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The Politics of Some Policy Instruments

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List of abbreviations

ANME	Agence Nationale pour la Maîtrise de l'Énergie
BIPV	Building-Integrated Photovoltaics
EEG	Erneuerbare-Energien-Gesetz
FEE	France Énergie Éolienne
FIT	Feed-in Tariff
FNME	Fonds national de maîtrise de l'énergie

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PV Photovoltaics
STEG Société tunisienne de l'électricité et du gaz
ZDE Zone de développement de l'éolien

1 Introduction: Policy Instruments That Frame and Foster Capitalisation

Policy support has been crucial in triggering and shaping the recent development of renewable energies. Often, this support links renewable energy development closely with market deployment or investment practices, in conceptual or in practical terms.

In this chapter, we explore the role of such policy instruments in energy transition processes as it emerges in several of our case studies (in Germany, France, and Tunisia). We focus on instruments aiming to spark and direct investments. This type of instrument includes subsidies (which reduce the cost of investment), fixed tariffs (which increase and guarantee future revenues from investment) and to a certain extent tenders (which sometimes grant tariffs, but do so in a competitive setting).

In contrast with market instruments organising competition to (supposedly) promote the most efficient solutions—say, devices setting up quantitative allowances that can be traded on specific markets, such as tradable carbon certificates or energy saving certificates—the instruments we consider are directed towards investment, entrepreneurship, and investment in new technologies, or what we call capitalisation. Although they sometimes create niches protected from market competition, they are primarily aimed at fostering policy-oriented capitalisation in hand-picked technologies. The promotion of investment in renewable energy technologies enacted by these instruments is intended to contribute to broader and varying political objectives, such as reducing greenhouse gas emissions, supporting domestic industries and innovation, and market integration, in Europe; and grid stability and decreasing energy subsidies in Tunisia. The policies considered here thus seek to direct investments as a way to tackle public problems, whose management may then seem to be reduced to a question of steering finance through the appropriate design and calibration of these instruments.

This chapter looks at the workings of these instruments, what they provoke and how they are regulated, and what happens when investors are charged with the realisation of political objectives. It examines the type of politics that surrounds and participates in the development of these instruments, their implementation, and the pursuit of the political objectives to which they are intended to contribute.

1.1 Our Case Studies

We explore these questions on the basis of three national case studies and five local case studies in France, Germany, and Tunisia. France and Germany are part of the European Union and are deploying renewable energy policies in similar contexts, although their energy systems and politics differ in many respects. Tunisia is a developing country and the problems addressed by its energy policy are quite different from those in European countries, but the organisation of its energy system was largely inspired by the French example. Given the disparity of the countries and case studies, we do not offer a comparative analysis, but instead, try to give accounts of events in the three countries through the same lens.

In France and Germany, feed-in tariffs (FITs) have been a central device of renewable energy policy. FITs first appeared as voluntary schemes in Germany and Denmark in the late 1980s to accommodate increasing wind power capacities and facilitate their integration into electricity grids and markets. They were introduced in the legislation of both countries in the early 1990s, and then grew increasingly widespread and sophisticated as European renewable energy policy developed (Cointe 2014; Evrard 2010; Jacobs 2012). By the end of the 2000s, they had become the most widespread instruments for renewable energy promotion in Europe. Through the combination of a purchase obligation and a fixed price (determined politically and guaranteed by the State), FITs offer high investment security, since they guarantee a commercial outlet and sale at a price that ensures profits. Their aim is to enable the large-scale deployment of grid-connected renewable energy generation capacities. In France and Germany, FITs can be said to have succeeded in this objective, especially for wind power and PV.

Assessing and regulating them in relationship to other objectives (e.g., employment, industrial development, environmental protection), however, is less straightforward. As the French and German case studies will show at length, FITs have evolved from mere price-based mechanisms into more sophisticated policies in order to take into account their own effects and to allow for more control over the markets and technologies they support. They are now accompanied by additional regulatory instruments, such as wind power development zones and developer good practices conventions in France.

In Tunisia, solar energy is supported by investment incentives in the framework of the programmes '*Prosol résidentiel*' (set up in 2007 for residential solar heating) and '*Prosol elec*' (launched in 2010 for solar PV). In contrast to FITs, these instruments have a very well-defined scope and objectives, and target a well-defined set of actors: they are mainly targeted at households (small-scale energy users), and are meant to contribute to decreasing electricity demand and improving the stability of the electricity grid by encouraging onsite energy generation and consumption. Both programmes consist in a combination of financial incentives for purchasing solar installations: subsidies for solar systems, financial aid in the form of loans reimbursed via electricity bills, and gains from reduced electricity use after installation of the solar system. The objective of these programmes is thus not to accelerate the large-scale deployment of renewable energy generation. Instead, they are meant to encourage the small-scale development of emerging technologies and associated practices through subsidies whose total amount is directly controlled by the state and by the international lenders that support them. Contrary to French and German FITs, the *Prosol* programmes are highly controlled and designed to avoid overflows (Table 1).

1.2 Current Approaches to These Instruments

Instruments such as FITs and investment subsidies can be considered from several perspectives. We will highlight four main strands of approaches to renewable energy policy instruments in the literature. A first strand, based in the economics of innovation, emphasises that renewable energy technologies, like any other technology, are likely to traverse a so-called 'Valley of death' when they need particular financial support, before they are ready for widespread deployment (Murphy

Table 1 Case studies in this chapter

Wind power	Photovoltaics
Feed-in tariff schemes + Planning and zoning schemes	Feed-in tariff schemes Increased sophistication and refinement
Changes in national policies	Changes in national policies
Focus on Northern Friesland[a] (Germany) and Narbonnaise (France)[b]	Three projects constructed around FITs: Centrales Villageoises[c] (France) Fermes de Figeac[d] (France) The energy cooperative of Weissach-im-Tal[e] (Germany)

[a]The material presented draws on a case study undertaken by Edith Chezel (Chezel 2015; Chezel and Labussière 2017)
[b]The material presented draws on Nadaï and Labussière (2010)
[c]The material presented draws on a case study undertaken by Antoine Fontaine (2015)
[d]The material presented on this case draws on Cointe (2014, 2016)
[e]The material presented on this case draws on a case study undertaken by Michel Deshaies (2015)

and Edwards 2003; Weyant 2011). FITs have been foregrounded as the instrument for triggering such support that potential investors most prefer (Bürer and Wüstenhagen 2009). Second, there have been numerous studies focused on the classification, design, evaluation, and fine-tuning of renewable energy policy instruments (Frondel et al. 2008; Haas et al. 2004, 2007, 2011; Hvelplund 2001; Lauber 2004; Ménanteau et al. 2003; Midttun and Gautesen 2007; Mitchell et al. 2006; Timilsina et al. 2012…). Third, in a less directly policy-relevant fashion, a growing number of studies retraces the *politics* of the emergence, evolution, and fine-tuning of renewable energy policy, most often from a political science perspective (for instance, Cointe 2014, 2017, for a recent history of tariffs for PV in France; Evrard 2010 on wind power policy in France; Jacobsson and Lauber 2006, on PV policy in Germany; Lauber and Schenner 2011, on debates around EU-wide harmonisation; Debourdeau 2011, on French PV tariffs; Nadaï 2007, on wind power policy in France; Hoppmann et al. 2014, on the evolution of PV tariffs in Germany…). This literature has mostly examined national policy,

with a focus on traditional policy-making arenas and debates (parliament, government, administrations, EU institutions). It also increasingly considers valuation issues, relying on economic sociology and performativity studies (Debourdeau 2011; Laurent 2015; Pallesen 2016; Cointe 2016, 2017; Silvast 2017). Finally, a broad current of literature on public policy instrumentation is heavily influenced by Foucault's work on governmentality. It strives to analyse power via the practices, devices, procedures, and rationalities of government (Foucault 2004, p. 819; Laborier and Lascoumes 2004). This literature does not address renewable energy policy per se, but it provides an interesting perspective on the workings of instruments or 'technologies of government' (Miller and Rose 1990). Breaking with a functionalist conception of public policy instruments, it stresses that instruments convey and enact political representations and format rationalities to align them with specific objectives (Miller and Rose 1990). They thus have their own agency and dynamics, and must be analysed not only in relationship to the objectives behind them, but also to what they produce (Lascoumes and Le Galès 2007; Laborier and Lascoumes 2004; Lascoumes 2004). Instruments also generate inertia, unintended effects, problems, and resistance. They thus have to adjust to or incorporate these effects. Governmentality studies have outlined the difficulties in making reality 'amenable to administration' (Miller and Rose 1990, p. 4). However, despite having pointed out the resistance of reality and the unintended effects of instruments, this literature has mostly focused on how instruments affect and format that which (and those whom) they regulate, paying limited attention to the subversion, reinterpretation, and emancipation of instruments.

1.3 Analysing These Instruments in Relation to Their Milieu

To some extent, the present chapter addresses the capacity of instruments to generate their own politics. However, it undertakes a slightly different grain of analysis in suggesting that instruments deploy along with a 'milieu'—meaning a set of actors, devices, knowledges, and practices—which is part of their functioning, and which grows with them and influences their becoming. This perspective echoes work by Dinica

(2008) emphasising the central role played by public–private partnerships in the early spread of wind power in Spain, and showing that an overly narrow perspective on instruments and their design precludes the understanding of the spread of renewable energy. This chapter thus does not begin from the assumption that a single instrument is the main driver of renewable energy development in a given country. Much to the contrary, it proposes to investigate how such instruments deploy in practice, how instruments and their milieux are coproduced, well beyond policy arenas and on different scales, and how these shape (or fail to shape) changes in energy systems.

It follows that, while instruments are at the centre of our analysis, we do not consider them as fixed technical devices, but as elements in wider assemblages of policy and capitalisation. Instruments themselves do not exist without an array of legislation, institutional arrangements, previous policies, and other, complementary instruments that can expand or restrict their scope (e.g., a FIT for building-integrated photovoltaics + rules for grid access + definitions of building integration + tax credits that make them more accessible).

As we will detail in the next section, our analysis takes its inspiration from pragmatist sociological approaches to capitalisation and (to a certain extent) markets (because the promise of value is in some cases mediated through markets). We focus on the multiple, complex relations between policy instruments and their milieux, and investigate the status of these instruments as incentives to investment from an empirical and methodological perspective. We explore how this translates into specificities in their functioning and their interactions with the milieu that unfolds around them. In doing so, we also consider the spaces for participation that are offered either around project development or around instrument design and adjustment.

1.4 Organisation of the Chapter

We start by describing how the instruments featured in the case studies work (§2), and discuss concepts from economic sociology and studies on capitalisation that can help analyse them, before detailing our approach in terms of milieux (§3). We then draw on our empirical material to

highlight several reasons why it is impossible to tell the whole story if instruments are considered in isolation. We show that economic and financial elements do not suffice to account for what the instruments do: first, the financial incentives are only one part of the design and success of the projects they trigger; and second, because the instruments' effects often extend beyond the mere multiplication of new forms of transactions (§4). We then examine the government and regulation of instruments and their milieux (§5 and 6). We provide examples of the difficulties and challenges of framing investments through policy instruments, along with different strategies to address them, emphasising their iterative and experimental character. In the final section, we discuss the findings presented in the chapter in the light of the proposition of this book (§7). We show that the delegation of political objectives to instruments that operate as capitalisation *agencements*, far from depoliticising an issue, brings about its own politics. The use of policy-dependent capitalisation to address public concerns clearly does not reduce politics to issues of instrument design and calibration.

2 How These Instruments Work

Policy instruments such as FITs and subsidies have a basic structure and logic, through which they are intended to organise action in order to align it with a stated aim. Those we consider in this chapter have a common feature: they are meant to help achieve public policy objectives by encouraging the involvement of diffuse private economic actors, encouraging and directing investment towards specific systems of energy production by making them less costly and/or more profitable. How exactly do they work?

2.1 Fostering Policy-Oriented Investment

FITs force electricity suppliers to purchase the electricity produced by a set of eligible technologies (e.g., wind power, PV, bioenergy) at a fixed price and for a fixed period of time—today in France and Germany, 20 years. The list of eligible technologies, the price, and the duration of

the agreement are all determined politically. In theory, tariff level and agreement duration are calculated so as to guarantee the profitability of investments; in practice, they are negotiated by actors who can be as varied as renewable energy industry representatives, utilities, grid operators, state agencies, NGOs, civil servants, and elected officials. The resulting costs are borne collectively through a levy on electricity use, also defined by law (*Contribution au Service Public de l'Electricité* in France).

The two *Prosol* programmes in Tunisia were designed to promote domestic solar energy, in the form of solar heaters and photovoltaic systems. They target individuals and industries (in the case of *Prosol Elec*, provided that they are under contract with the national electricity), reinforcing their economic capacities with investment subsidies and access to loans repaid via electricity bills (Benlalouache 2013). These programmes are financed by the national electricity provider (the Société tunisienne de l'électricité et du gaz (STEG)), the *Fonds National de la Maîtrise de l'Energie* (FNME), and international donors. Contrary to FITs, whose objective is to increase the amount of electricity from renewable energy sources fed into the grid, *Prosol* encourages onsite consumption and reductions in grid-provided electricity use. The reduction in energy bills associated with the combination of solar equipment and *Prosol* subsidies makes the investment profitable after 5–12 years. The development of markets for solar technologies is thus a means to reduce strain on the electricity grid and guarantee its stability.

German and French FITs and the Tunisian *Prosol* programmes thus work as guarantees of profitability for investments in specific energy generation equipment. They are designed to spur investments that are expected to contribute to specific policy objectives. Whether the guarantees they provide are sufficient, and whether they actually contribute to policy objectives, largely depends on their design, which to an extent makes political debates around them more technical.

2.2 Framing Market Transactions and Investments

In general, investors retain significant control over the content and organisation of renewable energy projects (Cointe 2014, Chapter 2). Nonetheless, the instruments determine conditions for access to the

markets they promote, and frame transactions in a more or less strict fashion in order to entice actors to invest in a way that conforms to policy objectives.

One first thing they do is to **define eligible goods**: the electricity produced from renewable energy sources using specific technologies and fed into the grid for FITs; technologies using solar energy for onsite consumption in the case of Prosol. They also determine **who takes part in the transaction** (in particular who the purchaser will be) and under what conditions. They can do so directly, for instance, by specifying eligible recipients (only STEG clients can benefit from the Prosol Elec programme), or less directly through technical and administrative procedures required to access the incentive. For instance, in France, FITs are awarded only after purchase agreement requests and grid-connection requests, which have to be done on a project-by-project basis and following specified procedures. These instruments also contribute more or less directly to the **formulation of prices and contracts**.[1] The Prosol programmes, for instance, have fostered standardisation in the supply of solar products in order to articulate technological solutions with uses that are largely framed by economic motivations.

In doing so, these instruments contribute to foregrounding a perspective in which the **economic and financial dimensions** of current renewable energy development are framed as central: the value of renewable energy technology is framed as the value of investing in it, and in particular as the value of the revenues that can be derived from it in the future. This vision is conceived to match with that of a potential investor, a figure that has to be adopted, at least to a certain extent, by individuals or collectives interested in developing renewable energy projects.

Such instruments' framing of goods, calculative capacities, prices, and conditions of profitability also **formats its beneficiaries**. To benefit from a given incentive, investors have to conform to the model of investors performed by the instrument. For instance, they need to conceive profitability in a way that is compatible with the conception assumed by the instrument, have the financial capacities to withstand the timeframe required by the instrument, have access to technologies and to the space to install them… While Prosol targets individuals and industries willing

to purchase small-scale equipment for onsite energy generation, FITs are designed for agents investing in grid-connected electricity generation capacities who are able to react quickly to incentives. As FITs leave great freedom in the design of business models and the sizing of projects, they can trigger the mobilisation of financial, human, and technical resources on a variety of scales, depending on the ambition of projects. Contrary to Prosol, they are meant to lead to the scaling-up of renewable energy development.

By framing prices and contract duration, these instruments also frame the point in time at which the investment will reach profitability. They thus confer on investments a **tempo**. In the case of wind power in Northern Friesland, for instance, the influence of the incentive structure on the timing of investments is quite clear. In this region, wind farms are exploited by 'citizen wind farm' (*Bürgerwindpark*) collectives which meet in assemblies, monitor the evolution of FITs, and discuss the corresponding opportunity to repower wind farms (i.e. replace them with more efficient or higher-capacity wind power installations) or to install new ones nearby depending on available areas.

These instruments thus frame and contribute to realising a scenario for encounters between potential investors (e.g., banks, renewable energy developers, citizens, local authorities…) and other actors (local administrations, communal authorities, electrical grid manager, electricity users…) in order for projects to be developed. They are charged with conveying a vision and ensuring that promises of future value can translate into actual money flows and revenues through appropriate devices, calculations, narratives, and encounters.

3 Capitalisation, an Inquiry from the Milieu

The two types of instruments considered here can be described as market devices designed and calibrated by public authorities in order to direct investments in the service of specific policy goals. This means that merely looking at them as market devices is not enough to understand how they work.

3.1 Market Devices That Aim to Direct Investment

The 'new new economic sociology'[2] defines market devices as devices that organise economic exchanges by framing goods exchanged, calculative agencies, market encounters, and price setting practices (Çalişkan and Callon 2009, 2010; Muniesa and Callon 2007). This perspective has two advantages for our study. First, its refinement around the concept of socio-technical *agencements* (Callon 2013; Laurent 2015) involves a conception of market devices as heterogeneous/hybrid combinations of material, social, and discursive elements that need to be carefully arranged together, a view that fits with our proposal to consider instruments along with their milieux. Second, one of its key contentions is that economic activities depend on framings that always risk being overflowed and generating matters of concern (Callon 2007). Thus, Callon (2009) has argued that a functioning market is one that is able to take the concerns it raises into account. This draws attention to the dynamics of market devices, in keeping with our ambition to consider changes in and readjustments of renewable energy policy instruments. That being said, describing FITs or investment subsidies as market devices is insufficient: they are not just any type of market device. They need to be further specified for two main reasons that resonate with current discussions in market sociology and STS.

The first reason is that they are also political instruments. While they share a great deal with other market devices, FITs and investment subsidies did not themselves emerge from market activities and actors. Instead, they were created by public authorities to facilitate, organise, and regulate investments that would not occur without them (or would remain marginal), because these investments were expected to contribute to political goals (the development of renewable energy in France and Germany, grid stability in Tunisia). Such devices that articulate political objectives and market activities have recently begun to attract scholarly attention in pragmatist studies of markets. Overdevest (2011), for instance, argued that such objects (such as food safety and environmental regulations) provide opportunities to explore changes and destabilisation in markets, and that technologies used to perform markets can also be used to perform other values. The argument has

been echoed in recent works on so-called 'concerned markets', defined as markets to which non-economic values are attached, and which produce multiple values and social relations (Callon 2009; Geiger et al. 2014; Cochoy 2015; Krafve 2015). Building on Callon's propositions, this literature analyses market development as an experimental process in which values and market devices are constantly re-evaluated and reshaped in attempts to take into account the various relationships and concerns that emerge from market operations.

The second reason not to restrict our framing of these instruments to their status as market devices is that they work by framing investments rather than transactions. Though market device approaches help make sense of the articulation of politics and economics in certain types of policy instruments, speaking of (concerned) markets may not be the best way to approach FITs and investment subsidies. While they can be described as market devices in a general sense, they are probably better described as an investment or capitalisation devices. They work by encouraging investments (oriented towards future profits) rather than by fostering competition in transactions of goods—as can be seen in their presentation above. It is noteworthy that the EU Commission itself has always seen the compatibility of FITs with the building of the internal electricity market as problematic, because of the potential distortion to free market functioning it may entail as a form of state aid. Recent work on capitalisation can help us take this crucial dimension into account.

3.2 Capitalisation as a Cultural Process

The above clearly shows that these instruments frame and foster investment by containing a problem—that of the value of technologies—and a solution for it along multiple dimensions. This multidimensional process of turning an object into something worth investing in—hence capitalising on it—has been named 'capitalisation' (Muniesa et al. 2017). Capitalisation covers the broad and collective—cultural—work of valuation, ranging from blank calculative methodologies and operations to metaphorical ways of capitalising on mundane activities (deriving future revenues from what we do). Akin to the work of the

tariff, capitalisation sets a value for the thing as equal to the profits that can be derived from it in the future. It also sets the conditions for this value to be performed and become real. This includes setting up relational spaces for encounters and resolving certain issues that are usually dealt with by business models, such as demonstrating future value and revenue streams (a point decided on a political level in the case of the tariffs), qualifying goods (wind power or solar PV kWh are endowed with a renewable energy qualification by decree, and the guarantee of origin allows this quality to be traded as a certificate), and users (partly, by granting certain users priority for injection into the grid). In the language of business models, these correspond to the value proposition, the value network, and the value model. Capitalisation thus combines a vision, a scenario (narrative, actors, capacities, encounters), and devices and settings (formulation of professional practices, instruments, methodologies…) to perform the value that it foregrounds.

This pragmatic approach to capitalisation processes is relevant in the analysis of policy instruments because it strongly suggests that they do not exist and perform in a vacuum. Visions and values are enacted in various configurations through the combined actions of the instruments' promoters and users.[3] While capitalisation theory enlarges the range of modes of analysis of policy instruments, it has not yet been much applied to renewable energy policies. As we showed in the introduction to this chapter, existing analyses of these instruments have not acknowledged the full dimensionality of their deployment. While the financial dimension is, in fact, a central part of current renewable energy development, one key question is how this financial approach is actually incorporated into renewable energy deployment, and what type of politics around these instruments is fostered as a result.

A renewable energy project incorporates and articulates different dimensions together through the siting of material devices (solar thermal or PV panels, wind turbines). It has a multiple existences as an economic and financial entity, but also as a social, technical, territorial, legal, and regulatory one. A successful project articulates capitalisation along several different dimensions. While capitalisation carries the promise of an encompassing approach, this strand of analyses is a recent development, and has mostly been focused on the economic, management, and

financial dimensions of capitalisation.[4] In what follows, we would like to analyse the politics that surround the development of policy instruments by proposing a mostly non-financial exploration of their functioning as devices for policy-driven capitalisation.

In doing so, we regard these instruments as socio-technical *agencements* defined and calibrated by public authorities. *Agencements* consist in combinations of material and discursive elements that organise transactions, and notably investments in new energy technologies, by framing economic goods, agents, prices, and encounters. *Agencements* point to the distributed and dynamic character of (economic) agency: by providing a frame for action, they also trigger potential overflows and transformations (Callon 2013; Laurent 2015).

3.3 Teasing Out the Role and Dynamics of the Milieu

While framing instruments as *agencements*, we would like to (somewhat redundantly) tease out the role of the hybrid network that grows along with their development, and its role in the politics that develops around them. Taking inspiration from the work of Gilbert Simondon (1989) on the genesis of technical objects, we analyse this network in terms of the notion of '*milieu*'. Purposefully, foregrounding these policy instruments' milieux enables us to analyse how instruments build on territorial, social, or political dimensions in order to foster policy-driven capitalisation.

Simondon holds that technologies do not exist separately from their environment, but progressively emerge while producing their own (associated) milieu. In this process, the technical object is a 'mediation' of a specific type, as it engages things in a completely new relational reality. Instruments, by setting incentives, set-ups, and devices, act as mediators in bringing actors and entities into a new relational realm, which grows as they are implemented, and constitutes a Simondonian milieu: it becomes part and parcel of the instruments' own realm.

In what follows, we explore the relationship between instruments and their milieux by **looking at the concrete arrangements through which instruments and their milieux deploy and evolve**. The empirical material that we draw on allows us to consider two interacting aspects

of the arrangements through which instruments make a difference. First, our empirical material offers a view on **how policy instruments are made operational, regulated, and reconfigured** according to evolutions in their effects and/or objectives. We thus look at the careers of FITs for PV and wind power in France and Germany, as well as the two Prosol programmes in Tunisia. In analysing these national careers, local case studies—wind power in Northern Friesland (Germany) and in Narbonnaise (southwestern France)—provide insights on how the emergence of these instruments reinforced pre-existing interests in wind power development, and structured collectives that had to be taken into account in changes made to these instruments at the national level.

Second, the empirical material provides **insights on how policy instruments are actually seized and activated by collectives of actors on the local level**. The case of Northern Friesland provides a historical perspective on the development of wind power in a region, and on how various actors, institutions, and territories arranged to seize FITs and, later, to devise zoning plans. The case of Narbonnaise, in southwestern France, shows how multiple values, including concerns for bird protection, can be woven together with environmental and economic logics in seizing the tariff for wind power. Three project-focused case studies make visible the work involved in using FITs for PV as a basis for developing or renewing collective involvement in renewable energy. The energy cooperative of Weissach-Im-Tal (Baden-Württemberg, Germany), the Sicaseli-Fermes de Figeac cooperative (Lot, France), and the Centrales Villageoises (Rhône-Alpes, France) all initiated photovoltaic projects built around FITs. In different ways, they all articulated various logics and values to the market incentive provided by the instrument and, to varying extents, turned it into something else.

4 Why a Focus on Policy Instruments Cannot Tell the Whole Story

Arguably, economic incentives do work. The impacts of FITs levels and reforms can be seen in the pace of renewable energy deployment. But renewable energy support schemes cannot be reduced to

their status as economic incentives. Building a project around an economic incentive requires the (re)arrangement of capacities—which are not only economic or financial—in a way that is compatible with the framing proposed by the instrument. To function, an instrument relies not only on the occurrence of financial and market operations, but on the emergence and arrangement of collectives that bring markets to life and drive them forward by constituting new capacities and relationships.

4.1 Incentives Do Not Act Alone

Analysis of projects articulated around FITs for PV shows that while the incentive does act as an initiator, this effect is far from immediate. FIT-supported PV are particularly interesting in this respect. The combination of strong incentives (high FITs) with technologies that are flexible, modular, and relatively easy to handle favours the rapid development of a wide diversity of small- or large-scale socio-technical arrangements. The contrast between the projects of the energy cooperative of Weissch-im-Tal in Baden-Württemberg and the Centrales Villageoises in the Rhône-Alpes regional natural parks sheds light on the potentialities and challenges of the process of arrangement by and around instruments.

The Need for a Collective Venture

The case of Weissach-im-Tal (Baden-Württemberg, Germany) focuses on an energy cooperative set up by the city council to install photovoltaic systems on the roofs of public buildings. FITs were critical in the decision to start the project, but they were only one of the elements that enabled the municipality to invest in PV. Weissach's energy cooperative was created in 2008 by the city council, following requests from citizens. It brings together about 250 people, and has financed a dozen photovoltaic installations on the roofs of public buildings made available by the city council. Most of its members have long been involved in the promotion of renewable energy as an alternative to nuclear and fossil resources. In particular, its leaders were first active members of

the local solar association Rems Murr, which has existed informally since the 1980s, and officially since 1994. Rems Murr has acted as a venue for reflection and experimentation and as a platform for learning and exchange among local renewable energy initiatives, thus contributing to the emergence of a local milieu favourable to renewable energy projects.

The cooperative has also taken advantage of a favourable historical and institutional context. In Germany, energy cooperatives benefit from a number of legal and financial privileges (exemption from the obligation to publish financial statements since 2004, no cap on the amount of subscriptions or the number of members). In 2006, the creation and functioning of cooperatives were simplified, reviving this form of organisation in the energy sector, and particularly in renewable energy: the number of energy cooperatives multiplied by 10 between 2006 and 2013, and the Weissach cooperative is part of this wave. This model is a renewal of the model of the electricity cooperatives that played a key role in the electrification of rural Germany in the first half of the twentieth century. It also reproduces the model of agricultural cooperatives such as the Raiffeisen-type systems that were established in southern Germany in the nineteenth century in collaboration with small local cooperative banks, the *Raiffeisenbanks*.

Finally, in the case of Weissach-im-Tal, the cooperative's project built on certain characteristics of PV technologies. The FIT was also available for other technologies, but PV had the advantage of being relatively easy to install, and of rapidly making the results of investments visible. The availability of public rooftops then became a determining parameter for the viability of the project, as much as, if not more than, the level of FITs. After three years, the stock of non-equipped public roofs in the city ran out, while the decrease in the level of FITs for PV-generated electricity reduced the financial attractiveness of investment in PVs, threatening the cooperative's future. However, the capacities that had been structured to carry out this project did not disappear: they have eventually been rearranged around a new support scheme for another technology: the Land's *Windenergiewende*, which eliminated wind power-free zones in Baden-Württemberg to support wind power development.

The Centrales Villageoises projects in the Rhône-Alpes region also built on an environment and set of capacities whose engagement with renewable energy predated the creation of FITs. In this case, however, tuning these capacities to the logic of FITs turned out to be quite challenging. The project was initiated by the Vercors Regional Natural Park and the regional energy agency, Rhône-Alpes Energie Environnement. Both have been involved in the development of renewable energy in the area for several decades. They had collaborated before in the context of European programmes. While their experience and networks were assets for the project, they had emerged during projects that focused on the territorialisation of energy issues, and mobilised technologies other than those now promoted by FITs. FITs, in contrast, were designed to facilitate investment without particular consideration for the territorial or social dimensions of projects: building a project around FITs thus implied a reconfiguration and updating of their expertise.

Here again, the incentive provided by FITs acted as a trigger. In this case, however, building projects on the basis of FITs turned out to be challenging for several reasons. First, the Centrales Villageoises projects are driven by territorial concerns and by an ambition to develop solar energy as a local resource; they seek to exploit solar potentials collectively and locally. By contrast, FITs foreground the economic dimension of the solar resource and gear actors' attention towards individual profitability. Second, given their territorial ambition, the Centrales Villageoises projects seek to associate local actors in all their heterogeneity. They were too busy assembling these heterogeneous collectives to act in time to reap the incentive at its highest point and maximise return on investment. In turn, contrary to the projects of Weissach-im-Tal or the Fermes de Figeac (detailed below), this has not been a key objective of the project.

Seizing FITs, in this case, is all the more difficult that it is difficult to gather diverse types of photovoltaic installations within a single project within the FIT framework. Following the 2011 reform of FITs for PV-generated electricity in France, the Centrales Villageoises project developers found themselves chasing after FITs that kept changing (in both levels and categories such as individual/commercial, roof-integrated or not) and constantly re-evaluating what the FIT scheme did and

did not allow at a given time—in particular, when it came to putting together different types of PV installations that did not all fall within the same tariff category. The Centrales Villageoises collectives found it extremely difficult to articulate their project around FITs. To overcome these difficulties, they tried to resort to direct political lobbying, attempting to convince public authorities to take into account the specificities of their project, and particularly their non-economic value, but failed to carry enough weight as a political force for ministers to heed their concerns.

Collectives That Articulate Multiple Values

Access to the incentives provided by renewable energy policy instruments depends on the capacity to conform (at least to an extent) to the investment model and rationale that instruments convey. This capacity, however, is far from relying solely on economic and financial resources. Collectively conforming to the instrument's framing requires articulating the multiple values to which the various members of the collectives hold, in one way or another.

In the cases of Weissach-im-Tal and of the Centrales Villageoises, it is clear that transactions around photovoltaic electricity were not the only reason for the existence of the socio-technical collectives that the FIT incentive set in motion. They drew on technical, legal, and social capacities and resources, some of which predated the incentives and were renewed by it. It follows that the effects of these instruments cannot be reduced to the realisation of economic transactions and investments that would not have taken place without them. **Since they rely on multiple resources, the collectives that emerge with the incentive are not merely economic entities: while organising to seize the incentive, they can transform territories, create new associations, emerge as political actors**… These multiple dimensions are crucial to assessing the political impacts of instruments, especially when there are uncertainties regarding their durability. Not only will those who are able to organise quickly to react to incentives benefit the most from them, they will also largely shape the future trajectory of renewable

energy development and the policies that support it, potentially creating lock-ins.

Some projects explicitly rely on the economic incentives provided by policy instruments to serve other objectives, for instance turning them into a tool for territorial development or a catalyst to bring together heterogeneous actors. This is clearly the ambition of the Centrales Villageoises, but, as we have just shown, in their case this ambition partly clashed with the FIT framework. Whilst FITs were critical for the success and viability of the Centrales Villageoises, the projects were not articulated with FITs as their backbone. Instead, the project developers attempted to keep up with changes in the FIT scheme. This created difficulties for them in emerging as a political and territorial player through, and beyond, FITs.

By contrast, the mutualised photovoltaic project carried out by the Fermes de Figeac cooperative was articulated around FITs from the outset. It clearly aimed to use them to make a profitable investment, but this was never the only objective. From its infancy, the project relied on the cooperative's skills, interests, and values to tightly articulate financial investment, territorial innovation, and mutualisation. Its business model was designed to make the most of FITs as a financial device that can turn the local solar resources into a source of profits, enabling the territory in all its diversity to benefit. Territorial innovation, renewable energy development, and mutualisation are central objectives of the project, but they depend upon the successful exploitation of a financial opportunity (Cointe 2017). The alignment of non-market objectives with a financial operation took a lot of work, especially when it came to negotiating with bankers. The business model of the Fermes de Figeac relied on the mutualisation of PV installations of various sizes, locations, and forms of ownership as a guarantee, insofar as it had been construed to smooth out and dilute risks. But the banks involved in the funding of the project were not ready to accept this mutualisation (which assembled heterogeneous individual projects) as a financial guarantee: they had to reassess risks for each installation individually and ask for additional guarantees to ensure that mutualisation was financially sound. In the end, this reinforced the interdependence of the

mutualised and territorial character of the project and its financial viability, as it validated it from a bankers' perspective.

Milieux That Predate Incentives and Live on

The milieux that are associated to and grow with the development of instruments often predate them. The first wind power projects in Northern Friesland emerged in the 1980s from the conjunction of individual initiatives driven by anti-nuclear mobilisations with the first federal RD support for renewable energy. The FITs set up in 1991 and reinforced in 2000 acted as a catalyst for a process that had already been launched.

In the Fermes de Figeac, the successful articulation of heterogeneous sources of value was partly allowed by the trust that farmers already had in the existing local agricultural cooperative, which developed the project. The collective that grew out of the PV project also had impacts far beyond the financial profits and immediate economic activity it generated. As a matter of fact, it equipped an agricultural supply cooperative with the expertise, the network, and the human, technical, and financial resources to become an actor in the field of renewable energy. More broadly, it enabled the cooperative to emerge as a representative of a specific political project centred on a territorial and mutualised conception of renewable energy development. Interestingly, it is because the project complied with the logic and temporality of the FITs that it could take them forward and make a financial device into the basis for building capacities in the field of territorial renewable energy.

In the case of the Narbonnaise Regional Natural Park (France), the milieu which allowed the repowering of a wind power project also predated the process and lives on in various ways. This case study displays a definite articulation between the financial capitalisation of a wind power project, which was triggered by the French FIT, and other types of non-financial capitalisation which underpinned the possibility of its development.

The case study is located at the border between France and Spain, on the east side of the Pyrennees. As a very windy area, Narbonnaise hosted

the first industrial wind power project in France in the early 1990s, which could then be considered for repowering (dismantling the wind farm in order to set up a new one) twenty years later (2010).[5]

Importantly, as a windy place, the small coastal plain of Narbonnaise is also a stop on one of two migratory routes for birds on their way from Africa to Eastern Europe and back. Narbonnaise has a strong political history in birdwatching. It was one of the important places in France where birdwatchers met and set up 'migration camps' in the 1970s, counting the population of birds passing by in order to attract the attention of European and French state authorities to the need for regulatory protection.

As the wind power site is located within a major migration corridor, birds became an important project adjuster in the repowering process. The project's design and siting proposal involved a collaboration between the wind power developer and the local branch of the French bird protection organisation (LPO), in which birdwatchers used the existing wind farm as a lab-site to monitor individual birds in their flight through the turbines. Focusing on individual trajectories allowed birdwatchers to understand and assess birds' cognitive and strategic capacities in crossing the turbines—knowledge which could then be translated into a proposal for siting the turbines that were felt to be compatible with migration. The project thus ventured into changing the politics of bird protection in the same area where migration camps had politicised it in the seventies. With this project and this experimentation, the developer and the LPO opened up access to spaces that were protected because of bird migration movements, turning them into energy-producing spaces.

Thus, in various ways, the milieu that grew with the project and allowed this capitalisation on wind energy predated the instrument, and lives on. Capitalisation was triggered by the wind power tariff, without which the developer would never have been interested in developing a wind farm, but it was not restricted to finance. Financial capitalisation was underpinned by other types of capitalisation, such as making more out of past knowledge and political and network structures around bird protection and environmental compensation.

4.2 Investment Is Not the Only End

Economic transactions and financial investments are an important aspect of the emergence and articulation of the collectives and action capacities that support instruments help bring into being. However, they do not tell the whole story. We have shown that the ability to seize an instrument and benefit from the incentive it provides is not immediate, and that it can be constituted with the explicit objective of going beyond the market framing proposed by policy instruments. In many cases, financial and economic objectives (i.e. investments and transactions) are only one element in the elaboration of projects. The instrument then produces more than financial flows. Regulation that only takes into account market effects is likely to fail.

Sometimes, however, especially when incentives are high, policy instruments act purely as financial devices: that is, they are used only to ensure financial profits. Between 2008 and 2010, the high level of French FITs for PV-generated electricity guaranteed extremely high rates of return. These attracted a multitude of economic agents with financial, if not speculative, aims (Debourdeau 2011). A specific milieu, oriented towards profit maximisation, thus emerged around FITs: PV developers proliferated, and some market actors combined multiple financial vehicles with public subsidies to turn PV into a financial product whose material characteristics mattered only insofar as they translated into added expected profits (Debourdeau 2011).[6] The FIT scheme did not withstand this proliferation: public support for a programme with an impact on electricity bills could no longer be justified if it had no other effect than to drive a surge in financial investments and speculation.

Thus, it turns out that policy instruments do not stand when they are used only as vehicles to enable profitable economic transactions: their objectives do *not* boil down to developing and multiplying economic transactions and investments. Through support to market creation, these policy instruments, in fact, aim to create more than markets.[7]

As soon as policy instruments foster more than mere market transactions, they cannot be governed simply by tinkering with market framings. Cutting incentives is not enough to make the collectives that grew

out of them disappear, because they tend to fight back. Nevertheless, it can scare away those motivated only by financial profits, and thus contribute to market regulation.

As Capitalisation Grows, Milieux Evolve and Challenge Instruments

The effects of renewable energy policy instruments cannot be reduced to their economic and market dimensions, such as the multiplication of new kinds of transactions, increased investment in technologies that were previously financially unattractive, and growth in installed renewable energy generation capacities. Variables such as technologies, prices, installation costs, number of projects, and expected and accumulated installed capacities and electricity generation are used to monitor and calibrate such policy instruments, but give only a partial account of the transformation induced by policy support. The qualities of renewable energy projects that develop in the context of economic support also depend on the types of collectives that mobilise around them, their motivations for doing so; physical, geographical, and administrative constraints; the material and administrative organisation of existing energy infrastructure; the material and industrial characteristics of technologies, etc. As of today, dimensions such as the ambitions and objectives of projects, types of business models, and the territorial and political impacts of instruments are not systematically monitored. This is perhaps in part because they are harder (if not impossible) to assess quantitatively. And yet regulation via instrument design and technical parameters can only act upon whatever the instrument in place is equipped to take into account.

It follows that **political action mediated by policy instruments only allows for limited regulation of renewable energy development. The effects of these instruments can thus easily challenge the associated frame**, not only because these effects can extend beyond the associated objectives, but also in the sense that instruments do not always provide the means to channel their effects.

The Challenging Management of PV Deployment

Overflows have been especially striking in the case of PV. Despite frequent readjustments and increasing sophistication, FIT schemes struggle to take into account the specificities and dynamics of the photovoltaic sector. As modular technologies, PV are very different from the technologies for which FITs were initially devised, chiefly wind power. Compared to wind turbines, PV modules are relatively easy to handle, and they can be assembled into installations of very diverse forms and scales. PV can thus deploy in varied, potentially very diffuse forms, which makes their development difficult to control. In Germany and France, channelling the development of PV in the context of FIT support schemes has proven extremely challenging.

In Germany, the 2004 FITs for PV-generated electricity, combined with the drop in global PV module prices in the late 2000s, triggered a surge in PV installations. To control this surge and redirect investments, the FIT scheme was revised four times (in 2009, 2011, 2012, and 2014). The failure of these revisions to effectively contain the development of PV stems from several factors. Given the rapid rate of change in the PV sector (globalisation, decreasing PV system prices), it is virtually impossible to incorporate reliable monitoring devices into a FIT scheme, or to keep track of and consolidate reliable data on future cost trends in order to adjust FIT levels.

These technical difficulties related to instrument calibration contributed to the incapacity of the FIT scheme to both contain the quantitative increase in PV projects and to direct PV development towards particular types of projects, actors, and landscapes. Until the 2012 revision, each decrease in FIT levels, in fact, accelerated the increase in installed capacity instead of halting it. Announcements of upcoming reforms triggered waves of investment (windfall effects) which accelerated the development of large-scale ground-mounted PV plants instead of promoting the decentralised diffusion of small-scale residential installations: firms used FITs as a financial vehicle for risk-free profits.[8]

Finally, the control of PV development in Germany was further hindered by a lack of consistency in the objectives of FITs. Apart from the goal of increasing investments in PV, these objectives were

never clearly defined. Throughout the 2000s, they oscillated between the development of substitutes for fossil fuels and support for the domestic PV-cell production industry. For instance, the increase in the cap on PV capacities eligible for FITs and the very attractive FITs for PV-generated electricity set in 2004 was aimed at providing market outlets for PV-cells manufacturing companies. This objective faded in 2011–2012, after most German PV manufacturing firms went bankrupt. These objectives tend to become increasingly variable as the success of FITs creates new problems, such as the management of the increasing share of intermittent electricity in the electricity grid (Hoppmann et al. 2014), or the increase in electricity bills caused by FITs.

In France, PV support provoked a similar surge, which was exacerbated by the design of FITs (which were high, static, and polyvalent) and by the lack of adaptation of the support scheme to evolutions in expectations. The FIT scheme set up in 2006 had very modest ambitions and provided no mechanisms for monitoring or readjustment. Market overflows were thus managed in a context of urgency: a series of ad hoc reforms in 2010 created windfall effects and accelerated the surge, as was the case in Germany. In order to discourage speculation and to direct investment towards specific types of PV installations, the government attempted to differentiate FITs—notably with the category of 'Building-integrated photovoltaics' (BIPV)—and introduced targeted decreases in FIT levels. BIPV was supposed to restrict access to the more attractive FIT it offered and be used as a proxy to differentiate between desirable and undesirable PV projects. It, however, was impossible to define 'building integration' in an exhaustive way and the category did not allow to contain the proliferation and diversity of roof-mounted PV, nor to control large-scale roof-mounted PV projects (the biggest share of installed capacity). In the end, its use greatly complicated the French FIT scheme, and the inability of the FIT scheme to actually frame the development of PV it had sparked led the market to explode and the instrument to implode.

The series of reforms in 2010 ended with a three-month moratorium on FITs which were then renegotiated and redesigned, along with their objectives.

Wind Power and the Landscape Challenge

Though they led to very different problems, French FITs for wind power also proved ill-equipped to manage their own effects, particularly in relationship to planning and territorial policy. They were adopted in 2001, without additional framing devices. In contrast to German policy, they were not associated with priority access to the grid for wind power. The financial incentive combined with the prospect of a possible limitation of access triggered a race to develop projects. The number of projects submitted for authorisation rose dramatically, especially in windy regions, and soon raised local opposition. In the absence of a coordinating framework, these contestations were initially dealt with on a case by case basis, and ad hoc institutions, rules, and regulations piled up at different levels of government: administrative and legal acts, voluntary regional schemes for wind power development, codes of good practices, wind power committees, etc. (Labussière and Nadaï 2015). In 2005, the *Loi de programmation énergétique* established 'Wind power development zones' (ZDE in French): landscape issues and local opposition were invoked to justify the need for state coordination and planning tools. But wind power development zones were not tailor-made to deal with siting issues, since their design essentially resulted from a political struggle over the decentralisation of energy policy (Nadaï 2007). This shift was accompanied by increases in litigation and in administrative constraints on wind power projects. Wind power development zones were eventually eliminated in 2013 (loi Brottes), leaving the issue of the collective and territorial construction of wind power unaddressed. Since then, there have been attempts to address this issue through the creation of a wind power development charter which was co-signed by a federation of wind power developers and an association of local authorities (FEE-Amorce). Overall, the case of French wind power shows that the regulation of FITs is difficult to stabilise owing to the divisions created by the fact that FITs reduce wind power to its economic dimension. These divisions have repeatedly prompted the development of strategies to contest and weaken the successive regulatory devices in the domain.

5 The Co-dependence of Instruments and Their Milieux

Policy instruments and those who benefit from them depend on each other. The collectives and milieux that arrange through and around a specific policy instrument generate their own political needs, in the strong sense of 'political' proposed by Barry (2001, 2002): that is, as something that cannot be channelled through the ordinary course of politics. These collectives and milieux have to be taken into account, dealt with, and sustained in further policy development. They can resist when the instrument they depend upon is threatened. Instruments need to be constantly adjusted, and the effects of these iterative changes need to be followed in order to govern the changes.

5.1 Sustaining a Milieu

The case of Prosol Elec in Tunisia illustrates the tensions that arise when a policy arrangement is too focused on end-transactions and fails to sustain the network of intermediaries without which these transactions cannot take place. Difficulties with managing Prosol Elec did not stem from the surge in PV installations so much as from the jamming effects that ensued. The incentives for households to install PV systems opened an unprecedented market for solar technologies, triggering the configuration of economic and entrepreneurial activities directed towards the supply and installation of solar systems. This 'boom' involved actors of highly diverse scope and strategies: subsidiaries of foreign firms, local businesses specialising in solar energy, firms seeking to diversify or reorient their activities. But the design of the Prosol Elec system did not make it easy for these businesses to develop, because it was almost exclusively focused on its recipients (chiefly, households). To prevent households from having to pay an advance on the cost of installations, the Agence Nationale pour la Maîtrise de l'Énergie (ANME) (National Energy Agency) directly transferred the amount of subsidies to the firms that supplied and installed PV systems.

The concrete consequence of this system was that firms had to bear installation costs themselves until the ANME paid them. Meanwhile, the ANME and the STEG, in charge of managing Prosol, lacked the financial and human resources needed to cope with the programme's success. Additional tensions stemmed from the limitations of extra-budgetary support instruments and from the low-level of international funds (which play a determinant role in the calibration of Prosol subsidies). This generated delays in payment, as the ANME was unable to process subsidy requests and make timely payments. PV system installers and suppliers thus faced delays that many were unable to bear. This led to bankruptcies and to a narrowing down of the sector around those best able to absorb the shock (for instance because their activities were more diversified or because they had greater financial capacities or more backup from banks), casting a shadow on the success of an instrument that benefited from strong legitimacy and the enthusiasm of its recipients.

5.2 Resisting the Milieu

In France, the mutual dependency of FITs and their milieux, and the resistance of these milieux to reforms, were abruptly revealed by the moratorium on FITs for PV-generated electricity in December 2010. The moratorium was perceived as a shock by the PV sector. It triggered intense political reactions, which translated into an extremely tense climate in the following months and the creation of diverse, more or less durable associations to represent and defend the interests of the various PV sector actors. Until then, they had felt no need to structure themselves politically, since the FIT scheme left room for everyone; but because it threatened their very existence, the moratorium pushed them to do so. The consultation of PV actors that took place during the moratorium enacted the politicisation of PV: by providing a stage for the expression of grievances and debate, it made visible the diversity of actors and interests related to FITs for PV. Moreover, the moratorium forced these actors to organise in order to constitute representatives and appear as legitimate voices in political arenas. Although many of these

actors and organisations disappeared shortly after the moratorium, the vehement reactions to the suspension and renegotiation of FITs and the political moment that they initiated suggest that tinkering with a policy instrument after it has started acting can never be neutral. The issue is not simply to regulate and cleanse a policy-dependent market, but rather to constitute reliable representatives and negotiate with diverging interests that assert themselves politically when they are threatened.

In Germany, the reform of the Erneuerbare-Energien-Gesetz (EEG) that came into force in August 2014 had similar effects. This reform clearly aimed to stall the uncontrolled development of PV, and the measure it introduced restrained it significantly (annual cap on new installed capacity, reduction in and quarterly adjustment of FITs, the introduction of tenders for ground-mounted PV). It thus triggered heated contestations from the sector (which had not been the case of previous EEG revisions).

5.3 Augmenting the Instrument

The instruments considered here work by providing market framings and financial incentives, but we have shown how neither their effects nor their objectives are limited to creating new markets. The calibration and adjustment of technical parameters are thus not enough to govern the dynamics that policy instruments initiate. In our case studies, specific strategies for regulation and steering take shape along the way, with more or less success. They need to take into account the dynamics and temporality of policy instruments, their multiple impacts, and the mutual interdependence of instruments and their recipients.

The support schemes studied here are characterised by iterative evolutions that constitute so many attempts to take additional criteria and effects into account. These evolutions either translate into increases in the sophistication of the policy instrument itself, which grows in complexity as it is equipped to adjust to its 'milieu', or into the addition of other instruments to the scheme. Often this process makes support schemes simultaneously more technical and more political: while the instruments grow in complexity, they also grow more contested.

Wind Power: Regulation Through Addition

The case of wind power in France is a good example of regulation by addition of instruments and devices. As detailed above, after five years of adding layer upon layer of ad hoc regulations, FITs were supplemented with devices for territorial planning: wind power development zones. These spurred increasing contestation, which eventually led to their demise in 2013. However, the issue (territorial planning and coordination) has not been resolved, and new strategies are being developed to address it, such as the current attempt to elaborate a convention between developers and local authorities. In Germany as well, wind power was regulated through the gradual introduction of zoning tools at different scales, but this led to very different modes of governing the territorial impacts of wind power. For instance, in Schleswig-Holstein and particularly in Northern Friesland, procedures for concerted zoning were developed (though they were not without their own problems, see §6.3).

Photovoltaics: Regulation Through Sophistication

In contrast to French wind power, the case of FITs for PV-generated electricity is emblematic of policy evolution through increases in the sophistication of instruments. When they appeared in Europe in the 1990s, FITs were relatively simple price-based instruments: they secured priority access to the grid, imposed a purchase obligation, and fixed a purchase price, usually on the basis of the avoided cost of electricity generation. In 2000, the German EEG introduced more sophisticated FITs that were more finely tuned to the characteristics of technologies. First, they were technology-specific, and their level was determined according to technology costs, and not avoided costs.[9] Second, they were set to decrease on a regular basis to follow the decreases in technology costs that they were expected to trigger. From 2003 onward, an additional distinction was introduced between roof-mounted and ground-mounted PV, so as to favour the former (Jacobs 2012).

By the late 2000s, as the need to control the development of PV became more pressing, FITs were made more sophisticated through the addition of mechanisms to control quantities. In Germany, a 'corridor' system for FIT adjustment was introduced in 2009: the evolution of FIT rates was indexed to the annual quantity of PV projects in order to follow a desired growth pathway. Similarly, in France, FITs were made 'self-adjusting' in 2011: the evolution of FIT rates was indexed to the pace of PV development, it was calculated on a quarterly basis according to predetermined formulas calibrated to a cap on yearly new PV installed capacity.

FIT schemes have further grown in complexity to allow for qualitative steering of PV development, notably with the introduction of a BIPV category intended to direct investments towards residential PV (see §4.2 'The challenging management of PV deployment'). The growing sophistication of FIT schemes, and their frequent adjustments, highlights the will to refine FITs as much as possible, as well as the difficulties of accounting for the multiple dimensions of PV within the frame of a single instrument.

Paradoxically, though this process has intensified the technical nature of these instruments, it has also tended to re-politicise them (even when the aim was the opposite). On the one hand, instruments become less transparent as they grow in complexity. The space for political negotiation narrows down, since political choices are tentatively delegated to instruments that are designed to adjust automatically. At the same time, the ambition to consider an increasing number of non-economic criteria in the design of instruments also requires more choices. In the end, price adjustment does not depend on market dynamics as much as it does on political negotiation processes that can be more or less open.

Furthermore, over the course of such evolutions, instruments come to assemble increasingly heterogeneous considerations—such as aesthetics, redistribution issues, equity, political constraints…—and become vulnerable to a wider range of contestations. The frequent renegotiations of FITs for PV-generated electricity in France and Germany emphasise the failures of de-politicisation through instruments, and the inability of policy instruments to channel renewable energy development wholly through markets.

6 Monitoring and Negotiating Change

A major challenge for market-oriented renewable energy policies is to adapt support instruments to their unintended effects, or in other words to bring the overflows of policy-dependent markets and investment dynamics back into the frame. These support schemes need not only to create renewable energy markets, but also to civilise them (Callon 2009). This generates tensions between the market, economic, or financial dimensions of instruments—which are pointless if they do not constitute economic incentives—and their political content—their objectives evolve along the way, and are not limited to profit-making and market creation.

In turn, what is at stake in the establishment of such means to monitor and represent the consequences of policy instruments is the capacity to hold support schemes together with the objectives that justify them. As the policy instruments that we consider here tie the achievement of political objectives to the successful development of market and investment activities, keeping them in line with their purpose requires the conciliation of the (often diverging) private interests of the collectives that arrange around them and keep them alive with the (often fluctuating) public concerns that justify their existence. This alignment of economic and non-economic values is an experimental, iterative process: as we show here, the development of market capacities that follows the adoption of instruments produces multiple new relationships, values, and concerns that are then fed back to the policy process. These emerging and multiple relationships, values, and concerns need to be represented and negotiated for the instrument to evolve. The cases studied in this paper display the variety of the arrangements set up to govern instruments and their consequences: that is, to represent them *and* act on them, with more or less success.

6.1 Representing and Documenting Multiple Effects

The challenge is then to devise means for representing and piloting the effects of policy instruments so as to bring back into the policy frame

those elements that threaten it because they extend beyond it. This holds true for economic framings (e.g., changes in technology costs over time) and political pacification (e.g., governing emerging socio-technical collectives).

The first challenge is to **represent and document the multiple effects** of policy instruments—and specifically, those that overflow policy instruments. Stabilising means to represent these effects requires reaching agreement on what elements should be considered relevant, and the development of devices to track and represent them. When it comes to policy instruments, especially those that are expected to produce something new, this process cannot be separated from regulation, or indeed from politics. Monitoring the effects of instruments requires discussions around what should be taken into account, how, and through what devices and representatives, but also around the extent to which effects should be attributed to instruments, and whether or not they are desirable. It is thus about stabilising the assemblages of means of representation that will contribute to the organisation of both the relevant markets and the associated political processes—what Brice Laurent calls 'constitutional orders' (Laurent 2013). Sometimes, these very arrangements are unstable and contested (as opposed to situations in which they are stabilised and institute specific forms of scientific objectivity and political legitimacy that channel the management of an issue).

For instance, the lack of established modes of representation and monitoring of FITs and their effects was at the heart of the French PV crisis in 2010. The lack of human, technical, institutional, and statistical resources to track the evolution of the PV sector largely contributed to the government's inability to readjust FIT levels in a timely fashion. The PV sector was comprised of economic actors of very diverse origins and interests (large utilities, local construction firms, actors from the finance sector, farmers, start-ups, etc.), all of whom benefited from very high FITs. In that context, there existed no reliable statistical, institutional, or political channels to, first, establish a picture of these actors and interests, and second, obtain robust data on the evolution of PV installation costs, which were crucial to FIT assessment and adjustment. There was also a lack of visibility on the number of PV projects that

would be carried out: grid operators were overwhelmed and the rate of speculative projects was unknown, making it even harder to get a clear view of the sector. The consultation that took place in 2011 brought these uncertainties, controversies, and divergences into light, and was made particularly difficult by the absence of legitimate spokespersons for the sector. As a matter of fact, it did not prove able to produce a representation of the PV sector that was considered reliable enough by public authorities (Cointe 2017). This collective inability to arrange the representation of PV and of the impacts of FITs was one of the reasons for limiting policy support for PV and restricting the scope of FITs in 2011. For instance, the introduction of tenders for medium- and large-scale PV installations allowed for more direct control over the sector, especially insofar as it forced project developers to provide standardised information. It made it possible to identify and list project developers, and to consolidate information on project costs (one of the calls for tenders was based on price as the only criterion, encouraging candidates to state their lowest price).

6.2 Keeping Flows of Money Running

In Tunisia, the solar sector does not appear to be very structured: two trade unions claim to represent the sector (the *Chambre syndicale des énergies renouvelables* and the *Chambre des industries électriques et des énergies renouvelables*), but neither seems to really play this role either in their relationship to firms or as an interface with public authorities. However, the difficulties encountered by Prosol Elec triggered vigorous debates in the press, revealing a confrontation between the *Chambre syndicale des énergies renouvelables*, the ANME, and the STEG. The ANME was thus challenged in its regulatory role. In the current arrangement of the Prosol programme, economic activity is heavily reliant on the capacities of administrative actors who appear unable to keep up with their tasks. Following this saturation of the instrument, the Tunisian PV sector has been developing new strategies to emancipate itself from subsidies and from public regulation. The jamming of Prosol Elec may thus hint at a rearrangement of PV activities.

6.3 Articulating Spatiality

With wind power development, the issue lays not so much in the representation of the effects of FITs as in the arrangement and stabilisation of ways of addressing one of their most visible, material effects: the geographical dispersion of wind turbines and wind farms. FITs schemes in Germany and France did not consider territorial or landscape issues at all, and, contrary to FITs for PV, there have been no attempts to adapt them to do so. Instead, a variety of strategies for planning, negotiating, and coordinating zones open to wind power development emerged, in tension between local and national politics and between economic and territorial concerns. The regulation of the territorial impacts of FITs for wind power has followed contrasting trajectories in Germany and France.

In the case of Northern Friesland, a rural district (a *Kreis*, totalling up to 133 rural towns) from the region (*Land*) of Schleswig-Holstein in northern Germany, the issue of the instrumentation and regulation of support for wind power has travelled across federal, regional, and municipal scales to be rearranged in a number of arenas. Its evolution has been shaped by tensions between attempts at regulating the effects of FITs and the interests and collectives arranged around them.

FITs for wind power were instituted at the federal (national) level without consideration of the spatial dimension of wind power development. Planning emerged gradually at the regional or municipal levels to regulate the impacts of FITs on territories and landscapes *a posteriori*. In 1991, immediately after the establishment of FITs, the number of authorisation requests for wind power projects surged.[10] Local town authorities encouraged project developers to group together in order to facilitate the planning of the projects. In 1992, the rural district of Northern Friesland started mapping both the landscapes to be preserved and the first zones 'suited for wind power development'. The latter emerged around existing wind farms. In 2000, Schleswig-Holstein followed a similar concentration policy and asked all its *Kreise* to negotiate with their town authorities and to suggest about 1000 ha suited for wind power development. Building on its longstanding interest in

wind power, the *Kreis* of Northern Friesland involved all local wind power actors (pioneers, citizen parks, and developers) as well as its 133 towns. It ended up proposing a surface that largely exceeded the threshold: it was first cut down under the direction of the *Land* of Schleswig-Holstein, before being raised again after the 2012 reform of the federal renewable energy policy (EEG).

In this process, the regulation of wind power development proceeded through a succession and superposition of several levels of decision-making and negotiations—individual-town, town-collective, town-*Kreis, Kreis-Land, Kreis*-town, and town-*Kreis*—with the federal government retaining power to trigger shifts in regulation that the Land had to take into account. The articulation of spatiality remains challenging. The result of the combination of FITs and the planning tool was that only a portion of the towns were allowed to develop wind farms, which then raised a distributive issue between towns with and without wind farms. This has led to legal recourses against the zoning plan, and threatens all regional planning in Germany since 2000.

The regulation of wind power development in France took shape through quite different arrangements. As mentioned above (cf. §4.2 'Wind Power and the Landscape Challenge'), 'wind power development zones' were established in 2005, five years after FITs, to regulate local opposition to wind power in a context of political ambiguity regarding wind power and the decentralisation of energy policy (Nadaï 2007). Moreover, this planning instrument established that wind power development zones would be devised by local authorities but validated by prefects (i.e. representatives of the state). The state thus maintained control over wind power development, and wind power development zones were immediately contested by the wind power sector, who pointed out that they constituted an additional barrier to wind power development. This triggered a proliferation of legal cases: developers have contested zoning that threatened ongoing projects, and, more recently, anti-wind power networks have contested the chosen zones in order to trigger reconsideration of projects under development (or even already developed) in these zones. In 2009, the planning of wind power development was regionalised—meaning that zones suited for

the development of wind power were re-examined and consolidated on a regional level by regional administrations. In this process, the political work that had been carried out by local authorities before the regionalisation was still very unevenly taken into account. This led to additional frustration and contestations, which added to the ongoing judicialisation of wind power development zones, and resulted in the eventual elimination of this planning device in 2013. The contested career of wind power development zones reflects the challenges of assembling diverging interests around an instrument for territorial planning that failed to develop in interaction with territorial issues, actors, and configurations.

7 Instruments, Concerns, and Relevance

The use of instruments or markets to pursue political ends is often considered to move issues away from the domain of political debates and negotiations, entrusting them instead to technical adjustments in instrument design or to economic activities coordinated through market operations, respectively. The cases studied in this chapter present us with a more complex picture, because despite (or perhaps due to) the crucial role that market activities and policy instruments play in them, all of the cases studied are rife with engaged collectives, conflicting interests, heated political debates, and attempts to configure arenas for the confrontation and conciliation of differences.

Our case studies show that the economic processes framed by policy instruments—either market or investment encounters—are 'concerned' (Geiger et al. 2014). They deal in multiple values and lead to policy reforms, or even crises, when they are only informed by economic and financial logics. Moreover, the potential of instruments to bring about changes in energy systems depends not just on their design, calibration, or inclusion in wider policy frameworks, but also on the constitution and arrangement of capacities and collectives able to react to policy incentives. Instruments grow with and within what we have called their milieux. These milieux are heterogeneous and dynamic, and the need to

take them into account leads to the iterative development of regulatory strategies that can take very diverse forms (and of which we have highlighted only a few examples).

With some exceptions, the literature on the policy instruments considered in this chapter has focused on their design and their fine-tuning in the political arena. It has not acknowledged the milieux that develop around them and the way in which these milieux shape the politics around them. When it has done so, it was either to explore the role of intermediaries in relationship to project development (Agterbosch et al. 2009) or to analyse the extent to which instruments succeeded in making certain realms and people governable (governmentality literature; cf. the introduction to this chapter).

Our analysis suggests that instrumentation and economisation do not necessarily lead to the de-politicisation of public issues. Indeed, they can be political (in the strong sense of producing effects that cannot be readily addressed through established procedures and institutions) in many ways. At any rate, they do not eliminate the need for collective and political negotiations, although they configure such negotiations in new ways. In that sense, this chapter completes previous studies in STS that emphasise the potentially destabilising effects of practices usually considered to 'cool things down', such as calculations (Barry 2001, 2002) or benchmarking (Overdevest 2011).

The cases related here also outline the multiple collectives, concerns and values that grow out of and sustain policy instruments (and the markets they frame). These appear to be crucial for the analysis of renewable energy policy, and for renewable energy deployment more broadly.

Policy instruments are often meant to initiate the deployment of specific forms of energy production. But in fact, the projects and collectives that build on these instruments, as well as the arrangements that are set up to regulate and govern them, continuously shape the trajectories and potentials of renewable energy. These arrangements can be more or less open—that is, more or less equipped to address the heterogeneous impacts, interests, and concerns that arise around them. It should also

be noted that their openness or lack thereof may as easily result from explicit and concerted political choices as from the contingency of accompanying ad hoc changes.

The processes by which instruments are deployed cannot be reduced to the negotiation of a design. In triggering the formation of collectives and coalitions as well as the articulation of shared values, they are part and parcel of the emergence of political ends, beyond those that are foregrounded by instruments.

The deployment and continuous adjustment of these policy instruments are thus moments in which democratic issues are at stake in the articulation of these shared values. What our analysis shows is that it most often builds on pre-existing political structures at various levels and scales, and triggers the structuring of new and persistent collectives and practices. In certain cases, it enables the emergence of participatory spaces (e.g., Figeac, Northern Friesland).

The articulation of instruments and their milieux thus plays on multiple levels, both around projects and in larger, national policy arenas. Far from merely depoliticising the conception and deployment of public policies, as has been argued in some analyses of the 'instrumentation' of public policies (Lascoumes and Le Galès 2005), the co-dependence and co-evolution of these instruments and their milieux gives rise to its own politics. These are not restricted to the offices of institutional politics and civil service, a feature made visible by the difficulties in controlling the effects of incentives to invest in renewable energy production in the three countries considered.

As capitalisation *agencements*, the policy instruments examined in this chapter convey a vision that is centred around economics and that, in certain cases, makes it difficult to capitalise projects along dimensions that are not aligned with this vision. The case studies, however, reflect a diversity of developments, and the articulation of multiple values seems to be all the more successful when it predates the deployment of these instruments. In some of our case studies, collective ventures capitalised as much on previously existing political structures as on the financial dimension of the tariff.

8 Conclusion

This chapter started from an interrogation of the role of policy instruments, especially those that are investment-oriented, in shaping changes in energy systems. Bringing together relatively recent developments in STS on 'concerned markets' and 'capitalisation' allowed us to examine the politics of policy instruments from an angle that differs from those taken in the existing academic literature, and to suggest several insights on the relations between politics, policy instruments, investment, and markets.

Here, we sought to develop a detailed, empirical sociological perspective on renewable energy policies in three countries (France, Germany, and Tunisia), addressing cases of instruments that were meant to achieve political objectives through markets, by both fostering *and* regulating investments in new energy technologies.

Despite their economic framing, these instruments trigger processes that deal with multiple values and that sustain the emergence of collectives concerned with their effects: what we called their 'milieu'. The need to articulate these instruments with their milieu leads to iterative adjustments and developments that carry with them their own politics, far beyond conventional issues of design. The processes by which instruments are deployed are thus part and parcel of the emergence of political ends beyond those directly foregrounded by these instruments. These instruments prove to be very unevenly equipped to address the heterogeneous impacts, interests, and concerns that arise, not to speak of cases where concerted political interests deliberately contribute to their being overlooked.

Echoing the introduction of this book, the deployment of policy instruments can thus be regarded as a moment of ontological trouble, in which actors and entities are embarked in energy change processes and faced with changing identities and capacities to act. The extent to which the different actors who are called for in these processes can make their concerns relevant is variable and needs to be explored further.

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Notes

1. For a detailed description of the framings created by FITs for PV in France, see Cointe (2014, pp. 90–98).
2. See, for instance, Chapter 3 in this book for a characterisation of this strand of analyses.
3. Sometimes, instruments do not have the desired effect precisely because they are not combined with the (institutional, legal, technical, informational) equipment that would make them operational, and thus fail to be seized and appropriated. For instance, in 2002, the first FIT for PV in France had a very little impact, not because of bad design, but because it was not connected to the realities of PV and was, it could be argued, an instrument 'without a milieu'.
4. See Muniesa et al. (2017) on capitalisation on Powerpoints, scientific research, and time.
5. Under the French FIT, 20 years is commonly considered by wind power developers as the time lag after which turbines can be dismantled and replaced.
6. Though they emerged around the same instrument, this milieu and those that developed in the Centrales Villageoises and the Figeac can be understood as diametrically opposed. On the one hand, actors in the financial ecosystem that developed to reap the benefits of FITs for PV strove to dematerialise PV: what counted for them was the ability of PV technology to produce a good that secured high return on investment. On the other hand, in Figeac and Rhône-Alpes, the objective was to entangle PV—and profits from PV—in specific territories and collectives.
7. In that sense, the transactions framed by policy instruments contrast with 'traditional' market transactions, which purchaser and seller leave without further mutual obligation, and the traded good is largely disentangled from the seller's world and entangled in the purchaser's world. Here, what the transaction provokes outside the exchange matters and has to be taken into account, because the transaction is not the ultimate objective of the instrument.
8. Most large ground-mounted PV plants were developed in the new *Länder* by developers and funding societies based in western Germany.
9. The 'technology cost' approach consists in setting the tariff on the basis of cost of the energy technology (PV in this case); the 'avoided cost'

approach consists in supporting the new technology on the basis of the costs (capacity investment, environmental damage…) avoided by virtue of its development.

10. In January 1991, 130 wind turbines were already in service in Northern Friesland, and 200 authorisation requests were pending; in August 1991, 500 additional requests were recorded.

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