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# Assembling markets for wind power : an inquiry into the making of market devices

Trine Pallesen

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Le 17 juin 2013

**Assembling Markets for Wind Power**

**An Inquiry into the Making of Market Devices**

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# **Assembling Markets for Wind Power**

**An Inquiry into the Making of Market Devices**

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Thesis submitted at Department of Organization, Copenhagen Business School,  
and Centre de Sociologie de l'Innovation, Mines ParisTech, 15<sup>th</sup> of April 2013



## ON VALUATION & LOCATION

BILL: *I know this is a ridiculous question before I ask it, but you haven't by any chance kept up with your swordplay?*

BUDD: *Hell, I pawned that years ago.*

BILL: *You hawked a Hattori Hanzo sword!?!?*

BUDD: *Yep.*

BILL: *It was priceless.*

BUDD: *Well, not in El Paso it ain't. In El Paso I got me 250 dollars for it.*

(QUENTIN TARANTINO: KILL BILL VOL. 2, 2004)



## THANK YOU...

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# 1. INTRODUCTION

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## 1.1 Insights From the Conception of an Economic Good

On a windy day in October 1975, the Danish carpenter Christian Riisager decided to reconfigure the range of his 15 kW wind turbine, which he had constructed in the backyard of his home in central Jutland a few years earlier. With the oil crisis of 1973 in mind, he decided to further develop his life-long interest in natural energies and test his turbine on the public electrical grid. He was thinking that if the electricity produced from his wind turbine could be integrated into the energy system through the grid, wind could potentially help ensure national electricity supply and decrease his own, and eventually the national, dependence on fossil fuels (Jersild 2000; Jensen 2003).

Rather than asking for permission at the local utility, Riisager went on to test his turbine, an *in vivo* and illegal experiment; he plugged in the wind turbine to the electrical grid through the outlet of the family's washing machine. He then went on to observe the effects of this somewhat uncontrolled experiment. For four days, Riisager left his turbine connected to the grid, all the while checking his household's installations for malfunctions as well as visiting the neighbours to ask whether their installations worked as usual. The Riisager family varied their electricity consumption in order to test whether fluctuations affected the integration of the wind turbine into the electrical system. However, the connection seemed to remain undetected by everyone, including the local utility; and not least important, the family's electrical meter ran backwards (Karnøe 2012; Jersild 2000).

After four days of producing electricity and sending it into the grid, Riisager disconnected the turbine and went to visit the local utility, called Herning Elværk, to ask whether any disturbances had occurred during the past few days. As Riisager expected, no disturbance had been noticed at the utility, and the director, Mr. Lund, was quite interested in not only hearing

about Riisager's story, but also in continuing the connection. However, to legalize the connection between the wind turbine and the grid, permission by the national council of electricity (Elektricitetsrådet) was required – something that would become far more difficult to obtain than the two men expected, not to mention the arrangement of the physical connection to the grid itself. The national council of electricity was reluctant to expose the grid to experiments with an untested technology. The story has it that without an article wrongly reporting the legalization of the connection, the permit would not have been given (Jersild 2000; Jensen 2003). But eventually, in 1976, the permit was granted, and the Riisagers could, as the first since the construction of the famous *Gedsermølle*<sup>1</sup> in 1957, legally produce wind power and lead it into the electrical grid.

This story of an early meeting between the wind turbine technology and electrical grid infrastructure has passed quite unnoticed in general, and Riisager has become better known for his wind turbine design than his experiments with combining turbine and grid infrastructure. However, considering this story about Riisager's turbine-to-grid experiment, two opposing insights may be taken from the experiments. On one hand, the experiment did not make wind power an economic good. With the experiment, Riisager performed a connection to a central part of a technical 'infrastructure' that allowed electricity to circulate between producers and consumers, but no economic compensation to the producer was determined, and in public the exchange value of wind power remained a highly debated and unsettled subject in the years that followed. On the other hand, the experiment was an important first step in the process of wind power *becoming* an economic good. While Riisager probably thought of his experiment as purely technical, a matter of tension in the lines, he proved the feasibility of the connection between turbine and grid. This physical connection allowed wind power to travel to consumers (not involved in its production), and it was eventually a first step towards the economization of wind power.

---

<sup>1</sup> Gedsermøllen, designed by Johannes Juul, was at the time of its erection the world's biggest windmill. It is often referred to as the 'mother' of modern wind turbine design: a three-bladed, horizontal-axis, upwind, stall-regulated turbine.

## 1.2 Connecting to a Field

The idea of connecting the turbines to the grid became a central point for starting the fieldwork of this thesis. During my fieldwork, the connection between turbines and grid kept surfacing as a crucial moment in wind power projects. On my first fieldtrip in France, on the highway from Paris to Orleans, the landscape was highly ‘decorated’ with turbines, and during an interview with a developer, I asked about these turbines, and he stressed the possibilities of getting connected to the grid as one of two major factors for choosing a location for a project:

*“As a wind site, it [North of Orleans] is actually horrible! There is not much wind. But the area is so far from beautiful, even ugly, and therefore no one objects to the construction of the turbines. And finally, the existing electricity lines between Orleans and Paris facilitate the connection, and that is why you see so many turbines in the area”* (Int. Lefebvre, my translation).

Today, many developers of wind power projects experience that getting a wind turbine connected to the grid, and doing so legally, is a process much unlike the experiment made by Riisager. The negotiations between developer and grid operator may take years and often constitute between 10% and 15% of a project’s overall costs of constructing a wind park<sup>2</sup>. The different modalities of this connection have been organizing the work leading to this thesis. I build on fieldwork in France, and common for all the sites that I have visited and investigated is that they appear as being ‘behind the grid’, i.e., places, negotiations, and arrangements that enable and organise the eventual connection between the turbines and the electrical system. Among these sites are municipalities in the French countryside, the French Parliament, Transmission System Operators, Energy Agencies in both France and Denmark, and industrial associations, etc. All of these sites have been part of the making or exploration of devices that arrange the connection in some way, and thus they become examples of some of the work that goes into the making of an economic good. They have dealt with, and some are still dealing with, what turns wind power into an economic good, and, how different modes of connections advance the process. This thesis explores a part of the void in the making of a

---

<sup>2</sup> Developers and grid operators formulated these project estimates during interviews. Furthermore, the finished contracts between developers and grid operators have become an object of exchange in itself, and in some French regions, half of the projects with signed contracts with EDF are sold. Thus, the possibility of getting access to the grid to undertake the connection has become a valuable right in itself.

market for wind power: It analyses essential parts of the process in moving from the technical connection to a connected economic good.

### 1.3 'Free' and 'Regulated' Markets

The agenda mobilized by Riisager as a backdrop for his backyard experiments was the oil crisis of the 1970s, and his grid-connected windmill was a proposed translation of the 'security of energy supply' theme. Today, proponents of wind power are generally enrolling climate change and global warming, in particular, as the backdrop of their arguments for the increase of wind power in the energy system. But if wind power is accepted as one potential part of the solution to global warming, the question remains: How do we organise this solution, and more precisely, are markets to play a role in this solution?

This question is not left unaddressed by economists; e.g., Nicholas Stern's report (2006) stressed global warming as the biggest market failure of the 20<sup>th</sup> century, i.e., CO<sub>2</sub>-emissions being left out of the market calculus. Nonetheless, the debate continues with regard to the relation between the market, in a general sense, and the natural environment (e.g., Reijonen and Tryggestad 2012). As a rough caricature, proponents of free-market environmentalism insist that efficient markets will emerge if market mechanisms are allowed to work freely. In their view, climate problems arise because markets are 'infected' by politics/laws. Eco-socialists, on the other hand, argue just the opposite; markets (and capitalism at large) are the root of environmental problems and should not be trusted as a means of solving these problems. Disagreement about the role to be played by the market in solving climate change is also found at the political stage; Vaclav Klav, president of the Czech Republic, proposed that we put our trust in the market to solve global warming (see Callon 2009). This disagreement may be summed up as a choice of more market – or less market – to encounter the challenges of global warming.

Not surprisingly, the organisation of wind power in Western capitalist societies is moulded on the market model, but a rather specific 'market model', and not the generic 'all-fits-one' market figure found in neo-classical economic theory. This model is sometimes referred to as a 'political market':

*“An important recurrent theme in [the] literature has been the notion of ‘political markets’, namely the understanding that the insertion of renewable generation technologies within conventional markets is premised on political will, articulated through public policies” (Szarka 2007: 322).*

The introduction of these public policies is grounded in economic theory itself, and closely related to the concept of ‘externality’ and ‘public good’. Because of the *non-excludable* and *non-rivalrous* characteristics of public goods, such as the environment/climate, economic theory argues that private actors are unlikely to be prepared to invest in their maintenance, because it is something which everyone can acquire free of charge. This dilemma is elsewhere referred to as the ‘tragedy of the commons’ (Hardin 1968). This malfunctioning of the economic system, it is stressed, is central to the creation of environmental problems: *“...there are features in our economic system that act as systematic inducement to environmental abuse”* (Baumol and Oates 1979: 71).

In other words, market failures are said to emerge because the costs of production are transferred to the collective, and the related markets are often deemed justified cases for state intervention and the ‘text-book’ approach to the distribution of responsibilities. The provision of private goods is assigned to the market, whereas the state is assigned the provision of public goods, such as climate stability or security of supply.

Proponents of different versions of ‘political markets’ therefore place themselves in between the position of the free-market environmentalists and the eco-socialists; in this middle range, the discussions stress the efficiency of different markets and thus builds on a recognition of the diversity of different markets as well as their ability to account for the specific environmental concerns they spur (Reijonen and Tryggstad 2012). From the viewpoint of economic theory, what is deemed ‘political’ in the so-called political markets is therefore less the introduction of public policies – they may be accounted for by economic theory itself as a way of correcting market failures – but rather the move from isolating the problem towards its resolution. For example, in the case of wind power, it may be asked: Is wind power a (partial) solution to global warming?

The link between global warming and wind power is not naturally given, rather it may be seen as a translation – and questioning the link also means questioning the reasons for articulating public policies in favour of wind power. Thus, it seems that when economics prescribe the

introduction of public policies, it is assuming that they are responses to well-defined problems, which may, in turn, be causally linked to the solutions, i.e., the policies.

Once established as a solution to the problem (e.g., wind power to global warming), the question then becomes what policies to introduce, or more precisely, how to design the market. In the case of wind power markets, one such example is the discussion of whether to design feed-in tariffs or certificate models to support the inclusion of wind power in the electricity systems, a discussion that has come up in a number of European countries (see Gipe 2006; Finon and Menanteau 2003; Finon 2006). This discussion has roughly been summed up in the table below as a description of the most common renewable energy governance models employed to sustain wind power projects. Frede Hvelplund (2001a and 2001b), a Danish energy economist, studied the discussion according to the guiding question: Does the governance system qualify as a market model?

**Figure 1.1: Governance Models**

	<b>“Political price-/amount market” model</b>	<b>“Political amount-/certificate price market” model</b>
<b>(a) Is it a market model?</b>	The price is political, the amount is decided upon a market.	The amount is political, the price is partly decided upon a market, partly politically set.

(Hvelplund 2001a: 22)

Hvelplund’s summary was a contribution to the debate between ‘the most market-like’ subvention system (the certificate system) on the one hand, and the system which has proven efficient in furthering wind power development (the feed-in tariff) on the other hand<sup>3</sup>. Hvelplund's contribution pointed out two interesting aspects of the discussion: First, he maintains the divide between the political and the economic model; second, his conclusion that both systems are mixtures of the political and the market also seems to carry an indirect defence of the existence of the pure form of the market, at least as an abstract figure. As he acknowledges that both the feed-in tariff system as well as the certificate system configure

<sup>3</sup> Hvelplund’s conclusion, however, is that both models are partly political and partly market; thus neither system should be qualified as more ‘market-like’ than the other, according to Hvelplund (Hvelplund 2001a and 2006).

elements of the ‘market’ and elements of the ‘political’, he keeps the idea of the free-market<sup>4</sup> alive.

Whether it is free-market environmentalism, eco-socialists, notions such as public goods, or political markets, they all emphasize a clear a priori distinction between the political and the economic, or more precisely that which is related to the market sphere. Often, the combination of these spheres is treated as a pollution of the ‘pure’ economic market, which is assumed to be an existing reality by, the political, i.e., the value-laden. Here, the political sphere and the market sphere (pertaining to the economic system) are two distinct systems that may be combined in different configurations, but they remain nonetheless distinct domains. To be able to make such a clear-cut distinction between the market (and economics at large) on the one hand, and the political on the other hand, reflects an underlying view of the market as a rather abstract structure with inherent properties. Whether one is a believer of eco-socialism or free-market environmentalism, or somewhere in between, the so-called free market exists as an abstract structure, living in and by itself; either as a panacea or as an evil. The approach to be taken here, however, suspects this distinction between different domains to be unproductive. Rather than taking established differences as a starting point, the ambition is to follow a process through which such distinctions may become part of the negotiations of market design.

#### **1.4 Reconfiguring the Market Figure – and Markets in the Making**

The potent figure of the ‘free’ market discussed above is the figure of economic theory, but it is also a figure that is dominant in everyday life, a reality we all engage with on a daily basis. This market figure is best described as an abstract structure that organizes scarce resources through the mechanisms of supply and demand. However, economics, as a science, has over the last few decades been increasingly criticized for not investigating this ‘vessel of growth’ of capitalist societies, i.e., the market (e.g., North 1977; Callon 1998; Aspers 2011). Rather than attempting to explain the market, this structure is treated as ‘natural’; in other words, the market may serve as explanan but rarely explanandum.

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<sup>4</sup> This is not to say that Hvelplund speaks in favour of a free market structure, quite the opposite is the case.

Over the last few decades, the new economic sociology as a growing field has challenged this ‘negligence’, and new approaches to the study of economic action and markets as one form of organization have emerged, stressing the relation to (or embeddedness in) society. The present thesis draws on what we may call ‘constructivist market studies’, a perspective which emphasizes markets as heterogeneous assemblages that are temporarily stabilized. With this perspective, the production of the market is brought to the centre of the analysis as the outcome of a long range of negotiations and struggles, aligning a range of diverse interest and concerns<sup>5</sup>. Instead of seeing *the market* as a natural structure already out there, this approach stresses markets as a configuration emerging from (or being the effect of) a range of heterogeneous actors and their networks (Callon 1998). In this view, markets, agents, calculative abilities, and commodities do not exist in a natural state. Rather, all these elements must be assembled into a distinct form of calculative agency.

This points us to an important difference between economics and constructivist market studies; there is not one single market structure, but rather an infinite number of different markets constituted through their unique socio-technical arrangements, and to get a grasp of these markets, they must be studied in the making. Whereas most economic sociologists may acknowledge this, proponents of constructivist market studies retain an openness towards the potential constituents of the market; by defining markets as socio-technical assemblages (e.g., Caliskan and Callon 2010), the specificity (and heterogeneity) of a given market may be captured.

From the perspective of constructivist market studies, the efficiency of markets with regard to the concerns they encapsulate in the market calculus depend on the socio-technical arrangements from which they are made (Callon 2009). This approach transcends the debates between eco-socialism and free-market environmentalists as well as the market/politics divide; there is not only one market configuration out there capable of it all – or nothing (!) Rather, Callon proposes the notion of ‘civilizing markets’, as markets that continuously partake in the articulation of the problems they touch as well as their solutions. These markets are markets that respond to a multitude of questions, accepting and inviting a variety of actors

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<sup>5</sup> Among these interests and concerns are that of the economists; the economist does not describe a reality, i.e., the economy, he contributes to its (re)production. Hvelplund's contribution discussed above is not a simple description, but may eventually become a performative act that itself participates in the construction and design of wind power markets.

who articulate these questions to join and eventually help transform these questions into ‘possibly solvable problems’ (Blok 2011).

These ‘civilizing markets’ seem to extend their range of possible constituents into new domains. Meanwhile, rather than labelling these markets as ‘political markets’, referring to an arrangement between distinct domains, these distinctions are made the effects of markets:

*“The distribution of the political and the economic is not anterior to the market; it is the outcome of the functioning of markets, of which it is a by-product, in a sense”* (Callon 2009: 542).

To describe something as a ‘political market’, that is, as made up of building blocks pertaining to different and distinct domains and reigned by different ‘regimes’ or ‘logics’, disables us from capturing the negotiations unfolding in the making of markets as well as the heterogeneity of the constituents. In other words, we miss the specificity of a given market. Instead, in the present study, I adopt the notions of politicization and economization as ways of describing processes of opening up to debate and contestation (politicization) or ways of making things calculable and subject to measurement (economization)<sup>6</sup>. This allows us to grasp how markets in the making create and resolve issues; issues that may in turn be labelled political or economical.

The premise of the heterogeneous architecture of markets allows for an in-depth analysis of the devices, material and textual, contributing to the marketization of wind power. From this point of view, the devices followed below contribute to the making of the market, or the marketization, of wind power: *“Being economic is not a qualification that comes from outside the agencement, this qualification is included in the agencement”* (Muniesa et al. 2007: 4). And as such, the analysis will stress the ways in which wind power is qualified, and/or disqualified, as an economic good.

The research question must be seen in this light: I do not set out to conclude for or against markets as a means of organising renewable energy, but rather, the project follows the making of the market for wind power through a set of devices that eventually frames the modality of being economic – and in doing so, excluding other actions and considerations from that which is ‘economic’.

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<sup>6</sup> For a more elaborate discussion of politicization and economization, see Chapter 2.

## 1.5 Wind Power Markets: Making Assemblages and a Research Question

As explained above, the connection between turbines and the grid is no longer a simple and straightforward affair. Rather, it is a tedious and costly business, sometimes taking years to settle between developer, grid operator as well as local communities. In the present thesis, this connection serves as an entry point to the assemblage work of market-making; the minimal ontology underlying the approach allows for devices to emerge as crucial to the marketization of wind power, and consequently as objects for research. Approaching the process of marketization openly, without a pre-fabricated list of possible constituents, allows an image of market configurations that “*combine devices that we previously attributed either to the economy or to expression and political action*” (Callon 2009: 543).

In order to study marketization, I have chosen to follow two specific devices: One is the formulation of the feed-in tariff. When the wind power developer wishes to connect their turbines, it is to obtain a specific price – and this price is determined in the tariff. Following the formulation of the tariff is the study of a process of valuation; how the value of wind power is determined as well as who calculates – and who does not calculate. The other is the connection of wind turbines. Wind turbines must be connected in a specific place, a location; something that is being orchestrated, in France, through a device called the ZDE (*‘Zone de developpement d’eolien’*). The ZDE is a device that divides the region into one or more zones suitable for wind power development. Furthermore, being located inside a ZDE has become a prerequisite for accessing the tariff.

These devices frame connections to a price as well as a specific location, including landscape and grid, but the devices are also part of the assemblage that eventually takes a part in the marketization of wind power.

### **Research Question:**

*How do the two devices, i.e., the feed-in tariff and the ZDE, affect the marketization of wind power? And how are processes of politicization and economization framing the two devices?*

## 1.6 The Devices at Stake

The overall argument of this thesis is that the assemblage of these devices is at the heart of the marketization of wind power. And to attempt to grasp the marketization, the two devices are unpacked; it is in their making, and in their framing, that the boundaries between the political and the economic are drawn. Rather than seeing the devices as having inherent properties, e.g., the feed-in tariff being an economic tool, and the ZDE a planning tool, what is traced is the effects of the devices as they unfold.

### 1.6.1 Feed-in Tariffs

The feed-in tariff as a device is designed to accelerate investments in renewable energy technologies. This is achieved through long-term contracts (for on-shore wind power, it is often 15 years) at a set price or as a fixed premium added to the market price (Couture et al. 2010). The design of the feed-in tariff may take different forms, but they generally entail a guaranteed access to the grid (ibid.). The price is often fixed at a degression rate, i.e., the price decreases over the time of the contract to create incentives for technological cost reductions (Edenhofer et al. 2012). Furthermore, differentiations in tariff-levels are often made according to the type of technology (wind power, solar power, hydro power), capacity/size of installations, resource quality, location, etc. (Couture et al. 2010).

First designed in the US in 1978, the feed-in tariff has spread to a range of countries; the first country in Europe to adopt the feed-in tariff was Germany in 1990 (The Electricity Feed-in Law, or *Stromeinspeisungsgesetz*), followed by Switzerland (1991), Italy (1992) and Denmark (1993) (Mendonça 2007). The most common alternatives to the feed-in tariff are, as mentioned briefly above, call to tender systems and quota-obligations, generally categorized as quantity-based instruments (e.g., Edenhofer et al. 2012).

The French feed-in tariff is designed as a purchase obligation, meaning that EDF is obliged to buy the electricity produced from the wind turbines. The feed-in tariff was first adopted in France in 2001, replacing the *Eole 2005* tendering scheme, and has so far remained the dominant governance model for wind power in France.

### 1.6.2 Wind Power Development Zones (ZDE)

The wind power development zones were an integrated part of the French law on energy policies, POPE (*Programme fixant les Orientations de la Politique Énergétique*), adopted in 2005. The period between July 2005 and 14 July 2007 was made a transition phase during which developers could choose under which legislative framework to operate; however, from 14 July 2007, the development zones became an obligatory framing for wind power developers in France if they were to access the price fixed in the tariff. The development zones are argued to be an important, or even necessary, step towards the further development of the wind power industry in France. Firstly, with the development zones, the local resistance is officially defined as a serious obstacle to the further development of wind power; and secondly, the local communities are engaged in the planning process, which is expected to increase local acceptance and sustain an untroubled development process in the future (Ministère de l'Économie et al. 2006). The design of the zones is made based on the following criteria:

- The wind potential of the zone.
- The possibilities of connecting the turbines to the electrical grid.
- Respect of the landscape, historical monuments, and protected sites.

In contrast to the feed-in tariff, the ZDE was designed and developed by French bureaucrats in the months predating its adoption by parliament. As such, the ZDE was experimental and the outcome of its introduction not entirely foreseeable.

### 1.6.3 The Status of the Devices

The devices, i.e., the feed-in tariff and the ZDE, serve as entry points to the analysis of marketization of wind power. As such, these devices are central to the organization of wind power as a good, all the while organizing the connection of wind turbines to the existing electrical system. As already indicated, this connection entails a technical dimension in which lines, loads, and frequencies are at stake in the meeting between the grid, itself a large and complex assemblage (Karnøe 2012; Hughes 1983; Bouneau et al. 2007; Bennet 2005), and

the turbines. Furthermore, the connection to the grid is also a connection to an economic assemblage with a well-defined distribution of roles and a distinct way of organizing the meeting between supply and demand. However, the notion of ‘connection to’ may allure to an idea of plugging into something, e.g., an already existing and stable system, in this case the grid, a price, or a landscape/territory. With assemblage, no assumptions are made about these existing and stable systems; they are not assumed to remain untouched structures to which one simply connects. Rather, with the notion of assemblage, the idea of a socio-material network with a changing ‘morphology’ is adopted, and the connection of devices may, and is likely to, produce politicizations and economizations of the overall assemblage. In other words, whereas the two devices are only elements of the socio-technical assemblage, their design addresses dimensions of the larger assemblage that they are made a part of.

## 1.7 Brief Description of the French Electricity Sector

Electricity in France seems to have become almost identical to nuclear power. This was true for the interviews I conducted in Denmark before leaving for France, where I was constantly met by quotes such as “*well, France is all about nuclear power*” (e.g., Int. Moesgaard, my translation). Gabrielle Hecht, in the afterword to her now classic work, “The Radiance of France”, portrays sequences of the only televised debate between Nicolas Sarkozy and Ségolène Royal, the two presidential candidates. Sarkozy asked Royal whether:

*“...she would continue to support nuclear power if elected. She replied with her own question: did he know what proportion of French electricity came from nuclear power? Yes, he answered: around 50 percent. No, she retorted, it was 17 percent. Wrong he shot back. Right, she insisted. He changed tack: would she confirm the recent decision to build an EPR (European Pressurized Reactor)? No, she said, she would suspend the EPR as soon as she took office. You would suspend new nuclear plants and prolong the life of old ones? He asked derisively. The EPR isn’t a plant, she answered; it’s a prototype. Did he even know what generation of nuclear technology it represented? It’s a fourth generation reactor, he replied, and it’s not a prototype. Wrong again, she snapped, it’s a third generation reactor, and it is a*

*prototype. Fourth. No, third. You don't know your facts. No you don't know yours"* (debate referred in Hecht 2009: 341).

So, what can we make of this? Well, the fact that nuclear power became an important issue in the only televised debate between the presidential candidates may underscore the importance this technology has been, and still is, granted in France. This is stressed by the battle on knowledge of technology that the two candidates engaged in, and to some extent, were expected to excel in (and their gaffes were somewhat puzzling, says Hecht 2009).

Eventually, none of them were entirely right, nor entirely wrong; France gets approximately 75% of its electricity from a nuclear reactor fleet of 58 pressurised water reactors (OEDC 2010). The approximation of 75% has not changed much over the last years, so even though the fieldwork of this dissertation dates back to 2007 and 2008, and many of the numbers and targets used to describe the energy system referred to throughout this study will appear out-dated, the role and importance ascribed to nuclear power has remained stable.

Apart from the 75% nuclear power, France generates the second highest share of renewable electricity in Europe from large hydropower projects established in the post-war years (Szarka 2007a). The profile of French electricity generation is illustrated in Table 1.2 below:

**Table 1.1: French Electricity Generation**

	<b>TWh</b>	<b>Variation 2010/2009 (%)</b>
<b>Net generation</b>	550.33	+6.0
<b>Nuclear</b>	407,9	+4.6%
<b>Fossil Fuels</b>	59.4	+8.3%
<i>Coal</i>	19.1	-7.6%
<i>Fuel-oil</i>	7.9	+2.7%
<i>Gas</i>	30.0	+24.7%
<b>Hydro-electric</b>	68.0	+9.9%
<b>Wind</b>	9.6	+22.2%

<b>Photovoltaic</b>	0.6	+281.6%
<b>Other renewable (mainly biomass)</b>	4.8	+11.1%

(RTE 2011: 14)

Often described as a latecomer to wind power development (e.g., Szarka 2007a; Jobert et al. 2007), France adopted a tender scheme named Eole 2005, as mentioned above, in 1996. The targeted outcome of Eole 2005 was set at 250-500 MW but had only disappointing results. In 2000, the Electricity Act established a new policy framework for wind power with the adoption of the feed-in tariff, to be discussed in depth in Chapter 4. The development of wind power installations following from this new Electricity Act is illustrated in Table 1.2:

**Table 1.2: Wind Power Production Development**

<b>Year</b>	<b>Annual installation (MW)</b>	<b>Accumulated production (MW)</b>	<b>Energy produced (GWh)</b>
<b>2000</b>	40	61	70
<b>2001</b>	31	92	131
<b>2002</b>	52	144	245
<b>2003</b>	100	244	363
<b>2004</b>	146	390	577
<b>2005</b>	367	757	963
<b>2006</b>	810	1567	2169
<b>2007</b>	928	2496	4140

<b>2008</b>	1081	3577	5653
<b>2009</b>	1136	4713	7800
<b>2010</b>	1253	5966	9600
<b>2011</b>	825	6792	11900

(Syndicat des Energies Renouvelables 2012: 2, my translation)

In 2009, under now former president Sarkozy, France adopted a 23% renewable energy target for 2020 (of total electricity consumption) following the EU Energy-Climate Package of 2008 (OECD 2010). Of this target, wind power is supposed to deliver 25 GW or 10% of the electricity consumption.

In the fall of 2012, France got a new President, Francois Hollande. Already under his presidential campaign, Hollande announced his ambition of cutting nuclear power generation from 75% to 50% of electricity consumption by 2025 (Figaro 2012) and increase investments in renewable energy technologies. However, wind power appears to find itself in limbo at present; recently, the French anti-wind power association, Wind of Anger (*Vent de Colère*), has legally contested the French feed-in tariff for being undeclared state aid. The case has been brought to the European Union's Court of Justice, where it is awaiting decision (Journal de l'environnement 2012; Spiegel 2013).

## 1.8 Outline of the Thesis

Apart from this introductory chapter, this dissertation consists of the following elements:

The following chapter (Chapter 2) outlines the theoretical framework, which I draw upon throughout this thesis. In many ways, the outline is not intended as a genealogy of this thesis but introduces certain discussions from new economic sociology, broadly defined, to eventually elaborate on the strand of research often referred to as constructivist market studies, or the marketization program, that underpin the study. The chapter introduces the

underlying approach to studying markets as socio-technical assemblages, and some of the main concepts of the marketization program are elaborated on.

Chapter 3 presents the methodological reflections concerning the framing of the objects to be followed throughout this thesis, and not least their distribution over time and place. It discusses why this distinct approach to studying markets is seen as the most fertile as well as the consequences of choosing this particular framework. Finally, the chapter presents the process of doing fieldwork and acquiring empirical data underlying the two analyses of this thesis.

Chapter 4 presents a study of the feed-in tariff, and as such, the making of a price for wind power. It does so by introducing new theoretical contributions to valuation in order to frame the discussion of the plurality values and the controversies unfolding around them. Singling out five different contributions to the making of a price for wind power, the study follows the qualification of wind power as well as the folding and unfolding of value and values. During the negotiations of the price, the device itself becomes central to producing issues of concern, among which the landscape becomes one concern and leads to the development of the ZDE, which is discussed in the following chapter.

Chapter 5 presents the analysis of the ZDE-device, i.e., the device for defining wind power development zones in the CdC du Pays de la Serre<sup>7</sup>. In doing so, the dynamics of the device are considered the outcome of two phases: its conception and its practice. Organized around these two phases, the chapter presents the device as politicization, a deliberate attempt at problematizing the association between the landscape and the turbines, as well as creating forums in which the local population may be involved in accepting wind power projects on their territory. Eventually, the practice of the engineers undertaking the process works in quite another direction, and the outcome is better described as an economized landscape, black-boxing the criteria from which the zones are created.

Chapter 6 returns in more detail to the conceptual architecture outlined in the research question, namely marketization, market devices, and politicization and economization. The chapter addresses the ways in which the studies of the two devices contribute to the marketization program as well as the explanatory power derived from these concepts. This is

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<sup>7</sup> CdC is an abbreviation of *Communauté de Communes*, an inter-communal cooperation.

done partly by reflecting on the role of the device as analytical entry points – the cornerstone of the approach adopted here – and finally by discussing these devices as being both prosthetic and habilitation, and how this may be related to underlying processes of politicization and economization.

Finally, Chapter 7 draws out the findings of the studies and points to the more specific contributions of this thesis.

## 2. THEORETICAL FRAMEWORK

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This chapter introduces the underlying theoretical framework of this thesis. Taking an interest in the marketization of wind power, the chapter starts with a brief introduction to the new economic sociology, and the different ways in which markets have been approached, analytically, within this field. This chapter does not provide a genealogy of economic sociology per se, but stresses specific elements central to the development of the perspective on which this thesis builds. Next, the framework mobilized in this thesis is introduced, what we may call constructivist market studies. In doing so, this chapter follows the movement from the opposition towards the singular, universal market structure of economic theory to the different versions of markets found in economic sociology, and in particular, the depiction of ‘market as politics’ proposed by Neil Fligstein, to eventually present the notion of marketization, found in constructivist market studies.

With this presentation of a general framework for studying marketization, the chapter stresses the research agendas this thesis wishes to connect to, as well as its heritage (i.e., science and technology studies and actor-network theory). In particular, it emphasises the notion of devices, and more narrowly market devices as well as the processes of politicization/economization, as these are central to the research question. Finally, it briefly discusses the notion of ‘civilizing markets’, a description used in relation to carbon markets (Callon 2009; McKenzie 2009), but also a concept that may eventually become useful for the discussion on the marketization of wind power.

This chapter operates at a general and introductory level. More concrete and thorough elaborations of the theories will be unfolded and discussed during the analytical chapters.

## 2.1 New Economic Sociology and its Market(s)

As already mentioned in the opening chapter, proponents of the new economic sociology have framed their work as a critique of economic theory, stressing the shortcomings and the lack of ability or will of economists to understand or engage with certain phenomena of economic life. This critique may be formulated as: The economists get it all wrong because their theory of society is simplistic and reduced to a theory of rational action. In general, one could say that what these contributions share is the mobilization of a certain ‘theory of society’ to frame their approach to markets, or economic behaviour more generally (Fourcade 2007: 1025). As such, the underlying claim of new economic sociology is that because of the reductionism of economic theory, economists are unable to provide an adequate description of a phenomenon such as the market. Moreover, it is not only new economic sociologists who have remarked on this shortcoming; economists such as Ronald Coase and Oliver Williamson have brought attention to this flaw within economics. Coase stressed that “*in modern economic theory the market itself has an even more shadowy role than the firm*” (Coase 1988: 7), and Williamson pointed to a similar observation when he, in his seminal work on ‘Markets and Hierarchies’, stated “[i]n the beginning there were markets” (Williamson 1975: 20). This section describes some of the attempts at filling this void, articulated by representatives of the new economic sociology.

### 2.1.1 The Embeddedness of Economic Action

The new economic sociology, it is claimed, was born with Mark Granovetter’s seminal article from 1985, *Economic Action and Social Structure: The Problem of Embeddedness* (Swedberg 1994 and 1997). In many ways, Granovetter’s contribution elaborated Karl Polanyi’s ideas of ‘embeddedness’ (Polanyi 1944). Polanyi, who introduced the notion of embeddedness, used it to describe the economy as immersed in social relations. Consequently, it (the economy) should not, and cannot, be separated from, or be made an autonomous sphere vis-à-vis society as a whole (Polanyi 1944; Block 2001; Machado 2011):

*“One can state the issue succinctly. The kinship, status, hierarchy and political or religious affiliations which underlie these economic structures are not explicable in terms of economizing behaviour – one can only understand them and therefore the functioning of the*

*economy – by in ‘depth’ studies which are social, cultural, and psychological in origin”* (North 1977: 708).

Granovetter, who would later become equally associated with the notion of embeddedness, stressed a somewhat different level of analysis, as his version of this idea has to do with the effects of interpersonal relations on economic outcomes (Granovetter 1985). Granovetter’s contribution has been fundamental to the new economic sociology, as it (re)connects, or anchors, economic action in the social – and thus makes the case for a sociological approach to economic phenomena (Swedberg 1994).

Contributions from the last few decades<sup>8</sup>, following Granovetter’s article from 1985<sup>9</sup>, have generally dealt with the interfaces between sociology and economics and have attempted to bring sociology back into economics, or rather to reposition sociology as a key to the analysis and understanding of economic life. However, it is primarily the direct critique addressed at the economists for not acknowledging economic action as embedded in the social that, according to Granovetter himself, is a demarcation between the new economic sociology and the ‘old’ economic sociology, and thus one key characteristic of the new economic sociology<sup>10</sup>:

*“In general, one of the main differences between the new and the old economic sociology has been precisely that it does not hesitate to attack neoclassical arguments in fundamental ways, whereas the older work kept its criticism rather muted ... My position is that there is something very basically wrong with microeconomics, and the new economic sociology should make this argument loud and clear in the absolute core economic areas of market structure, production, pricing, distribution and consumption”* (Granovetter in Swedberg 1997: 163).

As such, it is less a difference in substance between old and new economic sociology, and more the deliberate critique addressed at the economists that constitutes the difference. Therefore, Swedberg and Granovetter in their suggestion of some key propositions characterising economic sociology embrace contributions from both the old and new: (1)

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<sup>8</sup> Contributions to the field of the sociology of markets have intensified since the early 1980’s (Swedberg 1994; Fourcade 2007).

<sup>9</sup> Major proponents include Granovetter 1985, Zelizer 1994, Abolafia 1996.

<sup>10</sup> For a description of the history of economic sociology, see for example Granovetter (1990), Swedberg (1994), Granovetter and Swedberg (1992).

Economic action is a form of social action, (2) economic action is socially situated, and (3) economic institutions are social constructions (Swedberg and Granovetter 1992). This move from ‘economic’ to ‘social’ is well illustrated in the following description by Fligstein and Dauter (2007):

*“For neoclassical theory, markets simply imply exchange between actors for goods and services. These exchanges are usually thought to be fleeting, with price (i.e. the amount of a commodity that is exchanged for another through the use of a generalized medium of exchange, i.e. money) determined by the supply and demand for the commodity. The problem from the point of view of the sociology of markets is that this type of exchange already shows a great deal of social structure. First, market actors have to find one another. Second, money has to exist to allow market actors to get beyond bartering non-equivalent goods. Third, actors have to know what the price is. Finally, underlying all exchange is the faith that both buyers and sellers have that they will not be cheated. Such faith often implies informal (i.e. personal knowledge of the buyer and the seller) and formal mechanisms (i.e. the law) that govern exchange. Furthermore, market actors are often organizations implying that organizational dynamics influence the market structures”* (Fligstein and Dauter 2007: 112ff.).

So, even though different proponents of economic sociology have difficulties providing a sociological definition of markets, from their point of view, market exchange is premised on a range of social arrangements that are entirely outside the sphere of traditional economic explanation (Fligstein and Dauter 2007).

Central to these contributions are the (re)embedding of so-called economic action in the social: In this tradition markets may be defined as arenas of social interaction in which goods and services are exchanged for money – under conditions of competition (Beckert and Aspers 2011; Fligstein 2001). Definitions of this sort are illustrative of what Zelizer refers to as *“the attack on a common presumption among economists and sociologists alike: what I call the twinned stories of separate spheres and hostile worlds”* (Zelizer 2007: 1059). These separate spheres have traditionally been viewed (by economics and sociology alike) as distinct arenas: On one side an arena of rationality, calculation, and efficiency, and on the other side, an arena of personal relations, sentiment, and solidarity. Furthermore, it is claimed, close contact between these spheres can result in contamination and disorder. Zelizer caricatures this idea of contamination of spheres as: *“Economic rationality corrupts intimacy, and intimate*

*relations hinder efficiency*” (Zelizer 2007: 1059). One of the merits of the new economic sociology is its effort at challenging this dualism by moving towards a ‘social conception of economic activity’ (Zelizer 2007). As such, the new economic sociology has challenged the so-called pact which Talcott Parsons allegedly signed up to with economists: economists get to study the economy, and sociologists get to study society (e.g., Stark 2009; Fourcade 2011).

Whereas the economic sociology described above may be a reaction to the reductionist and under-socialized picture of economic agents and activity, the claim that economic activity is embedded in the ‘social’ has raised other concerns, also from within the expanding field of new economic sociology. One such early critique of the embeddedness-perspective has been delivered by Neil Fligstein, and his emphasis on specific institutions as the main architecture of markets, points to the distinctive characteristics of markets, all the while fleshing out their plurality.

### **2.1.2 Markets as Fields and Structures: Markets as Politics**

This section briefly discusses the work of Neil Fligstein, who, a part from being one prominent contributor to the field of new economic sociology, proposes a very specific programme of markets as politics. Fligstein’s approach to markets carries some family resemblances with constructivist market studies, and thus forms a link to the later discussion of constructivist market studies.

Fligstein’s critical agenda is less oriented towards critiquing the apparent social naivety of neoclassical economics, and rather stresses the lack of theoretical coherency, and clarity, of approaches to economic life within new economic sociology itself: “*The element that holds the field together is its opposition to the neoclassical model of perfect competition*” (Fligstein 2001: 8). The project Fligstein elaborates is partly that of creating some unity in the field as well as creating the foundation on which neoclassical theory and new economic sociology may start to collaborate (Fligstein 2001). In other words, new economic sociology must move beyond concentrating its critical capacities on documenting the shortcomings of neoclassical economic theory. To this end, Fligstein emphasises the importance of a theory of institutions, something that he claims to be missing in (economic) sociology (Fligstein 2001).

Fligstein stresses that a sociological approach to markets should make “*us understand that there is not a single set of social and political institutions that produces the most efficient allocation of societal resources*” (Fligstein 2001: 23). However, the issue at stake is creating the conditions that give rise to the stability that encourages investment. Once the institutional conditions are in place, he says, a variety of ways exist in which firms and markets may be organized to generate profits (ibid.).

Fligstein stresses the need for alternative theoretical frames to make sense of economic processes, including market processes (Fligstein 1996 and 2001). The current presentation of Fligstein’s framework serves the purpose of presenting an attempt at an elaborate and coherent model for understanding, and to some extent, predicting market processes and dynamics. In doing so, Fligstein brings together theoretical perspectives on institution building from politics and sociology (e.g., DiMaggio) in order to produce insights on the kinds of rules necessary to allow markets to exist (Fligstein and Mara-Drita 1996).

Using the metaphor ‘markets as politics’, Fligstein focuses on how market structures are produced along two dimensions: Firstly, he sees markets as part of state-building, stressing the role of the state in creating the institutional conditions for markets as well as their stable functioning; secondly, he argues, market processes are the result of two struggles, struggles internal to the firm as well as struggles between firms:

*“Markets are social constructions that reflect the unique political-cultural construction of their firms and nations. The creation of markets implies societal solutions to the problems of property rights, governance structures, conceptions of control, and rules of exchange”* (Fligstein 1996: 670).

Thus, Fligstein stresses the political and cultural aspects of market-making, and as such, he recognizes the diverse forms markets may take. The diversity of markets springs from the concrete (societal) solutions to a specific set of challenges, and the markets resulting from these solutions are social constructions reflecting the unique political-cultural construction of their firms and their nations. We must therefore expect market resemblances within a nation, though firm-specific diversity will affect individual markets in different ways.

Fligstein’s starting point is to propose institutions, which are preconditions to the existence of markets (Fligstein 1996). These institutions, defined as shared rules that are both formal and

informal, are the basis for the social structure of markets: property rights, governance structures, conceptions of control, and rules of exchange. These categories are meant as general (abstract) types that may appear as laws, understandings, or practices, and they enable actors to organize, compete, and cooperate (Fligstein 1996 and 2001). Each type of institution addresses different problems in the instability of market organization, both related to the creation of markets as well as ensuring stability. *Property rights* define who has claims on the profits of firms and they draw a set of delineations between different actors and their rights to the earnings of the firm. The making of these property rights is stressed as a continuous and contested political process, rather than the outcome of an efficient process (Fligstein 2001). As such, property rights define social relations and stabilize markets by making clear who carries risks and who is entitled to possible rewards (ibid.). *Governance structures* are general rules in the form of laws and informal institutional practices. As rules they specify the boundary between legal and illegal forms of competition by defining relations of competition, cooperation, and organization of firms. Drawing on the institutionalism of DiMaggio and Powell (1983) and Meyer and Rowan (1977), institutional practices are seen as spreading amongst organizations (e.g., as a result of isomorphism). Governance structures are central to the legal and normative rules according to which firms structure themselves as well as their relations to competitors (Fligstein 2001). Thirdly, *rules of exchange* as social structures define who may be part of transactions and the conditions for these transactions. Rules of exchange include rules for common standards, billing, insurance, as well as the regulation of health and safety standards, and they are central to the stabilization of market transactions that would otherwise be haphazard without these rules (Fligstein 2001). Finally, *conceptions of control* refer to forms of local knowledge<sup>11</sup> as historical and cultural products, which frame the understandings as well as the practices about ‘how things work’ in a specific market. This includes the principles for structuring organizations as well as the strategies for competition at play. The interrelations between state building and market building become evident from the descriptions of the four institutions; states, at least those organized as capitalist states, develop rules about property rights, governance structures, and rules of exchange as a means of stabilizing markets; they are arenas on which states establish rules for economic actors. And it is the enforcement of these laws that affects “*what conceptions of control can produce stable markets*” (Fligstein 1996: 660).

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<sup>11</sup> Here Fligstein draws on Geertz’s notion of ‘local knowledge’ (Geertz 1980 and 1983).

For Fligstein, the ‘stability’ of markets is the aim of the development and enforcement of rules by states. He stresses three phases of market formation: emergence, stability, and crisis. Though the phases may seem slightly simplifying, they feed into Fligstein’s metaphor of the market as politics: “*Differing conditions of market stability produce different kinds of politics*” (Fligstein 1996: 663). Stable markets have well-defined identities and status hierarchies, and firms resemble one another. In emergent markets, Fligstein argues, politics often resembles social movements, and the conditions are open and fluid. With the emergence of these new markets, all interorganizational relations have to be constructed, and markets are always the outcome of these projects of institutionalization: “*In this way, markets are social constructions. Making these institutional projects successful is inherently a political project*” (Fligstein 1996: 664).

To sum up Fligstein’s contribution to new economic sociology, he directs his critique at his own field rather than that of economics: “*Sociologists must go beyond documenting the shortcomings of the neoclassical model*” (Fligstein 1996: 657). Or, as he states elsewhere, one of the major reasons why economists ignore work from the field of economic sociology is that they have failed to develop ‘alternative theoretical tools’ to explain (or make sense of) economic processes (Fligstein 2001). Furthermore, even though Fligstein does not subscribe wholeheartedly to the idea of ‘embeddedness’ (Fligstein 1996, 2001), he replaces this notion with another set of explanations that remain inside the sphere of ‘the social’, and thus eventually holds on to the idea that economics should be, in some sense, embedded in sociology, which is seen as a meta-discipline ‘owning’ the core material of the field of economic life: that is ‘the social’.

From Fligstein’s project, at least two central contributions should be stressed: Firstly, his work illustrates the detailed and elaborate work and the numerous negotiations that go into the making and stabilization of markets, and thus allows for the identification of a number of different starting points for studying markets and their making. Secondly, Fligstein’s project clearly demonstrates the ‘pluralism’ of markets as the contingent effects of the institutions constituting the architectural building blocks of his markets as politics. The marketization programme presented in the following shares the general conclusions of markets as both plural and negotiated, but in doing so, it expands the architecture and thereby also the possible sources for their plurality.

## 2.2 Markets as Constructed – Towards Socio-technical Assemblages

The marketization programme presented in the following section may be seen as the synthesis of the last twelve to fifteen years of growing contributions to the emerging field of constructivist market studies. Often referred to as the crucial motivator of this strand of research, Michel Callon's collection 'The Laws of the Markets' was published in 1998 as a collection of essays, including articles by key contributors from the new economic sociology (e.g., Mark Granovetter, Viviana Zelizer, and Mitchel Abolafia), as well as authors representing a constructivist perspective (e.g., Michel Callon, Franck Cochoy, and Peter Miller) (Callon 1998). As such, the volume brings together authors taking an interest in the ways markets are shaped, put together, and assembled in a broad sense. In the opening chapter of the volume, Callon raises an elaborate critique of the new economic sociology: They have replaced the under-socialized image of economic activity of economics with the over-socialized image of economic sociology. By stressing the embeddedness of market behaviour, one risks losing sight of what constitutes economic and calculative behaviour altogether (Callon 1998a and 2008; McFall 2009). Instead, what Callon proposes is an alternative programme: To study markets at the intersection of economic sociology, science and technology studies (STS), and more especially actor-network theory (ANT).

This branch of literature, sometimes referred to as the 'new' new economic sociology (McFall 2009), is often presented as expressing a rather different perspective to that informing the overarching agenda of economic sociology, namely, placing 'the social' at the heart of the study of the economy (Fligstein and Dauter 2007; Zelizer 2007)<sup>12</sup>. The ambition of constructivist market studies extends beyond the instatement of sociology as the prime motor of explanation for economic processes; rather, it seems to address the economic sociologists (even more than the economists) and criticizes the replacement of *homo economicus* with *homo sociologicus* (Callon 1998a; Callon 2008). According to Caliskan and Callon, because of the ambition of the new economic sociology "to embed the economy in society and economics in sociology" (Caliskan and Callon 2009: 383), a number of important questions about the constitution and operation of markets have been pushed into the background. In

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<sup>12</sup> There seems to be a tendency to limit the contribution of the anthropology of markets to the idea of 'performativity', or performance (Zelizer 2007; Fourcade 2007; Fligstein and Dauter 2007).

deconstructing markets and analysing them as elements of ‘the social’, it fails to account for the particularities of market relations:

*“Do we explain something by dissolving the object to be explained in another general and controversial frame – society? The explanans being fuzzier than the explanandum, this approach leaves us with a more complicated question: what is society made of? Is it really satisfactory to limit the answer to the usual ‘sociological list’ without mentioning and analysing socio-technical assemblages and things that circulate from hand to hand? What would an economy be without commodities and their physical properties and materialities?”* (Caliskan and Callon 2009: 383ff, emphasis in original).

Thus, the critique promoted by the advocates of constructivist market studies is not primarily targeted at economics as a discipline, and in particular its inability to account for the ‘social’ element of markets. Rather, the critique is addressed at economic sociology and the ways in which ‘the social’ is overemphasized, and the practical nuts and bolts of market-making – their distinctive assemblages and modes of operation – are hence under-developed. The ambitious programme announced by Callon in ‘The Laws of the Markets’ is one which simultaneously brings back the economic actor, all the while extending its ontology; an actor is *“made up of human bodies but also prostheses, tools, equipment, technical devices, algorithms, etc.”* (Callon 2005: 4). Economic agencies, from this perspective, are materially and technically distributed, and spatially and temporally diverse (McFall 2009); in other words, they are socio-technical assemblages endowed with specific and non-reducible capacities (Callon et al. 2005; Callon et al. 2007; MacKenzie 2007 and 2009a; McFall 2009). As such, proponents of constructivist market studies may seek to disembed the actor of economic sociology from her social ties, at least as a predefined explanation for action. However, agency as a socio-technical assemblage implies other kinds of networks rather than the purely social. As an illustration of these networks, I will now turn to the issue of calculative agency, market devices, and performativity. These elements are central to the following analyses, and they are the premises on which the marketization programme is largely founded.

### 2.2.1 Calculative Agency

According to Callon, at the heart of the market lies calculation (Callon 1998a). But seen from the perspective of constructivism, the ability to calculate is not an inherent feature of man<sup>13</sup> – or of *homo economicus*. The root of what Callon chooses to call ‘calculativeness’, following Oliver Williamson, cannot be explained simply by cognitive or institutional competences. Rather, calculativeness is an effect of networks made up of social ties as well as distinct instruments and tools. Again, the contribution made by proponents of the marketization programme in regard to their description of calculativeness is found at the nexus between the under-socialized agent often portrayed by economics, by whom calculativeness is made part of human nature, and the over-socialized agent of sociology, describing calculation as rationalizations made ex post. In other words, calculativeness is neither an inherent capacity of humans per se, nor something we can simply ignore or disregard; rather, the sources of calculativeness lie in the nature of the equipment of agencies (Callon 1998a). As Muniesa and Callon suggest, “[e]conomic calculation is not an anthropological fiction, precisely because it is not a purely human mechanical and mental competence; it is distributed among human actors and material devices” (Callon and Muniesa 2005: 1245).

To Callon and Muniesa, enabling calculation in markets consists of three analytically different elements, namely, making goods calculable, making agents calculative, and lastly, organizing the calculative encounter (Callon and Muniesa 2005). Together these three elements “define concrete markets as organized collective devices that calculate compromises on the value of goods” (Callon and Muniesa 2005: 1230). The three elements that correspond to the stages of a process include sorting out or detaching the relevant entities and arranging them within a single space. Examples of single spaces are a shopping cart, an invoice, or a grid (ibid.). Moreover, the entities are associated with one another; relations are created between them through manipulations and transformations. Lastly, the result is extracted. This result – or this new entity – whether in the form of a sum, a ranking, a calculation, etc., corresponds precisely to the relations and manipulations performed in the previous stages (Callon and Law 2005). In other words, it is nothing other than the effect of the manipulations and associations it has been submitted to.

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<sup>13</sup> This is arguably the assumption made by neo-classical economics: “Agents calculate because they are calculative by nature” (Callon and Muniesa: 1229).

This description of calculation implies at least three characteristics of calculation; it illustrates the calculation as not a purely quantitative matter, but a process that links the quantitative with the qualitative – or calculation with judgement (Callon and Muniesa 2005), one version of which Cochoy has named ‘qualculation’<sup>14</sup> (2008). Furthermore, the role of devices is stressed; the existence of calculative agencies correlates closely with that of calculative tools – they are a prerequisite for calculativeness (Miller and O’Leary 2007).

Calculable goods, then, are an outcome of distributed agencies whose “*encounters are organized and stabilized to a greater or lesser degree*” (Callon and Muniesa 2005: 1245). The organization is provided by so-called algorithmic configurations that perform a variety of functions: They draw the configuration of calculative agencies participating in a particular encounter, they organize the links between agencies, and they outline the ground rules of ordering connections (Callon and Muniesa 2005; Araujo 2007).

### 2.2.2 Market Devices

In the following chapters of this thesis, market-making will to a large degree be followed through the analysis of devices, or *dispositifs*. In sociology, Foucault is usually credited for the introduction of the notion *dispositif* (commonly translated into device in English) (Beuscart and Peerbaye 2006; Raffnsøe and Gudmand-Høyer 2005; Callon et al. 2007); Foucault sees the *dispositif* as a network that can be traced between different elements in:

“*a thoroughly heterogeneous ensemble consisting of discourses, institutions, architectural forms, regulatory decisions, laws, administrative measures, scientific statements, philosophical and moral propositions – in short, the said as much as the unsaid*” (Foucault, from Dumez and Jeunemaître 2010: 30).

Extending the Foucauldian understanding of the notion to science and technology studies, and stressing the heterogeneity of the assemblage as also pointed out by Foucault, the device is used to designate all of these socio-technical assemblages of humans and non-humans, pointing to them as action programmes (Latour 1996), or as scripts, inscribed into objects (Akrich 1992). With the notion of the *socio-technical* device, the distribution of agency as

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<sup>14</sup> With the notion of qualification, Cochoy points to qualification as a prerequisite of calculation (Cochoy 2008; Callon and Law 2005).

well as its materiality is brought to the forefront, and it is a notion close to that of agencement: *“An agencement is constituted by fixtures and furnishings, by elements that allow tracing lines and constituting a territory”* (Muniesa et al. 2007: 3). These fixtures and furnishings and the territory that emerges are central to the distribution of roles and identities, as well as defining the relations between them. Accordingly, for a device to be a market device, or an agencement to be a market agencement, the framing of, for example, goods, agencies, and encounters are central. The stock ticker analysed by Alex Preda illustrates this point rather well; it redraws the boundaries between different groups, such as brokers (official and unofficial) and ticker-operators, as well as stimulates the competition between the New York and the London stock exchange (Preda 2006). Whereas the stock ticker may be analysed as a telecommunication device, it could also be analysed as a market device; it reconfigures the role and identity of traders as well as the premises of competition. As such, the status of the devices as a market device is an empirical question. In other words, *“[w]e can imagine that there are several kinds of agencements that do not need to be economic in nature, but they can turn economic through some aspect”* (Muniesa et al. 2007: 3), and as such, devices may be central to the construction of ‘economization’, i.e., something which renders objects or behaviours economic:

*“Market agencements are one kind of economic agencement. Like any other socio-technical agencements involved in a process of economization, markets contain devices that aim at rendering things more ‘economic’ or, more precisely, at enacting particular versions of what it is to be ‘economic’. Emphasis is put on the conception, production and circulation of goods, their valuation, the construction and subsequent transfer of property rights through monetary mediation, exchange mechanisms and systems of prices. Market agencements detach things from other things and attach them to other things”* (Muniesa et al. 2007: 4).

These detachments/reattachments are characteristic to the market agencement as one distinct form of economic agencement, stressing the circulation, pricing, and exchange of goods.

Finally, the analysis of often heterogeneous market devices calls for attention to be paid to the knowledge or expertise mobilized for their production; acknowledging that markets are simultaneously objects and products of economic research (Muniesa et al. 2007), the notion of performativity is intimately linked to the role and construction of market devices.

### 2.2.3 The Performativity Programme

One of the major elements in the constructivist market studies programme is the notion of performativity. Resonating with a general upsurge of interest within the larger STS ‘community’ in studies of performativity, studies of the effects of ‘economics’ on the ‘economy’ has sparked great interest in the last fifteen years and has proved particularly fruitful within the studies of financial markets (e.g., McKenzie and Millo 2003; McKenzie 2004; Beunza and Stark 2004). The upsurge in interest in this phenomenon is often linked to Callon’s (1998) “The Laws of the Markets”, in which he argues “*that economics, in the broad sense of the term, performs, shapes and formats the economy, rather than observing how it functions*” (Callon 1998a: 2). In other words, economics is seen as a technology that is involved in the production and reproduction of markets. When Callon argues that homo economicus exists, it is because he/she has been framed, formatted and equipped; and economists are often a central part of constituting this ‘creature’ of their theories.

The objects of economic theory, such as detached goods, rational agency, and calculative behaviour are all part of the reality of the economy, but they are made to happen (Callon 2007b; Cochoy 2007). For markets to work, they must become ‘practical enactments’ of the models of economists (Holm 2007). This approach has been criticized for eventually returning to simply a defence of the economist’s position (e.g., Miller 2002), and seeing “*the market as an ideological model rather than an empirical core to economic activity*” (Miller 2002: 219), something that Miller claims has been demonstrated through anthropological and sociological studies. In particular, the disentanglement that Callon claims to be a first requirement for market transactions to be undertaken is basically impossible to Miller (2002).

In a response to Judith Butler, who raises the question of whether the performativity of economics does not imply a depoliticization of questions of the economy (Butler 2010; Callon 2010), Callon discusses two relations between the performativity of economics and politics (Callon 2010). Firstly, he stresses the plurality of models and theories to account for and describe different aspects of market functioning. Theoretical frameworks, e.g., evolutionary models, are not the same as those proposed by neo-classical models (ibid.), and accordingly, there is room for negotiations regarding the type of models according to which a given market is conceived and enacted. These negotiations imply a political debate in which economics is one stakeholder (ibid.). This relation between politics and economics corresponds to a

‘political engineering’ of markets, involving the creation of institutions, procedures, and devices (Callon 2010, see also Callon et al. 2001). Secondly, this relation reaches beyond markets as instruments for political action, i.e., the engineering project: “*Saying and doing the economy means entering into the agonistic field where the delimitation-bifurcation between the economy and politics is constantly being debated and played out*” (Callon 2010: 165). It is because the economy is being performed, i.e., implying one definition of the economy and thereby leaving some things out of this definition, that counter programmes may emerge which attempt to redefine and redraw these boundaries (ibid.).

These ideas of what may be summed up as market design and the drawing of boundaries between the economy and politics is further elaborated in what remains of this chapter.

### **2.3 Marketization**

In their article from 2010, Caliskan and Callon build on the numerous studies undertaken under the broad heading of constructivist market studies to flesh out what they call the marketization programme. This approach implies a replacement of the object to be studied from ‘the economy’ to ‘economization’ or from ‘the market’ to ‘marketization’ (Caliskan and Callon 2009 and 2010). This shift implies looking at new places as well as a different ontology. Instead of taking the economy or markets as starting points, the perspective to be unfolded here is based on the premise that these entities, i.e., the economy/markets, are achievements or resulting arrangements, rather than pre-existing realities that may serve as starting points for an analysis of the market (Callon 1998; Caliskan and Callon 2009). More precisely, speaking of economization or marketization, the conjugation of the words stresses the distinct activities and investments undertaken to render something economic (Caliskan and Callon 2009).

To define markets, Caliskan and Callon take their point of departure in a generalized perception of markets as institutions, enabling the production of values through the organisation of competition. Markets are socio-technical assemblages and have the following characteristics (Caliskan and Callon 2010):

- They organise the conception, production, and circulation of goods (and services), as well as the transfer of the goods during which property rights are exchanged for monetary compensation.
- They are heterogeneous; i.e., made up of rules and conventions, technical devices, logistical infrastructures, discourses, etc.
- They delimit the space in which confrontation and power struggles flourish until they are peacefully determined by pricing mechanisms.

The definition maintains an openness towards the diversity of markets, which acknowledges that markets are organised and configured in many possible ways. As an approach to the study of markets that allows for an appreciation of their plurality, Caliskan and Callon point to five focal points of the process of marketization to be presented next.

### **2.3.1 Marketization as Five Types of Framing**

How does one then approach marketization? Given that they view a market as a distinct arrangement configured by a specific marketization process, Callon and Caliskan (2010) point to five types of framings crucial to the diversity of markets:

1. Pacifying goods
2. Marketizing agencies
3. Market encounters
4. Price-setting
5. Market design and maintenance

These five framings may provide the focal points that Callon and Caliskan argue (2010) to be necessary for understanding the process of marketization. In the following, these five framings will be unpacked.

#### ***Framings 1-3: Goods, Agencies, and Encounters***

The existence of markets are premised on the distinction between the ‘things’ to be valued and the ‘agencies’ capable of valuing them (Caliskan and Callon 2010). This ontological

divide is by no means given or natural but an effect of the arrangement it is part of. Thus, pacifying things, and enabling the transfer of property rights, requires the disentanglement of objects from their previous connections (Thomas 1991) to be attached or re-entangled with their new owners (Caliskan and Callon 2010). Thus, the emphasis put on the role of property rights (as seen in Fligstein's contribution above) is accentuated within the marketization programme, but more importantly, the (often) material process of disentangling and re-entangling goods is stressed. In the case of wind power, for instance, disentanglement through the grid is crucial as a first step in the transfer of electricity, but not more specifically than the meters counting the consumption of the individual consumer. Technical devices, such as transformer stations, grids, and meters, etc., partake in the framing of goods, agencies, and their encounters, enabling detachment from the site of production as well as keeping identities in place (e.g., the consumer as a certain sort of person through their meter), and finally, making the electrons behave in controlled and predictable ways<sup>15</sup>.

Pointing to the agencies stresses the 'key characteristic' of marketization, namely, the diversity as well as multiplicity of actors competing and participating in the definition and valuation of goods (Caliskan and Callon 2010). Empirically, we associate a range of concrete actors with markets, e.g., firms, trade organisations, consumers, etc., but the diversity of possible configurations is potentially much wider and should be part of an empirical analysis of any individual case; "*the classification of the different forms of agency is a finishing point, not a starting point of investigation*" (Caliskan and Callon 2010: 10). To capture the diversity (and heterogeneity), as well as the compound character of these agencies, the notion of agencement is mobilized. One reason for the introduction of the notion of agencement<sup>16</sup> is to overcome the so-called agency/structure divide, often found in the sociological tradition (Caliskan and Callon 2010; Hardie and MacKenzie 2007; Muniesa et al. 2007). The divide between agents and things, or those arranging and that which is being arranged, is overcome with the notion of agencement: "*agencement is arrangements endowed with the capacity to act in different ways, depending on their configuration*" (Caliskan and Callon 2010: 9). Furthermore, the notion addresses a second divide that is quite central here at the inter-section between the rational individual, homo economicus, of economic theory, and the embeddedness of the agent presented by the (economic) sociologist, discussed in the opening

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<sup>15</sup> For an account of a breakdown in control and predictability of the electrons, see Bennet 2005.

<sup>16</sup> To develop the notion of agencement, Callon and others draw on the work of Deleuze and Guattari (1980).

sections of this chapter. In the present work, I remain, however, with the notion of assemblage to stress the work of making the connections, which go into the making of wind power markets. I believe that the notion of assemblage better captures the work, over time and space, of making connections between different devices and the material infrastructure of the market: the grid. This does not mean, however, that I wish to do away with the ideas underlying the agencement stressed by Callon, but simply that the present thesis wishes to stress one particular aspect of the emergence of agencement.

Framing goods, agencies, and encounters creates the lines between what is inside the assemblage and what is outside, as well as setting the scene for and enabling the transactions of goods. Also, these three framings shape the marketization in its generality, but to allow for transactions to happen, goods must be priced.

#### ***Framing 4: Price-setting***

The existence of markets implies that valuations are taken into the form of prices (Caliskan and Callon 2010). Fixing prices<sup>17</sup> has, since Weber, been described as a struggle between men, eventually to be solved peacefully (Weber 1978; Stark 2009; Caliskan and Callon 2010). A price is an estimated quantification (see also Espeland and Stevens 1998 and 2008 for a somewhat similar notion of commensuration) that calls for the mobilization of calculation devices, which then become central to struggles of defining value. A number of studies have emerged over the last decade, particularly within the social studies of finance, stressing the role of calculative tools/methods, employed to calculate prices, e.g., the Black and Scholes formula (MacKenzie 2006), or the role of existing valuation formulas in the issuing of shares for emerging companies (Beunza and Garud 2007). Fixing prices are thus intimately linked to calculativeness, and not least the equipment that allows agency to become calculative (see above). Acknowledging that studies on price-setting are still rare, Caliskan and Callon point to two facts emerging from these studies: Firstly, the existence of a multiplicity of prices in markets at a given point in time, which are produced in different places and by different agencies (see for example Caliskan 2007). Rather than ignoring this multiplicity, we should take this opportunity to study forms of organization and their effects on pricing (Caliskan and

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<sup>17</sup> The fixing of price is the main object of analysis in Chapter 4 and will be elaborated on both theoretically and empirically there.

Callon 2010). Secondly, and related to the first fact, prices are calculated from other prices. Caliskan proposes the notion of *prosthetic prices* of those prices used as inputs to derive *actual prices*, i.e., prices used to seal a transaction (Caliskan 2007).

### ***Framing 5: Market Design and Maintenance***

The dynamics of markets, including their design, implementation, and maintenance, are closely linked to the work of economists and economic theory, discussed above under the heading of ‘performativity’. Studying market design implies studying knowledge developed and mobilized as a way of managing markets (e.g., Kjellberg and Helgesson 2006; MacKenzie 2006). But to Caliskan and Callon, market design (and performativity) may be gradually extending beyond the realm of economics and forming a ‘collective engagement’ (Caliskan and Callon 2010). For example, the involvement of actors outside economics, such as natural scientists, in the making of carbon markets has been investigated in a number of articles (MacKenzie 2009a and 2009b; Blok 2011; Callon 2009). However, this collaboration as a collective engagement leads to a proliferation of matters of concern, which come about as the effect of making market designs. This prediction of a new role for markets, referred to elsewhere as ‘civilized’ (Callon 2009), lends itself to studies of marketization and is discussed in more depth under the heading of politicization and economization.

## **2.4 Hot and Cold; Politicizing and Economizing**

*“There is [...] a great deal to be gained from considering marketplaces as yet another sort of assembly and from detecting their many techniques of representation. No matter how much effort they might make to look “natural”, they are always fully inside the domain of politics. So much that a close inspection of their ways of gathering, deciding and enforcing their edicts might go some way toward enriching the usual definitions of politics” (Latour and Weibel 2005: 613).*

In this final section, the contributions of Callon and others toward an understanding of the political and the economic as effects are discussed. According to Latour and Weibel quoted

above, the studies of market configuration may enrich the way we think about politics. But first, I will follow up on the discussion hinted at in the previous chapter – the discussion of what is meant here by politics or the political – and I will draw a distinction between the two. Andrew Barry’s discussion of politics/political is a good starting point; from what he calls a conventional definition of politics as “*all those kinds of institutions, agencies and practices broadly associated with international, national and local government*” (Barry 2002: 268), he identifies two distinct dimensions of what is commonly referred to as politics: On the one hand the technicality (or what Barry calls the physics) of politics (e.g., press conferences, parliamentary debates, opinion polls, etc.), and on the other hand contestations and conflicts. To see the full scope of politics, we must see both contestations and its containment: “*It [politics] is about the possibility of governing and about questioning and disrupting the conditions for government*” (Barry 2002: 270, emphasis in original). It is about conflicts as well as their resolution. Therefore, Barry proposes, it may be fruitful to distinguish between politics as the technical practices and institutions, and the political as an “*index of space of contestation and dissensus*” (Barry 2001: 7). For something to be political, it must then be open to possible disagreements or conflicting views coming to the surface. Following this distinction, politics will (often) be deeply anti-political in its effects, in as much as it delimits the space of potential conflict and debate.

Barry then asks the question of the specific relation between politics, technology, and the economy: In what ways may the operation and organization of markets become either a political matter or be prevented from becoming one?

*“In sociology, from Weber onwards, calculation is often regarded as an essentially anti-political instrument, in the sense used here. Calculation is thought to reduce the space of the political and to limit the possibility for disagreement. When situations become calculable it is taken to indicate the fact that political contestation has ended”* (Barry 2002: 272).

This description of the calculable situation resembles the *framed* situation described by Callon in his ‘Laws of the Markets’ (1998b). Calculation is not possible without framing; it is the framing that allows the ‘states of the world’, possible actions, as well as the expected outcomes of these actions to be recognized (Callon 1998b). However, no framing is universal, and overflows of the frame are always possible. Using pollution as an example of an overflow, i.e., something that would often exist outside the frame of economic calculation,

Barry illustrates how pollution as an overflow may be brought inside the frame (and thus be made calculable) through the introduction of pollution monitoring devices, tax differentiations between more or less polluting fuel forms, or measurements of different cars' fuel efficiency. While this reframing may change the situation for a potential car buyer by informing him of a new set of properties of the car he considers buying, it reduces the space of potential conflict. When car buyer and seller meet, these translations of pollution have been made calculable, and the transaction can be undertaken without political conflict: “[t]he political differences and moral dilemmas of car buyers have been partially resolved elsewhere” (Barry 2002: 273). The transaction can proceed because the world has been translated into stable properties and been made calculable.

However, measurement and calculation are not only restricting political controversy in the economic fields. They may also open up to the political, i.e., they may spark controversies and disagreement (Barry 2002)<sup>18</sup>. The notion of commensuration, proposed by Espeland and Stevens (1998 and 2008), hints at the efforts and negotiations underlying the identification of common metrics, something which is a prerequisite for calculations:

*“Commensurations creates a specific type of relationship among objects. It transforms all differences into quantity. In doing so it unites objects by encompassing them under a shared cognitive system ... Commensuration always is a process, often one that requires considerable social and intellectual investment”* (Espeland and Stevens 2008: 408).

Commensuration implies classification in such a way that things become comparable; this may appear simple when there is agreement on the similarity of the things to be commensurated (an example of a well-framed situation). However, at other times commensuration is about creating relations between things which are generally not perceived as comparable; conflicts and negotiations are likely to surface (as in cases where the framing is still fragile).

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<sup>18</sup> Barry stresses two issues where calculation and measurement may become sources for the political to raise; namely, the fragility of metrological regimes and the inventiveness of measurement. The former underscores the fragility of the standardization of metrological systems in the wake of more complex situations. The latter stresses that measurements have performative and regulative consequences (Barry 2002).

As a description of the prevalence of overflows in specific situations, Callon introduces the metaphor of ‘hot’ and ‘cold’ situations. In ‘cold’ situations, overflows are easily resolved and reframed. Possible world states are easily identified – or already known – and calculated decisions can be taken (Callon 1998b). In ‘hot’ situations, on the other hand, everything is controversial, including the identification of the overflow, its possible sources, the ways effects may be measured, etc. Furthermore, Callon adds that ‘hot’ situations are becoming increasingly more common and more pervasive – partly as a consequence of the spreading of the technosciences – but more importantly, they are exceedingly difficult to cool down: “*Externalities are at the centre of public debates with no obvious conclusions*” (Callon 1998b: 263). It is thus the claim of Callon that stable and robust framing, though maybe still the prevalent condition, is increasingly being confronted through the detection and identification of overflows.

Following Callon, Fabian Muniesa has elaborated on the discussion of the thermal metaphor, and he brings us full circle, back to the distinction between the political and the economic, as he discusses links between processes of politicization and economization:

*“To politicize something can mean a lot of things: to foster partisanship in the consideration of that thing, to discuss what to do about it in a way that is open to dissent and disagreement, to impose a differentiated will in the orientation or in the determination of that thing, to appraise that thing not only in itself but as part of a collective world. To economize something can also mean a lot of things: to subject this thing to a measure of rationing, to make this thing prone to calculation, to provide ground for a rather univocal assessment of this thing, to reduce the amount of collective energy and attention that this thing calls for. From all the contrasts that these profusions of meanings may suggest, I propose to pick this one: politicizing is to economizing what heating up is to cooling down”* (Muniesa 2011: 337).

Rather than discussing politicization and economization as operations or actions pertaining to distinct domains, Muniesa stresses that the processes point neither towards a distinct origin, nor a distinct domain for their resolution. An example in which we find both economizations and politicizations is climate change; scientists attempt to measure and predict the effects of melting poles, distribute these effects between ‘consequences of human activities’ and ‘a hot summer’, and distinguish emission allowances between developed and developing countries. These actions are close to economization. On the other hand, the recent and shocking decrease

of Greenland's ice sheet contests the measurements and predictability of climate change, imposing immediate threats on coastal villages and polar bears. It has sparked a politicization of the emerging understanding of climate change and its effects.

Taking the example of the creation of carbon markets, Callon stresses how the construction of this market produces matters of concern that nobody knows whether to address politically, economically, or techno-scientifically (Callon 2009). Different gases and their effects as well as opposing market designs and the inequality of the distribution of effects associated with climate change are all issues in the midst of the carbon market design, and as such, organizing markets potentially include a "*set of actors who were formerly on the fringes of markets and are now at their centre*" (Callon 2009: 546). Using the example of carbon markets, Callon illustrates how markets may produce matters of concern as well as how they may take these issues into account in their organization. This prompts him to suggest a new and civilized form of market:

*"They will force us not only to revise our market theories and our common conceptions of their functioning but also, above all, to alter our ways of distinguishing political and economic processes. As I have shown elsewhere, these markets of a new kind, which seem more open and civilized than those to which we are accustomed, combine devices that we previously attributed either to the economy or to expression and political action"* (Callon 2009: 544).

With this ambitious claim on behalf of markets, I leave the unpacking of this theoretical programme for the coming analyses. The strength of the marketization programme, not least to the study at hand, is its focus on processes of *rendering* markets, as well as its openness to the elements of this process. Agency is neither ascribed to the individual (rational) human being, nor is it simply a human being embedded in social ties, institutions, or conventions. Rather, agency is made up of humans, tools, equipment, and devices; it is a socio-technical assemblage, and as such, any study of such an entity may find its starting point in various locations. However, if we accept this premise of the socio-technical assemblage, we are impelled to inquire into its configuration; because it is only through empirical studies that we can get closer to their making and their plurality. Therefore, bringing the marketization programme on board implies a move from theorizing and modelling economic behaviour to

detailed studies of negotiations, tools and devices, and eventually matters of concern, as they emerge – and are tackled – via their marketization.

The analytical framework developed in this thesis, made possible by the marketization programme, makes devices the analytical entry points to the production of insights of market making activities and their effects. Furthermore, it draws attention to the underlying struggles of defining boundaries between questions to be tackled through politics – and questions to be solved by economics; or in other words, to inquire into processes of politicization and economization. But by acknowledging this non-reductionist approach, proponents of the marketization programme are left with quite a bit of work to do in narrowing down and delimiting their object of research, something that is the subject of the next chapter.

### 3. METHODOLOGICAL CONSIDERATIONS

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The following chapter outlines the methodological injunctions informing this thesis. As such, this chapter is intended to tie together the preceding chapters and extend the rationale of the inquiry they have initiated, not least by beginning to unpack the empirical field and the data examined in the chapters to follow. Located within a constructivist theory programme, as described in the preceding chapter, the aim is not to account for the ‘accuracy’ of an existing reality depicted in the study, but rather to describe my ‘ordering’ of French markets for wind power. This ordering, as an activity, points to the reflexivity of the process of doing research and prompts questions as to how the material at hand got ordered in the manner it did (Law 1994). In what follows, this ordering is described as a gradual crystallization of an object of research as something which may resemble a chronological account, but a process which has continuously moved back and forth between theory, fieldwork, and the formulation of a research question (see Andersen et al. 1995). In this sense, there is no intention to depict a linear process of a research project, but rather to describe its choices and challenges as they appeared over time, and to stress the gradually emerging understanding of what a marketization of wind power could mean and practically entail.

As such, I will begin by describing the assemblage of the object of research, both as a product of being interested in the phenomenon of the ‘political market’ as well as the distinct understanding of markets outlined in the previous chapter. Without presenting all the detours and retours of the ‘tiresome journey’ out of which this study has grown, I will begin to draw out the distinctive way of approaching marketization developed here. This also means that a description of the marketization of wind power could potentially have appeared in a variety of ways. The argument stressed here is that the methods I have used, and the way I have gone about doing my fieldwork, is intimately linked with the results I produced: “*We can distinguish a way of acting, and discuss it by itself; but the way exists only as a way-of-dealing-with-material*” (Dewey 1916: 165, emphasis in original). This chapter is dedicated

precisely to ‘the way of acting’, i.e., the methods as phrased by Dewey; however, as he insists, this way exists only in connection to the material at hand. In other words, this chapter provides a description of the ways in which the material and the methods have become mutually constitutive.

### **3.1 Towards an Object for Research**

The underlying curiosity feeding this study is framed by two contrasting discourses. On the one hand, the way in which market failure is routinely blamed for creating the issue of global warming (the most prominent being Stern 2006), and on the other, an insistence that the market provide the best means for organizing possible solutions to this issue, e.g., renewable energy technologies. One result of this ‘double shuffle’ is the creature referred to as the ‘political market’, something which I conceptualize via the view of markets as assemblages, but a notion that seems to imply a knitting together of two distinct, and easily separable, spheres: politics and economics. However, by drawing on the idea of the market assemblage, as outlined in the previous chapter, agency is seen as being the effect of heterogeneous networks. This is constitutional to the framing of the research object. What allows wind power a role or status as an economic good, not to mention the exchange of wind power between producers and consumers, is a web made by the electrical infrastructure, i.e., the grid, transformer stations, rules and legislation on roles and identities of those involved in generating electricity, and the maintenance of the market setup. The notion of the political market seen from this perspective becomes a somewhat odd creature; it seems to single out and praise two distinct domains, the political and the economic, rather than acknowledging the heterogeneity of the elements which make up the network. Most, if not all, of the nodes in the network could easily be tied to the sphere of politics, or economics, or technology, etc. But rather than discarding the claim that wind power markets are political markets, I have chosen to follow some of these devices that are simultaneously central to the functioning of the market, and on the other hand, devices that are seen as (politically) prosthetic in some way.

Taking an interest in the notion of the political market prompted me to inquire into the making of a price and the ways in which the value of wind power is negotiated. Theoretically, the label ‘political market’ is first and foremost associated with the tariff, a price regulated to reach specific ends. During some of my early interviews, I encountered rather different accounts of what a price is seen as representing, e.g., a politically tinkered number (Int. Durant and Int. Lawaetz) or a well-qualified, calculated, objective ‘valuation’ (e.g., Chabot 2000). These different versions of a price, for instance, as a feed-in tariff, represent an underlying theme in Chapter 4, which stresses the valuation of wind power in France.

Furthermore, I was curious about the ways in which the grid contributed to the framing of wind power, or one could say the specific politics of the grid, and the first round of interviews I conducted included meetings with several grid operators such as Energinet.dk, RTE<sup>19</sup>, and EDF. These interviews focused on the specific ways in which the infrastructure connects supply and demand, and thus allows exchange to take place, and at the same time addressed the pressing question of the disciplining of wind power to behave in a manner ‘compatible’ with the workings of the existing energy system. During the interviews at both RTE and EDF, the ZDE-device kept surfacing for at least two reasons: Firstly, the device could potentially become a tool for the grid operators to plan/predict future investments in the grid; and secondly, the ZDE was relatively new at the time of the interviews, which is why uncertainties regarding its practice and effects were predominant. An example of how the device could be introduced is described in the quote below:

*“Lebfevre: So, now when you want to connect a project [to the grid], we enter a procedure... which is justified, because at the beginning of wind power no procedure existed, and that was a struggle. Well now there is a procedure, which we know. Except with the ZDE it ...*

*Me: the ZDE?*

*Lebfevre: Well, EDF do not know how to manage the ZDE today in terms of connection. Normally, there is, on the one hand, the process of rating projects with a building permit one by one, and where a connection request is made, here the procedure is clear. And then, on the other hand, there is the ZDE that simply aims to make the communities agree on where they want to put the turbines and that it is consistent with the capacity of the grid. But the two*

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<sup>19</sup> The French Transmission System Operator (Réseau de transport d’électricité).

*things are done in parallel. So, when we set up a ZDE today, alongside a request for a building permit is made, and therefore both arrive at EDF, and they do not know if it is the same project or not”* (Int. Lebevre, my translation).

So, what eventually became a decision to build the study around two distinct devices was partly the effect of getting engaged with the field and my empirical material. In other words, my inquiry into the ways in which the grid took part in the framing of wind power kept referring me to the ZDE, not only as an obligatory passage point to the feed-in tariff but to the practice of getting turbines connected to the grid, in general. Furthermore, the ZDE seems to add another layer to the notion of the political market, as it connects wind power to landscapes and local populations in new ways. This account serves to illustrate how a version of the ‘follow the actor’ mantra (Latour 1987), or maybe rather following traces of a certain durability (Callon 1992), made me stress one instance or modality of grid connection. And this instance made me turn towards landscapes and local democracy rather than the qualities of the grid, such as the balancing of supply and demand, the presence and materiality of power lines, and eventually made me travel around small villages in Picardie rather than the centrally organized Transmission System Operators.

Making the two devices my entry point into rendering wind power as an object to be transacted in the market obviously drags some aspects of the marketization programme to the forefront, whilst hiding others (see Miller 1997). In this respect, the construction of the research object is not an external reality there for me to describe but rather the outcome (or the reality) of the ways I have gone about making the study (Law 2004). In what remains of this chapter, I will discuss the methods I have drawn upon and describe their outcome in more detail; in other words, I will focus on how the reality presented in the wording of this thesis has been crafted.

So, from an initial interest in markets for wind power as political markets, the inquiry has taken me beyond the ‘political market’ as a distinctive theoretical category to be made an object of inquiry in and by itself. Rather, the gradual emphasis building up during my fieldwork and readings towards two of the devices are at the heart of the qualification of the market as a distinctively political market. In other words, the adjective ‘political’, in this perspective, is considered a (temporarily stabilized) state of the network, which points exactly to the tools and devices put in place to enable a specific modality of market transaction.

### 3.2 The Market Device as an Object of Study

*“Markets are probably the least researched form of coordination – and, at the same time, perhaps the most enigmatic. This may appear strange, but there is one clear explanation of why this is the case in economics ... since markets are “natural”, and therefore a starting point, they are often used to explain other phenomena rather than considered as objects in need of explanation”* (Aspers 2011: 40).

What Aspers describes here is, to economic sociology at least, amongst the fundamental fallacies of economic theory. The ambition of the present study – to follow the two devices as they contribute to the marketization of wind power – is to demonstrate the *constructedness* of the ‘natural’ market; it is exactly what the notion of the political market points to, i.e., it is nothing but natural and only kept alive because of political will and ambitions. Both the feed-in tariff and the ZDE are examples of that which is political in the political market; i.e., they are distinct framings of obstacles to wind power development. Why then refer to them as market devices rather than policy devices or governance devices (e.g., du Gay et al. 2012)? This decision is not simply a pressing empirical reality so much as a choice motivated by interest/ambition:

*“Contextualization works in more than one direction. The trick is to select the paths you wish to follow, and those you wish to ignore, and do so according to the assemblage you wish to chart”* (Miller 1997: 363).

As in their study of three ‘governance devices’, du Gay et al. describe the devices as operating as ‘interrealm translation apparatuses’ (du Gay et al. 2012: 1086), combining the sphere of economics and politics. Associating the two devices with the marketization programme helps construct one among several possible realities. Furthermore, this construction is dual; on the one hand, taking an interest in marketization leads me to stress certain aspects of the two devices, and on the other, addressing marketization from the perspective of the two devices narrows my vision to whatever negotiations and emerging practices unfold within the world of the feed-in tariff and the ZDE. This is not, I believe, a reduction of the devices, i.e., stressing their relation to the market and its transaction:

*“For scientific, political and even moral reasons, it is crucial that enquirers do not in advance, and in place of the actors, define what sorts of building blocks the social world is made of”* (Latour 2005: 41).

To sum up, the choice to look at these devices as market devices is partly based on the empirical material and partly a choice based on interest. As I argue elsewhere, these devices have effects on markets through their reconfiguration of profitability, responsibilities, and agency in general. Thus, referring to these as market devices is no stretch. On the other hand, they could have been referred to as governance devices too, as stressed by du Gay et al.:

*“It can be claimed that the leakage of concepts should not come as a surprise. If indeed governance devices are assemblages then as such they do possess certain agential characteristics and thus it cannot be expected that they would simply ‘obey’ the wills of the different ecologies that created them”* (du Gay et al. 2012: 31).

As such, adopting a marketization approach is a way of narrowing down my study; meanwhile, accepting the ‘agential characteristics’ of the devices implies an openness towards the leakages, or overflows, as they may occur.

Finally, the devices not only intersect but also perform different realms such as the political and the economical. My study started out as a study of the construction of markets for wind power; as I argue elsewhere, the ‘market’ remains the organizing arena on which we rely to develop wind power. However, referring to the devices as market devices implies an acknowledgement that they have effects on the marketization, rather than referring to some essential characteristics of the devices. The devices are best described as assemblages, and from the perspective of marketization, they become part of a larger market assemblage.

### **3.3 Assembling Market Devices**

Referring to the feed-in tariff and the ZDE as ‘simply’ two devices may seem to imply that they have the same status in the larger assemblage as well as how they are approached in the study. However, a few differences relating to their history and design should be stressed. The feed-in tariff is a device that was developed in the US in the 1970’s, and has been

adopted in a range of European countries from the 1990's, specifically to define a price for wind power, but also other renewable energies. As such, the feed-in tariff is, if not a generic tool, then at least a widespread device sharing some basic functionalities (e.g., fixed price per kWh, guaranteed access to the grid, purchase obligation, long term contracts, etc.), which may be structured in different ways (e.g., the targeted technologies, fixed price versus premium price, decreasing tariffs over time). The ZDE, on the other hand, is a recent French invention developed specifically for wind power development and is of a more experimental nature. As a consequence, the feed-in tariff was relatively stable both in terms of design and the role it might play in energy markets. Controversies unfolding around this device were related to its level, i.e., the price to be defined within the frame of the feed-in tariff, and whether it was the most appropriate device (compared to other devices such as tendering or certificates). The ZDE, on the other hand, had not become stable at the time of the fieldwork; to some, the device was a tool for local democracy, to others a tool for energy planning, still others saw it as a means of protecting the landscape. Also, the actual practice of making zones on the specific territories was emerging and constantly being modified by the engineering companies.

These differences have effects both on the networks of the two devices and on the way I have approached them; during the valuation process leading to a definition of the tariff, the success (measured in terms of its capacity to boost wind power development) was stressed. Meanwhile, these associations were also targeted by opponents of the feed-in tariff through attempts at disconnecting resemblances between the French system, and, e.g., Denmark and/or Germany, as will be discussed in more depth in Chapter 4. The network of the feed-in tariff was thus both its strength and its weakness.

But these differences also affected the way I approached and designed my study of the two devices. The study of the feed-in tariff emphasizes the valuation of wind power as a process of qualification, a process addressing both the 'cleanliness' and the performance of the energy, as well as the specific network configuration of the French electricity system, which is either opened and debated or black-boxed. The tariff was defined six years before my fieldwork started, and gathering data was done mostly in the form of reports and documents supplemented by interviews. Given the leap in time between the process of valuation and my inquiry, the documents were crucial as a way of capturing the richness of debates and topics

addressed during the negotiations of defining a price. The recollection of the interviewees could sometimes be triggered from fragments of the reports or communications written at the time of the negotiations. The ZDE was made an obligatory point of passage for all wind power projects eligible for the feed-in tariff at approximately the same time as the fieldwork began. This timing has possibly increased the attention paid (mine as well as those I interviewed) to both the origins of the device as well as its practice under development. Nonetheless, the analysis of the device is organized around these phases, which are also stressed by Foucault as crucial to the dynamic of the device as *dispositif*; its conception and its practice (Dumez and Jeunemaitre 2010). Making this distinction makes sense in the case of the ZDE, as the conception of the device presents a framing to which the practice must obey, all the while remaining flexible as to the distinct ways in which it may perform the practice. As one engineer put it:

*“The ZDE has three criteria: the wind, the grid connection and the landscape, or more precisely, the landscape and the protection of natural heritage. But it does not have a technical aspect. That means that we can propose a ZDE which is entirely impossible, from a technical point of view, because of other constraints than those defined in the legislation”* (Int. Piedvache, my translation).

On several occasions, I was met with similar accounts that pointed to the distinct framing via the three criteria, and the need for additional criteria developed by the engineers.

The analysis of the ZDE is primarily based on interviews as well as the documentation of the practice of zone definition in a specific case, i.e., the CdC du Pays de la Serre. As such, the inquiries take different forms and stress quite different elements of the device, which is partly conditioned by the device itself and partly by my research interests. My choice of how to organize the analysis of the two devices, and how to structure the gathering of data, then became constitutive of my accounts and descriptions of them both. As Dewey put it, *“Method means that arrangement of subject matter which makes it most effective in use. Never is method something outside the material”* (Dewey 1916: 165). As such, the way I have arranged my studies of the two devices is not simply the effect of an existing reality; it is not the ‘nature’ of the devices that defines the ‘how to’ of conducting the inquiry. It is, as stressed by Law, my interactions with the world that create (my) reality by focusing on some elements and networks, all the while ignoring others (Law 2004). The studies to be presented and their

role in the overall research design were not the only ways to organize the studies, rather this organizing takes part in creating the ‘subject matter’; “*Method is not antithetical to subject matter; it is the effective direction of subject matter to desired results*” (Dewey 1916: 165). The outcome of this process of co-construction is presented in the following two chapters, but for the present, I will briefly comment on the process.

### 3.3.1 Devices as Performed

The feed-in tariff, in the account to be presented here, has become a device for framing valuation. Whether the price to be defined was presented as ‘purely’ a political number or as a carefully calculated price based on the costs of constructing wind parks, a number had to eventually be settled for and at least temporarily stabilized. As I started to inquire into the making of the tariff, it was clear from the outset that it was a controversial number, and it was contested in various places (Poignant 2003; CRE 2001 and 2006; Le Monde 2007; Le Figaro 2008). As I will describe in more depth in the following chapter, once I reached what I thought to be my final destination, the DGEMP<sup>20</sup> (who eventually signed authorship for the tariff), the fabric of the number disappeared. From the interview with an employee at DGEMP, actual calculation, he assured me, was behind the number – but I could not be allowed to see the calculation. Therefore, my inquiry into the price-making became a question of finding traces of inputs, which are used to the make the tariff, rather than opening the black-box of calculation. Some of these traces would be counter-calculations, others simply manifest non-calculating, e.g., refusing the ‘efficiency’ or ‘accuracy’ of prices generated at desks rather than through the market. Following these traces, five specific attempts of valuation kept appearing as reference points or simply spurring controversies, such as: “*Well, in principle you could fix a tariff, as for example CRE’s weird methodology*” (Int. Durant, my translation). Common to them all is that they, in some way, address the value of wind power as well as the role of the tariff to the development of wind power. This creates a patchwork of qualifications of wind power, electricity systems, and price mechanisms, and eventually creates what Callon refers to as a polyphonic narrative:

*“The choice of method obeys no epistemological imperative, since it is entirely dictated by the state of the network. If the network standardizes itself then one is bound to count and*

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<sup>20</sup> Direction Générale de l’Energie et des Matières Premières, a French agency for energy and natural resources.

*calculate. If it is divergent and reversible, then excessive simplification (and quantification) will betray the state of the network, and it is better just to tell a story! Each actor is relatively unpredictable because any translation is constantly being undone. Here, then, the only faithful – indeed intelligible – method is that of literary description. Such description multiplies points of view to form a polyphonic narrative distributed over as many voices as there are actors, and recovers all relevant details” (Callon 1991: 152).*

Assembling these accounts, which do indeed multiply points of view’, into a narrative contributes to the construction of an object, i.e., the feed-in tariff as a device for controversial valuation via qualifications of wind power.

The study of the ZDE-device unfolds in a somewhat different way. Starting as a case study of an emerging practice of zone-definition, the very different views of the role and identity of the device that I constantly met during my interviews and readings of legislative documents, journals, and academic papers made me follow it back to its conception. This, as I will describe in detail in Chapter 5, became yet another version of the device, and thus simply added to the polyphony. Eventually, I chose to construct the account of the ZDE around two phases, taking inspiration from the Foucauldian distinction between the conception and practice of a device as creating its dynamics (see Dumez and Jeunemaitre 2010). This ties the ZDE to a network opposed to wind power development on French territory, all the while following the emerging practice of engineers as they delineate zones favourable to wind power development. Organizing the study around these phases drags to the forefront a certain tension in the device, a tension which at the same time problematizes wind power through its relation to the territory/landscape, and at the same time transforms the issue into a manageable practice of breaking down the landscape into single variable layers. But representing the device as two phased is not innocent in the process of the creation of reality, which also holds true of the choice to represent the feed-in tariff device as a polyphonic account. This is not to do away with the studies as perspectivalism, “*we are not dealing with different and possibly flawed perspectives on the same object*” (Law 2004: 55, emphasis in original), but to stress how the objects – the two devices – are performed through my theoretical lenses and my interaction with the field. Accordingly, different objects are produced by different method assemblages; they may overlap, but they are not the same (ibid.).

### 3.3.2 CdC du Pays de la Serre

The inquiry into the practices of defining wind power development zones is studied through the case of CdC du Pays de la Serre. Settling on this particular case, rather than the two other cases (CdC du Pays Neslois and CdC de Rosieres en Santerre, both situated in Picardie) that I also followed in the initial phase, was primarily a question of the stages of the process in which the projects were at the time of my fieldwork; one being already accepted by the prefect, the other still in its early phases of negotiation. I conducted interviews with mayors from both CdCs as well as the engineers in charge of the process. Though my plan was to do observational studies of the practices of the engineers, my stay in France heading towards its end, forced me to limit my study to interviews. And settling with CdC du Pays de la Serre, who had just finished their proposal, I was allowed to address questions towards the entire process of making the proposal while people were still around and able to remember the work they had contributed to. Interviews may not be the best way of grasping practice, so to construct a situation that could evoke rich accounts, I would use the maps (the outcome of the practice) as a way of ‘triggering’ descriptions.

Amongst other criteria that led me to eventually end up with the case of CdC du Pays de la Serre was its location in the Picardie region. The region’s proximity to Paris, where I was living, allowed me to visit the field frequently (nine visits in all) as well as the large number of ZDE projects emerging in Picardie (partly due to its good wind regime), as I mention in Chapter 5. Furthermore, the CdC du Pays de la Serre had hired an engineering company, Airele, to undertake the project. Airele had been conducting other ZDE projects for several other CdCs, and thus the experience and the distinct practice they were developing allowed me to consider my findings; not as generalizable, but as anchored in a practice extending beyond my specific case. Plichon, the engineer responsible for the project in Airele, would on several occasions speak of his and his colleagues’ work as a practice under constant evaluation and continuous development. But these criteria of selection were, at the same time, providing some of the distinctiveness of the case; whereas the study does not find many traces of a strong local opposition, be that qualified as NIMBYism or something else (for a further discussion, see Chapter 5), this would probably have been different for other ZDE projects. To CdC du Pays de la Serre, CdC du Pays Neslois, and CdC de Rosieres en Santerre

(the two cases of my preliminary studies), some ‘regional’ characteristics were repeated; land as being an integral part of a production regime – whether agriculture, energy production or mining – as well as an aging population scattered over large territories, which created a need for income to cover the growing expenses of caring for the elderly. The engineer responsible for the ZDE project in CdC de Rosieres en Santerre had conducted a survey of the social perception of the landscape, and when she asked the inhabitants: “*Can you tell me about your landscape? Well, they do not know. To them, Santerre is not a landscape! You know it's silly, but for them, it [a landscape] is the valley of the Somme, it is the sea, or the mountain, but Santerre, it is flat and, well just flat!*” (Int. Piedvache, my translation). This perception of the landscape – or the lack of landscape – is likely to facilitate the planning of wind power projects on the territory, at least in terms of acceptance by the population. Had my studies involved ZDEs in other locations, where the landscape was actually regarded as such, opposition would potentially have been a more central issue in my findings.

### 3.3.3 Case Studies – Multi-sited and Multi-temporal

The inquiry into the ZDE-device has made me visit many sites, from the offices of the French Parliament to engineering companies, as well as the offices of the CdC, DRIRE<sup>21</sup>, EDF and RTE, and eventually, the (very) small village of Autremencourt. Therefore, as a case study, it was not easily delimited within a single location or organization (Bryman 2004), but rather took place in multiple and fragmented contexts (e.g., Marcus 1995; Czarniawska 1998). All of these places have been important to my gradual understanding of the ZDE as device, both in terms of its origins and the issues it associates with, but also the practice of engineers as they analyse and deconstruct the landscape until they eventually present a map of zones favourable to wind power development. But it was an ‘open-ended’ process where one interview or document would guide me to the next, rather than a well-defined list of people to speak to or reports to read. The three reports produced by Airele as the project went on (Airele 2006a, 2006b, and 2007) were the anchors in this process; they would help me ask about different particularities of the practice, e.g., why zones would change status (from constrained to favourable). Also, the reports would help me frame questions about the production of the

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<sup>21</sup> The Regional Office for Industry, Research and Environment.

maps or follow traces to agencies or people to interview by following those consulted during the process (e.g., RTE) or those receiving the final report (e.g., DRIRE).

Both the devices of the study are distributed over time and place, but this is particularly relevant to the ZDE-device: Stressing its conception as well as its practice, the device is both the effect of work and debates in the French Parliament (as well as in its corridors), and it is the outcome of the emerging practice of engineers in small towns distributed around France. In each of these places, the device is something different, and constructing an account of the device, then, becomes an outcome of often incoherent descriptions. For example, as mentioned earlier, the ZDE may be a tool for planning electricity development, organizing local democracy, etc., and likewise the feed-in tariff may be a monetary compensation for the market failing to take into account the pollution of fossil fuel technologies, a support of an emerging industry, a statement against nuclear power, etc. By no means is the aim here to conclude on the ‘essence’ of the devices, but rather to create a description that does not discriminate between these descriptions. In other words, the study strives towards a symmetrical gathering of material without any differentiation between statements as to their consistency with other accounts (Law 2004). Though this may have created substantial confusion several times during my fieldwork, when statements appeared to be contradictory, rather than discarding the interviews that appeared inconsistent with my emerging understanding of the devices, they were included – as will become apparent throughout the two following chapters. To me, the devices are the outcome of these different realities; they do not exist in spite of them. They are what John Law terms non-coherent realities (Law 2004). Or, as Miller referencing Paul Veyne states, it may be a true account, but an account that comes about as a ‘fabric of incoherences’ (Miller 1997: 356).

However, though we may accept our accounts as made up of incoherencies, they must still relate to the phenomenon that is the object of study, and Miller’s comment to Latour’s famous mantra of ‘follow the actor’ becomes crucial: “*It presupposes that we know the boundaries of the project at the outset. While the territory of a project may not be limitless, neither is it as clear-cut as you make it*” (Miller 1997: 363). This is the never-ending challenge to anyone doing research with an ANT-inspired point of departure, and crucial to the ways we move around in the field and gather our materials.

### 3.4 Gathering Field Materials

This study is based on fieldwork undertaken in France between 2007 and 2008. Before leaving for France in July 2007, I conducted seven interviews with employees at the Danish Energy Agency, the Danish TSO (Transmission System Operator), and the Danish wind industry association, and another two interviews after my return. These interviews served as an introduction to my broader understanding of issues at stake in getting wind power connected to the grid, as well as tracing the history of the Danish feed-in tariff. After arriving in France, and over the course of the next year, I interviewed twenty-four people, some on several occasions. They covered a broad range of professions, e.g., developers, consultants from engineering companies, grid operators (from both RTE and EDF), economists from agencies such as DGEMP and ADEME, politicians (local and national) and members of the bureaucratic staff of the French Parliament, and DRIRE. Furthermore, I followed a seminar at Ecole des Mines on renewable energies in the grid, and read through a variety of legal documents and debates in the senate.

#### 3.4.1 Interviews

The interviews were all semi-structured (e.g., Kvale 1997, Bryman 2004). The first round of interviews was related to my inquiry into the tariff, and I would use each interview to find out where to go next, not unlike ‘snowball sampling’ (see Noy 2008). Given the distributed character of my objects of inquiry, in particular the fact that they could not be located within a single organization such as a particular hospital ward or a distinct unit of a company, I would use the accounts as a way of detecting new places and new people to talk to. It was during the interviews themed around the feed-in tariff that the ZDE kept surfacing, and I eventually decided to follow the trajectory of this device too. As an example, a developer would tell me:

*“The instatement of the ZDE, which is presently happening, will have the effect that EDF, especially through RTE, will decide on the construction of large electrical transformer stations”* (Int. Lamarre, my translation).

This would take me to EDF and RTE to pursue this line of inquiry, and as such, the ‘follow the actor’, though this was not a material object that I could simply follow as it moved

around. Rather, it was the lines that were drawn as I moved around in the field that guided me to the next person to see. Whereas the feed-in tariff was defined by a national agency – on behalf of the government – and seen almost as a historical event, the access to the engineers behind the ZDE, at the time of the fieldwork an on-going negotiation with the prefect, was at first a more delicate balancing act in which participation should constantly be accepted by the hosting institution, the CdC. In other words, whereas the valuation followed in Chapter 4 is following contributions to the valuation of wind power, regardless of the institutional affiliations of the contributors, the analysis of the ZDE-device was not limited to the interior of the CdC but kept moving back and forth between the CdC and Airele (the engineering company), DRIRE, etc. The CdC constantly needed to confirm their acceptance of my access to the practices unfolding around their case, which was not problematic but time consuming.

Getting access to the people I interviewed was generally uncomplicated, and my nationality (Danish) was often a facilitator; Denmark is and was known for its very successful development of wind power, and many of the interviewees were eager to learn about the Danish case or simply wanted to discuss differences and similarities between Denmark and France. Meanwhile, this constant presence of black-boxed ‘macro-actants’, i.e., the Danish energy system and the French energy system, would also frame the accounts towards a rather distinctive comparative modality:

*“Well, in Denmark you started out by having a co-ownership model, where the locals were asked to buy shares in the projects. That is what makes the difference; we [in France] do not have that. That is one reason for the local opposition”* (Int. Lamarre, my translation).

As such, what served me as a ‘way in’ to the worlds of the interviewees was simultaneously framing the accounts constructed throughout these interviews. No doubt, this way of getting my interviewees ‘interested’ has influenced the data but by continuously pushing questions of ‘how’ something was done rather than why (Becker 1998). Asking *how* a zone moved from ‘constrained’ to ‘favourable’ (to wind power development), rather than *why*, a question which could potentially prompt a more defensive reaction, allowed rich descriptions of a practice evolving in between the ‘objectivity’ of the engineering of the zones and the politics being played out in the CdC.

Most of the interviews were transcribed. In the early phases of the fieldwork, all interviews were transcribed from start to finish, literally, but as I was pinning down the particular

analytical perspective, and moving towards well-defined research objects, I was getting increasingly selective as to the time-consuming activity of transcribing and started writing summaries of parts of the interviews. Two interviews were not entirely recorded, because they took place while visiting Autremencourt and its surroundings and the facilities of RTE in Lille. During these visits I would take notes, and pictures, and note down quotes that appeared particularly interesting. After the interviews, I wrote elaborate summaries of these ‘touring’ interviews. Eventually, these transcripts would form the ground for the analyses, and they would become subjected to ordering exercises, which I will briefly return to below.

### 3.4.2 Documents and Maps

In both analyses, documents, reports, and memos were central to mapping either the valuation process or the practice of the ZDE. Given that the valuation of the feed-in tariff was taking place years before my fieldwork, the reports and memos were central to following the traces of those contributing to the process. That being said, contributions that did not make their way into these documents were less likely to be made visible – and thus heard – in the study of the feed-in tariff. Often, the reports and memos would include calculations or counter-calculations and are often referenced in other documents. My intention has been to approach calculations and statements symmetrically, by essentially stressing the qualification work of the individual valuation processes, as something not necessarily expressed in numbers. The ‘relaxation’ of calculation into the notion of qualculation (see Chapter 2) enabled the symmetrical approach to these statements as ‘equal’ expressions of qualification, whether expressed in numbers or as statements.

In the study of the ZDE-device, the three phases of the practice, well-documented in reports, are used as background for interviews as well as the analysis. A central element of these reports are the maps, which both mediate the zone definition and are the tools of the engineers; mapping layers of constraints according to distinct criteria is at the heart of the engineering of the landscape as it was demonstrated to me, and as such, the maps perform the engineers emerging practice. During the interviews we would flip through the maps, and the engineer would point out how constraints would produce zones unfavourable to wind power development, something that I would note down on the printout of each map. Few of the maps are used in the analysis, but they become illustrations of the results of the practice. As I began

writing up the analysis, the extent to which these maps became an objectification of the messiness of the landscapes they were analysing became clear to me. However, as I had left France and my fieldwork had been forced to end, I could not pursue this line of inquiry further. But the constant dualism in the accounts of the engineers, between the local populations' emotional relation to their landscape and the objectivity of their own process, is discussed throughout Chapter 5.

Both analyses make use of official documents authored by government agencies as well as transcripts of debates in parliament. The two devices are, to some extent, merely textual devices, either specifying the level of the feed-in tariff, as well as the conditions under which it may be paid, or the guidelines for making a ZDE proposal. These documents would serve as the framework from where I started opening up their black-boxes: The tariff as number and the origin of the ZDE, as well as the emerging practice for defining zones, which takes place outside the government agencies authoring the guidelines. I would bring these documents along when interviewing and ask specific questions about the texts and the ways in which they would affect the work of the engineers.

### **3.4.3 From Fieldwork to Analysis and Texts**

My empirical analysis is framed around the two devices, but in many ways, this distinction – though guiding me throughout the fieldwork – was not clear-cut during the interviews. Many interviews would include discussions on both of the devices regarding their intersections, but also as some of the primary tools of organizing wind power development in France. Therefore, writing the two analyses included an element of differentiating and sorting the accounts provided around the two devices into two separate studies; though inter-related, they were still made singular studies. As I went through the transcripts of the interviews, and I realized the extent to which the accounts of the devices were intertwined, I nonetheless ordered the sequences of the interviews according to the two devices and eventually wrote two separate analyses. The way I have structured the two analyses (Chapters 4 and 5) attempts partly to capture some of these connections; firstly, they are presented chronologically as the devices were adopted, and secondly, the landscape as a matter of concern being partly the effect of the feed-in tariff is discussed as a motivation for developing the ZDE-device. This

dynamic of the two devices may be lost to some extent because they are made two separate studies.

As I started to tap into the accounts, the controversies and incoherencies between them began to surface, and this prompted me to think about how to make sense of the different realities that they represented. Also, there seemed to be an emerging interest in the notions of politicization and economization (Callon 2009; Callon 2010; Muniesa 2011). Though these concepts were still rather undeveloped, and unexplored empirically, they eventually became the hooks I employed to untangle some of the controversies and trials of strength I met during my fieldwork. Therefore, the concepts were not yet explicit to me during the interviews, but rather became a way of making sense of the material gathered from the fieldwork. Admittedly, putting these concepts to use has been a challenging and often frustrating task; as processes, they seem to constantly feed into each other and constantly displace the object submitted to either politicization or economization. For example, wind power may be made ‘politicized’, i.e., be made debatable and pushed towards political decision-making, by ‘economizing’ CO<sub>2</sub>-emissions from different energy technologies. The object is replaced, from the renewable energy technology to emissions, and it all comes down to the network associations that these processes build upon. The discussion of politicization and economization is unfolded in the discussion and is only vaguely present throughout the two analyses. In the discussion (Chapter 6), I will elaborate on the ‘explanatory power’ of these notions as well as their limitations.

#### **3.4.4 On Being Lost in Translation**

Finally, a few words need to be said about the many translations of this inquiry. Though translation – both from the technicalities of a distinct profession as well as from one language to another – is often the conditions for doing research, these studies present an abundance of translations; the technicalities of the grid, of lines, electrons and their transformations, and the economists and their tools and models, all of which were very unfamiliar to me. My approach in these situations has been to make my status as the ‘ingenuous outsider’ a resource for asking naïve questions, something that has often prompted interesting answers. This would often need some explanation, as in France I was a researcher from Ecole des Mines (an engineering school) and therefore often taken for a ‘knowledgeable insider’. Therefore, I

would stress my background in the social sciences. As a result, during an early interview, the interviewee took this information as an opportunity to improvise a presentation of the grid as an ‘electrical grid for dummies’. This introduction became a structuring understanding to the fieldwork that followed. Also, the French political system, and the many agencies I have visited, was new to me, and the many interviewees took it upon themselves to inform me – often in very judgemental ways – in order to demonstrate aspects of the French political system and bureaucracy unfamiliar (and often surprising) to me.

Finally, the translation from French, via Danish, to eventually end up as an English text may potentially have created some misunderstandings or lapses along the way. The interview transcripts were in French, and only the sequences used as quotes have been translated into English. The strategy I have chosen, hoping to minimize misunderstandings, was to be as literal as possible in my translations, something that occasionally compromises the ‘eloquence’ of the quotes. This is a choice of style, but I wish to stress that to the extent that my translations make the interviewees less well-articulated falls back entirely on the work of putting their accounts into English.

### 3.5 And So What?

So what does all of the above do for a study, a scientific account, like the one at hand? Well, first of all, the result has become a demonstration of the nitty-gritty details of two market devices, the controversies they span, the trials of strength that they eventually fold, the relating to landscapes as well as the technicalities of those involved in defining prices and zones for wind power projects. A quote by Homer Simpson, referenced by Liz McFall, immediately comes to mind: “[y]ou take forever to say nothing” (McFall 2009: 276). Obviously, I believe that something is to be gained from a study such as the one at hand, but I also believe that the criticism underlying Homer’s statement should be addressed. As McFall continues:

*“Despite all the jargon and terminological novelty the main result [of the ‘new’ new economic sociology] has been regarded, in some quarters and with some justification, as a plethora of banal description of processes and objects of limited, if any, general interest. This*

*criticism is related to a broader concern that in departing from the heartland of political economy analyses of categories like class and capital the field championed research that was not only banal but apolitical” (McFall 2009: 276).*

I am very aware that it might seem ignorant to plunge into a study of so-called political markets without paying credit to all those who have researched production and consumption at the intersection of economics, law, and political science for decades. Starting out by casting away the qualification ‘political’ of wind power markets is not, however, an attempt at depoliticizing the construct, but rather a question of remaining open to how and what kind of politics is being played out. From the point of view of this dissertation, all markets are necessarily political, and here I believe that Fligstein’s contribution to economic sociology is a crucial contribution, though our perspectives on what ‘markets as politics’ means are far from identical. To me, the idea of greenhouse gas emissions and their associated market failures are endowed with politics, which also holds true for the electrical grid; it eventually constructs the movements and behaviours of electrons and thus becomes disciplining and performative as to the suitability and not least profitability of energy technologies.

And this brings me to a second point, namely, the extent to which this study may say anything about markets other than the French market for wind power. The label ‘political market’ is one that is easily extended to, and used to describe, many markets for renewable or sustainable products. But given that this thesis does not present an inquiry into the ‘political market’ as a category, to what use may we put the details of site-specific controversies and negotiations unfolding around the two devices studied here.

Making more general claims is often a critical question for those conducting case-studies and at best turned into a question of case selection (e.g., Flyvbjerg 2004, Silverman 2005), and thus rather a question of categories and representativeness. In the hands of Latour, drawing on Isabelle Stengers and Vinciane Despret, generalization becomes a quest for the proliferation of differences rather than their elimination; instead of seeking to decrease or minimize alternatives and variations of a given phenomenon, generalization should strive to “*be a vehicle to travel through as many differences as possible*” (Latour 2004: 214). According to Latour, this distinction illustrates what should be made a differentiation between ‘good’ and ‘bad’ generalizations and thus has epistemological consequences:

*“The good ones are those who allow to connect widely different phenomena and thus to generate even more recognition of unexpected differences by engaging a few entities into the life and fate of many others. The bad ones are those who because they had had such a local success try to produce generality, not by connection of new differences, but by the discounting of all remaining differences as irrelevant” (ibid.).*

In that respect, the two devices investigated in the chapters to follow do connect widely, both in terms of the places mobilized as part of their networks as well as the phenomena they attempt to order. From the ordering of territories and landscapes to the ordering of prices and profitability levels, the study demonstrates the constant economization and/or politicization of matters of concern. Is this suggesting that the devices of these ‘political markets’ always unfold and refold issues according to the same modalities of ordering? No. But it does suggest that the practices and processes involved and involving these devices are so much more than simply ‘political’; i.e., a rational strategic means of obtaining a politically sought result.

## 4. ASSEMBLING VALUE – OR VALUABLE ASSEMBLAGES

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Christian Riisager was happy to see, that the experimental connection of his backyard wind turbine to the electrical, mentioned in the opening of this thesis, led to his meter running backwards. But an economic compensation was neither the driver nor the first priority for either Riisager or the utility. Therefore, a price on wind power was not the immediate result of his successful connection to the grid. Rather, Riisager, at least retrospectively, argued that renewable energy as part of the energy sector could prove valuable, not least in light of the energy crises of the 1970's. As such, the connection of the small wind turbine to the grid was yet again a connection to a larger societal frame of value, in particular, independence from the dominant owners of fossil fuel resources. Today, however, wind power producers in many European countries have, over the last few decades, received compensation through different governance models such as feed-in tariffs, call to tender programs (bidding systems), and sometimes green certificate systems. These systems imply that wind power has become priced, albeit in different ways, and it is this process of valuation that is stressed throughout the following chapter. As such, this first analysis addresses one central theme of both economics as well as the marketization programme, namely, that of pricing.

This chapter presents the making of value for wind power through the feed-in tariff. By means of inquiring into the device, the analysis also produces insights on the marketization of wind power, in general. Firstly, the chapter retraces the making of the French tariff; from the black box of '8,38 c€/kWh' emerges a process of qualification of both wind power as well as of the device (the feed-in tariff) through which value, in some sense, is articulated. Here, the underlying concept of the assemblage points us to the links that are made with the nuclear energy market as well as the configuration of the device itself. Through the assemblage with the nuclear power system, prices are made comparable and become inputs to qualifications of the proposed device, i.e., the feed-in tariff. These qualifications are traced through five

different valuations, which all have in common that they address the value of wind power in some way, as well as the device and its framing of wind power.

Before addressing the distinct valuations, however, this chapter will start with a brief description of the early French wind power development history, after which the theoretical backdrop for discussing value(s) and price will be presented.

## 4.1 Images of a Number

At the outset, one aim of my fieldwork was to follow the emergence of the French feed-in tariff system, and not least the negotiations involved in finally reaching 8,38 c€/kWh of wind power. Voting for a certain governance system, in this case the feed-in tariff, is one thing, but settling on a tariff – or a price – to express the tariff is another thing. Having read a number of articles by former ADEME employee, Bernard Chabot, and his discussion of the calculative methods leading to the French feed-in tariff (Chabot 2001a; Chabot and Saulnier 2001; Chabot et al. 2002; Chabot and Buquet 2006; Gipe and Chabot 2006), I set out to find the calculation used to ‘value’ wind power in France.

This chapter is about the making of the French feed-in tariff. However, my interest in the ‘calculation of a tariff’ was partly raised earlier, before arriving in France. While I was conducting an interview with a bureaucrat from the Danish Energy Agency, I asked him how the Danish tariff had come about, and he answered with the following comment: “*It is not a calculation as such ... it is a politically fixed number*” (Int. Lawaetz, my translation). He continued: “*... if you have offered [the wind power developers] 10 øre, and nothing comes from it, well, then you have to come up with a higher number*” (ibid.). So, on the one hand, I had an elaborate presentation of a calculation method (called the Profitability Index Method) developed by Bernard Chabot and his agency (ADEME), which was argued to have been part of fixing the French feed-in tariff. On the other hand, the tariff was presented as a ‘politically defined’ figure by a Danish bureaucrat, and not the conclusion of a calculation or a method. The latter presentation again raises the question: How does one define a number politically? Does it mean that it reflects the political climate, or ‘simply’ that it is the outcome of a

political struggle? According to the Danish bureaucrat, it could potentially involve a process of trial-and-error (“*if nothing comes from it, you’ll have to put out a higher number*”), where the tariff is corrected until the desired outcome is achieved.

Having met these rather different accounts of the procedures behind the making of the tariff sparked my interest in the calculation – or perhaps rather, the making of the number. The two accounts seemed to be in opposition, with one stressing the ‘objectivity’ of the calculation and its ability to safeguard against inefficiencies by ensuring ‘fair profitability’ to the developers (i.e., cancelling undue rents), and the other as a political process involving trial-and-error. Both, however, seemed intriguing fabrications of a figure. Put differently, my initial questions at some point resonate with the (rhetorical) question raised by Marion Fourcade in her discussion of the pricing of an environmental disaster, the Exxon Valdez accident and its despoiling of Alaska’s Prince William Sound: “*Was this a ‘rational’ number?*” (Fourcade 2011: 52). Though my aim was not to conclude on the rationality of the number, but rather the construction of an assemblage in which rationality could be measured, I decided to follow the negotiations leading to a price of 8,38 c€/kWh.

However, let it be said from the beginning that I never found the calculation. I found other calculations in favour of the tariff and calculations disqualifying it. Having tried to follow the tariff back to its origins (Latour 1996), I eventually ended up ‘in the right place’, i.e., in the house where the calculation was actually performed, as I was told. However, I was refused access to the actual calculation. But rather than abandoning the field when denied access to the calculations of the tariff, this story became a story of ‘who’ uses calculation and ‘how’ they use it, as well as a story of how to politicize and/or economize this governance system. Whereas this discussion may resemble questions of ‘trust’ (Porter 1995) or ‘distrust’ (Power 2003) in numbers, this chapter stresses the whereabouts of calculations – they are made public at some places and hidden at others.

## 4.2 From ‘Calls to Tender’ Towards ‘Feed-in Tariffs’ – Devices at Play

Historically, France has generated little impetus in relation to renewable energy<sup>22</sup> (Szarka 2007). But in 1996, a tender program called ‘EOLE 2005’ was launched. The formulated aim was to trigger the development of the French wind power capacity to reach a target of 250-500 MW by 2005 (Laali and Benard 1999). However, following four rounds of calls to tender, only 70 MW were issued (though submission and selection rounds accepted up to 324 MW) (Cochet 2000; Nadaï 2007; Szarka 2007). In a report in 2000, Yves Cochet named the limited success of the EOLE 2005 programme “*the [French] invention of virtual wind power*” (Cochet 2000: 41, my translation).

Later in 2000, the EOLE 2005 was abandoned<sup>23</sup> and the Electricity Act set the scene for a new dual system that combined calls for tender and feed-in tariffs. This turn towards feed-in tariffs was influenced by the Green party and was motivated by the success seen in other European countries, such as Germany and Denmark, with regard to their relatively high rate of wind power development (Int. Yves Cochet).

The dual system made the distinction between smaller wind parks, with a maximum capacity of 12 MW, and large projects beyond 12 MW<sup>24</sup>. Only the small installations qualified for the tariffs (fixed in 2001 at 8,38c€/kWh). Larger installations remained organized according to a call for tender principle. In practice, however, this has generally resulted in developers breaking down their projects into smaller projects not exceeding the 12 MW limit (Int. Lamarre; Int. Lefebvre) simply because the feed-in tariff appeared more ‘economic’ than the uncertain price that emerged from the call to tender.

In its main features, the French system reproduced the German Renewable Energy Sources Act of 2000 (Szarka 2007; Int. Cochet). Firstly, the feed-in tariff contains a ‘purchase obligation’, i.e., that all wind power projects accepted as qualified for the feed-in tariff are

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<sup>22</sup> Apart from the large hydro projects undertaken between the two wars (Szarka 2007).

<sup>23</sup> Though the general argument for calls for tender is that it keeps costs controlled, it was criticized for lowering the price below what was feasible for the developers (Cochet 2000; Nadaï 2007).

<sup>24</sup> The 12MW threshold was described as a pure coincidence, as Cochet described it: “*There was put a cap on – one was not entitled to more than 12 megawatts [...] the 12 megawatts, it was an amendment to the Act of February 10, 2000, 8 years ago, an amendment that was voted at 3 am during a parliamentary debate. People were going crazy at 3 am, you lose your reason: we said 12 megawatts, it could have been 50 megawatts, it could have been 100. People voted anything! Well, it has remained arbitrary, it is not based on technical studies at all, it is purely one can say random*” (Int. Cochet, my translation).

assured that the electricity they produce will be bought, in the case of France, by EDF at the price defined through the device. The first definition of the tariff introduced the principle of ‘degression’ into the fixing of the tariff, based closely on the German tariff. However, the three ways in which the feed-in tariff was articulated in France were distinctive, namely:

- a reduction of 3.3% in the tariff each year after 2003;
- a further reduction of 10% once a threshold of 1500 MW of capacity was installed (these lower rates being applicable to new constructions);
- a ‘price tier’ system whereby the same initial tariff was payable in all cases for the first five years, but for the following ten years, tiered tariffs were applied in relation to output. Rates were calculated according to a sliding scale based on full-load hours (using an average of three years of the first five, discarding the best and the worst years). Up to 2000 hours, the rate remained at 8.38 c€/kWh, dropping to 5.95 c€/kWh at 2600 hours, and to 3.05 c€/kWh for 3600 hours and above.

Although the ‘degression’ element was criticized for lowering incentives over time to switch to renewable energy technologies, it stimulated interest from developers by offering higher tariffs early. Tiered pricing also favoured dispersal to lower wind sites, discouraging the ‘wind rush’ phenomenon of excessive concentration in high wind-speed areas.

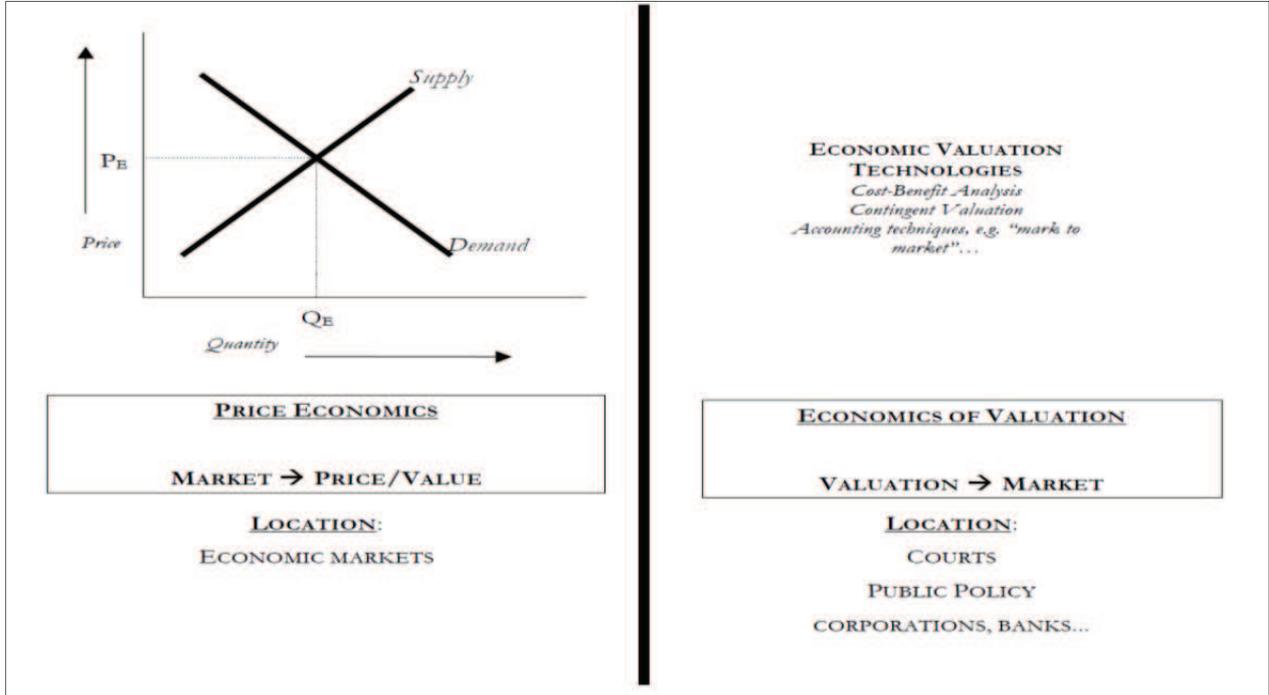
This brief outline of the feed-in tariff is fleshed out in the sections to follow. In particular, the feed-in tariff is discussed as the outcome of negotiations and the conflicting processes of valuations. But before unfolding the processes of valuation leading to the French feed-in tariff, I will briefly comment on recent developments within the sociology of prices and valuation.

### **4.3 Price and Value(s)**

If we consider the feed-in tariff to be a price, and we do, the description made by Weber of the price system as the result of a market struggle (between men); i.e. the result between

conflicts and compromises<sup>25</sup> (Weber 1978), is a quite precise description of the making of the French feed-in tariff (as will be illustrated below). But it is a price not determined in the market, per se, in that it is not the outcome of supply meeting demand. Rather, the pricing of wind power is found in the right side of the figure below. Though Weber described the struggle of the left-hand side of the figure, i.e., a market struggle, the point here is that a somewhat similar struggle is taking place in the forums of the right-hand side of Fourcade’s model.

Figure 4.1: The two roles of economics



(From Fourcade 2011: 47)

With the figure above, Marion Fourcade makes a point of the role of economics in processes of valuation<sup>26</sup>; economists have, for some time now, moved into the valuation of goods

<sup>25</sup> Weber described prices and the “the price system as a struggle of man against man ... and prices are expressions of the struggle; they are instruments of calculation only as estimated quantifications of relative chances in this struggle of interests” (Weber 1978: 108).

<sup>26</sup> It is important to stress that the distinction between the two roles of economics made in the figure is a distinction between the role of the economists as well as the tools and technologies enrolled in the process of

outside the market sphere, operating “...by and large as if non-market goods were priceable ... as if they were being traded on markets” (Fourcade 2011: 46, emphasis in original). Fourcade’s illustration of the two modes of valuation/pricing is also a comment on the so-called Parsons’ Pact (see Stark 2009); a pact made between Talcott Parsons, as a sociologist, and the economists at Harvard, according to which economists would appropriate the study of *value*, and the sociologists the study of *values* (Stark 2009). According to Fourcade, this pact is long gone: From the point of view of the economists, values may be collapsed into value, as all objects may be subjected to an economic valuation process (Fourcade 2011). Whereas a critique of this ‘economization’ process of all domains of human existence is ongoing (e.g., Ackerman and Heinzerling 2004), quite a different point emerges from my fieldwork. Though the tariff may be expressed as value in the singular, the process of defining this value is a process in which values (in the plural), are mobilized, created, debated, and aligned – in other words; rather than being a straight-forward process of economists peacefully defining the price of wind power (collapsing values into value) outside or on the fringe of the market, the process includes qualifications and disqualifications of wind power, its value(s), not to mention greenhouse gas emissions and their sources. As such, in my study the processes of economization and politicization as intertwined are underscored.

A range of techniques are involved in the valuation of wind power as determined through the tariff, e.g., the IRR and PIM. Stressing these ‘valuation devices’ (see Doganova 2012) is central to shifting attention from value, as a subjective or objective property of the subject matter, towards valuation as a process (or an action). This shift in attention corresponds to the recently renewed interest in valuation as viewed by pragmatism, and in particular valuation in the work of Dewey (e.g., Muniesa 2007; Muniesa 2012; Stark 2009). Here, the distinction between value and valuation is stressed:

*“Value can be understood as something that something has by virtue of how people consider it (how they personally like it, in particular), but also as something that something has as a*

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deriving a price. As such, the figure does not mean to describe the market as a self-sustaining mechanism for deriving prices, or ignoring the negotiations and assembling that goes into making markets. Rather, it pays attention to situations in which economists, with tools such as cost-benefit analysis, contingent valuation, etc., make price(s) happen and to “a focus on economic valuation processes, where the value problem is much more general and encompasses everything that people care about (or are believed and made to care about)” (Fourcade 2011: 46, emphasis in original). Therefore, the distinction is more of a distinction in practices of the economists undertaking pricing/valuation, as well as the situations in which they occur; e.g., in cases where markets do not exist and sometimes are not sought to exist.

*result of its own condition and of its relation to other things (for instance, in relation to work or to money, or to any sort of standard metric). Valuation, in turn, refers to something that happens to something, and this happening can be a matter of consideration or of relation, or both at the same time” (Muniesa 2012: 26).*

Centring attention on valuation, rather than value, involves a simultaneous attention to action because “*valuation is a costly and irregular activity that brings value about*” (ibid.: 27). Thus, value is the result emerging from processes of valuation. In the following, the price of 8,38 c€/kWh is followed in the making, i.e., we follow the controversies, the calculations, the valuation devices, and the qualifications undertaken to associate wind power to a specific value – or no value at all. As part of this valuation process, the environment is often mobilized as something valuable in the image of prices of CO2 quotas, costs of emissions, or the qualities of the landscape, and monuments, etc. Factors such as these are sometimes made part of the calculation and are at other times absent. As Andrew Barry notes:

*“[t]hose involved in the market do not worry about morality or politics, not because they are immoral or apolitical, but because enormous efforts have been made to make morality and politics calculable, and make them happen in other places” (Barry 2002: 273).*

Accordingly, it would be expected that market transactions involving wind power do not involve negotiations regarding the moral or political aspects of renewable energy, per se, because the calculation – or non-calculation – of tariffs or climate change consequences has been made, at least partly, calculable by economists on the fringe of the market. Therefore, wind power enters the market as an already valued configuration as in the right part of the figure above rather than being valued through the transaction in the market (as the left half of the figure illustrates).

So, on the one hand, this is a story of a market device, and on the other hand, it is a story of value – in particular, the value put on wind power through the device. Whereas sociologists, according to Barry, often draw an opposition between calculation and politics (Barry 2002), this study attempts to go beyond such an a priori divide. Stressing the associations that are made, and unmade, the analysis demonstrates that valuation, whether in the hands of politicians or economists, is centred around the construction of assemblages in which associations between different values and wind power are made; furthermore, this chapter illustrates how the valuation is central to the assemblage of a market: Through the valuation,

associations are made or cut off, and categories are stabilized, all of which eventually affect the assemblage of the market, and in particular, its relation to competing markets.

In the following, the framing of the feed-in tariff system and its translation into a specific price will be followed through different valuation propositions, offering or proposing themselves as ‘centers of calculation’ (Latour 1986).

#### 4.4 Qualification and Disqualifications of the Tariff – Tracing Controversies

In the following, five different approaches to the tariff as a price are followed. These are (1) Yves Cochet, former minister and member of Parliament, and the author of the 2000 report “Stratégie et moyens de développement de l’efficacité énergétique et des sources d’énergie renouvelables en France”; (2) Bernard Chabot, former employee at ADEME; (3) CRE, an independent Commission charged with the surveillance of the electricity sector; and (4) DGEMP (Direction générale de l’énergie et des matières premières), the place where the tariff was actually defined; and finally (5) Serge Poignant, member of Parliament, and the author of the 2003 report “*Rapport d’information sur la politique de soutien au développement des énergies renouvelables*”.

These five approaches towards the feed-in tariff have continuously appeared during my fieldwork, through interviews, in reports, as well as in academic articles. Their selection is based on their strength in seeking to reconfigure the existing system, and at other times, attempts at reconfigurations that remained visible, as they left traces in the shape of references, calculations, qualifications, etc.<sup>27</sup> Certainly, other approaches could have been added, e.g., SER (Syndicat des énergies renouvelables), a French industrial organisation for renewable energy, who did participate in the working group leading up to DGEMP’s definition of the tariff. However, traces of their participation seemed to vanish in the field. Rarely were they mentioned, and never in relation to attempts at defining/altering the governance model or the tariff.

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<sup>27</sup> All of the following accounts of value were continuously referred to during field visits, in reports, or sometimes in academic articles (e.g., the Cochet report is referred to in a number of articles on French energy policy; Poignant and Chabot are also referred to frequently in various materials).

The five approaches are quite diverse in their morphology: For example, Yves Cochet was delegated the task of investigating the future of the energy-sector by former Prime Minister Jospin; Chabot was a senior-consultant in ADEME, a government agency concerned with environmental and energy issues, but nonetheless appeared to be working 'in the wild' as a researcher. DGEMP was purely delegated the task of articulating the tariff and the texts surrounding it. The differences in status and strength may seem striking, but for the present purpose, they have been followed because of the traces they have left in the field. The apparent morphology is therefore less important than the ways and whereabouts of their (dis)qualifications; they have become part of networks and have become representative of these through their translations.

The various qualifications/disqualifications of the feed-in tariff referred to here did not appear at the same time; there are three years between the report authored by Yves Cochet (2000) and the report of Serge Poignant (2003). But the existence of the feed-in tariff in the period of investigation was never an entirely settled and stabilized configuration. Again, it has been the traces of the work of qualification left behind that has been the selection criteria rather than a consistent time line.

Finally, the (dis)qualification work unfolding around the feed-in tariff device is constantly related to the tender device in general, and the Eole 2005 discussed above in particular. The two devices are constantly juxtaposed and related; organization of the market through price (feed-in tariff) or quantity (call to tender) emerges as two opposing logics of market ordering. Furthermore, the two devices are related in such a way that a qualification of one of the two devices is a simultaneous disqualification of the other.

#### **4.4.1 Cochet – Framing the Forum for Valuation**

The feed-in tariff as a means of governing the French wind power production was set in motion in a report authored by Yves Cochet in 2000. Cochet was at that time a Member of Parliament representing The Green Party, and vice-president of the National Assembly. In July 2001 (to May 2002) he became Minister of Environment and Regional Planning, and he is today a member of the French National Assembly. In 2000, Prime Minister Jospin gave Yves Cochet the task of drawing up an account of the renewable energy situation in France.

Cochet was also asked to work out concrete ideas and recommendations for the government in order to implement further the EU Electricity Directive (Cochet 2000).

To Cochet, electricity produced from renewable energy technologies, and in particular wind power, had proven successful in the years leading up to the time of his report. This success, he stressed, was anchored in its compatibility with the energy system, the recent industrial and societal development, and was accompanied by the ‘birth of a true market’ (Cochet 2000). However, this positive development was tightly connected to the governance systems organizing renewable energies, and in France the Eole 2005 had been at the heart of the invention of virtual wind power as mentioned above (Cochet 2000). In his evaluation of the development perspectives of renewable energy, Cochet proposed an objective of the installation of 10 000 MW wind power (onshore as well as offshore) by 2010. Crucial to attaining this ambition was the choice of governance system:

*“Only a support mechanism based on guaranteed purchase, at a sufficient level and duration of time, is likely to give vigorous impetus necessary to achieve this ambitious goal, but a goal not out of reach”* (Cochet 2000: 115, emphasis in original, my translation).

Crucial to Cochet’s valuation is thus his problematization of the Eole 2005 program (leading only to ‘virtual wind power’), and his proposed solution: A guaranteed price modelled on the German feed-in tariff. Later, after the adoption of his proposal, the first feed-in tariff system often became referred to as the Cochet ruling (*Cochet-arrêté*). But the proposition of shifting from a bidding system, organized by EDF on behalf of the French state, was met by a firm opposition from various quarters:

*“These were the issues, we can say both ideological and technical at the same time, of people from the CRE, people from RTE, people from EDF, even people from the DGEMP, or people behind minister Christian Pierret; they said “Look, we already have too much nuclear electricity in France, we sell electricity [to neighbouring countries], why are the environmentalists going to annoy us with buying much more expensive renewable electricity, when we have the cheapest nuclear power in Europe... and we will be forced to buy much more expensive electricity from the environmentalists, with their shitty wind turbines... this is madness!”... There was this techno-ideological blockage, saying "we are the best in the world at nuclear electricity" which is true, we are the best in the world”* (Int. Cochet, my translation).

This was the very hostile environment described by Cochet in which he was trying to introduce the feed-in tariff. Though the blockage or barrier he confronted might very well have its source in a nuclear techno-ideology (or ‘technopolitical’ regime, see Hecht 2009), the argument is fixed on prices. Nuclear energy is cheap, wind power is expensive. Making the connection between the feed-in tariff and the price of nuclear power, the respective technologies could be compared. But to do this, the energies must be ‘made one’. The account of the opposition retraced by Cochet is one in which prices are made the only difference; electricity is simply electricity, no matter the source of it. Recalling Riisager’s experiments, the connection of the wind turbine to the grid might have detached the good from its producer, but it simultaneously performed a qualification in which wind power electrons became simply electricity. In other words, the detachment performed through the connection to the grid is not simply a detachment from the producer, but also from the technology of production. Cochet, who did not believe in the merits of nuclear power, was opposed to the idea that prices alone should settle the controversy; to him the source of the energy was paramount. Therefore, Cochet’s account designates different values: nuclear waste, renewability, and the creation of new industries. Cochet translates wind power into different values and defies the ‘economist’s act’ of collapsing values into value. The opponents he describes, on the other hand, argue along a single value, namely that of price. The introduction of the tariff device becomes the pivotal centre around which these opposing arguments are launched, all the while creating the possibility of (re)translating wind power into a single value: a price.

Yves Cochet’s primary argument for the abandonment of the call for tender governance system was based upon the system’s inability to prove itself efficient: As mentioned above, the system had so far only led to ‘virtual’ wind power (Cochet 2000). To illustrate the inefficiency of the call for tender system and the success of the feed-in tariff system, Cochet presented the following table, summarizing the wind power status of a set of European countries:

**Table 4.1: Wind Power Development and Price**

<b>Procedure</b>	<b>Country</b>	<b>Average price (cF/kWh)</b>	<b>MW connected in 1998</b>	<b>MW connected in 1999</b>
Guaranteed price	Germany	57	793	1569
Guaranteed price	Denmark	50	264	289
Guaranteed price	Spain	49	395	346
Guaranteed price	Italy	45	54	101
Calls to tender	France	32	7	0
Calls to tender	Great Britain	30	10	18
Calls to tender	Ireland	29	9	4,7
Green certificates	Holland	Unknown	42	45

(Cochet 2000: 42, my translation)

Tables like the above are often seen in discussions between different governance systems, linking governance systems to success/failure of the development rate as a function of the price they produce. Whereas the call to tender system has often been vented as the most ‘market-like’ governance system (see e.g., Hvelplund 2001b), the way Cochet mobilizes the table is rather that of ‘proof of efficiency’. Whereas the economist *in vitro* concluded on the suitability of the calls to tender system in a market economy, Cochet mobilizes an *in vivo* demonstration of the efficiency of feed-in tariff system. In other words, in the presentation made by Yves Cochet, the value (here a price) put on wind power, and the device, i.e., the feed-in tariff, are entangled. A high construction rate is itself made the success criteria, and choosing a tariff rather than a bidding system reflects a commitment to developing wind power. But Cochet is not unaware that economists discuss the ‘market-likeness’ of the governance systems:

*“Normally, the device that is a spontaneous market device is bidding, because in principle, it does not distort the market. Now we have twisted the market with guaranteed tariffs – a protected market in a way. Obviously we told Jospin and Pierret and the people of DGEMP “this is normal for a new emerging technology in which France could be champion because we have good engineers in France, it is normal to help it initially”. Me, I always take the*

*example of nuclear power in France, how much was a nuclear kilowatt-hour in France worth in 1950? It was very expensive!” (Int. Cochet, my translation).*

In the language of Boltanski and Thevenot, one could say that Cochet shifts the underlying regime of worth from that of the market world to that of the industrial world: Including the temporal dimension, i.e., investment in a future activity, is not conducive to the market arrangement and its underlying regime for justification (Boltanski and Thevenot 2006). Furthermore, he stresses the temporal dimension in technology development (and price development) by referring to the early days of nuclear power and making the parallel to its first price.

Continuing his disqualification of the market as an instrument for developing new energy technologies, Cochet comments on the so-called virtues of competition:

*“The proponents of calls to tender generally stress the ability to accelerate the lowering of the price of the production, thanks to competition, which is for the occasion dressed in all its virtues, and as proof they cite that the contractual prices of the EOLE 2005 as the lowest in Europe. In doing so, however, they confuse the notion of costs with the notion of price: if the latter reflect, as everyone knows, the strength relation in a commercial negotiation between a buyer and a seller, in time T, it is not automatically related to the real costs, undertaken by one or the other part” (Cochet 2000: 40, my translation).*

With this comment, Cochet attempts to unfold the ‘merits of competition’ (as well as the tender schemes). By making this relation between costs and price, Cochet stresses that even though competition drives down prices, someone still has to pay for the development of new technologies, i.e., undertake the costs. Costs are retained as real, whereas prices are seen as constructions that may – or may not – reflect the realities of costs. In other words, the developers are expected to carry the costs of developing RETs, which should be in the interest ‘of all’. But even though Cochet stresses the pitfalls of the belief in ‘optimizing competition’, he sees arguments from the market sphere as central to the discourse that could potentially convince the Prime Minister and others:

*“... we convinced them with arguments on the one hand ecologist, but also with market-arguments by saying... when we have an emergent market, we need a market instrument which is a price signal to guarantee that the investors, the private investors, the capitalists*

*who wants to invest in wind parks are guaranteed that their market will be sustained degressively, but for a certain period of time, and in a way that, after 15 years, they'll be competing with the nuclear... so it was partly ecologist arguments, and market arguments that convinced Jospin and his counselors” (Int. Cochet, my translation).*

Though the argument still seems more in line with Boltanski and Thevenot's (2006) 'Industrial world' by referring to the temporal frame, with its investment in the future argument, Cochet stresses the importance of making a strong relation between wind power and the market. The feed-in tariff does not exclude competition between wind power and nuclear power in the future.

Eventually, having set the scene for the feed-in tariff system, Cochet makes the proposition of a price to be offered to the developers. However, rather than calculating the tariff, he adopts the German tariff as his proposition for a level for the French tariff. During the interview, Cochet indicates that he is not a 'number-cruncher', but that the German tariff has proved its worth (Int. Cochet), and therefore the design (the tiered system) as well as the tariff-level is eventually proposed to be copied into French law by Cochet. Having made the case for the adoption of the feed-in tariff, Cochet is reluctant to undertake the actual translation into a specific number – or price. Rather, the tariff is a means of allowing new (or old) matters of concern to surface, and be framed, if not directly then indirectly, into the exchange of energy. This move is the politicization of wind power as a good, as well as that of its competitors. Acknowledging that a politicization process must eventually lead to an economization, i.e., the feed-in tariff must have a single price, seems less important to Cochet – though it must have a 'sufficient level': *“The table [above] clearly shows the direct link between a sufficient level for the guaranteed price and the increase of installed power ...”* (Cochet 2000: 42, my translation). Seven years later, however, in his article *“Why is There No Wind Rush in France”* (2007), Joseph Szarka concludes that institutional frameworks, industry structures, as well as the mobilising discourse have upset the development of wind power in France, despite the adoption of a feed-in tariff system resembling the German system.

Thus, Cochet sets the boundaries of a forum in which the valuation of wind power is to take place. His disqualification of the Eole 2005 device, and the proposition of its replacement by a fixed tariff, sets the frame within which the definition of the price for wind power is to be negotiated. In doing so, Cochet produces an important problematization; the choice of policy

instrument in the shape of a bidding system, i.e., Eole 2005, has kept prices under a realizable level, and thus stalled wind power development. In other words, though prices resulting from the Eole 2005 are reportedly the lowest in Europe, their effects were equally low. According to Cochet, the failure of the Eole 2005 reflects the core of the problematization, namely the relation between price and cost. This is stressed as he draws on the example of the price of the first kWh of nuclear power produced in France, which was probably more expensive than the price would reflect (I would argue that this is still the case even though nuclear power technology has matured). With the association between the first kWh of nuclear power, and wind power, Cochet asks the question: Who is to pay for emerging technologies? Whereas the Eole 2005 device, and the call to tender governance system in general, lead to individual prices for each project, it is said to reflect the costs of a given project. But because the specific costs are assumed to be framed within the individual bid, they remain concealed. On the other hand, making one single price (a universal framing, so to speak) has the effect that matters of concern emerge. In other words, it is the translation into a single price (rather than the individual project-related prices of the bidding system) that allows different values in the plural to emerge and be mobilized.

To Cochet, the value driving his contribution is the climate and a wish to cut carbon dioxide emissions. However, the frame he sets up for the valuation of wind power, i.e., the definition of a single price, opens a space within which controversies are to be played out and other values emerge.

#### **4.4.2 Chabot – Making Fairness and Efficiency Calculable**

An important contributor in the forum set up by Yves Cochet is Bernard Chabot. Chabot is an engineer and economist, recently retired from the French Environment and Energy Agency (ADEME), where he worked as a senior expert. ADEME is an industrial and commercial public agency under the joint supervision of the Ministry for Ecology, Sustainable Development and Spatial Planning (MEDAD) and the Ministry for Higher Education and Research. Today Chabot works as an independent consultant. Chabot has published a number of articles on the calculation of the tariff (Chabot 2001a, 2001b, 2002), and is often referenced in the field (e.g., Int. Cochet, Chrupek, Durant) as well as in academic articles (e.g., Szarka 2007a; 2007b; Nadaï 2007). The following discussion is based on interviews with Chabot, his

contribution to a course for engineering students at Ecole des Mines in Paris, and a number of articles he has published over the years.

In his opening of a seminar on wind power held by ADEME in 1992, Bernard Chabot finished his speech by paraphrasing the famous French novelist Victor Hugo: “*Nothing is stronger than an idea whose time has come*” (“*Rien ne peut s’opposer à la force d’une idée don’t l’heure est arrive*”) (Chabot 1992: 1). The idea he is referring to is wind power as a large-scale source of electricity. Thus, Chabot’s commitment to wind power goes back a long way, and he warmly welcomed Cochet’s proposal to adopt a feed-in tariff system. Unlike Yves Cochet, however, Chabot primarily emphasizes the distinct definition of the price, and his contributions primarily aim at translating the framing set up by Cochet into a specific figure. In doing so, however, Bernard Chabot frames his fabrication of the price as a response to the hostile environment described by Yves Cochet; ‘fairness’ and ‘efficiency’ are made qualities of his calculative method.

In a number of articles, Chabot presents what he calls the ‘Profitability Index Method’ (PIM), which has been used by ADEME to set the French tariffs (Chabot 2001a). According to Chabot, the PIM is a simple and powerful method to define ‘fair and efficient’ tariffs (Chabot 2001a; Chabot, Kellet, and Saulnier 2002). The method, Chabot et al. say: “ ... *is simply the ratio between the net present value (NPV) and the required initial investment (I):  $PI = NPV / I$* ” (Chabot, Kellet, and Saulnier 2002: 1), and he sums up the advantages of using the PIM in the table below:

**Table 4.2: Summary of the Profitability Index Method (PIM) and its basic tools:**

The linear model allows:
<ul style="list-style-type: none"><li>• To describe a single project’s economic profitability from its costs and performance ratios and to give access to the simple and related "PI - Tariff" linear graph.</li><li>• To determine directly the value of the Overall Discounted Cost (ODC, the "manufacturing cost") of a product or a service delivered from the investment and to assess its structure (variable cost part, O&amp;M cost part, investment cost part).</li></ul>

- To determine the relevant selling price (the tariff) and the related profit margin to apply on this cost (the margin on cost MOC) to get a targeted profitability of the project expressed in PI value.
- To clarify the linear link between the PI of a project and its margin on cost (MOC). In the case of power production, this link allows the demonstration of the "Free fuel cost energy sources paradox", which should be at the basis of the definition of a sound market regulation in order to favour renewable energy sources versus fossil based ones.
- To determine from a dynamic "Markets/Technologies Matrix" the minimal weighted mean value of the profitability indexes for the investments of a company active on global expanding markets and using advanced technologies in order to ensure a stable and strong long-term development of this company.
- To establish the links between the PI and the other profitability parameters (direct payback time, discounted payback time, internal rate of return (IRR), benefit-cost ratio) in order to assess their minimum or maximum required values from the above rational minimum values of profitability index.
- To easily integrate the valuable inputs from advanced profitability methods such as CAPM (capital asset pricing model) or ROV (real options valuation).

(Chabot 2004: 1)

At the heart of the PIM is thus a classic discounted cash flow analysis: An analysis of future cash flows discounted into a so-called 'net present value' (based on the principle of 'time-value' of money according to which a cent is worth more today than a cent tomorrow). As future cash flows of a wind power project benefitting from a feed-in tariff is a function of the production of the number kWh and the tariff itself, these are in turn set in relation to the costs of constructing the wind power project. Chabot's proposal is therefore based on a very well-known and used project valuation tool, familiar to most project developers and policy makers. Furthermore, the weight put on the description of the method is substantial; the legitimacy of the tariff definition is entirely bound up with the method, and as illustrated in the table,

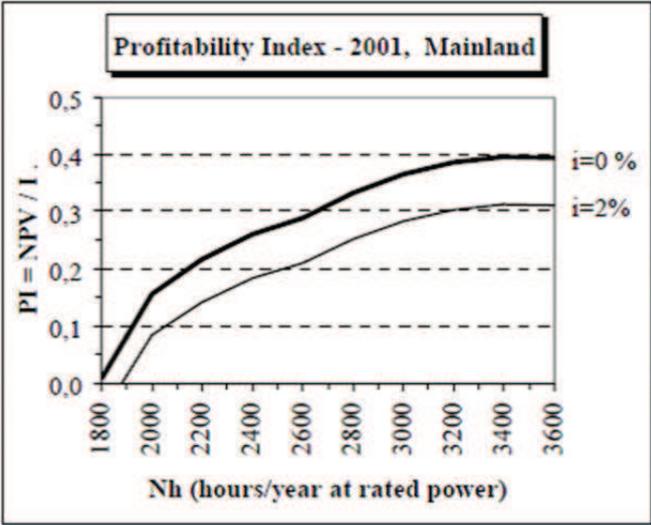
Chabot creates links to a variety of additional methods such as discounted payback time, IRR, benefit-cost ratio, and so on.

Very central to Chabot's calculation is, as illustrated in the table, the possibility of assessing the profitability of the wind power projects. This emphasis addresses the heart of the critique raised towards the assemblage of the feed-in tariff; the absence of competition means that there is no means of safeguarding against 'undue' rents gained by the project developers. The notion of 'undue' rents refers to the gap between cost and price discussed by Yves Cochet. To address this problematization, Chabot enrolls the profitability level of other energy technologies and makes them part of his calculation: "*In liberalised electricity markets, the minimum margin on cost for coal power plants is around 10%. As this margin corresponds for a modern coal plant to a profitability level  $PI = 0.3...$* " (Chabot et al. 2002: 3). As such, the coal-fired plant is made the reference on which to base the profitability of wind power producers or to make a legitimate case for their level of profitability.

However, within ADEME certain disagreements regarding the level of the tariff arose, and in an internal letter, one of Chabot's colleagues proposed a tariff of 43,3 centimes de francs rather than the 47,2 proposed by Chabot, noting: "*The justification for this difference ... could be explained, according to the author, by the desire to provide investors with not only a fair return on their investments, **but also a comfortable margin to ensure continued innovation and research investment, development, and production***" (Internal correspondence 2000, emphasis in original, my translation). The 'fairness' of a PI of 0,3 is thus questioned by other employees at ADEME, who argued that an 'extra' margin was included by Chabot to sustain the further development of the technology. In his reply, where Chabot retains the PI of 0,3, he also writes: "*By the way, historically all the tariffs having led to wind power success stories (DK, Germany, and Spain), 'by chance' lead to  $PI$  superior or equal to 0,3*" (Chabot, internal correspondence, June 2000, my translation). Though his main arguments for a result of a PI of 0,3 remains vested in the PIM method, Denmark, Germany, and Spain are again enrolled as models to follow.

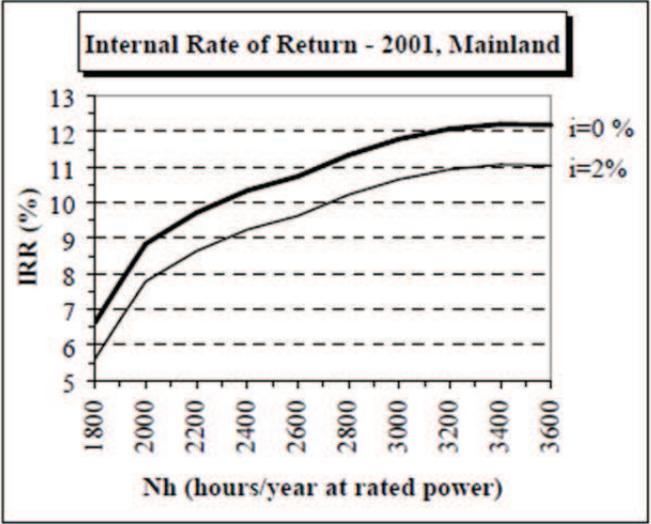
According to the above, what is entailed in the PIM is a calculation of 'fairness' and 'efficiency', respectively. To illustrate the 'fairness', Chabot (2001a) and Chabot and Saulnier (2001) present the following two graphs of the profitability index (Figure 4.2) and the internal rate of return (Figure 4.3).

Figure 4.2: Profitability Index



(Chabot 2001a: 4)

Figure 4.3: The Internal Rate of Return



(Chabot 2001a: 4)

Both graphs are made illustrations of the fairness of the tariff, and even more so when inflation (i) is considered:

“As it can be seen in each figure ... profitability is not always beyond the proposed minimum value of  $PI = 0.3$ . But profitability is increasing with  $N_h$ , as designed in order to give incentives to developers using good sites (which often imply higher costs) and using wind turbines with high productivity and availability” (Chabot 2001a: 4).

Chabot thereby demonstrates that the ‘fairness’ of the tariff implies certain qualities of the site as well as choosing turbines with particular capabilities. In other words, wind power developers must possess certain skills to earn profits from developing their projects; it is not simply enough to choose a random site and erect any turbine on the site. Finally, Chabot concludes:

*“With this new tariff system, France can now develop its huge wind potential at a pace as high as experienced recently in other countries with ‘fixed premium prices’. A minimum of five and up to ten GW could be installed in France in 2010, provided that all potential problems for grid connection and public acceptance are solved”* (Chabot 2001a: 4).

Chabot’s method as well as the calculation of the French tariff is made widely accessible through articles and conferences, in which he constantly stresses ‘fairness’ and ‘efficiency’ as the main objectives for the construction of the tariff. His PIM is presented as an illustration of how exactly to ensure this ‘fair and efficient price’, thus fairness as well as efficiency are made calculable. Anchoring his contribution in the (positive) association between wind power and the fight against climate change, his method proposes to replace the resource allocation optimum allegedly produced through a free market by ensuring fairness and efficiency through his calculation. The PIM folds these qualities as calculable qualities of the tariff, and thereby offers a direct response to proponents of tender schemes as described by Yves Cochet, and not least the valuation put forward by CRE to be discussed next.

#### **4.4.3 CRE – Disassociation and Displacement**

The frame of valuation set up by Yves Cochet was not, as indicated, uniformly accepted as legitimate. One opponent to the framing of the device is CRE, the French Energy Regulation Commission (Commission de Regulation de l’Énergie). CRE was established in 2000 as an independent public organisation charged with the surveillance of the proper functioning of French energy markets. In particular, CRE is charged with managing the access to the grid, monitoring the transactions between suppliers, producers and traders within energy markets, and ensuring the consistency of their offers.

Of interest here, CRE has published so-called notices on the rulings (arrêtes) fixing the feed-in tariffs in France in both 2001, following the first tariff, as well as in 2006, following the

modified tariff. Emphasis in the following discussion will be on the first notice, but CRE’s advice remains the same: Abandon the tariff system that provides undue rents to the developers and return to a competitive call for tenders system. The arguments articulated by CRE are associated with two problematizations: Firstly, they consider the renewable energy technologies that benefit from the purchase obligation, and their (negative) relation to greenhouse gas emissions; and secondly, they critique and (re)calculate the tariff.

To start, CRE addresses the contribution of the purchase obligation (i.e., the feed-in tariff) to the “*fight against the greenhouse effect*” (CRE 2001a: 3, my translation). To reach this evaluation, CRE translates the most common energy technologies in France into their costs of production and their costs in pollution (see table below).

**Table 4.3: Technologies, Their Costs of Production, and Costs of Pollution**

	Overall cost of production (€/MWh)	Fixed cost (€/MWh)	Variable cost (€/MWh)	CO2-emission value (€/MWh)	Value of air pollution (€/MWh)
Nuclear power	30	21	9	0	0,3-2,5(*)
CCGT(**)	33	8	25	8	6-35
Coal-fired plant DOM(***)	90	55	35	20	25-150
Fuel-fired plant DOM(***)	90	35	55	15	25-100

(After CRE 2001a: 4, my translation)

(\*)These figures include the negative externalities of nuclear power other than air pollution.  
 (\*\*) Combined Cycle Gas Turbine.  
 (\*\*\*) Corsica and overseas departments.

Distinguishing two categories of technologies potentially benefitting from purchase obligation schemes, namely those providing a ‘guaranteed production’ (e.g., co-generation), and those of ‘non-guaranteed’ production (e.g., wind and solar), CRE concludes that the latter category does not allow for the avoidance of a supplementary construction of centrals with guaranteed production. In other words, wind and solar power cannot substitute any of the technologies of

the table above, because their volatility conflict with the planning and management of the energy system. This point of view represents one side of a long-lived controversy, and though it is not the ambition to follow the controversy here, it should be mentioned that the relation between fluctuating technologies, production planning, and grid management remains controversial (e.g., see EWEA 2005). CRE concludes that since these fluctuating technologies cannot decrease the number of conventional centrals, *“the avoided cost of production is therefore limited to the variable costs, mainly the costs of fuel”* (CRE 2001a: 4, my translation). Furthermore, given that nuclear power has low variable cost, no greenhouse gas emissions, and hardly any air pollution, the contribution of wind and solar power is close to none in continental France (ibid.). Again, the cases of Denmark, Germany, and Spain are mobilized, and it is argued that these countries, well known for their renewable energy development profiles, benefit from renewable technologies because they have different technology configurations, and these are largely based on fossil fuels. CRE thus cuts the association between wind power and greenhouse gas emission reductions, though the dissociation remains contingent; i.e., the contribution of wind power to the fight against climate change depends on the energy technology configuration in which it is introduced. However, the (dis)qualification of wind power is a simultaneous qualification of nuclear power. Rather than stressing ‘renewability’, ‘emission-free’ becomes the category to be stressed. This replacement of the category allows the two energy technologies to be compared, as well as their value; here value is an expression of the relation between (variable) costs and costs of emissions. As such, CRE questions the assumed causality of the feed-in tariff device by problematizing the association between fluctuating technologies and the reduction of CO<sub>2</sub>-emissions in an energy system dominated by nuclear power. In other words, Yves Cochet was wrong in his translation of wind power into cuts of CO<sub>2</sub>-emissions.

Having concluded that the increase of wind power (and solar power) is unlikely to contribute positively to the fight against greenhouse effects, CRE problematizes the feed-in tariff, both as a device as well as its level. Firstly, CRE lists the economic value of avoided externalities:

**Table 4.4: Tariff Related to Costs of Externalities Avoided (Continental France)**

	Variable costs (€/MWh)	Value of CO2-emissions (€/MWh)	Value of air pollution (€/MWh)	<b>Total cost of avoided externalities (€/MWh)</b>	<b>Average tariff – 2400 hours (€/MWh)</b>	Difference (€/MWh)
Nuclear power	9	0	2	<b>11</b>	<b>70</b>	59
CCGT	25	8	6	<b>39</b>	<b>70</b>	31

(CRE 2001a: 7, emphasis in original, my translation)

This leads CRE to conclude that the tariff offered to wind power producers, whether compared to nuclear power or gas powered stations, is highly superior to the avoided costs of environmental externalities. Furthermore, CRE adds, “wind power, however, also has negative externalities that strictly speaking should not be overlooked” (CRE 2001a: 7, my translation).

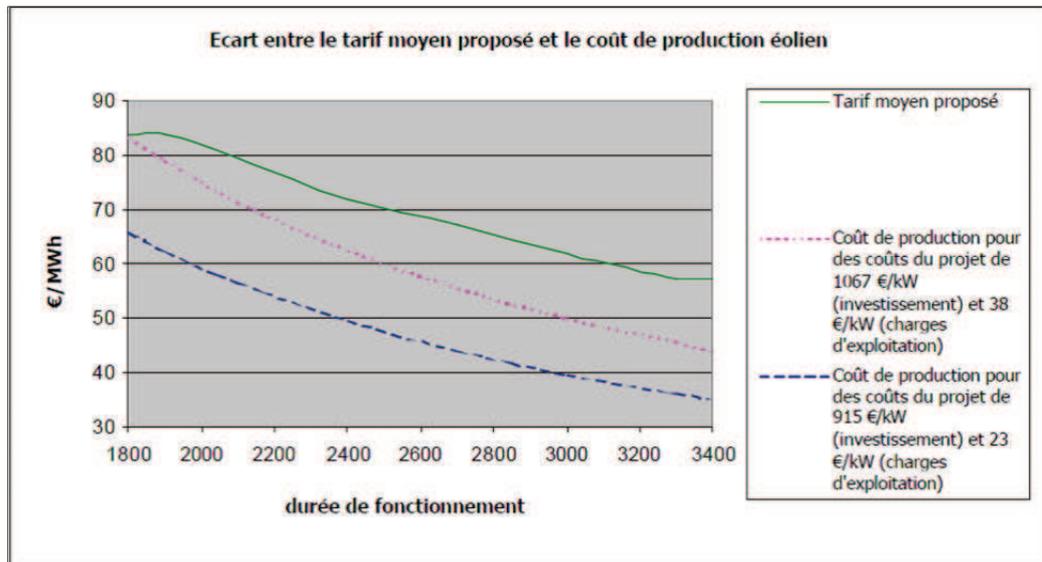
Lastly, CRE attends to the issue of rents, or profitability, to be gained by the wind power developers. The first step is to illustrate the gap between the average tariff and the cost of wind power production. As input to these calculations, CRE lays out its foundation:

*“The hearings conducted by the CRE showed that the investment costs specified by the various concerned actors are between 838 €/kW and 1143 €/kW, and annual operating costs between 2 and 3.5% of the costs of investment”* (CRE 2001a: 8, my translation).

To calculate the gains to be upheld by wind power producers, CRE retains ‘value couples’ of 915 €/kW and 23 €/kW (investment costs/operations costs), and 1067 €/kW and 38 €/kW. Both numbers fall within the spectrum of the costs resulting from CRE’s hearings mentioned in the quote above. Furthermore, it is said that the ‘value couple’ 1067 €/kW and 38 €/kW “corresponds approximately to the average defined through the Eole 2005 program” (CRE 2001a: 9, my translation). In other words, the former bidding program, Eole 2005, is mobilized as an indication of ‘true’ prices, though the replacement of the system was arguably

to be found in its failure to create wind power in France (see Cochet). The numbers used by CRE are the basis for the following graph:

**Figure 4.4: Tariff Compared to Wind Power's Cost of Production**



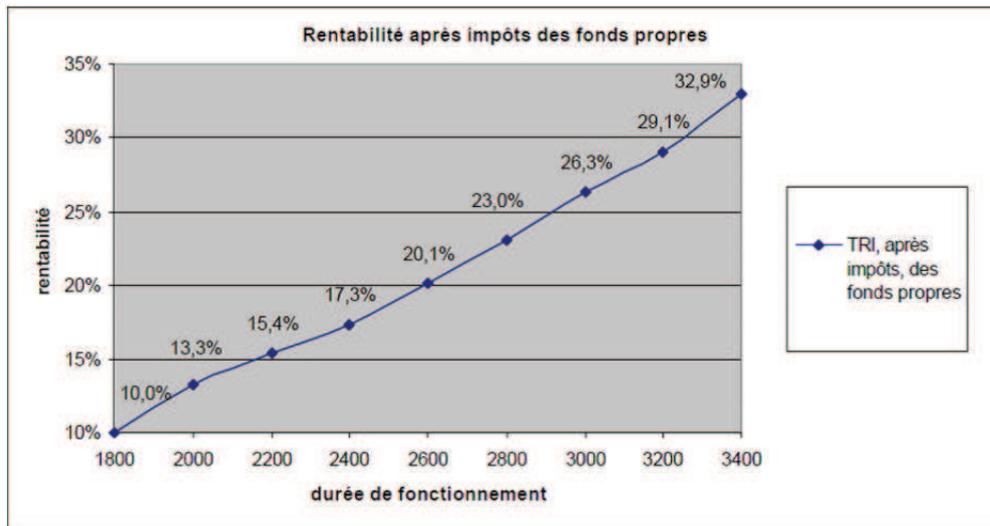
(CRE 2001a: 8)

With the X-axis representing hours of operation of a given installation, the upper curve illustrates the gains based on the tariff, and the two lower curves represent the costs based on the ‘value couples’ mentioned above. The graph leads CRE to the conclusion that “[t]he proposed tariff is evidently superior to the cost price of the sector, regardless of the assumptions made” (CRE 2001a: 9, my translation). Furthermore, the ‘value couples’ are substantially higher than costs reported from neighbouring countries where wind power has developed at a higher pace; thus, the numbers alone should be upper limits in the years to follow (ibid.).

CRE then turns to the profitability of wind power projects benefitting from the tariff. The annual return is calculated in relation to the quality of the site (i.e., wind qualities). The graph below illustrates the return along the Y-axis and hours of operation along the X-axis, and demonstrates that:

“[s]ites that are correctly or well winded, i.e., from 2600 hours and up, are offered annual after-tax returns of more than 20% per year, quite excessive given that the average rates in 15 years are without risk of default” (CRE 2001a: 9, my translation).

**Figure 4.5: Profitability**



(CRE 2001a: 9)

Again, the Eole 2005 program is mobilized as a disqualification of the tariff, as the last call resulted in an average price of 48 €/MWh for the twenty-four retained projects, operating 2900 hours per year. According to CRE’s calculations, the replacement of the Eole 2005 by the tariff will lead to global over-costs of 170 million euros over fifteen years compared to the remuneration demanded initially by the producers (ibid.). CRE concludes their judgment of the proposed tariff-system by the following statement:

“Given all the above elements, the CRE considers that the proposed tariff causes undue rents for the wind power producers that will result in a significant increase in electricity prices in France, and represents an excessively costly means for the community to achieve the objective of developing the industry set by the government. CRE, therefore, emits an unfavourable opinion on the ruling” (CRE 2001a: 14, my translation).

Rather, CRE advocates that a call for tender scheme (such as Eole 2005) be withheld because of properties inherent in both the tariff-device as well as the call for tender-device. Firstly, the tariff system is criticized for neither allowing the prediction or the control of the production

capacity nor the costs brought on to the community and consequences for the market (CRE 2001a). This critique of the feed-in tariff governance model is a general theoretical critique raised by economists (e.g., see Finon and Menanteau 2004). The argument is anchored in the difficulties of getting the tariff ‘right’: If the fixed price is too low, the technology will not develop; if it is too high, it will develop above the objectives (CRE 2001a). Only through the presence of competition may the price be revealed. Chabot’s claim that his method ensures fairness and efficiency is thus contested; CRE’s calculation demonstrates profitability levels of 20% (not 10% as Chabot would circulate).

All the while, the comment leaves alive the idea that such a thing as ‘the right’ price may exist, but competition alone is given the power to determine what is right. Secondly, CRE comments on the advantages of the call for tender governance system: Control of production capacity volume, and possibly of the geographical location of the production unit(s), keeping the power over other quality criteria of the projects, and taking account of other subventions from which a project might have benefitted.

*“The substitution of market mechanisms (such as tendering or markets for green certificates) to an administered price mechanism is a safeguard for the community to achieve the desired objectives at the minimum cost”* (CRE 2001a: 1, my translation).

In this statement, CRE categorizes call for tenders (together with green certificates) as ‘market mechanisms’, thus disqualifying the tariff system from this realm. Here, CRE echoes a discussion within environmental economy in which price-models (with fixed prices) are deemed less market-like than quota-models (fixed quotas) (Hvelplund 2001a). Competition between bidders is supposed to drive prices down and thus reveal the ‘real’ price:

*“To achieve the objectives of wind power development that the government has set, the CRE recommends the use of tenders, which reveal the real prices and allow the adjustment of the location and the volume of production, all the while avoiding the creation of unjustified rents”* (CRE 2001b: 1, my translation).

This quote is a rather precise example of what Cochet calls a confusion between cost and price. To CRE, market mechanisms (i.e., tendering and green certificates) reveal real prices, and at the same time, they allow the upholding of control over the development of wind power (in the hands of centralized institutions).

CRE's contribution thus problematizes the framing proposed by Cochet: Dissociating wind power and decreasing carbon dioxide emissions (at least not in Continental France). Given the 'emission free' quality of the dominant energy technology, nuclear power, the substitution of nuclear power with wind power has no positive effects in terms of decreasing emissions. Also, the tariff as a device blurs 'true' prices, and will eventually raise electricity prices in France. In other words, the objective of the feed-in tariff (sparking wind power development) as well as its realization (into a specific price) is made controversial. The valuation of wind power proposed by CRE is a simultaneous re-qualification of nuclear power: Displacing the category of 'renewability' by 'emission-free' along which to value energy technologies, nuclear power and wind power are made directly comparable. As such, CRE problematizes both the framing set up by Yves Cochet as well as its translation into a specific price by Bernard Chabot; however, the unfolding of the device, and not least the dissociation of greenhouse gas emission cuts and wind power, is undertaken by a several alternative foldings, e.g., contribution to air pollution by different energy technologies, profitability levels, etc. CRE presents these foldings representing the costs of externalities related to each energy technology as uncontroversial and well-framed inputs to new calculations regarding the costs of wind power. These numbers, presented as objective and well-framed values of externalities and costs, are at best controversial. The externalities of nuclear power, for example, seem marginal, and no mention is made of the costs of disposing of nuclear waste or the risk of accidents at nuclear power stations.

#### **4.4.4 Chrupek, DGEMP – Stabilization as Black-Boxing?**

The fourth account is based on an interview with an employee, Chrupek, at DGEMP (Direction Generale de l'Energie et des Matieres Premieres). Part of the Ministry of Industry, DGEMP (General Directorate for Energy and Raw Materials) is responsible for defining and implementing French energy policy and policy for the supply of raw materials. DGEMP hosted the working group undertaking the initial discussions around the first French feed-in tariff, and they defined the tariff of 2001. As such, the DGEMP is *the* centre of calculation, the place from where the tariff is actually diffused.

Getting the interview is a bit difficult, and I am finally referred to Mr Chrupek by his head of department. Once we arrive in his office, I ask for permission to record the interview;

Chrupek seems to be intimidated, and this influences the remaining interview. At times, he seems almost hostile.

During the interview with Chrupek, Bernard Chabot is mentioned as a participant in formulating the French tariffs. However, Chrupek laughs, rather contemptuously, when it is suggested that Chabot has undertaken the calculations leading to the French tariff. He continues by stressing that the model behind the tariff is different from that of Chabot – there is a method, IRR (TRI in French), and a calculation, but this is not publicly accessible. In other words, I had eventually found the place where the tariff is fabricated but cannot access the numbers going into the model. Getting the numbers that feed into the calculation is very crucial to understanding the number that eventually comes out. This is acknowledged by Chrupek thus:

*“After all, as everything else, once you have a method, everything depends on the assumptions you use and the numbers... everything depends on what you put behind, on the inputs... Do you take before tax, or after tax? Do you consider potential subsidies that may be granted, like ADEME offers... So, it all depends on what you take into account, just like all the numbers, you can take them just as you want”* (Int. Chrupek, my translation).

So, though the principle may seem straightforward, estimating the inputs is often quite complicated: Both the costs and the benefits of the project remain estimates. So, how is this done? *“There are no miracle remedies! What one does is to do a benchmarking; you look at what they do in the other countries, what is their tariff level and we look at cost development...”* (Int. Chrupek, my translation). As such, Chrupek explains the differences in calculations made by Chabot, CRE, and DGEMP, not surprisingly, to be an effect of inputs. Yet again, the tariffs offered in other European countries are mobilized as an important input to the definition of the French tariff. Even though the method is quite precise, once Chrupek discusses the inputs to the method, the result seems more like a process of ‘tinkering’ than a simple calculation. Anyway, Chrupek stresses, the numbers you can take them anyway you like.

According to Chrupek, the use of the IRR method was first and foremost aimed at eliminating undue rents. Here lies the strength of the IRR because it can be made the basis for comparing the rate of return between different projects or different technologies. In principle, the IRR of wind power projects can be compared to the IRR of other energy technologies, and thereby

measure the relative profitability of wind power projects. This argument for choice of calculative method resonates with Chabot's 'fairness' of tariffs; safeguarding against undue rents to the wind power developers is made a calculable property of the tariff. However, Chrupek uses another argument to prove that the calculation (and the tariff) was targeted correctly by mobilizing the French wind power development statistics:

*“Until now, when you see the development of wind power, you could consider that there are no undue rents, and there is not a multitude of projects on the sites, however, the tariffs allow a very satisfactory development of wind power in France, as you can see, because currently France is the third [fastest growing] market in Europe, according to the numbers of EWEA”* (Int. Chrupek, my translation).

Thus, the question of 'undue' rents is solved by referring to the 'actual' development (there is not a multitude of projects on the sites), and not by referring to similar IRRs between wind power and, for example, thermal power projects (this was the argument of Bernard Chabot, which was that the rate of return of wind power projects should be targeted at the same level as a coal-fired utility). Similarly, the tariff's so-called satisfactory level is based on the relative development situation in France vis-à-vis other European countries. Being among the countries presenting the fastest growing wind power sectors seems to be of value in itself – and an indication of a well-defined tariff-level.

To Chrupek, the choice of the tariff as a governance device is central to this development – it is made an example of a 'true' wish to increase wind power installations: *“You should use a device that is pertinent”* (Int. Chrupek, my translation). Commenting on the Danish state's attempts at defining green certificates in the early 2000's is the consequence of a 'saturated' landscape according to Chrupek. Therefore, the choice of device is indeed related to one objective that is *“purely installed power”* (Int. Chrupek, my translation). But there are other objectives too:

*“...it is appropriate to do wind power under good conditions, so you have this objective, but we also have the objective of preserving the landscape, preservation of the wildlife flora, for example you have the Natura 2000 coming out... So we have these objectives that we have to reconcile”* (Int. Chrupek, my translation).

So, whereas the feed-in tariff as a device may indeed bring forward wind power development, to Chrupek, the feed-in tariff calls for other devices such as the ZDE and Natura 2000. Landscape and wildlife flora emerge as values which call for a new set of devices to control the overflows of wind power development:

*“If you have purely an economic vision, I do not see why you would take the landscape integration into account, for example if you have a church, a monument, a castle, if you have that sort of reasoning [economic] there and you put, well ... If a potential, a wind corridor, and a grid that allows you to put a large wind farm precisely there, then you put a wind farm next to the castle!”* (Int. Chrupek, my translation)

Thus, the (ambitious) objective of 25GW of wind power installed by 2020, and with 19GW of these on land prompts the use of a tariff system, acknowledged to be the most efficient. However, it is seen as maybe too efficient: *“Having a purely economic orientation – we would go towards disaster”* (Int. Chrupek, my translation). However, this does not mean that the approach is opposed to the market according to Chrupek:

*“Altogether, ultimately... so this boils down to that it is precisely the government, the state that decides, not the individual bearer of the project so the state becomes ... the knot, and precisely the rates ... to say that we do not have a vision oriented towards the market, would in my opinion not be right for the simple reason that on the one hand we have the wind development which is a private initiative and secondly we regularly adjusts our tariffs - the level of these rates and that we also provide goals, so we do have an economic vision”* (Int. Chrupek, my translation).

Private initiative and the adjustment of tariffs are translated into an ‘economic’ attitude on behalf of the DGEMP and the French state. It is, however, a specific modality of being economic, i.e., one that pairs societal goals (defined by the state) and private enterprise.

DGEMP’s act is one of stabilizing the framing set up by Cochet as well as its translation into a specific price; however, profitability levels as well as the desired rate of development remains hidden to the observer. Though the calculation of the tariff is admittedly entirely dependent upon the assumptions made, as well as the numbers mobilized in the calculation, the tariff becomes a black box and a number difficult to question because we do not know what goes into its fabric. Chrupek and DGEMP’s task was to undertake the specific

translation from feed-in tariff as a device to its specific price. Sealing off the assumptions may be a strategy for stabilizing the figure and sealing off against problematizations; however, the tariff remained a somewhat controversial framing.

#### **4.4.5 Poignant – Defying Calculation**

The last contribution to be presented here is a report authored by Serge Poignant on behalf of the Committee for Economic Affairs, Environment and Territory. Serge Poignant worked out his report, “*Information report on the support policy for the development of renewable energy*” in 2003. Poignant is, and was at the time, a member of the National Assembly and of UMP (Union pour un Mouvement Populaire). The discussion below is based on his report as well as an interview with Durant, a bureaucrat from the Commission for Economic Affairs who specializes in the energy area and provides technical assistance to the members of the National Assembly. Durant played an active part in preparing the report.

The main conclusion of the report is that French renewable energy policy, at the time of writing the report, was unsatisfactory in the fight against intensifying climate change (Poignant 2003). However, in suggesting distinct policy areas to target, Poignant and his co-authors elaborate the problematizations made by CRE. In his report, Poignant makes an important distinction between electricity and the rest of the energy sector, stressing in particular transportation and the residential and tertiary sectors as primary targets for new energy policy initiatives. He bases this proposition on studies demonstrating that French electricity production was responsible for only 5,3% of the total volume of carbon dioxide released into the atmosphere in France (2001 numbers). Thus, potential policy instruments should accordingly target the sectors responsible for the major carbon dioxide emissions. As such, stressing the fight against climate change as the principal value, Poignant disqualifies wind power as a technology that may contribute to decreasing carbon dioxide emissions. According to this contribution, the value of wind power is negative in the French electricity sector, as it only increases costs for the consumers but has no environmental effect – or, as stressed by Durant, wind power may even increase carbon dioxide emissions because fluctuations in production means falling back on thermal production technologies to obtain balance in the grid (Int. Durant). In other words, Poignant continues the problematization of

the association between carbon dioxide emission and wind power argued by CRE by unfolding the CO<sub>2</sub> calculus according to the distinct sectors of the energy system.

Then, turning his attention towards the governance model, i.e. the feed-in tariff, Poignant cites CRE for claiming that Denmark, Germany and Spain – represented as the three most successful wind power developing countries (e.g., see the table presented in the Cochet report illustrated above) – are countries that have a quite different electricity production profile, as all three countries produce an important part of their electricity by CO<sub>2</sub>-emitting technologies (Poignant 2003; CRE 2001a). This is a response to Cochet, Chabot, and Chrupek’s arguments in favour of the feed-in tariff system through ‘proof of efficiency’, i.e., that the tariff has demonstrated its ability to spark the development of wind power. Referring to the numbers of installed wind power in Europe (June 2003) with nearly 85% situated in Germany (52%), Spain (20,5%) and Denmark (12%), he rhetorically asks: “*These figures are indisputable. Should we conclude on the effectiveness of the purchase obligation?*” (Poignant 2003: 49, my translation). No, he answers, there is no systematic correlation between the device and the development of renewable energy based on the following observations: (1) These same three countries have not succeeded in developing other renewable energy technologies at the same rate using the same governance model; (2) neither have other countries than the ones mentioned, though developing similar feed-in tariff systems obtained the same steep increase; and (3) other renewable energy technologies have strongly developed without such a system (e.g., biomass in Finland and Sweden). Hereby, he attempts to disentangle the association between the device and the successful increase in wind power installations anchored in the ‘proof of efficiency’ demonstrated by Cochet, in particular.

From the effects of the feed-in tariff, Poignant turns to the framing of the device:

*“First, an administered price, by definition, does not allow the game of competition to weigh on prices. The tariff is the same for all producers: Those who have the lowest production costs simply earn more money than the others”* (Poignant 2003: 48, my translation).

With this comment, Serge Poignant mobilizes the recurring theme of competition, whereas economic theory prescribes that the price will level with the marginal cost of producing yet another good, within this governance model, costs and price are disconnected. Whereas, in theory, competition should force developers with higher marginal costs to learn – or vanish; the tariff system simply makes some developers earn higher profits. Thus, “[t]he central

*problem of the purchase obligation is fixing the tariff. It is a harmful complexity” (Poignant 2003: 49, my translation). This argument against the feed-in tariff is further developed during the interview with Durant:*

*“Either the tariff is too low, and it won’t work, or it is too high, and you give an undue advantage to the producers. There is no reason to believe that it is at the right level – necessarily it is too high or too low” (Int. Durant, my translation).*

In other words, there is such a thing as a ‘right’ price, but this cannot be found at the desks of economists in the offices of DGEMP; this price can only be found through competition in the market or in the call for tenders. According to this discourse, there are limits to what calculations can do. Opposed to Chabot’s claim that the calculated tariff assures fair and efficient prices, Durant underscores that it is impossible to calculate such a figure. On the other hand, the call for tenders will push down prices and thus recreate the virtues of competition.

*“It’s a bad instrument [the tariff], because after all, how do you define the tariff? In theory, you could fix the tariff by following the CRE’s bizarre method...fixing a certain set of criteria and then you try to put a value in euros on these criteria – already, this is difficult. But let’s imagine that we do something like that and we then get some number. It’s a rational number and then ‘hop’ we’re on... But this is not at all how it is done. The problem is that the minister, he does his ‘ruling’... when he does his ruling, he either finds a level where the wind power industry says ‘you’re assassinating wind power, you just want to sustain the nuclear power system...’ Otherwise, the minister finds a level where people are, maybe not satisfied, but at least, they do not complain” (Int. Durant, my translation).*

The recalculation performed by CRE to demonstrate that the tariff-level is too high is thus mobilized because it is an attempt at providing a ‘truer’ price than the one DGEMP had proposed. CRE’s method is qualified as ‘bizarre’ because it folds a set of criteria into figures, and uses these as input to the calculus. However, according to Durant, constructing the tariff is a question of demonstrating political will rather than finding the ‘right’ level. To Durant, the level of the tariff has as its aim the cooling down of controversies rather than fairness or efficiency, as claimed by Chabot. Acceptance (not least between wind power proponents) is the goal. According to Durant, the level of the tariff is sought to be at a level where it does not spark controversies and keeps the door shut for critique of political support for the nuclear

power system. In this case, the level of the tariff is not about calculating the ‘right’ level but rather finding the level where controversies are silenced, which seems to be a number even more difficult to produce.

Poignant and Durant create a link between wind power and a value of zero – nothing seems to be gained from wind power in the French system. This valuation is not targeted at wind power per se, but wind power in the French electricity sector. As such, Poignant and Durant sidestep the question of the value of wind power at a global level but disqualify it in the French configuration.

This contribution refuses the possibility of calculating a rational tariff. Instead, it points to the tender system as the only system to avoid undue rents. Competition, referred to as the *game* of competition, is the guarantee that profitability is not undue, something which cannot be calculated. One price for all simply distributes the undue profits unevenly.

Finally, according to Durant, the approach to renewable energy in general, and wind power in particular, is intimately linked to the nuclear power regime. French pro-wind power people are first and foremost anti-nuclear power. A similar argument was raised by Cochet, an argument claiming that attitudes towards renewable energy technologies are determined by one’s attitude towards nuclear power. This description resembles the notion of ‘technopolitics’ (Hecht 2009) through which political goals become intertwined with technology, and according to the version presented by Durant, wind power is advocated as a means of disqualifying nuclear power and not because of its inherent qualities.

Paradoxically, by stressing the decrease of CO<sub>2</sub>-emissions as the main ambition, Poignant and Durant disqualify wind power as being a valuable technology. According to this approach to valuation, the particular assemblage of the French energy sector does not contribute positively to the valuation of wind power. This emphasizes an important aspect of the valuation process, namely that the practice of valuation is made an effect of the assemblage rather than an inherent property of the technology.

## 4.5 Discussion

Viewed through the lenses of the marketization program outlined in Chapter 2, we eventually get a glimpse of the ‘messy’ business of making a price. Valuation, as it unfolds within the frame of the feed-in tariff device illustrates the investments and the controversies entailed in price-making; it is a ‘costly and irregular activity’, as stressed by Muniesa (2012). If we accept the premise that goods do not possess value a priori, and that goods may experience changes of status (Caliskan and Callon 2009), then the five accounts depicted above become more than an exercise of visualizing or identifying ‘inherent’ value. The five attempts at framing the tariff described above, in some sense, all place a value on wind power, and this value is related to the feed-in tariff. In other words, price and value are continuously collapsed and separated, made the same and ‘unmade’ the same. As this study illustrates, valuation may be seen as a process of folding, unfolding, and refolding value in the singular, and values in the plural. And even though two of the valuation approaches (Poignant and CRE) stress valuation as a matter of configuration of the electricity system (wind power has one value in systems dominated by fossil fuel technologies, and yet another value in systems dominated by nuclear power), value or price is still presented as something that should be ‘unveiled’ through the market. So even though they conclude that wind power might have one value in a Danish or German setting, and yet another in the French setting, they still point us towards an understanding of value as something that may be ‘dragged out’ from the distinct assemblage, e.g., the particular configuration of national energy technologies. What we miss from this account is the construction of value *and* values as two intertwined processes, as well as the role of the methods and devices mobilized throughout the process.

The idea that the price should reflect an inherent value which may be made visible through (pure) market transactions makes the price somewhat comparable to the notion of ‘facts’ described by Latour: “*Scientists define facts... they leave to politicians and moralists the even more daunting task of defining values*” (Latour 2004: 95). Making this (rather daring) parallel between scientists and facts, and economists and prices, we end up in the separation of spheres discussed in the opening chapter: the economic and the political. When CRE and Poignant argue for prices to be defined by markets and not at a desk, they advocate for the existence of these distinct spheres; numbers created at the desk of economists, be it at DGEMP or ADEME (i.e., Chabot), are ‘political’ numbers and not true prices. However,

Latour says, that when using the word ‘facts’, we are obliged to omit the work that goes into their making. By contrasting facts and values, he continues, “*one is obliged to limit ‘facts’ to the final stage in a long process of elaboration*” (Latour 2004: 95). But if we acknowledge that prices, like facts, are made, they pass through a long range of stages in which they are “*uncertain, warm, cold, light, heavy, hard, supple...*” (ibid.), and during these stages the distinction between the spheres is not upheld. On the contrary, values are central elements in the making of what eventually becomes known as facts, and arguing along a similar vein, we could then see the values described above as politicizations and economizations that eventually lead to the folding of values into a single value in the shape of a price:

“*[T]he notion of facts does not describe the production of knowledge (it neglects both the intermediate stages and the shaping of theories) any better than the notion of values allows us to understand morality (it takes up its functions after the facts have been defined and finds itself with no resources except the appeal to principles that are as impotent as they are universal)*” (Latour 2004: 99).

Emphasising the intermediate stages rather than the result, we are allowed to see the interconnectedness of these processes. The problematizations undertaken through the valuations unfold and refold values by cutting some associations and proposing new connections. Therefore, I will now turn to some of the values that emerge during the valuation processes as they unfold and become refolded.

#### **4.5.1 Figures of Values in the Process of Valuation**

Though this chapter represents an attempt at following and sketching a process of valuation, one key element is the continual attempt at establishing ‘value’ as an objective category. Each of the five contributions to the valuation presented above has one or more version(s) of value or translates wind power into a distinct *figure of value*. These figures are framed as certain properties of the technology itself or as qualities of a certain exchange form, and when I choose to refer to them as figures, it is because they seem to emerge as strong categories that are referred to as distinct and accepted references for undertaking valuation. Furthermore, the five valuations all refer to at least one of these figures of value as definitive for the price of wind power.

Value is about CO2: Wind power is framed as an answer to climate change and greenhouse gas emissions, which is the point of departure for both Cochet and Chabot. However, CRE and Poignant disqualify the value of wind power by framing the question to which wind power may be the answer as a question of fighting climate change. This categorization of wind power as non-emitting in terms of CO2 rather than, for example, a renewable energy allows for a comparison between wind and nuclear power. According to the calculations of CRE, nuclear power has no costs related to CO2-emissions<sup>28</sup> (see Table 4.2). Wind power, however, eventually becomes associated with an increase in CO2 emitted into the atmosphere: Wind power does not replace existing technologies because of fluctuations in production (following the wind). Therefore, increasing the level of wind power will increase CO2-emissions because it increases demand for coal-fuelled energy to compensate for the fluctuations in the wind to meet demand. If value, then, is about decreasing CO2, wind power should be associated with a negative value according to CRE and Poignant.

Value as renewability: A second figure of value intimately linked to the figure described above is framed as renewability. With this framing, reducing CO2-emissions is important, but just as important is the renewability aspect of wind power. Fossil fuel resources and uranium are resources that will eventually become exhausted, and they are increasingly difficult (and costly) to access. From this figure of value, the costs of exhausting limited resources are crucial, though they are not included in the pricing of the energies. To Cochet and Chabot, renewability is an essential quality of wind power, and according to their framing, CO2-emission and renewability are equally important qualities. Stressing the renewability quality is what prompts, for example, Durant to conclude that wind power proponents are essentially nuclear power opponents; in other words, adding renewability to the CO2-figure of value is basically an attempt at disqualifying the dominant technology, nuclear power.

Value as being at the forefront: One figure of value is about being at the forefront of wind power development, therefore, to be developing wind power at the same scale as other 'successful' European countries becomes a meaningful measurement in itself. Cochet, in particular, attaches value to the relative accomplishments of the French industry vis-à-vis

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<sup>28</sup> For an account of the association of nuclear power to categories such as 'emission free' or 'sustainable', see Garud et al. 2010.

other European countries. Chrupek, too, stresses the relative success of developing wind power in France.

Value is nothing but supply and demand: For several of the contributions above, the devices at play should be as close to ‘market principles’ as possible. This figure of value is maybe better described as a figure of value that refuses the attachment of value to objects outside of the market sphere. According to this framing, value is the result of supply meeting demand as described in economics, and attempts of pricing outside of the market (as illustrated in figure 4.1 by Fourcade) will never reflect ‘true’ value. It is stressed several times throughout the contributions that prices should not be calculated at a desk, but instead they should emerge, or be subtracted, as a function of costs and supply and demand. The presence of competition is the ‘economic condition’ that safeguards against unfair profits. Accordingly, the introduction of the feed-in tariff device blurs the picture of the role of wind power. Yes or no to wind power, is a question that should be answered by the market – not politicians and bureaucrats.

Value of the landscape: The protection of the French countryside presents itself as an emerging value that was raised several times during interviews. The image of the famous Mont Saint Michel with nearby turbines is drawn as an example of how wind power development could potentially pose a threat to the beauty of historical monuments and the landscape in general.

To sum up, these figures of values are dominant categories at the centre of the valuation processes discussed throughout this chapter. They are presented as categories against which to undertake the valuation, or around which to fold the price. But none of these values are directly translatable into a common metric, namely, a number of euro cents paid for a kWh of wind power. On the other hand, the qualifications/disqualifications presented by the five valuation contributions would not appear without these values. The ways in which these values are associated with or dissociated from wind power into specific valuable assemblages that may eventually be folded into a price are amongst the activities of valuation, which may eventually bring about value.

Generally, the control of CO<sub>2</sub>-emissions is the overlying value addressed by all five valuations. But whereas Cochet, Chabot, and Chrupek attempt to fold this value as a quality of wind power, as well as the quality of renewability, into a specific price, Poignant and CRE rather unfold and problematize the value of CO<sub>2</sub>-emission control in relation to wind power.

To Cochet, Chabot, and Chrupek, this folding is framed as ‘sufficient’ (Cochet) and ‘efficient’ (Chabot and Chrupek) in meeting the defined target. To all three, this efficiency/sufficiency (itself a rubric) entails mobilizing the tariffs defined in other countries (benchmarking), and a calculation safeguarding the ‘fairness’ of the price through means of different calculative methods. They frame an assemblage in which the device and the successful development of wind power are associated with decreasing carbon dioxide emissions, as well as connected to ‘fair’ profitability levels. Meanwhile, the analysis demonstrates that these links between wind power, CO<sub>2</sub>-reduction, and the tariff are by no means stable or fixed, but rather these associations are framed as part of the valuation process. Though these foldings attempt to close or cool down the links between wind power, CO<sub>2</sub>-reductions, and tariff, they remain somewhat fragile framings.

The fragility of the framing is emphasised through the valuation of Poignant and CRE; both contributions seek to unfold the links between wind power and the value of CO<sub>2</sub>-emission reduction by recalculating wind power as a (potentially) positive contributor to CO<sub>2</sub>-emissions (i.e., increasing emissions). The relation between renewability and CO<sub>2</sub>-emission reduction is cut, or made a contingent relation, an effect of the distinct configuration of an energy system. Poignant’s and CRE’s valuations problematize this qualification of wind power, and thus the framing in which wind power, the war against climate change, and the feed-in tariff device were associated. Instead, they argue that supply and demand, and in particular competition at the supply side, should drive the fixation of prices. In other words, through market exchange, demand is made to express their values in terms of readiness to buy. Finally, the purchase obligation and the level of the tariff as properties of the device are recalculated. The result, indicating very high profitability levels, makes a new value or matter of concern emerge; the protection of the landscape. The problematization fosters the existence of a link between the device and the pollution of the landscape because of high concentrations of wind turbines.

Following the valuation of wind power makes it clear that constructing prices and undertaking calculations entail both acts of economization as well as acts of politicization. Each of the five valuations propose an assemblage of associated values and models for exchanging these. Chabot’s method, for example, presents an attempt at economizing the feed-in tariff device; everything is made calculable, and profitability levels are measured against and compared to

other (conventional) energy technologies. Profitability levels are illustrated to be equal to levels found elsewhere in the energy sector, allowing conclusions about the ‘fairness’ of the price. CRE, on the other hand, uses calculations for quite the opposite purpose. They calculate the greenhouse gas effects, recalculate the profitability level, and reach a very different conclusion: Wind power does not contribute to the fight against climate change, but creates a niche in which uncontrollable costs will be transferred to electricity consumers. The only forces that may stop wind power development from going wild are the difficulties of acceptance, locally, and the capacity of the grid to evacuate the produced wind power (CRE 2001a). These calculations politicize the role of wind power in the French electricity configuration and contest calculations made by Chabot and DRIRE concerning the rents upheld by wind power developers. CRE recalculates the profitability level to be derived from the feed-in tariff by the developers – and their conclusions demonstrate levels twice as high, at least, as the calculations made by Chabot. The idea of selling ‘wind at the price of gold’ has been raised more than once in the French public (e.g., *Le Figaro Magazine* 2008; *Le Point* 2007), stressing the absence of risk and total visibility of the projects, due to the purchase obligation and the fixed tariff. Thus, the design of the device is designated as a major source of the problem of the high costs associated with wind power development.

#### **4.5.2 The Device, Value, and ‘Fairness’**

As a device, the feed-in tariff sets a very specific frame for the exchange of wind power; as mentioned in Chapter 2, roles and identities are defined, and property rights and the conditions for transferring these become articulated. The purchase obligation, which is a central element of the feed-in tariff device, instates and enforces the roles of exchange between producers and EDF: EDF is forced to buy all electricity from wind power producers eligible for the feed-in tariff. This element is one of the qualities of the device that remains highly criticized by, amongst others, CRE. Furthermore, the cost associated with this purchase obligation is transferred to all electricity buyers, i.e., the consumers, equally and through their electricity bills. All electricity consumers thereby become contributors to the development of wind power. Finally, the prices to be paid for wind power decrease according to two principles: (1) Production rates, i.e., after the first five years, the numbers of kWh produced determines the rate at which the producer is paid; and (2) over time the rate decreases. As

such, the device frames a certain modality of economic behaviour from wind power producers, for example, in terms of choosing the location according to its wind speed characteristics. However, the connection of wind power to the feed-in tariff device is an important association affecting some of the valuation contributions presented above; Cochet seems to attach value to the choice of the feed-in tariff as a device – rather than stressing the distinct price (he is not a number-cruncher, he says). To him, the device itself becomes of value because it has proven efficient elsewhere. Therefore, the device becomes translated into a manifestation of political will. On the other hand, CRE and Poignant seem opposed to the tariff amongst other things because of the design of the device; first and foremost its ‘administered price’ quality. Poignant and CRE insist that only market-like forces in the shape of competition should be employed in the making of prices. When derived from a game of competition, price reflects the ‘true’ value of wind power. A price is not simply a price. For example, a ‘true’ price cannot be calculated at a desk. This is important, because the disqualifications made by Poignant and CRE designate the device rather than wind power. In their final recommendation, CRE argues for the abolishment of the feed-in tariff – not of wind power in general.

In this case, the quality of ‘fairness’ or ‘unfairness’ is linked to the device, and the modality of calculation, as much as to the price itself (for similar observations, see also Guyer 2009; Caliskan and Callon 2010). Or, to put it another way, the controversy is placed in the opposition between the ‘fairness’ of the price (Cochet, Chabot and Chrupek) and the ‘unfairness’ of the device (Poignant and CRE). Those properties of the device that disqualify it as fair are the purchase obligation and the administered price (inevitably), argued to lead to high costs. Instead, CRE suggests the return to a tender system in which competition will keep costs at a minimum. In the opposition of the two governance systems, the ‘singular-quality’ of the price becomes important. Whereas the tariff leads to a ‘universal’ price that is applicable to all producers of wind power, the bidding system leads to different prices varying, at least in theory, according to the different conditions of a given project at which the bid is given. The universality of the price creates visibility and security for the developer but also creates the possibility of making undue rents. Meanwhile, the singular-quality of the tariff becomes the driver of a set of matters of concern; the possibility of making undue rents is said to create a burst in development, which will eventually pose a threat to the landscape.

This concern is associated with the device and the modality of economic behaviour it constitutes.

The present study demonstrates the complex associations between value and values, as well as the alterations of the object of the valuation, from the valuation of wind power to that of the device. Disqualifying the valuation of wind power into a single number (8,38 €/kWh) is not the same as disqualifying the device and its translation of the value of wind power into a single price. That the price is ill performed (which they seek to demonstrate through their own (re)calculations) is but a distinctive quality of the formulation of the device because it fixes a single price to wind power. In other ways, the (re)calculation of the profitability levels possibly achieved by the developers at the fixed tariff simply becomes a demonstration of the impossible task of ‘getting a price right’ as an exercise performed at a desk.

#### 4.5.3 Tinkering or Calculation?

Throughout the five valuations described above, calculation plays a central role. As already stressed, calculations are made both as part of the economizations and politicizations. However, some of the valuations are distinguished by the ‘absence’ of calculation or avoiding the proliferation of calculations. During an interview with Bernard Chabot, he stressed that EDF, during the discussions of the tariff, avoided sharing the calculations and assumptions but simply proposed a price. This sealed off any possible critique of the fabric of the number. On the other hand, his own contribution seems to be merely a presentation of a calculative method. This illustrates one important aspect of making the calculation public; it makes the extracted result open to contestation. Chrupek admits that calculative devices such as PIM and NPV, and the result they may generate, are highly dependent upon the numbers and prices they mobilize. Presenting simply the extracted result, e.g., the price rather than the production may then be a strategy of forestalling attacks. The prices and numbers mobilized to perform the calculation are prosthetic forms “*produced, deployed, resisted and at times, abused...*” (Caliskan 2007: 257). At some points, the tariff of 8,38 €/kWh itself becomes a prosthetic price when mobilized in the calculations of CRE to demonstrate the ‘unfairness’ of the tariff.

In the opening pages of this chapter, I described the seemingly opposed descriptions of making a tariff: One as a politically fixed number without any calculations; a number that could be adjusted until the development of wind power reached an acceptable level. On the

other hand, the tariff was described as simply a calculation of ‘efficiency’ and ‘fairness’. The five valuations above seem to have elements of both ‘tinkering’ and calculation. When Chrupek argues for the accuracy of the tariff, the result of DGEMP’s calculation, he points to the absence of “*a multitude of projects on the sites*”, and “*France is the third [fastest growing] market in Europe*”. The justification of the tariff points to its effects, not its fabric, per se. This comment seems to allow for both descriptions of the making of a tariff, entailing both tinkering and calculation.

Furthermore, the methods of calculation, such as the PIM, the IRR, or the NPV, are important tools in the production of the numbers and so is the opposition between these tools. When Chrupek stresses that DGEMP did not use the method developed by Chabot, the distinction between different calculative methods becomes important. To Cochet, the fabric of the price seems secondary; it should simply spark the development of wind power. He takes no interest in the tools to be mobilized, and his own proposition simply copies the German tariff because it has proven its worth.

Chabot’s valuation presents both a proposition of the distinct French tariff as well as a method developed simply for the fixation of feed-in tariffs. In other words, it is an algorithm for constructing feed-in tariffs. Since its development, Chabot has conducted a large number of workshops and seminars where the PIM is presented and explained. In the valuation of the French tariff, the explicitness of the presentation of the PIM makes it an example of an *interessement* device: “*Interessement is the group of actions by which an entity... attempts to impose and stabilize the identity of the other actors it defines through its problematization. Different devices are used to implement these actions*” (Callon 1986: 8).

As an *interessement* device, the ‘huge wind potential of France’, the future objectives of the European Union in relation to renewable energy development, as well as ‘farmers, citizens and local authorities to be involved as investors in wind projects’ are all connected to the existence of ‘fair and efficient’ tariffs as the one proposed through the PIM. The transfer of over-costs, equally and to all consumers, makes the tariff system ‘compatible with the liberalisation of the electricity sector’ (Chabot 2001b). The PIM and its algorithm tie together a net of possible actors and identities as well as measures for efficiency, fairness, and liberalization. Not physically, as the towlines fixe the scallops of St. Brieuç (see Callon 1986),

but the PIM is a framing in which actors and a modality of being economic, which is compatible with liberal markets, are tied together.

#### **4.6 Concluding Remarks: Prices and Values**

This study has followed the making of prices as processes of folding and unfolding value and values. Rejecting a priori distinctions between the political and the economic as distinct spheres, or the opposition between calculation and politics (Barry 2002), and instead stressing the associations and dissociations between wind power and emerging values, the study demonstrates how the process of translating wind power into a price includes opposing qualifications of the technology: ‘Wind power reduces CO<sub>2</sub>-emissions’ or ‘wind power increases CO<sub>2</sub>-emissions’. Also, the feed-in tariff is qualified as a device allowing the construction of fair numbers as well as a device of ‘unfairness’. The object to be qualified is replaced: from wind power, to its defined price, and eventually to the device itself.

Values, of the sort that we would often relate to moral or political agendas, are made reference points in all five valuations presented. This is maybe not surprising; after all, markets for wind power are often referred to as political markets. But the making of the price fold (or unfold) these values with notions of efficiency and fairness, expressing sizes of development rates (and market shares) and profitability levels. As such, the extracted result is a folding of a long range of concerns, sometimes expressed as numbers and at other times as concerns. Stressing these rather complex associations going into the making of the price, the study contributes theoretically (and empirically) to explicate this new understanding of price making as a highly controversial process of qualifying wind power and device as well as the values to be made reference points. The valuation process portrayed in this chapter demonstrates how the making of the price draws (or cuts off) relations between wind power and other forms of energy as well as transaction formats and CO<sub>2</sub>-emissions. Finally, the valuation process is central to the making of matters of concern; wind power as the source of increasing CO<sub>2</sub>-emissions, costs to be paid by the French electricity consumers, and not least the ‘pollution’ of the landscape. This matter of concern and its framing through yet another device (the ZDE) is addressed in the following chapter. However, before directing my

attention to the unfolding/refolding of the landscape, I will briefly connect the valuation followed above to an ongoing discussion within my theoretical field regarding the concept of ‘singularity’/‘singularization’<sup>29</sup>.

The entrance of wind power into the grid, as already mentioned, stabilizes wind power as an ‘electricity-good’. This highly material connection between the turbines and the grid, via the transformer stations, is one that makes wind power not only compatible with electricity from other sources but also comparable in terms of prices, fluctuation/predictability, etc. The effects of making the connection is an important step in what Callon refers to as singularization, “*positioning it [the good] in a space of goods, in a system of differences and similarities, of distinct yet connected categories*” (Callon et al.: 198). Thus, singularity in Callon’s understanding points to the combination of “*characteristics that establish its singularity*” (ibid.), all the while it is relational and thereby connected to other categories. In this argument, Callon draws on Chamberlin’s work on ‘monopolistic competition’ (Chamberlin 1962), stressing the simultaneous singularity and similarity between products at all times. Therefore, according to Chamberlin, the contrast between pure competition and monopoly is meaningless. In the electricity system, the co-existence in the electrical grid of wind power and nuclear power (or electricity from other production technologies) becomes a driver of qualifications of each of the two categories.

Lucien Karpik has developed a somewhat different version of singularity – and its valuation (Karpik 2010; 2011). For Karpik, singularity points to the good’s ‘uniqueness’ as defined by three characteristics: multidimensionality, incommensurability, and radical quality uncertainty - examples hereof could be a painting, a film, or a scientific paper (Karpik 2011). Central to Karpik’s development of ‘singular’ goods is the role of valuation because of the uncertainty of quality. The valuation of singularities is based on judgement: “*When products are singularities, when actors give more weight to qualities than to the price... choice takes the form of judgment*” (Karpik 2010: 39). To reduce the uncertainty (or opacity), people make use of ‘judgement devices’ that act as aids or guideposts. Karpik (2010) lists five such types of judgement devices: Networks, appellations, cicerones, rankings, and confluences.

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<sup>29</sup> The notion of ‘singularity’ is associated with theoretical contributions referred to as ‘economics of quality’ (e.g., Karpik in Musselin and Paradeise 2005), or ‘the economy of qualities’ (Callon et al. 2002).

Perhaps the controversy is slightly exaggerated; after all, Callon and Muniesa define calculation (qualification) in rather broad terms and explicitly allow it to embrace judgement, too:

*“Depending on the concrete achievement of each calculative step, calculation can either meet the requirements of algorithmic formulation or be closer to intuition or judgement. Such a definition establishes a continuum between qualitative judgement and quantitative (or numeric) calculation”* (Callon and Muniesa 2005: 1232).

With this broad definition of calculation (or ‘qualculation’), Callon and Muniesa add that the primary distinction is no longer located between judgement and calculation, but between arrangements allowing calculation and those making calculation impossible (Callon and Muniesa 2005). By getting rid of the distinction between calculation and judgement, Callon’s framework proposes itself as an ‘all-inclusive’ explanatory framework, whereas Karpik addresses a very specific type of market, namely, ‘markets for the unique’.

This discussion may be informative in relation to the valuation of wind power; throughout the valuations, the qualification and requalification of wind power is contested, and its properties remain somewhat unstable.

These two opposing definitions of singularization seem well suited for the description of the valuation of wind power, with one stressing the difficulties or even impossibilities of making comparisons, and the other stressing the relational characteristics and comparability. Bringing these two versions of singularization back to the valuation of wind power allows us to see how wind power is sometimes treated as a singularity (Karpik) qua its role in a larger assemblage in the fight against climate change; thus choice is a question of judgement (Karpik 2010: 39). To Cochet, a price might be necessary to allow transactions, but the choice of introducing wind power in the electricity system is rather a judgment of environmental responsibility. The association between wind power and climate change connects wind power to a network which could well be described as multidimensional, incommensurable, and radically uncertain in relation to quality. What are the effects of climate change? Can wind power be part of postponing/eliminating some of these effects? (And if yes, to what extent?). How are effects measured? And so forth. On the other hand, if wind power is qualified as electricity, the three dimensions are no longer well-fitted descriptions of its properties. This holds true of the valuations of CRE and Poinant; singularization as a process of defining

characteristics related to, yet distinct from, seems to be a more appropriate description: Classifying wind power as simply electricity makes it directly comparable to nuclear power, and the commensuration through a common metric and exchange format seems inevitable.

What seems important from the opposition between the two definitions of singularity to the discussion here is that they are both present. This is possible because the qualification is unstable. And if we see the valuation of wind power as entailing all five contributions described above, then both forms of singularization at some point contribute to the value attached to wind power. The controversy remains; wind power is still seen by some of its proponents as carrying a value (almost) beyond price, and the choice for wind power is a question of judgment, and possible judgement devices are for example reports on the effects of climate change, etc. To others, the association between CO<sub>2</sub>-emission reduction and wind power is cut, and the formatting of the electricity market should simply form the grounds for valuing wind power; in other words, its connection to the grid becomes performative in relation to its valuation.

This discussion demonstrates that all the while the qualification of wind power is unstable, both versions of singularities are present, though in different versions. Multidimensionality, incommensurability, and radical quality uncertainty are not inherent properties of wind power but could potentially become the effect of a process of qualification. And one is tempted to ask how a wine or a painting becomes multidimensional and incommensurable, etc.

The feed-in tariff device eventually defines the price at which wind power may be sold. However, the price is simply one element of the process of marketization during which wind power becomes a good configured in such a way that it may become part of market transactions. I will now turn towards a second device, dealing with the location of the turbines, but also a device that is connected to the feed-in tariff. To become qualified for the feed-in tariff, the producer must be located within a specific zone. The making of these zones are the object of the following chapter.

## 5. ASSEMBLING LANDSCAPES: THE ZDE

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In the previous chapter, the landscape emerged as a value from the process of valuation centred on settling a price for wind power. This chapter pursues this question of valuing further by studying a device (the ZDE<sup>30</sup>) for developing specific development zones for wind power projects in France. The ZDE has been organized as a very manifest obligatory passage point to the feed-in tariff; from July 2007 and onwards, only wind power projects constructed within a ZDE are eligible for the tariff. Thus, the idea of the landscape as a valuable entity, and its qualifications, serve as a backdrop for the following analysis.

The ambition of the following chapter is twofold: Firstly, the making of the device, i.e., the wind power development zones, is described as a process of politicization. During this politicization, the ‘pollution’ of the landscape is one among several disqualifications of wind power; secondly, the practice of defining wind power development zones performed by engineers is followed. This practice transforms the landscape into one-dimensional layers of constraints that are eventually piled up to become zones of no or only small constraints to wind power development. By stressing these two moments of the device, i.e., its conception and its practice, this chapter illustrates the somewhat unanticipated effects of the device. Echoing the discussion by Dumez and Jeunemaître (2010) of Foucault’s and Callon’s work on the ‘dispositif’, they stress how the dynamics of a device emerge as the effect of the structuring of a given device along two phases<sup>31</sup>:

*“The creation of devices is marked by an ‘urgent need’ (as Michel Foucault puts it). Then, during the second phase, new, unanticipated functions, strategies, and processes emerge and contribute to stabilize and entrench the device (if it does not rapidly disappear). So Michel*

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<sup>30</sup> In the following, ZDE and wind power development zones will be used interchangeably.

<sup>31</sup> Dumez and Jeunemaître argue that the dispositif of Foucault and Callon, respectively, has strong resemblances, not least its heterogeneously assembled nature, but the dynamics of the two phases seem to be lost, at least partially, in the contributions made by Callon (Dumez and Jeunemaître 2010).

*Foucault's vision is an invitation to focus on two distinct moments: the appearance of the device, and its stabilization, a strategy that uncovers continuities and discontinuities*" (Dumez and Jeunemaître 2010: 31).

In the case of the ZDE-device, it makes sense to stress this distinction between the two phases of the device, as they frame the location of wind power projects in rather distinct ways; the appearance or conception of the ZDE will be described as an attempt at politicizing wind power through location, and the construction of spaces in which local populations may oppose the development of wind power on their territory. On the other hand, the second phase, i.e., the practice of the engineers of defining these zones, may be better described as an economization of the territory; they break down the landscape according to single-variable dimensions and they ration the landscape to eventually conclude on the relative favourability of the zones as wind power territory. To capture the dynamics of the device constituted by these different processes, this chapter is organized around these two phases, i.e., the ZDE's conception and its practice.

## **5.1 Situating Location**

To Riisager, the connection of his turbine to the grid involved connecting a wind turbine situated in his own backyard to an outlet in his home. Thus, the location of his early configuration of wind power as an economic good was not a concern affecting the calculative agency emerging around wind power. To wind power developers today, however, location is among the most important concerns in wind power projects (Int. Lebfèvre, Lamarre, Legrand). Choosing the location in which the turbines are constructed often implies qualifying the site according to several dimensions, such as: wind potential, distance to the grid, willingness of landowners to sign long-term rental agreements, etc. Land, or location, in the hands of the wind power developers is transformed into a calculable entity, singling out a distinct set of qualities. This comment of a developer, referred to in the first chapter, stresses the ordering of these qualities:

*"As a wind site, it [North of Orleans] is actually horrible! There is not much wind. But the area is so far from beautiful, even ugly, and therefore no one objects to the construction of the*

*turbines. And finally, the existing electricity lines between Orleans and Paris facilitate the connection, and that is why you see so many turbines in the area”* (Int. Lefebvre, my translation).

Thus, the developer ordering the qualities of wind power projects pushes the driver of production, i.e., the wind, into the background, emphasising the presence of a grid and the absence of local opposition. In Lefebvre’s account, the location of projects is valued according to qualities of grid presence and ‘ugliness’, and it demonstrates the framing and qualification process of the site for wind power development undertaken. The same criteria are found in a study of developers in Sweden though their ordering is somewhat different:

*“When asked how they start developing wind farms, developers usually answer that they begin by looking for a site with good wind conditions, since this is a key requisite for the profitability of a project. The costs for constructing and developing the farm and connecting it to the power grid should also be reasonable. As one developer put it: We have three criteria for assessing the suitability of a site: first that the wind is good, second that we are not too far from the grid so that the operation does not become unprofitable, and third, of course, we must always make sure that it is at least 400m away from any habitation. For example, for a site to be of any interest, it should not be close to any dwellings, or too close to any place of Swedish national interest”* (Corvellec and Risberg 2007: 310).

So, whereas the landscape in terms of aesthetics, (undisturbed) nature, flora and fauna, is often stressed as a value to those inhabiting it (people and animals), it has yet another value to the developer, who stresses qualities such as proximity to the grid, wind resource, and willingness of landowners to host wind turbines. This framing of the landscape performed by the developers may be overflowed by migration patterns of birds (Nadaï and Labussière 2010), or the presence of (rare) animal species threatened by the construction work or by the functioning of the turbines.

This chapter addresses the process through which the landscape is qualified and economized through its enrolment in the wind power market assemblage: Firstly, by its inscription into the ZDE-device, and secondly, by following the making of a ZDE in Picardie (Northern France). Engineers, landscape architects, and regional and local administration are all part of the process, which allows the making of zones for wind power development. This work is followed in relation to a specific set of zones emerging in the Communauté de Commune de

Pays de la Serre (from now referred to as CdC du Pays de la Serre). This chapter is based on interviews with a variety of actors involved in making the ZDE as a device, as well as documents, and not least the maps produced during the process of qualification.

This chapter proceeds as follows: It starts by contextualizing location through a discussion of the association between price, i.e., the feed-in tariff, and location, as well as the notion of NIMBYism and how this concept is related to wind power development. Building on this particular framing of location as a problem for wind power development, what could be seen as the ‘urgent need’ marking the conception phase of the device (Dumenz and Jeunemaitre 2010), this chapter describes the emergence of the ZDE as a politicization of wind power. Moving through debates in parliament, the device is slightly reshaped as various interests are brought along, and the result in the shape of a legal device is introduced. This chapter then proceeds to the second phase pointed out by Foucault; i.e., its unfolding into a practice on the territory of CdC du Pays de la Serre. Finally, the findings are briefly discussed.

### **5.1.1 Associating the Feed-in Tariff and the Landscape**

As mentioned, since 2007 eligibility for the feed-in tariff requires that wind power projects are situated within a ZDE; i.e., the ZDE is made an obligatory passage point to the tariff. This association goes even further; the feed-in tariff is proposed as central to the making of the ZDE as a device in at least two ways: Firstly, the matter of location, and secondly, the level of the tariff. Concerning the former, the replacement of the tender device by the feed-in tariff effaces the central planning element of future wind power projects, which was part of the tender device. Whereas the tender system would invite proposals for wind power projects in predefined locations, the feed-in tariff was, from the early days, eligible to all projects otherwise following the prescribed legislation (from 2001 to 2007, where the ZDE was made an obligation). The feed-in tariff may therefore be said to lead to ‘anarchy’ regarding the location of wind power projects. Thus, the transition from one market device to another is arguably amongst the triggers of an emerging matter of concern, namely, the location for the development of wind power projects: “*The ZDE is there to avoid what we call ‘sprawling’. Sprawling is the anarchistic construction of turbines destroying the landscape – its everything, anywhere, and anyhow*” (Int. Lamarre, my translation). Secondly, the feed-in tariff, and more precisely the level of the tariff, is said to lead to anarchy, too; the level of the

tariff is suspected as attracting an increasing number of developers in their quest for ‘undue profits’:

*“And with all the projects coming out – and there have been no bankruptcies yet, because it is too recent. The entire population, and in particular the public authorities, are under the impression that it is a ‘cake’. They say: ‘it is not normal that we continue to subsidize a thing like that, which makes the investors grow fat, and they are not even French’. That is what they say; they make 20% profitability easily, and on top, its Canadian or German investors. That’s not normal”* (Int. Lefebvre, my translation).

This description may be seen as a demonstration of the ways in which a market, and here its particular organization through specific devices, triggers the emergence of new matters of concern (Callon 2007a). The framing of the French wind power market through the construction of the feed-in tariff becomes associated with the so-called anarchy of wind power developers; it is profitability-levels which are seen as the source of ‘anarchistic development’; and the device is argued to lead to the *“proliferation of numerous projects scattered around the territory”* (Le Monde 2005). The turbines and their disfiguration of the landscape are made a political issue, which in turn affects the reconfiguration of the market, i.e., by developing yet another device, the ZDE. This dynamic aspect of ordering economic activities is well captured by Callon:

*“...markets trigger the emergence of matters of concern to which they are not always able to provide satisfactory answers. These matters of concern may then evolve into many (potentially) political issues whose solutions may, in turn, impact on the organization of economic activities”* (Callon 2007a: 139).

One of the matters of concern to be discussed here is the landscape threatened by wind turbines and the local opposition this is expected to spur. This is often discussed under the heading of NIMBYism. This notion, though not uncontroversial, and its role in the ZDE is briefly examined in the following section.

### **5.1.2 NIMBYism and Public Goods**

The idea of the landscape being a threatened value has often been raised in relation to wind power development, and local opposition to projects is said to be amongst the major obstacles

to its expansion (e.g., Hvelplund 2006; Gosset and Ranchin 2006; Jobert et al. 2007; Szarka 2007): “*Landscape is among the principal reasons invoked by the local administration for rejecting projects*” (Nadaï and Labussière 2009: 4). This local opposition is sometimes referred to as NIMBYism (not in my back yard) (e.g., Nadaï 2007; van der Horst 1994 and 2007). The NIMBY syndrome positions hostility as locally anchored rather than as a general opposition towards wind power, per se:

*“A survey ... conducted in September 2007 showed that 90% of the French population supports their [wind turbines’] development. For many, the turbines have a good image and good looks. Some consider them to participate in the organization of the landscape, as, in their time, aqueducts, viaducts, windmills, roads ... But for those who are at the foot of the tower, they are first and foremost machines placed on a base of more than 1000 tons of concrete, up to 150 meters high, who massacre their local environment, overshadowing and noisy. For comparison, the largest electricity pylons rise 48 meters. “Whereas a wind turbine is maybe not unaesthetic, but their multiplication becomes catastrophic for the landscapes,” says Paule Albrecht, president of the Society for the protection of landscape and aesthetics of France” (Figaro 2008, my translation).*

So, whereas wind power may be framed (as a valuable) solution of the pollution problem of CO<sub>2</sub>-emissions, the turbines become the source of a somewhat different pollution problem, namely, that of the landscape. This could be described as an example of the framing/overflowing dynamics stressed by Callon (1998b). Common to these overflows (i.e., CO<sub>2</sub>-emissions and pollution of the landscape) is that they are both, arguably, connected to the most common source of market failure, namely, the association to a so-called ‘public good’. In what Hardin (1968) termed the ‘tragedy of the commons’, the public good (here the land, or the landscape) is prone to overuse, when too many owners have the privilege to use a given resource, and no one has a right to exclude others. Framing the countryside or the landscape as a ‘commons’ transforms the wind power developer into a figure resembling a ‘free-rider’, something that is accentuated by the existence of the feed-in tariff (see Chapter Four).

On the other hand, the NIMBY concept seems to build on the reversion of the ‘tragedy of the commons’, namely, what Heller and Eisenberg (1998) refer to as ‘the tragedy of the anticommons’ in which a resource (e.g., wind potential) is prone to underuse when multiple

owners have the right to exclude others from the resource (Heller and Eisenberg 1998). In other words, the so-called proponents of the NIMBY argue that the landscape is ‘polluted’ by wind power developers in their quest for profit maximization, whereas the proponents of wind power argue that the locals are too restrictive in their protection of the landscape – and have too much power vis-à-vis their means of excluding project developers from their ‘backyards’. Thus, shifting the public good of the equation from that of the landscape to the wind, allows a reframing of the problematization facing either the locals or the developers.

Concentrating on the problematization around the ‘tragedy of the anticommons’ and its translation into NIMBYism, is often described as a way of discrediting project opposition (e.g., van der Horst 2007). The reference to NIMBYism dissolves all (local) opposition into a one-dimensional evaluation of the landscape; that of ‘self-interest’, i.e., the proximity between a given construction and one’s own land is made circumscribing<sup>32</sup>:

*“The implication is clear: this opposition is based purely on self-interest; and because standing up for one’s own interests is seen as selfish, it may be safely disregarded. Proponents of this argument do not distinguish between the interests of the opponents and their motives”* (Wolsink 1994: 853).

Acknowledging that the opposition may be anchored in a variety of arguments, an a priori reduction into one dimension, i.e., NIMBYism, discredits the opposition, all the while disguising the variety of possible sources of concern. The approach adopted here seeks to remain open to the many different ways in which the landscape may be qualified as well as the ways in which these qualities are ordered. Whereas the NIMBY syndrome is often discussed in relation to wind power projects (e.g., van der Horst 2007; Nadaï 2007)<sup>33</sup>, the role it takes up in the present analysis is rather a framing/representation taking place outside of the local environment of the CdC Pays de la Serre followed here. Rather, the NIMBY syndrome becomes a figure in the formulation of the ZDE as a device<sup>34</sup>. In other words, the following analysis will demonstrate how the dynamics of framing-overflowing-reframing in the case

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<sup>32</sup> Wolsink (2000) identified four different categories of opposition towards wind farms in Holland and quantified their relative importance; he concludes that NIMBY is a myth and that institutional restraints are more important than public acceptance.

<sup>33</sup> Wolsink (1994) describes how the NIMBY concept became a political issue in the Dutch political debate over the disposal of nuclear waste in leading to the adoption of a ‘NIMBY bill’ as well as ‘NIMBY instrument’.

<sup>34</sup> Chrupek stressed that the ZDE was an instrument developed to avoid NIMBYism (Int. Chrupek).

studied here may be seen as an attempt at constructing NIMBYism (centrally) rather than responding to it.

## 5.2 The Making of the Device

The legal text of the ZDE argues for its introduction as a means of continuing the positive French development of wind power seen in 2005<sup>35</sup>: “*We must now consolidate this dynamic by pursuing this growth, within a framework favoring the good local integration of the [wind power] projects*” (Ministere de l’Ecologie et du Developpement Durable et al. 2006: 1). The origins of the device, however, seem to have emerged out of a somewhat different ambition, as will be described below. As such, this section addresses the first phase feeding the dynamics of the device stressed by Foucault. In the following, the conception of the device is described as an act of politicization, i.e., an attempt to problematize wind power by associating it with emerging issues related to the landscape. Next, the device as it eventually took shape is described, and finally it is discussed in terms of ‘planning’ and ‘siting’ as two distinct approaches to wind power policies (Nadaï 2007).

### 5.2.1 An Act of Politicization

During an interview with an official of the French Parliament, Durant<sup>36</sup>, regarding the qualification of wind power and the fixing of the feed-in tariff, the conversation touched upon the ZDE. Durant immediately claimed to be the ‘father’ of the device and presented an elaborate description of the birth of the ZDE. During his presentation of the making of the wind power development zones, it was unfolded as a strategic device aimed at putting an end to, or at least slowing down, French wind power development:

*“...when the second PPI<sup>37</sup> ... it was in 2003, something like that... it set an already very ambitious goal, but at the time everyone thought it was pure display. It's a bit like.... there is*

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<sup>35</sup> 400 MW installed in the year 2005 (Ministere de l’Ecologie et du Developpement Durable 2006).

<sup>36</sup> Durant is identical to Durant from the previous chapter.

<sup>37</sup> The PPI (Programmation Pluriannuelle des Investissements de production électrique) is a multiannual investment program for electricity production.

*this permanent double discourse, where you announce that you are going to make 10 megawatts of wind power – you do not believe it, but by making the announcement, well eventually it makes 10 megawatts of wind power. But at the time we did not believe it would happen, we did not think it would work as it worked... we thought that the wind power development zones would considerably put the brakes on the development of the projects, so they have been made for that... to put the brakes on, really. Obviously, it does not seem like it has really stopped wind power”* (Int. Durant, my translation).

According to Durant, wind power development zones emerged as a safety brake on what was conceived as a highly ambitious goal. Though the ZDE is presented through law and guidelines as an attempt to encounter and eventually, at least partially, overcome local resistance, Durant presents the device as an attempt at problematizing wind power by framing the issue as a democratic decision. In general, the subject of renewable energy and wind power in particular – in France and elsewhere – has been discussed with passion, and it has rarely been treated in a rational, cold, and purely economic manner (Int. Durant). Furthermore, arguments for and against wind power are often translated into a discussion for/or against nuclear power, a long running discussion in France: *“Those who now support wind power were all former nuclear power enemies”* (ibid.). Hence, the discussion of wind power is not solely a matter of increasing the amount of renewable energy in the system but also a battle of technologies. People are often referred to as being convinced by either one or the other technology; e.g., *“The new CEO of RTE is a pro-wind power guy, whereas the previous was 100% into nuclear power”* (Int. Lefranc, my translation). Durant’s account makes these issues re-emerge as a possible concern in the conceptualization of the ZDE. To Durant, however, the ‘real’ concern of wind power was the feed-in tariff. He describes how tariff-opponents as a first step proposed additions to the legal text, so that the tariff could later become overridden by the legal system:

*“The basic idea ... the idea, from the outset, is to say the subject of wind power is an economic issue, and the basic problem is the level of the tariff. If ... the tariff is lower, there would be fewer projects, which makes good sense - that’s the first point. Second point, one cannot, “one” being the Parliament, the legislator cannot reduce the tariff, since it is a decree. However, the legislator did ask the Parliament, the government, to remake a tariff ... asked to redo the tariff by writing in the law that the tariff should not lead to excessive*

*advantages [to the developers], meaning an entire device made to end the tariff decree, precisely because there were arguments to say that the level was excessive, and therefore the tariff bill was probably illegal and thereby could have been overridden by a judge...*" (Int. Durant, my translation).

Thus, had the decree explicitly stressed that 'excessive advantages' were not to be the result of the tariff, this would have been an opportunity to bring the controversy on to new grounds, i.e., that of the legal system. Here the different calculations of the (undue) rents made by developers could have been discussed and possibly led to a reordering of the calculative agencies opposed during the debate of the feed-in tariff. Having failed to make these changes to the decree, Durant describes how the matter of concern regarding the level of the tariff was replaced by yet another matter of concern, namely, that of the national heritage: "*Since the topic is the tariff... one, it's the tariff... and two, the political angle of attack by which you can touch wind power is the protection of the heritage*" (Int. Durant, my translation). Stressing this involves an evaluation of three different matters of concern related to wind power and their potential for becoming the backdrop of a political discourse impeding French wind power development. It is the potential for creating public attention and understanding that which is stressed during the evaluation of these matters of concern, and their problematization:

*"Politically, the discourse: 'it is useless' from an energy point of view, it makes no sense, it is a political discourse that does not deliver. It does not work, because it is easily returned on the mode 'you defend the nuclear ...', and furthermore, it is also extremely difficult to defend, meaning the idea that when it turns [the turbines] it will release a thermal unit that will export to Germany. It is a chain that will be difficult to defend. So, the energy argument is not politically viable"* (Int. Durant, my translation).

According to Durant, the problematization of wind power as an energy concern does not have the potential to mobilize the public against the expansion of wind power in France. Firstly, it may be translated into simply a 'battle' of energy technologies, and secondly, the complexity of the argument makes it difficult to engage the public. To make the argument, the energy system has to be represented in some form, including the balance between supply and demand, energy technologies, and their production modes (e.g., base load energy, etc.). As a 'viable' politicization, here seen as the ability to mobilize public support, the energy point of

view is disqualified. In other words, a clear distinction is made between the argument's technical qualities versus its political qualities. This is not meant as a disqualification of the argument as such, only its qualities as a political argument. Durant continues his account by drawing the lines of the second possible politicization:

*“And the economic argument that it creates too high profitability, and it comes at very high cost... that was not audible because it could easily be answered by saying, but two eurocents per invoice, it's nothing”* (Int. Durant, my translation).

The ‘economic argument’, which was according to Durant the ‘real’ concern could not create the mobilization of the public either, as the effect on the individual consumer simply translates into the rather manageable cost of two eurocents. Durant’s politicization, then, includes an evaluation of the energy concern and the economic concern, and their potential for problematizing wind power. He concludes that these are ‘weak’ problematizations and they will not help to slow down wind power, as intended by his politicization. Therefore, Durant rejects these as backdrops for the device he is conceptualizing and continues to the third problematization:

*“So, the only tenable argument is that it should not disfigure the landscape, because that – that is working. People may agree or may not agree, but it is something that holds together politically. So, suddenly the ZDE mixes two issues, which is it draws on a landscape protection argument, and it affects the price. Because, in fact, the ZDE does not interdict. It is not a planning measure, it does not interdict, or it does not frame the realization of machines outside of these zones, it conditions the benefiter of the purchase obligation through the fact of zoning. So it closes the economic window, which is posed by the level of the tariff, outside of zones...The idea is... that it limits a regime in momentum, it effectively frames the location, it limits the potentially a bit anarchic initiatives. And the second point: it complicates ... it allows for more procedural steps, and each procedural step may become an object of conflict. So if a local association is against, it gives them points for action to obtain the cancellation of acts [construction of parks]. And so it has as its nature to halt the development of the project objectively...”* (Int. Durant, my translation)

The disfiguration of the landscape is eventually estimated to be the best possible way of mobilizing and enabling the emergence of an opposition. As stressed by Durant, people may – or may not – accept that turbines disfigure the landscape, but it is an argument that is easily

framed and communicated. The ZDE becomes an opportunity to allow local opposition to gain momentum and present their concerns in a well-framed forum. While the developer is tied to the ZDE so that he can be eligible for the tariff, it ultimately connects the landscape disfiguration concern with the economic concern. Durant's account of the making of the ZDE-device as a series of problematizations, i.e., the fragmentation and division of issues *“that evolves into the joint formulation of a set of different problems which in a sense, at least partially, are substituted for the initial issue”* (Callon 2008: 9) draws on concerns that emerged along the process of valuation in the preceding chapter, such as the level of the tariff, the fact that it is generated at a desk, rather than by the market, and the potential of wind power (or lack thereof) to decrease CO<sub>2</sub>-emissions in the French energy system. Thus, the three issues discussed by Durant were not made up during the making of the device; they emerged and were refined during the process of valuation unfolding around the settlement for a price. But during the formulation of the ZDE-device, these concerns were qualified according to their ‘public appeal’, sometimes disqualified as being too technical, etc.

This account of the conceptualization of the ZDE-device indicates that the NIMBY effect may rather be seen as an effect of politicization rather than a way of encountering it. Paradoxically, one could say, it seems that *local* opposition stressed in NIMBYism is constructed centrally, i.e., in the halls of Parliament. As such, the opposition seem to be nurtured and enabled in the way the problematizations frame matters of concern associated with wind power.

However, for reasons I will address later, the ZDE was less successful in creating the NIMBY effect than was expected by its ‘father’:

*“This being the case, the initial idea was to slow down, or constraining through breaking or slowing down... but there was a very vigorous press campaign by the union of renewable energy and therefore critics were less harsh than originally envisaged, so it's normal that it slows less down ... it does not slow down as it was intended...”* (Int. Durant, my translation).

The framing presented by Durant closely associates wind power and the landscape. As a policy device, however, the translation of the device – from its conception to its formulation into a policy – passed through two hearings in both chambers (the assembly and the senate)

during which other issues emerged<sup>38</sup>. During this process, the landscape became associated with other issues such as decentralization, e.g., the instruction text mentions that prefects should be attentive and avoid ‘sprawling-effects’, and the device, in turn, folded around these issues. In other words, the ZDE passed through steps of translation and was eventually transformed into distinct formulations of requirements and guidelines for regional and local administration and framed as a tool for local democracy to emerge.

### 5.2.2 From Politicization to Policy

Following Durant’s conception of the ZDE as a politicization through which the association between wind power and the landscape is enforced, the wind power development zones became an integrated part of the French law on energy policies, POPE (*Programme fixant les Orientations de la Politique Énergétique*)<sup>39</sup>, adopted in 2005. From 14 July 2007<sup>40</sup>, the wind power development zones were made an obligation to wind power developers in France for their projects to be eligible for the feed-in tariff. According to a letter addressed to the French Prefects, and the attached instruction letter (La Ministère de l’Écologie et du développement Durable 2006), the device “*should encourage communities to participate in this form of decentralized energy production while taking into account the protection of landscapes, historical monuments and remarkable and protected sites*” (La Ministère de l’Écologie et du développement Durable 2006: 1, my translation). And as such, the development zones are argued to be a means of obtaining the overall French objective of increasing the share of energy from RETs from the present 15% to 21% in 2010 (presently, wind power represents between 1% and 2% of French electricity consumption).

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<sup>38</sup> According to Nadaï, these discussions were centred on the centralization/decentralization of the French energy infrastructure: “*The analysis of the French legislative debate over the new energy policy shows that landscape and local acceptance have been recurring issues in the debate. However, these issues were not examined as such in the political debate. They were pushed forward by the protagonists in order to fight a battle, which boiled down to a major issue for French energy policy: decentralization*” (Nadaï 2007: 2724). Even though the ZDE is argued to be an attempt to allow the local communities to take over the initiative of the future wind power development, the planning of the electrical grid, or the infrastructure connecting the turbines to the distribution, remains in the hands of RTE.

<sup>39</sup> As such, the ZDE is characterized as an ‘electrical device’ rather than an urban planning tool (*dispositif d’urbanisme*). This ambiguity is born from the fact that the two classes of instruments are coupled in the ZDE (5eme colloque national éolien, synthèse;32).

<sup>40</sup> The period between July 2005 and 14 July 2007 was made a transition phase during which developers could choose under which legislative framework to operate.

From 14 July 2007, the feed-in tariff granted to wind power producers guarantees the producer not only that all energy produced from his turbines is purchased by EDF, but also that he is paid at a fixed price. But these terms only apply for turbines constructed within the development zones. The development zones have, in other words, become indeed very physical ‘obligatory passage points’ to the economic incentives constructed to attract wind power. Furthermore, with the development zones, it has become possible to benefit from the purchase obligation even for projects that exceed 12 MW. Therefore, the development zones enable the construction of large wind turbine farms without compromising or renouncing the fixed and attractive price offered to the wind power developers. Before the POPE law, the purchase obligation was limited to smaller projects of 12 MW or less, which forced developers of larger wind farms to ‘slice’ his projects into smaller projects under 12 MW and submit each ‘slice’ to the administrative procedures of applying for construction permits and grid connection permits.

The ‘basic principle’ of the ZDE is to respond “*to the desire of the communities to accommodate, in an organized framework, wind power installations on their territory*” (Ministere de l’Economie et al. 2006: 4, my translation). The geographical location of the development zones must be proposed by the concerned municipalities or by an inter-communal cooperation, often referred to as a *Communauté de Communes* – or a CdC. The proposal of a wind power development zone, addressed to the prefect, must be based on three criteria (Ministère de l’Economie et al. 2006):

- The wind potential in the zone.
- The possibilities of connecting the turbines to the electrical grid.
- Respect of the landscape, historical monuments, and protected sites.

These criteria should be described in depth in the proposal, and upon these the precise geographical perimeter of the development zone is defined. This becomes the specific area in which the municipality wishes to allow the development of wind farms in their area, and it defines the minimal as well as maximal power that may be installed in the development zone (ibid.).

Finally, once the municipalities have defined a territory as a potential development zone based on the three criteria, they propose the development zone to the department<sup>41</sup> prefect, who must validate the proposal. As such, it is the prefect who holds the final decision whether or not to allow a development zone, and thus the final decision of what is to become ‘legal turbine territory’.

At the end of February 2007<sup>42</sup>, eighteen development zones had been created, reaching an upper limit of 602 MW of wind power to be potentially installed. Five development zones had been refused, with arguments stressing that the zones were small-scale zones and thus not avoiding mitigation of the parks. Furthermore, sixty-three (with a maximal power of 4142 MW) had been proposed and were being processed by the prefects, and finally, at least eighty-six proposals (that were known of) were being prepared for submission to the prefects.

### 5.2.3 Increasing ‘Red Tape’

The idea of the ZDE is not to undertake a full analysis of the ‘very local’ constraints, i.e., the device does not replace the construction permits and the related impact study. As such, the device is rather that of territorial planning than an accurate tool for the micro-level insertion. As a consequence, the procedure does not investigate whether landowners of the appointed zones have any interest in renting their land to the potential developer (Int. Plichon, Int. Piedvache):

*“So it's not an impact assessment. The study we do as consultants is really a study at the scale of a territory, so it's not a local study; that is to say, we will not make accurate census on such sites, but it really has to guide a number of areas, taking into account the specificities of territories and neighbouring territories...”* (Int. Plichon, my translation).

As such, the device ensures that wind power has been on the local agenda, and that the local community accepts the idea of installations. However, it does not, per se, do away with any of the procedures that the developer is legally obliged to perform; as argued by Francois Pelissiers, director of ERELIA, *“The ZDEs seem to represent a supplementary step and may*

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<sup>41</sup> From the French *département*, a sub-regional administrative division.

<sup>42</sup> Until 14 July 2007, it was still possible to construct turbines outside of the development zones and still benefit from the purchase obligation – as long as the project did not exceed 12 MW. The real increase is therefore not expected before July 2007.

*result in litigation. An increase in case files is possible*” (ADEME, Roundtable Amiens, my translation).

The ZDE-device does not, however, dictate how the proposals are to be made and thus allows a certain flexibility for the CdCs to work out the proposals of wind power development zones. It is made an explicit requirement that the proposal addresses ways in which the idea of a local wind power zone has been communicated to the local inhabitants. The ZDE is often referred to as a device for ‘*consultation*’, i.e., including elements of cooperation and/or dialogue. The framework makes particular mention of this *consultation*: The final proposal should include “*a clarification on the modalities of consultation with citizens affected by the ZDE would usefully be mentioned in the dossier*” (Ministère de l’Economie, des Finances et de l’Industrie 2006b, my translation). As such, the instructions leave the CdC with the choice of how to conduct the dialogue, with examples ranging from a public meeting held by the CdC with the presence of bureau d’étude (CdC Santerre) to the invitation of all inhabitants to a nearby wind park (CdC Pays de la Serre). In none of the cases was the consultation a question of yes or no to wind power development but rather an introduction to the plans already made.

The device may add layers of bureaucracy to defining wind parks, but it remains less concrete on the distinct ways in which to make the proposal as well as the form of the ‘consultation’ of the local population. As such, there is a certain plasticity to the device (Akrich 1992); though the distribution of identities and roles seems well-defined by the device, the exact ways of performing the roles remains open to those using the device.

#### **5.2.4 The ZDE as a Frame for Overflows**

Alain Nadaï, a French environmental economist, has discussed wind power policies developed in France since the Eole 2005 program and in particular the local acceptance of wind power (Nadaï 2007; Nadaï and Labussière 2009), invoking the concepts of ‘planning’ and ‘siting’ (Nadaï 2007). Planning refers to an ‘integrated approach’ of the territory, “*which allows planners to decide on land uses in time and space*” (Nadaï 2007: 2716). Methods such as the ecological planning developed in the sixties (Mc Harg 1969), also referred to as rational planning, implies an analysis of the territory according to a number of criteria and the drawing

of maps for each criteria<sup>43</sup>. Next, maps are superimposed, and the emerging blank zones are regarded as acceptable zones for new infrastructural constructions. ‘Siting’ approaches, on the other hand, refer to policies dealing with local issues related to the siting of wind power infrastructures (Wolsink 1996). For landscape designers, siting is a process that is part of the transformation of a landscape. The site on which the landscape engineer/designer works is stressed as being in a temporary and unstable state, “*a state in which social networks that are connected to the place get recomposed*” (Nadaï 2007: 2716). During this open process, the memory and identity of the place emerges in the course of the process (ibid.).

Bringing the concepts of planning and siting to work on French wind power policy, Nadaï concludes that the intention behind the law of the ZDEs seems to be situated somewhere between the two. On the one side habilitating the local communities as definers of their territory (siting), all the while leaving final decisions (and control) in the hands of the centrally organized prefects (planning); “*the question remains open whether or not the new policy scheme might provide the right balance between territorial planning and room for open participation*” (Nadaï 2007: 2716).

In his article, Nadaï explicitly connects siting and Callon’s concept of overflows as a process through which social groups emerge, and not least the proliferation of social links. On the other hand, (rational) planning being based on predefined spatial schemes, is seen as close to the logic of the Callonian framing. Connecting the ideas of planning/framing and siting/overflows to Durant’s account of the ZDE as an attempt of politicizing French wind power development, I argue that the association between wind power and landscape is an attempted framing of turbines as pollution that is premised on processes of siting, i.e., the emergence of concerned groups and their mobilization. Returning to the terminology of Callon, the ZDE may then be seen as a frame intended, at least by Durant, for the creation, enrolment, and reinforcement of overflows.

The making of the device, what Foucault referred to as the first phase, may be seen as a response to an ‘urgent need’ defined by Durant to be ultimately the price of wind power. But rather than problematizing the price of wind power, the ZDE is set up as a platform on which wind power and the territory are associated and forced to pass through several ‘trials of

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<sup>43</sup> The method proceeds by abstraction as it extrudes from the territory a set of single-variable layers (e.g., natural space layer, roads layer...) (Nadaï 2007).

strength’: Agreement between neighbouring municipalities to make a proposal; the prefect must accept the proposal; and local inhabitants must be consulted on the initiative. However, as Durant admits, the ZDE eventually does not put a halt to the development of wind power. To grasp the, according to Durant, counterproductive effects of the ZDE-device, I will now turn to its practice.

### 5.3 The Making of a ZDE in Picardie

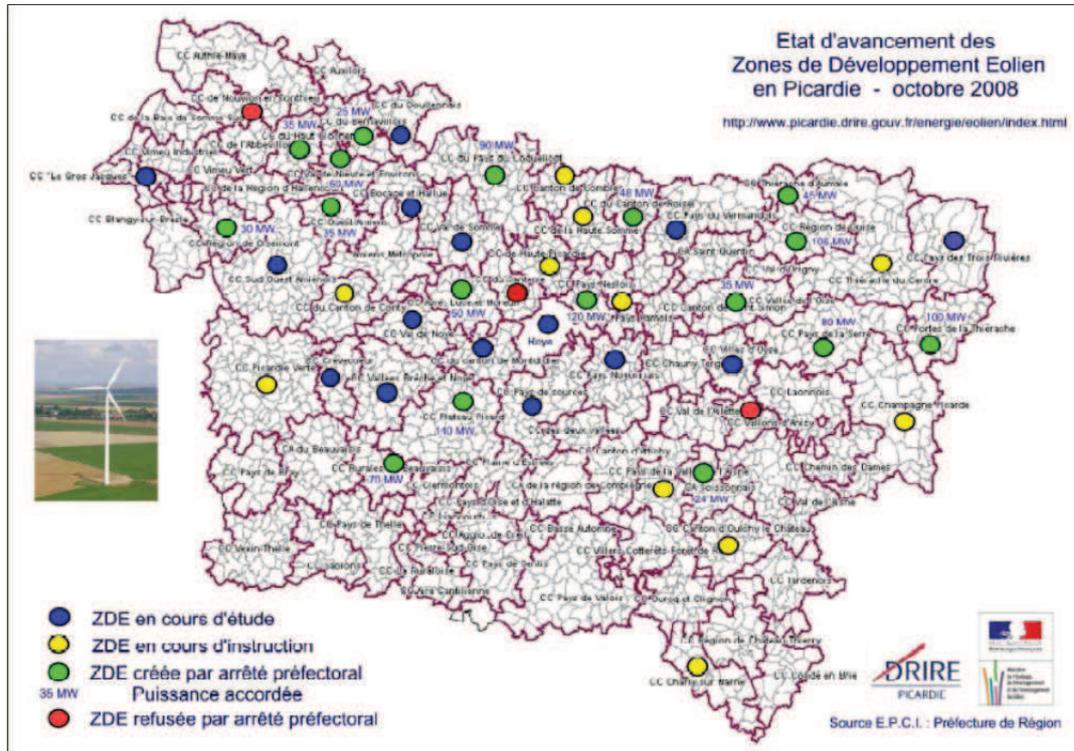
I will now turn to the second phase of the device as stressed by Foucault, i.e., the practice of defining wind power development zones. The practice to be followed is that of engineers, as they translate the territory of the CdC du Pays de la Serre into zones more or less favourable to wind power development; a process that may eventually be described as an economization of the territory.

The ZDE to be followed is situated in Picardie, a region north of Paris. Picardie covers an area of 19,399 km<sup>2</sup>; consists of three departments, Aisne, Somme, and Oise<sup>44</sup>; and has a population of approximately 1890.000. Within Picardie, the intended politicization described above does not seem to have worked quite the way as intended by the originators of the ZDE, as already indicated. As illustrated in the figure below, ZDEs have been proposed in most Communautés de Communes in the Picardie region and were, at the time of following the process of CdC du Pays de la Serre, at different states of preparation.

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<sup>44</sup> CdC Pays de la Serre is situated in Aisne, and the CdC du Santerre in Somme.

Map 5.1: Wind Power Development Zones in Picardie anno 2008



(DRIRE 2008)

### 5.3.1 CdC du Pays de la Serre

The CdC du Pays de la Serre regroups forty-two villages (see figure below), working together since 1986 and has approximately 16.000 inhabitants. The CdC is placed in the eastern part of Picardie, a region often mentioned as one of the best territories in France for wind power due to the region’s wind regime. The interest in wind power projects in the CdC dates back to 2002. In the *Journal des Elus*, a journal for the elected representatives in the CdC, the German developer, Eoles Futur, is described as having approached the CdC for future investments in the region and inviting a delegation from the CdC as well as neighbouring CdCs on a field trip to Northern Germany in September 2002. In the note, the interest of the developer is explained firstly referring to the Kyoto protocol, and secondly making reference to the characteristics of the region:

*“Ratifying the Kyoto protocol, France is committed to actively participating in the promotion and development of so-called ‘clean’ energy. The company Eoles Futur has therefore realized an important research study in the North-eastern part of France, to determine most favorable geographical areas for the establishment of wind turbines. The result of this study show that*

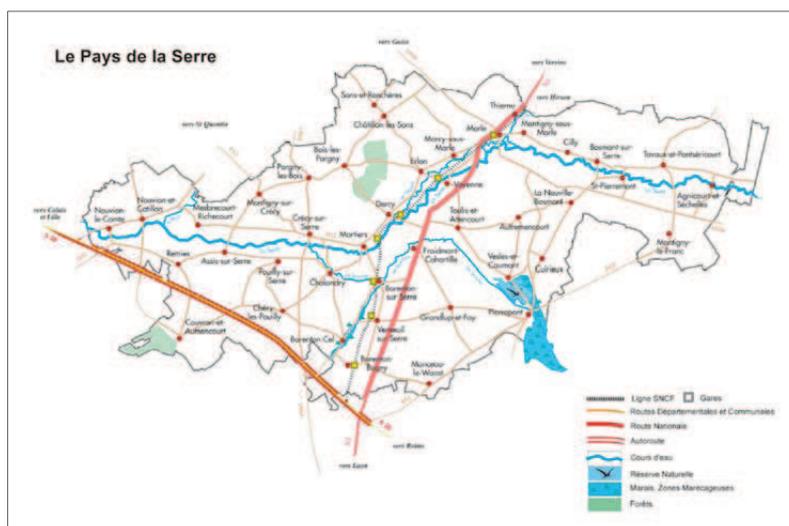
*the Serre-valley, and in particular the plateau from East of Montcomet to Marle, combines all the characteristics allowing the implementation of wind turbines:*

- *Meteorological and aerological conditions*
- *Topography (plateaus and plains)*
- *Sparse habitation*
- *Regulatory compliance constraints (aviation corridors, distance to habitation...)*”  
(Journal des Elus 2002, in Airele 2007, my translation).

The developer makes a translation from the French commitment to the transnational agreement of the Kyoto protocol and into some rather distinct qualifications of the territory within the CdC du Pays de la Serre. The preliminary studies of the North-eastern part of France allow for the emergence of a valuable framing of the territory, something that is first communicated to the elected politicians of the region.

In 2003 the local journal, Pays de la Serre Magazine, published a small note on an upcoming meeting organized by the developer, Eole Futur (Airele 2007). However, in spring and summer of 2008 (the time of my fieldtrips) there were still no turbines installed in the region, but plans for a park at Autremencourt had been granted with the final construction permits, and in 2008, construction work was slowly beginning.

**Map 5.2: Pays de la Serre**



(Airele 2007: 8)

In 2006, the CdC du Pays de la Serre began a process towards the definition of a ZDE on the territory. Though the CdC du Pays de la Serre had the actual expertise in-house to undertake large parts of the work required to define the ZDE, they nonetheless chose to buy the service of making the proposal from a specialized consulting firm: *“It was chosen to sign a consulting firm, which is totally new to us - but saying that we will have a new look at the territory”* (Int. Vonfeldt, my translation). This ‘new look’ on the territory was first and foremost said to ensure what the responsible in-house engineer called non-partiality and objectivity that separates the actual analysis from the political agenda unfolding between the elected representatives, a distinction which is also stressed by one of the consultants hired by the CdC du Pays de la Serre:

*“...that is to say that we, the consultants, are there to give advice to the administration of the community, being very objective. You can see that in the landscape studies, the technical studies, several levels of studies. But behind this is the political aspect; that is to say, that it is the community of communes who hands in its file in the prefecture, so it is ... it is the file of the community of communes, and not that of consultancy firm, we were there to guide them, to define the scenarios, and finally after that, they choose”* (Int. Plichon, my translation).

To both engineers, the distinction between the politics of the CdC and the (technical) objectivity of the external consultants is stressed and provided an argument for buying the service. The consultancy firm Airele, a company based in the region, was hired to undertake the analysis of the territory building upon their emerging specialization in the work of making ZDE-proposals.

### **5.3.2 A Process of Qualification**

In very rough terms, the entire process of analysis may be described as a process of qualifying areas of the territory as favourable – or not – to wind power development. The main tool in this process of qualification is the map. Mapping the qualities of the territory along a wide range of dimensions is what eventually leads to the final proposal together with its definition of power limits. Maps are constructed, each delimiting areas of constraints, and eventually they are layered allowing areas without constraints to emerge (Int. Plichon). Airele organized

the work around three phases (not to be confused with the two phases of the device, stressed by Foucault):

Phase one: Analysis and global synthesis of the data (Airele 2006a).

Phases two and three: Proposal of the ZDE and recommendation on implantations (Airele 2006b).

Finally, an official proposal, based on the results of the subsequent phases, was submitted to the DRIRE in July 2007 (Airele 2007).

In the following, the three phases followed by Airele<sup>45</sup> are described in more depth. The description is based on the three reports and supplemented by interviews.

### **Phase One: Global Analysis and Synthesis of Data**

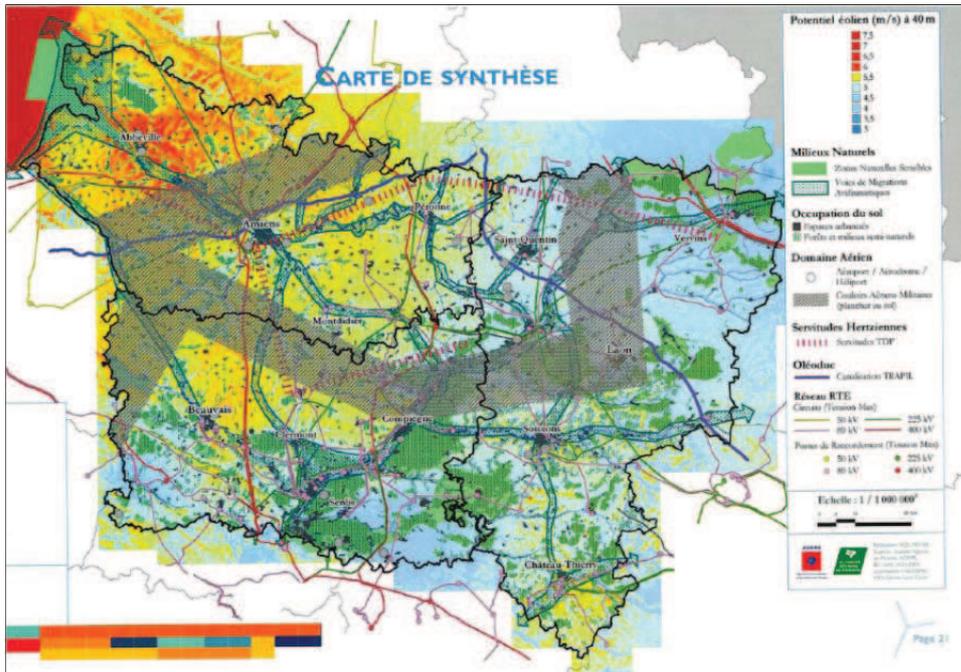
The first phase is first and foremost a contextualization of wind power development on a large scale: The political agenda set with the Kyoto protocol, its translation into the European directives on renewable energy development, and eventually the French objectives as they are defined in the POPE-law; 21% of the French electricity consumption should, by 2020, be renewable energy. The report concludes that wind power is, at present, the primary source of renewable energy likely to respond to these objectives (Airele 2006a). From this very general contextualization of the wind power development, the report moves on to the regulation of the ZDEs and the regional development of wind power in Picardie. These chains of translations tie the local wind power development to a climate change discourse rather than an energy discourse.

The following map ties together some of these issues; from the strong investments required in order for France to live up to the objectives, Picardie is described as one of the regions with the strongest potential in France. CdC Pays de la Serre is no exception; being a vast agricultural plateau that is well exposed to the wind makes it an attractive territory to host wind power projects (Airele 2006a). The following map is deployed to illustrate the 'suitability' of Picardie for wind power projects (Airele 2006a).

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<sup>45</sup> The process of ETD on the CdC de Santerre was identical to the steps described by Plichon from Airele.

Map 5.3: Carte de Synthèse



(Airele 2007: 10)

This map, produced by ADEME and le Conseil Régional de Picardie, illustrates the major constraints to wind power development, such as environmental, aeronautical, and, urbanizational constraints, in the region.

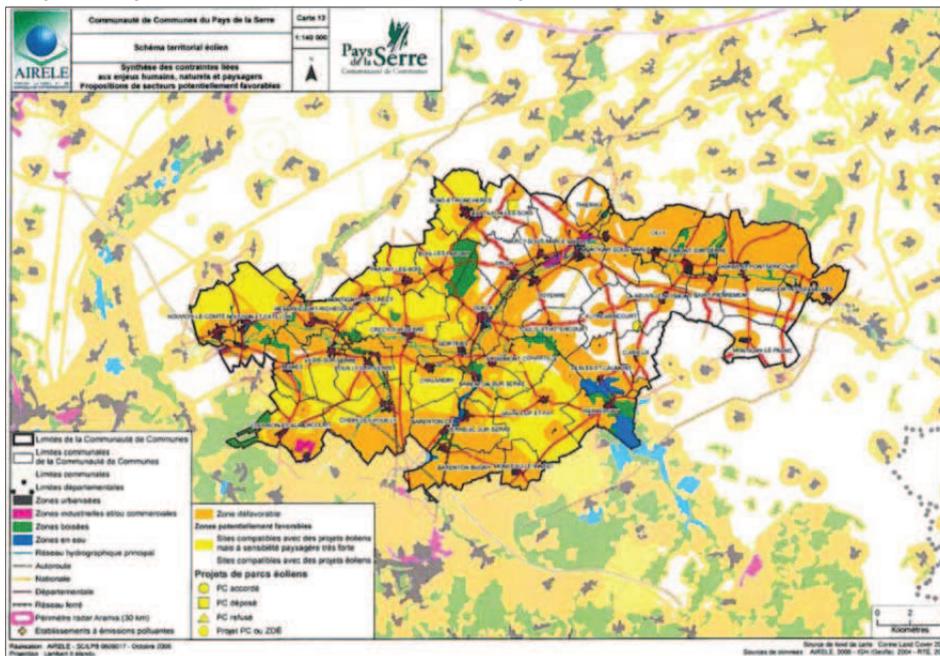
This first phase of analysis includes collecting a maximum of data from available sources (Int. Plichon) but does not include field visits. Analysis is an exercise performed at the engineer’s desk, using data to draw maps. The analysis includes what is referred to as the socio-economic context; the use of the territory (e.g., urban areas, agriculture, and industry), infrastructure, natural and technological risk-zones, and existing wind power projects. Then, the natural environment is analysed: protected zones, natural environment, and migration paths. This first phase is in many ways an early and rough attempt at framing the landscape into more or less favourable zones for wind power development. Meanwhile, it is also presented as a communication tool:

*“It is a global analysis, the synthesis of the data, so there are several chapters: it recalls the context – that is a chapter which is more ...which allows the reader external to services of the state, and even external to the CdC, to see where we are, and especially in wind power, what*

is a wind turbine park... it is a chapter, a contextual presentation” (Int. Plichon, my translation).

Still, the first analysis remains global, and is first and foremost aimed at bringing forward the major constraints as to where the zones may eventually be placed. The first phase resulted in a seventy-eight page document, and in many ways the analysis is summed up in the following map:

**Map 5.4: Synthesis of Human and Landscape Restraints**



(Airele 2006a)

This first phase of defining wind power zones as technically feasible is represented as highly objective: “*It is objective constraints that we map here, it is actually a Cartesian process*” (Int. Plichon). It is a process much like making the region pass through a kaleidoscope; it translates the landscape through different ‘lenses’ and each ‘lens’ results in a map.

These maps draw out the ‘human activity’ of the region, such as towns, industry, habitation and roads, and enable the mapping of distinctions between zones ‘favourable’ to wind power and those unfavourable to wind power. Also, cultural heritage sites are mapped such as archaeological sites, protected (natural) sites, and monuments. From each site, a protection

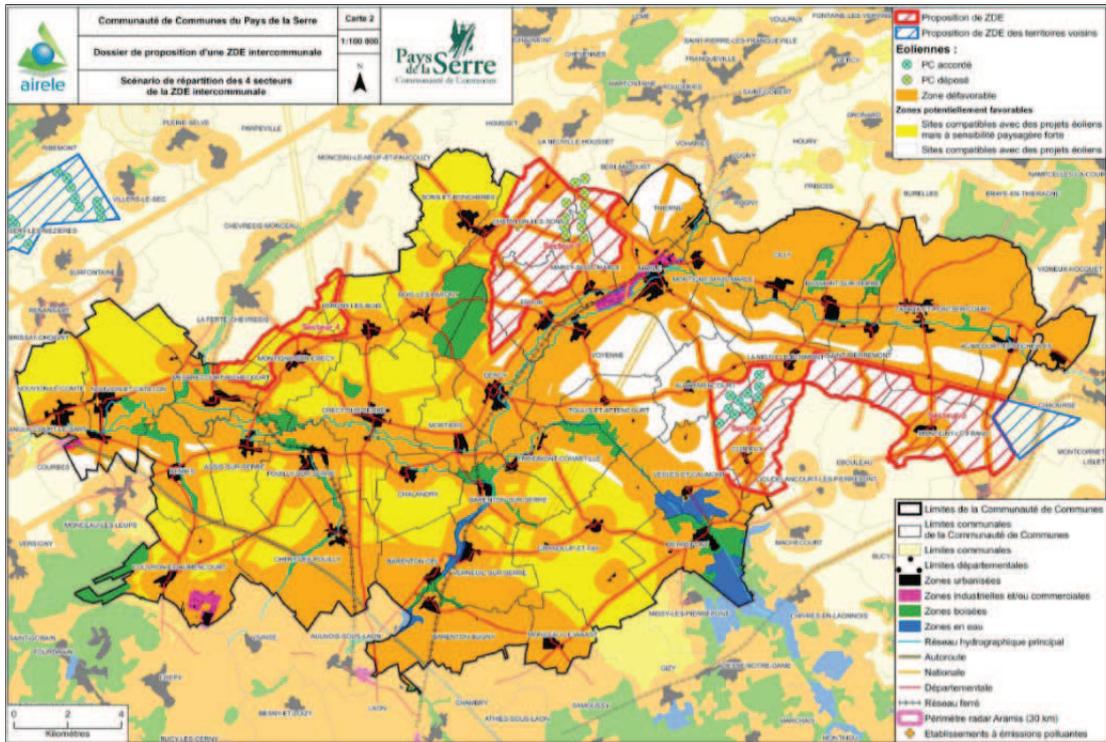
zone (i.e., a perimeter around the site) is drawn, depending on the importance of the monument. Finally, transformer stations and their availability are considered and mapped.

Each step is based on existing databases and atlases, often produced by state agencies such as DIREN (regional agency for the environment) or DRIRE (regional agency for the industry, research and the environment).

The constraints are presented by both engineers, as well as local politicians, as externally given limitations or imperatives. Based on externally produced atlases and maps, the process of adding layers of constraints is what brings ‘objectivity’ and legitimacy to the process. The process of generating scenarios favourable to wind power zones is argued to be a technical process and not a political process, because of the accumulation of the layers of ‘objective’ constraints.

Finally, this first phase of analysis includes a selection between the favourable zones: “*At the end of this multi-criteria analysis, the potentially favourable zones appear as numerous on the territory*” (Airele 2006a: 20, my translation). Therefore, a selection between two scenarios was proposed by the engineering company, which makes the procedure iterate between the technical and the political. The chosen scenario allows the definition of a ZDE with four sectors, as illustrated in the map below. White areas are described as being fully compatible with wind power projects, whereas yellow is compatible but with strong landscape sensibilities.

Map 5.5: Zone Proposal



(Airele 2007: 18)

### Phases Two and Three: Proposal of the ZDE and Recommendation on Implantations

The next phase of the analysis is far more local in its orientation and investigates the ‘sensitivity’ of the territory with the aim of concluding on well-defined zones, which may be qualified as most suitable. As such, phase two starts where phase one concluded (see map 5.5 above).

*“So, phase two is the phase of selection of zones and the formation of a comprehensive landscaping project on the entire territory. So, it is an outline of all the wind farms around that are important to consider ... to see where the zones that are already available on the neighbouring territory ... There was a zone here, and there were neighbouring territories, we said that it was a little close, because when you go through the territory, you will have a succession of zones one behind the other”* (Int. Plichon, my translation).

Thus, avoiding any so-called ‘sprawling-effect’ is a central element of this particular phase of the project, and it starts by summing up all nearby wind power installations (Airele 2006b). Therefore, nearby wind power installations are added to the concluding map of phase one,

which allows an overview of the parts of the territory that may eventually become wind power development zones.

*“As a result of the analysis under phase one, the superposition of the human, ecological and landscape issues have allowed the identification of the unfavourable zones as well as the potentially favourable zones for the implementation of wind power parks” (Airele 2006b: 15, my translation).*

The next step revolves around the ‘intersection point’ between the technical objectivity of phase one and the underlying politics. This part of the process is described by the engineer of Airele as:

*“Really difficult ... the first phase is very technical, we collect data, we superimpose layers, we get the emerging zones, etc., I mean, it is very objective, very methodological, very Cartesian, we move forward like that. But the second phase where we will enter the consultation process, it is much more delicate, it is hard to accommodate all the expectations and make ends meet, which is why there is a job beyond the environmental technicalities, it is really a job of consultations, chairing meetings, debates, etc., ... It is extremely political, that is for sure” (Int. Plichon, my translation).*

He mentions that a recurring problem is that when presented with the potential zones (i.e., the white areas without constraints), the local politicians of the CdC insist on retaining and proposing all of the zones to the prefect (this was, however, only to a less extent the case in the CdC du Pays de la Serre). This is *“theoretically impossible”* (Int. Plichon, my translation) because often the zones ‘compete’ among each other, i.e., the acceptance of one zone becomes a constraint on another zone. As such, the emerging zones themselves become constraints on other potential zones, not least because the ZDE instructions mention the need to avoid ‘sprawling’ effects (La Ministere de l’Ecologie et du developement Durable 2006).

As Plichon continues his description of the process, the dynamic between technique and politics becomes further elaborated. As he flips through the maps as they are layered, an area outside of the village Marle is marked in yellow, i.e., having some constraints as a potential wind power development zone, and then eventually turns out as white in the concluding map.

*“Here we take into account the landscape criteria and that is why it is yellow here, because we take into account the landscape, because otherwise it would be white. Why it evolves from*

*that map to that map, because we had a question from the mayor, who is also the chairman of the CdC, he asked us: there, you put the territory, which is a plateau, you put it in yellow, why? Because it has no other constraints than the landscape, but the landscape constraint is an intermediary constraint, because here we are in another type of typology of plateaus...it is a question of hierarchization, we relativize the zones, saying that one is much better than this” (Int. Plichon, my translation).*

Firstly, the favourability of the zones is relative; there will always be some zones more favourable than others, regardless of any so-called absolute favourability. In other words, the maps do not say anything about the overall favourability of the territory, simply the individual area’s relative favourability. Secondly, the dialogue between politicians and engineers is not simply a question of choosing between rival zones, but also a dialogue in which the status of the zones change from a zone with constraints to a zone without any constraints. Thirdly, the constraints are ordered hierarchically, which allows for the reordering of the categorization of the zone. All of this happens in dialogue between the consultants, the regional administration, and the local politicians:

*“Initially we had put in yellow, it was discussed in a meeting, etc. ... with the DIREN and finally we passed it into white after these discussions... consultation. Objectively, it is reworked through the opinions of everyone after the meetings, but it is not fundamental, it is not as if we were asked to move it in white ... it was ... it was rather through a shared experience, sharing the territory, or the vision of the territory that one may have. So these maps then are inserted in there to get to the final map of synthesis. That is why it's yellow here and white here” (Int. Plichon, my translation).*

Among the white areas of the map, three zones are retained. The remaining part of the process describes these zones in depth and proposes the organization of the turbines in the zones as well as the upper and lower limit for installed power in each zone (Airele 2006b).

### **The Final Proposal – and Democracy**

The final proposal, a 184 page document in itself, was prepared and sent to the DRIRE, who communicated it to the prefect as well as other involved institutions taking part in the decision-making process. This final proposal describes the ZDE as consisting of four sectors,

however, the report describing phases two and three only retains three sectors (Airele 2006b). Furthermore, an upper as well as a lower limit for the number of MW that could eventually be installed in the zones is fixed. In total, the ZDE is proposed at an upper limit of 129 MW.

Sector One: 30 MW

Sector Two: 33 MW

Sector Three: 36 MW

Sector Four: 30 MW

The addition of the fourth sector is only explained in the last pages of the description of the sector, which is presented in the proposal as follows:

*“This area was not identified as one of the most favourable, from a landscape point of view, during the preparatory studies. Indeed, the sector embraces several high points with offers an interesting views on the agricultural plains around it, even the hill of Laon”* (Airele 2007: 58, my translation).

In the closing section of the proposal, the addition of the fourth sector is stressed as something following after phases one to three of the preliminary analysis:

*“The CdC afterwards wished to consider the possibility of defining a sector around Montigny-sur-Crecy and Pargny-les-Bois. This sector four is not part of the most favourable areas of the territory, from a landscape point of view”* (Airele 2007: 65, my translation).

This phrasing seems to draw a line between the ‘objective’ outcome of the analysis and the politics of the location and size/numbers of zones. Furthermore, the status of the fourth sector as not among the most favourable is again stressed.

This final document frames the proposal of the ZDE around the three criteria described in the POPE law; namely, wind potential, grid connection, and the protection of the landscape. Also, a section on the activities of consultation and openness with the local population is included. The three main chapters of the proposal (Airele 2007; pp. 23-63) give a description of these criteria through which not only the added layers of constraints are made invisible, but the wider set of criteria deployed by Airele are not described even though they were essential to the work of defining the zones. Hence, what only took up very limited room in the detailed

analysis of phases one to three eventually comes back at centre stage as being the primary framing criteria for the ZDE.

The process of consultation is described in two pages; firstly as a process dating back to 2002, and secondly as including the following:

*“The actions led by the Community of Communes of the Pays de la Serre are diverse and complementary.*

- *Thus, several articles are often dedicated to wind turbines in the local information newsletters:*
  - *"L'Émi'Serre Express" for elected representatives;*
  - *"Pays de la Serre Magazine" and Hors Série intended for the inhabitants.*
- *Several press releases and public meetings have also been realized. The public meetings are organized around wind projects under development, on the territory of the municipalities.*
- *Articles are regularly posted on the Internet.*
- *The inhabitants of the area are invited to participate in free visits to the wind farm of Clastre, accompanied by a guide from the Tourist Office of St-Quentin (30 tours available)” (Airele 2007: 14, my translation).*

Thus, the consultation realized by the CdC mainly took the form of written information in local media. Public meetings were not organized to discuss for or against the creation of a ZDE on the territory, but at one occasion a specific development project, with a concrete developer behind it, was made the subject of a public meeting. Consultation is not discussed as such in the reports of Airele (2006a and 2006b), but the communication of wind power development on the territory is thoroughly documented in an appendix to the final proposal, where all articles and notices from a range of media are presented (Airele 2007).

The maps dominating the final proposal are thus illustrations of the electrical grid presented in relation to the proposed zones (see Map 5.5 above) as well as the wind potential in the region (Map 5.3 above). The final proposal is thus a return to the three criteria without making any mention of the detailed analysis based on adding layers of constraints.

### 5.3.3 From Maps to Landscape: A Visit to Autremencourt – ‘a Corner of No Interest’

In June 2008 I visited the small village of Autremencourt, where one of the zones was to be situated. I met the mayor of the village, Dominique Potart, who insisted on driving me around to visit the area. Once in the car, he immediately tells me that he was born in the village – his mother did not get to the hospital in time, so this is truly his village. Our first stop is the site where the turbines are to be constructed. From the hill where the turbines will eventually stand, we can see the village of Autremencourt as well as the neighbouring village. Describing the location makes Potart comment on his and the neighbouring village:

*“If they should have been closer to our village, I would have said no to the project... Actually, I do not understand that the mayor of the [neighbouring] village accepted – had I been him, I would have made sure that at least some of the turbines were cancelled... As it is, it will seem as the turbines fall down on them”* (Int. Potart, my translation).

From the site where the turbines are to be constructed, Potart points to a hill close by and tells me that there used to be a windmill there where locals milled their grains. So the windmill ‘thing’ is nothing new around there, and he adds: *“By the way, it shows that it is a good spot for mills”* (Int. Potart, my translation). He also points to different areas of the landscape where hangars were located earlier; they were ugly and did not in any way look good on the land, but as such, the landscape has always been ‘embossed’.

Some years ago, tells Potart, the government invited all the mayors of the region to a meeting; plans had been made for a nuclear waste deposit in the region. The planned deposit was to be 800 meters underground. The area appointed was well suited, geologically, and it was said to be entirely safe. But the farmers did not agree. They were afraid that the land would become polluted, and that it would decrease the value of their properties. North of the village is a ‘retired’ nuclear power plant; it simply stands there as a ‘life-threatening sarcophagus’ – no one knows what to do with it. At least, it is guaranteed that the wind turbines will be dismantled once they stop working.

From the spot where the turbines are to be constructed, we drive off to the marshland, ‘Marais de la Souches’, nearly 3500 hectares and consisting of close to 1000 ponds. Potart indicates that the marshes have a unique fauna and flora and attract scientists from all over Europe. While we drive through the marshes, he repeats time and again: *“It is so beautiful around here”* (Int. Potart, my translation).

Back in the village, Potart points out Autremencourt's newly built houses. Since the wind power project was initially planned, Potart has informed all newcomers to the village of the project – but no one has changed their mind and abandoned their construction plans. And finally, one should not neglect the money that can be earned from hosting the turbines. Taxes are considerable: *“If it wasn't for the TPU<sup>46</sup>, Autremencourt could have put streetlights made of gold along all their dust roads”* (Int. Potart, my translation).

The visit at Autremencourt was a way of leaving the technicalities of the maps and moving into the ‘realities’ of the landscape. Potart emphasizes how the landscape has always had an ‘industrial’ element, and he continuously refers to hangars, windmills, nuclear power plants, etc., as being an integral part of the landscape. Potart seems to express an attitude towards the landscape that is highly personal and emotional, all the while being practical. Land serves other purposes than being recreational; it has historical and industrial elements too, something, he argues, that goes well with the construction of a wind park. He sums up by saying that people from outside often refer to Autremencourt as a ‘corner of no interest’, but he and the other villagers do not agree.

This approach to the landscape is partly explained as a ‘geographical’ factor by Lefranc, an engineer at DRIRE in Picardie:

*“When you are in the periurban [zone], we'll take Oise for example, you have a population that is francilienne, so these are people who work in the Parisian region and for them, when they come out [of Paris], they are very attentive to their environment, they even appropriate their environment, so their reaction is not the same – in terms of population. There is an easier rejection, an opposition to wind power, because it disrupts their environment. Meanwhile, in the rural areas such as in Aisne or in Somme, after all rural or less urbanized... the issues are different, the social perception, different populations culturally and socially”* (Int. Lefranc, my translation).

According to Lefranc, what the landscape represents is intimately linked to geography and/or population. In other words, the framing of the qualifications of the landscape are predominantly related to recreational dimensions in Oise and also include the land itself as a possible source of income in the more rural areas of Aisne and Somme.

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<sup>46</sup> The TPU (Taxe Professionnelle Unitaire) divides the tax income between the municipalities of the CdC.

## 5.4 Discussion

The emergent dynamic of the device, as described in the introduction as an effect of the two phases of the device fleshed out by Foucault, is one that translates the location into a variety of objects. To the developers, location is crucial to the economics of developing a wind park, and to them, location translates into both costs (grid connection, rent of land, etc.) and size of production (wind regime). The politicization performed by Durant makes landscape and national heritage the primary focus of attention, all the while distributing decision power and initiative to the locals. Debates in the parliament over centralization versus decentralization translate location into a question of grid capacity, particularly a problem in rural areas where the grid is prepared for moderate production input but also a question of energy system control. The second phase, where the device is transformed into a practice undertaken by engineers, is rather a process of qualification along well-defined criteria, each allowing the mapping of constraints. From this process emerges a representation of the territory in the form of a map that defines zones favourable to wind power. Here, location is translated into a technical object. Finally, to the mayor of Autremencourt, Mr. Potart (and probably many of his neighbours), the landscape is history, industry, and aesthetics all at the same time. Potart stresses the dynamic aspect of relating to the landscape; from windmills of the past, to future turbines, and the territory as a possible source of income. And these dimensions are not easily disentangled.

It is hardly surprising that location (and even more so landscape) may be translated into a variety of things, and that is recognized by the engineers as they constantly stress that landscape/territory is a subjective matter. But the fact that the ZDE is linked to the feed-in tariff as an obligatory passage point brings location, in all its shapes, to the midst of the marketization of wind power. With the ZDE, the different modalities of framing and qualifying location are connected and mediated through the practice of the engineers. These seem to reflect the distinction discussed in the previous chapter between value and values; the former being related to the transformation into a single currency, and the latter the subjective commitment/dedication of the locals to their environment. The politicization performed by

Durant seems to be built, at least partly, on the assumption that these two modalities of value will create controversies. However, it seems as if these different modalities co-exist peacefully. How this effect comes about is the subject of the next discussion, organized around the themes of the conflict between the framing of the device and the practice of the engineers – made possible through the plasticity of the device, and the tools put to use by the engineers – and finally a discussion of the effect on the economic agency of the developer.

#### 5.4.1 The Absence of Opposition

As an attempt at constructing a NIMBY figure through the ZDE-device by the framing of the landscape as values rather than value, the actual unfolding of a ZDE at the territory of CdC du Pays de la Serre does not seem to support, or reinforce, the attempt at creating an issue of concern. Though opposition is not entirely absent, it only plays a very limited place in the accounts. The group called ‘Vent de colère’<sup>47</sup> (Wind of fury) is mentioned a couple of times, but rather than being ‘born out’ of localness (as NIMBYism is generally said to be), it is referred to as a critique decoupled from the local context: “*I think that there were ... how to say, arguments that were actually the same and which can be found on any territory; saying that finally wind power, it is useless, it's ugly*” (Int. Vonfeldt, my translation).

One reason why the ZDE, rather than politicizing the landscape, seems to have almost the opposite effect, I suggest, has to do with the practice emerging around the making of wind power development zones. The dynamic of the device, referred to in the opening of this chapter as unfolding around two phases, consists of a specific framing of wind power established through the politicization, and the (unanticipated) ways in which it unfolds, and a process emerging once it is put to use (Dumez and Jeunemaître 2010). In the case of the ZDE, the practice of the engineers does not ‘open up’ the landscape to make it debatable and controversial (not least vis-à-vis its use as wind turbine territory). The process of accumulating layers of concern, each layer being a single variable, to finally present the overall favourability of the territory in a unified map seals off rather than opens up controversies and possible differences in views of the landscape. The first phase of analysis is undertaken without any visits to the field and simply by mapping constraints from already

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<sup>47</sup> ‘Vent de Colère’ is a national federation against industrial wind power in France.

available resources. These one-dimensional layers eventually translate the territory into a black-box because the succession of translations disappears in the final presentation of the zone definition. They become folded into the final presentation. The layering of constraints stands in stark contrast to the account of the local mayor, who presents the land as birthplace, living place, but also as having an industrial element, an account in which everything is woven into the multidimensional ‘site’ described by Nadaï; a state rather resembling the notion of overflows. In other words, the practice of the engineers may be an approach of narrowly framing the territory, but a framing that disappears when visiting those inhabiting the territory.

#### 5.4.2 Going Beyond the Device

The phases undertaken by the engineers of Airele are in many ways processes through which the territory is qualified as suitable, or even very suitable, for wind power projects. Whereas the regulation regarding the ZDEs underline three criteria for what constitutes a suitable territory for wind power projects, i.e., wind potential, grid connection, and landscape/monuments, the engineers rework the set of parameters that must be included:

*“So in principle, we should define the zones according to these three criteria ... however we realize once conducting the studies, that there are many other constraints on the territorial level that should be taken into account to refine ... the zones which are as relevant as possible... such as the constraints of civil and military aviation, for example ...”* (Int. Plichon, my translation).

Just as illustrated through the description of the processes performed by Airele, the three criteria are far from categorical, in practice, for the ZDE. Rather, at least two of them are disqualified as important to the practical work of drawing boundaries between suitable/not suitable wind turbine territory, both by engineers as well as those responsible at ERDF.

*“It is true that the wind resource is perfect, there’re no worries. The instruction criteria for a ZDE is set very low since the wind resource must be greater than 4 meters per second at 50 meters of height – for a wind turbine to be profitable, it must at least at 50 meters reach 5.5 meters per second, so they set the level rather low. But also because the atlases, we base it on atlases, and the atlases are very, very imprecise, so there is a market and therefore the wind*

*resource, frankly, it takes away the holes and then that's all that it takes away from areas where they would never go. Electrical connection, in fact it is not a true test since everything is always feasible to view electrical connection, simply put the cost so...*" (Int. Piedvache, my translation).

The criteria determining wind potential is, according to the engineer of ETD, too low to allow a profitable investment. According to her, the wind must be above 4 m/second at 50 metres. To her then, the criteria are fixed without benefiting the investment of the developer. In addition, the connection criterion is disqualified as being a question of costs. This is also raised by those responsible at ERDF. The local grid operator, answering the question whether the ZDE was not a way of facilitating or framing his activities of adjusting wind parks and local grid toward each other, states it thus:

*"Absolutely not! no! It does not facilitate mine or that of the project developer. Because before you could go outside the ZDE and look. Now he will be forced to look only in the ZDEs. Where there is supposed to be a potential grid connection. I say 'supposed', because the legislation says there have to be three criteria in the ZDE: (1) heritage protection, (2) wind, and (3) a possibility for grid connection which does not exceed seven years. But that is ... never would we answer that we could not to do something in seven years. So you will always have a potential grid connection. In a ZDE, always! We answer, and we do the work towards a delivery date in seven years"* (Int. Legrand, my translation).

The criteria are met if the connection work can be performed seven years from when the PTF (the technical and financial proposal) is signed. But ERDF or RTE would never refuse to make the necessary grid work in seven years. Having disqualified two of the three criteria defining the ZDE, the engineers at ETD and Airele have worked out, independently, another set of criteria. These criteria emerge from their work with developers<sup>48</sup>, i.e., their expertise in the more detailed work of making wind power projects. These criteria are rather found within the *code d'urbanisation*, and the accounts from the two engineering companies illustrate a certain similarity on the criteria enrolled in defining the zones:

*".... radars, weather, we also take into account, as we will see, the various constraints linked to the infrastructure of transport of energy or roads, the distances, to finally have the zones*

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<sup>48</sup> Both companies have worked on projects with developers including the more detailed analysis required in impact studies, etc. – i.e., requirements for obtaining construction permits.

*that are as realistic as possible. In fact, as soon as one has a case, as robust as possible, we already have the preparation for the impact study, because we do not define a zone, if we consider, for example, only the criteria of wind potential, grid connection and landscape. We would maybe define a zone that is burdened by other constraints, which then afterwards prevent wind power development to be carried out into projects... at the same time we must have some flexibility to allow for changes over time, because maybe future constraints will appear or the present constraints will change in the future” (Int. Plichon, my translation).*

The objective then is defining zones in the most ‘realist’ possible way, or in other words, framing the zones that have the best chance of becoming wind parks. These studies are referred to as something resembling an early impact study, a study that has generally been part of the developers’ job. As such, the engineers in the case studied here adopt a very thorough and meticulous approach, which goes well beyond the framing of the ZDE-device:

*“Here, these are the radars, the distance to habitats, the distance to gas pipelines. So in a ZDE we could as well have gas pipelines, power lines, all that can enter the ZDE, even though we will never have wind power there. We know we need certain distances, we could not put a wind turbine five meters from a gas pipeline. But the ZDE does not care about that. Therefore, we, and every other consulting firm, offer this first step to remove all technical constraints, because otherwise it is useless. We won’t do work to put wind turbines in valleys or things like that. Well, if we take the wind, the level of wind, we may remove all the valleys ... but in the Somme, after that everything else is good ...” (Int. Piedvache, my translation).*

The practice of the engineers followed in the Picardie thus seems to be very close to the ‘planning’ approach discussed by Nadaï: *“This method ... proceeds from abstraction as it extrudes from the territory a set of single-variable layers (e.g. natural space layer, roads layer etc.)”* (Nadaï 2007: 2716). Nowhere in the process performed by the engineers is the site approached as an open and multidimensional entity or one in which overflows are invited or encouraged to take on life.

### **5.4.3 Loosing Sight of Site**

Potart’s description of the surroundings of Autremencourt stands in stark contrast to the process of the engineers. His account defies any predefined framing of the landscape such as

recreational, aesthetic, or ‘natural’. To Potart, the region is beautiful; this he stresses throughout the visit, but it is also embossed historically and industrially. His account seems to stress the multidimensional nature of ‘his’ site. Meanwhile, the process of adding layers of constraints as an emerging practice for designing ZDEs seems to be a movement away from the site as an open process (Nadaï 2007), allowing or even inviting overflows, as such. It is a process undertaken in the offices of the engineers without visits paid to the territory. Rather, it is the added or accumulated result that is presented in which the added layers disappear, and therefore each layer of constraint, as well as its premises, is black-boxed. When the final maps defining the zones are presented, what is visible is simply the result of adding layers, however, nowhere are the layers accessible.

The specific aesthetics of the territory are only made a valuable parameter insofar as they are inscribed in regulation as sites to be protected, such as the city of Laon situated in proximity to the CdC. In other words, through the practice of the engineers, aesthetics become a quality defined in lists of ‘protected sites’ or even ‘tourist guides’ (Int. Plichon). The attachment of some inhabitants to their landscape as having a distinct quality, e.g., some inhabitants of the CdC “*felt that this particular large plateau at Marle should remain as it is – naked. And that the insertion like that, of vertical elements, would disrupt the landscape and it would lose its quality because of it*” (Int. Vonfeldt, my translation). But such attitudes are rejected with reference to their subjective nature: “*The landscape is very subjective. Everyone has their own notion of his vision of the territory, of his vision of the landscape*” (Int. Plichon, my translation), or “*however, I tell you that these are arguments ... one can judge that it is beautiful, or it's ugly. Me, I say that an agricultural silo is ugly, an agricultural hangar is ugly – yet they exist*” (Int. Vonfeldt, my translation). The ordering of qualities as either objective or subjective, then, depends on a site’s inscription in a set of well-defined lists, such as listings of protected sites or tourist guides, and only those ordered as objective are translated into constraints in the practice of zone-making.

The political element, in the sense of ‘opening up’ and making debatable (Barry 2001), in the siting approach as described by Nadaï, i.e., the potential co-construction of the site as an ‘in-the-making’, is sealed off during the process undertaken by the engineers. Finalizing the proposal includes presenting it to the locals during meetings open to all inhabitants of the CdC. These presentations are performed using maps, like the ones above, and present the

zones suitable for wind power development as extracted from the surrounding landscape. As such, the democratization called for with the present device restricts itself to one question only: Wind power or not? Questions of *how to* order a potential development on the territory are black-boxed when presented to the local population as well as the local politicians, as only the engineers know the criteria actually underlying the definition of the zone. What remains are white zones on maps, indicating the favourability in terms of wind power development and the ‘multidimensional messiness’ of the site, as Potart’s description is an example of, seems to disappear.

#### 5.4.4 The Map as Inscription and Objectivity

The map is the primary tool in the entire process of working out the wind power development zones, and it is central to the notion of objectivity continuously stressed by the engineers of Airele and the CdC. The map serves as a tool in the analysis and it provides the format for the collected data, and finally, it is a means of communication. The map is both an artefact and a fact: It is made by someone as a representation of the world, all the while enabling by affording us reality (Taylor and Van Every 2000). The representation constructed by the engineers at Airele is performed by means of a deconstruction of the territory into single-variable layers, and it is this practice that is central to their notion of objectivity, and as such, the practice and objectivity is closely connected: *“Unlike conduct books, maps don’t prescribe rules on how to see; they embody a set of practices. To read a map is to master a way of seeing by doing”* (Daston and Galison 2008: 667).

This objectivity of their practice of drawing the zones is constantly stressed by the engineers involved in the process of qualifying the territory and opposed to the politics of the local politicians as well as the inhabitants. The mapping of constraints starts with what is referred to as a ‘virgin landscape’ to allow an ‘objective’ qualification along the dimensions described above.

*“In fact, we could say that the whole territory was white initially – or we could say favourable to wind power development, and then after we added... topographically "well, this is not good, well there anyway, this is the centre of the village, we will not construct in the middle of the village”... then there are listed buildings, then we have the perimeter around the hill of*

*Laon, that disappears too. Then we have a beautiful mille-feuilles, and then finally through deduction, the zones which remain favourable” (Int. Vonfeldt, my translation).*

The reduction of favourable zones proceeds from the ‘white’ map towards a few white zones, and though the process is characterized as objective, it is an objectivity that is, at some points, negotiable. As discussed earlier, one zone is transformed from yellow (i.e., having some constraints) to white (i.e., being favourable to wind power), following the inquiry of one of the CdC’s mayors. According to Plichon, the status of the zone is discussed with engineers at DRIRE and eventually qualified as favourable.

But though the engineers describe the process as Cartesian or objective, they recognize that the object of the study, i.e., the landscape, might as well be founded on a subjective attachment:

*“Yes, that is it, we propose a territorial project argued on objective criteria, although sometimes, in particular in relation to the landscape, it is not always objective, because the landscape is very subjective. Everyone has their own notion of his vision of the territory, of his vision of the landscape. So, we give you our vision with an external view, because we are external to the territory – we are not from the territory. But then, the landscape is a parameter which is often debated, because everyone does not have the same vision of the landscape, everyone does not have the same vision of wind turbines; to some it is very nice, it adds value to the territory, to others, it distorts the landscape, sometimes even though it is a very banal landscape of agricultural plateaus, there are people who are very committed to this type of landscape, yet there are no specific concerns, there are no particular concerns. These are not landscapes that are identified in atlases or which are highly touristic or other. But the people who live there, they are attached to their territory in a manner and to them a wind project distorts it, so it's really a subjective vision, the landscape” (Int. Plichon, my translation).*

This kind of commitment to an otherwise ‘banal’ landscape, or as expressed by the mayor of Autremencourt, a ‘corner without interest’, seems premised on an attachment to a landscape resembling the singularity described by Karpik; stressing its multidimensional, quality uncertain and incommensurable character (for a similar account see Espeland’s (2001) account of the Yavapai tribe’s relation to the territory surrounding the Orme Dam). The existence of the multidimensional and incommensurability of the territory is acknowledged by

the engineers: In their approach, there is a constant awareness of this delicate balance between, on the one hand, the subjective attachment of the local population to their environment/landscape, and on the other hand, their own process of deconstructing the territory, representing and mapping the landscape, and defining zones of favourability.

#### 5.4.5 Reconfiguring the Assemblage?

As stressed in the introduction to this chapter, location is simultaneously a central cost component of a wind power project, and closely associated with the most common reasoning for the rejection of wind park projects. The framing of the ZDE-device addresses these vital, but quite different, aspects of location. It is therefore not an exaggeration if it is expected that the ZDE affect the economic agency of the developer. Any developer, who wants to be paid the price settled as feed-in tariff – and it is hardly possible to imagine a developer who does not want that – needs to look for a location within the ZDEs<sup>49</sup>. As such, the ZDE as a device bears heavily on the market organization. The socio-technical market assemblage is influenced by the constitution of the zones as obligatory passage points to the tariff. As already mentioned, criteria for assessing the suitability of a site are first and foremost wind regime, costs of grid connection, and proximity to habitation and dwellings (Int. Lebfèvre; Corvellec and Risberg 2007). These criteria, as well as the production capacity of the park, become defined through the ZDE. According to the ZDE-specialist from the local grid manager, fixing the limits of the ZDE is simplified by the engineering companies:

*“The upper limit [of the ZDE] is determined by the engineering company that makes the ZDE, which computes ... it's pretty impressive, actually... How can we do? Very well, here there are no constraints! Ok, we calculate, we put approximately one machine every 350 meters. Well, so I put one here! Another one here! And one there!! So I can put three machines, so the upper limit will be... since the average is two megawatts, well its three machines of two megawatts, so the upper limit will be six megawatts. And if the trend is machines with three megawatts, then the upper limit will be three machines times three megawatts. Here you go, nine megawatts!”* (Int. Legrand and Lamarre, my translation).

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<sup>49</sup> According to one developer, it is sometimes the developer who mobilizes and undertakes the creation of the ZDE (Int. Lebfèvre).

According to Legrand, with the introduction of the ZDE, the activities of the developer become premised on the local politics as well as the practices of the engineers defining the zones favourable to wind power development, something that he thinks is carried out in a rather dubious manner (Int. Legrand and Lamarre). Whatever experience and skills the developer may have built up, they seem to have been made redundant to some extent.

As such, framing the location of a development project is changed with the introduction of the ZDE-device. Whereas location may not be a good, per se, it holds certain similarities to the good: (Voluntary) transfer of property rights, matched by a monetary transfer and rather stable qualities (at least to the developer). Thus, recalling Caliskan and Callon's statement regarding the passivity of things, the study here suggests a somewhat more modest separation between different modalities of valuation, or at least an example of their co-existence:

*"... is it possible to conceive of one [market] in which goods are authorized to destroy this asymmetry of their own initiative and to contribute multiple suggestions of their own value or that of the agencies trading them? The answer is a resounding no, for it is the passivity of things that transforms them into goods, and that enables agencies to form expectations, make plans, stabilize their preferences and undertake calculations"* (Caliskan and Callon 2010: 5).

Maybe the 'resounding no' suggested by Caliskan and Callon could be replaced by a quiet and tentative yes, based on the case unfolded here. To the extent that the location becomes a central part of the 'good' of wind power, the case of CdC du Pays de la Serre suggests that rather different worlds co-exist. Potart illustrates how the proposal of the 'objectively' defined zones are accepted, but only as long as these can co-exist with his valuation of the landscape, which has stronger similarities with the singularity. He is not overtaken by the framing of the engineers, but accepts them: *"There used to be a windmill here"*, so it is well suited for the turbines. On the other hand, he would never have accepted the wind park had it been superimposed on the village (as is the case for the neighbouring village). These two modalities of valuing seem to peacefully co-exist without any pacification necessarily taking place.

## 5.5 Concluding Remarks

This study has illustrated that location is not a simple matter for wind power developers. Location becomes many things, depending on where, who, and how the framing and qualification is undertaken; it is a crucial element in the projects for wind power developers, it is the dwelling of locals, and it is an object of politics. The dynamic of the device, partly the effect of the two phases stressed by Foucault, is central to this outcome. The ZDE-device connects the different worlds, and as such, the initial framing of the device is not innocent; roles and responsibilities are distributed, e.g., the engineers do have to follow the guidelines of the device, local politicians are privileged in the role of initiators, and the price of wind power is premised on location inside a wind power development zone. These roles and responsibilities are delineated in the so-called first phase of the device. But the practice of defining the zones moves; in the case of the CdC du Pays de la Serre (as well as in two other cases followed), it moves well beyond the framing of the device; from the three conditions around which the ZDE-device is framed, i.e., wind potential, grid connection, and landscape/heritage, only the latter seems to be the criterion around which the zones are emerging. The attempt to unfold the layering of the landscape performed by the engineers, and its subsequent refolding in the final proposal, black-boxes the criteria invoked to undertake the layering. The landscape, which is often referred to as an entirely subjective matter, is transformed into a technical sketch made up of a considerable number of layers of intermediary maps of constraints. Through this process, one seems to lose sight of site, so to speak. This may well be referred to as an ‘objectification’ of the landscape, which seems to stand in contrast to the construction of NIMBYists, as described by the ‘father’ of the device, and as such, the second phase of the device, at least as it is performed in the case of CdC du Pays de la Serre, creates effects that may be seen as counterproductive to the conception of the device. The politicization of the landscape (in the sense of making it debatable), which led to the design of the ZDE, is transformed in the practice of the engineers involved in defining zones favourable to wind power development into something that seems closer to an economization of the territory (i.e., making it calculable by ordering and ranking it). As such, each of the two phases of the device, as defined by Foucault, are predominantly two opposed approaches to the territory, and consequently, two different proposals regarding the role location is to play to wind power development.

The ZDE is a central device in the market assemblage for wind power but only one element. The following chapter will address the links between the two devices of this study, the feed-in tariff and the ZDE, in order to discuss the (potentially) constitutive role they have in the larger market assemblage.

## 6. DISCUSSION

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From the detailed analyses of two market devices, this chapter will reconnect to the broader marketization programme, and more specifically the notions of politicization and economization. However, before doing so, I will briefly redraw the skeleton of the theoretical argument of this dissertation by recalling the work of Polanyi, and his claim that the ‘invention’ of the free-market springs from investments, often of a so-called political sort:

*“There was nothing natural about laissez-faire; free markets could never have come into being merely by allowing things to take their course. Just as cotton-manufacturers – the leading free trade industry – were created by the help of protective tariffs, export bounties, and indirect wage subsidies, laissez-faire itself was enforced by the state”* (Polanyi 1944: 145).

One implicit aspect of this observation made by Polanyi is that there might be something to be gained from focusing on the making of markets; i.e., the rendering of markets that are found in the marketization programme. Laissez-faire is an achievement, not a starting point. Moreover, Polanyi stresses protective tariffs, export bounties, and wage subsidies as mechanisms (or devices) enabling laissez-faire. This is not meant to suggest that the French wind power market is bound to move towards Polanyi’s laissez-faire modality, or that the political market label is simply covering a phase in a market evolution scheme. Rather than assuming any distinct result of the introduction of the devices, inquiring into the controversies unfolding around them, including their politicization and economization, demonstrates a third aspect of Polanyi’s quote; these mechanisms or devices are neither predefined, nor as to their content, nor to the effects they create.

One consequence of adopting the marketization programme, and the choice of the two devices as analytical entry points, is the visibility of the often-unsettled negotiations; controversies,

conflicts, and trials of strength, in the cases followed here, become a premise for studying marketization.

In this chapter, I will take the opportunity to revisit the distinctive elements of the marketization programme, and more precisely, the five framings of the programme. In doing so, I will stress how the two devices contribute to all five framings pointed out in the programme; they may simply be two devices among many, but they contribute broadly to the construction of the market. Then I will discuss the two devices as prostheses and habilitation, which will then allow me to elaborate on the economization and politicization unfolding around the two devices.

Finally, throughout the discussion, I will draw attention to the ways in which the empirical specificities of the two devices are enriched through the marketization programme – and vice versa.

## **6.1 From ‘Markets as Politics’ to Markets as Outcomes of Politicization and Economization**

Before moving on, I will briefly readdress some of the architectural elements of this dissertation and stress the implications of such an emphasis in relation to the theory of markets as politics as presented by Fligstein. To Fligstein, seeing economic markets and politics as ultimately connected, and stressed under the heading of ‘markets as politics’, is not the exception but simply the nature of markets. According to Fligstein, this has to do with the formation of capitalist markets as premised on state building (as also pointed out by Polanyi above) and also with intra-firm and inter-firm power struggles (Fligstein 1996 and 2001). To him, market orders build on specific and general rules, and the underpinning idea of this market order is embedded in any particular society – and reflects its distinct history. As such, the way of organizing the wind power good in French energy markets could be analysed as an institutionally/historically conditioned process, stressing, for example, the role and status of nuclear power to the French state and the organization of its energy system, and not least the role of the organizations charged with the system’s maintenance. But rather than granting the institutional setup the explanatory power of the unfolding politics in the two cases, and

thereby making the political a distinct way of ordering such a thing as the energy system (and determining a priori what one means by political), I chose to make the devices my unit of analysis. This has allowed me to follow the processes, of whatever nature they may be granted, as they are unfolded and refolded. In other words, adopting the marketization programme, and its focus on *the rendering* of markets, has allowed me to construct a somewhat different account of markets for wind power and to remain open to the effects of the devices.

One could argue that the issues addressed by the two devices belong to very different spheres; the feed-in tariff fixing the price of wind power, and the ZDE defining geographical zones in which wind parks should be constructed. However, qualifying one as more ‘economic’ than the other would be disregarding the possible effects of the devices, and rather stress predefined categories and assumptions of what it means to be economic. In other words, whereas most would easily agree that ‘pricing’-activities are at the heart of economics and economic markets, the analysis of landscape by engineers is something completely different. But the two devices bear effects on the marketization of wind power, e.g., by reconfiguring the market assemblage without any possible a priori differentiation between different spheres such as politics/economics.

### **6.1.1 Marketization as a Framework**

Whereas the marketization programme, and the market devices, may allow me to inquire into markets in the making, they also create detailed accounts that seem both incoherent and sometimes confusing. In other words, they have ‘forced’ me to pay attention to struggles and negotiations of modes of calculation, emerging engineering practices, and landscapes, just to mention a few aspects described in the previous chapters.

The marketization programme outlined in Chapter 2 has underpinned the study, but I have often restrained from referring to the programme in a literal way. However, as stressed in the opening of this chapter, the underlying approach of marketization is, as the conjugation of the word suggests, directed towards the process or activities which *render* something economic or make it into an exchangeable good. As part of this process, I argue that the two devices play crucial, but somewhat different roles, which I will elaborate on below. But before discussing

the two devices in more depth, I will briefly return to the strands of research to which the marketization programme speaks; first and foremost, the notion stresses the constructed nature of the market and thereby attempts to make up for the absence of theorizing on the origins of markets found in economics. Seeing markets as socio-technical assemblages and their obduracy as the outcome of continuous investments, and to a large extent emerging from the investments of economists, complements neo-classical economics. Though it is unlikely that many economists would believe in his/her existence, *homo economicus* may actually be constructed through the configuration of his/her network; of interest then are the ways in which he/she is constructed. But the marketization programme addresses yet another critique towards economic sociology by insisting that there is a ‘particular’ dimension to markets; they cannot be explained solely as socially embedded structures, which dissolve everything into social theory. In an attempt to drag out these particularities, we may return to the five framings central to the marketization programme; i.e., the framing of (1) goods, (2) agencies, (3) encounters, (4) price-setting, and (5) market design and maintenance, as discussed in Chapter 2. The two devices followed in this study together address all five framings, though not exhaustively. In other words, the two devices play a role in the five framings, but eventually these are outcomes of the larger assemblage that includes other devices, rules, grids, etc.

Framing goods: The efforts of settling a feed-in tariff for wind power is intimately linked to the qualification of the good, and the controversies unfolded during these negotiations include attempts at framing wind power as a renewable energy, a polluting energy (both in terms of CO<sub>2</sub>-emissions and qua its insertion in the landscape), fluctuating energy, and expensive energy, just to mention a few. These qualifications are made through associations between wind power and CO<sub>2</sub>-emissions, nuclear power, centrally organized energy systems, etc. As such, the stabilization of the good is sought after through its connection to different networks, rather than a set of stable and inherent qualities. Meanwhile, the introduction of wind power into the energy system also leads to attempts at requalifying other parts of the network; e.g., nuclear power may be framed as a sustainable energy, demonstrating a lower CO<sub>2</sub>-emission profile than many renewable energy sources. As such, the framing of wind power spills over and potentially contributes to the re-categorisation of nuclear power.

Framing agency: Agency in this study is at the same time performed through the devices, as well as the overall effect of the entire assemblage, and as such ascribes to the irreductionist approach (see Asdal and Moser 2012; Law and Moser 2012). Concentrating on the feed-in tariff and the ZDE allows me to see some elements of agency, whereas other elements may remain in the dark. However, one aspect of framing agency that should be stressed is the implications the feed-in tariff has for the economic agency of wind power production by setting the boundaries for profitability and efficiency, but more importantly, it is ridding the assemblage of yet another kind of agency, that implied by the tendering device which the feed-in tariff replaced. The tendering device allowed a very distinct approach to energy system planning; as mentioned, the tendering scheme allowed predefined boundaries to any project to be established by EDF, such as location and size in terms of capacity of the park, and prices were based on bidding. The replacement of the tendering scheme with the feed-in tariff was thus a reconfiguration of the agency, which was eventually seen as crucial to the development of the ZDE-device, i.e., an attempt at controlling the so-called anarchistic development of wind parks.

Framing encounters: With the ZDE, many dimensions of the encounter are made visible (in contrast to the mild critique by Caliskan and Callon (2010) towards Polanyi for repeating the classical doctrine of markets as the encounter between two blocs, namely, supply and demand): The ZDE frames the encounter between exactly these two blocs, but reconfigures the conditions enabling the encounter. For example, only projects within wind power development zones are eligible for the tariff, and as such, it re-organizes the encounter by introducing predefined geographical zones. Furthermore, the device is a preliminary organization of the encounter between turbines and grid as it delineates points of access in which the grid may be accessible, e.g., in terms of capacity. As such, the study of the ZDE-device unfolded in the previous chapter begins to respond to the invitations by Caliskan and Callon: *“In spite of the richness of existing scholarship, the various social or material technologies that play a part in structuring encounters still need to be recorded and studied in detail”* (Caliskan and Callon 2010: 16). The analyses of the two devices illustrate the many modes of encounters and allow an appreciation of the role of the encounter to the economization of wind power as well as their connection to the overall assemblage.

Framing price-setting: One of the main controversies is directly related to the feed-in tariff itself, and in particular the making of the tariff at a desk rather than in the market. This particular mode of price-making is problematized, pointing to the device as ‘faulty’ or flawed. As such, the device is not simply an instrument for price generation, but also becomes the arena for discussions of the ‘rules of exchange’ in the emerging market for wind power as well as acceptable profitability levels. Though the price is eventually settled, and transactions may be peacefully undertaken, many of these controversies remain, as the ZDE is an example of whether the ZDE-device is considered an attempt to construct NIMBYism (as described by Durant) or ‘simply’ address an existing concern of local integration of turbines. The ZDE reinforces the relation between turbines and their territory; an association that may potentially become problematic. As such, the ZDE both problematizes and frames the encounter stressed in the marketization programme.

Framing market design/maintenance: Eventually, this relationship between the two devices feeds into the fifth framing, market design/maintenance, which essentially is about the dynamics of the market assemblage (Caliskan and Callon 2010). With the study of fixing a feed-in tariff, or a price, for wind power, and the ways in which the valuation of the good leads to the proliferation of issues and controversies, as well as how ‘adoption’ of the device eventually leads to the design of yet another device, the ZDE may begin to illustrate some of the potential Callon ascribes to markets when referring to these as potentially ‘civilizing’ (Callon 2009). But whereas the ZDE seems designed to allow a certain local involvement to emerge, by bringing *consultation* of the local population to the forefront, it becomes as much (in CdC de Pays de la Serre) an engineered design for favourable wind power zones. Though the device seems to introduce a certain form of local democracy, quite the opposite seems to be the effect. In other words, even where a version of a hybrid forum (Callon et al. 2001; Callon 2009) seems to be sought instated, through the ZDE’s insistence on consultation of the local population, neighbouring municipalities’ involvement is not bound to happen.

Connecting the findings of the two analyses to the five framings of the marketization programme reflects the distributed aspect of studying marketization of economic goods, seen here via two devices, as argued in Chapter 3. Not only are the devices’ practices distributed over time and place, but their constitutive effects for the marketization of wind power are also distributed over the two devices – and probably many more. Whereas this distribution may

prove a challenge to the study of marketization, for example, where to go, who to talk to, which temporal traces to follow, and not least the exercise of following effects that appear to unravel in many different directions, they demonstrate the assembled nature of the market for wind power, and as such, they may be seen as a premise for studying marketization as a phenomenon.

In terms of contributing to the marketization programme, this study is first and foremost an empirical contribution that draws together a range of subthemes within this rather broad, and not easily delineable, field of research; values, market devices, singularization, and politicization and economization are all themes unambiguously connected to marketization, but the study at hand is rather stressing how these processes are intertwined. Furthermore, choosing an object such as wind power, as well as devices targeted at reframing wind power, (which may be qualified as a political good or political devices (e.g., Szarka 2007a)) rather than any 'conventional' object reflects an interest in cases where market failures are 'corrected' through deliberate market making. In the case followed here, the market-making efforts include vivid negotiations around the 'invisible hand' of free markets in contrast to an allegedly 'visible hand' of policymakers. This includes continuous attempts at drawing and redrawing the line between that which is economic and that which is political. Wishing to follow these negotiations, the notions of politicization and economization allow an appreciation of the making of the 'political' or 'economical' as they are unfolded in the devices. The gradual accumulation of devices may be a move towards such an end. From this perspective, we may see markets as assemblages that continuously grow or diminish, in order to address such emerging issues by constructing new devices to make issues 'accounted for' or internalize them. The two devices of this study are examples here of: The feed-in tariff as a response to demands for renewable energy technologies and part of a large sustainability discourse, and the ZDE, at least partly, a response to the effects of the feed-in tariff's so-called anarchistic effects.

Stressing the 'rendering' of the good into something exchangeable in a market, as marketization does, implies constantly paying attention to these negotiations. When adopting the device as the entry point to the study of the marketization of wind power, the device becomes the arena from which to inquire into these negotiations, addressing not only the good it may be designed to frame, but also the larger assemblage that it is made a part of.

## 6.2 Devices Between Prostheses and Habilitation

The feed-in tariff and the ZDE were both, as described in the preceding chapters, results of rather controversial political discussions that were fiercely debated in parliament. Both devices were the policy outcomes of these debates, and as such, it could easily be argued that they are very concrete responses to political issues. However, once made part of the wind power market assemblage, they step into a new career; they become *de facto* market devices as they organize agency by redistributing roles and responsibilities between existing and new actors of the market, as well as reformulating the conditions of efficiency and profitability. That means that both devices being the objects of study throughout the preceding two chapters may be seen as born out of attempts to make a political issue, and after a range of negotiations between politicians and bureaucrats, they become part of a market assemblage. It is primarily this career of the devices, and the association between wind power as a good and climate change, that underlie the nomination of the label ‘political markets’ referred to in the opening chapter. From this point of view, the two devices may simply be seen as facilitating a desired development of renewable energy by compensating for failures in the existing electricity market. However, from the approach adopted here, the devices have agency, and choosing to inquire into the (re)organization of the market through the devices is founded on an interest in *how* this particular market activity is being instantiated (McFall 2009). One criticism of this approach could be that it effaces that which is political of the political market, or that it transforms political action into apolitical description (*ibid.*). Why I believe this not to be the case will be discussed in the remainder of this chapter by addressing an (implicit) qualification of the devices as prosthetic or habilitation, as well as the processes of economization and politicization unfolding in the two devices.

### 6.2.1 Prostheses and Habilitation

Following the two devices of this study, the ways in which they are constantly related to the existing market configuration as a means of helping or repairing certain obstacles associated with wind power development has been predominant. Therefore, one way of talking about these devices, an approach that bridges more traditional economic approaches from which the

notion of the political market may refer as well as the approach adopted by Callon and others, is seeing the devices as ‘prostheses’ (Callon 2008). Inspired by the literature on ‘disability or handicap studies’, the following quote demonstrates how Callon may see the fertile grounds to be found in the handicap literature with regard to the studies of markets:

*“The forms and nature of handicaps are multiple. Some are qualified as mental and others as physical; some are accidental and others congenital; some are evolving and others stable. Agreement has gradually been reached on the idea that handicaps are not (only) linked to individuals themselves: they also stem from the relationship between individuals and society. A handicap is not located exclusively in the handicapped person, even if the two cannot be entirely dissociated; it is synonymous with maladjustment”* (Callon 2008: 42).

Extending these ideas to the devices developed to assist wind power in succeeding in the market as an economic good, I will argue that the sources of the handicap as distributed between the socio-technical assemblage and the good (rather than the individual) are taken even further in the case analysed here (and in many other markets for renewable energies): Wind power as a maturing technology, with emphasis on the move *towards* maturity, i.e., acknowledging its status as presently immature and thus locating the *handicap* in the technology itself. On the other hand, as also stressed elsewhere in this text, recognizing the failure aspect of the markets, e.g., in accounting for the pollution of fossil fuel energies, seems like an approach that locates the handicap in the market organization rather than the technology per se<sup>50</sup>. The Stern report referred to global warming as the 20<sup>th</sup> century’s biggest market failure, pointing to the absence of internalizing CO<sub>2</sub>-emissions in fossil fuel technologies.

Addressing the different strategies potentially developed to ‘repair’ the disabled, Callon points to two different types of policies: prosthetic and habilitation policies (Callon 2008)<sup>51</sup>. Considering the two devices of this study, I want to argue that they may be seen as both

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<sup>50</sup> Those critical of market organization in general, as a means for optimizing the distribution of resources, would then adhere to the latter attitude, namely, that the way of organizing the good appears to be the source of the problem – not the technology itself.

<sup>51</sup> Callon’s discussion of prosthetic and habilitation policies are directed at individual agency, and the emergence of what he calls *homo economicus 2.0*, an economic agent located somewhere between *homo economicus* and *homo sociologicus* (Callon 2008). The discussion here does not centre the individual, but rather the good; nonetheless, I believe that the two notions enrich the different roles the two devices may be performing.

prosthetic and habilitation and then briefly address the implications this has for the kind of politics they imply.

Each of the two models is linked to a distinct “*distribution of the sources of the handicap and hence the origins of the weakness it causes*” (Callon 2008: 43). According to Callon, prosthetic policies, building on the conceptualization of the individual as the source of the disability, aims at equipping (repairing) the individual through attempts to restore the lacking competencies. Habilitation, Callon says, works in the opposite direction: Starting from the ‘outside environment’, it shapes devices, procedures, and so on, with the objective of including the disabled (ibid.). Callon concedes that the models are not exclusive, and overlaps are bound to happen; however, what I want to stress in the following is how the devices are simultaneously framed as both prosthetic and habilitation policies by different spokespersons.

The feed-in tariff: Considering the feed-in tariff as a prosthetic device would imply equipping or ‘repairing’ the good, which is seen as ‘disabled’ or simply immature, so that it is allowed to survive in the market. Making a price for wind power, the prostheses attributed to wind power are premised on the relation between costs and price; the price paid for electricity in France (as for most other countries) was considered too low to allow wind power to develop, given the costs of the technology. Or in other words, the cost of wind power does not allow it to compete directly with existing technologies, which have benefitted from learning effects and mass production (Menanteau et al. 2003). Therefore, the survival problem was pinned down to be a consequence of wind power technology, and thus the prosthetic model described by Callon. However, the recognition that wind power is to survive in a world of failing markets, i.e., their inability to take into account or internalize the costs of the externalities they produce (e.g., the costs of CO<sub>2</sub>-emissions), is also present in the device. Adopting this perspective, the source of the problem is not the costs of wind power, but rather the costs of competing technologies not reflecting the environmental costs (ibid.). As such, the device may target wind power, but as a way of correcting/repairing disabilities elsewhere. Here, the device is seen as a response to a weakness in the outside world, i.e., external to wind power technology, and therefore closer to the habilitation model described by Callon. Therefore, the distribution of sources of the handicap targets both the technology as well as to its environment. As such, the device is folded around both the inefficiency of the technology as well as the failure of the market it must compete in, i.e., its environment. It is both prosthetic and habilitation.

The ZDE: The ZDE may be analysed in quite the same way; on the one hand, it is argued, at least by some, to be a device that overcomes the obstacle of local opposition, identified as one of the major hindrances to the further development of wind power. As such, the ZDE may be seen as a prosthetic device compensating for the potential ‘pollution’ problem perceived by those living nearby a wind park. Here, the ‘inherent’ properties of the technology, such as noisy, tall-structured, and shadowy, are seen as the source of the weakness, calling for a device to allow for wind power’s insertion into the landscape. On the other hand, the ZDE allows the locals to become participants in the framing of the energy future of France, to put it boldly. Enacting and empowering local communities to invite wind power projects into their region seems to evoke not an opposition, but rather an invitation to overcome the potential effect of NIMBYism. As such, the ‘disability’ is equally located in local communities objecting to the development of wind power on their territory.

It could thus be argued that the two devices are framed as both prosthetic and habilitation policies, arguing for their own existence as both a means of repairing wind power as well as repairing the conditions for competition between renewable energy technologies, and more mature energy technologies, by compensating for the externalities created by the latter technologies.

The devices, whether framed as prosthetic or habilitation policies, aim at equipping wind power in such a way that it may be able to act as a ‘comparable’ good – but they are only two devices among many, which are put to play in order to discipline, organize, and make wind power behave/be controlled in the same way as other forms of energy. Many of these may be seen as prosthetic in the sense that the:

*“...capacity for action (which is, as any action, distributed) imposes a very specific model in which the individual is autonomous to the precise extent that, in a disciplined way, she follows the course of action allowed by the prostheses and inscribed in them...”* (Callon 2008: 44).

Other devices aim at disciplining wind power as electrons and make them compatible with an energy system organized around central production units constantly made to match demand. On a visit at RTE’s facilities in Lille, I was shown new forecasting tools under development, and their potential role as facilitating the introduction of more wind power into the grid was stressed. New equipment or tools are constantly developed to address some aspect of inviting

wind power into the energy system, often by making wind power behave as any other form of electricity. As such, the market assemblage in which wind power is configured as an economic good is an assemblage constantly changing its morphology, and the inclusion/exclusion of devices may bring wind power closer – or further from – the framing as a disabled good. The two devices addressed in this study have both been stressed as crucial to the development of wind power in France, but they are both made part of a larger assemblage that combines a long and very heterogeneous range of devices, which may eventually create other obstacles or opportunities. For example, the introduction of the feed-in tariff was expected to create a radical increase in wind power development, not least because the feed-in tariff was ascribed success in Denmark, Germany, and Spain (Szarka 2007a and 2007b). However, the ‘wind rush’ was not realized (Szarka 2007b; Nadaï 2007). To Szarka, this effect may be explained by:

*“The wider policy lesson from the French case is that it is inadvisable to focus narrowly on a single policy instrument – such as the feed-in tariff – since the settings, the contexts of usage and the relevance of mobilizing discourses are as important as the choice of instrument”* (Szarka 2007b: 331).

In the perspective adopted here, the market device, i.e., an assemblage being part of a larger market assemblage, for wind power implies that the agency/effects of the device may disappear in the politics carried by other devices in the larger assemblage.

These devices extend the market by enlarging the associations of the network with several elements; firstly, the tariff is defined by the DGEMP but as the result of a working group, which consists of a range of actors. Secondly, the ZDE makes the engineers drawing up the zones as well as the CdCs important actors of the market assemblage. Furthermore, values associated (and negotiated) around figures of sustainability, compatibility with the remaining energy system, and turbines as potentially polluting get dragged into the space of calculation and become part of the trials of strength which combines different modalities of calculating. In other ways, it becomes a market space *“built in a way to include goods, and the practices of actors that have previously been situated outside of market exchange”* (Sjögren and Helgesson 2007: 236).

Acknowledging that the devices are simply parts of the larger market assemblage, however, also has implications for how we may conceptualize the idea of prosthetic and habilitation

policies (or devices). Insofar as we consider efficiency as an effect of the network, the prosthetic character of any given device is premised on the distinct configuration of the individual assemblage it is made a part of. In other words, a device may be prosthetic in one network and habilitation when associated with yet another network. From this point of view, mobilizing the concepts of prosthetics and habilitation as done here invites us to see the politics of any network, and as a consequence, the idea of the political market seems to lose its meaning, at least when juxtaposed with its assumed counterpart, the free market.

I believe that this is one of the strengths of making the device an entry point to the inquiry; the larger arrangements that the devices are ‘added’<sup>52</sup> to are not given simply as contexts or used to explain the creation of the devices; rather, they are enacted and brought into being (Asdal and Moser 2012), and as such they allow us to address the otherwise black-boxed network to which they add. Through the devices, we are prompted to follow the negotiations and problematizations of these black boxes, something that may be studied as processes of politicization and economization.

### **6.3 Between the Politicized Price and the Economized Location**

Choosing the perspective of the market, and thus the insistence of referring to the devices as market devices, obviously has the potential of creating a bias in the analysis towards certain effects created by the devices; namely, those related to market (re)organization. But because the notions of economization and politicization do not discriminate between the issues they act upon, profitability levels may become politicized and CO<sub>2</sub>-emissions may be economized. In other words, profitability is not simply an aspect of economics, it may be made debatable and problematized, just as much as CO<sub>2</sub>-emissions may be translated into a calculable aspect of wind power economics.

In Chapter 5, I discussed the conception of the ZDE-device as an attempted politicization of wind power, a process in which three concerns associated with wind power were evaluated according to their potential public appeal as matters of concern. The conception of the ZDE may be seen as an enactment of the politicization in the sense that it seeks to instate:

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<sup>52</sup> What Asdal refers to as a ‘philosophy of adding’ (Asdal 2012).

*“processes, situations or modes of actions in which the arguability of issues is emphasized and in which, consequently, decisions and resolutions are exposed to their political determination”* (Muniesa and Linhardt 2011: 555).

The arena defined in the ZDE for this political determination is situated among local politicians and local populations. At least three moments are created in which this politicization is encouraged to unravel in the process defined by the ZDE: Firstly, the wind power development zones must be proposed by inter-communal cooperation, which conditions a certain agreement of a large number of neighbouring municipalities. Secondly, the department prefect must validate the zones. This has proven to become an obstacle in some departments where the prefect has been reluctant to validate wind power development zones in general. And thirdly, elements of dialogue or consultation with the local population must be undertaken and eventually demonstrated in the final proposal.

Nonetheless, the ZDE turned out to work not quite as intended, at least by Durant, and a large number of wind power development zones were validated soon after the adoption of the device. Durant acknowledges that the ZDE did not put the breaks on wind power development, and that the ZDE did not reinforce, or even create, local opposition – or NIMBYism. One reason for this, I have argued, at least in the case of CdC du Pays de la Serre, has to do with the emerging practice of the engineers; a practice which might be better described as a process resembling an economization of the landscape; i.e. *“as an aspect of practices, procedures and activities in which the calculability of things is put forward and in which, accordingly, action is subjected to optimality and hence made prone to economic assessment”* (Muniesa and Linhardt 2011: 555). Though it would be a stretch to refer to the engineers as performing an ‘economic assessment’, the process bears strong resemblances to this type of assessment: The process of breaking down the landscape according to single-variable layers, and measuring distances from a given spot of interest, such as the medieval city of Laon, to eventually add the layers of constraints, allowing the rationing of the landscape according to the favourability of the distinct zones. Though no economic metric is extracted from the practices of the engineers, the process enables an evaluation of the relative appropriateness of a given zone as to its favourability in terms of becoming a wind power development zone. Also, the practice described by Plichon, the engineer in charge of the process in CdC du Pays de la Serre, defines a rather specific distribution between the

‘objective’ delimitation of favourability, what I refer to as economization, and the politics of defining zones: Only when there is an excess of favourable zones are the politicians consulted and asked to enter into negotiations of selecting a limited number of zones. Eventually, at least in the case of the CdC du Pays de la Serre, the economization performed by the engineers seems to be stronger than the intended politicization of the device. But the case illustrates how two phases of the device (as stressed by Foucault) may become opposing forces as they act upon their object.

To Durant, choosing to adopt a feed-in tariff is ‘truly’ a political choice: *“I do not think anyone has ever really asked the question ‘is this [wind power] good or bad’ and even today, I do not think this is the case”* (Int. Durant, my translation). Rather, it is the exact opposite of an economic logical reasoning that he and Poignant are proposing:

*“That is what we are trying to say here in the report [Poignant 2003], if we apply a purely economic logic, it encourages ... the question becomes why you encourage it [wind power]. We can reasonably say that the main argument is still CO<sup>2</sup>, and therefore I have always found it surprising that no one ever started with a reflection on the economy of CO<sup>2</sup>, or how many tons of CO<sup>2</sup> were saved by the wind turbines. From this point of view, the analysis of Serge Poignant, the general argument is to say: there is Denmark or Germany, where you had a production regime, originally, you had a regime of production chains dominated by fossil fuel technologies and which are highly polluting. You choose to support wind vigorously, when you do, it has two advantages, the first is that the production is clearly entirely replaced by a clean production, so there is a gain in CO<sup>2</sup> which is crisp and clear. Moreover, it is the first countries, chronologically, and therefore, it allowed them to build an industrial machine production as we see it today... those two countries are leaders today in the European production [of turbines]”* (Int. Durant, my translation).

Durant argues that the decision to favour the development of wind power may easily be economized – only it is not. Translating wind power into a question of decreasing CO<sub>2</sub>-emissions allows an economization of the French electricity system, which demonstrates the uselessness of wind power (see also CRE 2001). The crux is the translation of wind power into a non-emitting technology rather than a renewable technology, which could address issues of uranium extraction and nuclear waste as part of the calculation.

From this point, the decision of adopting the feed-in tariff is purely political in the sense that wind power is promoted as part of a fight against nuclear power; as stressed by Durant, wind power supporters are merely nuclear power opponents. As such, one could see the feed-in tariff as a politicization of electricity production in France; i.e., a way of making electricity technologies a debateable issue.

To Durant, yet another problem is the fact that any price made ‘at a desk’, such as the feed-in tariff, and not in the market is unlikely to reflect the costs of production, and in this case, the costs of wind power generation. As such, he draws a clear distinction between the ‘market price’ and the ‘tinkered price’ (as any price made at a desk, he says, is bound to be either too high or too low). This attitude illustrates the ‘moralization’, which “*relies on the elevation of purely economic criteria such as efficiency or profit making to the status of moral value*” (Fourcade and Healy 2004: 1421). The problematization of the price is shared by CRE, but it takes different forms: Durant and Poignant simply deny that ‘desk-made’ prices can be made to reflect costs of the projects and thus generate acceptable profits for the project developers. The economists from CRE, on the other hand, (re)calculate and compare profitability levels to the proposals made by Chabot or eventually DGEMP. In other words, Durant and Poignant stress the idea of calculating prices as debateable (and as such, the feed-in tariff device itself), contrary to CRE, who stress the actual ‘number’ as faulty rather than its source. To CRE, the problem seems to be posed on the distinction between ‘good’ versus ‘bad’ economics; Chabot’s and DGEMP’s calculations belong to the latter category, and their own calculations belong to the former. In other words, Durant and Poignant’s refusal to calculate and the calculation by CRE serve the same purpose; namely, to problematize the feed-in tariff. To CRE, the calculated demonstration that the tariff leads to profitability levels way above average is not a proposal to simply lower the tariff; rather, it is used to suggest the dismissal of the feed-in tariff and make all wind power development projects be the result of EDF initiated tendering processes.

The device as prosthetic, and thus the implication that the source of the handicap is located in the technology rather than the failure of markets, allows the politicization of wind power vis-à-vis its role in the French energy system: Does wind power lead to a decrease in CO<sub>2</sub>-emissions? Is it ‘cleaner’ than nuclear power? Or does it in fact increase CO<sub>2</sub>-emissions from the French energy system? The feed-in tariff, and thus the making of a price for wind power is

made the arena in which these issues are opened and problematized, and they are intimately linked with the idea of the device being a prosthesis: Why support an inefficient technology if it has no positive effects? In other words, it is the need of prostheses that is made part of the disqualification of the technology.

Eventually, a price is fixed. But the making of the price is black-boxed to some extent, though admittedly the different valuations discussed in Chapter 4 were all considered in the price-making. And this seems to reinforce its status as a ‘political’ number rather than an ‘economic’ number. Making the calculation invisible leaves questions of what has been taken into account unanswered.

This brings me closer to the counterintuitive conclusion that the feed-in tariff, and the negotiations around it, is closer to politicization, and the practice of the ZDE to economization. Dissolving the distinction between politics and economics as two distinct spheres, and rather stressing the importance of economization and politicization, allows us to see these devices in a new light; fixing a price as a process of valuation gives rise to a range of often-conflicting values that need to be negotiated. On the other hand, though starting as a device for politicization, the ZDE, at least as it is practised in the CdC de Pays de la Serre, seems closer to the idea of economization, a process of closing down and making everything measurable – even the landscape.

As processes, economization and politicization are constantly ongoing, sometimes intermingled, and at other times very pure. This discussion also demonstrates that the two concepts are difficult to handle because the objects they address, i.e., the objects that they make arguable or make apt for rationing, constantly shift. The politicization of wind power may be positioned on its association to CO<sub>2</sub>-emissions as calculable benefits (or lack thereof), its role in the electricity system, its effects on the landscape, or its association to the prosthetic device, i.e., the feed-in tariff. Politicization may thus be unfastening distinct elements of the particular network and be making it debateable; sometimes by calculating the association between wind power and parts of the network – at other times refusing the calculability of the same aspect.

The political market in light of the above discussion emerges as a more complex assemblage in which the ‘political’ becomes an effect of constant ongoing efforts of framing elements of wind power development, e.g., the location of the installations, and at other times wind power

per se, or eventually pointing to the flaws of the context into which it is introduced. Accordingly, qualifications of the devices as either prostheses or habilitation points to the distinct configuration of the socio-technical assemblages and processes of economization and politicization.

Seen from the perspective of politicization and economization, the political market may simply be seen as a market in which attempts at politicizing the good has stabilized to a degree that some aspects of the ordering of market exchange must be dealt with, or has become premised on politics in some way. And these may, in turn, become translated into specific devices added to the assemblage.

#### **6.4 Unstable Assemblages – Telling Stories**

Whereas there might seem to be a certain stabilization of the devices' association to politics in some way, the studies of the two devices constantly remind us of the unstable character of their network. One way of discussing this stability is through the notion of weak or strong convergence in a network (Callon 1991). A convergent network is one in which activities, despite the heterogeneity of its putative actors, fit together, and where actors may “*mobilise the skills within that network without having to get involved in costly adaptation, translation and decoding*” (Callon 1991: 148). But such strongly convergent networks, Callon stresses, are only likely to come about after large investments over long periods of time (ibid.). As this study has shown, the assemblage of a market for wind power is rather one in which a proposed translation is met by counter translations, and the introduction of one device leads to the making of yet another device. In this way, actor identities and roles are questioned, and the mobilisation of other parts of the network may be difficult to sustain. Such a weakly convergent network is a description not unlike the market assemblage for wind power, and more specifically, the two devices studied here. As also discussed in the methodological reflexions (Chapter 3), an account of such a network should strive towards ‘telling the story’ rather than risk simplifying (and possibly quantifying) and thus betraying the state of the network. Stressing valuation as involving five different, and to some degree conflicting, figures of value, as well as the opposing modalities for calculating fairness and efficiency,

demonstrates the empirical variation in valuation approaches and practices. The result is thus a description of controversies, attempts at reconfiguration, or detailed descriptions of engineering practices; activities which are all difficult – if not impossible – to summarize and simplify in a once and for all manner.

However, this is not meant to suggest that the market devices and the wind power market assemblage will remain weakly convergent networks; as Callon indirectly suggests, and what also seems to be implied by Polanyi's comment on the notion of *laissez-faire* outlined in the opening of this chapter, continuous investments over time may bring the assemblage closer to convergence, e.g., the variation in valuation practices may be reduced to a single criterion that is well accepted by (all) actors in the network. In that case, the studies presented in this dissertation would rather serve as an illustration of the work and controversies, which may eventually lead to the achievement of a convergent network. Such a convergence is a possibility but far from an inescapable future.

In many ways, the (weak) convergence of the market assemblage for wind power may be related to matters of concern. As demonstrated, the valuation of wind power evolve in close relation to concerns (such as global warming), and new concerns emerge (e.g., concern for the pollution of the landscape). Furthermore, the ZDE is framed as a response to concerns, and it provides a space in which these may be raised. This leads me to one final question, namely, whether the case studied here bears any resemblance to the 'civilizing' market described by Callon; i.e., a market which is at the heart of producing and resolving matters of concern, as well as a market which combines devices that used to be attributed either to the economy or to 'expression and political action' (Callon 2009). For such a 'civilizing' market to exist, and for issues to be raised and eventually 'be taken into account', strong convergence, I argue, is unlikely to be the state of the network. It implies openness towards new actors as well as towards the translation of issues into, for example, new criteria for valuation. Central to the civilizing process is the emergence of 'hybrid forums' (Callon et al. 2001) or concerned groups (Callon 2009) participating or contributing, either through problematizations of existing markets or their suggestions for designs of emerging markets, which appear to expand the boundaries of groups involved in making market designs and their maintenance. In many ways, as demonstrated throughout this study, the making of a market for wind power does exactly that. Nonetheless, I am hesitant to describe the market for wind power as a

civilizing market; not as a description of the distinct market studied here, but also because of what the term seems to imply.

The normative dimension the depiction appears to suggest, and its implication as a new category of markets, seems to fall into a somewhat similar trap of reproducing the critique, raised by Callon himself, of the new economic sociology; namely, to expand sociological explanations to all kinds of orderings, including those of the market (and thus embedding economics in sociology). In other words, it seems to propose that marketization has the potential to be a possible solution to a range of matters of concern, such as climate change, which extends the ordering of exchange of distinct goods<sup>53</sup>. However, the adoption of the marketization programme prompts us to inquire into these matters of concern, which emerge in relation to the markets we study, and the politicizations and economizations through which delineations between spheres and their responsibilities are drawn. Making these processes a characteristic of an emerging kind of market is maybe as much an effect of our methods and materials, as argued in Chapter 3, as a new reality. As the discussion by Polanyi in the opening of this chapter reminds us, the free market in which cotton manufacturers engaged in exchanges found its origin in protective tariffs and wage subsidies (devices not so unlike the devices of this thesis) and could possibly have generated concerns of their own.

Finally, and this has to do with my reluctance to use the term ‘civilizing’ in relation to the specific case studied here. The study of the feed-in tariff suggests that one significant concern emerging from the valuation is related to the perceived ‘merits’ of economic markets from a neo-classical perspective; namely, deregulated markets as providers of optimal resource allocation – and not least that the optimum is distorted by the introduction of prosthetic devices such as the feed-in tariff. Seen from a constructivist perspective, it is hardly a civilizing quality of a market that this abstract figure of the free market still roams around, no matter who its protagonists are, neither when put forward by economists, nor by concerned agents outside of economics. Instead, I would stick to the description of the market for wind power as a negotiated, and thus, at a minimum, a quasi-political market.

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<sup>53</sup> Though I believe that Callon’s civilized market is something rather different from what Keynes meant to propose when he commented that economists are the “*trustees, not of civilization, but of the possibility of civilization*” (from Fourcade and Healy 2007: 14.3), it still seems to privilege the economist and his practice.

## 7. CONCLUSION

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Let us now briefly return to the place we started; Herning in the mid 1970's. Many of the discussions over the preceding pages have demonstrated some of the work that goes into the marketization of wind power. Though the experiments of Christian Riisager demonstrated that electricity produced from a turbine could be injected into the grid simply by using an existing outlet in Riisager's home, these efforts did not construct an economic good. To him, the turbine and the grid were within reach, and it was out of curiosity that he wanted to test their compatibility. Though Riisager's experiment demonstrated the potential peaceful coexistence of grid and wind turbine, this 'marriage' has remained controversial. And the marketization of wind power, following albeit indirectly and discontinuously from this experiment, has been a fragile and contingent achievement ever since and has also spanned a range of concerns, as the studies here demonstrate.

The two studies presented here illustrate how both 'valuation' and 'location' were problematized and eventually framed through the two devices analysed. The approach adopted has allowed me to follow the marketization of wind power through these two devices deemed both crucial to the further development of wind power (i.e., the proliferation of the wind power good), and simultaneously the 'correction', or disciplining, of the good (i.e., attempts at making up for some of the perceived side-effects of wind power development). In other words, wind power is deemed a 'good' to the collective (because of its positive association with global warming as a CO<sub>2</sub>-emission reducing technology), but none the less a disabled energy in terms of being an economic good.

The study of the feed-in tariff, as a frame for setting a price for wind power, demonstrated controversies relating to the qualities of wind power as well as its associations with different networks; according to some valuation accounts, wind power is a CO<sub>2</sub>-reducing technology,

and at other times the reverse, i.e., a CO<sub>2</sub>-increasing technology. Not surprisingly, these different qualifications affect the value attached to wind power. However, the qualifications which are central to the valuation of wind power are not limited to wind power as energy or the turbines as technology, but they also address the device that frames the valuation; the feed-in tariff is framed as both market-like, and market-distorting, and as such, the object of valuation shifts between the energy, its position in the network, and the device.

Also, the study demonstrated the constant folding and unfolding of both value and values, together with notions of efficiency and fairness. Moreover, a range of different figures of value appear and reappear throughout the five different valuation proposals: Value as being CO<sub>2</sub> reductions, value as being renewability, value as being on the forefront (in developing wind power), value as being nothing but supply/demand, and finally the value of landscape. Each of the five valuations followed suggest specific assemblages of value (folded around these figures) and use them to suggest calculated prices – or simply deny the possibility of such calculations. For example, calculations are rejected in one valuation because unfairness is associated with the device, not the price per se. Finally, and maybe most importantly, it is when stressing the value of CO<sub>2</sub> reductions that the requalification of nuclear power as ‘sustainable’ is made possible. The shift of category, from renewability (a category from which nuclear power is disqualified) to sustainability (a category in which nuclear power may or may not qualify), frames the calculative space in which nuclear power and wind power may become compared along their CO<sub>2</sub>-emissions profiles – and leave out questions of nuclear waste and security issues. Eventually, it is the association with climate change that allows the devaluation of wind power.

The price, which is eventually defined, remains a rather controversial number, both in terms of fairness and efficiency, as well as to its effects. One such effect is said to be the risk of polluting the landscape, a concern that is being associated with the establishment of the tariff. This concern is translated into the second device, the ZDE. Though born as an attempt to politicize wind power, i.e., making the location of turbines an issue in the hands of local populations and local politicians, the case of CdC du Pays de la Serre demonstrates quite different effects. The engineers’ meticulous practice of breaking down the landscape according to single-dimension layers is presented as an entirely objective process; the contrast of the politics and the ‘social relating’ to the landscape of the local population. The

engineered process entails expanding the list of criteria from which to frame and qualify the landscape, all of which are eventually black-boxed and presented as an objective definition of favourable zones.

The study also illustrates how location remains a variety of other things besides well-defined zones of relative favourability; for example, landscape, heritage, and dwelling place. As demonstrated by the mayor of Autremencourt, Dominique Potart, the territory is beyond being well framed, but rather co-exists with the zoning process undertaken by the engineers. This coexistence, I argue, could be described along the lines of singularization and singularity; the former pointing to the process of establishing the characteristics (of the good), and the latter stressing its uniqueness as multidimensional, incommensurable, and uncertain as to its quality. A similar contrast is found in the valuation accounts. For example, the association between wind power and climate change allows, in some of the valuations, for the establishment of wind power as a singularity, because the extent (and ways) to which it contributes to climate change remains relatively undetermined (it is multidimensional, incommensurable, and uncertain as to its quality). At the same time, wind power is subjected to a singularization in which it is made comparable to nuclear power (as well as other energies) qua CO<sub>2</sub> calculations.

Both devices are central to the marketization of wind power; the feed-in tariff not only defines the price but also guarantees that the energy produced is bought, creates expectations as to technological learning curves through the declining tariffs, and explicitly addresses what are considered acceptable profitability levels. The ZDE is crucial to the marketization of wind power for at least two reasons; firstly, it is an obligatory passage point to the tariffs, and secondly, it defines possible locations for wind parks, which is a central element of any wind power project.

Meanwhile, the two devices may be studied as market devices, but they are also at the heart of the negotiations and controversies unfolding around the creation of markets for wind power. As prosthetic devices, they become the crutches that allow wind power (market) to survive, and as habilitation, they become a means of addressing the politics of the networks into which they are introduced. Taking this insight as a stepping-stone for a discussion of politicization and economization, and as a means of demonstrating how the boundaries between politics and

economics are defined and redefined, the two devices are as prostheses, at least partly situated within the realm of politics. This is what underlies the notion of the political market. But inquiring into these two devices demonstrates how the notions of politicization and economization may be used to describe the ongoing controversies. Sometimes they are mutually constitutive; economizations of CO<sub>2</sub>-emissions or profitability levels may be used to politicize the existence of the feed-in tariff. At the core of these processes is the emphasis on network associations such as wind power associated with nuclear power, or wind power associated with fossil fuel generated power.

Eventually, what seems to remain is a feed-in tariff that continues to be controversial; not only did some valuation proposals attempt to disqualify the potential for CO<sub>2</sub> reductions in relation to the French electricity system through an economization of emission profiles of wind power and nuclear power, something which suggests the feed-in tariff is not only a politically driven choice, but also a ‘bad’ one. On the other hand, the ZDE-device, born out of a deliberate attempt to politicize wind power, appoints ‘spaces’ for concerned groups (or rather opponents) to be heard. As the father of the device concluded, the ZDE did not work out quite as intended. Based on the case study of the CdC du Pays de la Serre, it is illustrated how the meticulous practice of the engineers, something I describe as an economization of the landscape, black boxes that which went into its fabric and simply remains an (objective) delineation between favourable and less favourable zones for wind power development.

As a result, in the case studied here, deconstructing and organizing landscapes in order to draw zones for wind power development behind the desks of engineers is far less controversial than the making of prices behind the desks of government officials.

## **7.1 Contributions**

The contributions made by the present study are first and foremost empirical elaborations of the marketization programme in general and the role of market devices more specifically; on the one hand making the devices the analytical entry points to the study of markets, and on the other hand, their effects on the larger market assemblage. The two analyses respond to

Caliskan and Callon's (2010) invitation for contributions to the issues of price-setting and framing of encounters, and with the feed-in tariff and the ZDE, the two empirical analyses provide examples of the distinct ways in which prices may be defined and how encounters are framed as processes of connecting developer, grid, landscape, wind, and inhabitants, amongst others.

Furthermore, the study contributes to the emerging field of valuation studies. Making the feed-in tariff an entry point to such a study allows insights to be produced on the qualifications and associations required to set a price; but instead of discarding the tariff as political, because it is performed at the desks of bureaucrats rather than by the market, it demonstrates the diversity of values emerging from the process of setting a price, and not least how the making of the price is entangled with notions of fairness, efficiency, and profitability levels. And eventually, how the disqualifications target the device rather than the price per se.

Finally, what I believe to be the most important contribution is to establish an agenda for furthering studies of markets for 'goods', which are argued to require the mobilization or construction of prosthetic devices. As demonstrated, these prosthetic devices may eventually become targets for the disqualification of the good (e.g., the device is unfair, rather than the price). However, when the devices are seen as habilitations, they allow for a recognition of the politics of the socio-technical assemblage they are added to. In other words, assemblages such as the grid are by no means 'value-neutral' but are organized around specific modalities for production, which eventually may be made part of disqualifications of wind power.

We need to inquire into these markets (e.g., markets for renewable energy, carbon markets, markets for sustainable goods, etc.), which are, on the one hand, set in motion to 'save' us from the putative dysfunctions of mass production and consumption – and the so-called failures of its organization – and on the other hand, the ongoing disqualifications of these (political) markets because of the alleged pollution of the economy they are said to cause. Instead, we should see these controversies as the effect of not (yet) stabilized demarcations between questions qualified as political and questions qualified as economic, i.e., questions that are expected to be solved in one, rather than the other 'sphere'.

## RÉSUMÉ

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This project studies the making of a market for wind power in France. Markets for wind power, as well as markets for other renewable energies, are often referred to as ‘political markets: On the one hand, wind power has the potential to reduce CO<sub>2</sub>-emissions and thus stall the effects of electricity generation on climate change; and on the other hand, as an economic good, wind power is said to suffer from ‘disabilities’, such as high costs, fluctuating and unpredictable generation, etc. Therefore, because of its performance as a good, it is argued that the survival of wind power in the market is premised on different instruments, some of which I will refer to as ‘prosthetic devices’. This thesis inquires into two such prosthetic devices: The feed-in tariff and the wind power development zones (ZDE) as they are negotiated and practiced in France, and the ways in which they affect the making of markets for wind power. In this thesis, it is argued that while the two devices frame the price of wind power and the location of turbines, they also affect and address questions of costs, profitability, and efficiency; and as such, they may be investigated as market devices.

Theoretically, this dissertation mobilizes the marketization programme, which, as the conjugation of the word suggests, implies stressing the rendering of markets; i.e., markets as outcomes of negotiations and the alignment of interests and concerns. Being a constructivist approach, the marketization programme conceptualizes markets as socio-technical assemblages, stressing the heterogeneous and distributed character of their constituent elements. Furthermore, the marketization programme allows for the questioning of the deadlocked delineation between politics and economics, a delineation that appears to underlie the idea of the political market. With the notions of politicization and economization, the fundamental delineation between the spheres of politics and economics may be challenged. By investigating the ways in which an issue is opened up and made debateable, and eventually becomes an object for political decision-making (i.e., a politicization), or how its measurability and calculability is stressed, and it is made into an object for economic

assessment (i.e., economization), the naturalized distinction between politics and the market disappears.

Based on fieldwork in France, the core of this thesis is made up of two analyses; firstly, the definition of a feed-in tariff is empirically followed as a process of valuation in which value is seen as the outcome of irregular and costly activities, rather than as the identification of the inherent property of any object. To study how value, here in the form of a price, comes about in the case of wind power, five different empirical traces are followed with each one presenting a distinct approach to valuation. These valuation proposals involve qualifying and disqualifying wind power, e.g., from CO<sub>2</sub>-reducing to CO<sub>2</sub>-emitting, and they span a range of controversies. In particular, the study suggests that the valuations may be associated with five emerging figures of value – categories against which to undertake the valuation. The study demonstrates how these values are folded – or unfolded – with notions of efficiency, fairness, and profitability levels; for example, several valuations disqualify the device rather than the price itself.

The second analysis addresses the ZDE-device. With this device, the location of any wind power project is bound to be located within predefined zones if they are to be paid the price defined in the feed-in tariff. In other words, the ZDE is made an obligatory passage to the feed-in tariff. The analysis follows the device along two phases; namely, its conception and its emerging practice in a specific case, the CdC du Pays de la Serre. The first phase is discussed as a politicization of wind power, a distinct framing of location in which the possibility for local opposition is enforced. The practice of the device as it unfolds in CdC du Pays de la Serre, on the other hand, is better described as an economization of the landscape, a process of translating the territory into single-layer variables. In their final presentation, these layers are accumulated and black-boxed, and the criteria for their construction disappear.

Based on the studies of the two market devices, this dissertation addresses their roles as either prostheses or habilitation. The mobilisation of these concepts allows a discussion not only of the politics of the devices, but also a discussion of the politics of the networks to which the devices are added. When seen as prosthetic, the devices become explicit framings in which the source of ‘disability’ is located in wind power technology itself, whereas the notion of habilitation draws attention to ‘disabilities’ located in the network, or the connexion between

the network and the technology, e.g., the grid, the distinct framings of the market constituents, or even notions such as sustainability. In other words, it allows for an appreciation of the distinct politics of the existing system.

In the market assemblage for wind power studied here, the status of the devices as either prosthetic or habilitation seem to coexist; this may be explained by the constantly ongoing processes of politicization and economization. These processes seem to be continuous and overlapping attempts at either making the introduction of wind power a (bad) political choice, or premised on failures of the existing system. The economizations and politicizations target different points in the network. The economization of CO<sub>2</sub>-emissions, i.e., calculating and associating the emissions and their sources, may be used to frame the decision of subsidizing wind power as a political decision, rather than a decision related to the failure of existing markets for energy. As such, these processes are difficult to follow, something that is partly affected by the state of the network; the market assemblage for wind power is not a convergent and uncontroversial arrangement.

Eventually, the study demonstrates how making a price is – and remains – politicized, whereas the making of geographical zones becomes an economization of the landscape through its practice, despite its origin as a device for politicization. It remains far more controversial to make prices behind desks than to deconstruct and redefine the landscape behind desks.

This dissertation contributes to the marketization programme as a detailed empirical study of two market devices as framings of valuation and location. Furthermore, the study of the controversial and irregular activities of making a price – and a price that may be disqualified through the device rather than the price itself – contributes by empirically underscoring the importance of valuation studies. Also, using the notions of politicization and economization with regard to the empirical material, as illustrated in the ongoing attempts of (dis)qualifying the market assemblage for wind power, the study suggests a new approach to a phenomenon such as the ‘political market’. It reorients attention towards an underlying struggle for determining where to draw the demarcation between economics and politics. As such, this thesis stresses the importance of studying these so-called political markets; markets that are, on the one hand, argued to be a partial solution to issues such as climate change and on the

other hand constantly negotiated because of the 'pollution' that the prosthetic devices are argued to infer on markets.

## DANSK RESUMÉ (RÉSUMÉ IN DANISH)

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Denne afhandling undersøger konstruktionen af et vindkraftmarked i Frankrig. Vindkraftmarkeder, såvel som andre markeder for vedvarende energi, benævnes ofte 'politiske markeder'. Den benævnelse fremhæver på den ene side vindkraftens potentiale til at reducere CO<sub>2</sub>-udledninger, og derved mindske elproduktionens effekt på den globale opvarmning. På den anden side argumenteres det, at vindkraft som 'økonomisk gode' ikke er konkurrencedygtig på grund af høje omkostninger, samt svingende og uforudsigelig produktion. Disse 'svagheder' fører til en antagelse om, at vindkraftens overlevelse på markedet er betinget af en række 'policy-instrumenter', som i afhandlingen betegnes '*prosthetic devices*'. I afhandlingen ses nærmere på to af disse *prosthetic devices*: 'Feed-in tariffen' og 'Zoner for vindkraftudvikling', som de er blevet forhandlet og praktiseret i Frankrig – og ikke mindst måderne hvorpå disse påvirker markedsdannelsen for vindkraft. I afhandlingen argumenteres der for, at almindeligvis de to *devices* sætter rammerne for prisen på vindkraft, samt placeringen af møllerne, så påvirker og adresserer de samtidig spørgsmål vedrørende omkostninger, rentabilitet og efficiens. Derfor kan de undersøges som '*market devices*'.

Afhandlingens teoretiske grundlag er det såkaldte *marketization*-program, der indebærer et særligt fokus på selve processen bag markedsdannelsen. Med dette menes, at markedet kan ses som et resultat af forhandlinger samt tilpasninger af forskellige interesser. I *marketization*-programmets konstruktivistiske tilgang konceptualiseres markedet som et socio-teknisk arrangement, der fremhæver markeder som konstituerede gennem heterogene og distribuerede elementer, såsom mennesker, værktøjer, *devices* etc. Endvidere giver *marketization*-programmet anledning til at åbne den fastlåste grænse mellem politik og økonomi: En afgrænsning som forekommer at ligge til grund for selve ideen om det 'politiske marked'. Ved at inddrage begreberne politisering og økonomisering gøres det muligt at udfordre denne

grænse mellem det politiske og det økonomiske, det vil sige som to væsensforskellige sfærer. På den baggrund undersøges måderne hvorpå et *issue* åbnes op og gøres debaterbart, og dermed i sidste ende bliver gjort til objekt for en politisk beslutningsproces (dvs. en politisering), eller hvorledes dets målbarhed og beregnelighed fremhæves, og det dermed gøres til objekt for en økonomisk vurdering (dvs. en økonomisering). Med denne tilgang udviskes det 'naturlige' skel mellem det 'politiske', på den ene side, og markedet som del af den økonomiske sfære, på den anden side.

Empirisk er afhandlingen baseret på feltarbejde foretaget i Frankrig. Det empiriske materiale udfoldes over to analyser: Første analyse følger fastsættelsen af feed-in tariffen, som en proces hvorigennem værdi og pris opfattes som resultatet af en værdifastsættelsesproces (*valuation*), der indebærer kvalificeringer af vindkraft, fra hhv. CO2-reducerende til CO2-forurenende. I analysen følges fem forskellige forslag til værdifastsættelsen på vindkraft, som hver især repræsenterer en særskilt strategi herfor. I analysen isoleres fem specifikke 'værdifigurer' som centrale kategorier i de enkelte værdifastsættelsesforslag og studiet demonstrerer, hvorledes disse værdier 'foldes' - eller 'udfoldes' - med begreber som effektivitet, retfærdighed og rentabilitet, der eksempelvis muliggør en diskvalificering af feed-in tariffen som *device*, frem for prisen selv.

Afhandlingens anden analyse undersøger dannelsen af vindkraftzoner. Med dette *device* bliver placeringen af vindmølleprojekter bundet til predefinerede zoner, såfremt projektet skal kunne modtage betaling i form af feed-in tariffen. Med andre ord er vindkraftzonerne blevet *obligatory passage points* til feed-in tariffen. Analysen følger dette *device* som konstitueret gennem to faser, nemlig dens 'undfangelse' samt dens praksis. Den første fase diskuteres som en politisering af vindkraft, hvor møllernes placering i landskabet problematiseres, og der skabes rum og mulighed for lokal modstand mod vindkraftprojekter. Den anden fase, dvs. den praksis de involverede ingeniører udvikler for dannelsen af vindkraftzoner, undersøges gennem et casestudie af CdC du Pays de la Serre. Denne fase beskrives som en økonomisering af landskabet, det vil sige en proces hvori det geografiske område dekonstrueres ved hjælp af en række kriterier. I den endelige præsentation af vindkraftzonerne er disse lag akkumuleret og *black-boxed* og tilbage står zoner, der er vurderet særligt favorable for vindkraftudvikling, men hvor kriterierne bag processen ikke længere er synlige.

På baggrund af analyserne af de to *devices*, adresserer afhandlingen dernæst deres roller som enten 'proteser' eller 'habilitering'. Anvendelsen af disse begreber muliggør en diskussion, ikke blot af den politik der udfoldes i de to *devices*, men også af den politik, der er indlejret i de netværk som de knyttes til. Set som proteser bliver de to *devices* eksplicitte *framings*, hvor kilden til 'svaghederne' er placeret i selve vindkraftteknologien. Begrebet habilitering henleder derimod opmærksomheden på 'svagheder' i netværket, som for eksempel elnettet. Med andre ord giver *marketization* perspektivet mulighed for et indblik i det eksisterende systems politik.

I nærværende studie af det franske vindkraftmarked, synes de to *devices* status (som enten protese eller habilitering) at sameksistere. Dette kan delvist forklares ved de konstant igangværende politiserings- og økonomiseringsprocesser: Processerne synes at være kontinuerlige og overlappende forsøg på enten at gøre introduktionen af vindkraft til et (dårligt) politisk valg, eller være begrundet i fejl i det eksisterende system. Dertil rettes økonomiseringerne og politiseringerne mod forskellige punkter i netværket. Økonomiseringen af CO<sub>2</sub>-udledninger, dvs. kalkuler af, samt associationer mellem, CO<sub>2</sub>-udledningen og dens kilder, anvendes til at *frame* beslutningen om at subsidiere vindkraft som en politisk beslutning, frem for en beslutning relateret til svagheder i de eksisterende energimarkeder. Således bliver processerne vanskelige at følge, hvilket delvist er en effekt af netværkets tilstand, og særligt at det studerede markedsarrangement for vindkraft ikke er et stabilt og konvergent arrangement.

Endeligt demonstrerer afhandlingen, at prisskabelsen er og forbliver politiseret, hvorimod skabelsen af geografiske zoner gennem praksis, og på trods af vindkraftzonernes oprindelse som en politisering, snarere tager karakter af en økonomisering af landskabet. Med andre ord forbliver det langt mere kontroversielt at gøre prisfastsættelse til et skrivebordsarbejde, end at dekonstruere og redefinere landskabet bag et skrivebord.

Afhandlingen bidrager til *marketization*-programmet gennem de detaljerede empiriske studier af de to *market devices*, som *framer* såvel værdifastsættelse som lokalitet. Studiet af prisfastsættelsens forhandlinger og kontroverser, og ikke mindst hvorledes feed-in tariffen som *device* gøres til objekt for diskvalifikationerne, snarere end af prisen selv, bidrager til at understrege vigtigheden af *valuation studies*. Ved at udfolde begreberne politisering og

økonomisering på et empirisk materiale, som forsøg på at (dis)kvalificere vindkraftmarkedet, bidrager afhandlingen til at udpege en ny indgangsvinkel til fænomenet det 'politiske marked', idet den sætter fokus på den underliggende kamp for at definere grænsen mellem det økonomiske og det politiske. Dermed understreger afhandlingen også vigtigheden af at studere disse såkaldte politiske markeder; det vil sige, markeder der på den ene side fremhæves som en delvis løsning på udfordringer såsom klimaændringer, og på den anden side konstant er til forhandling på grund af den 'forurening' de såkaldte *prosthetic devices* siges at påføre markedet.

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## L'Assemblage d'un marché de l'électricité éolienne - Analyse de la construction de dispositifs de marché

**RESUME :** Ce projet étudie la réalisation d'un marché d'énergie éolienne en France. Les marchés d'énergie éolienne sont souvent désignés comme des «marchés politiques» : D'une part, l'énergie éolienne réduit les émissions de CO2 et retarde les effets de la production d'électricité sur le changement climatique. D'autre part, comme bien économique, l'énergie éolienne se dit souffrir «d'handicaps» technico-économiques (les coûts élevés, la production fluctuante et imprévisible, etc.). Par conséquent, en raison de sa performance comme bien économique, il est argumenté que la survie de l'énergie éolienne dans le marché est fondée sur différents instruments, dont certains que je qualifierai de «prothèses». Cette thèse s'interroge sur deux de ces prothèses : Le tarif d'achat et les Zones de Développement Eolien (ZDE) comme ils sont négociés et mis en pratique en France, ainsi que la manière dont ils affectent la réalisation des marchés de l'énergie éolienne.

**Mots clés :** Marchés de l'énergie, dispositifs de marché, électricité, éolienne, environnement, réseau électrique

## Assembling Markets for Wind Power – An Inquiry into the Making of Market Devices

**ABSTRACT :** This project studies the making of a market for wind power in France. Markets for wind power are often referred to as 'political markets: On the one hand, wind power has the potential to reduce CO2-emissions and thus stall the effects of electricity generation on climate change; and on the other hand, as an economic good, wind power is said to suffer from (techno-economic) 'disabilities', such as high costs, fluctuating and unpredictable generation, etc. Therefore, because of its performance as a good, it is argued that the survival of wind power in the market is premised on different instruments, some of which I will refer to as 'prosthetic devices'. This thesis inquires into two such prosthetic devices: The feed-in tariff and the wind power development zones (ZDE) as they are negotiated and practiced in France, and also the ways in which they affect the making of markets for wind power.

**Keywords :** Energy markets, market devices, electricity, wind power, environment, electrical grid