From a promise to a problem: The political economy of solar photovoltaics in France

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Abstract:[1]
In France as in many European countries, grid-connected photovoltaics (PV) took off between 2008 and 2010, driven by an overly attractive feed-in tariff scheme that failed to take into account the rapid evolutions of PV technologies and markets. This unexpected expansion of a policy-dependent market led to a moratorium on feed-in tariffs followed by a consultation with stakeholders in 2010-2011. This article analyses the build-up, explosion and resolution of this crisis by focusing on the market and political effects of feed-in tariffs in the years 2008 to 2011. The consultation is analysed as an attempt at the political organisation and representation of the emerging PV sector. The paper shows that it failed to constitute a reliable representation of it, and that the government addressed the difficulty to control the sector by closing down both the market and the political space. It concludes that the good functioning of feed-in tariffs requires work of market organisation as much as of political construction, since their regulation relies on market data and on political compromises.

Keywords: photovoltaics, feed-in tariffs, France, marketization, politicization

Highlights:
- This paper analyses the crisis of photovoltaic support schemes in France in 2010.
- It gives a detailed account of the market and political effects of feed-in tariffs for PV.
- The French case is an extreme example of the turbulences of FIT-driven PV deployment.
- The regulation of FITs for PV relies on market expertise and political compromises.
- These are not given and need to take into account the dynamic effects of FITs.

[1] Abbreviations: BIPV (Building-integrated photovoltaics); CRE (Commission de Régulation de l'Energie); EDF (Electricité de France); EDF-EN (EDF Energies Nouvelles); EDF-AOA (EDF Obligation d'achat); ERDF (Electricité Réseau Distribution de France); FIT (feed-in tariff); PV (photovoltaics); SER (Syndicat des Energies Renouvelables); RTE (Réseaux et Transport d'Electricité).

In less than a decade, the photovoltaic (PV) sector has undergone dramatic evolutions. Considered extremely promising but expensive and far from economic maturity a few years ago, photovoltaics have turned into increasingly widespread and affordable electricity generating technologies. PV module prices have decreased by 80% since 2008, while installed PV capacity worldwide has expanded from 39 GW in 2010 to 140 GW by the end of 2013, with an increase of about 47 GW estimated for 2014 (Jäger-Waldau, 2013, 2014; REN 21, 2014, p. 47). Most of this growth occurred in Europe, where photovoltaic electricity generation capacity has increased by 373 times between 2000 and 2012 (Jäger-Waldau, 2013, p. 11-12), though the European market is now declining (Jäger-Waldau, 2014, p. 14).

The recent deployment of grid-connected photovoltaics in Europe was driven by policy support in the context of the development of renewable energy policy by the European Union (EU). Following the adoption of EU renewable energy objectives for 2020 in 2001 (European Parliament and Council, 2001), many European countries have set incentives for grid-connected PV, taking the technology out of the labs and niches. Despite heated debates over the best support instruments among academics and EU institutions alike (Hvelplund, 2001; Lauber & Schenner, 2011; Ménanteau et al., 2003), feed-in tariffs (FITs) such as those adopted in Germany soon became the dominant instrument for PV support (J acobs, 2012, p. 27), in large part because of their success in triggering increases in installed PV capacity (Cointe, 2014; Commission of the European Communities, 2008). However, because FITs are policy instruments whose costs are borne collectively, their effectiveness in sparking market deployment had political consequences, leading to more or less dramatic crises and/or reforms in most of the European countries that had adopted them, such as Spain, the Czech Republic, Germany, the UK, Italy, or France (Hoppman et al., 2014; Jacobs, 2012; Poignant, 2009; European Energy Review, 2012a; European Energy Review, 2012b). FITs have generated turmoil in photovoltaic markets and politics alike, and in both respects have proven hard to stabilise (Cointe, 2014). Though evolutions in FIT design have been studied extensively (e.g. Couture et al., 2010; Jacobs, 2012; Mitchell et al., 2011), the actual difficulties in steering FIT policies and markets and managing their effects have so far received more limited attention.

This paper seeks to contribute to the understanding of these difficulties by focusing on the French case, which provides a striking illustration of the potentially overwhelming consequences of FITs for PV. Relying on studies of marketisation (e.g. Caliskan & Callon, 2009, 2010; Callon & Muniesa, 2003) and of public issues (Barry, 2002; de Vries, 2007; Latour, 2007; Marres, 2005, 2007), it studies FITs as devices that are both political and economic and focuses on their effects and unintended consequences. The development of French photovoltaics went through a crisis in 2009-2011 during which these consequences, their implications and ramifications were made visible, debated and tentatively ordered. Focusing on this moment of controversy makes it possible to explore the variety of stakes, concerns and problems associated to FITs for PV (Callon et al., 2001). It is also an opportunity to study the concrete relations between markets and politics, and in particular the political effects of markets. The objective is not to assess FITs in terms of effectiveness or fairness, but to explore how they are made, what they do, and what they make others do. In so doing, this paper contributes to the study of energy policy in practice and in how it relates to actual energy technologies and markets: it looks at "the 'how' of regulation" (Sovacool, 2014, p. 22), rather than at the "'what'" (e.g. regulatory substance, best design…).

FITs are policy instruments designed to trigger markets: they are investment incentives that function by providing "almost risk-free" contracts from the perspective of renewable energy producers (Mitchell et al., 2011, p. 50). By combining a purchase obligation and a fixed price (usually higher than market prices) guaranteed for a determined period of time, FITs virtually guarantee the profitability of renewable electricity generation projects (Couture & Gagnon, 2010; Jacobs, 2010). They are completed by mechanisms to compensate for the extra costs induced by the purchase obligation and the fixed rate, most commonly in the form of a levy on energy consumption. Given the high investment security that they provide, FITs have led to rapid increases in renewable energy generation capacity (Couture & Gagnon, 2010; European Commission, 2011c; Lipp, 2007). This is supposed to induce innovation, learning-by-doing and cost reductions. Their flexibility has also enabled non-traditional actors to enter the market, especially in the case of photovoltaics, whose modularity permits rapid deployment at various scales and by a wide range of actors (Couture & Gagnon, 2010; Hvelplund, 2001; Mitchell et al., 2011).

FITs have dynamic effects, so their frequent adjustment to market and technology development is recommended, but should be introduced so as not to undermine investor visibility and confidence (Couture et al., 2010, p. 106). In recent years, discrepancies between the level of FITs and the cost of photovoltaics have entailed market over-stimulation and high collective costs, but the extremely rapid evolution of PV module costs since 2008 made the adjustment of FITs for PV-generated electricity particularly challenging (Jacobs, 2012, p. 198). This led to an unintended – and hard to monitor – proliferation of new actors and business models to make the most of the opportunity, including Chinese photovoltaic panel manufacturers, farmers exploiting their large available sunlit roof surfaces, or investors attracted by the security of investing in PV in the context of the financial crisis.

The French case provides a particularly dramatic example of this evolution. This might seem surprising at first: in France, photovoltaics represent 2% of renewable energy production and only 0.8% of electricity production (CGDD, 2014), and weigh little as a source of energy and as an industry. They rank low as a policy priority: ambitions regarding photovoltaic electricity generation are modest, and the administrative resources devoted to the topic scarce. PV development in France was targeted at overseas territories and R&D, and was not intended to have significant effects on the energy mix (MEFI, 2006b). Yet, in 2009-2010, France boasted the highest incentives for PV worldwide, in large part because an unsophisticated design of FITs amplified their financial attractiveness. This golden era for photovoltaic developers was followed by a brutal backlash in December 2010 when the government found no solution other than freezing incentives and organizing an ad-hoc consultation to stall the unmanageable rise in FIT requests. French photovoltaic policy thus went from an extreme to another in less than a year: feed-in tariffs turned photovoltaics almost directly from a promise into a problem. How did this crisis come about and what were its effects? How has the impact of FITs for PV-generated electricity been managed in France? What can it tell us about the regulation of support for photovoltaics, and more generally about the interactions between, and co-evolution of, photovoltaic markets and politics?

The first section of this article draws on STS work on markets and politics to account for the choice to study the joint marketisation and politicisation of photovoltaics by focusing on a moment of crisis. On this basis, the second section describes how policy support triggered the development of an overflowing market for photovoltaics. It shows how the opportunity framed

by polyvalent FITs applicable to any type of photovoltaic projects and by their misalignment with the evolution of PV module costs led to an unanticipated and hardly monitored proliferation of photovoltaic projects. This overflowing market activity triggered government intervention, drawing the focus on the political effects of FITs. The third section focuses on the political management of this crisis. It shows that this intervention constituted the actors of the PV sector as a public in the pragmatist sense proposed by Dewey (2010 [1927]) and led to the articulation of photovoltaics as a political issue. The fourth section analyses the outcome of the consultation. It shows that it failed to constitute a reliable representation of the PV sector, and that the government addressed the difficulty to control the sector by redesigning FITs so as to narrow down the space for market activity and innovation and to stifle possibilities for political intervention and discussion. Though FITs played a crucial role in sparking both a proliferating market and a political moment, they were also used to close them down; they have thus been alternately used to generate economic – and to an extent political – mobilisation around photovoltaics, and in attempts to strictly contain the development of photovoltaic markets and publics. Drawing on this case study, the conclusion outlines that the good functioning of FITs requires work of market organisation as much as of political construction, since their regulation relies on market data and on political compromises.

1. Photovoltaic markets and politics in-the-making

1.1. Approaching PV markets and politics "in real time"

This study relies on a set of 30 semi-directive interviews realised between March 2011 and May 2013 with various actors of the photovoltaic sector: civil servants, industry representatives, NGOs, researchers, members of Parliament, renewable energy companies, local government officials, grid operators (Table 1). These interviews were completed with an analysis of documents produced during the consultation as well as documents relative to photovoltaic policy before and after the consultation (parliamentary reports, legislative and regulatory texts, policy-relevant documents…).

Table 1: List of interviews

Category	Number of interviews
Photovoltaic sector [PV]	6
Administration, policymakers and regulatory bodies [Government]	6
NGOs	5
Utilities and grid operators [Utilities]	4
R&D	3
Others (banks, international organisation, legal consultants, etc.)	6

The initial objective of this investigation was to understand what had led to the moratorium, what had happened during the consultation, and how this had affected the photovoltaic sector in France. As it was realised just after the event, the situation was not pacified: photovoltaics and FITs were still hotly contested objects, and it was not clear how they would evolve. Neither the photovoltaic market nor photovoltaic policies were stabilised by then.

This standpoint shaped the approach adopted in two ways. First, it implied the study of a contested object in almost real-time. In that way, it was close to the analysis of socio-technical controversies as processes of collective exploration and problematisation (Callon et al., 2001). Relying on an actor-network theory corpus, I approached French photovoltaics as a "matter of concern", which Latour defines as "highly uncertain and loudly disputed", "real, objective, atypical, and, above all, *interesting* agencies" that "are taken not exactly as objects but rather as *gatherings*" (Latour, 2005, p. 114). Second, it directed the focus towards the main object of contention, namely FITs. In this episode, FITs act both as devices that sparked and drove a surge in market activities, and as the core of the political debate that ensued.

1.2. Analysing FITs in their market and political dimensions

This entailed a specific perspective on FITs, which had to be analysed both as market devices and as political instruments. Prevalent approaches to FITs tend to consider them as market instruments set up and regulated by policy means. FITs are then usually considered in either one or the other of these two aspects: some studies assess their characteristics, effectiveness and efficiency as economic instruments in regards with specific objectives (e.g. Couture & Gagnon, 2010; Frondel et al., 2008; Ménanteau et al., 2003; Schmalensee, 2012), while others are interested in their politics, i.e. in how they were adopted and in the policy objectives they are supposed to meet (e.g. Hoppmann et al., 2014; Lauber & Mez, 2004).

On the contrary, the approach adopted in this paper does not distinguish *a priori* between the functioning of FITs for PV-generated electricity and their politics. Since FITs constitute political prices, their functioning relies on the market processes that they trigger as much as on the political processes that regulate them. As Debourdeau pointed out in her study of "the concretisation of photovoltaics", in the case of photovoltaics, marketisation and politicisation go hand in hand (Debourdeau, 2009, 2011a, 2011b).[2] As she argues, the marketisation of photovoltaics triggered by FITs is also a politicisation of photovoltaics in two respects. First, FITs were developed as a solution to achieve specific political objectives (i.e. the development of photovoltaics), and thus translated the (political) choice to rely on market mechanisms to transform the energy sector. Second, the effects of FITs sparked problems and contestation (Debourdeau, 2011b). The design of FITs can be traced as a process of joint marketisation and politicisation (Cointe, 2014; Debourdeau, 2011a, 2011b).

1.3. The political effects of marketisation

To analyse the effects of FITs for PV-generated electricity in France, this article relies on the performativity approach to economic sociology that developed following Callon's seminal book *The Laws of the Market* (Callon, 1998). One of the key contributions of this line of research has been to show that economic activities depend on series of framings that delineate what is to be taken into account in market transactions and economic calculations and what is not (Caliskan & Callon, 2009, 2010; Callon, 1998; Callon & Muniesa, 2003; Muniesa & Callon,

[2] The terms "marketisation" and "politicisation" refer to the actual processes of making a market for a specific product, and of turning a specific problem or topic into an area of political action, respectively. Here, they stress the notion that "markets" and "politics" are not pre-existing entities, and that it requires work to make things "marketable" or to turn them into policy areas or matters of political discussion. The study of "marketisation" and "politicisation" is thus the study of markets and politics in-the-making.

2007). Such framings are fragile and incomplete achievements: precisely because they produce exclusion, they are always contestable. In addition, framings are always imperfect and produce overflows that sometimes lead to reconfigurations (Callon, 1998). That which was deemed irrelevant to economic activity at some point may later need to be considered: it may become a matter of concern (Callon, 2007). Market framings thus "spawn matters of concern" (Callon, 2007, 2009) characterised by deep uncertainties and to which markets "are not always able to provide satisfactory answers", so that they "evolve into many (potentially) political issues whose solutions may, in turn, impact on the organisation of economic activities" (Callon, 2007, p. 139).

What does it mean for a market – such as the French photovoltaic market – to produce "political issues"? How are the consequences of market activities articulated as collective, political problems? According to Callon, these issues stem from the unaccounted consequences of market activities. STS literature on politics and on the articulation of public concerns provides insights on how to account for the actual emergence of issues stemming from the functioning of markets.

Barry (2001, 2002) has drawn a distinction between "politics" as sets of institutions and codified procedures that "contain and channel [dissensus] in particular directions" (Barry, 2001, p. 208) and "the political" as what opens up new, unchartered spaces of disagreement, that is to say as what cannot be readily managed by the existing devices and procedures of politics. Following this distinction, market overflows can be understood as political insofar as they constitute new problems that existing market and political institutions may not be equipped to address. Analysing them involves a focus on their translation into politically manageable issues.

Recent STS studies of the formation of political issues have built on Dewey to analyse this process. According to Dewey, "publics" gathering those affected by "the unexpected and unattended consequences of collective action" emerge when established institutions fail to address these indirect and unintended consequences (Dewey, 2010 [1927]; Marres, 2005, 2007). Marres (2005, 2007) analysed the formation of publics and the articulation of issues jointly as a tentative, risky process. In the face of unanticipated problems, affected groups emerge out of concern for a similar issue.[3] These heterogeneous groups, often composed of actors with different, sometimes diverging, interests, *can* become publics if the "specific irreconcilability" between members "comes to be articulated" and if divergences are translated into "focused disagreement" (Marres 2005, p. 61).

Combining these perspectives, this paper analyses how feed-in tariffs turned photovoltaics into a matter of concern in France. It first describes the overflowing of the FIT-driven photovoltaic market. It then analyses how it opened a political moment and shows that the community of people and organisations with interests and stakes in photovoltaic was not enacted as a delimited group until the moratorium and the consultation convoked them together around the common objective of redesigning PV incentives. The consultation, though an attempt at channelling the issue through "politics", also provided an arena for the expression of the "political" effects of FITs. How did FIT-supported photovoltaics turn into an unanticipated

[3] Marres calls these affected groups "communities of strange things", which she defines as "a relation, or rather a tangle of relations, among entities that do not belong to the same social world but are connected through an affair that affects them jointly." (Marres, 2005, p. 58)

problem? How did the disorganised and heterogeneous photovoltaic sector take shape as a public? What were the outcomes of this crisis in terms of market and political organisation?

2. French FITs in crisis

2.1. French FITs for PV in the 2000s

Incentives for the development of photovoltaic electricity in France are framed by the Bill on the modernisation and development of the electricity public service adopted in 2000. It defines the overarching objectives, the mode of financing and the policy instruments available for the development of renewable energy technologies. This bill created an obligation to purchase electricity generated from renewable energy sources, opening the door to FITs, as well as the possibility to suspend the aforementioned obligation by decree in the event that "it no longer corresponded to the objectives of the multi-year planning of investments" (Loi n°2000-108).

Within this frame, a FIT for PV-generated electricity was initially set at a level of 15,25 €c/kWh in March 2002 (MEFI, 2002). It was directly inspired from the German model: the FIT rate was set to decrease by 5% every year so as to follow expected cost reductions. However, the initial rate was too low to make PV installations profitable, and it was not until the doubling of the level of FITs and the creation of a premium for building-integrated photovoltaic (BIPV) in July 2006 that the conditions for the emergence of a grid-connected PV market in France were met (MEFI, 2006a).

Set at a level of 30 €c/kWh and guaranteed for 20 years, the 2006 FIT was high enough to ensure the profitability of PV projects; it also introduced a fixed premium of 25 €c/kWh for BIPV to take into account the extra costs of such systems and foster the development of a BIPV niche (Jacobs, 2012). However, contrary to the previous scheme, its design provided no means of control over the development of the PV market, in terms of either quality or quantity. Two features in particular suggest a lack of anticipation of the effects of the system. First, contrary to usual recommendations on FIT design (e.g. Couture et al., 2010, Rickerson et al., 2012) and to the previous scheme, no dynamic adjustment of feed-in rates to technology costs was planned; rates were simply indexed to inflation, resulting in a slight increase between 2006 and 2010 which led to a large discrepancy with actual PV project costs. Second, the queuing procedure encouraged speculation,[4] since the level of the FIT for a specific project was locked at the date of the request of the purchase agreement, long before actual grid connection. This left little visibility over the volume of projects that would be carried out and when, and over the total cost of the incentives.

This FIT scheme drew critics early on, especially from the *Commission de Régulation de l'Energie* [Energy Regulation Commission] (CRE). A crucial actor of French energy policy, the CRE is in charge of the regulation of French energy markets and emits consultative opinions on energy regulation decisions. It is historically rather critical of FITs (Jacobs, 2012, pp. 72, 74), and emitted a negative opinion on the 2006 FIT for PV, which it considered too high compared to avoided costs, environmental externalities and other positive effects. Given the pace of innovation in PV technologies, the CRE underlined the risk for FITs to lead to the

[4] According to Couture et al. (2010, p. 87), "speculative queuing occurs when RE project developers get in line to 'reserve' a spot in the queue for projects that may or may not be developed (Grace et al., 2008)."

massive installation of expansive, soon-to-be obsolete PV systems. It also deemed the BIPV premium too high and not necessarily relevant (CRE, 2006). The FIT scheme was, however, maintained as it was. Indeed, the government did not expect the development of PV to have any significant impact in the short to medium term. Scenarios used at the time assumed that PV development would mostly occur in overseas territories and zones not connected to the central grid and would not lead to more than 500 MW of installed capacity in 2015 (MEFI, 2006b). PV support was a marginal policy and was not expected to produce any significant impact.

2.2. Market changes

Between 2007 and 2009, the political focus on environmental issues increased at the national and at the European levels. The negotiation and adoption of the European Energy-Climate Package in 2007, as well as the creation of a Ministry in charge of both Energy and Ecology and the *Grenelle de l'Environnement* process all contributed to spur the development of renewable energy policy in France.

The deployment of PV was catching up quickly with the 2006 objectives of 500 MW installed capacity by 2015 (Grenelle de l'Environnement, 2007, MEEDDM, 2009). In 2008, these were raised to 5,400 MW installed PV capacity by 2020 (MEEDDAT, 2008; MEEDDM, 2009). Though still expensive and marginal, PV appeared as a very promising energy technology that was gaining importance. Along this line of reasoning, FITs were a way to develop a market that would allow for the emergence of an industry, provide an outlet for R&D, and thus ensure that France stayed in the race. As a research-intensive, promising technology, photovoltaics could serve as a figurehead for renewable energy development, all the more since the fulfilment of their great potential still seemed relatively remote (Cochet, 2000; Interview Government C).

At the time, the global PV market underwent radical changes. The price of PV modules had remained stable between 2004 and mid-2008 because shortages of polysilicon constrained production, while German and Spanish FITs made it possible to buy the technology at a high price. Driven by the expansion of polysilicon production and downstream manufacturers, it fell from $4.00/W in 2008 to $2.00/W in 2009 (Bazilian et al., 2013). PV modules prices have remained on a sharp decreasing trend since then. They were falling by around 20% a year between 2009 and 2011 (Solarserver, 2013), while the French FIT increased slightly along with inflation.

Return rates for photovoltaic projects in French thus went flying through the roof. FIT rates in 2009 amounted to over 60 c€/kWh for BIPV, i.e. 10 to 20 c€ higher than in most European countries (Jäger-Waldau, 2009) and could be combined to fiscal credits. At the time, FITs for BIPV were of 43 c€/kWh in Germany and 34 c€/kWh in Spain, and they were decreasing regularly in both countries. French incentives for PV were the most attractive in Europe, and French officials even claimed that the French FIT was the highest in the world (Jacobs, 2012, p. 194). Lifted by a growing and diverse community of subvention-fuelled project developers, the market swelled out of proportions. The generosity of the incentive scheme allowed new actors to enter the market and a wide variety of business models to develop: large-scale ground-mounted solar plants, rental of the roofs of farm buildings to install photovoltaic panels on them, BIPV on large public buildings, installations on individual houses, etc… Photovoltaics had largely turned into a financial product, an extremely profitable and secure investment with Internal Rates of Returns as high as 25% in certain cases (Interview Utility A). The supply and

demand generated by subventions were increasingly articulated in terms of financial and economic profitability (Debourdeau, 2011a).

Though the increase in newly connected installations remained reasonable in 2008 and 2009, the number of purchase agreement requests rose exponentially (SER, 2010, 2011). They started to translate into grid-connected capacity in 2010 and 2011 (CGDD, 2010; SER, 2011). Given the queuing procedure, high FITs were attributed with no visibility on the future of projects, while installations costs decreased extremely fast, feeding a bubble soon described as "speculative". This fed a bulging list of virtual projects but actual contracts (i.e. projects whose realisation was not certain but that would benefit from the FIT if they were carried out) that lengthened too fast for grid operators and administrations to keep up.

2.3. MisFITs

First concerns about the mismatch of incentives arose in 2009. The brutal collapse of the Spanish photovoltaic market after the suppression of incentives in 2008 was a first warning sign (Poignant, 2009). In late 2009, the national grid operator EDF warned public authorities about an increasing amount of grid connection requests that was hard to manage. The administration sent notes to the Minister of the Ecology's staff, while local governments were overflowed with paperwork (Interviews Government A, B, C, E; Utility A, C).

2010 was a year of in-the-field experiments in reframing incentives to realign their effects with their initial objectives. Regulatory proliferation added to PV projects proliferation, each reinforcing the other. The fiscal credit for individual households was decreased in January, and two targeted FITs decreases affecting specific categories of projects came into effect in January, then in August (MEEDDM, 2010a, 2010c). On top of that, the government released circulars and notes aiming at clarifying the increasingly refined – and increasingly confusing – picture of PV incentives (e.g. MEEDDM, 2010b). This mostly resulted in making things even more tangled, adding layer upon layer of regulatory bodies, texts, categories and guidelines that never quite managed to thwart the multiplication of projects.

In 2010, the impacts of the overflowing of the PV market became manifest, raising concern. "Simple calculations" based on the lists of purchase agreement requests provided by grid operators showed the impact FITs would have on the electricity bill and the Ministry of the Economy started to push for a moratorium (Interviews Government A, C). In the last trimester of 2010, a report on the PV sector was published, advising FIT reductions (Charpin et al., 2010). The Assemblée Nationale held series of hearings on the issue, and the government's management of PV was strongly criticised (Assemblée Nationale, 2010a, 2010b). Still, the Minister for Ecology and Energy dismissed alarms, stating that:

> "The troubles encountered are at the margins. […] Developing the photovoltaic sector by 500% was the only way to meet our objectives. The fact that we reduced by 12% part of the tariffs does not mean that we are not controlling growth" (Assemblée Nationale, 2010a)

After he left the government in November 2010, virtually no one in the government supported FITs for PV-generated electricity. As an electoral period drew near, the main concern was the impact of FITs on the electricity bill – a particularly sensitive issue in France, where cheap electricity is considered a national asset (Assemblée Nationale, 2010b; Interview Government

D). The issue moved up to the Prime Minister, and, on December 2nd, a press release announced an imminent moratorium on FITs "to put an end to the creation of a real speculative bubble" and the organisation of a consultation with stakeholders to find a new balance that would respect "the objective of 500 MW of new photovoltaics each year, and protect consumers by allowing for the control of the evolution of the price of electricity" (Premier ministre, 2010). The moratorium would last three months starting on December 9, 2010 and apply to all PV installations except those of less than 3 kWp capacity (MEEDDM, 2010d).

With this moratorium, the government opted for the solution that entailed least uncertainty and momentarily took back control over the volume of projected installations. It affirmed its will to bridle volumes and not just meddle with prices hoping it would steer the market in the intended direction.

The moratorium was a shock for the emerging photovoltaic sector and violently disrupted it. It constituted a threat on the very existence of many actors, and reactions to it outline the tragic dimension of this episode. The government's panic had transferred to the sector, and anxiety was at its peak (Assemblée Nationale, 2010c; Interviews NGO A; PV A, B, C; Utility A, B).

Despite the tension that it triggered, the moratorium was also a way to buy time from the relentless dynamic of PV deployment, and to cut short to the proliferation of projects and regulations that were making PV un-manageable. As a recognition that the framework called for at least partial redesign, the decision opened a window for renegotiating a support scheme that the pace of market development had left no time to discuss.

3. A specific assembly for a specific assemblage

Chaired by two high officials in close interaction with ministers and their staff, the consultation consisted of six thematic plenary meetings and numerous bilateral consultations scheduled over three months, between December 20, 2010 and February 11, 2011. In parallel, the administration drafted proposals for a future arrangement of incentives that would fall within the perimeter allowed by existing legislation and take into account the outcomes of the consultation (Charpin et al., 2011, p. 6).

Despite being an attempt at a traditional ministerial consultation, it was a rather unusual and very contentious event that made explicit the multiplicity of those affected by the effects of FITs for PV and by the suspension thereof. It enacted the chaotic situation engendered by FITs for PV and provided space for the tentative emergence of a public. It differed from usual governmental consultations insofar as it could not fully channel the political overflows and tensions triggered by the recent evolutions of FITs: in that, it turned out to be a "political" event in Barry's sense. Both the height of a political and sectoral crisis and a unique opportunity for dialogue, the consultation was characterised by a tension between mutual defiance and the need to establish the grounds for trust and compromise.

3.1. Mass and Mess

The consultation gathered the diversity of organisations and interests involved in the PV sector. Given the number of participants, the short timeframe and the tense climate, it was a relatively messy process. Seventy-four people or organisations were invited to plenary meetings, which

took place in one large meeting room in Bercy,[5] and fifty-five bilateral meetings were held. Then, as one of the organisers recalls, "there were all those that were not invited… […] there were insults, death threats, people trying to commit suicide…" (Interview Government C). The number and the diversity of those willing to be heeded were a manifestation of the impact of FITs for PV-generated electricity. FITs had radically transformed the photovoltaic sector, and their generosity allowed a great variety of business models and activities related to PV to thrive. The diversity of stakeholders reflected the great heterogeneity of the PV sector.

As the PV value chain is segmented, the "sector" was composed of firms operating in very different fields: panels manufacture, system components manufacture, projects development, construction… PV electricity producers were equally diverse, since PV installations can take many forms, of which the tariff did not exclude any. PV producers included developers and manufacturers, but also local governments, large utilities, social-housing promoters, individual households, artisans and agricultural cooperatives. Environmental NGOs and large utilities, farmers and bankers, local governments and members of Parliament, manufacturers and project developers, grid operators and representatives of the building industry all sat around the same table.[6]

As FITs left room for virtually everybody on the market, they had allowed these stakeholders to cohabit in all their diversity without needing to organise as a constituency. But, apart from their dependence on PV policies, these actors had little in common. They were not used to working together, and had very different, sometimes irreconcilable interests and objectives. Some attended on behalf of their company, representing private interests, while others were members of syndicates, unions or associations representing collective interests (Interview PV D). Many were not accustomed to such negotiations and, as the future of their businesses was often under threat, could take rather radical stances.

This unanticipated myriad of actors came in dispersed order, and the consultation was a messy, cacophonic undertaking. Plenary meetings gathered between 50 and 100 people in a single room, intervening in turns to react on proposals that the administration put forward. To quote an interviewee:

> "All the associations that represented anything, however small, attended, and it was a choir of mourners in front of people taking notes*"* (Interview Utility A).

3.2. Established institutions challenged

Defiance and tension were exacerbated by uncertainties about the exact status of PV markets that made it difficult to adjust incentives (evolution of the prices of PV systems, part of the PV chain with the highest added value, number of "real" as opposed to "speculative" projects, number of firms and jobs threatened by the moratorium…). The unanticipated pace and scale of the development of the PV market heightened these uncertainties for two main reasons: the quick and disorganised proliferation of projects and stakeholders, and the failure of established institutions, representatives and expertise to channel it. As an interviewee pointed out, "we were amateurs at every level. Because we had all been overwhelmed by the instrument" (Interview Utility C).

[5] Bercy is the name of the main building of the Ministry of Finance and the Economy.
[6] A list of participants is available as an annex to Charpin et al., 2011.

First, the rapid proliferation of actors dealing in PV had blurred the picture, especially when it came to analysing the actual status of PV deployment and projects in France. To assess the cost of support, it was necessary to know which share of the projects having requested FITs would actually be carried out, which the queuing procedure made difficult. This uncertainty is illustrated by the reference often made to "speculative projects" registered so as to secure a high tariff and to make the most of the difference between tariff levels and decreasing PV modules costs. These supposedly encompassed a large share of the waiting list, but their origin was undefined given the proliferation of new actors and the lack of transparency over the evolution of grid-connection waiting lists. The uncertainty over who had "speculated" and was responsible for the bubble sparked suspicion and accusations. The diversity and disorganisation of participants and of their positions made it hard to distinguish between legitimate and illegitimate representatives of the sector and to identify reliable messages from lobbying. Besides, many entrepreneurs of the PV sector operated independently from constituted professional branches and were not syndicated in unions, so the statistical apparatus was not equipped to record the development of the sector (Interview NGO C).

In addition, established institutions had trouble keeping up with the fast development of the PV sector. State officials, electricity retailers, grid operators and traditional representatives of the renewable energy sector had not had time to readjust their expertise and discourses yet: there was a clear lack of established, reliable tools and channels to provide data on the market status and evolution.

The main French utility, EDF, was in a difficult and ambiguous position since it included entities with different and potentially conflicting interests: grid operators (RTE and ERDF) managing grid-connection, a subsidiary in charge of purchase agreements (EDF-AOA), and a subsidiary renewable energy production firm developing large-scale PV projects (EDF-EN). Added to the historical proximity of EDF with the government, this triggered suspicions of collusion of interests (Interviews Utility A, B; PV C). During the first consultation meeting, the news that there had been not one but two distinct grid-connection waiting lists, one managed by ERDF and the other by RTE, heightened defiance, especially since one of the lists comprised mostly large-scale projects, many of which were developed by EDF-EN.

The government and administration, on their part, had not anticipated the impact of FITs and lacked human resources to tackle it. The government was blamed for its erratic management of incentives over the previous years, which gave many actors the impression that it either did not really know what to do and was operating in a relatively careless manner, or simply wanted to sabotage PV deployment. The moratorium definitely undermined trust in its will and ability to steer the development of photovoltaics (Interviews Government C; NGO C; PV B; Utility A; Others A).

The representatives of the renewable energy sector, especially the *Syndicat des Energies Renouvelables* (SER),[7] were challenged in their representation and mediation roles. The recent evolutions of the PV sector had transformed their membership, now dominated by project developers and promoters whose best interest was that tariffs remained high. This undermined

[7] The SER (Renewable Energy Syndicate), created in 1993, is one of the main associations representing the interests of renewable energy firms and industry in France.

the trust that the government had in them: they appeared as protecting the interests of those who had reaped most benefits from the misalignment of FITs. On the other hand, as a well-established syndicate, the SER represents large utilities as well as small firms, and has a history of working closely with ministries. It was thus perceived as a moderate actor, and many of the new, more radical players felt it failed to represent their interests faithfully. The proliferation of new associations made the SER "a syndicate among others", further undermining its legitimacy as *the* representative of the PV sector (Interviews PV A, B; Utility A).

As a result, no competent authority stood out as a potential legitimate arbiter, and discussions were levelled to a surprising extent: the characteristics of PV modules, details of instrument design or price calculation techniques were just as important as the definition of overall objectives for photovoltaic development.

3.3. Focusing disagreement over a shared matter of concern

Though the consultation started on shifting grounds, it allowed for a partial mapping of the actors and interests at stake and the emergence of a common approach to the issue. In this sense, it can be analysed as one of these "occasion[s] in which a specific irreconcilability between modes of living comes to be articulated, as opposed to the many divergences among them that are often easy to observe, but rarely translate into focused disagreement*"* (Marres, 2005, p. 58).

There is no space here to give a precise account of all the issues raised during the consultation, which are detailed in the report that concluded the process (Charpin et al., 2011; Table 2). The organisation of the process itself contributed into their articulation. By gathering actors concerned by PV in a single venue, it forced people into talking – something they had not needed to do before. However messy and disorganised, the consultation provided tools to foster collaboration: written contributions were circulated, email addresses were exchanged, positions were identified, participants organised into groups of shared interests... The agenda of meetings was defined along the way, in cooperation with the participants, which channelled discussions and helped identify key issues. One meeting focused on the project waiting lists,[8] two on specific categories of PV installations, two on the industry; the last was a discussion of the draft report (Charpin et al., 2011, p.5). Six key issues and sources of uncertainties emerged: project waiting lists, the structure of the industry, overall targets and their breakdown among categories of PV systems, the relevance of BIPV, the design of incentives, and their mode of financing (Table 2).

On most issues, no consensus was reached, but concerned actors and what they stood for were identified, and areas of convergence and divergence were clarified. Though far from consensual itself, the report on the consultation was an attempt at mapping the debate (Charpin et al., 2011).[9] As a representative from the SER remarked, "the professionals we were did not have

[8] The "project waiting lists" were the lists of the photovoltaic projects that had obtained their purchase agreement but had not yet been effectively connected to the grid. During the first meeting of the consultation, it was revealed that there were two such lists: one managed by ERDF for small to medium capacity projects, and one managed by RTE for large-scale, ground-mounted projects.

[9] The report was written by the civil servants in charge of the consultation, and though it constituted an attempt at an objective, neutral account of the consultation, it also paved the way for the reform. Given the tense climate during the consultation and the general disappointment that followed, it is not surprising

structured vision of the industry at the beginning of the consultation. Serious work has been carried out since then" (Poniatowski, 2011, p. 40).

This work allowed for the elaboration of a common language and, in some instances, of a common ground. Taking into account the uncertainties on future social costs and the need to contain these costs, the need for a market that could sustain the emerging industry, and the distinct dynamics of segments of installation, most agreed that a target between 700 and 1000 MW a year divided among categories of installations was an acceptable compromise (Charpin et al., 2011, p. 23). Besides, the shock of the moratorium generated a form of solidarity among participants, and groups and federations such *the Association des Industriels du Photovoltaïque Français (*AIPF) or the *Etats Généraux du Solaire Photovoltaïque* emerged during the consultation or in its aftermath to channel and strengthen positions.

Table 2: Issues and topics addressed during the consultation and impact of the 2011 reform

Topics	**Key issues and uncertainties**	**Outcome of the consultation**	**Situation after the March 2011 reform**
Waiting lists	Grid-connection delays Share of speculative projects Management of the waiting list	Clarification of the process, increase in transparency	Organised transfer of information on the waiting lists and grid-connection requests
PV sector	Composition and structure of the sector, reliability of sector representatives Actual benefiters from FITs Added value in France Actual costs of PV projects	Organisation and partial mapping of the sector Creation of associations (e.g. AIPF) and forums (e.g. *Etats Généraux du Solaire PV*)	Increased structuration of the sector Decrease in activity, many bankruptcies following the moratorium and decrease in FITs; disappearance of speculative ventures.
Development targets according to categories of installations	Balance between the collective costs of support and the need to sustain the market Definition of installation types and assessment of their respective advantages	Compromise on a target of 800 MW newly installed capacity per year Differentiation of support according to size and type of installation	*De facto* cap at 500 MW new capacity per year. Differentiation of support according to size and type of installations to allow for maximum control.
BIPV	Definition of BIPV Cost and impact of supporting BIPV	No agreement, but assessment and discussion of the relevance of the category	BIPV support restricted to small-scale installations
Design of incentives	Most suited instruments for specific categories of installations Visibility on the evolution of support Mechanisms for the adjustment of FITs	No agreement, but discussion and assessment of support options and proposals for adjustment mechanisms and procedures	Three categories of incentives (self-adjusting FITs, simplified calls for tenders, calls for tenders). Relative stability with punctual readjustments.

that this report is controversial and contested. Combined with individual written contributions and interviews, it nonetheless provides an overview of the process and its results.

Financing of incentives	Actual costs of PV (project costs, avoided costs, grid connection costs) Impacts of FITs on the price of electricity and their acceptability	Discussions on the calculation of the compensation of FIT, alternative proposals to reduce the impact of FIT on the price of electricity.	No change in financing mechanisms, control of costs via control of volume.

4. A paradoxical outcome

4.1. A self-adjusting FIT scheme

Yet, most participants agree in their analysis of the consultation and of its outcome as a disappointment, even a deception: no one was listened to and everything had been decided ahead, they say (Interviews NGO A, B, C; PV A, B, C; Utility A). This reaction can be at least partially accounted for by the outcome of the moratorium that ended in March 2011 with the publication of an administrative order redefining support to PV (MEEDTL, 2011).

The new scheme was explicitly designed to support the installation of 500 MW of new capacity each year – no more (Poniatowski, 2011). PV installations were divided into several categories, each submitted to a different regime (Table 3). FITs were lowered, restricted to small-scale BIPV, and set to automatically decrease every three months on the basis of cumulated purchase agreement requests for a specific category of projects: the more projects in the waiting list, the sharper the decrease. This "self-adjusting" mechanism was supposed to permit to adjust FITs without recourse to political negotiations (MEDDTL, 2011). For larger installations, two types of calls for bids were created: a simplified, price-based call for bids for medium-capacity installations (100 to 250 kWc), and a classic call for bids divided into seven distinct lots for installations over 250 kWc (MEEDTL & MEFI, 2011).

Table 3: Evolution of categories of support for photovoltaics in France since 2002

<table>
<tr><th>2002-2006</th><th>2006-2010</th><th>January-August 2010</th><th>August-December 2010</th><th>March 2011- February 2013</th></tr>
<tr><td rowspan="4">PV
FIT</td><td rowspan="2">Standard PV
FIT</td><td rowspan="2">Non BIPV and large-scale BIPV
FIT : 31.4 €c/kWh</td><td rowspan="2">Non BIPV and large-scale BIPV
FIT: 27.6 €c/kWh</td><td>Non BIPV and large-scale BIPV, 100-250 kWp
Simplified call for tenders</td></tr>
<tr><td>Non BIPV and large-scale BIPV, above 250 kWp
Call for tenders</td></tr>
<tr><td rowspan="2">BIPV
FIT + premium</td><td rowspan="2">BIPV on residential buildings
FIT: 58€c/kWh</td><td rowspan="2">Small-scale (below 3 kWp) BIPV on residential buildings
FIT: 58€c/kWh</td><td>BIPV on residential buildings below 9 kWp
FIT, category "T1" (initial level: 46 €c/kWh)</td></tr>
<tr><td>BIPV on residential buildings, 9-36 kWp
FIT, category "T1" (initial level: 40.25 €c/kWh)</td></tr>
</table>

		BIPV on educational and medical buildings *FIT: 58€c/kWh*	BIPV on educational and medical buildings, BIPV on residential buildings above 3 kWc *FIT: 51€c/kWh*	BIPV on educational and residential buildings below 36 kWp *FIT, category "T2" (initial level: 40.6 €c/kWh)*
		BIPV on other buildings *FIT: 50€c/kWh*	BIPV on other buildings *FIT: 44 €c/kWh*	BIPV on other buildings below 9 kWp *FIT, category "T3" (initial level: 35.2) €c/kWh)*
		Simplified BIPV *FIT: 42€c/kWh*	Simplified BIPV *FIT: 37 €c/kWh*	Simplified BIPV, below 36 kWp *FIT, category "T4" (initial level: 30.35 €c/kWh)*
				Simplified BIPV, 36-100 kWp *FIT, category "T4" (initial level: 28.83 €c/kWh)*

By making FITs dynamic, the reform corrected some of the flaws of the previous scheme. However, because of its complexity and mathematical sophistication,[10] the new scheme was analysed as a serious restriction on PV development, as well as an achievement in technocratic, engineer-led policy-making (Poniatowki, 2011; Interviews NGO B; PV B, C)). Not only did it cap market development, it also restricted possibilities for the political renegotiation of FIT design.

4.2. Complicated assembly v. complicated formulas

The logic of the new PV support scheme reflected the government's will to master full control of the development of French photovoltaics and of its cost. The government wanted to take as little risk as possible.

The choice to incorporate adjustment mechanisms within the design of economic instruments resulted from the intention to take responsibility for dealing with the uncertainties on the evolution of the PV market away from a concerned collective that seemed too diverse and untamed to reach a reasonable agreement. Though the assembly gathered during the consultation had to an extent managed to focus disagreement and to reach a common ground, its articulation of the issue did not survive outside of the microcosm of the consultation. It failed to convince government officials, who considered it unreliable. The consultation could not lift the uncertainty over the total number of registered projects that would be effectively completed and connected to the grid, and as result could not provide clear estimates of the cost of FITs

[10] For instance, the list of requirements for an installation to qualify as BIPV is one and half page-long, and it takes three pages of tables and high-level mathematical formulas to define the self-adjusting FIT.

and of their impact on electricity prices – which was the main issue for the Prime Minister. This resulted in miscomprehensions, as one of the consultation organisers recalled:

> "We proposed [800 MW a year] to the cabinet, and then there was a meeting at the Prime Minister's level, where there were people from [the Ministry of Economy], people from [The Minister of the Environment]'s staff […] and it went wrong. At some point, the Prime Minister's adviser lost her nerves, she said: 'but no, you're not able to tell me how much it costs!' – because she looked back at the past, asking how much would be carried out. It was at the time when we knew that there were 4000 MW in the pipelines, that we had done 1000 or 1500 MW, but we did not know roughly how many were left and how many would really be carried out. Maybe we communicated badly on uncertainties during this meeting. In the end, her logic was: 'you are not able to tell me how much this costs, and you want to do more than the 500 MW a year that were initially planned? You must be kidding, this is going to blow up on our faces!' So we stayed at 500 [MW].'" (Interview Government C)

But neither did the government want to take the responsibility for adjusting FITs and steering the market upon itself. It thus delegated this responsibility into a set of mathematical and legal devices considered the best way to keep track of the dynamic of the PV market (Interview Government A). Provided that they were well calibrated from the start, such mechanisms were not supposed to require any further intervention. Considering the public that had emerged during the consultation unreliable, the government thus tried to control the sector by designing FITs meant to close down both the market and the space for political discussion.

Yet, this initial calibration required a form of negotiation and expertise, if only to distinguish between the specificities of different categories of projects. The sophistication and refinement of the scheme may not have been possible without the consultation, which laid the ground for the identification of relevant stakeholders and reliable interlocutors, the organisation of access to information on market evolutions, and the emergence of a degree of political compromise. Besides, as the success of the calibration can only be assessed through experience, the emergence of a structuring, potentially contesting public during the consultation may come to play an important role in future readjustments.

4.3. Balancing uncertainty

The moratorium and consultation were characterised by an oscillation between two opposite but to an extent complementary ways of addressing the uncertainties related to the emergence of the hardly-predictable policy-driven PV market.

The consultation focused disagreement and allowed for the start of an organisation and stabilisation of the actors concerned by PV through the process of constituting a public and articulating an issue (Marres, 2005, 2007). The government's way of circumventing asymmetries of information through the use of mathematical formulas and legal devices was an attempt at containing and channelling contestations and market uncertainties through the use of familiar policy-engineering techniques, that is what Barry calls "politics" (Barry, 2001). Both logics grapple with the same need to ensure enough stability and flexibility so as to steer the development of a market and an industry in a highly uncertain context. The fact that none perfectly manages it gives an idea of all the work and hesitations of market regulation:

stabilising a regulated market while guaranteeing a fair allocation of costs and benefits appears as a complicated, risky and highly contentious endeavour.

In fact, the issue was not so much to reduce uncertainty as to identify its sources and, most importantly, to allocate the burden of uncertainty. The March 2011 administrative order marked a shift from a situation in which virtually all the consequences of market uncertainties were on the government's side to one in which the government took all the guarantees.

The de-publicizing character of the new support scheme reinforced this imbalance. Incorporating the task of tracking market evolutions and adjusting incentives into mathematical and legal techniques was a means to stabilise things and to circumvent the need to constantly review and update support. This automation of market regulation can be read as a way to address the lack of reliable expertise on and representation of the emerging PV sector. It made manifest a power asymmetry, as the government asserted the dependence of the PV market on policy support. However, it also made it more difficult for alternative proposals to be taken into account and for potential flaws to be corrected quickly, thus introducing a new source of inertia. The focus on the control of market deployment largely leaves out the "incentive" dimension of the instrument: it is designed to control and steer the market, but not necessarily to sustain it. As a matter of fact, the PV market has shrunk, and has only been maintained "alive" since then by punctual revisions of the scheme (Cointe, 2014; MEDDE, 2013a, 2013b). The 2011 support scheme might have performed a form of market organisation, but, by not allowing for the renegotiation of the political objectives and compromises it carried, it could not really accompany the development of French PV.

5. Conclusions

This paper focused on the emergence of photovoltaics in France to shed light on the dynamics induced by FITs and on the turbulent evolution of PV policies in Europe It argues that the understanding of this evolution requires a consideration of the economic and political effects of feed-in tariffs, which STS concepts help analyse.

In many European countries, FITs succeeded in sparking markets for grid-connected photovoltaics. The late 2000s have witnessed a sophistication and refinements of FITs for PV throughout Europe (Cointe, 2014; Ecofys, 2013), in large part in attempts to readjust support to the rapid evolutions of the PV sector and to contain the proliferation of FIT-supported PV and the associated policy costs. It is not just in France that FITs have turned PV from a promise into a problem, but the French case provides an extreme example of their dramatic effects in terms of market creation and political contestation. Besides, as a well-defined setting for addressing these effects, the moratorium and consultation constitute a privileged window for the observation of how PV markets and politics were managed in practice.

The unexpected proliferation of FIT-supported PV in France can be read as an overflowing of the market. Market actors, institutions and regulators were not equipped to monitor, channel and contain it, bringing forward the issue of the collective cost and risks of FIT schemes. This resulted in a political crisis that culminated with a suspension of FITs and a consultation of so far ill-identified stakeholders. The economisation of photovoltaics thus triggered their politicisation: FITs turned PV into an object of contestation and a matter of concern, gathering people and organisations that previously rarely interacted. The consultation can be read as an

attempt by the government to steer contestation towards a codified, familiar procedure. At the same time, it failed to channel the divergent interests of those concerned and provided a setting for the expression of contestation in a potentially original form. However, the redesign of incentives that followed was a clear attempt at depoliticisation that aimed to close down both the space of contestation that had just opened and the space for market deployment.

This account stresses that the regulation of FITs for PV-generated electricity is far from trivial. It shows that it cannot be reduced to an assessment of the effectiveness and cost-efficiency of FITs, or to adjustments to technological and market evolutions. Their potential to generate unintended effects and overflows was the main reason for the crisis in France, and as such it has to be fully acknowledged. To this end, this paper has analysed FITs as political prices that trigger changes and require continuous work of economic and political construction. Their regulation relies on the production of reliable economic information on rapidly evolving markets as well as on negotiated compromises on the objectives of support to photovoltaics and on the acceptable level of collective risks. There is thus a need for a structured market (with established representatives and monitoring devices) *and* for an articulated public (with identified interests and legitimacies). Both lacked in the French case, which may explain the 2010 crisis.

However, both are also particularly hard to establish, and this is not specific to France. Though they adopted different strategies, Spain and Germany have faced similar difficulties in containing the effects of FITs and in articulating their market and political dimensions. In Spain, the drastic reduction of support and stringent caps and capacity established in 2008 virtually "killed" the PV sector. In Germany, the calibration of FIT decrease rates has been challenging, leading to frequent cuts and readjusments (notably in 2009 and 2014), even though the PV sector is more organised politically than in France. These difficulties at least partly owe to the specificities of FITs as incentives. Indeed, by securing and encouraging investment in photovoltaics, FITs are meant to drive the emergence of diverse market actors and to trigger innovation and cost reductions: they are bound to transform the markets that they sustain. In this perspective, the difficulties encountered to base FITs on data on the evolution of technological costs cannot be attributed to information asymmetries. Rather, it stems from the dynamic effects of FITs themselves, which transform the market by encouraging new actors to enter it. Assessing the development of such a rapidly evolving market – and the legitimacy of politically supporting it – thus requires a thorough work of political construction. By analysing how this occurs in practice, the study of the French case points at the difficulty of this work. In that respect, its relevance is not limited to France but expands to the study of the evolution of PV policies in other European countries faced with similar issues; it paves the way for comparisons with alternative national experiences, which could take the analysis further.

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