

Institutionalising Green Electricity

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Peter S. Hofman

Senior Research Associate of the Center for Clean Technology and Environmental Policy
Faculty for Business, Public Administration and Technology
University of Twente, The Netherlands

Address: CSTM - University of Twente, Het Capitool, PO Box 217, 7500 AE Enschede, The Netherlands

Phone: x31.53.4894541

Fax: x31.53.4894850

E-mail: P.S.Hofman@utwente.nl

CSTM WEB-site: <http://www.utwente.nl/cstm/>

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Abstract

Both energy companies and consumers have embraced green electricity as a concept in which electricity produced by renewable energy sources is separately marketed and priced from conventionally generated electricity based on fossil or nuclear sources. After its introduction in 1995 by an energy distributor at the end of 2003 around 35 % (2.4 million) of Dutch households were buying green electricity, and more than twenty providers of varieties of the product had emerged. From the perspective of realising a sustainable electricity system this seems very promising as inherent to 'green' electricity is its renewable source base. From the perspective of realising systems change the new practice involves different competencies, routines and interaction patterns and signifies the creation of a path diverging from the fossil based trajectory of the electricity sector.

To increase our understanding of systems change this paper provides a more detailed assessment why the concept emerged and how its introduction triggered a sequence of changes in actors, networks, and institutions. The emergence of the concept is understood as the outcome of changing routines within a firm triggered by changes in its institutional environment. The spread of green electricity is understood as a process of institutionalisation with new practices diffusing throughout the energy sector, with legitimacy gained through the formation of new networks and alignment of a variety of actors, and with increasing co-ordination between actors as emerging governance structures develop from the local to the national and international level.

Institutionalising Green Electricity

1. Introduction

One of the most salient developments in the Dutch electricity system in recent decades has been the emergence and spread of green electricity. Both energy companies and consumers have embraced green electricity as a concept in which electricity produced by renewable energy sources is separately marketed and priced from conventionally generated electricity based on fossil or nuclear sources. After its introduction in 1995 by an energy distributor in a pilot project in a Dutch municipality, at the end of 2003 around 35 % (2.4 million) of Dutch households and several hundreds organisations were buying green electricity, and more than twenty providers of varieties of the product had emerged. From the perspective of realising a sustainable or at least a carbon lean electricity system this seems very promising as inherent to 'green' electricity is its renewable source base. From the perspective of realising systems change the new practice involves different competencies, routines and interaction patterns and signifies the creation of a path diverging from the fossil based trajectory of the electricity sector. The analysis will show, however, that as the new practice travelled from one organisation to another it became increasingly appropriated by the existing system and its path creation force was weakened.

To increase our understanding in processes of systems change this paper provides a more detailed assessment why the concept emerged and how the introduction of this new concept within the electricity system triggered a sequence of changes in actors, networks, and institutions. The aim is furthermore to explain these changes and to analyse to what extent they signify a process of path creation. The evolution of green electricity will be chronologically traced and the logic behind this evolution will be unravelled. The evolution of green electricity is explained as a multi-level process of changes in actors, networks, sectors, and governance structures. The emergence of the concept is understood as the outcome of changing routines and practices within a firm triggered by changes in the institutional environment in which it operates. The spread of green electricity is understood as a process of institutionalisation with new practices diffusing throughout the energy sector, with legitimacy gained through the formation of new networks and alignment of a variety of actors, and with increasing co-ordination between actors as emerging governance structures develop from the local to the national and international level. It is thus conceptualised as a process taking place at two levels, representing a nested system of practices guided by institutions (Holm, 1995). The first level involves the emergence and development of the new practice and the way it diffuses to and is altered by other organisations. The second, higher order, level involves the institutional set up in which the new practice is embedded, and actors, rule making bodies involved in maintaining this institutional set up but sometimes also capable of changing it. The focus of our research is especially on the way the new practice and its diffusion interacts with changes in the 'rules of the game' and those capable of introducing rule change within the electricity system. The focus is not restricted to so-called regulative institutions, often associated with formal rules, but also includes normative institutions such as informal rules, conventions and voluntary standards, and cognitive institutions such as common beliefs, taken-for-granted ways of doing things, and shared logics of action (Scott, 1995).

While often ‘radicalness’ of an innovation is conceptualised as breaking with existing market linkages and technological competences (Abernathy & Clark, 1985), this paper contends that the extent that the innovation studied here diverts from existing paths, and involves radical innovation and path creation, is something which is negotiated in the course of its development and dependent upon the way it becomes institutionally embedded, i.e. linked to existing and new institutions. Understanding the nature of the process of institutionalisation of new practices is therefore key to assessing where these new practices represent the creation of a new path towards a new sociotechnical system based on a set of different rules, norms and values as compared to the fossil-based electricity system.

2. The emergence of green electricity: innovation shaped by processes external and internal to the firm

Changes in the institutional environment facilitate the innovation

In the background for the innovation studied in this paper two developments are crucial to explain the emergence of green electricity. The first development is the increasing attention for renewable energy as a strategy to reduce CO₂ emissions. After the oil crisis renewable energy is considered as an alternative for electricity generation. When the climate change problem becomes more apparent, and also energy saving is not able to significantly reduce CO₂ emissions, renewable energy gets a higher priority on the political agenda. This crucial change coincided with the first National Environmental Policy Plan of 1989 that reinforced the need to save energy and that adopts the strategy of identifying specific target groups (Ministry of VROM, 1989). This signifies an important change in the relationship between the electricity industry and government. From 1989 on the electricity industry is targeted as a specific target group in environmental policy. The Ministry of VROM has entered the policy network of the electricity industry next to the Ministry of Economic Affairs. Moreover, at the Ministry of Economic Affairs a change of energy policy has taken place. The perspective of the Ministry changes from security of supply to energy saving, energy-efficiency and sustainability. In a follow up to the NEPP specific targets for the reduction of CO₂ emissions were set (Ministry of VROM, 1990) and this is followed by a policy goal of 10% renewable energy in 2020 set in the third White paper on Energy in 1996. Specific programmes to reach targets for CO₂ reduction and renewable energy led to a boom of projects in this period. Research efforts for renewable energy increase, but also the mix of instruments is broadened with increasing focus on the stimulation of demand.

The second important development is the change in institutional organisation of the electricity sector. Institutional changes that were formalised with the electricity act of 1989 corrode the autonomy of the electricity industry to a large extent. The electricity act of 1989 enforced a new structure upon the electricity sector in which distribution and production companies were separated, and which created effective national control of the electricity industry. The new arrangement was expected to increase efficiency by increasing scale of the separated production and distribution companies and by reducing negative effects of vertical integration. The act allows for some decentralised electricity production and import of electricity. Distributors were allowed to produce electricity in up to 25 megawatt (MW) capacity plants, industrial companies are allowed to produce unlimited amounts of electricity (Arentsen et al, 1997). The act opened

up ways for distribution companies to produce electricity outside the central generation capacity co-ordinated by the electricity producers through their co-operative organisation SEP.¹

Consequently distribution companies started generating electricity, in fact rather strategically. Apart from investing in decentral combined heat and power production that at that time could successfully compete with centrally produced electricity, distributors also engaged in several renewable energy projects. Government actively stimulated this, especially since the first National Environmental Policy Plan had formulated ambitious targets on reducing CO₂ emissions and renewable energy.² A voluntary agreement was reached in 1991 by the distribution sector and the Ministry of Economic Affairs to increase energy efficiency and reduce CO₂ emissions by energy saving measures, by increasing combined heat and power production, and by introducing renewable energy. This so-called environmental action plan (MAP) allowed utilities to impose a levy of 1.8% on the electricity price, the returns of this levy were then invested in projects on energy saving, combined heat and power production, and renewable energy (EnergieNed, 1994, 1997). The environmental action plan of the distribution sector was based on individual action plans of the distribution companies and covered the period 1990-2000. The distributors start to take an important role in the development of wind energy and later biomass, also as part of their environmental action plans.

Invention of the concept of green electricity by an energy distributor

Before 1993 the energy distribution company PNEM³ was involved in several renewable energy projects that were mainly policy driven. In 1989 the company had published an environmental action plan with CO₂ reduction as an important objective. This was part of an agreement between the energy distribution sector and the Ministry of Economic Affairs, where an overall target for CO₂ reduction for the distribution sector was set and a framework for raising the financial resources for the various projects was introduced.⁴ In parallel to this the Ministry of Economic Affairs provided financial resources through subsidies on projects for combined heat and power and renewable energy.

With the relative volatility and uncertainty of money flows from subsidies the question arose whether PNEM could achieve more independence through market funding of these projects. In 1993 the idea emerged to have customers pay a premium for so-called 'green' electricity in order to use the premium for financing renewable energy projects, thus letting the market become more influential in deciding the development of renewable energy. Inside the company there was resistance to this concept because it would imply that customers would pay more for something that physically is the same: the electricity provided to their house.

Various factors explain the emergence and acceptance of the concept. The company and its top management was committed to further development of renewable energy, and this initially mainly policy driven commitment became more and more based on a strategy to develop a green profile for the company. Using this green profile in a strategy of product differentiation was part

¹ SEP stands for Co-operation of electricity producers (samenwerkende elektriciteitsproducenten).

² A year after the conclusion of the first National Environmental Policy Plan an extension to the NEPP was published with intensified goals especially for the reduction of CO₂ due to increasing concern regarding climate change and regarding the implementation framework in the Netherlands (Ministry of VROM, 1989, 1990).

³ Provinciale Noord-Brabantse Energie Maatschappij (Energy company for the Province of North Brabant). PNEM had until the electricity act of 1998 a monopolistic position for distribution of electricity in the province of North Brabant.

⁴ The proposed measures in the environmental action plan were financed by a surcharge on the electricity tariff with a maximum of 2 % of the electricity tariff (EnergieNed, 1994).

of the stronger market orientation the company developed in anticipation of a liberalised market. The change of dominance of top management from those with an engineering background towards an increase of business management background and the stronger focus on developing marketing strategies to attract customers underpinned this stronger market orientation. Acceptance of the idea of green electricity was also strengthened by market research indicating that a significant part of households was willing to pay a premium for electricity based on renewable sources.⁵

Consumers played a relative passive role in the electricity system until the nineties, as they were 'captive' electricity consumers dependent on the electricity provider in their respective regions, and confronted with fixed prices. In a liberalised market the position of the consumers would become more active as they could freely choose products and services from different providers. In combination with continued and rising awareness regarding the environmental and particularly climate consequences this could unlock previously latent user demands. Based on these findings and to secure first mover advantage the company decided to establish the product 'green electricity' as a trademark (Van Gestel, 2001).

A final factor facilitating the acceptance was that the company could better plan investments in renewable energy, as they would become more market and less policy driven. The company felt that market developments were more easy to influence and forecast by the company in comparison to policy (Van Gestel, 2001). The strategy to become less dependent on government subsidies was underpinned as the new 1994 Dutch government coalition of liberals and social-democrats announced, among others, budget cuts for energy subsidies to energy distribution companies.

In overview then the process of liberalisation, and the associated introduction of new rules within the electricity system, led to the emergence of competitive forces previously absent in the electricity sector and induced a process of change in the energy distributor. The increasing intensity of rivalry, the threat of new entrants, and the increasing power of consumers induced significant changes in organisational and evaluation routines in the company, which could be implemented in a period of reorganisation within the electricity sector. The increasing sense of urgency regarding the climate problem in society led the company to develop a profile where sustainability played an important role. The company started to view renewable energy as an opportunity instead of an obligation, which was facilitated by learning that took place in the earlier mainly policy-driven renewable energy projects of the company.⁶ The search for new concepts was local in the sense that originated from existing competences, built up experiences and changing routines within the company.⁷ In combination, this led to the conception of green electricity as part of a strategy to attract and retain customers on the basis of an established brand.⁸

⁵ Market research indicated that around half of the customers would find an increase of the monthly electricity bill with around € 9 for green electricity acceptable (ECN, 1996).

⁶ Changing evaluation routines from the focus on problems and limitations to achievements and potential is a core element of path creation (Lampel 2001).

⁷ It would have been much more unlikely that the company would have engaged in renewable energy development without this learning, as, as Kash and Rycroft, 2002 and Rycroft and Kash, 2002 have pointed out, search processes for innovation tend to be local in the sense that they built upon existing competences, experiences and routines.

⁸ Porter (1979) identifies five competitive forces that shape strategy: bargaining power of buyers, bargaining power of suppliers, the threat of new entry, the threat of substitutes, and the intensity of rivalry.

An unusual partnership to support the launch of green electricity

With market research indicating a potential for green electricity and the good fit of concept in the emerging 'green' and pro-active company profile, the company decided to launch green electricity through a pilot project in one city. Shortly before the pilot project the Dutch branch of the World Wide Fund for Nature (WWF) was approached to act as an external verifier of the product. Market research had indicated hesitancy of customers to buy the product because of some lack of trustworthiness regarding the sources of the electricity and the destination of the revenues, which were to be re-invested in renewable energy projects. Participation of WWF was expected to increase legitimacy and trustworthiness of green electricity. For WWF collaboration with PNEM was part of its changing strategy from fund-raising for nature conservation with a neutral image towards more actively seeking opportunities to co-operate with parties in civil society (Glasbergen and Groenenberg, 2001). The co-operation of WWF with the energy utility also reflected the shifting culture of environmental organisations from one of protest to practical solutions (Hartman, Hofman and Stafford, 1999). The partnership fitted their changed strategy towards realising direct results, instead of working on agreements with government that are always subject to long-term implementation.⁹ WWF supported green electricity to stimulate sustainable energy use, and to counteract climate change, which was viewed as one of the largest threats for global nature and diversity conservation. (Quarles van Ufford, 2000; Schöne, 2001). For PNEM the collaboration with WWF on green electricity gave the product the sustainable and trustworthy profile necessary to attract and commit customers. The positive results of the pilot project for green electricity in the municipality of Tilburg¹⁰ led to the launch of the concept in the province of North Brabant in 1995.

3. Early success with green electricity: policy and competitors' reactions

Although initially the number of customers opting for the new product was limited, with 400 customers after the pilot project (see table 1), the launch was a success in several ways. An important objective was to make customers familiar with the product and to convince the general public of the reliability of its 'green' sources. As the media covered the launch of green electricity quite extensively, familiarity with the product rose steadily. The partnership with WWF, with the environmental organisation acting as a verifier of the renewable source for green electricity, gave the product the legitimacy it needed to transcend regular commercial product launches by giving it a flavour as being for the common good. Milestones in the introduction of green electricity are presented in table one. The new product also triggered reactions from other energy companies and policy makers. Energy distributors started to imitate green electricity by introducing other names for electricity based on renewable sources in their region.¹¹ Policy makers reacted by exempting green electricity from the regulatory energy tax that was introduced in 1996. The supply-oriented policy approach towards renewable energy was at that time gradually shifting towards more demand-orientation (Dinica and Arentsen, 2001). The regulatory energy tax, initiated initially to promote energy saving behaviour of households, thus became an important driver of green electricity. Exemption of green electricity from the tax

⁹ Interview with co-ordinator of WWF quoted in Glasbergen and Groenenberg (2001: 1).

¹⁰ The project took place in May-June 1995 with support from the municipality. The first customer for green electricity was the alderman of environment of the municipality.

¹¹ At that time also other utilities had adopted the principles of green electricity, but under other names (nature power, eco-power) because of the trademark of Essent on the name green electricity. WWF promoted the general idea of green electricity and not the specific trademarks.

turned out to be a rather effective policy strategy to support the concept. The exemption initially led to a small reduction of the premium paid for green electricity, but with tax hikes in 1999 and 2000 it led to competitive prices for green electricity from 2000 on.

Especially from 1999 on the increase in consumers of 'green' electricity was rapid, with a growth rate of 47% between July 1st 1999 and January 1st 2000. Activities of the WWF were an important factor contributing to this increase. In September 1999, when green electricity had become available throughout the Netherlands⁹, they started the campaign 'Don't Let the North Pole Melt, Go for Green Energy' (Quarles van Ufford, 2000). The campaign, supported by the Ministries of Economic and Environmental Affairs, consisted of various advertisements in national newspapers, large scale actions with dressed up polar bears handing out 300,000 application forms on train stations, and with the North Pole, climate change, and green electricity as featured themes for one week in programs of one of the largest television broadcasting companies in the Netherlands. Overall the campaign led to an acceleration in the monthly growth rate of green electricity from around 2500 to 10,000, and to a sharp increase in public recognition of the concept of green electricity (Schöne, 2001). For Essent, the company in which PNEM merged in 1999 with two other energy distributors, the number of green electricity customers expanded from around 50,000 in 1999 to 100,000 in 2000, 200,000 in 2001, and 300,000 in 2002 on a total number of around 2.4 million households.

Table 1 Milestones in the introduction of green electricity¹²

Year	Activity
1990	PNEM publishes first environmental action plan
1991	Agreement on CO ₂ reduction targets in environmental action plan for the sector, introduction of MAP levy
1993	Idea for green electricity emerges, business plan developed
1994	PNEM registers the product name 'green electricity' as a trademark
1995	PNEM approaches WWF to act as external controller for the product green electricity
	Pilot project for 'green' electricity in the Municipality of Tilburg results in 400 customers who pay a premium of around 4 €cts on top of the normal electricity price of € 9 cts
	Green electricity introduced in whole Province of North Brabant resulting in 2350 customers at the end of the year (on a total of around 800,000 electricity customers)
1996	Decision to construct biomass fired power station to secure green electricity supply in anticipation of growing demand
	Regulatory energy tax for small electricity consumers is introduced (€ 1.5 cts per kilowatthour, kWh), exemption for renewable energy
	Other energy companies also launch green electricity as a new product under other names (nature electricity, eco-electricity)
1997	Number of green electricity customers at PNEM rises to 10,000
1998	PNEM merges with MEGA, forming an electricity distribution utility for the provinces of North Brabant and Limburg, with 40,000 green electricity customers at the end of the year
	Approval of environmental permit for the biomass power plant at Cuijk, agreements with Staatsbosbeheer to supply clean wood as fuel for the power plant
1999	National campaign for green electricity is started by WWF; the number of green electricity customers grows with 38 % (44,000) in four months)
	The utility Essent is formed through a merger of PNEM-MEGA with the distribution company Edon. Essent has 65,000 green electricity customers in November (on a total of around 2.4 million customers)
1999	The Cuijk biomass fired power plant starts its operations being able to serve around 70,000 customers of green electricity
2000	After a hike in the regulatory energy tax (to € 4 cts per kWh) prices of green electricity become competitive to conventional electricity, overall number of customers rises from around 120,000 in January to 200,000 at the end of the year
2001	Liberalisation of green electricity market, customers are free to choose their own provider, the number of providers of green electricity rise to more than 20 and the number of customers rises sharply from 200,000 on Jan. 1 to around 800,000 at the end of the year
2002	At July 1 st the number of green electricity customers reaches 1 million in the Netherlands, market share of Essent is around one third
2003	Number of green electricity customers reaches more than 2 million, more than half supplied from power produced outside the Netherlands
2003	Exemption for regulatory energy tax is phased out and replaced by domestic support differentiated for various types of renewable electricity generation

¹² Data from this table based on interviews with Remmers (2000, 2001), Van Gestel (2001), Schöne (2001), Vis (2001); information from Dutch newspapers, www.greenprices.com, Essent (2000) on green electricity customers.

4. Liberalisation of the green electricity market and diffusion of the concept to other countries

In the development towards liberalisation of the Dutch electricity market the success of green electricity and the initial introduction of green labels by energy distribution companies (in 1998) led to the decision to accelerate a separate liberalisation of the market for green electricity up to 2001, earlier than the planned liberalisation of the regular electricity market for small consumers in 2004. In this way both industry and consumers could gain experience with competition in the electricity sector. The measure worked well to spur competition, with all major providers engaged in extensive marketing campaigns and the number of providers growing from under ten in 2000 to above twenty in 2002. Liberalisation of the market for green electricity however also had a not intended side effect. Due to the attractive compensation for green electricity, which consisted of restitution of the regulatory energy tax and a producer compensation for renewable electricity, several foreign companies started to offer green electricity to Dutch customers. Thus, the growth in demand for green electricity was mainly satisfied by green electricity of already existing installations for renewable electricity generation. While various support schemes for renewable energy were in place in different European countries, only in the Netherlands it was based on fiscal measures, whereas in most countries the main schemes were a supply oriented feed-in tariff for produced electricity based on renewables or a demand oriented quota obligation or renewable portfolio standard in combination with a tradable green certificate system (van Sambeek en van Thuijl, 2003). After the opening of the Dutch retail market for renewable electricity in July 2001 the number of renewable electricity customers increased from about 250,000 to approximately 1.4 million in January 2003 (www.greenprices.com). This dramatic increase in the demand for renewable electricity was caused mainly by a combination of two factors. First, the favourable fiscal stimulation of renewable electricity production and consumption allowed suppliers to offer renewable electricity products at the same price as conventional electricity while covering the extra cost of renewable electricity relative to wholesale power prices. Second, the retail market for renewable electricity was opened in advance of the rest of the retail segment. Renewable electricity therefore became a primary tool in attracting new customers and establishing a retail brand (van Sambeek en van Thuijl, 2003). After the introduction of green electricity as a separated product based on electricity from renewables in the Netherlands the concept diffused to other European countries, e.g. Finland, Sweden, UK, and Germany (van Dijk et al, 2003: 34). This also spurred European collaboration for the development of a system of green certificates. A platform for dialogue was initiated where energy companies, environmental NGO's, and government representatives of seven countries discussed the establishment of an European green certificate trading system (Dinica and Arentsen, 2003).

5. Explaining momentum for green electricity

In less than a decade a new product attracted one million customers in a sector previously characterised by stability and incremental change. The invention and launch of the concept of green electricity triggered a process of change in both producers and consumers in the electricity sector. Anticipation of the effects of liberalisation and responding to the increasing societal importance of climate change led initial producers' efforts. One set of factors that explains how the company could escape lock-in to the fossil-based trajectory thus lies in the build-up of

pressures on and tensions in the previously stable electricity sector, which challenged the fossil base and institutional organisation of the system.

The change of organisational routines in anticipation of liberalisation (e.g. new planning mechanisms due to loss of captive consumers, new strategic orientation vis à vis future competitors, development of marketing competences) in combination with the acquired competences in renewable energy production due to policy pressure led to the conception of green electricity. The company perceived increasing societal attention on climate change as an opportunity to distinguish itself from its competitors by developing a green profile and exploiting the shifting preferences of open-minded users. Cooperation with an environmental organisation was entered into in order to increase the product's legitimacy, which was also an illustration of the changed culture in the electricity distributor. This coalition of actors turned out to be able to successfully introduce the concept of green electricity. Momentum for the new product increased as competitors imitated the product and familiarity with the concept became widespread.

Policy played a significant role in this process by introducing the regulatory energy tax and exempting green electricity from the tax. This greening of the tax system effectively led to a competitive price for green electricity compared to conventional electricity. It also implies that green electricity is to some extent vulnerable to policy changes, such as changes in the regulatory energy tax and exemption rates. This became clear in 2002 when a change of government occurred and a halving of the exemption rate for green electricity was proposed. To prevent loss of customers, the Dutch energy distributors responded publicly by asserting that this would not affect the price of green electricity. Although the changes did not come into effect due to the fall of the government in the same year, it was expected that such new measures would particularly harm the imports of green electricity as they were to be accompanied by supply-side measures to support domestic renewable-energy production.

The success of the green electricity concept also facilitated the decision to construct the biomass-fired power plant. Other factors were the importance of the power plant for realising the goals of the environmental action plan, and the company's strategy to be the front-runner in gaining experience with the logistics of large-scale biomass-based electricity generation. The company's ability to build a network in which skills, know-how and experience regarding the logistics of the biomass resource were accumulated, and its relative power within policy networks, were crucial for the power plant to succeed.

The case points up several aspects that are relevant to success in diverging from established paths: for example, in response to climate change. One is the important role of 'prime movers', such as in raising awareness, undertaking investment and providing legitimacy for new technologies or products (Jacobsson and Johnson 2000). Clearly there is risk involved in developing new products and technologies, and companies often tend to play a strategic game of wait-and-see, especially when new product or technology characteristics are more a reflection of policy pressure than of market demand. This case shows that if a company is able to read the latent demands of the market it may be able to gain some first-mover advantage. As prime movers may trigger wider transformation processes, as in our case through the acceleration of the greening of the tax system and further institutional change towards labelling of electricity flows, they are likely to be well placed to take advantage of the momentum that is generated. Second, the case has also shown that in order to be able to acquire first-mover advantages the company needed to build new networks that provided the competences and legitimacy it lacked

individually. Other research has confirmed that the building or restructuring of networks is required to diverge from familiar paths and to establish new practices (Rycroft and Kash 2002).

Third, the introduction of a new product or technology often needs to be accompanied by further institutional change in order to gain momentum and to change a technological system. Processes of standardisation, building legitimacy and adapting regulatory frameworks are examples of this. This case also shows that these processes need to be carefully monitored and if possible directed. While the case company invested in a new facility to supply green electricity, the attractive fiscal compensation increasingly led companies to offer green electricity that was not based on newly installed capacity. Moreover, the difficulty of developing new renewable-energy projects in the Netherlands resulted in a sharp increase in imported green electricity. Although there was considerable support for measures to constrain the import of green electricity or to cancel fiscal support for green electricity based on already installed capacity, these were difficult to implement as they would require either an elaborate verification system or would conflict with the intended level playing field in the European energy sector.

6. Filling the institutional void: defining green electricity and its market

The emergence of green electricity in the energy system in the Netherlands triggered a sequence of events and changes in the Dutch electricity system. While the case shows that the mobilisation of actors under the right conditions can create strong drivers for change, the main difficulty is to direct this driving force in a sustainable direction towards fundamental change of systems of production and consumption. While the concept initially developed was relatively 'pure', with green electricity domestically generated through new installations of mainly wind and 'clean' biomass and revenues re-invested in renewable energy development, it lost its virginity when the concept travelled to other organisations. The boundaries of clean biomass faded away and also the organic fraction of waste became acceptable. The boundaries of new installations faded away and also co-combustion of biomass with coal in coal-fired power plants became acceptable. And, above all, green electricity became an easy profit maker for foreign energy companies that already had renewable electricity installations (mainly hydropower). The main reason for these developments was that green electricity was developed in an institutional void¹³: the definitions for green electricity had to be developed, and the definition over what constituted the market and which rules were guiding it, had to be developed. What is striking that in these processes the main actors were energy companies and environmental NGO's, while governments mostly reactive and hesitant in taking up a position. For example the Ministry of Economic Affairs acknowledged that it didn't want to become involved in the complex discussions about what constitutes 'clean' and 'dirty' biomass and how these relate to different conversion technologies. The most progressive energy companies have therefore developed guidelines themselves and in collaboration with environmental NGO's and appear to be transparent with regard to the inputs that are used relative to other companies.

A second relevant lesson in the transformation of production and consumption systems is the potential mismatch of policy and institutional frameworks at different administrative levels.

¹³ Hajer (2003) introduces and explains this term more specifically.

7. Conclusion

This paper unravels the factors behind the invention of the concept by an energy distribution company and behind its successful introduction. It explains how a process of change in corporate culture and marketing strategy provided footing for the concept and was motivated by internalisation of external policy and market pressures emerging from climate change policy and liberalisation. It also reveals how the company revised its innovation strategy to cope with increasing demand of the product. In the process the company was able to reap some first-mover advantages but it also experienced serious problems as it deviated from the familiar path of fossil fuel based electricity production and delivery. Some of the main problems were the lack of the firms' trustworthiness regarding the 'greenness' of the electricity and its unfamiliarity with biomass resource contracting outside the established channels for fossil fuels. Crucial in overcoming these obstacles were several partnerships the company built with actors outside the electricity sector. Through the formation of new networks the company was able to acquire competences and built credibility and legitimacy for the new product. As the new product was imitated by other companies, however, the commercial aspects of the product gained dominance over the sustainability aspects of the product. In this process of institutionalisation, there were no actors who could safeguard the sustainability dimension of green electricity. Moreover, institutionalisation did not take place in a complete void, but was nested in the structure of European liberalisation of electricity markets with constitutional rules such as the establishment of a 'level playing field'. In practice there was never a level playing field, as Dutch energy distributors were having a hard time developing domestic renewable opportunities, foreign energy companies sold green electricity based on already existing power plants. The inability to specify rules to block imports based on existing installations weakened the change process significantly. Moreover, instead of collectively search for ways to satisfy demand domestically, most efforts were focussing on how to repair the mismatch between Dutch and European policy frameworks. While in 2003 actions were taken to reduce attractiveness of exports of green electricity to the Dutch market, it stills remains to be seen whether the concept is able to regain its initial momentum for change.

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