appealing to the widest possible audience' (Pacheco et al., 2010:990). We found that statements do not necessarily concern sets of institutions, but can also concern *the technology that requires institutional change* for its development. Framing is meant to influence institutions, but institutions are not necessarily mentioned in the framing. In fact, the essence of framing for an actor is not to promote its interests directly, but to translate

them into different terms. Moreover, in our cases, framing also includes depicting a certain institutional setup or technology as *undesirable* to the widest possible audience. This negative framing happens in the biofuel, LED, and bottle deposit cases, where incumbents wish to prevent changes to the status quo (i.e. introduction of LED and biofuel) or actually wish to change the status quo (i.e. abolishment of bottle deposit system). These findings show that in our cases, framing entails: ‘depicting an institutional arrangement or technology that requires institutional change as appealing or undesirable to the widest possible audience’.

We emphasize two key insights on framing that hold for each type of institutional work: creating, maintaining, and disrupting institutions. Most importantly, incumbents successfully translate their private interests in terms of public policy goals and/or broader societal beliefs, i.e. into legitimate interests. The framing of incumbents’ interests always fits to government’s concerns or aims, such as promoting sustainability, energy efficiency or cost efficiency. This way, incumbents make sure that their frame is perceived as relevant by government, i.e. incumbents achieve ‘frame resonance’ (Hung & Whittington, 2001). This enhances the legitimacy of their proposals and increases the likelihood of the proposed institutional setup being implemented. Incumbents are able to create this frame resonance because they are very knowledgeable about the issues government is working on and the goals government pursues.

The biofuel case (Chapter 2) shows how incumbents relate to the Minister’s concerns about the sustainability of biofuels. In the biomethane case (Chapter 4), gas sector incumbents highlight the energy- and cost-efficiency as well as the economic potential of biomethane. The packaging industry also emphasizes the higher cost-efficiency of the Plastic Heroes system compared to the bottle deposit system (Chapter 3).

In contrast, Chapter 4 on biomethane shows that new entrants translate their interests into a weaker frame. Entrants emphasize the contribution of biomethane to their own sector (e.g. agriculture) rather than the Dutch economy as a whole.

In addition, incumbents carefully steer attention towards particular aspects of an institution or technology. So apart from translating private interests into public interests, framing also highlights certain aspects of an institution or technology, thereby downplaying others. The steering of attention is present in all three types of institutional work. On the other hand, we observe differences in the framings’ discursive content, i.e. tone and focus of attention, depending on the type of institutional work. Attention can be directed towards positive or negative aspects, as well as towards a new or existing institution or technology. In the case of institutional entrepreneurship (i.e. creating institutions) (Chapter 4), incumbents steer attention towards the *positive* aspects of a *new* institution or technology. For instance, in Chapter 4 gas incumbents state, “The goal for biomethane is to become a substantial contribution

to a sustainable energy system, and thus to provide a strong competitive position for Netherlands Inc.” (Topteam Energie, 2012). This frame appeals to the desirability and legitimacy of a sustainable energy system and a strong economy, which is shared by a wide audience. To maintain and defend institutions (Chapter 2), incumbents highlight the *negative* aspects of a *new* institution or technology. The lighting incumbent stresses that “LED does not yet provide a good alternative for the fluorescent tube” (De Telegraaf, 2009, 2010; ANP, 2010), while the oil incumbents emphasizes that “The necessary tax exemptions [for biofuels] are too costly for the government” (De Telegraaf, 2003). In these two examples, the incumbents’ framing is appealing to a wide audience because it relates to the legitimate idea that as a consumer you do not want to buy inferior products, and that government has to spend tax money wisely, respectively. To disrupt institutions (Chapter 3), incumbents focus on the *negative* aspects of an *existing* institution or technology. The packaging industry states that “Deposit bottles represent only 5% of total plastic waste; for this mere 5% we run a complex and very costly deposit system” (de Volkskrant, 2012). This framing appeals to the widely-shared idea that costs are only legitimate if they are outweighed by the benefits. In addition, in maintaining and disruptive institutional work, incumbents speak positively about the new institutional setup they propose.

In short, for all three types of institutional work it holds that incumbents are very skillful in portraying the positive aspects of what they are in favor of, while contrasting these positive aspects with the negative aspects of what they are against. This complicates a straightforward comparison of the alternatives by policy makers and the public. These patterns are reflected in incumbents’ proposals for alternative sets of institutions, in their research reports, and in their contact with the wider audience through the media.

Again we observe differences between incumbents’ and new entrants’ framing patterns. While the new entrants in Chapter 4 do mention the benefits of biomethane for the agricultural sector, a large share of their framing has a negative tone. They highlight the problems the new technology encounters, such as negative effects of new regulations.

Fourthly, incumbents conduct or commission research to influence institutions. The examples below illustrate how research outcomes are important input for ongoing policy discussions. Moreover, the research outcomes are used in framing and in addressing the wider public.

In the biofuels case in Chapter 2, the European oil and automotive industry together with the EU Joint Research Centre published research showing that blending of biofuels for transport would lead to higher emissions than the use of conventional fuels. The outcomes of this research provided the default values for biofuels emissions in the EU Renewable Energy Directive.

In Chapter 4, incumbent associations in the gas sector conducted research highlighting that biomethane is cheaper to produce per kWh than wind energy. Moreover, the national gas network operator commissioned research highlighting that biomethane is indispensable to meet the Dutch renewable energy targets. These studies contributed to increased government support for biomethane, including production subsidies. Regarding the bottle deposit system (Chapter 3), the packaging industry commissioned and conducted a range of research reports over the years, which all point at the relatively high costs of the deposit system compared to alternative systems. In combination with the development of an alternative system for plastic collection and recycling, these research outcomes convinced the Minister the bottle deposit system could be abolished.

In the bottle deposit case, the choice of research setup tends to benefit the outcome that supports the industry's position. If the outcome did not support their preferred alternative, the research was not used as an instrument in their institutional work (Chapter 3).

In all cases, cost-efficiency is the dominant decision criterion. This cost-efficiency frame resonates with government's decision making, which often follows a market approach. However, the determination of costs and benefits is not self-evident, leaving room for a particular representation highlighting some costs and benefits and downplaying others (Rossi, 2004; Stone, 2012). In the bottle deposit case, for instance, the monetary costs and environmental benefits of the deposit systems are heavily debated.

Chapter 4 shows a clear difference between the research activities of incumbents and new entrants. Whereas incumbents conduct studies or commission research at renowned research institutes, new entrants rely on research reports carried out by other organizations.

Finally, incumbents speak through the media to influence institutions indirectly. Public opinion functions as a framework that indicates which policy decisions will be perceived as favorable and which as unfavorable. The more public opinion is aligned with the incumbents' preferred institutional setup, the more difficult it becomes for policy makers to decide otherwise. Therefore, incumbents aim to influence public opinion before important policy decisions, i.e. during policy windows. Thus, influencing public opinion contributes to influencing policy making. Chapter 2 shows how the incumbent tried to delay the LED market by influencing institutions on LED lighting, warning consumers against LED products introduced by other firms. In the biofuels case, incumbents influence institutions on biofuel blending by voicing their arguments against biofuels in the media. For instance, the Dutch oil industry argued that the biofuel import required to meet EU biofuel targets would lead Dutch tax money to flow abroad. In Chapter 3, the packaging industry attempts to shape institu-

tions regarding the bottle deposit system, e.g. by arguing that it is the responsibility of consumers and not of the industry to prevent plastic bottles ending up as litter in the streets. In the biomethane case incumbents speak extensively about biomethane through the media, thus influencing institutions regarding biomethane development. Biomethane is said to contribute substantially to a sustainable energy system and to the Netherlands' competitive position. In both the biofuels and bottle deposit cases, we observe a sharp increase in incumbents' efforts to affect public opinion through the media during policy windows. This also holds for the biomethane case, but only until the moment government adopted the biomethane agenda.

Incumbents use the media in a much more strategic way than new entrants. Chapter 4 finds that incumbents' messages appear in more prominent media outlets during policy windows and are aimed at creating legitimacy for new institutions or technology. New entrants rather inform their peers about policy outcomes in agricultural newspapers.

In conclusion, we have mentioned five main activities that hold for all types of institutional work, whether it is aimed at maintaining, creating, or disrupting institutions. Incumbents influence institutions by closely participating with government, providing an alternative institutional setup, framing their interests, conducting research, and shaping public opinion. The main difference observed in this thesis' cases is related to the discursive content of the activities. Each type of institutional work features differences in the framing's tone and focus. The different tone and focus are then reflected in the research incumbents conduct and the contact with the wider audience through the media. Moreover, the provision of an alternative institutional setup plays different roles in the three types of institutional work; for institutional entrepreneurship it is the main goal, whereas for maintaining and disruptive institutional work it serves as a means.

Through these institutional work activities, incumbents influence their institutional environment to fit their preferences. Incumbents thus actively shape the institutions that matter to sustainability transitions.

6.1.2 How incumbents are influenced by institutions: institutional logics

The literature on institutional logics highlights how incumbents are being influenced by institutions. It sheds light on *why* incumbents behave the way they do in transition processes. This stream within institutional theory provides new insights into why niche-regime interaction is often problematic.

Chapter 5 addresses this question by looking at how institutional logics enable and constrain the behavior of incumbent network operators towards biomethane. We find that the hierarchy logic under which network operators function, limits the

network operator's range of possible behavior towards new practices, in this case biomethane. Important elements of the hierarchy logic in this case are: operation according to the Gas Law, responsibility for safety and reliability, and a preference for large-scale arrangements.

Firstly, the Gas Law and associated codes and norms prescribe what type of activities network operators are allowed to employ and go into detail as to what materials should be used for these activities. For new practices, prescriptions are often lacking. Therefore, the new practice will at first be judged by existing norms. Moreover, the prescribed decision-making procedures make that network operators have a hierarchical and formal decision-making style. In practice, the legal prescriptions mean that network operators are not able to integrate new practices in a flexible way.

Secondly, network operators' responsibility for safety and reliability of the gas provision stemming from the Gas Law has a major impact on their behavior. Their responsibility results in risk-averse behavior in the form of conducting studies, coordination with other network operators, and sometimes starting court cases. Network operators are inclined to refuse new practices unless they know for sure there are no risks.

Thirdly, the influence of existing infrastructure shows in the hierarchy logic's preference for large-scale arrangements. Network operators have always dealt with large quantities of gas in a centralized infrastructure. All infrastructure needs to meet very strict safety and quality standards and therefore requires large investments. These investments are only justified in cases of large gas flows and are not feasible for decentralized and small inflows of (renewable) gas. Therefore, network operators strive for a simple and uniform physical infrastructure as well as administrative systems.

The hierarchy logic has particular consequences for the way in which network operators deal with transition processes. If network operators are being confronted with new practices that are not aligned with the institutional logics guiding network operators, they face difficulties in accommodating innovative practices. The transition process will only proceed smoothly if the innovative practices match the network operators' hierarchical and formal decision-making, do not hinder the provision of safety and reliability, and entail large flows of energy. However, many innovative practices in the fossil fuel system are at odds with the hierarchy logic. For instance, new practices are often characterized by pragmatic decision-making and small-scale arrangements.

Having insight into the institutional logics that guide network operators brings us an enhanced understanding of why they tend to hold on to existing practices, have difficulties accommodating new practices, and why they prefer certain types of solutions. Chapter 5 shows that resistance against biomethane by the network operator is

often based on concerns stemming from existing institutional logics, rather than on strategic activities to protect their interests.

6.2 PRACTICAL IMPLICATIONS

There is a serious group of companies that have a voice that is much louder, that is better funded, that operates much more in unison and that is still stuck in the technologies and the fuels of yesterday...

So if we don't have a voice that is equally as orchestrated with arguments that are at least equally as compelling, then governments are going to be taking very timid decisions and they're not going to be tipping the scale.

Christiana Figueres, Executive Secretary of the UNFCCC. Address at the Carbon Disclosure Project's Global Forum. New York, 14th September 2011.

6.2.1 Implications for sustainability transitions

The institutional work activities incumbents employ contribute to institutional change that is aligned with the incumbents' interests. Given that institutions and institutional change are a crucial part of sustainability transitions, incumbents exert a considerable influence on the unfolding of sustainability transitions. For instance, Chapter 4 shows that institutional change driven by gas sector incumbents' institutional entrepreneurship results in a shift from electricity to gas production and to an increase in the scale of installations. This means conditions have become unfavorable for new entrants with small-scale installations, such as farmers. The institutional logics that guide incumbents influence for a large part what type of solutions and related institutions will be pursued. For instance, this thesis shows how network operators are likely to pursue solutions that involve large-scale arrangements, perfect control of safety and reliability, and that fit a hierarchical decision-making style. In sum, Chapter 4 shows that incumbents are much more successful in achieving institutional change than new entrants. Therefore, in the absence of other powerful (societal) actors advocating institutional change supporting sustainable innovations, it is to be expected that sustainability transitions will evolve along the lines of solutions preferred by incumbents.

6.2.2 Implications for policy makers

Policy makers wish to engage incumbents in sustainability processes, because of incumbents' large potential contribution to a sustainability transition. However, it is not easy to steer incumbents in a particular direction. First, they are embedded in the institutional logics of a particular socio-technical system, which largely guide their activities. Second, incumbents are very skillful at influencing institutions. This thesis shows that incumbents have a large influence on policy makers. Therefore, incumbents are a force to be reckoned with.

For government it is key to develop its own vision and concrete plans regarding renewable energy production. Incumbents' input through institutional work can then be evaluated against these plans.

Policy makers should always think through the effects of the incumbents' proposals on the development of new technologies or transition processes, rather than follow the incumbents' framing. Namely, incumbents can 'hinder by cooperation' (Dutch: *meestribbelen*): the wording of their framing points in another direction than the consequences of the proposed course of action. In relation to framing, policy makers should ask themselves what issues, solutions, or worldviews are left out in a particular frame. Similarly, in relation to research, policy makers should also question the assumptions, criteria, and indicators used to draw conclusions on a particular technology or institutional setup.

Apart from incumbents' proposals, policy makers should actively collect and consider other proposals and scenarios from other, probably less prominent actors. All scenarios should then be weighed against government's vision.

Incumbents can be a valuable partner for policy making if a new technology is expected to become their core business in the near future. This thesis shows incumbents are strong at achieving institutional change and may thus help government reach its sustainability goals. On the other hand, policy makers should be aware that incumbents' involvement does not necessarily lead to results on the ground, e.g. increased renewable energy production. Incumbents do not necessarily have connections with the sectors and actors that are supposed to contribute to the sustainability transition. In fact, innovative solutions may come from these other sectors and actors, such as for the integration of renewable energy into existing infrastructure. Therefore, it is key for policy makers to keep the initiative throughout the transition process and keep measuring incumbents' input against the input of other actors and against their own vision and plans.

Finally, policy makers should study the institutional logics that guide incumbents' behavior. Insight into why actors behave the way they do is the starting point to draft plans for changing this behavior and promoting sustainability transitions. Policy

makers are in the position to change formal institutions guiding incumbents and thus to facilitate new practices.

6.2.3 Implications for new entrants

Above we have shown through which types of activities incumbents are successful at achieving institutional change. It remains an open question to what extent these activities are also suitable and effective for new entrants to pursue their interests. A number of activities can potentially be translated towards the context of new entrants. First of all, new entrants could put more efforts in creating a frame that is appealing to a wider audience. If possible, this framing should have a positive tone. Second, new entrants could also put more efforts in building support among a wider audience. They can do so by targeting regional and national media. Third, to change institutions according to their preferences, new entrants could take the initiative and propose a comprehensive alternative institutional setup rather than target institutions individually. After all, to change a particular plan, it is not sufficient to oppose it. Fourth, new entrants could organize among actors with similar interests and find common policy goals. Speaking on behalf of a larger group of actors may increase their impact. Again, in the context of new entrants, the feasibility of these activities remains uncertain. The elaborate activities and the particular skills involved in institutional work do not necessarily match with the daily activities and skills of new entrants. Therefore, new entrants would do well to hire their own professional lobbyists. Due to their skills, experience and connection to the political arena, professional lobbyists could better tune the institutional work to the political reality and thus better advance new entrants' interests.

6.3 LIMITATIONS AND FUTURE RESEARCH

The findings of this thesis emphasize the importance of incumbents and institutions in the development of sustainability transitions. Incumbents are very skillful at influencing institutions that influence the transition process and that meet their preferences. At the same time, incumbents' behavior is also guided – constrained and enabled – by the institutional logics of their institutional environment. An important contribution of this thesis is thus an improved understanding of the interaction between incumbents and institutions in sustainability transitions. However, this thesis is also confronted with a few limitations. This section discusses these limitations and suggests avenues for future research.

First, collecting data on incumbents' behavior is complicated due to the politically and economically sensitive nature of the topic. In a research field with powerful actors advancing large interests, much of the data contains a strategic component. Especially interviewing incumbents' strategically oriented PR and lobbying professionals results in data that has been framed to portray the incumbents' behavior in a particular light. In turn, new entrants are sometimes very careful in providing detailed information about incumbent behavior they experienced for fear of hurting their own interests, or they may overstate the incumbent's influence on the development of the innovation they work on. Since part of our research is explicitly focused on framing by incumbents, these interviews are considered to provide additional insights into incumbents' framing and are considered an appropriate element in our data collection method.

We have chosen to combine the interviews with a large variety of publicly available data, such as legislation and regulation, policy documents, industry reports and websites, and newspaper articles. Relying on these sources improves the validity and reliability of this research. In addition, interpretation of the data is greatly improved by studying a particular case over a longer time-frame. Creating a timeline of events allows the researcher to observe changes in actors' behavior and framing (note the analogy with our implications for policy makers).

A remaining shortcoming is that the data does not capture if and how incumbents take a hard line or strike a bargain behind closed doors. In any case, such activities would be very hard to document in a scientifically sound way without direct access to these meetings. The results of this thesis emphasize the more or less public activities of incumbents, and are therefore able to illustrate how incumbents openly influence institutions, e.g. by communicating via media outlets. An avenue for future research would be to conduct ethnographic research through for instance participant observation in various branch organizations related to the fossil fuel system or the transition to more renewable energy production. Such research could provide additional insight into the actors' decisions and considerations.

Second, the outcomes of this thesis related to institutional work may very well be generalizable to incumbent actors beyond the context of the fossil fuel system. Also in the food and transport sector, powerful incumbents are present and are expected to employ similar strategies. We expect these types of institutional work to be employed by private and profit-driven actors that provide products and services fulfilling basic human needs. However, this research does not suggest that other types of actors will be as successful if they were to copy these institutional work activities. Especially new entrants will not necessarily be able to imitate the incumbents' activities or success. Therefore, additional research is required that investigates what strategies are suitable for new entrants to advance their interests through institutional change.

Furthermore, future research may investigate in more detail how exactly institutional change (fueled by incumbents) affects sustainability transitions. Chapter 4 makes a first attempt at measuring the effect of institutional change on the number and scale of biogas installations.

Finally, the outcomes of this research regarding the role of institutional logics in understanding incumbent behavior are not necessarily generalizable to other incumbent actors. The hierarchy logic guiding network operators may not be representative for the logics guiding other types of incumbent actors in the energy sector. Network operators are non-profit public entities that have to offer transport services to any customer for tariffs set by the government. In this sense, network operators are very different entities from energy companies, which are private and profit-driven. While there are important differences between these types of incumbents, there are also similarities in terms of the large scale of their operations and their preoccupation with safety. However, what exactly the institutional logics for other incumbent actors entail and how they compare to the logics guiding network operators, is a topic for further research.



Summary/Samenvatting



SUMMARY

The current fossil fuel-based energy system creates a number of pressing sustainability problems: fossil fuels greatly contribute to climate change as well as local air pollution. Moreover, oil resources are finite, which is problematic due to the wide range of ubiquitous materials that are based on oil, such as plastics. In sum, the current system in which we use fossil fuels (hence: fossil fuel system) for the purpose of energy and materials production is in need of a fundamental transformation. Such a sustainability transition entails significant changes to the socio-technical system that provides energy through fossil fuels. More specifically, it requires an energy transition towards renewable energy technologies and towards more efficient use of energy.

Governments have recognized the need to reduce the use of fossil fuels and have decided upon targets to stimulate renewable energy technologies to address the above mentioned issues. To fulfill these targets, several renewable energy sources are available, such as solar energy, wind energy, geothermal energy, biomass, and hydro power.

However, while the production of renewable energy increases, this does not mean the role of fossil fuels in energy and materials production automatically decreases. In fact, the fossil fuel industry is still expanding and in recent years has started exploring and exploiting more polluting and more dangerous unconventional fossil fuels, such as tar sands, shale gas, deep sea oil reserves, and Arctic oil. In sum, we are presented with a paradox: despite the societal need, the targets set by policy makers, and the availability of renewable energy technologies, the fossil fuel system keeps expanding into increasingly unsustainable directions. This raises the question of why it is so difficult to move away from fossil fuels.

To answer this question, this thesis focuses on both institutions and incumbents in the energy transition. The fossil fuel system is aligned with an extensive set of rules that guide our society and economic system. The rules that both enable and constrain our behavior and provide meaning to our society are also referred to as *institutions*. Relevant institutions for the fossil fuel system are fuel quality norms, energy taxation, and safety standards. Moreover, also ideas about what is legitimate or logical are relevant institutions. An important characteristic of institutions is that they provide stability and resist change. Therefore, the energy transition is not only a technological problem, but also requires the transformation of an enormous amount of institutions. However, institutional change is a difficult process.

Incumbents have traditionally been part of the fossil fuel system and therefore have extensive vested interests. These interests are the result of investments in infrastructure assets and competencies related to fossil fuel exploration, production,

distribution, and sales. Incumbents stand to lose a large share of their potential profits when energy production shifts towards renewable energy technologies. Therefore, it is likely that companies will attempt to protect their fossil fuel interests. Moreover, the sheer economic value of the fossil fuel system and its strategic importance for society make that incumbents are also actors with substantial political influence.

Little attention has been paid to how incumbents influence institutions. This may be a crucial relationship in transition processes. Namely, if institutions provide stability to the fossil fuel system and incumbents are powerful actors, able to influence these very institutions, this implies that the stability of the regime is also partially dependent on the active support of powerful actors. Therefore, transitions cannot be fully understood by accepting institutions as 'given', but an investigation of how exactly incumbents contribute to the stability and change of those institutions is needed.

Building on the centrality of the interaction between institutions and incumbents in transition processes, this thesis asks the following question:

- How do incumbents and institutions interact in sustainability transitions?

On the one hand, given the importance and persistence of institutions, this thesis studies how incumbent behavior is influenced by institutions. On the other hand, actors do not only react to institutions, they also shape them. Reflecting this two-way relationship between incumbents and institutions, two sub-questions were formulated:

- How do incumbents influence institutions?
- How are incumbents influenced by institutions?

The theoretical framework for this thesis builds on two streams in institutional theory. The first sub-question is addressed through the lens of *institutional work*. The stream of institutional work studies 'the purposive action of individuals and organizations aimed at creating, maintaining and disrupting institutions' (Lawrence & Suddaby, 2006: 215). Institutional work activities are mostly discursive in nature: they involve 'practices of speaking and writing' (Lawrence & Suddaby, 2006:239).

The second sub-question is addressed through the lens of *institutional logics*. The institutional logics approach highlights how actors' behavior is influenced by institutions. Institutional logics are defined as 'the socially constructed, historical patterns of material practices, assumptions, values, beliefs, and rules by which individuals produce and reproduce their material subsistence, organize time and space, and provide meaning to their social reality' (Thornton & Ocasio, 1999:804). In other

words, the concept includes both practices (the typical way of operating) and the underlying belief system (ideas and guidelines) that influence individual actors' acting and thinking. Moreover, the institutional logics approach emphasizes that institutions have both symbolic and material elements and that these elements co-evolve. This emphasis makes the institutional logics approach very well suited to highlight the role of physical infrastructure in transition processes. Namely, also the fossil fuel system consists of symbolic or social elements as well as material or technical elements.

This thesis contains four *case studies* in the context of the *Dutch fossil fuel system*. The Netherlands was purposively selected to answer the research question for two reasons. First, with renewable energy production lingering around 4% for several years, it is characterized by a relatively slow energy transition. Second, the Netherlands has many incumbents that will be affected by this energy transition. In fact, the Netherlands has one of the largest fossil fuel and CO₂ intensive economies of Europe. Given this situation, interactions between incumbents and institutions relevant for sustainability transitions are expected.

This thesis investigated three cases that each highlight one of the three categories of institutional work: maintenance work, institutional entrepreneurship, and disruptive institutional work. These are addressed in Chapters 2, 3, and 4, respectively. Chapter 2 explores how lighting and oil incumbents engage in maintenance work when LED lighting was introduced to the market and when biofuel blending was mandated by government, respectively. Chapter 3 showcases how incumbents aim to disrupt existing institutions in the context of the Dutch bottle deposit system. Chapter 4 illustrates how incumbents engage in institutional entrepreneurship to promote the development of biomethane, the upgraded version of biogas. The fourth case study presented in Chapter 5 was selected to show the influence of institutional logics on incumbents' behavior. This chapter focuses on the problematic interaction between gas network operators and biomethane producers that results from diverging institutional logics.

Our *data collection* includes interviews, newspaper articles, policy documents, annual reports, and organization websites. Analysis was conducted through categorization and constant comparison of the data in iteration with the theoretical framework. Multiple data sources were used to assure triangulation of the data.

Chapter 2, 3, and 4 present in detail how incumbents maintain, create and disrupt institutions through institutional work. Below, the most important *conclusions* of these three chapters are synthesized, illustrating that in all cases incumbents employ similar institutional work activities to influence institutions.

Firstly, incumbents closely participate with government to influence institutions. In all three cases incumbents take part in the relevant governmental decision-making structures from a very early stage. By acting as a partner of government, incumbents are able to influence the broader regulatory framework, rather than just one particular policy decision.

Secondly, incumbents always provide an alternative institutional setup to the current or proposed setup in order to influence institutions in their favor. This proactive stance allows incumbents to take the lead in achieving institutional change. It is not sufficient to argue against a new or existing institution.

Thirdly, incumbents very skillfully frame their interests in order to influence institutions. Framing entails: depicting an institutional arrangement or technology that requires institutional change as appealing or undesirable to the widest possible audience. Two key insights on framing are emphasized here. Most importantly, incumbents successfully translate their private interests in terms of public policy goals and/or broader societal beliefs, i.e. into legitimate interests. This translation enhances the legitimacy of the incumbent's proposal and increases the likelihood of implementation. In addition, incumbents carefully steer attention towards particular aspects of an institution or technology. Thus, framing highlights certain aspects of an institution or technology, thereby downplaying others.

Fourthly, incumbents conduct or commission research to influence institutions. The research outcomes are used in framing and in addressing the wider public and help to legitimize the incumbent's proposal. In all cases, cost-efficiency is the dominant decision criterion.

Finally, incumbents speak through the media to influence institutions indirectly. Public opinion functions as a framework that indicates which policy decisions will be perceived as favorable and which as unfavorable. The more public opinion is aligned with the incumbents' preferred institutional setup, the more difficult it becomes for policy makers to decide otherwise. Therefore, incumbents aim to influence public opinion before important policy decisions, i.e. during policy windows.

This thesis concludes that incumbents engage in all three types of institutional work: maintaining, creating, and disrupting institutions. This contrasts with various bodies of literature which suggest that incumbents predominantly aim to defend the status quo. Furthermore, incumbents' institutional work activities contribute to institutional change that is aligned with incumbents' institutional preferences.

In contrast with Chapter 2, 3, and 4, Chapter 5 highlights how incumbents are being influenced by institutions. It sheds light on *why* incumbents behave the way they do in transition processes through the lens of institutional logics. This stream within

institutional theory provides new insights into why interaction between incumbents and new entrants is often problematic.

Chapter 5 looks at how institutional logics enable and constrain the behavior of incumbent network operators towards biomethane. This chapter finds that the hierarchy logic under which network operators function, limits the network operator's range of possible behavior towards new practices, in this case biomethane. Important elements of the hierarchy logic in this case are: operation according to the Gas Law, responsibility for safety and reliability, and a preference for large-scale arrangements.

When network operators are being confronted with new practices that are not aligned with the institutional logics guiding them, they face difficulties in accommodating innovative practices. The transition process will only proceed smoothly if the innovative practices match the network operators' hierarchical and formal decision-making, do not hinder the provision of safety and reliability, and entail large flows of energy. However, many innovative practices in the fossil fuel system are at odds with the hierarchy logic. For instance, new practices are often characterized by pragmatic decision-making and small-scale arrangements.

Having insight into the institutional logics that guide network operators brings us an enhanced understanding of why they tend to hold on to existing practices, have difficulties accommodating new practices, and why they prefer certain types of solutions. Chapter 5 shows that resistance against biomethane by the network operator is often based on concerns stemming from existing institutional logics, rather than on strategic activities to protect their interests.

The *implications* of this thesis' findings are that incumbents exert a considerable influence on the unfolding of sustainability transitions. Namely, institutions and institutional change are a crucial part of sustainability transitions and the institutional work activities that incumbents employ contribute to institutional change that is aligned with the incumbents' interests.

The institutional logics that guide incumbents influence for a large part what type of solutions and related institutions will be pursued. For instance, this thesis shows how network operators are likely to pursue solutions that involve large-scale arrangements, perfect control of safety and reliability, and that fit a hierarchical decision-making style. Moreover, Chapter 4 shows that incumbents are much more successful in achieving institutional change than new entrants. Therefore, in the absence of other powerful (societal) actors advocating institutional change supporting sustainable innovations, it is to be expected that sustainability transitions will evolve along the lines of solutions preferred by incumbents.

Policy makers wish to engage incumbents in sustainability processes, because of incumbents' large potential contribution to a sustainability transition. However,

it is not easy to steer incumbents in a particular direction. Therefore, it is key for government to develop its own vision and concrete plans regarding renewable energy production. Incumbents' input through institutional work can then be evaluated against these plans. Apart from incumbents' proposals, policy makers should actively collect and consider other proposals and scenarios from other, probably less prominent actors. All scenarios should then be weighed against government's vision.

Incumbents can be a valuable partner for policy making if a new technology is expected to become their core business in the near future. This thesis shows that incumbents are strong at achieving institutional change and may thus help government reach its sustainability goals. On the other hand, policy makers should be aware that incumbents' involvement does not necessarily lead to results on the ground, e.g. increased renewable energy production. Incumbents do not necessarily have connections with the sectors and actors that are supposed to contribute to the sustainability transition. In fact, innovative solutions may come from these other sectors and actors.

Policy makers should study the institutional logics that guide incumbents' behavior. Insight into why actors behave the way they do is the starting point to draft policy for changing this behavior and promoting sustainability transitions. Moreover, policy makers are in the position to change formal institutions guiding incumbents and thus to facilitate new practices.

A number of incumbents' institutional work activities can potentially be translated towards the context of new entrants that wish to create institutional change. However, the elaborate activities and the particular skills involved in institutional work do not necessarily match with the daily activities and skills of new entrants. For this reason, new entrants would do well to hire their own professional lobbyists.

SAMENVATTING

Het huidige fossiele energie systeem veroorzaakt een aantal dringende duurzaamheidsproblemen: fossiele brandstoffen dragen in belangrijke mate bij aan klimaatverandering, maar ook aan luchtvervuiling. Bovendien zijn de olievoorraden eindig. Dit is problematisch vanwege de vele materialen die van olie gemaakt worden, zoals plastic. Kortom, het huidige systeem waarin we fossiele brandstoffen gebruiken voor de productie van energie en materialen (oftewel: het fossiele energie systeem) is aan een fundamentele herziening toe. Zo'n duurzaamheidstransitie vereist substantiële veranderingen van het socio-technische systeem dat ons op basis van fossiele brandstoffen van energie voorziet. Het betekent met name een omschakeling naar hernieuwbare energietechnologieën en een efficiënter gebruik van energie, ook wel de energietransitie genoemd.

Overheden erkennen de noodzaak om het gebruik van fossiele brandstoffen te verminderen en hebben doelen gesteld om hernieuwbare energietechnologieën te stimuleren, om zo de bovengenoemde problemen aan te pakken. Meerdere hernieuwbare energietechnologieën zijn beschikbaar om deze doelen te halen, zoals zonne-energie, windenergie, geothermische energie, biomassa en waterkracht.

Hoewel de productie van hernieuwbare energie toeneemt, betekent dit niet dat de rol van fossiele brandstoffen automatisch afneemt. Integendeel, de fossiele brandstofindustrie groeit juist en is in de afgelopen jaren begonnen met het verkennen en exploiteren van meer vervuilende en meer gevaarlijke onconventionele fossiele brandstoffen, zoals teerzanden, schaliegas, diepzee-olie en Noordpool-olie. We worden dus geconfronteerd met een paradox: ondanks de noodzaak, de doelen gesteld door beleidsmakers en de beschikbaarheid van hernieuwbare energietechnologieën, blijft het fossiele energiesysteem zich uitbreiden met steeds meer onduurzame fossiele brandstoffen. Daarom rijst de vraag: waarom is het zo moeilijk om het gebruik van fossiele brandstoffen te verminderen?

Om deze vraag te beantwoorden richt dit proefschrift zich op instituties en gevestigde organisaties in de energietransitie. Het fossiele energiesysteem is verbonden met een uitgebreide set aan regels die onze maatschappij en economisch systeem vormgeven. Deze regels worden *instituties* genoemd en beïnvloeden ons door bepaald gedrag te faciliteren en ander gedrag juist te bemoeilijken. Verder geven instituties betekenis aan onze maatschappij. Relevante instituties voor het fossiele energiesysteem zijn normen voor brandstofkwaliteit, energiebelasting en veiligheidseisen. Daarnaast zijn ook ideeën over wat legitiem of logisch is, relevante instituties. Een belangrijke eigenschap van instituties is dat ze stabiliteit creëren en verandering tegenhouden. Daarom is de energietransitie niet alleen een technologisch probleem, maar vraagt het ook

een verandering van een grote hoeveelheid instituties. Institutionele verandering is echter een moeizaam proces.

Gevestigde organisaties zijn van oudsher onderdeel van het fossiele energiesysteem en hebben daarom omvangrijke gevestigde belangen. Deze belangen zijn het gevolg van investeringen in infrastructuur en vaardigheden die nodig zijn voor het vinden, produceren, distribueren en verkopen van fossiele brandstoffen. Gevestigde organisaties lopen het risico een groot deel van hun potentiële winst kwijt te raken wanneer hernieuwbare energietechnologieën de energieproductie gaan verzorgen. Daarom is het aannemelijk dat deze gevestigde organisaties zullen proberen hun fossiele energiebelangen te beschermen. Daarnaast zorgt de enorme economische waarde van het fossiele energiesysteem en het strategische belang van energie voor de maatschappij ervoor dat deze gevestigde organisaties ook aanzienlijke politieke invloed hebben.

Tot nu toe is er weinig aandacht besteed aan de vraag hoe gevestigde organisaties instituties beïnvloeden. Dit lijkt een essentieel onderdeel van transitieprocessen te zijn. Namelijk, als instituties zorgen voor de stabiliteit van het fossiele energiesysteem en gevestigde organisaties invloedrijke actoren zijn die deze instituties kunnen beïnvloeden, dan betekent dat dat de stabiliteit van het energiesysteem ook deels afhankelijk is van actieve steun van invloedrijke actoren. Om transitieprocessen te begrijpen moeten we instituties daarom niet als gegeven beschouwen, maar moeten we juist onderzoeken hoe gevestigde organisaties precies bijdragen aan de stabiliteit en verandering van instituties.

Uitgaande van de essentiële rol van de verhouding tussen instituties en gevestigde organisaties in transitieprocessen, stelt dit proefschrift de volgende vraag:

- Hoe beïnvloeden gevestigde organisaties en instituties elkaar in duurzaamheidstransities?

Eenzijds, gezien het belang en de stabiliteit van instituties, bestudeert dit proefschrift hoe het gedrag van gevestigde organisaties wordt beïnvloed door instituties. Anderzijds reageren actoren niet alleen op instituties, maar creëren deze actoren de instituties ook zelf. Vanwege deze tweeledige verhouding tussen gevestigde organisaties en instituties zijn er twee deelvragen geformuleerd:

- Hoe beïnvloeden gevestigde organisaties instituties?
- Hoe worden gevestigde organisaties beïnvloed door instituties?

Het theoretisch raamwerk voor dit proefschrift is gebaseerd op twee stromingen binnen institutionele theorie. De eerste deelvraag wordt beschouwd door de bril

van *institutioneel werk*. Deze stroming binnen institutionele theorie bestudeert de doelgerichte activiteiten van individuen en organisaties om instituties te creëren, handhaven en ontwrichten (Lawrence & Suddaby, 2006: 215). Institutioneel werk activiteiten bestaat vooral uit het mondeling of schriftelijk overbrengen van een bepaald discours (betoog) (Lawrence & Suddaby, 2006:239).

De tweede deelvraag wordt beschouwd door de bril van *institutionele logica*. Deze stroming benadrukt dat het gedrag van actoren wordt beïnvloed door instituties. Institutionele logica wordt gedefinieerd als het geheel aan gedrag (*practices*) en de onderliggende overtuigingen (*belief system*) dat het gedrag van actoren beïnvloed. Verder stelt de institutionele logica benadering dat instituties uit zowel symbolische als materiële elementen bestaan en dat deze elementen elkaar in hun ontwikkeling beïnvloeden. Op dit punt doet de institutionele logica stroming recht aan het belang van fysieke infrastructuur in transitieprocessen. Het fossiele energiesysteem bestaat namelijk ook uit zowel symbolische, sociale elementen als materiële, technische elementen.

Dit proefschrift bestaat uit vier *case studies* in de context van het *Nederlandse fossiele energiesysteem*. Nederland is om twee redenen gekozen om de onderzoeksvraag te beantwoorden. Ten eerste schommelt de duurzame energieproductie in Nederland al een aantal jaar rond de 4% en wordt het land gekenmerkt door een relatief langzame energietransitie. Ten tweede kent Nederland veel gevestigde organisaties met fossiele belangen die zullen worden getroffen door deze energietransitie. Sterker nog, Nederland heeft één van de grootste fossiele brandstof en CO₂ intensieve economieën van Europa. In deze situatie is het zeer aannemelijk dat er interactie plaatsvindt tussen gevestigde organisaties en instituties die van belang zijn voor het verloop van de energietransitie.

Drie case studies in dit proefschrift belichten elk van de drie categorieën van institutioneel werk: handhavingswerk, institutioneel ondernemerschap en ontwrichtend institutioneel werk. Deze worden respectievelijk in Hoofdstuk 2, 3 en 4 behandeld. Hoofdstuk 2 verkent hoe de gevestigde organisaties op het gebied van verlichting en aardolie handhavingswerk uitvoeren op het moment dat LED verlichting werd geïntroduceerd, respectievelijk de overheid het bijmengen van biobrandstof verplicht stelde. Hoofdstuk 3 toont hoe gevestigde organisaties ontwrichtend institutioneel werk verrichten ten aanzien van het Nederlandse statiegeldsysteem. Hoofdstuk 4 illustreert hoe gevestigde organisaties institutioneel ondernemerschap uitoefenen ter promotie van de ontwikkeling van groen gas: biogas dat is opgewaardeerd tot aardgaskwaliteit. De vierde case study in Hoofdstuk 5 is gekozen om de invloed van institutionele logica op het gedrag van gevestigde organisaties te laten zien. Dit

hoofdstuk richt zich op de problematische interactie tussen de gasnetbeheerders en groen gasproducenten, die het gevolg is van uiteenlopende institutionele logica.

De *dataverzameling* bevat interviews, krantenartikelen, beleidsdocumenten, jaarverslagen en websites van organisaties. De analyse werd uitgevoerd door het continue vergelijken en categoriseren van deze gegevens in wisselwerking met het theoretisch raamwerk. Er zijn meerdere databronnen gebruikt om voor triangulatie van de data te zorgen.

Hoofdstuk 2, 3 en 4 laten op zeer gedetailleerde wijze zien hoe gevestigde organisaties instituties handhaven, creëren en ontwrichten door middel van institutioneel werk. Hieronder worden de belangrijkste *bevindingen* van deze drie hoofdstukken samengevat. Hiermee wordt getoond dat de gevestigde organisaties in alle case studies soortgelijke institutioneel werk activiteiten ontplooiën om instituties te beïnvloeden.

Ten eerste werken gevestigde organisaties nauw samen met de overheid om instituties te beïnvloeden. In alle drie de case studies nemen de gevestigde organisaties vanaf een vroeg stadium deel aan de relevante besluitvormingsstructuren van de overheid. Door zich als partner van de overheid op te stellen, zijn gevestigde organisaties in staat om een beleidskader in bredere zin te beïnvloeden in plaats van slechts één bepaald beleidsonderdeel.

Ten tweede presenteren gevestigde organisaties altijd een alternatief institutioneel plan ten opzichte van de huidige situatie of het voorgestelde plan. Deze proactieve houding stelt gevestigde organisaties in staat om de leiding te nemen in het proces van institutionele verandering. Het is niet voldoende om een nieuwe of bestaande institutie af te wijzen.

Ten derde zijn gevestigde organisaties zeer vaardig in het framen van hun belangen. Framen betekent het als aantrekkelijk of onaantrekkelijk weergeven van een institutioneel plan of een technologie die nieuwe instituties vereist, aan een zo groot mogelijk publiek. Twee inzichten worden hier benadrukt. Een cruciaal element is dat gevestigde organisaties erin slagen om bedrijfsbelangen te vertalen in publieke belangen. Deze vertaalslag vergroot de legitimiteit van het voorstel van de gevestigde organisaties en vergroot zo de kans dat het plan wordt uitgevoerd. Daarnaast sturen gevestigde organisaties zorgvuldig de aandacht naar bepaalde aspecten van een institutie of technologie. Door deze framing worden sommige aspecten naar voren gebracht, terwijl anderen juist geen aandacht krijgen.

Ten vierde voeren gevestigde organisaties onderzoek uit, of laten dit uitvoeren, om instituties te beïnvloeden. De uitkomsten van het onderzoek verhogen de legitimiteit van het voorstel van de gevestigde organisaties en worden ook gebruikt in de framing en het aanspreken van het brede publiek. In alle case studies is kostenefficiëntie het doorslaggevende selectiecriteria.

Tenslotte beïnvloeden gevestigde organisaties de publieke opinie via de media. De publieke opinie bepaalt deels welke politieke besluiten als gunstig en welke als ongunstig zullen worden beschouwd. Hoe meer de publieke opinie overeenkomt met het gewenste institutionele plan van de gevestigde organisaties, hoe moeilijker het zal zijn voor beleidsmakers om een ander besluit te nemen. Daarom proberen gevestigde organisaties de publieke opinie te beïnvloeden, met name voorafgaand aan belangrijke besluiten (tijdens een *policy window*).

Dit proefschrift concludeert dat gevestigde organisaties alle drie de types institutioneel werk uitvoeren, gericht op zowel handhaving, creatie als ontwrichting van instituties. Dit is in tegenspraak met meerdere vakgebieden die suggereren dat gevestigde organisaties voornamelijk proberen om de status quo te handhaven. Verder concludeert dit proefschrift dat het institutionele werk dat gevestigde organisaties verrichten leidt tot institutionele verandering die in lijn is met de institutionele voorkeuren van deze organisaties.

In tegenstelling tot Hoofdstuk 2, 3 en 4, benadrukt Hoofdstuk 5 hoe gevestigde organisaties juist worden beïnvloed door instituties. Vanuit de institutionele logica benadering belicht dit hoofdstuk waarom gevestigde organisaties zich in transitieprocessen gedragen zoals ze doen. De institutionele logica stroming brengt nieuwe inzichten ten aanzien van de vaak problematische interactie tussen gevestigde organisaties en nieuwe spelers.

Hoofdstuk 5 bestudeert hoe institutionele logica het gedrag van gevestigde gasnetbeheerders ten aanzien van groen gas faciliteert en bemoeilijkt. Dit hoofdstuk concludeert dat de 'hiërarchie logica' die het gedrag van netbeheerders beïnvloedt, het voor netbeheerder moeilijk maakt om duurzame energiestromen in te passen in hun netwerk, zoals bijvoorbeeld groen gas. De hiërarchie logica houdt in dat netbeheerders handelen volgens de Gaswet, hun verantwoordelijkheid voor veiligheid en leveringszekerheid, en hun voorkeur voor grootschalige infrastructuur.

Het transitieproces zal alleen soepel verlopen wanneer innovaties aansluiten bij de hiërarchische en formele besluitvorming van netbeheerders, het waarborgen van de veiligheid en leveringszekerheid niet in gevaar brengt, en het grootschalige energiestromen betreft. De kenmerken van veel innovaties zijn echter strijdig met deze elementen van de hiërarchie logica. Innovaties worden vaak juist gekenmerkt door pragmatische besluitvorming en kleinschaligheid.

Inzicht in de institutionele logica die het handelen van netbeheerders beïnvloedt zorgt dat we beter begrijpen waarom netbeheerders de neiging hebben vast te houden aan de bestaande manier van werken, het moeilijk vinden om innovaties in te passen en waarom zij de voorkeur geven aan bepaalde soorten oplossingen. Hoofdstuk 5 laat zien dat de netbeheerders' weerstand tegen groen gas vaak voortkomt

uit de institutionele logica, in plaats van uit strategisch gedrag om hun belangen te beschermen.

De *implicatie* van deze conclusies is dat gevestigde organisaties aanzienlijke invloed uitoefenen op het verloop van duurzaamheidstransities. Instituties en institutionele verandering zijn immers een essentieel onderdeel van duurzaamheidstransities en de institutioneel werk activiteiten van gevestigde organisaties dragen bij aan institutionele verandering die in lijn is met de belangen van deze gevestigde organisaties.

De institutionele logica die het gedrag van gevestigde organisaties beïnvloedt bepaalt voor een belangrijk deel welk soort oplossingen en bijbehorende instituties nagestreefd zullen worden. Dit proefschrift toont bijvoorbeeld dat netbeheerders geneigd zijn oplossingen na te streven die gekenmerkt worden door grootschaligheid, perfecte controle over veiligheid en leveringszekerheid, en een hiërarchische besluitvorming. Bovendien laat Hoofdstuk 4 zien dat gevestigde organisaties veel succesvoller zijn in het realiseren van institutionele verandering dan nieuwe spelers. Daarom is het aannemelijk dat de energietransitie, zonder tegenwicht van andere invloedrijke (maatschappelijke) spelers, vorm zal krijgen op basis van de oplossingen die gevestigde organisaties voorstellen.

Beleidsmakers betrekken gevestigde organisaties graag bij besluitvormingsprocessen over duurzaamheid vanwege de grote potentiële bijdrage van deze organisaties aan duurzaamheidstransities. Het is echter niet gemakkelijk om gevestigde organisaties in een bepaalde richting te bewegen. Daarom is het van groot belang dat de overheid haar eigen visie en concrete plannen ontwikkelt ten aanzien van hernieuwbare energieproductie. De inbreng van gevestigde organisaties kan tegen deze visie afgewogen worden. Naast de voorstellen van gevestigde organisaties moeten beleidsmakers actief de voorstellen en scenario's van andere, vaak minder prominente actoren, verzamelen en overwegen.

Gevestigde organisaties kunnen een waardevolle partner zijn voor beleidsmakers op voorwaarde dat een nieuwe, gewenste technologie binnen afzienbare tijd hun core business zal vormen. Dit proefschrift laat zien dat gevestigde organisaties erg sterk zijn in het realiseren van institutionele verandering en op deze wijze de overheid zouden kunnen helpen om haar duurzaamheidsdoelen te halen. Anderzijds moeten beleidsmakers zich bewust zijn dat het samenwerken met gevestigde organisaties niet automatisch leidt tot een toename in de productie van hernieuwbare energie. Gevestigde organisaties hebben niet per se contact met de sectoren en actoren die geacht worden bij te dragen aan de duurzaamheidstransitie. Innovatieve oplossingen komen echter vaak juist van deze andere sectoren en actoren.

Beleidsmakers moeten de institutionele logica die het handelen van gevestigde organisaties mede bepaalt goed bestuderen. Inzicht in waarom actoren zich gedragen

zoals ze doen is het startpunt voor het opstellen van beleid om dit gedrag te veranderen en duurzaamheidstransities te stimuleren. Bovendien zijn beleidsmakers in staat om de formele instituties, die onderdeel uitmaken van de institutionele logica, aan te passen en zo innovaties te faciliteren.

Een aantal van de institutioneel werk activiteiten die gevestigde organisaties ondernemen zouden mogelijk vertaald kunnen worden naar de context van nieuwe spelers die institutionele verandering wensen te realiseren. De goed doordachte activiteiten en de daarvoor benodigde vaardigheden sluiten echter niet noodzakelijkerwijs aan bij de dagelijkse activiteiten en vaardigheden van nieuwe spelers. Daarom zouden deze nieuwe spelers er goed aan doen hun eigen professionele lobbyisten in te huren.



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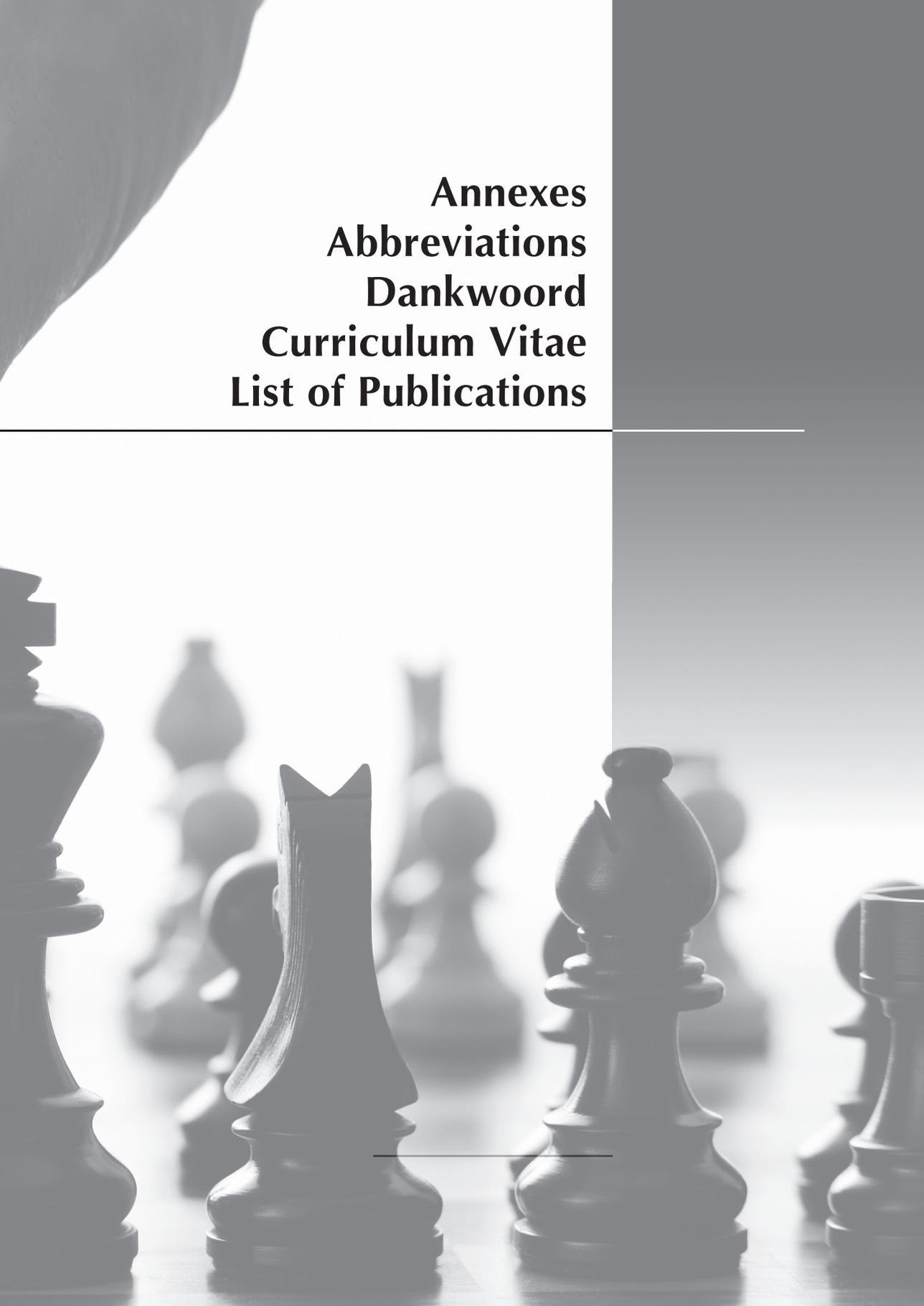
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Annexes
Abbreviations
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ANNEXES

Annex I. Overview of interviewees

New entrants	Incumbents	Government
1: Biogas producers association (BGPA)	3: Biomethane Netherlands (BMNL)	1: Min. of Economic Affairs
2: Biomethane producers association (BMPA)	4: Energy North Netherlands (ENNL) / BMNL	2: Min. of Economic Affairs
3: Sugar producer	5: Network bus.dev.*/ BMNL	
4: Sustainability consultant	6: Network bus.dev./ BMNL	
	7: Network bus.dev.	
	8: Gas network operator	
	9: Gas network operator	
	10: Gas network operator	
	11: Gas network operator	

*Business development unit of gas network operator

Annex II. Data sources per section

Section	Topic	Data sources
4.6.1	Institutional change	News articles, policy documents, NEA archive
4.6.2	Proposed institutional change	News articles, policy documents
4.6.3	Cooperation	Interviews, other publications
4.6.4	Framing	News articles, policy documents
4.6.5.1	Wider audience	News articles, interviews
4.6.5.2	Policy makers	News articles, policy documents, interviews, other publications
4.6.6	Effects of institutional entrepreneurship on institutional change	News articles, policy documents, interviews, other documents
4.6.7	Effects of institutional change on biomethane development	NEA archive

LIST OF ABBREVIATIONS

ACM	Netherlands Authority for Consumers and Markets
BGPA	Biogas producers association
BMNL	National biomethane association
BMPA	Biomethane producers association
CBL	Branch organization for retailers
CBS	Statistics Netherlands
CE	Dutch research institute
CEN	European standardization institute
CFL	Compact Fluorescent Light
CONCAWE	Environmental research centre of oil companies operating in Europe
CPA	Corporate Political Activities
ENNL	Regional energy association
EUCAR	European Council for Automotive R&D
Eurostat	Statistical office of the European Union
DDT	Insecticide
FNLI	Branch organization for companies using packaging for their products
IC	Institutional change
IE	Institutional entrepreneurship
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
LED	Light Emitting Diode
MEP	Subsidy program for electricity production from biogas
MP	Member of Parliament
Min. I&E	Ministry of Infrastructure and the Environment
MLP	Multi-level perspective
NAM	Dutch production company of oil and natural gas, owned by Shell and ExxonMobil
NEA	Ministry of Economic Affairs' executive agency
NGO	Non-Governmental Organization
PET	Polyethylene terephthalate
PNG	Platform New Gas
SDE(+)	Subsidy program for renewable energy production
TNO	Dutch research institute
UNFCCC	United Nations Framework Convention on Climate Change
VNPI	Dutch Association of Petroleum Industry
VNO-NCW	Dutch employers' organization
WHO	World Health Organization

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CURRICULUM VITAE

Magda Smink was born in Amersfoort (1986), the Netherlands. In 2004 she started a bachelor in International Relations and International Organizations at the University of Groningen, following her curiosity about politics and the world. In 2006-2007 she spent an exchange year at *Université Laval* in Québec, Canada.

After finishing her bachelor's degree, she changed her focus to environmental issues, convinced that these too have a strong political dimension. In 2008 she therefore started a research master in Sustainable Development at Utrecht University. During this master program the energy transition in particular drew her attention. Her master's thesis eventually became the prelude to her PhD thesis.

In 2010, Magda started her PhD research at the Innovation Studies group, Faculty of Geosciences, Utrecht University. She presented her research at various international conferences. Apart from research activities, she taught tutorials in research methods, supervised bachelor and master students, and gave several guest lectures. In 2011 she was President of the board of YES-DC, an association for young professionals working on energy issues.

Since October 2015, Magda is working at Stichting Natuur & Milieu, an environmental NGO in Utrecht. As a member of the energy team, she aims to put to use her research insights. Having the public interest at heart, she intends to contribute to the Dutch energy transition.

LIST OF PUBLICATIONS

Smink, M. M., Hekkert, M. P., & Negro, S. O. (2015). Keeping sustainable innovation on a leash? Exploring incumbents' institutional strategies. *Business Strategy and the Environment*, 24 (2), 86-101.

Smink, M., Negro, S. O., Niesten, E., Hekkert, M. P. (in press). How mismatching institutional logics hinder niche-regime interaction and how boundary spanners intervene. *Technological Forecasting and Social Change*.

Smink, M., Koch, J., Niesten, E., Negro, S. O., & Hekkert, M. P. (2015). Institutional entrepreneurship in the emerging renewable energy field: incumbents versus new entrants. Innovation Studies Utrecht working paper. Available at: http://www.geo.uu.nl/isu/isu.html#_#15.01%28PDF%29.

The current use of fossil fuels creates a number of pressing sustainability problems, such as climate change. Therefore, the fossil fuel system is in need of a fundamental transformation. However, despite this need, the targets set by policy makers, and the availability of renewable energy technologies, the fossil fuels system keeps expanding. Why is it so difficult to move away from fossil fuels?

First of all, the fossil fuel system is aligned with an extensive set of rules or *institutions* that both enable and constrain our behavior. An important characteristic of institutions is that they provide stability and resist change. For this reason, institutional change is a crucial element in transition processes. Moreover, established organizations or *incumbents* have heavily invested in the fossil fuel system. So it is likely that incumbents will attempt to protect their fossil fuel interests in the face of a shift towards renewable energy technologies.

This thesis investigates the interaction between these two important elements in transition processes: incumbents and institutions. Based on four case studies in the context of the Dutch fossil fuel system, this thesis shows how incumbents influence institutions as well as how institutions influence incumbents.

