



Paper to be presented at  
DRUID15, Rome, June 15-17, 2015  
(Coorganized with LUISS)

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

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**Abstract**

An underexplored issue in the institutional entrepreneurship literature is the difference between the activities of incumbents and new entrants when promoting institutional change for innovative technologies. Institutional entrepreneurship entails the following activities: cooperation, framing, and political tactics. We study these three

activities in the case of biomethane development in the Netherlands, during the time period 2006-2012. Since the 1970s biogas farmers have been unable to build up a supporting institutional framework. However, when incumbents from the gas sector enter the field around 2006, biomethane starts receiving substantial government support. We show how both new entrants and incumbents engage in all three activities, but do so in a very different manner. For example, while incumbents form associations that bridge different interests, new entrants cooperate only with actors that have strictly the same interests. Our analysis shows that incumbents' institutional activities lead to 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 consequence, there is a shift from electricity to gas and an increase in the scale of installations. We conclude that incumbents can speed up innovation processes, however their focus on large-scale installations makes it very difficult for small-scale biogas farmers to contribute to biomethane production.

## 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. Okereke et al., 2012) and a sustainable energy system (IPCC, UN, etc). 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. 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 (Stenzel & Frenzel, 2008; Wesseling et al., 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 (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 the 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. 29, 38]. From 2008 onwards, dramatic improvements occurred in the institutional framework for biogas and its upgraded version, biomethane (see Table 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 (RVO, 2012). 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 biomethane development on the ground. Due to the government’s central role in the development and diffusion of new energy technologies, 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?

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 provide insight in the dimensions that distinguish between incumbents' and new entrants' institutional entrepreneurship activities, and how activities of cooperation, framing, and political tactics build on each other to have an impact on institutional change.

## **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.

### **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 (Bled, 2010). Namely, the framing and political tactics that will be 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. 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).

## **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 or story usually begins with a particular problem definition, 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).

## **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). Successful framing will influence policy making through agenda setting.

### 3. Background on biomethane and actors’ motivations

Biogas is the product of a co-digestion process of manure and other organic materials, such as corn (step 1-3 of Figure 1). Traditionally, biogas is turned into electricity and heat by burning it in a cogeneration plant (not depicted in Figure 1). Often, more than half of the energy content is lost with cogeneration because there is no useful application for the heat (RVO, 2011:11). Since 2004, the electricity produced receives a renewable energy production subsidy.

Another possibility is to upgrade biogas to Dutch natural gas quality by extracting CO<sub>2</sub> (step 4 and 5 of Figure 1). The resulting biomethane can be injected into the natural gas grid. Now it can be used for multiple purposes, e.g. heat and electricity production, or transport (step 6 and 7 of Figure 1). In contrast to electricity production from biogas, heat can be applied in a useful way. Therefore, biomethane potentially has a much higher energy efficiency than biogas.

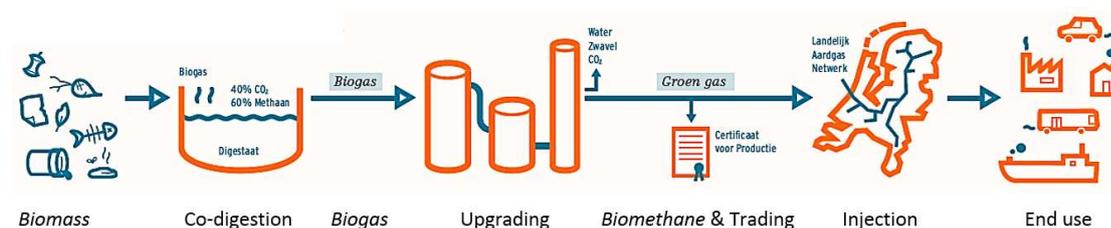


Figure 1. Biomethane value chain (adapted from Nieuw Gas Krant, 2010:4)

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. 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 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. In addition, waste companies are categorized as incumbents because they often used to be part of the integrated energy companies. The gas incumbents do not produce biomethane themselves, but will trade and transport it.

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 (Rekenkamer, 2014:15). This equals 6 to 9% of Government's annual revenues (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. Methods**

Given that institutional change is a complex process evolving over time and our wish is to give a rich description of 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 the Netherlands Enterprise Agency (NEA: 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 gas market: the biogas producers association (BGPA), biomethane producers association (BMPA), 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 interrelatedness characterizes the gas sector. 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 subcategories. We labeled, categorized and constantly compared the data, so as to identify the dimensions on which incumbent and new entrant IE activities differ. We used multiple sources, thus assuring triangulation of the data. Two key actors in the biomethane field, employed at NEA, have checked both Table 1 and the Results section for (missing) data and validity of argumentation, enhancing the inter-observer consistency (Bryman, 2008).

## **5. Findings**

### **5.1 Institutional change 2006-2012**

The formal institutions 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 points) 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' [14; 22], in 2009 it was 'a logical next step' [3], and in 2011 it was presented as 'sustainable, efficient, and offering plenty of economic opportunities' (rijksoverheid.nl). Table 1 presents the main institutional developments. Each instance of institutional change will be numbered (IC X), to be able to link it to actors' institutional entrepreneurship activities in the next paragraphs.

**Table 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 [10].
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 <sub>2</sub> emissions, the subsidy costs have to be compared with those of other forms of renewable energy [60].
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 [12].
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 [13].
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' [14; 22]. 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 [14].
6	Mar 2008	A majority in Parliament supports the motion to pay 15 cents/kWh for electricity from biogas, following the official advice [23].
7	Jun 2008	Nevertheless, the Minister of Economic Affairs decides to pay 12 cents/kWh for electricity production from biogas [15].
8	Jul 2008	As a result of negotiations between government parties, renewable gas is added to the scope of the SDE subsidy program [24].
9	Feb 2009	The SDE 2009 subsidy tariff for electricity production from biogas is increased to a range of 15-17 cents/kWh [16].
10	Apr 2009	The Ministry of Economic Affairs charges the national network operator with setting up a biomass certification scheme [2].
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' [3].
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) [59].
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 a 4,1 million euro subsidy to gas stations that are to sell natural gas and biomethane [4].
15	Jan	Due to pressure from Parliament, the SDE 2010 subsidy tariff for electricity production from

	2010	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 [30].
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. The budgets are 7 million and 12 million euro, respectively (NEA, PNG 2010:4).
17	Oct 2010	The executive branch NEA of the Ministry of Economic Affairs publishes a time schedule with different tasks to create a biomethane market (AgentschapNL, 2010:13)proposed that same year by PNG
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 [18]. By contrast, the minimum subsidy for biomethane increases from 63 to 79 cents/m <sup>3</sup> [19]. The new design aims to stimulate innovation and competition between different types of renewable energy by allocating money to the cheapest options first [18]. The Minister aims to 'focus exclusively on an efficient approach to meet the EU target of 14% renewable energy in 2020' (Rijksoverheid, 2010)
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; govt 1, 2012) following the EU Renewable Energy Directive (2009/28/EC). 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 [49] (I2, 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 [37].
22	Aug 2011	The first year of the new SDE+ subsidy scheme results in 1 billion euro for biomethane projects, or 2/3 of the total budget (RVO, 2012). Due to the large number of applications, the Ministry of Economic Affairs transferred 250 million euros initially allocated for renewable electricity, to biomethane (Staatscourant, 2011; Energiegids, 2011)
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 [38].
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 [7]. The Minister states that biomethane is 'sustainable, efficient, and offers plenty of economic opportunities' (Rijksoverheid, 2011). 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; [51]
26	Nov 2011	In the SDE 2012, also biomethane hubs qualify for the SDE+ subsidy [39].
27	Apr 2012	The Ministry of Economic Affairs puts another 87 substances on the positive list [43].

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

Tables 2 and 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 preferences of the new entrants. 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 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 3).

Table 2. Institutional change proposed by new entrants and institutional change implemented by government

	Proposed institutional change by new entrants 2006-2012 (1)	Institutional change implemented by government as of December 31st, 2012 (2)
1	Reintroduction of MEP subsidy programme [21]	IC 3
2	Increase in subsidy tariff for electricity from biogas [23; 29; 18]	IC 9, 15
3	Expansion of number of co-products on positive list [16; 30; 31; 34]	IC 21, 27
4	Level playing field in Europe (i.e. Germany) regarding subsidy tariff and substances on positive list [17; 35; 42]	-
5	Easing of digestate policy [17; 30]	-
6	Certification of co-products [30; 32]	-
7	Alternative for allocation through lottery in SDE scheme [33; 35]	-
8	Level playing field regarding subsidy tariff for new and existing biogas installations [35]	-
9	Leftover SDE subsidy should flow back into next SDE subsidy round [35]	IC 18
10	Inclusion of heat in SDE subsidy scheme [18]	IC 23
11	Level playing field regarding small and large-scale biogas installations [18; 41]	-
12	Increase in subsidy tariff for heat from biogas [40]	-
13	Inclusion of mono-digestion (only manure) in SDE subsidy scheme [20]	-

Table 3. Institutional change proposed by incumbents and institutional change implemented by government

	Proposed institutional change by incumbents 2006-2012 (1)	Institutional change implemented by government as of December 31st, 2012 (3)
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	IC 14, IC 19, IC 20, IC 22

	electricity in terms of subsidy (2)	
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

### 5.3 Cooperation for institutional change

Cooperation in the biomethane case entails the formation of associations by new entrants and incumbents. It is the first step towards contributing to institutional change. Table 4 presents a summary of the differences between new entrants and incumbents in their cooperation activities.

**Table 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. This broad membership 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 (<http://groengas.nl/over-ons/founderspartners/>, NE3, 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 heating or transport. BMNL and ENNL summarize this aim in targets of 300 and 200 million m<sup>3</sup> biomethane production in 2014, respectively (Groen Gas Nederland, 2013:7, 17).

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, 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.

### **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 (NE1, 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 (VGGP, 2014). Due to this narrow focus,

members of BMPA express this association best promotes their specific interests (NE1, 2014; NE3, 2012). Some overlap with incumbents exists: a number of individual members of BMPA, as well as the association BGPA became partners of BMNL ([groengas.nl/over-ons/partners/](http://groengas.nl/over-ons/partners/)).

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 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.

#### 5.4 Framing for institutional change

Cooperation and framing reinforce each other in contributing to institutional change. Table 5 summarizes the different framing styles of new entrants and incumbents.

**Table 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'

#### Incumbents

First, similar to new entrants, incumbents strongly emphasize the need for biomethane to meet national sustainability goals (PNG, 2007:9; PNG, 2011; GGNL, 2013; Topteam Energie, 2012 [6; 45; 1; 50; 8; 54]. Incumbents then emphasize that building on the strengths of the gas sector (PNG, 2007; PNG 2006; PNG, 2008:5 [54]) [54]) is a national interest. Incumbents thus align biomethane with new growth opportunities for the Dutch economy (Topteam Energie, 2012), thereby appealing to a broader audience than the new entrants' agricultural framing. Therefore, the government should (financially) 'safeguard' biomethane development [54; 46; 58]. 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 [54; 46]. 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 [46].

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 and it points at the depletion of the Groningen gas field, the necessity of continued use of the Dutch gas infrastructure, and the necessity of low-carbon energy technologies. 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.

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 system (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 [1].

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 [52; 46] (Green deal groen gas, najaar 2011), and more so than wind energy [54]. Incumbents emphasize they are creating a 'biomethane market' (PNG, 2007); build a 'competitive sector' [57]; a 'well-functioning market mechanism' [47]; will 'bring down the price of biomethane' [58; 51; 45]; and in time biomethane will be 'profitable without government subsidies' [56; 52]. These types of arguments are likely to appeal to a large audience.

Incumbents' framing towards the government can be summarized as: *'You have a problem, we have a solution to help you'*.

## New entrants

First, framing emphasizes the benefits of biogas to the agricultural sector. Similar to the incumbents, new entrants claim that biogas and biomethane contribute to CO<sub>2</sub>-reduction (BGPA, 2008b) and are necessary to meet the national renewable energy targets [e.g. 23]. However, new entrants' framing is most elaborate on how biogas helps develop a sustainable rural economy [30] and the agricultural sector by increasing the value of manure, byproducts and rest materials [23]; (NE4, 2012).

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 (BGPA, 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 is 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' [21].*

*'If front runners [first biogas producers] have no choice but to stop production ... this means a large destruction of capital (about 100 MW capacity) (BGPA, 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' [17].*

*'A bonus for heat [use] yields on average 60.000 euro and that is not sufficient' [40].*

The framing of new entrants towards the government can be summarized as 'We have a problem (biogas installations are not profitable), we deserve your help'.

## 5.5 Political tactics for 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.

### 5.5.1 Political tactics aimed at wider audience

We observed that new entrants and incumbents adopt distinctly different approaches 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 frequent in process communication. Table 6 sums up the findings of new entrants' and incumbents' political tactics aimed at a wider audience.

**Table 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

#### 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. 1; 2]. 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 (NE2, 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’ (1 juni, zie screenshot dec 2014), and advertising biomethane through sports clubs and at schools (I3, 2012). Conversely, new entrants’ contacts with the wider audience are limited. Since 2007, BGPA publishes a magazine called ‘Biogas’ to inform members and regional governments about (the importance of) biogas (BBO, 2007; NE1, 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 [46; 54; 58]. 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 (G1, 2012). Furthermore, incumbents are strong in process communication: highlighting every milestone related to biomethane, adding to the optimism in their framing (refs). For instance, incumbents increase biomethane’s socio-political legitimacy by having well-known public figures perform the opening ceremony of new biomethane installations ([9], [53], [5]). 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 (NE1, 2014). Therefore, BGPA’s news articles can be characterized as after-the-fact status updates about new policies and its consequences for agricultural peers [13; 16; 18].

### **Response to criticism**

Incumbents receive little criticism due to the broad network they created. Once, biomethane was openly criticized for being a ‘very expensive right-wing hobby’ [49] 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” [44].

## **5.5.2 Political tactics aimed at policy-makers**

New entrants have limited access to the government, that they are in an antagonistic relationship with. 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 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 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 structure of framework itself	Change of parameters within framework
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 (I2, 2012), and the political connections of regional politicians from BMNL and ENNL (G1, 2012). For instance, ENNL established a dedicated 'Taskforce Biomethane' (EV strategieplan 2012-2015 p 15) with regional politicians that lobby the national government, e.g. for subsidized biomethane hubs (I2,2012; G1, 2012). Furthermore, ENNL used existing procedures to request the inclusion of biomethane hubs into the EIA tax deduction scheme (IC 20) (I2, 2012) and the SDE+ subsidy scheme (IC 26) ([49]; I2, 2012).

*New entrants'* access to the political system is limited, which shows in the fact that they tend to engage in a late stage of the policy process and are dependent 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 (BGPA 2008d). Moreover, they meet civil servants in recurring meetings with the Ministries of Economic Affairs and Infrastructure & Environment (NE1, 2014; NE2, 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 (G1, 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? Furthermore, 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) (I2, 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) (AgentschapNL, 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. NE1, 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' [17] (also [31], [25]).

### **Focus of proposals**

The *incumbents'* strategy is very proactive and is driven by opportunities. They link broader (inter)national developments, such as CO<sub>2</sub> 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 (BGPA 2007-1, 2008-1; NE1, 2014). BGPA's recurring meetings with the Ministry concern existing practical concerns, such as setting up a certification scheme for co-digestion substances (NE1, 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 (I2, 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 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 (BGPA 2007; BGPA 2008a; BGPA, 2011, NE1, 2014), proposals are aimed at optimizing this framework, such as higher subsidy per kWh produced (IC 6, 9, 15, ref) or permission for more substances to be digested (IC 21, 27, ref). 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 [46] (IC 18 and IC 19).

Incumbents employ professionals that know how to translate their ideas into the language of policy makers (I2, 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 (I2, 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 [11] 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 (BGPA, 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, incumbents 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 [54] (IC 18 and IC 19). Research institute ECN presented a study emphasizing that biomethane is indispensable to meet the renewable energy targets [6]. 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 ECN, Rabobank (Ref 2012 8 maart; 1 feb 2013), Raadhuisgroep (NE1, 2012) and Landbouw Economisch Instituut (10 juli 2010).

## 5.6 Effects of IE on IC and on biomethane development

Table 8 concerns incumbents' institutional entrepreneurship and Table 9 deals with new entrants' institutional entrepreneurship. Furthermore, this section discusses the influence of the institutional changes on biomethane development, in terms of the actual amount of biomethane installations.

*Table 8: Incumbents' political tactics linked to institutional change*

Political tactics	IC #	Institutional change
Vision document 'Stepping on the gas' (PNG, 2007) argues for subsidy for biomethane production (p. 8).	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 (Year Report 2007 = 2008, p 51) High-level meeting between government and national network operator ([2]; I3, 2012)	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; 51; 52; 54; 58]	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).	IC 13	Government establishes Interdepartmental Acceleration Team
Vision document 'Stepping on the gas' (PNG, 2007) proposes facilitation of biomethane for transport purposes (p. 8).	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 (GGNL, p. 4)	IC 16	Government sets up two tenders for research into digestion and gasification of biomass. 4 million euro was eventually granted to national network operator and waste company
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).	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 [54]. Waste company commissions study at research institute ECN. Study states that biomethane is indispensable to meet renewable energy target [6].	IC 18	New SDE+ subsidy scheme favors cheapest renewable energy technology
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).	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 ([54]; I2, 2012). ENNL presents plan to build 4-5 biomethane hubs [23 sept 2009 DVHN]	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)	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).	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).	IC 25	The newly established knowledge center BMNL receives 400.000 euro from the Ministry of Economic Affairs

Table 9: New entrants' political tactics linked to institutional change

Political tactics	IC #	Institutional change
Lobbying policy-makers for continued subsidy for biogas: pointing at investments put at risk [21] Publicly denouncing government [10] Offering petition to Prime Minister [11]	IC 3	OVMEP subsidy for farmers that already invested in production capacity before the MEP subsidy was discontinued
Lobbying MPs (BGPA, 2008b, 2008d) and at political parties'	IC 6,	Parliament accepts two

conventions (BGPA, 2008d) for higher subsidy tariff, justified by biogas' contribution to agricultural sector [e.g. 23, 30] and renewable energy target [e.g. 23]. Publicly denouncing government [17, 25] and emphasizing biogas' difficult circumstances [17, 25] Survey amongst BGPA members and symbolic withdrawal of grant applications by biogas producers (BGPA, 2008d)	IC 9, IC 15	motions to increase subsidy for electricity production from biogas, which is translated into SDE scheme
Recurring meetings with Ministry of Economic Affairs [16, 31] Publicly denouncing government [31]	IC 21, IC 27	New substances added to positive list
Lobby for extending SDE+ subsidy scheme with heat production [18]	IC 23	SDE+ subsidy scheme will include heat production

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. This resulted in predominantly small-scale biogas cogeneration installations. As shown in Table 10, in 2010, 56% of the existing biogas installations had a capacity smaller than 3,6 GJ (OWS, 2011:88). Biomethane production did not yet receive a subsidy.

Table 10. Number and percentage of biogas installations at the end of 2010 according to capacity class (source: OWS, 2011:88)

Capacity of installation (GJ)	0 - 3,6 GJ	3,6 - 7,2 GJ	> 7,2 GJ	Total
Number of installations	47	18	19	84
Percentage of installations	56%	18%	23%	100%

With the SDE+ 2011 subsidy scheme, the institutional framework's focus changed towards cost-efficient production of biomethane. Table 11 shows that by the end of 2013, new installations had been constructed that produce biomethane. Moreover, all biomethane installations had a capacity of more than 3,3 GJ, with 50% of the installations between 3,3 and 17 GJ. In fact, 36% of installations had a capacity between 17 and 33 GJ, while 7% went beyond 33 GJ.

Table 11. Number and percentage of biomethane installations at the end of 2013 according to capacity class (source: RVO, 2014)

Capacity of installation (GJ)	0 - 3,3 GJ	3,3 - 17 GJ	17 - 33 GJ	> 33 GJ	Total
Number of installations	0	7	5	2	14
Percentage of installations	0%	50%	36%	7%	100%

Table 12 shows that by the end of 2013, 57% of biogas installations still had a capacity smaller than 3,6 GJ and 26% remained between 3,3 and 7,2 GJ. Furthermore, Table 12 shows an increase in the number of biogas cogeneration plants. However, this increase is not due to the SDE+ scheme, but to a time-lag in construction of installations running on previous subsidy schemes (MEP, OVMEP, SDE).

Table 12. Number and percentage of biogas installations at the end of 2013 according to capacity class (source: RVO, 2014)

Capacity of installation (GJ)	0 - 3,6 GJ	3,6 - 7,2 GJ	> 7,2 GJ	Total
Number of installations	82	38	24	144
Percentage of installations	57%	26%	17%	100%

## 6 Discussion

Our findings correspond with insights from case studies in the field of 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. We also noticed the crucial importance of public-private partnerships in creating institutional change (cf. Hillman & Hitt

(1999)). 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 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 can 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' IE activities and enhance their influence on institutions? Or does new entrants' relative power position force them to fulfil IE 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?

## **7 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.

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