FEED-IN TARIFFS IN TURMOIL

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I. INTRODUCTION

Of the available renewable energy support mechanisms, feed-in tariffs ("FITs")—laws that mandate the purchase of renewable energy at premium prices—often garner praise as the best and most proven policy.[1] Feed-in tariffs, it is said, offer an abundance of benefits. They are effective. They send clear market signals. They reduce risk both for investors and for renewable energy facility operators. Thus, because feed-in tariffs provide the kind of certainty investors crave, many observers assert that they are more cost-effective than other renewable support policies, as they moderate the need for risk premiums and reduce renewables' costs through "learning by doing."[2] All this has caused

[1] This statement deserves some context. It refers primarily to advocates of renewable energy as such. Those who promote renewables as a climate mitigation tool often see renewable energy support mechanisms as necessarily "second best" policies, because direct mitigation tools like carbon taxes or cap-and-trade systems may be more effective and efficient at reducing greenhouse gas emissions. Others oppose policies like FITs and RPSs. For an example of a critique of such laws, see Robert J. Michaels, *A National Renewable Portfolio Standard: Politically Correct, Economically Suspect*, ELECTRICITY J., Apr. 2008, at 9.

[2] Robert Wand & Florian Leuthold, *Feed-in Tariffs for Photovoltaics: Learning by Doing in Germany?*, 88 APPLIED ENERGY 4387 (2011). For discussions of the comparative efficacy and efficiency of feed-in tariffs and RPSs, see, for example, INT'L ENERGY AGENCY, DEPLOYING RENEWABLES: PRINCIPLES FOR EFFECTIVE POLICIES 101–24 (2008), *available at* http://www.iea.org/textbase/nppdf/free/2008/deployingrenewables2008.pdf; *see also* INT'L ENERGY AGENCY, DEPLOYING RENEWABLES: BEST AND FUTURE POLICY PRACTICE (2011).

many advocates of renewable energy to heap acclaim on feed-in tariffs, with one observer declaring them simply "fabulous."[3]

The rosy picture often painted of feed-in tariffs is important. In what is frequently characterized as a dichotomous choice between the two leading renewable energy support mechanisms—feed-in tariffs and renewable portfolio standards ("RPSs")—many observers have cast their lot with the feed-in tariff. Irrespective of RPS performance,[4] the line of scholars, analysts, and advocates rushing to say that feed-in tariffs are better is not a short one. Numerous studies have suggested that in a head-to-head match, feed-in tariffs repeatedly outperform RPSs on both efficacy and efficiency.[5] Thus, one set of commentators recently observed that there is an emerging trend in the literature showing that feed-in tariffs are the superior renewable energy support policy.[6]

Of course, the choice between feed-in tariffs and RPSs is hardly mutually exclusive. The devices might be used in tandem, or they might serve as complementary evolutionary steps in a jurisdiction's support for renewable energy.[7] But the fact that feed-in tariffs are earning so much adulation cannot be discounted. Over-exaltation risks marginalizing other renewable support policies.

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3 David Jacobs, *Fabulous Feed-in Tariffs*, 11 RENEWABLE ENERGY FOCUS 28 (2010).

4 There is some disagreement about how effective RPSs are. For a summary of the literature, see Lincoln L. Davies, *Reconciling Renewable Portfolio Standards and Feed-in Tariffs*, 32 UTAH. ENVTL. L. REV. 311, 333–37 (2012).

5 *See, e.g.*, Lucy Butler & Karsten Neuhoff, *Comparison of Feed-in Tariff, Quota and Auction Mechanisms to Support Wind Power Development*, 33 RENEWABLE ENERGY 1854, 1858 (2008); C.G. Dong, *Feed-in Tariff vs. Renewable Portfolio Standard: An Empirical Test of Their Relative Effectiveness in Promoting Wind Capacity Development*, 42 ENERGY POL'Y 476 (2012); Reinhard Haas et al., *A Historical Review of Promotion Strategies for Electricity from Renewable Energy Sources in EU Countries*, 15 RENEWABLE & SUSTAINABLE ENERGY REVS. 1003, 1026 (2011); Marc Ringel, *Fostering the Use of Renewable Energies in the European Union: The Race Between Feed-in Tariffs and Green Certificates*, 31 RENEWABLE ENERGY 1 (2006). For a discussion of the literature, see Davies, *supra* note 4, at 333–42. For an excellent assessment of why this may be so, see Felix Mormann, *Enhancing the Investor Appeal of Renewable Energy*, 42 ENVTL. L. 681, 704–24 (2012).

6 *See* Pablo del Río & Pere Mir-Artigues, *Support for Solar PV Deployment in Spain: Some Policy Lessons*, 16 RENEWABLE & SUSTAINABLE ENERGY REVS. 5557, 5558 (2012). For analyses of the barriers renewable energy deployment faces, see Felix Mormann, *Requirements for a Renewables Revolution*, 38 ECOLOGY L.Q. 903 (2011). *See also* Uma Outka, *Environmental Law and Fossil Fuels: Barriers to Renewable Energy*, 65 VAND. L. REV. 1679 (2012).

7 *See* Davies, *supra* note 4; *see also* KARLYNN CORY ET AL., NAT'L RENEWABLE ENERGY LAB., FEED-IN TARIFF POLICY: DESIGN, IMPLEMENTATION, AND POLICY INTERACTIONS 9–11 (2009), *available at* http://www.nrel.gov/docs/fy09osti/45549.pdf; Volkmar Lauber, *REFIT and RPS: Options for a Harmonised Community Framework*, 32 ENERGY POL'Y 1405, 1405 (2004); Wilson H. Rickerson et al., *If the Shoe FITs: Using Feed-in Tariffs To Meet U.S. Renewable Electricity Targets*, 20 ELEC. J. 73, 83–84 (May 2007).

There can be no question that feed-in tariffs often have been extremely effective. The two global leaders in solar photovoltaic installations—Spain and Germany—have used feed-in tariffs, and those same two countries are within the top four nations for installed wind power capacity worldwide.[8] Germany, for one, has revolutionized its electricity system under its feed-in tariff, increasing its use of renewable electricity sevenfold over the last twenty-five years and rapidly approaching its goal of 35% electricity production from renewables by 2020. This is an astonishing feat for a developed, heavily industrialized nation, and it is turning heads across the globe. By one count, as of 2012, at least 61 countries and 26 states or provinces had some form of feed-in tariff in place.[9]

Yet the stock story of feed-in tariffs as policy overachievers is beginning to show cracks. Increasingly, the media has spotlighted stark economic and political troubles that feed-in tariffs have caused or encountered, such as in Spain.[10] Moreover, focusing solely on feed-in tariff success ignores key subplots of these laws' effects.

As much as feed-in tariffs have created a blue sky for renewables, they also have put clouds on the horizon. In many portraits of FIT function, this goes overlooked. Feed-in tariffs bring benefits, but they also have downsides. Among these, feed-in tariffs can be expensive, a fact that can be exacerbated if, as in some regimes, FIT funds are drawn from state coffers. Feed-in tariffs can lag behind the technology change they create, thus generating windfall profits and over-subsidizing the renewable industry. Feed-in tariffs can cause energy inequity, benefiting well-off citizens who can afford to install solar panels at the expense of lower-income consumers who have to pay higher electricity bills.

Feed-in tariffs also can create enormous turmoil for the existing energy system. As renewable energy penetration goes up, the grid, which was not built to handle energy swings or two-way transactions with end consumers, becomes more difficult to manage. Grid operators thus have to adapt to changing energy profiles that are less predictable and less controllable than before because renewables are both more intermittent and less dispatchable than conventional generation. Feed-in tariffs likewise hold the potential to significantly disrupt the predecessor energy markets into which they are introduced. Renewables require easily dispatchable generation to back them up, plus other resources such as voltage support, yet feed-in tariffs do not always anticipate this—nor

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[8] *See* GLOBAL WIND ENERGY COUNCIL, GLOBAL WIND STATISTICS 2013 (May 2, 2014), *available at* http://www.gwec.net/wp-content/uploads/2014/02/GWEC-PRstats-2013_EN.pdf.

[9] Del Río & Mir-Artigues, *supra* note 6, at 5558.

[10] *See, e.g.*, Andrés Cala, *Renewable Energy in Spain is Taking a Beating*, N.Y. TIMES (Oct. 8, 2013), *available at* http://www.nytimes.com/2013/10/09/business/energy-environment/renewable-energy-in-spain-is-taking-a-beating.html?pagewanted=1&_r=0.

do they necessarily ensure the market will adequately adapt to the changing load profile which FITs create.[11] The result: as feed-in tariffs become increasingly effective at achieving their goal, the physical, legal, and economic worlds in which they operate begin to experience, at best, growing pains, and increasingly more often, tumult.

As this occurs, turmoil surrounds feed-in tariffs. The laws themselves become subject to frequent tinkering, modification, and amendment. The ensuing state is a paradoxical one. While feed-in tariffs often are praised for creating certainty, they themselves become uncertain. As a consequence, the very reason why renewable energy advocates favor FITs can become quickly lost. Feed-in tariffs in full throttle can morph seamlessly into feed-in tariffs in turmoil.

Perhaps it should not be surprising that feed-in tariffs incite great change around them. After all, the very idea of the feed-in tariff is that it will disrupt the persistent energy paradigm: make it greener, more competitive, and more democratic by swapping out old energy sources and players for smaller, more distributed generation run by more diverse, more nimble competitors with new and different business models. Indeed, the fact that feed-in tariffs force their own evolution might be seen more as policy success than failure: That a FIT needs to adjust to a changing market means that the policy is doing what it is supposed to. Nevertheless, the darker side of feed-in tariffs—and how to grapple with the challenges they create—has received remarkably little attention to date in the scholarly debate over renewable energy policy.

This Article seeks to throw light on this aspect of the feed-in tariff story. By examining head-on the dilemmas that feed-in tariffs present in some of the most high profile countries where they have been deployed, we hope to show that the oft-offered, optimistic narrative of feed-in tariffs is in actuality much more complex, complicated, and uncertain. Our core point is that feed-in tariffs, as effective as they might be, create challenges too—challenges that, if not managed well by governments willing to adapt their policy regimes to changing circumstances, can become significant problems. As feed-in tariffs evolve, they demand increasing amounts of management and attention, and that effort cannot be achieved solely by fine-tuning FIT design itself. Feed-in tariffs inexorably impact the complex (physical, legal, political, social, and economic) energy systems in which they operate. Accordingly, responsive change exogenous to these policies is inevitable, and FIT policy evolution in turn must account for it. In drawing attention to this more complete narrative of feed-in tariffs, we thus offer some initial observations of the challenges feed-in tariffs

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[11] Concededly, any effective renewable support policy might impose any of these effects. That FITs are now the focus of this discussion is in part because they have been so broadly adopted and in part because they have, in many cases, produced rapid results.

face. Our hope is that by adding this texture, the more nuanced narrative of feed-in tariff performance and design will emerge.

Specifically, four major lessons arise from our analysis of feed-in tariffs in Germany, Spain, and South Korea. First, feed-in tariffs are undeniably effective at deploying renewable technology. Second, during a feed-in tariff's lifetime, problems, particularly related to costs, make modification of the FIT policy design inevitable. Third, the change that feed-in tariffs effect goes beyond the FIT itself and impacts external energy and other related systems. Finally, rapid or unexpected changes brought about by feed-in tariffs can undermine the certainty and stability that makes these policies attractive in the first place. Avoiding modifications that weaken confidence in the FIT's renewable energy support regime should be foremost in the minds of policymakers as they adapt their laws to new challenges.

This Article proceeds in six parts. Parts II, III, and IV offer case studies of notable nations that have used feed-in tariffs: Germany, Spain, and South Korea. Each case study traces the evolution of the country's law, its record of success and overall impact, and the challenges it now faces. Part V draws observations and sketches out initial impressions about the difficulties feed-in tariffs create and the obstacles they confront. Part VI concludes.

II. GERMANY

If feed-in tariffs are the model policy for promoting renewables, Germany may offer the classic tale. For years, Germany has been lauded as a global renewable energy exemplar. Its feed-in tariff has not just worked but worked well—not only getting renewables built but ensuring multiple types of technologies are deployed. In wind, in solar, in renewables in general,[12] Germany has quickly emerged as a world leader, in no small part because of its feed-in tariff.

Like any good story worth telling, however, Germany's is not a simple straight line. Its plot is full of twists and turns, with the German feed-in tariff transforming in multiple ways over the last two-and-a-half decades. Morphing from a modest 1990 law that gave feed-in tariffs their name, to the current sophisticated regime that now occupies 81 pages of law,[13] the German feed-in

12 Also of particular note in Germany are biogas and biomass combined heat and power ("CHP") systems, which grew rapidly under the country's FIT regime.

13 *See Gesetz für den Vorrang Erneuerbarer Energien*, ERNEUERBARE-ENERGIEN.DE (Jan. 1, 2012), *available at* http://www.erneuerbare-energien.de/fileadmin/ee-import/files/pdfs/allgemein/application/pdf/eeg_2012_bf.pdf. Legal commentaries on the Erneuerbare-Energien-Gesetz, or "EEG," further underscore the law's complexity. *See generally, e.g.*, MARTIN ALTROCK ET AL., EEG: ERNEUERBARE-ENERGIEN-GESETZ KOMMENTAR (3d ed. 2011) (1197 pages); WALTER FRENZ ET AL., EEG: ERNEUERBARE-ENERGIEN-GESETZ KOMMENTAR

tariff today is as complicated as it is controversial. Indeed, in the current context, questions epitomize the German law as much as accounts of its success do. While the longevity of the German FIT may not yet be in serious doubt, only one thing about the future of the law's shape and design seems clear: They are uncertain.

A. The German FIT: A Leader, a Challenger

1. Germany's FIT Innovation: The StrEG of 1990

The first feed-in tariff in the world—or, at least, the law that gave feed-in tariffs their name—was German.[14] In 1990, Germany adopted its *Stromeinspeisegesetz* ("StrEG"), which roughly translates as "electricity feed-in law," and the feed-in tariff was born.[15] As the progenitor of FITs around the globe, the 1990 StrEG bore the hallmarks of what we now know as the archetypal feed-in tariff.[16] It mandated that network operators purchase electricity produced by renewables, so long as a large utility was not the energy producer. And it established incentive prices that had to be paid for those purchases.[17]

Both of these policy innovations were critical. The mandatory purchase requirement substantially simplified the process for German renewable generators to bring their product to market. "Generators were not required to negotiate contracts or otherwise engage in much bureaucratic activity."[18] Instead, the StrEG itself imposed the mandate to connect and purchase electricity. Thus, the StrEG removed an important barrier to entry because,

(3d ed. 2013) (1804 pages); PETER SALJE, EEG 2012: ERNEUERBARE-ENERGIEN-GESETZ KOMMENTAR (6th ed. 2011) (1590 pages).

14 Of course, the idea of the StrEG was preceded by PURPA in the United States, which arguably was the original feed-in tariff or, at least, the progenitor of modern FITs. *See* Lincoln L. Davies, *Incentivizing Renewable Energy Deployment: Renewable Portfolio Standards and Feed-in-Tariffs*, 1 KLRI J.L. & LEGIS. 39, 52 (2011).

15 *See* RANIER HINRICHS-RAHLWES, SUSTAINABLE ENERGY POLICIES FOR EUROPE: TOWARDS 100% RENEWABLE ENERGY 30 n.12 (2013).

16 The StrEG was adopted in 1990 but took effect in 1991. The literature thus refers to it alternately as the 1990 StrEG or the 1991 StrEG.

17 *See* Paul-Georg Gutermuth, *Regulatory and Institutional Measures by the State to Enhance the Deployment of Renewable Energies: German Experiences*, 69 SOLAR ENERGY 205, 207 (2000).

18 Volkmar Lauber & Lutz Mez, *Three Decades of Renewable Electricity Policies in Germany*, 15 ENERGY & ENV'T, no. 4, 2004, at 3, *available at* http://www.wind-works.org/cms/uploads/media/Three_decades_of_renewable_electricity_policy_in_Germany.pdf.

previously, monopoly utilities had resisted efforts by non-affiliates to interconnect with the network.[19]

Likewise, the StrEG gave companies strong incentives to produce electricity using renewables. It established payment rates that were, by historical measures, quite generous.[20] These rates changed yearly and were calculated based on "the average revenues earned by the network operators from sales to all final electricity consumers" during the prior year—that is, retail electricity prices.[21] The rates were also technology-specific. For solar and wind, the rate was 90% of average final sale revenues. From 1991 to 1999, this rate fluctuated between 8.45 and 8.84 €cents/kWh.[22] For electricity produced by hydropower, biomass, and landfill or sewage gas, the rate varied between 65, 75, and 80% of the final sale revenues, depending on the size and type of the facility and the year in question.[23]

The StrEG thus broke new ground in two important ways. It made Germany both a leader on renewable energy policy and a challenger. Germany became a leader because its feed-in tariff opened up markets for renewables in a way prior policies had not. The StrEG's purchase and price guarantees gave investors a kind of stability and predictability they had not enjoyed under former regimes, such as the Public Utilities Regulatory Policy Act ("PURPA") in the United States,[24] or Germany's own PURPA-like avoided cost regime.[25] This made renewable energy projects in Germany more attractive financially and set off an "unexpected boom" in wind energy.[26] In turn, Germany came to

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19 *See* Gutermuth, *supra* note 17, at 207.

20 DAVID JACOBS, RENEWABLE ENERGY POLICY CONVERGENCE IN THE EU: THE EVOLUTION OF FEED-IN TARIFFS IN GERMANY, SPAIN AND FRANCE 176–77 (2012).

21 Gutermuth, *supra* note 17, at 207.

22 JACOBS, *supra* note 20, at 176. The rate at the time was expressed in pfennigs rather than Eurocents. The rate in 1991 was roughly 16.61 pfennigs per kilowatt hour ("pf/kWh") and 16.52 pf/kWh in 1999. *See* Lauber & Mez, *supra* note 18, at 4. From 1948 until the adoption of the Euro in 1999, the Deutsche Mark was Germany's official currency and was subdivided into pfennigs—100 pfennigs per Mark. *German Mark*, OANDA CORP., http://www.oanda.com/currency/iso-currency-codes/DEM (last visited Feb. 26, 2014). In 1999, one Mark was worth just over €0.50 Euros and approximately $0.60 U.S. *Currency Converter*, OANDA CORP., http://www.oanda.com/currency/converter/ (last visited Mar. 4, 2014).

23 In 1991, this amounted to rates of 11.99, 13.83, and 13.84 pf/kWh; in 1999, the rates were 11.93, 14.69 and 14.69 pf/kWh, respectively. Lauber & Mez, *supra* note 18, at 1.

24 Pub. L. No. 95-617, 92 Stat. 3117 (codified at 16 U.S.C. §§ 2601–2645 (1978)).

25 *See* Gutermuth, *supra* note 17, at 207.

26 *Id.* The security offered by the StrEG was not absolute. Because its payment price was tied to retail prices, if prices dipped, which they did in some markets as the E.U. pushed for liberalization and competition, some wind projects in the late 1990s became concerned about profitability. This uncertainty was one of the factors that led to the EEG's adoption in 2000.

be seen internationally "as one of the pioneering countries in the development and application of [renewable energy sources]."[27]

At the same time, the StrEG rendered Germany a kind of challenger on renewable energy. One of the StrEG's express purposes was "to 'level the playing field' for [renewables] by setting feed-in rates that took account of the external costs of conventional power generation."[28] In this way, the StrEG specifically sought to break the stranglehold of both incumbent utilities and conventional generation sources on the electricity market. It aimed, in short, to make electricity generation both more diverse and more democratic: more open to smaller and more distributed resources and driven more by entrepreneurial enterprises and individuals than large, monolithic utilities. Critically, however, Germany's largest utilities "did not mobilise" to oppose the StrEG at the time, "probably because they underestimated the importance of the law (which at first was expected to play a minor role, mostly for small hydro)" and perhaps because they were otherwise occupied with "taking over the East German electricity sector during reunification."[29] Yet with the StrEG in place, renewables gained a toehold toward breaking down the traditional German electricity production system.

2. Further Innovation: The Aachen Model and Broader Renewable Policy

While the StrEG was "certainly the most significant" renewable energy support mechanism in Germany during the 1990s, it was not the only one.[30] The StrEG was adopted into a broader ecosystem of German renewable energy policy. As had other countries, Germany began supporting research into renewables following the oil crises of the 1970s, although the German government's "main response" to those crises was to promote coal and nuclear.[31] Support for renewables "was chiefly a concession to dissenters."[32]

Nevertheless, by the late 1980s, the government had adopted two important programs to promote renewable energy use: a 100 megawatt ("MW") wind program and a 1,000-roof solar program. Under the former, the government paid a subsidy of 3-4 €cents/kWh to generators using wind energy,

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[27] Mischa Bechberger & Danyel Reiche, *Renewable Energy Policy in Germany: Pioneering and Exemplary Regulations*, 8 ENERGY FOR SUSTAINABLE DEV. 47, 49 (2004).

[28] Lauber & Mez, *supra* note 18, at 3.

[29] *Id.*

[30] Paolo Agnolucci, *Use of Economic Instruments in the German Renewable Electricity Policy*, 34 ENERGY POL'Y 3538, 3539 (2006).

[31] *See* Lauber & Mez, *supra* note 18, at 1.

[32] *Id.*

with the goal of getting 100 MW of wind generation installed on the grid.[33] Similarly, under the 1,000-roof program, the government agreed to provide 70% of the costs necessary to install rooftop photovoltaic ("PV") panels.[34] "Eventually [2,250] roofs were equipped with PV modules, leading to about five MW of installations."[35] Part of the StrEG's success thus could be attributed both to renewable energy's growing political support and to the ability to combine StrEG rates with existing government subsidies.[36]

As pathmarking as the StrEG was, it was neither Germany's first nor its last feed-in tariff innovation. The StrEG was a successor to a national competition law, adopted in 1979, that obliged German electricity distributors to purchase renewable energy at "avoided cost" rates[37]—a principle familiar to observers of PURPA in the United States.[38] The StrEG also came on the heels of voluntary agreements that utilities had entered into for the purchase of renewables-based electricity.[39] The key difference in the StrEG was that it increased the amount of compensation that renewables producers would receive, and it made utility purchases mandatory rather than voluntary. Very quickly, other FIT innovations made the StrEG's foundational support for renewables even stronger.

In 1993, Aachen, a western German city of about a quarter-million residents situated on the German-Dutch-Belgian border,[40] adopted a policy that would eventually become the core idea used to overhaul the StrEG. Rather than paying renewables producers a percentage of retail rates as the StrEG did, Aachen established a solar feed-in tariff based on the technology's cost, plus an adder to cover a modest investor profit.[41] Policymakers deemed this innovation "revolutionary" because prior support mechanisms had tended to key subsidies off of something external—conventional generation prices, retail electricity

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33 *Id.* at 3; *see also* Bechberger & Reiche, *supra* note 27, at 49–50. The government later increased the amount of generation eligible for the subsidy to 250 MW. Lauber & Mez, *supra* note 18, at 3.

34 Lauber & Mez, *supra* note 18, at 3. Generally, the federal government paid 50%, and state (*Länder*) governments paid 20%. *Id.* However, this breakdown was slightly different in some states: 60% federal funds and 10% *Länder* funds. *Id.*

35 *Id.*; *see also* Bechberger & Reiche, *supra* note 27, at 49–50.

36 *See, e.g.*, Agnolucci, *supra* note 30, at 3359–60; Lauber & Mez, *supra* note 18, at 3–4.

37 *See* Lauber & Mez, *supra* note 18, at 1–2.

38 Pub. L. No. 95-617, 92 Stat. 3117 (codified at 16 U.S.C. §§ 2601–2645 (1978)).

39 Gutermuth, *supra* note 17, at 207.

40 *See General Information*, AACHEN.DE, http://www.aachen.de/en/sb/ac/index.html (last visited Mar. 4, 2014).

41 PEMBINA INSTITUTE, *Cities Leading Global Renewable Energy Boom*, *in* RENEWABLE ENERGY FIT FOR CITIES: MAKING RENEWABLE ENERGY A PRIORITY, at 2 (2010) [hereinafter Fact Sheet], *available at* http://www.pembina.org/pub/2133.

prices, or environmental costs—rather than the price of the technology itself.[42] What quickly became known as the "Aachen model" flipped this presumption on its head. It looked to the cost of the technology rather than external factors. In the early 1990s, the Aachen policy paid two Deutsche Marks per kWh—or roughly twelve times the amount available under the StrEG—for solar energy.[43] This rate, moreover, unlike the StrEG's, remained constant for ten years.[44]

Soon, others followed Aachen's lead. These included large cities such as Bonn, Freiburg, Nuremburg, and Hamburg,[45] plus many smaller locales, including thirty different villages in Bavaria that adopted versions of the Aachen model between 1994 and 1997.[46] "The Aachen Model opened the door for a completely new funding approach," Klaus Meiners, head of the Aachen Department of Environment, observed.[47] "[T]oday we still get visits from government officials and experts from Japan who want to see it for themselves on the spot."[48]

While the Aachen model pushed forward, others pulled back against the StrEG. Political and legal challenges to the StrEG, including a complaint filed with the European Commission that the law violated European Union "state aid" rules, gained momentum, raising questions about the policy's long-term sustainability.[49] Eventually, "[a]n intense political battle ensued," with the German Ministry of Economic Affairs proposing to reduce StrEG rates while industry unions, environmental groups, renewable energy associations, and churches joined forces in opposition.[50]

The Ministry's proposal lost narrowly in the Bundestag, the German legislature's lower house,[51] but the Energy Supply Industry Act of 1998

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42 Paul Gipe, *All About Solar Energy: The Aachen Solar Tariff Model*, WIND-WORKS (Apr. 7, 2007), http://www.wind-works.org/cms/index.php?id=38&tx_ttnews%5Btt_news%5D=227&cHash=e088827563342ea235137c8e2e5f7cf6 (last visited Mar. 4, 2014).

43 F. Staiß & A. Räuber, *Strategies in Photovoltaic Research and Development—Market Introduction Programs*, *in* PHOTOVOLTAICS GUIDEBOOK FOR DECISION-MAKERS: TECHNOLOGICAL STATUS AND POTENTIAL ROLE IN ENERGY ECONOMY 243, 249 (Achim Bubenzer & Joachim Luther eds., 2013); *see also* Fact Sheet, *supra* note 41, at 2.

44 Staiß & Räuber, *supra* note 43, at 243, 249.

45 Lauber & Mez, *supra* note 18, at 6; Stefanie Hallberg, *On the Way to a CO2 Neutral City—The Example of Aachen*, GOETHE INSTITUT, http://www.goethe.de/ges/umw/prj/kuk/the/arc/en9664671.htm (last visited Mar. 4, 2014).

46 Gipe, *supra* note 42.

47 Hallberg, *supra* note 45.

48 *Id.*

49 *See* Lauber & Mez, *supra* note 18, at 3–4.

50 *Id.* at 4.

51 The Bundesrat, or Federal Council, is the upper house.

modified the StrEG in two important ways.[52] Specifically, this 1998 law put in place a tiered system in which upstream network operators would compensate downstream distribution system operators to which renewables facilities connected, if the connected facilities exceeded 5% of the downstream operator's output.[53] This was referred to as the "first ceiling," while a "second ceiling" afforded compensation to the upstream operator if the compensation payments it had to make exceeded 5% of its output.[54]

These reforms met mixed reviews.[55] On one hand, they addressed a persistent concern that the StrEG was unfair because it did not spread its costs evenly over the nation. But the fight over how to amend the StrEG also created "insecurity for investors and stagnating markets for wind turbines from 1996 to 1998."[56] It was thus a welcome change for renewable energy industries when, in 1998, the governing coalition in Germany shifted, and the new Social Democrat-Green government named renewable energy one of its key environmental priorities.[57]

3. The EEG of 2000

The ensuing *Erneuerbare-Energien-Gesetz* ("EEG"), or "Renewable Energy Sources Act," adopted in 2000, both cemented the StrEG's concept in place and expanded the ways the prior law supported renewables. The EEG added three planks to the StrEG's twin pillars of mandated renewable energy purchases at premium prices. First, the EEG adopted the Aachen model and decoupled feed-in rates from retail electric prices. In fact, the EEG raised "all remuneration rates"—on average by ten percent, but for some sources much more substantially.[58] Solar PV rates, for instance, increased more than five-fold: from 8.52 to 50.62 €cents/kWh.[59] Second, the EEG promulgated fixed

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52 *See* Lauber & Mez, *supra* note 18, at 5.

53 *Id.*

54 *Id.* If an upstream operator did not have another operator that was further upstream from whom it could collect its "second ceiling" compensation, the 1998 revisions specified that the purchase obligation would no longer apply.

55 *See id.* at 4.

56 *Id.* at 5.

57 *See* Bechberger & Reiche, *supra* note 27, at 50.

58 *Id.* at 52.

59 *Id.*; *see* Erneuerbare-Energien-Gesetz [EEG] [Renewable Energy Sources Act], March 29, 2000, BUNDESGESETZBLATT, Teil I [BGBL. I] at 305, § 8 (Ger.) [hereinafter EEG 2000]. The German version of the statute is available at http://www.gesetze-im-internet.de/bundesrecht/eeg/gesamt.pdf. The English version is available at http://www.erneuerbare-energien.de/fileadmin/ee-import/files/pdfs/allgemein/application/pdf/res-act.pdf.

periods of time that the feed-in rates would be paid—typically twenty years, except for hydropower.[60] Previously under the StrEG, the duration of tariff payments was not specified.[61] Finally, the EEG created a stronger investment incentive for renewables by prioritizing electricity produced from these resources over others.[62]

Thus, under the EEG, the German FIT now bore several key features: (1) the mandatory purchase of renewable electricity by grid operators, (2) at cost-based tariff rates guaranteed for twenty years, (3) with a priority for renewables use on the system, and (4) mandatory grid connection. Together, each of these features sought to induce construction of more renewables by reducing risk to investors, increasing remuneration rates for producers, and lowering barriers to entry for non-incumbents.

The EEG implemented a number of other key changes to the StrEG regime. To address concerns that the StrEG constituted unlawful state aid to industry, the EEG made feed-in rates degressive, so that, for each plant, the amount of compensation decreased in the years after the tariff took effect.[63] Further, the EEG capped eligibility for solar facilities at an aggregate installed capacity of 350 MW.[64] The law also put in place a biennial reporting mechanism, to track progress toward renewable energy goals and propose rate adjustments depending on how quickly those goals were met.[65] And to expand the FIT's reach, the EEG lifted the StrEG's ban on utility-owned facilities from receiving remuneration, although it exempted facilities with a 25% or more government (federal or *Länder*) ownership.[66]

The EEG also clarified grid connection obligations and costs. Under the StrEG, grid operators were required to connect to and purchase electricity from renewable facilities, but the law "did not include any further

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60 EEG 2000, *supra* note 59, at 305, § 9.

61 *See* Volkmar Lauber & Lutz Mez, *Renewable Electricity Policy in Germany, 1974 to 2005*, 26 BULL. OF SCI., TECH. & SOC'Y 105, 110 (2006).

62 EEG 2000, *supra* note 59, at 305, § 3(1); *see also* Bechberger & Reiche, *supra* note 27, at 52.

63 *See, e.g.*, EEG 2000, *supra* note 59, at 305, § 5(2) (minimum compensation amounts for new biomass installations shall be reduced by 1% annually); *Id.* § 8(5) (minimum compensation amounts for new solar installations shall be reduced by 5% annually). For some resources, degression took effect immediately. For others, such as geothermal and off-shore wind, it did not take effect until several years after the FIT was effective, reflecting the reality that some projects have longer development lead times.

64 *Id.* § 8 (2). This limit was later raised to 1,000 MW in 2002 "because 350 MW seemed about to be surpassed already . . . and the successful PV sector needed further planning security." Bechberger & Reiche, *supra* note 27, at 53.

65 EEG 2000, *supra* note 59, at 305, § 12; *see also* Bechberger & Reiche, *supra* note 27, at 52.

66 EEG 2000, *supra* note 59, at 305, § 10(1); *see also* Agnolucci, *supra* note 30, at 3540.

specifications regarding the sharing of costs."[67] The EEG filled this gap in two ways: first, by specifying that renewable facilities had the right to connect at the "technically and economically most suitable grid connecting point";[68] and second, by dictating that renewable facility operators would bear responsibility for direct connection costs, but that grid operators would bear the costs for any necessary grid upgrades from the facility coming online.[69]

Finally, to address concerns that some regions of the country paid more than their fair share of FIT costs—northern Germany tends to be windier while more industry is located in the south—the EEG instituted a rate equalization scheme.[70] This was the same problem the 1998 StrEG amendments sought to fix, but the EEG struck more directly at the heart of the problem. Under the EEG regime, local distribution system operators paid the feed-in tariffs, but "they could now transfer [those costs] to the level immediately above them—the transmission system operators in their region. At this level, the four German transmission system operators calculate[d] the total costs of renewable electricity promotion and then distribute[d]" those costs "equally among all supply companies."[71] In this way, the costs of the EEG were "equally distributed among all German electricity consumers."[72] Eventually, the cost of tariff payments imposed on consumers under the EEG's equalization scheme came to be known as the *Umlage*: the "EEG surcharge" or "EEG fee."

The EEG was an immediate hit. It earned praise early and often for its ability to get more and more renewables on the grid. As one set of observers wrote, "The most important German [renewable energy] promotion measure in the area of electricity is without any doubt the . . . EEG . . . ."[73]

Cracks in the system, however, soon emerged. Industry and economically-minded political interests complained vociferously that the EEG came with many flaws, including a heavy price tag. Thus, while administrative oversight of the EEG switched from the economics ministry to the environment ministry following the 2002 elections, the Economic Affairs Minister, Wolfgang Clement, "attacked the very principle of the feed-in tariff and wanted to replace it by a tender system, arguing that particularly for wind energy, rates were excessive."[74] Clement failed in his attempt to eliminate any FIT at all, but in the ensuing amendments to the EEG, a pattern was established. Rates for

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67 JACOBS, *supra* note 20, at 91.

68 EEG 2000, *supra* note 59, at 305, § 10(1).

69 *Id.* §§ 10(1)–(2); *see also* JACOBS, *supra* note 20, at 91–92.

70 EEG 2000, *supra* note 59, at 305, § 11.

71 JACOBS, *supra* note 20, at 83. This was sometimes referred to as the "EEG quota."

72 *Id.*; *see also* Agnolucci, *supra* note 30, at 3540.

73 Bechberger & Reiche, *supra* note 27, at 52.

74 Lauber & Mez, *supra* note 18, at 12.

wind resources were reduced, and perhaps more important, a process of repeatedly revising the EEG system every few years took hold. Whereas the StrEG had remained basically steady for a decade, the question of what the EEG would look like seemed quickly to become one presented by virtually every election cycle.

4. The 2004 EEG Amendments

The 2004 EEG amendments worked significant change to the law. While keeping the basic structure of the EEG in place, they made numerous other important modifications to its design.

The 2004 law declared official national renewable energy goals. To comply with a European Union directive that Germany supply 12.5% of its electricity from renewables,[75] the 2004 amendments stated a target of meeting that goal by 2010, and a benchmark of 20% by 2020.[76] The law further provided that the environment ministry could establish an EEG "clearinghouse" to provide an alternative dispute resolution forum for disputes between parties over the law's implementation.[77]

Most fundamentally, the 2004 amendments altered FIT payments. For onshore wind, these rates went down—from initial tariffs of 9.1 €cents/kWh under the 2000 EEG to 8.7 €cents/kWh under the 2004 law.[78] For others, they went up. This was especially true for smaller facilities. Offshore wind, for instance, kept an initial rate of 9.1 €cents/kWh,[79] small biomass facilities increased from 10.23 to 11.50 €cents/kWh,[80] and small geothermal climbed

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75 Council Directive 2001/77, of the European Parliament and of the Council of 27 September 2001 on the Promotion of Electricity Produced from Renewable Energy Sources in the Internal Electricity Market, 2001 O.J. (L 283) 33, 39, *available at* http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2001:283:0033:0040:EN:PDF.

76 Erneuerbare-Energien-Gesetz [EEG] [Renewable Energy Sources Act], July 31, 2004, BUNDESGESETZBLATT [BGBL I.] at 40, § 1 art. 1(2) (Ger) [hereinafter EEG 2004]. The English version of the statute is available at http://www.erneuerbare-energien.de/fileadmin/ee-import/files/english/pdf/application/pdf/eeg_en.pdf.

77 EEG 2004, *supra* note 76, § 1 art. 19. The clearinghouse was established in 2007—the *Clearingstelle EEG*. *See English*, CLEARINGSTELLE EEG, http://clearingstelle-eeg.de/english (last visited Mar. 4, 2014).

78 *Compare* EEG 2000, *supra* note 59, at 305, § 7(1), *with* EEG 2004, *supra* note 76, at 40, art. 10(1), § 1.

79 *Compare* EEG 2000, *supra* note 59, at 305, § 7(1), *with* EEG 2004, *supra* note 76, at 40, art. 10(3), § 1.

80 *Compare* EEG 2000, *supra* note 59, at 305, § 5(1), *with* EEG 2004, *supra* note 76, at 40, art. 8(1), § 1. Under the 2004 statute, the 10.23 rate applied to 500-kilowatt facilities, while the 11.50 cent rate applied to 150-kilowatt facilities. *Id.*

from 8.95 to 15 €cents/kWh.[81] Solar, however, enjoyed perhaps the most notable increase, from 50.62 to 57.4 €cents/kWh, plus a 5 €cent adder for non-built up areas.[82]

Importantly, the 2004 amendments also created additional "banding" within each resource, with different tariffs applicable to different-sized facilities. For instance, under the 2000 EEG, biomass was broken down into three subcategories: up to 500 kW, 500 kW to 5 MW, and 5 MW to 20 MW.[83] Under the 2004 law, biomass now occupied five categories: up to 150 kW, up to 500 kW, up to 5 MW, above 5 MW, and recycled timber.[84] Other eligible resources received similarly nuanced price treatment depending on their size, and large hydropower facilities became eligible for FIT payments if expanded or modernized in compliance with the law.[85]

Further, the 2004 amendments changed the way the EEG's costs were distributed. A 2003 adjustment exempted some large energy users from full payment of EEG fees.[86] The 2004 law made this exemption larger. Under the 2004 approach, intensive energy users (such as manufacturing and rail operators) that purchased more than 100 GWh of electricity per year could apply for exemption. Once exempted, they would be required to pay no more than 0.05 €cent/kWh for electricity they purchased derived from renewables.[87]

Finally, the 2004 EEG expanded the law's application in a number of ways. For solar, the 2004 amendments removed the 350 MW cap on PV.[88] For wind, the amendments extended the period for which offshore facilities could receive full tariff payments under the 2000 EEG's "reference yield model." Under this model, if a facility could demonstrate that it would meet a certain percentage of the so-called "reference yield" wind site, the facility would receive higher FIT payments than facilities that did not.[89] This, the environment ministry asserted, "quash[ed] any economic incentive to install wind turbines

[81] *Compare* EEG 2000, *supra* note 59, at 305, § 6(1), *with* EEG 2004, *supra* note 76, at 40, art. 9(1), § 1.

[82] *Compare* EEG 2000, *supra* note 59, at 305, § 8(1), *with* EEG 2004, *supra* note 76, at 40, art. 11(2), § 1. The solar rates actually were increased in 2003. *See* Lauber & Mez, *supra* note 61, at 110–12.

[83] EEG 2000, *supra* note 59, at 305, § 5(1).

[84] EEG 2004, *supra* note 76, at 40, art. 8(1), § 1.

[85] *Id.* at 40, § 1, art. 6(2).

[86] JACOBS, *supra* note 20, at 84–85.

[87] EEG 2004, *supra* note 76, at 40, art. 16, § 1. Such entities also had to have a ratio of electricity costs to gross value added greater than fifteen.

[88] *See id.* § 1 art. 11.

[89] *Id.* § 1 art. 10(4).

on sites with poor wind conditions."[90] Under the 2000 law, offshore facilities could receive these payments for nine years; under the 2004 amendments, that period was extended to twelve years.[91] In addition, the 2004 amendments made FIT payments available both for onshore wind facilities that "replace[d] or modernize[d]" old "plants in the same rural district" and for facilities that "at least triple[d] the installed capacity"—referred to as "repowering" facilities—for a certain period of time.[92]

5. The 2009 EEG Amendments

The 2004 amendments were hardly the end of the EEG's evolution. Following those revisions, the German legislature began making a series of rapid, successive changes to the law, particularly with respect to solar energy.

The 2009 amendments were perhaps most significant. With the Green Party now out of power, the new coalition of Christian Democrats and Social Democrats sought to make the FIT more market-responsive. The 2009 EEG thus included a provision allowing renewables producers to sell their power directly into the market, rather than feeding it to an upstream grid operator in exchange for a tariff payment.[93] This new provision allowed producers to make this decision on a month-to-month basis, opting in and out of the FIT regime with advance notice,[94] or to take a hybrid approach of selling a specified portion of their output directly at market and collecting a tariff payment on the rest.[95] The idea was to help prepare renewables operators to fully enter the market —an ultimate goal of FITs in the first place[96]—by allowing them to take

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90 FED. MINISTRY FOR THE ENV'T, NATURE CONSERVATION AND NUCLEAR SAFETY (BMU), AMENDING THE RENEWABLE ENERGY SOURCES ACT (EEG) (2004), *available at* http://www.senes.bas.bg/DE_tariff.pdf.

91 *Compare* EEG 2004, *supra* note 76, at art. 10(3), *with* EEG 2000, *supra* note 59, § 7(1). Under both the 2000 and 2004 EEGs, the reference-yield period for onshore facilities was five years.

92 EEG 2004, *supra* note 76, at art. 10(2).

93 Erneuerbare-Energien-Gesetz [EEG] [Renewable Energy Solutions Act], Oct. 25, 2008, BGBL. I § 17 (Ger.) [hereinafter EEG 2009]. The German version of the statute is available at http://www.gesetze-im-internet.de/bundesrecht/eeg_2009/gesamt.pdf. The English version of the statute is available at http://www.erneuerbare-energien.de/fileadmin/ee-import/files/english/pdf/application/pdf/eeg_2009_en_bf.pdf.

94 EEG 2009, *supra* note 93, § 17(1).

95 *Id.* § 17(2). For an explanation of the choice of a one-month time period rather than a year as Spain had used, see *infra* Part III.A, or a one-hour period as others had advocated, *see* JACOBS, *supra* note 20, at 141.

96 A core objective of any renewables support regime is to make the resources commercially competitive, but the German FIT, like most environmental policies, had many other goals as well, including: to scale up renewable energy, to introduce new actors into the generation

advantage of times when it is "financially more rewarding for green power producers [to sell into the market] than [to] receiv[e] the fixed feed-in tariff."[97]

The 2009 EEG also provided requirements and incentives for managing the intermittent nature of renewables, which by 2009 represented 16.3% of German electricity production.[98] With that much production from renewables, grid management had become more difficult. So the 2009 law required installations of over 100 kW to utilize equipment that would allow grid operators to manage their production, including reducing their "output by remote means in the event of grid overload."[99] Further, in 2009, a "system service bonus," or "SDL,"[100] was implemented for wind facilities that could help maintain grid stability.[101]

In addition, the 2009 EEG adjusted the tariffs themselves. In most cases, these were upward adjustments. For instance, initial onshore wind tariffs increased from 9.2 €cents/kWh,[102] small biomass climbed to 11.67 €cents/kWh,[103] and the bonus for repowering existing wind facilities increased by 0.5 €cents/kWh.[104] The 2009 EEG kept the degression rates stable for biogas, biomass, geothermal, and small hydropower, but it reduced the amount of degression for wind from 2 to 1% annually.[105] The 2009 amendments also

business, to create economies of scale to drive costs down, and to provide environmental benefits such as climate change mitigation.

97 JACOBS, *supra* note 20, at 138.

98 FED. MINISTRY FOR THE ENV'T, NATURE CONSERVATION AND NUCLEAR SAFETY, RENEWABLE ENERGY SOURCES IN FIGURES: NATIONAL AND INTERNATIONAL DEVELOPMENT 13 (2013) [hereinafter BMU, SOURCES IN FIGURES], *available at* http://www.bmub.bund.de/fileadmin/Daten_BMU/Pools/Broschueren/ee_in_zahlen_en_bf.pdf. The Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety has since changed its name to the Federal Ministry for the Environment, Nature Conservation, Building, and Nuclear Safety.

99 EEG 2009, *supra* note 93, § 6. Grid operators could exercise this "technical control" over renewables installations only if three criteria were met: (1) the "grid capacity . . . would otherwise be overloaded on account of that electricity," (2) the operator already "ensured that the largest possible quantity of electricity" from renewables was purchased, and (3) the operator "called up the data on the current feed-in situation in the relevant" part of the grid. *Id.* § 11.

100 The German term is *Systemdienstleistungsbonus*. *See* JACOBS, *supra* note 20, at 153.

101 *Id.*; *see also* EEG 2009, *supra* note 93, § 6. These were additional tariff payments of 0.5 €cents/kWh for new facilities and 0.7 €cents/kWh for retrofitted windmills. *See* JACOBS, *supra* note 20, at 153.

102 EEG 2009, *supra* note 93, §§ 29(1)–(2).

103 *Id.* § 27(1).

104 *Id.* § 30.

105 *Compare* Agnolucci, *supra* note 30, at 3541 (listing 2004 EEG tariff and degression rates for renewable energy sources), *with* Matthias Lang & U. Mutschler, *German Feed-in Tariffs 2009*, GERMAN ENERGY BLOG, http://www.germanenergyblog.de/?page_id=834 (last visited Mar. 5, 2014) (outlining the 2009 EEG tariff and degression rates for renewable energy sources).

provided additional banding within small hydropower, mine gas, and roof-mounted solar, although it simplified the banding for geothermal.[106]

By 2009, solar had become a dominant force in Germany, dramatically increasing from 3,075 GWh of electricity production in 2007 to 6,583 GWh in 2009.[107] The 2009 law thus sought to respond to this "considerable market" expansion, aiming to rein in runaway growth in the PV market and ensure that investors were not earning windfall profits as PV costs dropped with greater economies of scale.[108]

The law marshaled this effort in two parts. First, it reduced all of the solar tariffs substantially. Small rooftop installations, for instance, had their tariffs lowered from 57.4 €cents/kWh under the 2004 law to 43.01 €cents/kWh under the 2009 EEG.[109] Second, it modified the degression regime for solar. It did so both by increasing solar tariff degression rates—from 5–6.5% to 8–10% depending on the facility[110]—and by making the amount of degression more flexible. Under the prior EEG, degression rates were stable, with tariff payments decreasing at a fixed percentage from year to year. The 2009 act, however, made degression "responsive" to market growth.[111] The law instituted a device known as the *atmender Deckel*—the "breathing cap."[112] Attempting in yet another way to make sure the solar market did not overheat, the *atmender Deckel* meant that degression would increase when more PV came online and decrease if the market fell below expectations.[113] Thus, under the 2009 EEG, the solar degression rates for 2011 and 2012 would fluctuate upward by 1 to

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106 *See supra* note 105.

107 BMU, SOURCES IN FIGURES, *supra* note 98, at 18.

108 JACOBS, *supra* note 20, at 177.

109 *Compare* EEG 2004, *supra* note 76, at art. 11 § 2, *with* EEG 2009 § 33(1).

110 *Compare* EEG 2004, *supra* note 76, at art. 11 § 5, *with* EEG § 20(2).

111 Jacobs uses the term "flexible" to describe the fluctuating nature of these degression rates. *See* JACOBS, *supra* note 20, at 127. This kind of degression also has been described as "responsive." *See* TOBY COUTURE ET AL., NAT'L RENEWABLE ENERGY LAB., POLICYMAKERS' GUIDE TO FEED-IN TARIFF POLICY DESIGN 41–42 (2010), *available at* http://www.nrel.gov/docs/fy10osti/44849.pdf.

112 *See* Matthias Lang & U. Mutschler, *Overview of Renewable Energy Sources Act*, GERMAN ENERGY BLOG, http://www.germanenergyblog.de/?page_id=283 (last visited Mar. 5, 2014). While the literal translation is "breathing cap," the device sometimes also is referred to as the "breathing ceiling" or "floating ceiling."

113 The level of expectation is known as the PV "corridor." *See* MARK FULTON ET AL., DEUTCSHE BANK GRP., DB CLIMATE CHANGE ADVISORS, THE GERMAN FEED-IN TARIFF: RECENT POLICY CHANGES 3 (2012), *available at* http://www.dbresearch.com/PROD/DBR_INTERNET_EN-PROD/PROD0000000000294376/The+German+Feed-in+Tariff:+Recent+Policy+Changes.pdf.

12% and downward by 2.5 to 7.5% from a statutory baseline depending on how many PV installations were made in those years.[114]

6. The 2010 EEG Amendments

Despite the 2009 EEG's effort to moderate explosive solar growth, installations in 2009 and 2010 only exceeded expectations. As a result, by the spring of 2010, a political debate was raging over whether and how to amend the EEG yet again. In July 2010, the government finalized agreed-upon changes, which sought to bring solar tariffs more in line with rapidly falling technology costs. The 2010 EEG thus reduced solar payments significantly: by 16% for rooftop facilities, 15% for ground-mounted facilities, and 11% for certain other plants.[115] These changes, moreover, were at least partially retroactive. A portion of the cuts took effect for facilities installed October 1, 2010 or later, but the bulk of the reductions took effect July 1—before the amendments were formally adopted.[116] The 2010 amendments also increased the amount of degression that could apply to solar. Again, as in the 2009 EEG, the amount of degression depended on the amount of installations made.[117]

7. The 2011 EEG Amendments

The next year brought only more change. Following the disaster at the Fukushima Daiichi nuclear power plant in Japan, the German government announced that it would permanently shut down the nation's entire nuclear fleet by 2022.[118] Renewables thus assumed an even stronger spotlight in Germany, with the expectation that they would make up the foregone nuclear capacity, or

[114] EEG 2009, *supra* note 93, § 20(3).

[115] Erneuerbare-Energien-Gesetz [EEG] [Renewable Energy Solutions Act], Aug. 11, 2010, BUNDESGESETZBLATT, Teil I [BGBL. I] §§ 32–33 (Ger.) [hereinafter EEG 2010]. The German version of the statute is available at http://www.gesetze-im-internet.de/bundesrecht/eeg_2009/gesamt.pdf. The English version is available at http://www.erneuerbare-energien.de/fileadmin/ee-import/files/english/pdf/application pdf/eeg_2009_verguetungsdegression_en_bf.pdf. For sample tariff calculations, see FED. MINISTRY FOR THE ENV'T, NATURE CONSERVATION, BUILDING AND NUCLEAR SAFETY, TARIFFS AND SAMPLE EGRESSION RATES PURSUANT TO THE NEW RENEWABLE ENERGY SOURCES ACT OF 25 OCTOBER 2008 WITH AMENDMENTS OF 11 AUGUST 2010, 12 (2010), *available at* http://www.erneuerbare-energien.de/fileadmin/ee-import/files/english/pdf/application/pdf/eeg_2009_verguetungsdegression_en_bf.pdf.

[116] EEG 2010, *supra* note 115, § 66(4).

[117] *See* JACOBS, *supra* note 20, at 125–26.

[118] For more on the German government's response to Fukushima, see Lincoln L. Davies, *Beyond Fukushima: Disasters, Nuclear Energy, and Energy Law*, 2011 BYU L. REV. 1937 (2011).

nearly a quarter of German electricity production.[119] The 2011 EEG consequently announced even more aggressive renewable targets: 35% of German electricity production by 2020, 50% by 2030, 65% by 2040, and 80% by 2050.[120] Germany's effort to transform its energy system away from nuclear and conventional sources also took on a new name: *Energiewende*, or "energy turnaround." Without question, the EEG thus became the core weapon in Germany's arsenal for making the *Energiewende* a reality.

The 2011 amendments worked a number of other important changes to the EEG. To "reflect market conditions and place downward price pressure on developers and manufacturers," the 2011 EEG reduced tariff rates for all resources except geothermal, offshore wind, and biomass.[121] Further, the 2011 amendments adjusted degression rates upward for both wind and biomass: from 1 to 1.5% and from 1 to 2%, respectively.[122]

The 2011 EEG also strengthened the incentive to engage in direct marketing—part of the law's overall trajectory toward urging renewables producers to become less reliant on fixed payments and more market-oriented. Whereas before the choice to direct market came with significant market risk, under the 2011 amendments facilities that chose to sell their power in this way now received a so-called "market premium." By limiting investor risk, this premium created heavy motivation to direct market renewable energy.[123] In short, under the 2011 amendments, suppliers who chose to direct market their energy could keep all of their above-FIT profits but potentially would be heavily subsidized by the market premium for any market losses they incurred.[124]

Finally, the 2011 amendments again modified solar tariffs. These amendments called for biannual adjustments to the solar FIT on January 1 and

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119 *Id.* at 1949–50.

120 Erneuerbare-Energien-Gesetz [EEG] [Renewable Energy Solutions Act], Apr. 1, 2012, BUNDESGESETZBLATT, Teil I [BGBL. I] § 1(2) (Ger.) [hereinafter EEG 2012]. The German version of the statute is available at http://www.erneuerbare-energien.de/fileadmin/ee-import/files/pdfs/allgemein/application/pdf/eeg_2012_bf.pdf. The English version of the statute is available at http://www.erneuerbare-energien.de/fileadmin/ee-import/files/english/pdf/application/pdf/eeg_2012_en_bf.pdf.

121 FULTON, *supra* note 113, at 4.

122 *Id.* at n.12.

123 *Id.* at 7.

124 The premium was calculated as the difference between the otherwise applicable FIT rate and a periodically determined "reference price." The reference price, in turn, was computed as the average market price in the prior month, minus a technology-specific "management premium" that sought to approximate the cost of renewables operators learning how to sell in the spot market. EEG 2012, *supra* note 120, § 33g. For an excellent explanation of this scheme, see FULTON, *supra* note 113, at 5–6.

July 1 of each year, depending on recent PV deployments.[125] Thus, beginning in July 2011, small rooftop facilities had a tariff of 28.74 €cents/kWh, and ground-mounted facilities had a FIT of 21.11 €cents/kWh.[126] The new tariff allowed for up to 24% degression beginning in July 2012 if enough solar power was installed.[127]

8. The 2012 EEG Amendments

The brakes the 2011 amendments attempted to apply to the solar market failed to have immediate effect.[128] Germany added another 7,485 MW of solar to its grid in 2011, on top of the 6,988 MW built in 2010.[129] Indeed, by 2012, solar represented a remarkable 42.3% of installed German renewable energy generating capacity.[130]

Thus, in July 2012, the EEG was amended again. These amendments made four significant changes to the EEG. First, they decreased solar tariffs once more—and heavily. Now, all facilities under 10 MW received an initial FIT of 13.5 €cents/kWh.[131] Second, they limited the amount of energy that could earn a tariff payment. For solar facilities between 100 kW and 10 MW, the 2012 EEG declared that only 90% of their output would be FIT-eligible.[132] Third, the amendments modified the *atmender Deckel* so that FIT payments now adjusted upward or downward each month depending on how much solar was built in Germany during the prior year.[133] Finally, the 2012 amendments reintroduced a cumulative FIT cap for solar power. In this respect, the EEG

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125 EEG 2012, *supra* note 120, § 20(a).

126 *Id.* § 32.

127 *Id.* § 20b. As it turned out, no additional degression occurred in 2011. However, because 5.2 GW of solar was installed between October 2010 and September 2011, a 15% degression rate took effect in January 2012. Lang & Mutschler, *supra* note 112.

128 The point about immediate effect is important because the EEG changes did ultimately change the market. Although price degression helped prices begin tracking cost evolution, domestic factors and built-up momentum kept propelling the market forward. Eventually, subsequent monthly degression, which was presaged by the 2011 amendments, realigned the solar market more fundamentally. *See, e.g.*, Jochen Diekmann et al., *The Proposed Adjustment of Germany's Renewable Energy Law – A Critical Assessment*, DIW ECONOMIC BULLETIN (June 2012), http://www.diw.de/documents/publikationen/73/diw_01.c.401744.de/diw_econ_bull_2012-06-1.pdf.

129 BMU, SOURCES IN FIGURES, *supra* note 98, at 18.

130 *See id.* at 20.

131 EEG 2012, *supra* note 120, § 32(1).

132 *Id.* § 33(1).

133 *Id.* § 20b. The 2012 amendments actually phased in the new monthly degression scheme in three stages. For an explanation of this and the accompanying calculations, see FULTON, *supra* note 113, at 18–19.

came full circle—though the circle was much larger than the 350 MW limit instituted by the original EEG. Under the 2012 amendments, once Germany installs 52 GW of solar power, new solar facilities will no longer be eligible for EEG payments.[134]

B. *The Impact of the German FITs: A Growing EEG Legacy*

It is hard to dispute the German feed-in tariffs' effectiveness. Since the StrEG's adoption in 1990, German renewable installations and production have only climbed, and the EEG simply magnified the effect. As a result, descriptors that could only be considered hyperbolic in other contexts are nothing but fitting in Germany: Explosive, nearly exponential, beyond expectation—renewables growth in Germany is all this and more.

Multiple metrics demonstrate the point. From 1990 to 2012, renewable generation in Germany grew from 3.4% of the nation's gross electric consumption to 23.5%.[135] This represents a monumental shift in renewable electricity production: from 18,932 GWh in 1990 to 142,418 GWh in 2012.[136] Likewise, the amount of renewable generation facilities in place on the grid grew rapidly during this time. In 1990, Germany had 4,674 MW of installed renewable generation.[137] In 2012, it had 77,121 MW.[138]

By any measure, these are remarkable changes: in just two decades, a nearly sevenfold increase in the percentage of electricity generation, a more than sevenfold increase in the gross amount of renewable electricity generated, and a more than sixteen-fold jump in installed renewable capacity. Further, every FIT-eligible renewable resource—hydropower, onshore and offshore wind, biomass, photovoltaics, and geothermal—increased substantially from 1990 to 2012 in both installations and electricity produced,[139] although onshore wind, photovoltaics, and biomass were the clear winners among the bunch.[140]

More to the point, the German FITs hold clear responsibility for these growth trends.[141] While onshore wind began a growth spurt under the StrEG, it

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[134] EEG 2012, *supra* note 120, § 20b(9a).

[135] BMU, SOURCES IN FIGURES, *supra* note 98, at 18.

[136] *Id.*

[137] *Id.* at 20.

[138] *Id.*

[139] *See id.* at 18, 20.

[140] Onshore wind grew from 71 GWh and 55 MW of installed capacity in 1990 to 49,948 GWh and 30,869 MW in 2012; solar PV increased from 1 GWh and 2 MW in 1990 to 26,380 GWh and 32,643 MW in 2012; biomass moved from 1,434 GWh and 635 MW in 1990 to 43,550 GWh and 7,557 MW in 2012. *See id.*

[141] *See* Judith Lipp, *Lessons for Effective Renewable Electricity Policy from Denmark, Germany and the United Kingdom*, 35 ENERGY POL'Y 5481, 5488 (2007).

absolutely took off under the EEG. The percentage of renewable electricity generated in Germany jumped from 3.4% to 6.2% from 1990 to 2000, but it leaped from 6.2% to 23.5% from 2000 to 2012.[142] Commentators thus routinely attribute Germany's success in renewables to the EEG.[143] "Germany's feed-in tariff program has been the key incentive structure in the country's successful renewable energy industry . . . . The incentives have worked."[144] In fact, the EEG far surpassed most observers'—and even its own—expectations.[145] The EEG blew past its goal of 12.5% renewable energy production by 2010 three years early, in 2007, and it met its original objective of 20% by 2020 *nine years early*, in 2011.[146] Today, virtually no one questions whether the country will meet its revised objective of producing more than a third of the nation's electricity from renewables by 2020. Indeed, there are already many days when solar production alone meets a full half of German electricity demand in some hours.[147]

Much less clear are the German FITs' macroeconomic effects. The German environment ministry ascribes extensive economic benefits to the EEG. A 2013 government report, for instance, observes that employment in the renewable energy sector expanded from 160,500 jobs in 2004 to 377,800 in

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142 BMU, SOURCES IN FIGURES, *supra* note 98, at 13.

143 *See, e.g.*, FED. MINISTRY FOR THE ENV'T, NATURE CONSERVATION, AND NUCLEAR SAFETY, EEG—THE RENEWABLE ENERGY SOURCES ACT 4, 13 (2007), [hereinafter BMU, EEG], *available at* http://www.folkecenter.dk/mediafiles/folkecenter/pdf/eeg_success _brochure_engl.pdf; Rainer Hinrichs-Rahlwes, *Renewable Energy: Paving the Way Towards Sustainable Energy Security Lessons Learnt from Germany*, 49 RENEWABLE ENERGY 10, 10–11 (2012), *available at* http://ac.els-cdn.com/S0960148112000870/1-s2.0-S0960148112000870-main.pdf?_tid=04d1 aab0-9e82-11e3-9c73-00000aacb35f&acdnat=1393376881_d3e5bf6e3d68cf2 b514370c1799458e2.

144 Warren E. Mabee, Justine Mannion & Tom Carpenter, *Comparing the Feed-in Tariff Incentives for Renewable Electricity in Ontario and Germany*, 40 ENERGY POL'Y 480, 482 (2012). In a series of interviews with nearly fifty German energy experts, the interviewees unanimously agreed that the EEG has been effective at incenting renewables. *See* LINCOLN L. DAVIES, RENEWABLE ENERGY PROMOTION IN GERMANY AND THE UNITED STATES: A COMPARATIVE ASSESSMENT, REPORT FOR THE 2012–13 MCCLOY FELLOWSHIP IN ENVIRONMENTAL POLICY (June 11, 2013) (on file with author).

145 *See, e.g.*, CARSTEN ROLLE & DENNIS RENDSCHIMDT, TRANSITION TO RENEWABLE ENERGY SYSTEMS 68 (Detlef Stolten & Viktor Scherer eds., 2013); Manuel Frondel, Nolan Ritter & Christoph M. Schmidt, *Germany's Solar Cell Promotion: Dark Clouds on the Horizon*, 36 ENERGY POL'Y 4198, 4198 (2008); *see also* BMU, EEG, *supra* note 143, at 14 ("The EEG has caused an undreamed-of boom in renewable energy sources.").

146 *See* BMU, SOURCES IN FIGURES, *supra* note 98, at 13; *see also* Ole Langniss, Jochen Diekmann & Ulrike Lehr, *Advanced Mechanisms for the Promotion of Renewable Energy—Models for the Future Evolution of the German Renewable Energy Act*, 37 ENERGY POL'Y 1289, 1290 (2009).

147 *See* CRAIG MORRIS & MARTIN PEHNT, ENERGY TRANSITION THE GERMAN ENERGIEWENDE 20 (2012).

2012.[148] The report suggests that "[a]bout 268,000" of these jobs "were due to the effects" of the EEG.[149] The same report notes €19.5 billion investments in renewable energy in Germany in 2012, up from €10.6 billion in 2005,[150] and concludes that "[a]s in the past, the greater part (85 percent) of the investment was due to installations eligible for assistance under the [EEG]."[151] The report also finds that renewable energy consumption in the German electricity sector saved the nation €3.9 billion in fossil fuel imports and reduced greenhouse gas emissions by 101,148 tons in 2012.[152]

However, other studies have been less sanguine about the EEG's ability to produce jobs and economic growth. Noting that increased energy prices and investment in renewables can displace expenditures in other sectors of the economy, so that net—not gross—job numbers must be analyzed, a 2008 study observed that "[s]everal recent investigations" cast "doubt on whether the EEG's employment effects are positive at all."[153] Likewise, another 2008 study funded by the German environment ministry projected a rather modest net "positive labor effect" of 8,000 to 12,000 jobs from renewables by 2020, and found that effect heavily dependent on export growth.[154] "Without the expansion of the international market," the article concluded, "the renewable energy industry cannot contribute a large employment benefit to the German economy."[155]

In short, while EEG proponents often point to the law's economic bona fides as reason to support the regime, others take issue with both the economic evidence and the conclusions drawn from it. Despite the EEG's efficacy in getting renewables built, a lack of consensus persists on its ability to promote green economic growth in Germany.

Nor has the EEG succeeded in silencing dissenters about its impact on energy costs. According to the German environment ministry, the EEG surcharge has escalated just as rapidly as renewable energy growth. In 2001,

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148 BMU, SOURCES IN FIGURES, *supra* note 98, at 32.

149 *Id.*

150 *Id.* at 31.

151 *Id.* at 30.

152 *Id.* at 27, 29.

153 Frondel, *supra* note 145, at 4201 ("Taking account of adverse investment and crowding-out effects, [one analysis] finds a negligible employment impact. Another analysis draws the conclusion that the overall employment effects . . . are negative, although it indicates initially positive impacts. Similar results were obtained [in two other studies]."); *see also* Manuel Frondel et al., *Economic Impacts from the Promotion of Renewable Energy Technologies: The German Experience*, 38 ENERGY POL'Y 4048, 4053–54 (2010) [hereinafter *Economic Impacts*].

154 Ulrike Lehr et al., *Renewable Energy and Employment in Germany*, 36 ENERGY POL'Y 108, 116–17 (2008).

155 *Id.* at 117; *see also Economic Impacts*, *supra* note 153, at 4055–56.

the *Umlage* was 0.25 €cents/kWh.[156] In 2013, it was over twenty times that: 5.28 €cents/kWh.[157] Moreover, the swelling of the *Umlage* has been particularly stark over the last four years, with increases from 2.05 €cents/kWh in 2010 to 3.53 and 3.59 in 2011 and 2012, respectively.[158] The four German transmission system operators recently announced that the 2014 *Umlage* will be even higher—6.24 €cents/kWh[159]—and it could be yet higher still in 2015, with a projected range between 5.85 and 6.86 €cents/kWh.[160]

The *Umlage*'s increase has a clear impact on electricity prices. German electricity rates—already among the highest in the E.U.—have risen every year since 2000, from 13.9 to 25.8 €cents/kWh, and the proportionate share of the EEG surcharge in that price has grown with it: from roughly 2% in 2002 to over 14% in 2012.[161] This amounts to nearly €20 billion paid out in tariff compensation under the EEG in 2012, up vastly from well under €2.5 billion in 2000—and any amount paid in any year under the StrEG.[162]

Of course, it should only be expected that EEG payouts will increase if the law is doing what it is supposed to: getting renewables built. But that logic has not dissuaded feed-in tariff detractors from pointing to the law's impact on electricity prices as reason to abandon the scheme. The clamor over EEG costs, in fact, has become so loud in recent years that the environment ministry recently saw fit to respond directly to the claim: "2013 has been marked by an overheated discussion of costs in which the shift to renewable energy has been characterised as the sole factor responsible for the rise in energy costs."[163] Plainly, the *Umlage* presents policy design issues that eventually will have to be addressed.[164] Yet no amount of policy design correction can change the fundamental fact that EEG costs long have been, and increasingly are, used as a bludgeon to argue against the German FIT. That political resistance, in turn, is one of the core obstacles the EEG now faces.

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156 BMU, SOURCES IN FIGURES, *supra* note 98, at 38.

157 *Id.*

158 *Id.*

159 Matthias Lang, *Renewable Surcharge Account Deficit Shrinks in September and October*, GERMAN ENERGY BLOG (Nov. 8, 2013), http://www.germanenergyblog.de/?p=14720.

160 Matthias Lang, *EEG Medium Term Forecast: Likely EEG Surcharge in 2015 Between 5.85 and 6.86 ct/kWh*, GERMAN ENERGY BLOG (Nov. 15, 2013), http://www.germanenergyblog.de/?p=14760.

161 *See* BMU, SOURCES IN FIGURES, *supra* note 98, at 38–39.

162 *See id.* at 36.

163 *Id.* at 50.

164 *See infra* Part II.C.

C. Current Obstacles for the EEG: More Reform on the Horizon

As 2014 began, the EEG took up a peculiar place indeed. The feed-in tariff that had been the exemplar for the world—the law the German government called "an export hit," with eighteen countries in Europe alone having adopted "statutory regulations based on the EEG"[165]—had also become a feed-in tariff in turmoil.

Perhaps the greatest driver of this turmoil was the EEG's rising cost—or at least the appearance of its rising cost. Clearly, the EEG surcharge has increased sharply in recent years,[166] but the fact that the *Umlage* is on a steady climb does not necessarily mean that EEG costs are spiraling out of control. EEG costs were always going to be what they were going to be. Either facilities would connect to the grid and take advantage of FIT payments or they would not. The real cost of the EEG, then, is tied to the level the EEG tariffs have been set at and the amount of resources taking advantage of them. Thus, to the extent one seeks to lay blame for too-high EEG costs on any one thing, it might more appropriately be put on high PV rates and the ensuing rapid uptake of solar plants on the German system. Indeed, solar installations grew by nearly 73% from 2008 to 2009 alone, when Germany added 4,446 MW to the system, and then continued to set record amounts of new installations in every succeeding year since[167]—all while the EEG was repeatedly revised in an attempt to slow this expansion.[168]

Despite this, the *Umlage* has become a symbol of EEG expense, both because it is a ready target and because it has increased so quickly. Two design flaws, however, exaggerate the *Umlage*'s appearance of rising EEG costs.

First, the *Umlage* is tied to wholesale spot market costs, which creates a paradox within the law. As renewables produce more energy, they necessarily drive spot market prices down because their fuel costs are zero or low, and because under the EEG they receive first priority for consumption. Indeed, it has not been uncommon recently for the vast amount of renewables now on the German grid to drive spot market prices close to zero—and on some sunny, windy days actually to *negative* prices. The problem is that the *Umlage* shows this as a cost, not a benefit. Because the *Umlage* is measured by the difference between the applicable EEG rate and the spot market price, when wholesale prices go down, the *Umlage* goes up. Thus the paradox: The more successful the EEG is at putting downward pressure on wholesale prices, the more upward pressure is placed on the *Umlage*.

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165 BMU, EEG, *supra* note 143, at 21.

166 *See supra* notes 135–164 and accompanying text.

167 *See* BMU, SOURCES IN FIGURES, *supra* note 98, at 20.

168 *See supra* Part II.A.

Second, because the *Umlage* does not fully apply to large energy users that have received an exemption, when EEG surcharge costs rise, they are felt more sharply by consumers because they are spread over a smaller pool.[169] Indeed, in 2012, "a total of 734 companies in the manufacturing sector and railways profited" from the EEG's hardship exemption,[170] accounting for 86 billion kWh of German electricity consumption—or "nearly 18 percent of the total power consumption subject to the allocation system."[171]

Consequently, while the EEG already has been substantially revised on multiple occasions since its adoption, calls to reform the law even further have become only more common over the last year. In February 2013, for instance, economics minister Philipp Rösler took the spotlight when he proposed cutting changes to the EEG, including mandating direct marketing for all but small renewable installations, reducing or eliminating payments to facilities that have to temporarily stop operation to ensure grid stability, and slashing what he termed "excessive payments" under the EEG for wind producers.[172] Environment minister Peter Altmaier then became a lightning rod for attention himself when he agreed that Rösler's proposed changes should be considered.[173] Otherwise, he suggested, "the costs for the German Energiewende could add up to a trillion Euros 'by the end of the thirties of this century.'"[174]

EEG-related costs, moreover, are bound only to increase, particularly given the continually growing amount of installations on the system and the upgrades to the grid necessary to support them. As the environment ministry has observed, the "massive expansion" of renewables has created an "urgent need" for "electricity highways"—"transmission lines to carry electricity from wind farms to centres of consumption, which will also be able to act as a kind of 'bypass' in the short term to avert critical situations in the grid."[175]

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169 *See* BMU, SOURCES IN FIGURES, *supra* note 98, at 38.

170 *Id.* at 37.

171 *Id.* at 37–38.

172 Matthias Lang, *Economics Minister Rösler Calls for Binding Direct Marketing Obligation for Solar and Wind Power*, GERMAN ENERGY BLOG (Feb. 12, 2013), http://www.germanenergyblog.de/?p=12193.

173 *See* Eckhart K. Gouras, *Intersolar China: Ambitious Targets and Emerging Markets*, PV MAGAZINE (Dec. 13, 2012), http://www.pv-magazine.com/news/details/beitrag/intersolar-china—ambitious-targets-and-emerging-markets_100009576/.

174 Matthias Lang, *Minister Altmaier: EEG Cuts Needed—or Energiewende Costs Will Reach Trillion Euro Mark by 2040*, GERMAN ENERGY BLOG (Feb. 20, 2013), http://www.germanenergyblog.de/?p=12278 (quoting Minister Altmaier).

175 FED. MINISTRY FOR THE ENV'T, NATURE CONSERVATION, AND NUCLEAR SAFETY, RENEWABLE ENERGIES: DRIVING GERMANY'S ENERGIEWENDE 38 (2012), *available at* http://www.bmub.bund.de/fileadmin/Daten_BMU/Pools/Broschueren/Motor_der_Energiewende_eng_bf.pdf.

To be sure, the EEG's grid expansion costs will be no small matter. In 2012 alone, EEG-related costs of grid expansion climbed to €460 million, or almost three times the 2011 figure and nearly twelve times the 2008 cost of €40 million.[176] Other estimates anticipate that Germany needs to invest between €10 and €20 billion by 2022, and between €27.5 and €42.5 billion by 2030, in further grid expansion efforts depending on how quickly more renewables are installed.[177]

And there is the EEG rub. Cost comes back again and again. Cost has dominated the EEG discussion so heavily recently, in fact, that media reports have begun to characterize the German renewable energy transition as "reckless,"[178] a "disaster,"[179] a "defective . . . game plan,"[180] and as creating "chaos."[181] The popular magazine *Der Spiegel* ran a cover story in August 2013 entitled "Luxury Power"—the "High Costs and Errors of the German Transition to Renewable Energy."[182] Meanwhile, Michael Fuchs, deputy parliamentary floor leader for the Christian Democrats, has called promises to keep the *Umlage* stable a "utopian" dream,[183] and Maria van der Hoeven,

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176 *See* FED. MINISTRY FOR THE ENV'T, NATURE CONSERVATION AND NUCLEAR SAFETY, RENEWABLE ENERGY SOURCES IN FIGURES: NATIONAL AND INTERNATIONAL DEVELOPMENT 52 (2013), *available at* http://www.erneuerbare-energien.de/fileadmin/Daten_EE/Dokumente__PDFs_/ee_in_zahlen_en_bf.pdf; Ulrike Lehr, Presentation at the 2013 Global Energy Systems Conference: The Benefits and Costs of Renewable Energy Deployment 8 (June 27, 2013) [hereinafter Lehr Conference Presentation], *available at* http://globalenergysystemsconference.com/wp-content/uploads/presentations/GES2013Day2Session2_Ulrike_Lehr.pdf .

177 Lehr Conference Presentation, *supra* note 176, at 8; Jabeen Bhatti, *The Cost of Green: Germany Tussles Over the Bill for Its Energy Revolution*, TIME WORLD (May 28, 2013), http://world.time.com/2013/05/28/the-cost-of-green-germany-tussles-over-the-bill-for-its-energy-revolution/.

178 Frank Dohmen et al., *Germany's Energy Poverty: How Electricity Became a Luxury Good*, SPIEGEL ONLINE INT'L (Sept. 4, 2013), http://www.spiegel.de/international/germany/high-costs-and-errors-of-german-transition-to-renewable-energy-a-920288.html.

179 Howard Rich, *Germany's Green Energy Disaster: A Cautionary Tale for World Leaders*, FORBES, Mar. 14, 2013.

180 Alexander Neubacher, *Reality Check: Germany's Defective Green Energy Game Plan*, SPIEGEL ONLINE INT'L (Oct. 25, 2013), http://www.spiegel.de/international/germany/commentary-why-germany-is-waging-its-green-revolution-wrong-a-929693.html.

181 Ambrose Evans-Pritchard, *Germany Industry in Revolt as Green Dream Causes Cost Spiral*, TELEGRAPH (Sept. 19, 2013), http://www.telegraph.co.uk/finance/newsbysector/energy/10321173/Germany-industry-in-revolt-as-green-dream-causes-cost-spiral.html.

182 Dohmen et al., *supra* note 178.

183 Peter Müller & Alexander Neubacher, *Spiegel Interview with Michael Fuchs: Solar Subsidy 'Insanity' Will Cost Consumers*, SPIEGEL ONLINE INT'L (Jan. 18, 2012),

executive director of the International Energy Agency, referred to the high price of German electricity as "a warning signal."[184] Even environment minister Peter Altmaier echoed these concerns. "The price of electricity has to remain a tolerable burden," Altmaier said in June 2012. "We can't allow electricity to become a luxury."[185]

Thus, as 2013 drew to a close, the new governing coalition in Germany agreed on a draft proposal to overhaul the EEG yet again.[186] The coalition presented this legislation in early April 2014, aiming to make a bevy of changes to the EEG. Binding targets for renewable energy production would go up (to 40% or 45% in 2025 and 55% or 60% in 2035), but tariff rates would decrease, particularly by removing bonuses for wind and biomass. The bill would introduce renewable energy target "corridors" for different resources—2,500 MW of planned growth per year for onshore wind and solar and 100 MW per year for biomass—and it would decrease goals for offshore wind from the current target of 25 GW in 2030 to 15 GW. To keep tariff rates in line with these corridors, the bill also would apply "breathing caps" modeled on the current solar *atmender Deckel* to onshore wind and biomass, adjusting their FIT rates quarterly. Direct marketing would be mandated for all but small installations and other facilities unable to market their own power. Finally, beginning in 2017, tariff levels will be set by an auction process, rather than legislatively.[187]

Of course, the ultimate details of this EEG reform cannot be predicted. The introduced bill still must move through parliamentary process. The fact, however, that it appears the EEG is about to be revamped yet again is telling indeed. That FITs—which are premised on the very idea that they provide investor confidence—demand increasing adaptation and change over time necessarily begs the question of how long-lasting these regimes can be. That inherent policy uncertainty—not well advertised but undeniably present in these laws—is, in short, a core message of feed-in tariffs in turmoil.

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http://www.spiegel.de/international/germany/spiegel-interview-with-michael-fuchs-solar-subsidy-insanity-will-cost-consumers-a-809529.html.

184 Bhatti, *supra* note 177 (quoting MARIA VAN DER HOEVEN, INTERNATIONAL ENERGY AGENCY REPORT, ENERGY POLICIES OF IEA COUNTRIES—GERMANY 2013 REVIEW (2013)).

185 Konstantin von Hammerstein & Peter Müller, *Environment Minister Peter Altmaier: 'We Can't Allow Electricity to Become a Luxury,'* SPIEGEL ONLINE INT'L (June 6, 2012), http://www.spiegel.de/international/germany/german-environment-minister-discusses-fresh-start-in-energy-revolution-a-837012.html.

186 Matthias Lang, *CDU/CSU and SPD Present Coalition Agreement—55% to 60% Renewables by 2035 and More*, GERMAN ENERGY BLOG (Nov. 27, 2013), http://www.germanenergyblog.de/?p=14825.

187 Matthias Lang, *EEG 2.0: Cabinet Adopts Renewables Law Amendment Bill – Agreement with Brussels on EEG Surcharge Reductions for Industry*, GERMAN ENERGY BLOG (Apr. 8, 2014), http://www.germanenergyblog.de/?p=15647.

III. SPAIN

The story of Spain's feed-in tariff is in many ways a mirror image of Germany's. Spain, like Germany, had rapid and extensive success with its FIT. Spain, like Germany, now stands out as a nation whose feed-in tariff system is in turmoil. Yet the reasons Spain's FIT is roiled in difficulty today strike a sharp contrast to the uncertainties Germany's law faces.

Since it adopted its FIT in 1994, Spain quickly rose to become the second largest producer of renewable energy in Western Europe, behind only Germany. Spain seized this status largely through its FIT, which guaranteed the purchase of renewable energy at premium prices for long periods of time, by generous government subsidies for renewable projects, and via massive bank loans available to solar producers.[188] Despite its success at incentivizing renewable energy production, however, the Spanish FIT regime proved to be politically unsustainable, in no small part because of the law's design. By 2013, Spain racked up a huge tariff deficit and determined that reevaluating—and eventually eliminating—its FIT was necessary to increase efficiency and reduce costs.[189] Thus, unlike Germany, which so far has managed to keep its FIT afloat through constant modification and adaptation to changing circumstances, Spain's efforts to perpetuate its law were unable to save it from demise.

A. The Spanish FIT: Birth and Constant Evolution

Spain built its FIT on top of existing policy promoting renewable energy. Like other countries, early renewable energy support in Spain was adopted out of concern over escalating oil prices and the risks of depending on imported fossil fuels. Although environmental motives were "virtually absent at the time,"[190] this early support for renewables laid the foundation for later adoption of a FIT.

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188 *Infra* Section III.B.

189 *See* Craig Morris, *Spanish Feed-In Tariffs—A Wrapup*, RENEWABLES INT'L (July 22, 2013), http://www.renewablesinternational.net/spanish-feed-in-tariffs-a-wrapup/150/537/71424/.

190 Valentina Dinica, *Renewable Energy Policies in Spain*, *in* HANDBOOK OF RENEWABLE ENERGIES IN THE EUROPEAN UNION: CASE STUDIES OF ALL MEMBER STATES (Danyel Reich ed., 2002).

1. Origins of the Spanish FIT: Reducing Fossil Fuel Dependence

In the wake of the 1970s oil crises, Spain in 1980 passed Law 82/1980[191] supporting renewable energy production. The law implemented three major legal protections for renewables, upon which later FIT policies were built: "network connection, purchase contracts with utilities, and a certain guaranteed price."[192] The law adopted these features in an effort to remove barriers for independent electricity generators to connect with incumbent grid operators, so long as new connections would not cause a disruption to the normal functioning of the electricity system. Specifically, under the 1980 law, renewable generators received a price for their electricity, set by the Ministry of Energy and Industry and paid by the utilities, for any power produced beyond the facility's needs.[193]

While these features of the 1980 law would later become paradigmatic of the Spanish FIT, the law's main thrust was providing tax benefits, government subsidies, and third-party financing of renewable plants through tax incentives on loans.[194] These benefits applied to a large category of individuals and companies that developed, modified, and improved efficiencies, or took other actions, to reduce Spain's oil dependence. For example, the law included as its beneficiaries individuals who improved home insulation and companies that developed energy efficient industrial practices.[195]

Since it was motivated largely by a spike in oil prices, enthusiasm for Spain's renewable energy policy waned when the costs of imported fossil fuels dropped.[196] Thus, the government did not implement new binding renewable support mechanisms in the latter half of the 1980s.[197] Nevertheless, Law

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[191] Ley 82/1980, de 30 de desembre, sobre conservació d'energia [Law on the Conservation of Energy] (B.O.E. 1980, 1898), *available at* http://www.boe.es/boe_catalan/dias/1981/12/31/pdfs/A00005-00009.pdf.

[192] *Id.* at 5.

[193] Pablo del Río González, *Ten Years of Renewable Electricity Policies in Spain: An Analysis of Successive Feed-In Tariff Reforms*, 36 ENERGY POL'Y 2917, 2918 (2008).

[194] *Id.*

[195] Ley 82/1980, de 30 de desembre, sobre conservació d'energia [Law on the Conservation of Energy] (B.O.E. 1980, 1898), *available at* http://www.boe.es/boe_catalan/dias/1981/12/31/pdfs/A00005-00009.pdf.

[196] Pere Mir-Artigues, *The Photovoltaic Crisis and the Demand-Side Generation in Spain* 1 (University of Cambridge, Electricity Policy Research Group, Working Paper No. 1307, 2013); *see also* INTERNATIONAL RENEWABLE ENERGY AGENCY AND GLOBAL WIND ENERGY COUNCIL, 30 YEARS OF POLICIES FOR WIND ENERGY: LESSONS FROM 12 WIND MARKETS 114–15 (2013), *available at* https://www.irena.org/DocumentDownloads/Publications/IRENA_GWEC_WindReport_Full.pdf.

[197] Spain adopted other regulations relevant to renewables in the 1980s, including, for example, the National Energy Plan, which set a policy goal of encouraging renewables. *See* Real

82/1980 had several direct long-term impacts. First, it bolstered the country's renewable energy production, primarily from hydropower, which, as of 1990, generated 977 GWh.[198] More importantly, the law established a political precedent for the Spanish government's efforts to promote renewables. As one commentator later noted, the 1980 law was "the first policy document providing a justification for the support of [renewable energy]" in Spain—a policy that would be expanded significantly in the years to come.[199]

2. Building Spain's FIT: Royal Decree 2366/1994

Spain took the next step in incentivizing renewable technologies in 1994.[200] In that year, Spain adopted Royal Decree[201] 2366/1994.[202] Building off the 1980 law's structure, this decree instituted the country's first true FIT. It had three core features. First, the law required electricity distributors to purchase excess energy from renewable energy producers in six eligible technological groups.[203] Second, the law set initial tariffs for these purchases—as much as "36 [€cents] for small-scale solar plants" and 5 €cents for most other renewables[204]—and tied those tariffs, with annual adjustments, to electricity price inflation. Under the decree, these payments would be made for a minimum of five years. Third, the decree created subsidies of up to 20% of up-front costs for renewable energy projects.[205]

Decreto 2366/1994, de 9 de diciembre, sobre producción de energía eléctrica por instalaciones hidráulicas, de cogeneración y otras abastecidas por recursos o fuentes de energía renovables [Law on Production of Electrical Energy by Hydraulic Systems, Cogeneration and Others Supplied by Renewable Energy Sources] (B.O.E. 1994, 28980), *available at* http://www.boe.es/buscar/doc.php?id=BOE-A-1994-28980.

198 González, *supra* note 193, at 2918.

199 *Id.*

200 *Id*. at 2923.

201 Subsequent FIT laws and policies frequently took the form of Royal Decrees. Royal Decrees are a type of regulation adopted by the executive power of the central government or governments that implement, develop, or supplement laws. *See Official State Bulletin*, N-LEX, http://eur-lex.europa.eu/n-lex/info/info_es/index_en.htm (last visited Mar. 5, 2014).

202 Real Decreto 2366/1994, de 9 de diciembre, sobre producción de energía eléctrica por instalaciones hidráulicas, de cogeneración y otras abastecidas por recursos o fuentes de energía renovables [Law on Production of Electrical Energy by Hydraulic Systems, Cogeneration and Others Supplied by Renewable Energy Sources] (B.O.E. 1994, 28980), *available at* http://www.boe.es/buscar/doc.php?id=BOE-A-1994-28980.

203 *Id*. The law defined such surplus electricity as the balance resulting from the electricity sent to the grid from a facility and the amount received from the grid at that facility.

204 J.P.M SIJM, ENERGY RESEARCH CENTRE OF THE NETHERLANDS (ECN), THE PERFORMANCE OF FEED-IN TARIFFS TO PROMOTE RENEWABLE ELECTRICITY IN EUROPEAN COUNTRIES 12 (2002).

205 Pere Mir-Artigues, *supra* note 196, at 1.

Spain's early adoption of a FIT was partly a reaction to the growing international awareness about fossil fuels' environmental costs, including climate change.[206] However, the major motivation for the law was its potential to spur economic growth: Germany's and Denmark's early successes with their feed-in tariffs influenced Spain's choice to adopt a FIT, a choice later underscored by E.U. directives for national renewable energy development.[207]

Domestically, Spain's main energy regulatory and consultative body, the National Energy Commission ("CNE"), a part of the Ministry of Industry, Tourism, and Trade, advocated for supporting renewables. The argument was that heavier reliance on renewables would be a step towards a more secure domestic energy supply, with the benefit of creating new employment opportunities.[208] The CNE acknowledged the potential risk of perceived windfall profits to renewable producers, as well as the possibility of higher electricity costs.[209] Yet the commission predicted that initial economic impacts would not be acute since retail electricity costs remained regulated. Ultimately, these limits on electricity prices would prove to be part of the FIT's undoing, but in the short term, they also made the program's adoption politically feasible.[210]

Forging the Spanish FIT, however, did not come without effort. The pro-renewables sentiment was not the only one at play, and several well-organized domestic groups with a stake in electricity policy pushed back against the idea. For example, Red Eléctrica de España ("REE"), which manages the nation's electric grid,[211] emphasized the importance of grid access and stability. REE worried that a Spanish FIT could undermine grid stability.[212] Likewise, major traditional electric utilities saw new technologies, including renewables, as competitors in their domain, and were accused by at least some

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206 *See* Carlos Padrós & Endrius E. Cocciolo, *Security of Energy Supply: When Could National Policy Take Precedence over European Law*, 31 ENERGY L. J. 31, 36 (2010).

207 González, *supra* note 193, at 2923; *see* Marc Ringel, *Fostering the Use of Renewable Energies in the European Union: The Race Between Feed-In Tariffs and Green Certificates*, 31 RENEWABLE ENERGY 1, 5 (2006) ("With the Kyoto-Protocol on climate change having come into effect in February 2005, the member states of the EU have accepted binding emission reduction targets.").

208 González, *supra* note 193, at 2923.

209 *Id.* at 2919.

210 *See* José Luis García Ortega & Emilio Menéndez Pérez, *Spanish Renewable Energy: Successes and Untapped Potential*, *in* RENEWABLE ENERGY POL'Y AND POLITICS: A HANDBOOK FOR DECISION-MAKING 215, 217 (Karl Mallon ed., 2006); *see also La Asociación*, ASOCIACIÓN DE PRODUCTORES DE ENERGÍAS RENOVABLES, http://www.appa.es/02appa/02asociacion.php (last visited Mar. 5, 2013).

211 González, *supra* note 193, at 2923.

212 *Id.* at 2924.

of "using grid access as a major obstacle to renewable energy developments."[213]

In the years following the 1994 Royal Decree, a pattern of new laws and decrees superseding older regulations emerged. Much as in Germany, this occurred as the government frequently adjusted technology-specific tariffs up or down to avoid market stagnation or out-of-control growth. Likewise, market feedback compelled the adoption of regulations on issues that previously had not been considered important but that gained greater significance as renewable penetration increased.[214] Perhaps most notably, and ultimately most troubling for the Spanish FIT, was the decision—quite opposite from Germany—late in the twenty-first century's first decade to decouple FIT payments from market prices, thus providing enhanced financial certainty for investors just as PV panel costs were declining. As a result, developers flooded the market, and the Spanish FIT became overwhelmed. Meanwhile, however, the Spanish government continued to modify the FIT.

3. The 1997 "Special Regime" and Royal Decree 2818/1998

A key adjustment strengthening the Spanish FIT took place in 1997. In that year, the Law of the Electricity Sector went further than the previous royal decree by establishing a "Special Regime" giving priority treatment to renewables.[215] Much as did the 2000 EEG in Germany, this Special Regime required distributors to purchase electricity from qualifying renewable plants before energy from conventional generators.[216] The law also reaffirmed grid access for renewable producers and specified price support for individual renewable energy technologies.[217]

The following year, Royal Decree 2818/1998 adopted procedures to implement the 1997 law.[218] The 1998 decree (1) established new renewable energy targets and (2) modified the FIT pricing structure. Specifically, the

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213 Ortega & Pérez, *supra* note 210, at 221. However, these utilities generally quickly dropped their opposition in light of the generous government subsidies and incentives, and participated in the renewable electricity market. González, *supra* note 193, at 2923.

214 González, *supra* note 193, at 2924.

215 Pablo del Río & Miguel A. Gual, *An Integrated Assessment of the Feed-In Tariff System in Spain*, 35 ENERGY POL'Y 944, 998 (2007).

216 *Spanish Electricity System*, ENERGIAS DE PORTUGAL, http://www.edp.pt/en/aedp/sectordeenergia/sistemaelectricoespanhol/Pages/SistElectES.aspx (last visited Mar. 5, 2014).

217 *Id.*

218 González, *supra* note 193, at 2918.

decree implemented the E.U.'s mandate that renewables account for 12% of Spain's gross energy supply by 2010.[219]

The 1998 decree also amended the FIT's pricing structure. Under this decree, distributors would pay the premium rate to renewable energy producers.[220] Distributors would then pass the FIT costs on to the CNE, which would determine how those costs would land with consumers.[221] The 1998 decree anticipated that the government would periodically consider market prices and technological developments, and adjust tariff rates accordingly.[222]

Additionally, the 1998 decree instituted a FIT pricing innovation then-unique to Spain. Similar to the market premium model later adopted in Germany, this innovation allowed renewables producers to choose between fixed-price and fixed-premium tariff rates.[223] The *fixed price* provided a total payment per kWh of renewable electricity, while the *fixed premium* granted a payment per kWh on top of the wholesale market price.[224] Producers' choice of tariff structure was valid for one year and could be changed after each year.[225]

4. Royal Decree 436/2004

Partially in response to the effects of earlier royal decrees, Spain again modified its FIT framework in 2004 with Royal Decree 436/2004.[226] This decree continued the regulatory framework established in 1997 and 1998 but

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[219] *Id*. Spain increased its target the following year to 29.4% of electricity from renewables by 2010. *Id.*

[220] González, *supra* note 193, at 2918.

[221] Setting the actual price for consumers, however, was a complex process, involving consultation by CNE with legislative bodies, and consideration of price regulations, electricity bidding and auctions, international integration, and other factors. For more detail, see Giulio Federico, *The Spanish Gas and Electricity Sector: Regulation, Markets and Environmental Policies* (IESE Bus. Sch., OP-187, 2011), *available at* http://www.iese.edu/research/pdfs/op-0187-e.pdf.

[222] Río & Gual, *supra* note 215, at 998.

[223] Julieta Schallenberg-Rodriguez & Reinhard Haas, *Fixed Feed-In Tariff Versus Premium: A Review of the Current Spanish System*, 16 RENEWABLE & SUSTAINABLE ENERGY REVS. 293, 293 (2012).

[224] *Id.*

[225] *See* Mario Ragwitz & Claus Huber, *Feed-In Systems in Germany and Spain and a Comparison*, FRAUNHOFER INST. SYS. & INNOVATION RES. 8–9, *available at* http://www.erneuerbare-energien.de/fileadmin/ee-import/files/english/pdf/application/pdf/ langfassung_ einspeisesysteme_en.pdf.

[226] Real Decreto 436/2004, de 12 de marzo, por el que se establece la metodología para la actualización y sistematización del régimen jurídico y económico de la actividad de producción de energía eléctrica en régimen especial [Law Establishing the Methodology for the Update and Systemization of the Legal and Economic System of Electric Production in the Special Regime] (B.O.E. 2004, 5562), *available at* http://www.boe.es/buscar/doc.php?id=BOE-A-2004-5562.

went beyond the former laws in two important ways. First, it addressed the impact of renewables, particularly the huge influx of wind capacity, on national grid stability. Second, it adjusted tariff rates, namely, to encourage PV.[227]

By 2004, the Spanish FIT had noticeably altered the nation's electricity system. The 1998 decree proved to be a powerful force in overcoming institutional inertia of conventional electricity, at least with respect to wind: As of 2004, Spain was second only to Germany in installed onshore wind capacity,[228] even though from 1999 to 2003 Spain annually decreased its FIT rates for wind as technology costs also fell.[229]

This rapid influx of wind capacity, however, changed the way the Spanish grid operated, and the 2004 decree set out to address the problem. Before the 2004 decree, the FIT did not restrict renewable generators' ability to deviate from what they predicted they would supply to the grid in terms of energy actually delivered. The new decree required operators to forecast 30 hours in advance the electricity they anticipated they would feed into the grid, and it imposed new penalties on producers for delivery deviations.[230] Specifically, the deviation requirements allowed solar and wind generators a 20% tolerance limit and gave other renewable technologies a 5% leeway.[231] For producers utilizing fixed tariffs, deviations beyond these amounts resulted in penalties of 10% of the average electricity tariff, applied to the amount of deviation beyond the tolerance limit. And producers using market-based tariffs were subject to the same deviation penalties as traditional operators.[232]

While the Spanish FIT made strides in wind, it was not nearly as effective at promoting solar. By the end of 2003, only 28 MW of PV had been installed in Spain.[233] Accordingly, the 2004 decree sought to increase photovoltaic installations. It encouraged PV by raising the fixed tariff rate for PV plants of up to 100 kW to a rate 575% greater than the average price of

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[227] *Id*.

[228] Pablo Del Río & Gregory Unruh, *Overcoming the Lock-Out of Renewable Energy Technologies in Spain: The Case of Wind and Solar Electricity*, 11 RENEWABLE & SUSTAINABLE ENERGY REVS. 1498, 1502 (2007). Growth in onshore wind was largely from medium- to large-sized wind farms made up of a "consortia of power utilities, regional government and turbine manufacturers." *Id.* at 1502–03.

[229] *See id.* at 1502 & 1505. Despite the FIT's success, criticisms of the annual revisions to its rates—and delays in permitting new installations—were persistent. *See id.* at 1505 ("The implementation of wind farms is affected by 60 different regulations involving 40 different procedures between different administrative levels and causing lead times of 4 to 8 years.").

[230] Ragwitz & Huber, *supra* note 225, at 13.

[231] *Id.*

[232] *See id.*

[233] *Id.* at 1506; *see id*. at 1508.

electricity.[234] However, in contrast to other technologies, PV producers with less than 100 kW could not choose to sell on the free market under the 2004 decree.[235]

Finally, the 2004 decree continued to reduce the tariffs for other technologies, such as wind, which had grown quickly, in part by building tariff degression into the fixed rate structure. For example, five years after a plant was commissioned, the tariff for a wind facility would drop to 85% of the initial tariff under the 2004 decree.[236] The decree scheduled most tariff degression to occur at specified dates of 5, 15, 20, or 25 years from the date of commissioning—dates, notably, that were tied simply to time, not to technology cost reductions. To encourage the use of market-based tariffs, however, the decree anticipated that most market premiums could remain fixed throughout the "useful life of the plant."[237]

5. Royal Decree 661/2007

The 2004 reforms were generally considered successful at improving Spain's FIT. However, only three years later, it became apparent that further action was necessary to address three emerging problems: (1) threatened security of the electric supply, (2) spiraling system costs, and (3) fewer renewable producers choosing the market premium option than policymakers preferred.[238] Thus, in 2007, after more than a year of negotiations, Spain adopted Royal Decree 661/2007.[239] This decree made several key changes to the FIT.

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234 *Id.* at 14–15. Formerly, only PV installations with less than 5 kW qualified for the highest tariff rate. The published electricity price was determined as a "fixed percentage of the average electricity tariff published at the end of each year, and which apply to the following year." *Id.* at 14.

235 *Id.* at 14–15.

236 *Id.*

237 *Id.* The 2004 amendments also sought to address complaints that grid connection remained a major obstacle for renewables generators, both in terms of lead time and connection costs, despite being legally mandated by the 1997 decree. Subsequently, in 2011, Spain again sought to streamline grid connection for renewables. *See* PAOLO MICHELE SONVILLA ET AL., INTEGRATION OF ELECTRICITY FROM RENEWABLES TO THE ELECTRICITY GRID AND TO THE ELECTRICITY MARKET—RES-INTEGRATION (Mar. 14, 2012), *available at* http://www.eclareon.eu/sites/default/files/spain_-_res_integration_national_study_nreap.pdf.

238 González, *supra* note 193, at 2926.

239 Real Decreto 661/2007, de 25 de mayo, por el que se regula la actividad de producción de energía eléctrica en régimen especial [Law Regulating the Activity of Electricity Production Under the Special Regime] (B.O.E. 2007, 10556), *available at* http://www.cne.es/cne/doc/legislacion/RD_661-2007-RE.pdf.

First, the 2007 decree targeted grid security by limiting capacity guarantee payments to fluctuating technologies like wind and PV. It also increased regulation of deviations and penalties, applying a 5% tolerance limit for deviations to all technologies.[240]

Second, the 2007 decree set cap and floor prices for renewable producers participating in the market.[241] If the market price plus the renewable premium was above the cap, producers received only the cap. However, if the market price fell below the floor, the floor price was paid. The idea was to reduce windfall profits while preserving investor certainty.[242]

Third, the 2007 decree set an extremely generous PV rate: 58 €cents/kWh, the most generous rate anywhere in the world at the time.[243] Given this rate, the decree also anticipated that a new royal decree would be adopted once 85% of the PV target was reached.[244] The aim of this mandate for a replacement decree was to reduce eventual PV payouts. In fact, however, the risk of a new decree had the effect of reducing investor certainty for future PV installs, thus spurring a rush to install new panels during the generous rate period.[245]

Fourth, the 2007 decree extended the price cap to the market premium option.[246] This in turn made market participation less profitable than opting for a fixed tariff, which was tied to inflation and guaranteed for forty years.[247] Consequently, the high long-term fixed tariff rate and decreasing solar panel costs enticed renewable investors to flood Spain's PV market.

Despite the 2007 decree's cost-controlling efforts, the Spanish electricity sector incurred huge debt at the same time Spain was hit by the global recession. Though the economic crisis went far beyond renewable energy tariffs, the FIT quickly became a fiscal target as an avoidable expense in a time of government austerity.[248]

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[240] *Id.*

[241] González, *supra* note 193, at 2926.

[242] *Id.*

[243] Elisabeth Rosenthal, *Solar Industry Learns Lessons in Spanish Sun*, N.Y. TIMES, Mar. 8, 2010, at A1.

[244] Del Río & Mir-Artigues, *supra* note 6. The resulting booming PV industry of 2008 is well documented. *See id.*

[245] Río & Mir-Artigues, *supra* note 6, at 5559.

[246] del Río González, *supra* note 193, at 2926.

[247] *Id.*

[248] *Id.*

6. Royal Decree 1578/2008

The 2007 decree had such an immediate impact on PV installations that by 2008, Spain had already surpassed its 2010 PV goals.[249] But developers' rush to cash in on Spain's generous fixed PV rate led quickly to ill effects, including overinvestment, mounting FIT costs, and windfall profits as panel costs fell. To counteract this, the 2008 decree made downward adjustments to PV rates for installations made after September 29, 2008. The new rates differentiated based on ground-based, building-integrated, and small rooftop panels, and were most favorable for the latter.[250] An eligibility cap applied to each type of installation. These changes to the FIT regime sought to halt the booming growth in PV, although they also reduced investor certainty.

7. Royal Decrees 1565/2010, 1578/2010, and 14/2010

By 2010, Spain was reeling from both the global recession and the PV sector's faster-than-expected growth. Thus, 2010 reforms to the FIT introduced strong measures to pull back on the regime's aggressiveness.[251] Quickly, these changes drew criticism and, eventually, litigation for retroactivity and the unsettling of legitimate expectations.[252]

Royal Decree 1565/2010 limited the 2007 tariff rates to the first twenty-five years of facility operation, rather than the initially guaranteed duration, which was often forty years. The 2010 decrees further reduced the PV tariff rate from 2008 levels. Finally, they capped the amount of PV hours eligible for payment, substantially shrinking the potential Spanish PV market.[253]

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[249] Rosenthal, *supra* note 243.

[250] *See* Rachel A. Nathanson, *The Revocation of Clean-Energy Investment Economic-Support Systems as Indirect Expropriation Post-*Nykomb*: A Spanish Case Analysis*, 98 IOWA L. REV. 863, 895–96 (2013).

[251] Toby D. Couture, *FITs and Stops: Spain's New Renewable Energy Plot Twist & What it All Means*, E3 ANALYTICS, (Mar. 2012), at 6, *available at* http://www.e3analytics.ca/wp-content/uploads/2012/05/Analytical_Brief_Vol4_Issue1.pdf

[252] *Id.*; *High Court Case Law on Royal Decree 1565/2010*, OSBORNE CLARKE (Apr. 16, 2012), http://www.osborneclarke.com/connected-insights/publications/high-court-case-law-on-royal-decree-15652010/.

[253] *See Solar Panel Installation in Spain*, ENERGY KOREA (June 4, 2012), http://energy.korea.com/archives/28981. In addition, the 2010 law removed the premium payment option for wind power and solar thermal power for installations over 50 MW. *Id.*

Obviously, each of these steps undercut generators' expectations and profit projections.[254] Thus, many observers were critical of the 2010 changes, arguing that they undermined Spain's ability to attract investors. The European Commission, in particular, criticized Spain's shifting policy as a threat to foreign investments throughout the European Union.[255] Nevertheless, Spain was not done reforming its FIT.

8. Stepping Back From the FIT: 2012 and 2013

Spain's 2008 and 2010 FIT revisions were widely seen as dramatic steps to scale back what had proven to be an effective—but arguably fiscally unsustainable—energy policy. The reasons for these changes were manifold, but arguably foremost was the rising tariff deficit. Retail electricity rates, tightly controlled by the government, did not cover the prices utilities paid under the FIT. As a result, the system accumulated a "tariff debt" of €26 billion.[256] Though this debt was initially accrued as private debt by utilities, the government had backed the debt in 2009, essentially assuming liability for the FIT regime's cost.[257] As the tariff debt gained a greater spotlight during the economic crisis, the Spanish government targeted the FIT for further cuts, even though the true underlying regulatory problem was the inability to charge consumers the full cost of electricity. Thus, renewable energy industry, which was "[o]nce touted as the embodiment of progress, wealth and sustainability," began to be seen in Spain "as an unwanted and costly extravagance."[258] The ensuing FIT reform was not just abrupt but swift.

In 2012, the Spanish government froze new renewable energy investments and removed producers' choice of tariff payment method, forcing developers to use the market price.[259] These measures saved the government

254 Courts later determined, however, that these cuts, though promised in the past, were not illegally retroactive since the support reduction's impact was in the future. *High Court Case Law on Royal Decree 1565/2010*, *supra* note 252.

255 *Solar Panel Installation in Spain*, *supra* note 253.

256 Blanca Diaz, *Spain Abolishes FITs Entirely*, PV MAG. (July 15, 2013), *available at* http://www.pv-magazine.com/news/details/beitrag/spain-abolishes-fits-entirely_100012050/#axzz2eWmHu98I; *Summary of the Reform of the Electricity System in Spain and Financing of the Tariff Deficit*, MINISTERIO DE INDUSTRIA, ENERGIA Y TURISM (July 2013), *available at* http://www.thespanisheconomy.com/stfls/tse/ficheros/2013/agosto/Power_System_Reform.pdf.

257 Couture, *supra* note 251.

258 Cala, *supra* note 10.

259 Diaz, *supra* note 256.

approximately €750 million,[260] but as would soon be seen, this was not the end of the government's changes to its tariff.

The following year, the government announced financial stability mechanisms throughout the energy sector, with a special emphasis on renewable subsidies. The idea was to begin generating surpluses to cover the cumulated debt and to prevent future utility deficit.[261] The government determined that the 2013 deficit would be shared between "the state budget (€900 million), higher prices for consumers (€900 million), and utilities and renewables electricity generators though lower remuneration (€2.7 billion)."[262]

The new FIT payment arrangement, announced in July 2013, will directly lower compensation for renewables. The reform's final details have not been announced, but it is already clear that the scheme's general contours will differ from the former FIT in several ways.

First, renewable generators' guaranteed profits will no longer be tied to the market premium or fixed FIT rates; gone are the days of per-kilowatt-hour payments. Instead, each company's assets will be estimated, and those estimates will be used to determine a "reasonable profitability"—using a formula seeking to provide a 7.5% return on investment—that will be relied on to establish the next six years' payments.[263] Moreover, the renewable energy compensation system is likely to be more market-oriented going forward.[264] Any continuing subsidies will consider both (1) plants' operational lifetime, and (2) what subsidies they have already received.

Second, the reforms will apply retroactively,[265] which means that older plants that have already received FIT payments may soon stop receiving

260 *See id.*

261 *Id.*

262 STANDARD & POOR'S, CREDIT FAQ: HOW SPAIN'S LATEST ELECTRICITY REFORMS WILL FURTHER ERODE UTILITIES' RATING HEADROOM 2 (2013), *available at* http://twitdoc.com/upload/lisa_nugent/2013-08-15-sp-creditfaq-how-spain-s-latest-electricity-reforms-will-further-erode-utilities-rating-headroom.pdf.

263 Diaz, *supra* note 256; Alex Morales, *Further Spanish Energy Reform Could Mean "Nasty Revenue Cut" for Renewables*, BLOOMBERG (July 15, 2013), http://www.renewableenergyworld.com/rea/news/article/2013/07/spain-says-energy-reform-to-cost-companies-2-7-billion; Suzanne Daley, *Spain's Solar Pullback Threatens Pocketbooks*, N.Y. TIMES, Jan. 5, 2014, at A4, *available at* http://www.nytimes.com/2014/01/06/world/europe/spains-solar-pullback-threatens-pocketbooks.html?pagewanted=all&_r=0 (noting that this transition hurts investors who "paid more for their equipment, took out big loans or are paying high interest rates").

264 *See* Cala, *supra* note 10.

265 *The Cost Del Sol*, ECONOMIST (July 20, 2013), *available at* http://www.economist.com/news/business/21582018-sustainable-energy-meets-unsustainable-costs-cost-del-sol; *see also* William Pentland, *No End in Sight for Spain's Escalating Solar Crisis*, FORBES (Aug. 16, 2013, 2:28 PM),

subsidies altogether.[266] This is critical because it unsettles market expectations in yet another way, as some facilities will not receive a FIT at all. Indeed, similar to the legal outcry following the 2010 Royal Decree, the 2013 announcement has already spurred legal challenges as to the constitutionality of its retroactive application.[267]

Third, FIT payments will be subject to automatic adjustments going forward. The aim of this change is to prevent growth of the tariff deficit.[268]

Thus, as 2013 came to a close, the Spanish FIT had in many ways become the epitome of the turmoil these laws can create. Until the specifics of the 2013 reforms are released, investors can only speculate about the ultimate impact of Spain's new policy. However, the need for this kind of speculation at all is the very antithesis of the core attribute for which FITs long have been praised: the market certainty they can create.

B. Effects of the Spanish FIT: Massive Deployment, High Costs

For proponents of renewable energy, there can be no doubt that the Spanish FIT was for many years a success. Despite repeated changes to the system over the last two decades, the Spanish FIT has made the country a global leader in renewables deployment. In 1990, Spain produced less than 1% of its electricity from renewables, and that 1% was almost exclusively from hydro.[269] By 2009, renewables accounted for 24.7% of Spain's gross electricity production and included a diverse portfolio of wind, solar, biomass, and hydroelectric sources.[270] By April 2013, that figure was even higher: 54% of total electricity production.[271]

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http://www.forbes.com/sites/williampentland/2013/08/16/no-end-in-sight-for-spains-escalating-solar-crisis/; *Spanish CSP Sector Asks Europe to Start Proceedings Against Spain*, CSP WORLD (June 18, 2013, 11:45 AM) [hereinafter *Proceedings*], http://www.csp-world.com/news/20130618/001088/spanish-csp-sector-asks-europe-start-proceedings-against-spain.

266 Ilan Brat, *Spain Prepares Cuts in Renewable-Energy Subsidies*, WALL ST. J. (July 11, 2013, 9:48 PM), http://online.wsj.com/news/articles/SB10001424127887324879504578600500367507418.

267 *The Cost Del Sol*, *supra* note 265; *see also* Pentland, *supra* note 265. The Spanish CSP association, Protermosolar, has already asked the European Commission to begin proceedings against Spain for violating principles of, among other things, "legitimate expectations." *Proceedings*, *supra* note 265.

268 Cala, *supra* note 258; *The Cost Del Sol*, *supra* note 265.

269 del Río González, *supra* note 193, at 2918.

270 MINISTERIO DE INDUSTRIA, TURISMO Y COMERCIO, SPAIN'S NATIONAL RENEWABLE ENERGY ACTION PLAN 2011–2020 17, (June 30, 2010). According to Eurostat, Spain's percentage of gross electricity consumption from renewable sources went from 18.7% in 2004 to 31.5% in 2011. *Electricity Generated from Renewable Sources*, EUROSTAT,

The PV market is a strong example of the Spanish FIT's success at incentivizing renewables.[272] In the late 1990s, Spain had approximately 2 MW of installed solar PV.[273] By 2009, the country had 3,317 MW of installed capacity.[274] Two years later, PV capacity had grown to 4,047 MW, with PV production accounting for 4% of the nation's total electricity demand.[275] This was substantially above the official PV target, which initially was 400 MW for 2010.[276] This extreme growth came in direct response to the FIT, and helped produce a faster-than-predicted reduction in the technology's cost.[277]

The Spanish FIT's success, however, was not limited to PV. It also dramatically changed onshore wind capacity. With an initially strong tariff rate, wind grew from less than 90 MW in 1993,[278] to 114 MW in 1995,[279] and to over 2,800 MW in 2000.[280] At the end of 2012, Spain remained second only to Germany in installed wind in Europe, with 22,796 MW, and in 2013, Spain became the first nation in the world to supply more of its electricity demand with wind than any other generation source.[281] Likewise, the Concentrated Solar Power ("CSP") industry grew rapidly after the CSP tariff was increased

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http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=tsdcc330&plugin=1 (last visited Mar. 6, 2014).

271 Peter Kelly-Detwiler, *Renewable Energy in Spain: The Good, And the Downright Ugly*, FORBES (May 8, 2013, 10:16 AM), http://www.forbes.com/sites/peterdetwiler/2013/05/08/renewable- energy-in-spain-the-good-and-the-downright-ugly/.

272 *See* Río & Gual, *supra* note 215, at 1010–11.

273 JACOBS, *supra* note 20, at 175.

274 Alasdair Cameron, *Spanish PV After the Crash*, RENEWABLEENERGYWORLD.COM (Apr. 29, 2010), http://www.renewableenergyworld.com/rea/news/article/2010/04/spanish-pv-after-the-crash.

275 Maria Paz Espinosa, *Understanding Tariff Deficit and Its Challenges*, 2 SPANISH ECON. & FIN. OUTLOOK 1, 5 (2013).

276 *Id*.

277 *Id.*

278 *Time Britain Got the Wind Up*, TIMES (London), Sept. 5, 1991.

279 J.P.M. SIJM, ENERGY RESEARCH CTR. OF THE NETH., THE PERFORMANCE OF FEED-IN TARIFFS TO PROMOTE RENEWABLE ELECTRICITY IN EUROPEAN COUNTRIES 12 (2002).

280 *Id.*; *Time Britain Got the Wind Up*, TIMES (London), Sept. 5, 1991.

281 EUROPEAN WIND ENERGY ASS'N, WIND IN POWER: 2012 EUROPEAN STATISTICS 4 (2013), *available at* http://www.ewea.org/fileadmin/files/library/publications/statistics/Wind_in_power_annual_statistics_2012.pdf; *Spain Breezes Into the Record Books as Wind Power Becomes Main Source of Energy*, EL PAIS (Jan. 15, 2014), http://elpais.com/elpais/2014/01/15/inenglish/1389798670_862500.html (noting that the wind sector covered 20.9% of the total electricity demand in 2014).

in 2007. Before the FIT, Spain had only negligible amounts of installed CSP. By the end of 2012, it had 1,781 MW of installed capacity.[282]

Despite the Spanish FIT's success at deploying renewables, the economic costs of achieving this success exposed a darker side of the system. At least two major economic problems arose around Spain's FIT: the tariff deficit and the boom-bust cycle for particular technologies.

The tariff deficit arose in large part because regulated consumer prices were held low even as tariff costs increased.[283] While Spanish retail electricity prices were supposed to include "incentives for renewable energy and domestic coal," in practice the government limited retail rates to prices well below the amounts paid under the FIT.[284] Indeed, from 2002 until 2006, electricity prices were not permitted to grow by more than 2% annually.[285] Thus, because the tariff deficit was calculated as the difference between utilities' FIT payments to producers and the amount recouped by utilities from customers, the tariff deficit quickly became an easy target for opponents of the FIT regime.

Spain's ever-increasing tariff deficit was supposed to be solved by gradual rate increases for consumers and by selling the utilities' deficit as securitized debt.[286] With the financial crisis of 2008, however, debt buyers became scarce, consumer demand for electricity dropped, and, politically, the government could not raise consumer rates.[287] Accordingly, in 2009, the Spanish government guaranteed the utilities' securitized debts.[288] This, the rush of developers into the PV market post-2007, and uncertainty about the renewable energy market's sustainability combined to create immense pressure to change the FIT.[289]

Moreover, the Spanish FIT resulted in a cycle of booms and busts for renewable technologies. These cycles, in turn, spurred rapid policy changes in the FIT itself, which in turn reduced investor certainty.[290] Initial generous tariffs incentivized fast, booming installations, particularly for PV and wind,

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282 Herman K. Trabish, *CSP 2012: Concentrated Solar Power Review*, GREENTECH MEDIA (Dec. 13, 2012), http://www.greentechmedia.com/articles/read/CSP-2012-Concentrated-Solar-Power-Review-2012.

283 *See generally* Espinosa, *supra* note 275.

284 *Id.* at 2; *see also* Toby D. Couture, *Guest Post: Spain's Renewable Energy Odyssey*, GREENTECH MEDIA (Feb. 23, 2011), http://www.greentechmedia.com/articles/read/spains-renewable-energy-odyssey (criticizing Spanish consumer price structures).

285 Mark Nolan, *January Electricity Increase Set at 2.3%*, LEADER (Dec. 27, 2013), *available at* http://www.theleader.info/article/42060/.

286 *Id.*

287 *Id.*

288 Couture, *supra* note 251.

289 Espinosa, *supra* note 275, at 2.

290 Couture, *supra* note 251.

but the Spanish system did not include automatic degression, even when installation targets were met.[291] The ensuing reaction was predictable. Locked into overpaying for renewable energy production, the Spanish government responded by decreasing FIT rates, capping eligible capacity, and instituting rate degression.[292] The impacted technologies, which had gone through a boom cycle from high tariffs, quickly turned to a bust cycle, with the government lowering tariffs, demand for new installations slackening, and renewable companies often unable to adjust quickly enough.[293] This boom-bust spiral sent FIT policy into a further chain of changes, undermining the very certainty for which FITs are praised.

The PV market epitomized this interrelationship between technology and policy change. In 2007, Spain set what was, in retrospect, a clearly too high PV tariff: 44 €cents/kWh.[294] Within the year, over 350 MW of new PV was installed, and Spain quickly neared its 2010 target of 400 MW.[295] This boom was fueled partly by the overly generous tariff and partly by the faster-than-anticipated reduction in the price of Chinese solar panels, which flooded Spain's market. The Spanish government quickly countered by capping solar FIT eligibility, shortening contract periods, and reducing PV rates to approximately 13 €cents/kWh.[296] Such measures were arguably necessary to "control the market and thus the costs [of the tariff] for the final consumer."[297] But the measures had negative consequences on both the solar market and overall investor confidence. Excess panels purchased before the tariff was reduced overwhelmed the market, reducing their price even further. The Spanish solar industry abandoned planned installations and lost approximately 20,000 employees.[298] As the CEO of one of Spain's largest solar developers, Santiago Seage noted, "What's important for the regulation of solar is stability . . . . [U]p to now, we have had too many changes . . . [and] if the context changes, you can make mistakes in business decisions."[299]

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[291] Paul Voosen, *Spain's Solar Market Crash Offers a Cautionary Tale About Feed-In Tariffs*, N.Y. TIMES (Aug. 18, 2009), http://www.nytimes.com/gwire/2009/08/18/18greenwire-spains-solar-market-crash-offers-a-cautionary-88308.html?pagewanted=all.

[292] *The Cost Del Sol*, *supra* note 265.

[293] Voosen, *supra* note 291.

[294] Cameron, *supra* note 274.

[295] Voosen, *supra* note 291.

[296] *Id.* (noting that rates were dropped by 30%).

[297] JACOBS, *supra* note 20, at 181.

[298] Voosen, *supra* note 291.

[299] *Id*.

C. Current Barriers to the Spanish Feed-In Tariff System: Fundamental Transition

As 2014 dawned, the sun set on Spain's FIT. Predictably, the end of the Spanish feed-in tariff has garnered substantial criticism from the renewable energy industry. Industry representatives have "condemned the removal of FITs, saying the decision was made without consultation and comes on the back of previous cuts which have already reduced the profitability of . . . installations by up to 40 per cent."[300] In addition, consumers, subdivisions of the Spanish government, and minority political parties[301] have criticized the reform. Particularly problematic is the retroactive application of the 2013 amendments, which has spurred legal action.[302]

The Spanish government, however, has urged that abandonment of the FIT helps "plug a 26 billion euro . . . electricity tariff deficit . . . [and] is necessary to guarantee the power system's financial stability."[303] Spain's industry minister, Jose Manuel Soria, has rejected claims that the 2013 electricity reforms were unconstitutional, and has suggested that under his watch, any future tariff deficit "won't be the result of a gap in regulated costs and revenues . . . ."[304]

Thus, on the eve of what would have been the Spanish FIT's twentieth anniversary, the law may have instead earned a eulogy. The Spanish FIT deteriorated largely because consumer prices did not cover the support scheme's costs, because adjustments made by the government did not match the changing market (particularly in 2007), and because financing for any kind of project became much scarcer. While the politics and design details of any FIT are of course unique to the jurisdiction, inevitably nations worldwide will look to the saga of Spain's FIT in deciding how to promote renewables at home. In the wake of global economic recession, the Spanish government made cuts across the board, and particularly to expenses as visible as electricity bills. Unemployment skyrocketed to 26% in 2013, with prospects for 2014 looking

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300 Diaz, *supra* note 256; Daley, *supra* note 263.

301 The 2013 reforms were introduced by the conservative party, which had a majority in parliament. Tracy Rucinski, *Spanish Court to Hear Cases Against Electricity Reform*, REUTERS (Nov. 13, 2013), http://in.reuters.com/article/2013/11/13/spain-energy-court-idINL5N0IY3J120131113.

302 *Id.* The European Photovoltaic Industry Association ("EPIA") and Spanish industry have contended that the 2013 reform may violate E.U. directives. John Parnell, *Spanish Solar Reforms Could Break EU Laws*, PV TECH (Nov. 13, 2013, 1:51 PM), http://www.pv-tech.org/news/spanish_solar_reforms_could_break_eu_laws.

303 Rucinski, *supra* note 301.

304 *Id.*

no better.[305] Now, austerity reigns, both generally and for renewables. After nearly two decades of heavy governmental incentives, Spain's official position on renewable energy shifted dramatically: from longstanding support to abandonment of a traditional FIT—in short, another story of feed-in tariffs in turmoil.[306]

IV. SOUTH KOREA

A comparative latecomer to the game, South Korea implemented a FIT, modeled on Germany's,[307] from 2002 until 2011. Initially, as was true in Spain, South Korea's FIT had some success in jumpstarting specific renewable technologies. In particular, wind and solar power grew quickly. However, in 2011, due in part to cost concerns, South Korea discontinued its FIT and replaced it with a renewable portfolio standard ("RPS"). Unlike the fiscal crisis in Spain, however, South Korea's step away from its FIT and toward an RPS was as much deliberate policy choice as an outcome of financial and political necessity. Indeed, the South Korean story adds yet another angle to the narrative of feed-in tariffs in turmoil. While South Korea's abandonment of its FIT shares a plotline with Spain's—particularly given South Korea's payment for its tariff with government funds, and Spain's ultimate backing of utility debt for its FIT's costs—the South Korean tale also highlights the importance of policy goals for feed-in tariff longevity. The aim in Korea was to promote domestic industry, and when the feed-in tariff instead benefitted foreign companies, it quickly was in the crosshairs.

A. The South Korean FIT: A Short-Lived Policy

A combination of factors motivated South Korea to implement a FIT in 2002. These centered mainly on hope for industry promotion and job creation,

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305 Youth unemployment is even higher: 50%. An estimated 100,000 university graduates have left Spain to seek employment in comparatively prosperous northern Europe. Liz Alderman, *Young and Educated in Europe, but Desperate for Jobs*, N.Y. TIMES (Nov. 15, 2013), http://www.nytimes.com/2013/11/16/world/europe/youth-unemployement-in-europe.html?_r=0; *see also* ORG. FOR ECON. CO-OPERATION & DEV., ECONOMIC SURVEYS OF SPAIN 17 (2012), *available at* http://www.keepeek.com/Digital-Asset-Management/oecd/economics/oecd-economic-surveys-spain-2012_eco_surveys-esp-2012-en#page19.

306 In addition to altering the FIT, Spain's parliament is expected to pass a measure that will place a fee on individuals who produce renewable power for personal use. Anna Pérez & Ilan Brat, *Spaniards Gird for Solar-Power Fee*, WALL ST. J. (Oct. 20, 2013, 8:59 PM), http://online.wsj.com/news/articles/SB10001424052702304626104579121823944695940.

307 Jane Burgermeister, *South Korea Taps Germany to Help Grow Its Solar Industry*, RENEWABLEENERGYWORLD.COM (Apr. 29, 2009), http://www.renewableenergyworld.com/rea/news/article/2009/04/south-korea-looks-to-germany-to-help-grow-its-solar-industry.

energy security, and some concern for environmental protection. In short, the background factors driving South Korea's adoption of a FIT were broadly similar to those in Germany and Spain. The ultimate policy outcome in South Korea, however, was substantially different for several reasons. First, the government viewed the FIT as a heavy financial burden because it was drawn directly out of the state budget. Second, domestic renewable industry growth did not develop as successfully as anticipated. Rather, imported equipment made up the majority of South Korea's renewable installations during its FIT regime.[308] Thus, over the life of its FIT, South Korea gradually increased capacity caps for specific renewable technologies while also continuously implementing cost control measures by decreasing FIT rates.[309] Then, less than a decade after adopting it, South Korea abdicated its feed-in tariff altogether.

Renewables fell into favor in South Korea at the end of the twentieth century in part because of their positive environmental attributes but even more so for their potential to drive economic growth. Energy security long has been an important concern in South Korea because of the nation's heavy dependence on imported fuels, including in its electricity sector.[310] Nevertheless, beginning in the 1960s, South Korea experienced meteoric economic growth, quickly developing into an industrial, export-oriented economy.[311] During this period of fast-paced growth, electricity needs doubled every eight to ten years,[312] and imported energy powered the transformation: In 2000, energy imports (including nuclear) accounted for 97.6% of South Korea's energy supply.[313] This dependence on energy imports became particularly problematic for South Korea after the Asian Currency Crisis of 1997, which significantly devalued the

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308 Choi Woo-jung, *Solar Energy Second Only to Biofuel*, KOREA TIMES (July 29, 2007), http://koreatimes.co.kr/www/news/biz/2007/07/602_7372.html.

309 INT'L ENERGY AGENCY, ENERGY POLICIES OF IEA COUNTRIES 75 (2006).

310 John Byrne et al., *Electricity Reform at a Crossroads: Problems in South Korea's Power Liberalization Strategy*, 77 PACIFIC AFF. 496 (2004). South Korea does possess some anthracite coal and natural gas. STEPHEN WEBB, DLA PIPER, RENEWABLE ENERGY IN THE ASIA PACIFIC: A LEGAL OVERVIEW (3d ed. 2013), *available at* http://www.dlapiper.com/files/Publication/03fb410e-3881-448c-b903-4a5a8ded836c/Presentation/PublicationAttachment/39b12ffb-6c12-4fc8-a201-9183b32c612c/Renewable_Energy_in_Asia_Pacific_3rd_Edition.pdf.

311 *See* KENT E. CALDER, KOR. ECON. INST., KOREA'S ENERGY INSECURITIES: COMPARATIVE AND REGIONAL PERSPECTIVES 7 (2005), *available at* http://www.keia.org/sites/default/files/publications/05Calder.pdf.; *see also* Byrne et al., *supra* note 310, at 496–97.

312 *See id.*

313 Hoseok Kim et al., *Energy Demand and Supply, Energy Policies, and Energy Security in the Republic of Korea*, 39 ENERGY POL'Y 6882, 6883 (2011).

South Korean won ("KRW"),[314] cutting national purchasing power in half and driving the economy into tailspin.[315]

In light of these conditions, South Korea began to see renewables both as a possible solution to its energy security concerns and as an opportunity to create a new export commodity. Under a banner that would later become known as "green growth"—economic development "through green technology innovations"—South Korea embraced renewable policy as an important tool for improving the country's socioeconomic outlook.[316] Thus, green technology, developed and used at home, was seen as a pathway to get South Korea's foot in the door of the global renewable energy market.[317]

Meanwhile, environmental policy and consciousness in South Korea also began to rise, particularly following the advent of South Korean democracy in 1987.[318] Social advocates began to "vigorously" push environmental and other concerns to shape national legislation, and by the late 1980s, civic groups grew substantially.[319] Concerns over air pollution, climate change, and opposition to nuclear power entered the national discussion.[320] South Korea became a party to the United Nations Framework Convention on Climate Change and ratified the Kyoto Protocol.[321] In 1998, South Korea

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314 As of March 6, 2014, one U.S. dollar was equal to 1,064.84 Korean won. *Currency Converter*, XE, http://www.xe.com/currencyconverter/ (last visited Mar. 6, 2014).

315 Byrne et al., *supra* note 310, at 500; *see also Ten Years On: How Asia Shrugged off Its Economic Crisis*, ECONOMIST (July 4, 2007), *available at* http://www.economist.com/node/9432495.

316 *Id.*; Sang In Kang et al., *Korea's Low-Carbon Green Growth Strategy* 7 (Org. for Econ. Cooperation & Dev., Working Paper No. 310, 2012), *available at* http://www.oecd-ilibrary.org/development/korea-s-low-carbon-green-growth-strategy_5k9cvqmvszbr-en; *Wind Power on the Rise in South Korea*, RENEWABLEENERGYWORLD.COM (Jan. 15, 2007), http://www.renewableenergyworld.com/rea/news/article/2007/01/wind-power-on-the-rise-in-south-korea-47109; *see also* Jim Tankersley, *Green Growth Advocate Hopes for Bigger Changes from the Copenhagen Conference*, L.A. TIMES (Dec. 9. 2009), http://articles.latimes.com/2009/dec/09/world/la-fg-global-climate9-2009dec09.

317 *It's Time for Korea to Plumb for Renewable Energy*, CHOSUNILBO (Mar. 12, 2007), http://english.chosun.com/site/data/html_dir/2007/03/12/2007031261015.html.

318 Byrne et al., *supra* note 310, at 507.

319 *Id.* at 500, 507.

320 CALDER, *supra* note 311, at 8. For example, in 1990, farmers on the island of Anmyeon violently protested against a planned nuclear waste storage facility. Park Seong-won et al., *The Domestic and International Politics of Spent Nuclear Fuel in South Korea: Are We Approaching Meltdown?*, KOR. ECON. INST., 1, 2 (Mar. 2010), *available at* http://www.nautilus.org/wp-content/uploads/2011/12/10021KEI.pdf.

321 *Republic of Korea*, UN FRAMEWORK CONVENTION ON CLIMATE CHANGE, http://maindb.unfccc.int/public/country.pl?country=KR (last visited Mar. 6, 2014); ORG. FOR ECON. CO-OPERATION & DEV., KOREA-REGULATORY REFORM IN ELECTRICITY 21 (2000), *available at* http://www.oecd.org/regreform/sectors/2497412.pdf. South Korea does not have binding

formed a response committee to establish policy goals for greenhouse gas mitigation.[322] While that policy grew to include a wide variety of features, including internal energy audits and certification for high efficiency equipment and cars, the promotion of renewable energy quickly became one of its core attributes.[323] "To prepare for the Kyoto Protocol system, the Ministry of Commerce, Industry and Energy is trying to raise the portion of renewable energy in Korea's total power supply by offering subsidies."[324] In fact, since at least 1994, Korea provided government subsidies for renewables.[325]

Together, all this set the stage for a South Korean FIT. Indeed, that step came less than five years after Kyoto.

1. Implementing Fixed Prices

The first steps to South Korea's FIT came as part of its effort to promote economic development through clean energy in 2002 and 2003. In those years, South Korea's Ministry of Commerce, Industry, and Energy set the first standard prices for renewable energy.[326] The Ministry of Commerce, Industry, and Energy implemented the FIT policy by relying on two legal documents. First, the government amended the Act on the Promotion of the Development, Use and Diffusion of New and Renewable Energy[327] (the "South Korean Act"), which became the legal framework for the FIT.[328] The government originally passed the South Korean Act, without the FIT provision,

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obligations under international treaties; however, it has voluntarily set conservation and efficiency goals throughout its energy sector. *See generally id.*; *UN Framework Convention on Climate Change, Status of Ratification of the Kyoto Protocol*, UNITED NATIONS, http://unfccc.int/kyoto_protocol/status_of_ratification/items/2613.php (last visited Mar. 6, 2014).

322 INT'L ENERGY AGENCY, ENERGY POLICIES OF IEA COUNTRIES: REPUBLIC OF KOREA, 51 (2006), *available at* http://www.iea.org/publications/freepublications/publication/korea2006.pdf.

323 *See id.* at 50.

324 *Wind Power on the Rise in South Korea*, *supra* note 316.

325 Amin Shokri & Eunnyeong Heo, *Energy Policies to Promote Renewable Energy Technologies; Learning from Asian Countries Experiences* 3, *available at* http://eneken.ieej.or.jp/3rd_IAEE_Asia/pdf/paper/110p.pdf.

326 Act on the Promotion of the Development, Use and Diffusion of New and Renewable Energy, Act. No. 7284, Dec. 31, 2004, art. 17, *amended by* Act. No. 10253, Apr. 12, 2010 (S. Kor.). S*ee generally* Korean Energy Management Corporation, *Program for Promoting NRE Utilization: Feed-In-Tariffs*, http://www.kemco.or.kr/new_eng/pg02/pg02040700.asp (last visited Mar. 8, 2014). The Ministry of Commerce, Industry, and Energy was responsible for energy policy in Korea. This agency was reorganized into the Ministry of Knowledge Economy ("MKE") in 2008, and finally into the Ministry of Trade, Industry, and Energy in 2013.

327 Act on the Promotion of the Development, Use and Diffusion of New and Renewable Energy, Act. No. 7284, Dec. 31, 2004, art. 17, *amended by* Act. No. 10253, Apr. 12, 2010 (S. Kor.).

328 ENERGY POLICIES OF IEA COUNTRIES: REPUBLIC OF KOREA, *supra* note 322, at 12.

in 1987. The South Korean Act's original purpose was to provide funding for research and development into renewable energies.[329] By 2002, however, it expanded to include a provision implementing the FIT. Second, in 2003, the Second Basic Plan for National Energy (the "Plan")[330] established ambitious renewable energy targets for South Korea. Specifically, the Plan created an overall goal of 3% of total primary energy supply from renewables by 2006 and 5% by 2011.[331]

The details of the South Korean FIT resembled policies used in other countries, although the law also had to operate within a highly consolidated electricity system. Specifically, under the FIT, the Ministry of Commerce, Industry, and Energy set a rate for each renewable technology pursuant to the South Korean Act. Similar to FIT regulations in Spain and Germany, the South Korean Act defined renewable energy as a variety of different technologies including photovoltaic, wind, hydro, tidal, biofuel, waste, and fuel cells.[332] Rates aimed to compensate companies for the additional costs of renewable power generation over conventional electricity.[333] Tariffs were adjusted annually.

After the government set the rate, the Korea Energy Management Corporation ("KEMCO"),[334] working in conjunction with Korea Electric Power Corporation ("KEPCO")—which owns essentially all aspects of South Korea's electricity system, including the nation's major electricity generation[335]—

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329 HYAN JEAN LEE & SUNG-WON YOON, RENEWABLE ENERGY POLICY IN GERMANY AND ITS IMPLICATIONS FOR KOREA 87–88 (2010).

330 ENERGY POLICIES OF IEA COUNTRIES: REPUBLIC OF KOREA, *supra* note 322, at 12, 71. Basic plans and national energy plans were passed in subsequent years with similar names. Most recently, the Second Basic National Energy Plan was announced in January 2014, setting a goal of 11% renewable energy by 2035. Heesu Lee, *South Korea Targets 29 Percent Nuclear Power Reliance by 2035*, BLOOMBERG (Dec. 10, 2013), http://www.bloomberg.com/news/2013-12-10/south-korea-targets-29-percent-nuclear-power-reliance-by-2035.html.

331 *Id.* These goals were reduced in subsequent energy plans. *Id.*

332 Act on the Promotion of the Development, Use and Diffusion of New and Renewable Energy, Act. No. 7284, Dec. 31, 2004, art. 17, *amended by* Act. No. 10253, Apr. 12, 2010 (S. Kor.).

333 The International CHP/DHC Collaborative, *CHP/DHC Country Scorecard: Republic of Korea*, http://www.iea.org/media/files/chp/profiles/Korea.pdf (last visited Mar. 8, 2014); *see also* Dokjeom gyuje mit gongjeong geooraeae gwanhanbeobyul sihaengryung [Enforcement Decree of the Monopoly Regulation and Fair Trade Act], Presidential Decree No. 19023, Aug. 31, 2005, *as amended* (S. Kor.).

334 The Ministry of Commerce, Industry, and Energy (later MKE) imposed the task of implementing the FIT and meeting national renewable energy targets on KEMCO and its affiliate, the New and Renewable Energy Center.

335 KEPCO is a state-owned company that, since 1961, has dominated all aspects of the Korean electricity sector, including generation, distribution, and transmission. Efforts in the early

implemented the FIT. KEMCO assessed how to apply the FIT to KEPCO's renewable electricity generators. Since KEPCO sets standard prices for traditional electricity and is the main buyer from the centralized electricity pool, KEMCO and KEPCO both influenced the prices paid to renewable generators.[336]

Specifically, by the terms of the South Korean Act, KEPCO would purchase electricity from renewable sources for a fixed, FIT price. The government would then compensate KEPCO out of the state budget for the difference between the cost of renewable electricity and the cost of electricity powered by fossil fuels.[337] As in Germany and Spain, purchase of renewable electricity was mandatory, as was a grid connection for such producers.

Initially, most renewable generators could choose between a fixed (often below market price) or a variable FIT (approximately 5-20 KRW above wholesale market price).[338] If a generation project received more than 30% of costs from other government grants or subsidies, it was not eligible for the FIT.[339]

The government guaranteed a fixed tariff of five years for small hydropower, biomass, and waste, and fifteen to twenty years for wind and PV.[340] The government set an initial upper limit of support for solar and wind at 20 MW and 250 MW, respectively, on a first-come, first-serve basis.[341] Later, the government modified these caps to 50 MW for 2009, 70 MW for 2010, and 80 MW for 2011.[342] The modification of these caps demonstrates how South Korea, like Spain and Germany, continuously monitored and altered aspects of its FIT in an effort to control program costs.

2000s to unbundle and privatize KEPCO's generation facilities were largely unsuccessful; independent producers owned only 13% of generation capacity in 2009. KEPCO continues to wholly own or own majority shares in all other aspects of the electricity sector. ORG. FOR ECON. CO-OPERATION & DEV., KOREA-REGULATORY REFORM IN ELECTRICITY, *supra* note 321, at 11. The few independent generators that were permitted in the 1990s could only sell their power to KEPCO. *Id.* at 11, 24; *see also* AUSTRALIAN PRODUCTIVITY COMMISSION, SOUTH KOREA'S ELECTRICITY GENERATION SECTOR 2, *available at* http://www.pc.gov.au/__data/assets/pdf_file/0009/109926/18-carbon-prices-appendixi.pdf.

336 Several large industrial consumers may make contracts with electricity generators as wholesale purchasers. Byrne et al., *supra* note 310, at 505.

337 Korean Energy Management Corporation, *supra* note 326.

338 AUSTRALIAN PRODUCTIVITY COMMISSION, *supra* note 335, at 7.

339 KPMG INT'L, TAXES AND INCENTIVES FOR RENEWABLE ENERGY 37 (June 2012), *available at* http://www.kpmg.at/uploads/media/Taxes_incentives_renewable_2012_02.pdf.

340 INT'L ENERGY AGENCY, *supra* note 322, at 75.

341 *Id.*

342 KOREAN-GERMAN CHAMBER OF COMMERCE AND INDUS., MARKET STUDY: GREEN TECHNOLOGY IN KOREA 11 (Sept. 2010) [hereinafter MARKET STUDY], *available at* http://www.s-ge.com/en/filefield-private/files/6561/field_blog_public_files/7928.

Initially, the FIT gave PV and wind the most generous rates. PV producers received 716.4 KRW/kWh and wind 107.6 KRW/kWh.[343] By contrast, small hydro and tidal power received 73.7 KRW/kWh and 62.81 KRW/kWh, respectively.[344] Rates were differentiated on the basis of generation capacity, and in the case of PV, by ground-based or rooftop installations (and by the contractual period guaranteed). FIT rates for new installations, in general, progressively decreased from highs in 2002 to a low in 2011.[345]

Although PV received a generous rate as early as 2004, investors did not fully embrace the solar FIT until 2006, when Korea saw 23 MW of PV installed. The rate for PV in 2006 was 677.38 KRW/kWh for systems larger than 30 kW, and 711.25 KRW/kWh for smaller systems.[346] The growth of PV installations continued in 2007 with 46.9 MW installed, and spiked in 2008 with over 280 MW of installed PV.[347] Rates remained favorable throughout 2008, and South Korea quickly became the nation with the fourth largest number of solar panel installations in the world.[348]

Following this boom, in 2010 and 2011, the government decreased PV tariff rates by 12% to 13% for ground-based systems and 6% to 7% for rooftop installations.[349] By 2010, for example, ground-based PV installations smaller than 30 kW received 514.34 KRW/kWh, and installations larger than 3 MW received 370.7 KRW/kWh.[350] In 2011, the year before the government eliminated the FIT, the same generation facilities received as little as 439.56 KRW/kWh and 316.8 KRW/kWh.[351]

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343 INT'L ENERGY AGENCY, *supra* note 322, at 75.

344 Seong-Ho Lee, *The Role of New and Renewable Energy Center (KEMCO) in the Expansion of PV Market in Korea*, PHOTOVOLTAIC SPECIALISTS CONF., 2006 IEEE 4th, May 2006, at 14, *available at* http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=4059550.

345 *See* Sophie Avril et al., *Solar Energy Support in the Asia-Pacific Region*, PROGRESS IN PHOTOVLOTAICS 785, 792 (2012).

346 *Id*.

347 Kyung Nam Kim et al., *Korean Photovoltaic Industry and Technology: Now and Future*, PHOTOVOLTAIC SPECIALISTS CONF., 2011 IEEE 37th, June 2011, *available at* http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6185856. FIT rates for ground-based PV with less than 30 kW and fifteen year contracts, for example, received a rate of 646.96 KRW. Sophie Avril et al., *supra* note 345.

348 Ucilia Wang, *Report: Korea's Solar Industry on the Rise*, GREENTECHSOLAR (Mar. 6, 2009), http://www.greentechmedia.com/articles/read/report-koreas-solar-industry-on-the-rise-5840/.

349 Kyung Nam Kim et al., *supra* note 347.

350 *Id.*

351 *Id*.

2. Winding Down the FIT

Although the South Korean FIT had some success, it soon ran into strong headwinds, caused in part by its own design flaws. First was cost. While new 2008 South Korean President, Lee Myung-bak, continued to promote the renewables industry "as a new economic growth engine" during the global economic downturn of 2008,[352] payment of FIT rates out of the state budget, perhaps predictably, did not play well. This was especially true as the idea that the FIT could deliver economic benefits began to show cracks. South Korea adopted its FIT with the hope that it would spur economic growth domestically, but as it turned out, it was foreign investment firms and foreign-made equipment that reaped many of the program's benefits.[353] Thus, contrary to the government's intention of jumpstarting a domestic clean technology industry, Korean tax funds shifted to the pockets of foreign companies, which, understandably, quickly turned government officials against the costly program.

As criticism of the Korean FIT mounted, it soon became apparent that the regime would not last. While official statements remained positive on clean technology, some began to criticize Korean green growth policies as putting growth first and green second.[354] Beginning in 2009, the government passed regulations to reduce FIT rates for new installations: down to 400–560 KRW/kWh for solar and approximately 107 KRW/kWh for wind.[355] These FIT reduction measures were responsible for decreases in the amounts of new installations, particularly in PV in 2009–2010.[356] The government also continuously modified capacity limits for specific technologies and, as early as 2006, began considering alternative renewable promotion strategies, such as an RPS.[357] By 2009, against the wishes of small renewable generators, the

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352 *Green Energy Gets Government Boost*, CHOSUNILBO (Sept. 12, 2008), http://english.chosun.com/site/data/html_dir/2008/09/12/2008091261016.html.

353 Choi Woo-jung, *Solar Energy Second Only to Biofuel*, KOREA TIMES (July 29, 2007), http://www.koreatimes.co.kr/www/news/biz/2010/09/123_7372.html.

354 Inhye Heo, *The Political Economy of Policy Gridlock in South Korea: The Case of the Lee Myung-bak Government's Green Growth Policy*, 41 POLITICS & POLICY 509, 513–14 (2013); *see also, e.g.*, *Renewable Energy Supplies to Increase*, CHOSUNILBO (Aug. 28, 2008), *available at* http://english.chosun.com/site/data/html_dir/2008/08/28/2008082861015.html; Kim Yoo-chul, *HHI Muscles into Solar Power Generation Business*, KOREA TIMES (Oct. 21, 2008), http://koreatimes.co.kr/www/news/biz/2008/10/602_33081.html.

355 MARKET STUDY, *supra* note 342, at 11.

356 Sophie Avril et al., *supra* note 345, at 793.

357 *Id.*; INT'L ENERGY AGENCY, *supra* note 322, at 76. In 2010, the government again modified FIT support for PV by limiting eligibility to 70 MW per year, and in 2011 to 80 MW. MARKET STUDY, *supra* note 342, at 11.

government began phasing out FIT support,[358] and in 2012, eliminated the FIT altogether, replacing it with an RPS.[359] South Korea thus followed in Spain's tracks by repeatedly adjusting, and eventually abolishing, its FIT.

B. *Effects of South Korea's FIT*

The South Korean FIT opened the door for investments in certain technologies, namely PV and onshore wind. Overall, however, the FIT did not substantially reduce South Korea's dependence on imports and nonrenewables. Under its feed-in tariff, sales of renewable energy grew from 139.4 billion KRW in South Korea in 2004 to 4,275 billion KRW in 2009.[360] According to KEMCO, "Annual total volume of PV dissemination, . . . [which received the most generous FIT rate,] had been just over 200kW before 2004. However, as the FIT system was announced and recognized by investors, PV installation increased dramatically and reached about 497MW in 2011."[361] By 2008, South Korea had installed over 228 MW of PV and possessed the fourth largest amount of installed solar panels worldwide, behind only Spain, Germany, and the United States.[362]

However, as happened in Spain and Germany, after the initial PV boom, the government quickly adjusted the FIT, lowering the PV rate.[363] Correspondingly, the level of new installations fell, and South Korea installed 131 MW and 92 MW, respectively, in 2010 and 2011—down from 228 MW in 2008 and 170 MW in 2009.[364]

Wind technology likewise increased dramatically under the Korean FIT. In 2003, South Korea had an installed capacity of 18.2 MW of wind energy.[365] By 2008, that figure grew to 204.1 MW.[366] However, concurrent with the global economic downturn, the government decreased the wind FIT by 2% annually after 2008, and new installations fell from a peak of 108.02 MW

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358 *Korea to Invest W3 Trillion in Renewable Energy*, CHOSUNILBO (July 10, 2009), http://english.chosun.com/site/data/html_dir/2009/07/10/2009071000849.html.

359 Jonathan Gifford, *Korea's Cautious Comeback*, PV MAGAZINE (Mar. 2013), *available at* http://www.pv-magazine.com/archive/articles/beitrag/koreas-cautious-comeback-_100010400/86/?tx_ttnews%5BbackCat%5D=215&cHash=77adbf15f8bed8a9ab9617cedf0f11c.

360 MARKET STUDY, *supra* note 342, at 9.

361 Korean Energy Management Corporation, *supra* note 326.

362 Wang, *supra* note 348.

363 MARKET STUDY, *supra* note 342, at 10; Gifford, *supra* note 359.

364 Gifford, *supra* note 359.

365 MARKET STUDY, *supra* note 342, at 19.

366 *Id.*

installed in 2008 to only 84 MW installed in 2009.[367] Nevertheless, by 2011, South Korea had more than 276 MW of wind power connected to the grid, accounting for approximately 1% of the global wind market.[368] By September 2013, the country had accumulated 480 MW of onshore installed wind capacity.[369]

Indeed, not just PV and wind, but total electricity generation from renewables grew while South Korea used a feed-in tariff. In 2003, renewable energy accounted for just over 1% of primary energy consumption and less than 0.5% of total electricity generation in South Korea.[370] By 2010, those tallies had increased to 2.6% and 1.24%, respectively.[371]

In addition, the South Korean FIT did at least partially succeed at promoting economic development. For instance, KEMCO reported a strong increase in the number of companies active in the nation's renewable energy sector, growing from 41 firms in 2004 to 212 in 2010.[372] Included in those companies were 91 PV firms, 46 bioenergy companies, and 30 wind firms.[373] Furthermore, KEMCO noted that the renewable energy workforce climbed from 689 in 2004 to 17,348 in 2010. [374] Of these workers, 11,556 were employed in the PV and wind power industries alone.[375] Of course, how much of this growth is directly attributable to the FIT is less clear.

Despite this, the South Korean FIT did little to move the needle on the country's overall energy mix. At the FIT's end in 2011, South Korea was the fifth largest importer of oil and the second largest importer of liquefied natural

367 MARKET STUDY, *supra* note 342, at 19; Young Il Choung, Ernst & Young, *Quick Look: Renewable Energy Development in South Korea*, RENEWABLEENERGYWORLD.COM (Dec. 28, 2010), http://www.renewableenergyworld.com/rea/news/article/2010/12/quick-look-renewable-energy-development-in-south-korea.

368 *See* WEBB, *supra* note 310; Sarosh Bana, *Market Report: South Korea and its Renewable Energy Ambition*, RENEWABLEENERGYFOCUS.COM (Mar. 2, 2013), http://www.renewableenergyfocus.com/view/31482/market-report-south-korea-and-its-renewable-energy-ambition/.

369 WEBB, *supra* note 310.

370 KOREA ENERGY MANAGEMENT CORPORATION (KEMCO), OVERVIEW OF NEW AND RENEWABLE ENERGY IN KOREA (2012) [hereinafter KEMCO]; ENERGY INFO. ADMIN., ANNUAL ENERGY REVIEW 2003, at 325 (2004), *available at* http://www.eia.gov/totalenergy/data/annual/archive/038403.pdf.

371 KEMCO, *supra* note 370, at 10.

372 Sarosh Bana, *Factfile: RPS Framework Drives South Korean Market*, RENEWABLEENERGYFOCUS.COM (Apr. 1, 2013), http://www.renewableenergyfocus.com/view/31556/factfile-rps-framework-drives-south-korean-market/.

373 *Id.*

374 *Id.*

375 *Id.*

gas ("LNG") in the world.[376] This represents little change from 2002 oil imports and a 125% increase in LNG imports.[377] Thus, even after the FIT, South Korea continued to import 97% of its energy needs.[378]

Even more tellingly, the FIT's monetary cost was substantial.[379] In 2004, after only two years of implementation, the FIT had cost the government 11.7 billion KRW, and officials were already anticipating a market-based method to curtail growing costs.[380] The International Energy Agency thus criticized South Korea's FIT as an expensive way of funding technology:

> Korea's USD 0.70 per kWh feed-in tariff rate for solar photovoltaics would provide a payment of USD [1,600] annually per 2-kW panel, equivalent to a ten-year simple payback time, a favourable rate considering that payments are guaranteed for 15 years and the operational lifetime of a solar panel is about 20 years. The government should consider more market-based alternatives to feed-in tariffs . . . .[381]

The government also noted other problems with the FIT, including strain on the public fisc, the difficulty in setting realistic renewable energy targets, and the risk of market imperfections, such as windfall profits or "excess" renewable energy production not covered by the FIT because of program caps.[382] As a consequence, the government, though publicly continuing its quest for a "Low Carbon, Green Growth" economy, determined that the FIT placed too much obligation on the government and not enough on the market.[383]

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376 U.S. ENERGY INFO. ADMIN., SOUTH KOREA (Jan 17, 2013), *available at* http://www.eia.gov/countries/analysisbriefs/South_Korea/south_korea.pdf; Calder, *supra* note 311, at 5.

377 U.S. ENERGY INFO. ADMIN., *supra* note 376.

378 *Id.*

379 Do-Yo Kim, *Introduction of RPS and Phase-Out of FIT in Renewable Energy Policy*, INT'L FIN. L. REV. (Aug. 1, 2012), http://www.iflr.com/Article/3072471/Introduction-of-RPS-and-phase-out-of-FIT-in-renewable-energy-policy.html. The KEMCO body charged with maintaining the FIT was given a budget of almost 4 billion KRW for FIT purposes. KEMCO, *supra* note 370, at 5.

380 INT'L ENERGY AGENCY, *supra* note 322, at 76.

381 *Id.* at 78–79 (internal citations omitted).

382 *Program for Promoting NRE Deployment*, KOREAN ENERGY MGMT. CORP., http://www.kemco.or.kr/new_eng/pg02/pg02040705.asp (last visited Mar. 6, 2014); *see also* Burgermeister, *supra* note 307. While operating its FIT, South Korea also implemented other renewable energy support measures, such as direct support, tax benefits, and research funding. The lack of coordination among these schemes was criticized as inefficient and for creating path dependency. INT'L ENERGY AGENCY, *supra* note 322, at 78.

383 Ali Almansoori, *The Influence of South Korean Energy Policy on OPEC Oil Exports*, 67 ENERGY POL'Y 572, 572 (2014).

C. Replacing South Korea's FIT

South Korea no longer operates a FIT. Although prior tariff rates will continue to apply to existing facilities for their promised duration, usually fifteen years, no new projects are eligible for the old regime. Instead, in 2012, South Korea replaced its FIT with a renewable portfolio standard.[384] The RPS applies only to power generators with a capacity of 500 MW or more.[385] It imposes purchasing goals on generators, beginning at 2% renewables in 2012 and increasing by 0.5% until 2015, when it will rise by 1% per year until it reaches 10% in 2022.[386] Government subsidies, such as a 5% tax credit for renewable equipment and investments in renewable research and development, are also scheduled to continue.[387]

Small renewable generators, which no longer receive the FIT, and the largest producers, which must now find ways to comply with RPS mandates, objected to the FIT's removal. Nevertheless, other energy players view the switch to an RPS as a boon to their business. Under the RPS, a multiplier of 0.25 to 2 is assigned to each type of renewable technology, determining its value under the law.[388] Fuel cells, for example, are rated favorably as a 2 under the new RPS. One executive of a fuel cell company lauded the decision to remove the capped FIT system: "The Government initially encouraged . . . fuel cells [using] a feed-in tariff . . . with an aggregate limit of 50 MW over the life of the program. This new RPS program, with a goal for approximately 7,000 MW of new and renewable power by 2022, creates a substantially larger market opportunity . . . ."[389] Likewise, other technologies, such as solar, continue to receive favored treatment under the RPS due to technology-specific quotas that are carved out to promote development of particular renewable technologies.[390]

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384 TAXES AND INCENTIVES FOR RENEWABLE ENERGY, *supra* note 339.

385 Kim, *supra* note 379. This includes, initially, Korea District Heat Corporation, Korea Water Resources Corporation, Posco Power, SK E&S, GS EPS, GS Power, and MPC Yulchon, as well as six KEPCO subsidiaries. KEMCO, *supra* note 370, at 37.

386 Kim, *supra* note 379.

387 SOUTH KOREA, *supra* note 376.

388 *Program for Promoting NRE Deployment*, *supra* note 382.

389 FuelCell Energy, *Fuel Cells Earn Prominent Position Within South Korean Renewable Portfolio Standard Pricing Mechanism*, GLOBENEWSWIRE (Jan. 13, 2011), http://globenewswire.com/news-release/2011/01/13/437763/211028/en/Fuel-Cells-Earn-Prominent-Position-Within-South-Korean-Renewable-Portfolio-Standard-Pricing-Mechanism.html.

390 Choung, *supra* note 367.

South Korea's RPS seeks to resolve the economic problems that motivated its transition away from a FIT.[391] Perhaps most significantly, the RPS changed the practice of financing renewables out of the state budget and instead now allows renewable energy costs to be passed to consumers and, in the near term, renewable producers.[392] In addition, because the RPS favors least costly renewable technologies, it aims to diminish the overall price tag of supporting renewables development. Finally, the Korean RPS seeks to smooth out market growth for renewables. In contrast to the risk of FITs encouraging a rush to market,[393] such as the boom in PV from 45 MW in 2007 to 274 MW in 2008,[394] the RPS's time-based percentage targets seek to encourage more even, rather than boom-bust, renewables growth.

Given that it has only just begun to operate, it is too early for a verdict on the Korean RPS's success, although it is clear that some new renewable installations are continuing. At the start of 2014, for example, the largest fuel cell park in the world, a 59 MW facility, became operational in South Korea, and the country's new president, Park Geun Hye endorsed renewable energy as a vehicle for economic development, rebooting an "era of green growth 2.0."[395] At the same time, some question the ability of the RPS to foment further growth in renewables, raising questions of the shape of Korean policy in the future.[396]

Thus, as Germany continues to grapple with how to best manage its FIT, and Spain seeks to find a new path for promoting renewable energy in the Iberian Peninsula, the story of renewable energy development in South Korea

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391 Kim, *supra* note 379.

392 Jihyo Kim et al., *Renewable Electricity as a Differentiated Good? The Case of the Republic of Korea*, 54 ENERGY POL'Y 327, 329 (2013), *available at* http://www.sciencedirect.com/science/article/pii/S0301421512010245 (noting, however, that rises in traditionally low consumer electricity costs may become politically problematic).

393 KEMCO, *supra* note 370, at 34.

394 Wang, *supra* note 348.

395 Heather Clancy, *Milestone Year for Fuel Cell Energy Installations*, FORBES (Dec. 12, 2013), http://www.forbes.com/sites/heatherclancy/2013/12/12/milestone-year-for-fuel-cell-energy-installations/; Pete Danko, *Fuel Cells Power Up: Three Surprising Places Where Hydrogen Energy Is Working*, NATIONAL GEOGRAPHIC (April 3, 2014), *available at* http://news.nationalgeographic.com/news/energy/2014/04/140403-fuel-cells-hydrogen-wal-mart-stationary/. Previously, President Park had distanced herself from her predecessor's green growth policies for political reasons. Shin Hyon-hee, *Korea Eyes Era of 'Green Growth 2.0,'* KOREA HERALD, Nov. 10, 2013, *available at* http://www.koreaherald.com/view.php?ud=20131110000342; Sung-Young Kim & Elizabeth Thurbon, *Green Growth: Rebooted in South Korea, Booted out in Australia*, CONVERSATION (Feb. 6, 2014), http://theconversation.com/green-growth-rebooted-in-south-korea-booted-out-in-australia-22243.

396 *See, e.g.*, *RPS System Achieves 'Half Success' in First Year of Adoption*, ENERGY KOREA (Dec. 21, 2012), http://energy.korea.com/archives/40644.

also remains an ongoing one. The country's shift away from a FIT to an RPS is one to watch, with the Korean experience potentially offering important lessons for renewable energy support policy worldwide.

V. LESSONS AND IMPLICATIONS

Often, especially by renewable energy advocates, feed-in tariffs are portrayed as optimal policies that promote renewable energy in a way other support mechanisms cannot. As the experiences in Germany, Spain, and South Korea make plain, however, such a characterization of feed-in tariffs is only half the story. The feed-in tariff's full arc does not stop with effective renewable energy deployment. The complete story is that these laws have numerous other effects, and those effects both impact the market more broadly and risk undercutting the very benefits feed-in tariffs seek to provide.

Highlighting the nuanced ways in which this can occur is crucial. If jurisdictions are to use feed-in tariffs to promote renewables, they should do so with full vision. Feed-in tariffs offer much that deserves praise, but a complete accounting of their costs and benefits is more complex than is often sold. Jurisdictions considering using feed-in tariffs—and those that already do—should be aware that as these policies and the markets around them mature, they also require more management and planning. All too easily, feed-in tariffs in operation can become feed-in tariffs in turmoil. That turmoil demands attention.

That feed-in tariffs create tumult over time should not be especially revelatory, despite the relative inattention given to this point in the literature to date.[397] Feed-in tariffs by their very definition seek to disrupt the existing energy system. Renewables are fundamentally different from conventional generation, and as grid operators adjust to increasing amounts of these resources in the system, both the physical infrastructure and how it is managed must also evolve. To the extent FITs encourage very small or distributed generation, this also changes the energy world. It holds the potential to reduce the position of large incumbent firms and make energy production and consumption more interactive, diversified, and populist.[398] As one German document promoting the EEG brags, "Everyone can produce electricity."[399]

Indeed, the paradox inherent in feed-in tariffs is that they are designed to gradually self-destruct. A core objective of any renewable energy support mechanism is to drive down production costs until renewables are on a level

397 For one notable exception, consider Professor Mormann's astute analysis of the challenges facing FIT design. *See* Mormann, *supra* note 5, at 728–33.

398 *See* BMU, EEG, *supra* note 143, at 13, 14.

399 *Id.* at 13.

playing field with conventional resources.[400] Once that happens, the theory goes, the support mechanism is no longer needed. Policy change, then, demanded by feed-in tariffs can be seen as a sign of their success: They must evolve because they are achieving desired results.

The problem, however, is twofold. First, adjusting to changing market prices—much less deciding when a technology has achieved "grid parity"—is no easy task, as the experiences that Germany, Spain, and South Korea had with attempting to adjust their FIT rates in response to falling solar costs should make abundantly clear.[401] Second, political resistance to ending feed-in tariffs is inevitable, even if that is their design. Industry always resists changing laws that support it, and a likely consequence of effective feed-in tariffs is that by becoming a bigger part of the system, the renewables industry may gain more political suasion. Certainly this has happened under the German and Spanish FITs.[402]

Nevertheless, while the lessons of feed-in tariffs in turmoil might be evident, they remain relatively underappreciated. It is thus our objective here to offer initial observations of the challenges that feed-in tariffs can face and create, based on the case studies of Germany, Spain, and South Korea. Our analysis is not intended to be definitive or exhaustive. The experiences of Germany, Spain, and South Korea cannot necessarily be generalized. Every country, every FIT is different, and the distinctive culture, politics, energy makeup, and policy preferences of any given jurisdiction matter.

Our fundamental observation is plain: More attention needs to be given to assessing how and when feed-in tariffs should evolve over time. Our conclusions here represent an initial, if modest, contribution to that conversation. The point is that the experience of feed-in tariffs is more nuanced than either supporters or detractors of these policies often acknowledge.

On this score, a number of key points emerge. First, feed-in tariffs can be extremely effective. Second, as feed-in tariffs begin functioning, they can lead to problems that demand modifying policy design. Third, FIT operation also can lead to unforeseen impacts external to the tariff itself. Most concretely, these relate to grid integration and infrastructure growth, but perhaps most importantly, these impacts underscore the need for lasting political support for FIT regimes. Finally, feed-in tariffs inevitably must change over time. Managing that change is a critical endeavor for policymakers. Markets change; policies must too. Jurisdictions that quickly and adeptly adjust their feed-in tariffs to the evolving markets these policies foment can maximize their laws' efficacy and efficiency. Those who fail to adapt risk regulatory collapse. The

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400 *See, e.g.*, Davies, *supra* note 14, at 48.

401 *See* MARKET STUDY, *supra* note 342, at 10; Couture, *supra* note 252.

402 Parnell, *supra* note 302. Of course, this also does not necessarily alleviate political opposition to FITs when the regimes become expensive or flawed.

challenge, then, is to keep FITs flexible enough that they are responsive to changing markets without destabilizing the tariff regime itself. The consequence of failing to find this balance is clear: an imploding policy scheme, as in Spain, or replacement of the FIT with another policy altogether, as in South Korea. We explore each of these observations in greater depth below.

A. FIT Effectiveness

The common narrative of feed-in tariffs is that they are effective, and the experiences of Germany, Spain, and South Korea confirm this message. Thus, the fact that managing FIT operation is more difficult and complex than often implied is hardly reason for jurisdictions weighing how to promote renewables to cross feed-in tariffs off their list of possible policies. Even in the face of their challenges, feed-in tariffs remain a viable—and, arguably, often preferable—option for renewable energy support.

Each of the experiences in the countries examined here bears this out. In Germany, renewables penetration increased under both the StrEG and the EEG, and especially under the latter. Sevenfold increases over just two decades in the amount and percentage of electricity produced from renewables is remarkable, to say the least.[403] Indeed, Germany's shift from the StrEG to the EEG itself offers a lesson for policymakers, as it appears that the EEG's focus on technology costs, guarantee of two-decade-long payments, and spreading of costs nationwide across consumers all significantly improved the EEG's performance over its predecessor's.[404] Likewise in Spain, renewable energy grew significantly: from barely 1% of total electricity production in 1990, to over 50% in 2013.[405] The evolution of the Spanish FIT further demonstrates that providing investor certainty through required grid connections and mandatory purchases can be balanced with necessary flexibility in long-term feed-in tariff design. South Korea's FIT was somewhat less effective at altering the nation's energy profile. Nonetheless, electricity generated from renewables increased by approximately 0.75% in less than a decade under the FIT, and individual technologies grew exponentially.[406] South Korea's experience with PV, like that in Germany and Spain, also confirms the revelation that generous rates for a particular technology often directly correlate with technology growth.

The tale of feed-in tariffs in Germany, Spain, and South Korea, then, is not just a cautionary one. It is also an optimistic one—a narrative highlighting

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403 *See supra* Part II.B.

404 *See supra* Parts II.B–C.

405 *See supra* Part III.B.

406 *See supra* Part IV.B (from 0.5% in 2003 to 1.25% in 2010).

that even in jurisdictions that eventually give up on the idea of a feed-in tariff, this policy can be successful at achieving its core objective. It is the question of how to manage these laws as they move toward accomplishing their aims, then, that demands increasing attention.

B. Internal FIT Design

Possible problems with feed-in tariffs long have been known. From their inception, FITs have been criticized as potentially too expensive, too likely to lock-in technologies, too thwarting of competition, and too risky to offer windfall profits to renewables producers.[407] The response to these concerns has consistently been, on the one hand, that FITs are nevertheless more effective, less expensive, and more market-responsive than other renewable energy support mechanisms, such as RPSs, and, on the other, that adjustments to policy design can correct most FIT flaws.[408]

The experiences in Germany, Spain, and South Korea demonstrate that the possible flaws identified in feed-in tariffs are not just theoretical but real. Each of these countries faced dilemmas in implementing their laws that eventually demanded policy design correction. Foremost among these is cost. Indeed, if the experiences of Germany, Spain, and South Korea have anything to teach other jurisdictions about FIT design, it may be that managing cost is the most critical aspect of maintaining support for these policies. Certainly it is cost—or at least its appearance through the *Umlage*—that is now driving the debate over FIT reform in Germany.[409] Likewise, it was perceived costs in the form of a tariff deficit that caused Spain to pull back from its FIT, just as it was the FIT's heavy financial draw on government coffers that was behind South Korea's abandonment of its law.[410]

Of course, other design problems have repeatedly emerged in FIT implementation, as the experiences of these countries show. Equity is one. Thus, in Germany, many large industrial energy users have been effectively

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407 *See, e.g.*, TOBY D. COUTURE ET AL., *supra* note 111, at 72–73; Jonathan A. Lesser & Xuejuan Su, *Design of an Economically Efficient Feed-In Tariff Structure for Renewable Energy Development*, 36 ENERGY POL'Y 981 (2008), *available at* http://www.sciencedirect.com/science/article/pii/S0301421507004983.

408 *See, e.g.*, Toby Couture & Yves Gagnon, *An Analysis of Feed-In Tariff Remuneration Models: Implications for Renewable Energy Investment*, 38 ENERGY POL'Y 955 (2010), *available at* http://www.sciencedirect.com/science/article/pii/S0301421509007940; Pablo del Río, *The Dynamic Efficiency of Feed-In Tariffs: The Impact of Different Design Elements*, 41 ENERGY POL'Y 139 (2012), *available at* http://www.sciencedirect.com/science/article/pii/S0301421511006264.

409 *See supra* Part II.B.

410 *See supra* Parts III.B, IV.B.

exempted from the EEG surcharge while everyday consumers bear the brunt of the law's cost.[411]

Likewise, figuring out how to transition renewables to the market has been no easy task, despite the clear FIT objective of eventually making renewable generators players in a fully competitive market. Each of the countries highlighted here have experimented with resolving this tension. In Germany, the original option to allow EEG-eligible producers to bid into the market has been replaced with a stronger incentive to encourage them to do so,[412] and now a proposal to force installations to use market-tethered tariffs is a center feature in proposed EEG reform. Spain underwent a similar process, as regulators first attempted to lure generators with a market premium, only to later compel its use.[413] South Korea, too, offered a fixed FIT typically below market levels but a variable tariff rate above wholesale costs.[414]

Indeed, even as more advanced FIT design options—including degression, market-responsive degression, eligibility caps, and resource and location banding and differentiation—have become available to help limit program costs, the problem of possible windfall profits has remained. This can be seen most visibly in the context of PV, though it also has reared its head in wind. Without question, the dilemma of how to manage FIT prices as technology costs drop has proven a knotty puzzle for policymakers in Germany, Spain, and South Korea. In Germany, the government ended up repeatedly revising the FIT in every year from 2009 to 2012 to try to both reduce the speed of solar uptake and to bring FIT payments closer to technology costs. Instead, PV installations did anything but abate, breaking records in every one of these years.[415] Now, FIT payments for solar in Germany are made under a "breathing cap," or *atmender Deckel*, that means the tariff fluctuates on a monthly basis depending on prior installations.[416] Likewise, Spain created and superseded royal decrees on a near-yearly basis to address unintended consequences of prior FIT policy, technological development, and political and economic shifts, all of which influenced actual costs, installations, windfall profits, and government willingness to incur debt.[417] Similarly, even during the short time it was in place, South Korea adjusted its FIT policy,

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411 *See supra* Parts II.B–C.

412 *See supra* Part II.A.

413 *See supra* Parts III.A–B.

414 *See supra* note 338 and accompanying text.

415 *See supra* Parts II.B–C.

416 *See supra* Part II.A.

417 *See supra* Part III.B.

implementing program caps and reducing tariff rates to deal with falling PV costs and ensuing installation booms.[418]

Fundamentally, however, all of the design problems the FIT regimes in Germany, Spain, and South Korea have faced are merely evidence of a larger, arguably more important, truth. No matter how well designed a feed-in tariff is, it inevitably will need to undergo revision to remain effective and efficient. Feed-in tariffs, then, do not just hold the potential for creating energy market turmoil, they also are certain to embody turmoil within themselves.

C. External Effects

It is not simply desire for good policy that prompts frequent tinkering with feed-in tariffs, but also external market influences—changes that FITs themselves provoke. These impacts on the broader energy system around feed-in tariffs thus deserve careful attention.

Perhaps the most direct external effect of FITs is the need these laws create for grid upgrades and infrastructure expansion. Such needs hardly are unexpected, particularly where FITs are effective at incenting significant renewable installations, but they also are not immaterial. In Germany, for instance, investments of over a billion Euros already have been made to grapple with the shift in the energy system affected by the EEG, with tens of billions of Euros more to come.[419] Tension in Spain over guaranteeing grid-access to renewables, yet forcing companies to pay for costly connection lines, likewise demonstrates the systemic shifts in infrastructure that successful introduction of renewables can initiate.[420]

A similar FIT impact is on the energy market itself. FITs by definition seek to create a "breakthrough for renewable energy,"[421] and the way they do this is by trying to alter—fundamentally—the extant energy market. They often succeed. For instance, in Germany, renewable energy penetration has become so pervasive that large amounts of flexible (load-following) generation is needed, but many of the plants capable of providing this service do not want to run because it is not profitable to do so. Thus, calls for new generation capacity markets have become more frequent. At the same time, high PV tariffs have encouraged so many workaday citizens to become involved in the energy system that popular support for the EEG has a much more pervasive hold than it ever did before. Indeed, at least some German utilities, who initially resisted

418 *See supra* Parts IV.A–B.

419 *See supra* Parts II.B–C.

420 *See supra* Part III.A.5.

421 BMU, EEG, *supra* note 143, at 13 (quoting Hermann Scheer).

the idea of a FIT, now actively participate in the renewables sector, with one major utility having affirmatively backed in the EEG amendments in 2004.

Together, these external effects combine to create a kind of feedback loop. FITs alter markets; those altered markets force FIT adjustments; the adjusted tariffs transform markets further; and the cycle perpetuates. Thus, as feed-in tariffs change the energy system around them, they themselves also must be continually recalibrated to the new world they have created. Germany, Spain, and South Korea each provide examples of this. The German EEG has been amended no less than six times in twelve years, with another overhaul coming soon. So too in Spain, where repeated amendments of the regime have placed the law on the precipice of becoming something fundamentally different than a traditional FIT. Likewise, South Korea's FIT, short-lived as it was, repeatedly was adjusted and, eventually, abandoned.

All this underlines the transitional nature of feed-in tariffs. No doubt, every change to a feed-in tariff is moderated by the complex machinery of politics, which, by definition, vary by jurisdiction. Nonetheless, the core point remains. FIT change begets more change, and at some point, the turmoil feed-in tariffs create around them puts feed-in tariffs in turmoil themselves.

D. Flexibility and Stability

Change itself is not a bad thing. Law's very nature is that we expect it to shift to more closely match society's ever-evolving structures, expectations, and norms. But in a regulated environment, where businesses need firm ground on which to make plans, too much—or too rapid—change can be problematic. This is especially true when a policy mechanism is chosen precisely because of its ability to provide stability and certainty.

Change, in the context of feed-in tariffs, thus can create numerous difficulties. Feed-in tariffs are lauded precisely because they provide certainty that other renewable support mechanisms do not.[422] Indeed, in many ways, a feed-in tariff is akin to a fixed-rate, government-backed investment account. Certainly this was true in Germany, Spain, and South Korea: Those FIT regimes offered guaranteed payments for renewable energy production for twenty years in Germany, twenty five in Spain, and up to twenty years in South Korea.

The quandary, then, is that feed-in tariffs necessarily come in a damned-if-you-do-damned-if-you-don't box. Feed-in tariffs inevitably have to evolve because they alter the markets and systems in which they operate. If they do not evolve, they risk becoming ineffective, overly expensive, or unwanted. This is exactly why the German, Spanish, and Korean FITs have been amended so heavily—to stay relevant. By the same token, however, the

422 *See, e.g.*, Mormann, *supra* note 5, at 710–24.

more feed-in tariffs change, the more they risk undermining their principal asset: their ability to create market certainty. Thus, at a minimum, policymakers must be careful as they seek to balance the need to change FITs with the speed, frequency, and severity in which they do so. This is no easy task.

Indeed, how to strike the right balance between ensuring feed-in tariff flexibility and market stability may be the most difficult dilemma in all FIT design. It is the core tension in the policy's function: Governments that succeed at it may well prosper in their renewable energy policy. Those who do not will likely founder. We do not endeavor here to seriously explore approaches for resolving this tension, but a few initial observations may help demarcate its contours.

First, FIT change generally—if not universally—must be prospective. This is why even though Germany has repeatedly changed the EEG, it has almost always done so on a forward-looking rather than retroactive basis, and it is why Spanish amendments with retroactive effect have ignited such controversy. Retroactive changes to feed-in tariffs do not just render the policies less stable. They dislocate investor expectations.

Second, careful policy design can help minimize the amount of change needed in feed-in tariffs. For instance, choosing a funding mechanism that spreads the cost of a FIT as widely as possible is likely to make the policy more durable. This was precisely the problem in South Korea, where the government paid for the FIT out of the state budget instead of tying its costs to electricity prices. It also explains why the discourse over the German *Umlage* has become so sharp; the exemption of large manufacturers from EEG costs makes everyone else feel the pain more keenly. Indeed, knowing that modern economies tend to be cyclical, it would seem imperative that feed-in tariffs not have all their funding eggs in one financial basket. Of course, disentangling how much of FITs' recent difficulties can be attributed to poor design rather than the global recession is no easy task. But recognizing that there are some ways to limit how government austerity might impact policies as important as feed-in tariffs should be obvious enough.

Third, it may be that some technologies are more susceptible to policy change than others. Intuitively, it would seem that this relationship may hinge heavily on technological maturity and production costs. As happened in Germany, Spain, and South Korea, the tariffs for PV necessarily became more flexible—and thus less certain—over time. Yet the PV market was able to handle this change because the technology's cost was falling so rapidly: that is, because the technology was maturing. Likewise for wind, Germany was able to lower FIT payments early on and still achieve success because increasing wind deployments gave the technology a stronger market position as its own costs decreased. Thus, it may be that as technologies mature, the amount of certainty provided by the feed-in tariff can also decrease, just as the amount of support should as well.

In the end, there can be no doubt that the amount of change a FIT undergoes is neither as flashy nor as likely to capture the public's attention as easily as its costs might. It is also self-evident that maintaining public support for feed-in tariffs is essential if they are to remain stable. But attention to other aspects of the FIT should not diminish the need to pay careful heed to deciding when, and how much, any given policy should change. That, at least, is one clear lesson the turmoil of the feed-in tariffs in Germany, Spain, and South Korea has to teach.

VI. CONCLUSION

The paradox of feed-in tariffs is that by providing certainty, they force themselves to change. It is this fact—and the reality that governments must grapple with how to adjust their policies over time—that complicates the feed-in tariff narrative beyond the simple, common accounting of these laws as effective, efficient renewable energy support mechanisms. Feed-in tariffs clearly can bear those attributes. But making FITs resilient requires much more than putting an initially well-designed policy in place. As the experiences of Germany, Spain, and South Korea show, careful, continued policy calibration and innovation is necessary to keep feed-in tariffs durable. This more nuanced narrative of feed-in tariffs only recently has begun to garner attention, and it is one that cannot be ignored. At their core, feed-in tariffs aim to transform energy markets: to scale up renewables, increase their prevalence, drive down their costs, and alter the shape and makeup of electricity generation. That feed-in tariffs actually succeed in this endeavor should not be surprising, but neither should it be that feed-in tariffs must evolve in response to their success. As proponents of renewable energy look to the future, this may be their core dilemma: to envision how feed-in tariffs should change over time, and then to help investors plan for the policy's evolution. In the meantime, the fundamental challenge is adapting feed-in tariffs to the turmoil around them. Governments who excel at this may keep their policies aloft, functional, and effective, while those who do not are likely to find themselves on a much different trajectory.