3 The times they are a-changin'? The evolution of support schemes in Member States over time

3.1 The first generation of support schemes: from the late 1970s until the First RES Directive

Denmark was the first Member State to introduce a national support scheme for renewable electricity when in 1979 it launched investment grants for wind turbines. Investment grants are classical subsidies and exist in different forms still today in many Member States, in particular the new Member States, and also rely on EU funding under the structural fund programmes.[1] However, their overall impact remains limited compared to operating support granted under price-based and quantity-based systems. Those are therefore at the center of this book.

Despite the 1986 Communication and 1988 Recommendation (see Section 1.3.1), initial efforts to promote renewable electricity through regulatory policy were driven nearly exclusively by national policy considerations. The recommendations were not binding, and had little effect. Promotion only took place where in the national political context there was strong support for such measures. Prominent examples are Denmark and Germany. In Denmark, the decision (taken in 1985) not to use nuclear power triggered a push for alternative energy sources, in particular wind.[2] In Germany, a combination of the aftershocks of the Chernobyl accident, frustration of small producers of hydropower in

[1] See for Denmark, which phased out the investment aid in 1989, Rønne 2005, p. 169. See for a review across all Member States Del Rio and Mir-Artigues 2014. As the latter point out, the continued parallel existence of operating aid and investment aid in other Member States raises important questions of efficiency of public spending: only if the price-based and quantity-based systems take that additional funding into account can overcompensation (and therefore inefficiency) be excluded in such a situation.

[2] Meyer, Niels 2007, p. 349.

conservative Bavaria and alternative producers of wind power in the North with the monopoly undertakings, and a joint effort of backbenchers of all political parties allowed for the adoption of the *Stromeinspeisungsgesetz*, the first German FIT.[3] It is interesting to note that a surge in demand for wind turbines in the USA in the early 1980s as a result of § 210(a) PURPA (see Section 1.3.1) had triggered the technological innovation in turbine manufacturing that was a precondition for making successful use of the Danish and the German FIT.[4] Spain, which had a FIT since 1980, adopted an ambitious energy strategy that foresaw investment in wind energy in 1991 and implemented a more ambitious FIT in 1994, experienced very strong growth as well. Contrary to Denmark and Germany, the policy was embraced in Spain by a major power company, which invested strongly. Both in Denmark and Germany, the early promotion of wind power through FIT also prepared the ground for market opening: small wind power producers were the first challengers to established power companies, which had enjoyed a monopoly on production until then.

The default option for promoting renewable electricity in markets closed to competition was FIT on the basis of avoided costs. FIT was implemented in France (1955; revised for renewable electricity in 1994),[5] the USA (1978),[6] Spain (1980),[7] Portugal and Sweden (1988), Germany (1990),[8] Denmark and Italy (1992),[9] Luxembourg and Greece (1994) and Austria (1998). Latvia (1997) and Estonia (1998), which were not yet Member States, also introduced them. They were also recommended in the 1988 Recommendation (see Section 1.3.1). At that time, most FIT relied on methodologies of "avoided costs" or "percentage of retail price" in order to establish the level of the FIT.[10] In most cases, the level of FIT was set at a certain percentage of the (often-still regulated) price paid by consumers for electricity (e.g., it stood at 85 percent of the retail price in Denmark and 100 percent of the retail price in Germany). The underlying philosophy was one of avoided costs:

[3] Ohlhorst et al. 2008, p. 43 and following; Stefes 2010.
[4] Ohlhorst et al. 2008, p. 29.
[5] See Chapter 1, footnote 56.
[6] § 210(a) PURPA, see Section 1.3.1.
[7] See Chapter 1, footnote 71.
[8] Bradbrook 1995, p. 536 claims that the German law was modeled on § 210(a) PURPA.
[9] See on Spain, Portugal, Denmark and Germany, which are usually considered front-runners, Mendonca et al. 2010, p. 77.
[10] Brassard 2010, p. 30 notes that the avoided cost method had been taken over in Europe from § 210(a) PURPA.

As the tariff for consumers was regulated so that utilities could recoup their investment (and thus a function of the production costs of the existing power plants), the idea was to ensure that new, independent producers would receive a "fair" price from utilities. Indeed, both in Germany and in Denmark, the first FIT were adopted because of complaints by independent producers that utilities refused to pay a fair remuneration. Sometimes, an "environmental premium" was added. The avoided cost method was also recommended in early EU policy documents and State aid control (see Section 1.3.1).

In the Netherlands and Finland, the promotion of renewable electricity took the form of an exemption from the tax on electricity. The economic effect was identical, as the tax on electricity was in both countries set at a high level. That tool was not available in other Member States with low tax rates.[11]

PTS was used as a technique since the 1980s by a number of PUC in the USA under § 210(a) PURPA.[12] In the EU, the United Kingdom started PTS in 1990;[13] France and Ireland followed shortly thereafter. Those schemes did not bring about the expected success,[14] and were abandoned. Some of the long-term contracts concluded on their basis are still running. The choice of PTS had very different reasons. In the United Kingdom, it has to be seen in the broader context of the introduction of the non-fossil fuel levy, which had as its prime aim support for nuclear power (and only as a side effect contained also the promotion of renewable electricity). The non-fossil fuel obligation in the United Kingdom was the result of an attempt to open the electricity market to competition. Indeed, it had turned out that the existing nuclear plants were not economically viable in a liberalized market.[15] In France, the choice for a tender for wind power is probably best explained by the fact that the national incumbent wanted to keep control of market entry of independent power producers and the location of wind parks, in order to minimize costs for grid integration (that has, however, not been analyzed in detail in the literature).

[11] Haas 2001, p. 26. See Heineken 2002, for a detailed account of the Dutch system.
[12] Bolle 1991.
[13] For an extensive description of the British tender model and the tender theory, see Mitchell 1995 and 2000.
[14] The failure of bidding schemes appears to have been due to unrealistically low bids, which were then not honored (Haas 2001, p. 21)
[15] Edge 2006, pp. 164 and following; Mitchell 1995 and 2000 in detail on the birth of the non-fossil fuel obligation and its renewable component.

By 2000, that is, before the adoption of the First RES Directive, all EU-15 Member States had adopted national support schemes.[16] In order to comply with the *acquis*, the EU-13 Member States had to introduce support schemes prior to their accession in 2004, 2007 or 2013.

3.2 The second generation of support schemes: emergence of TGC in the context of market opening and increasing sophistication of FIT

The debate on TGC started in the late 1990s, at around the time when liberalization of electricity markets was the dominant topic in the EU and the First Electricity Directive had been agreed upon. Academics and policy-makers, in particular the Commission, expressed doubts whether FIT – or, in other words, regulated tariffs and purchase obligations for renewable electricity – were compatible with the idea of an open, competitive market (see Section 1.3.2). At the same time, they recognized the existence of a market failure and the need to fix it by means of regulation. However, they strongly favored TGC over FIT as a tool of regulatory intervention, and sought inspiration in the USA, where TGC had been proposed in the academic debate[17] and introduced in some states, starting with Minnesota.[18] In 2011, twenty-nine US states and the District of Columbia had TGC.[19] The fact that academics also considered FIT to be compatible with market opening (or electricity restructuring, as it is often referred to) seems to have gone widely unnoticed in the European debate.[20]

The first TGC in Europe was introduced on a voluntary basis by electricity undertakings active in the Netherlands, and ran from 1998 until 2000.[21] In 2001, Austria (only for small hydropower plants), Belgium (both Wallonia and Flanders), the United Kingdom and Italy

[16] For a detailed description of the historical development of national support schemes, see Haas 2001.

[17] The fundamental paper in that regard is Rader and Norgaard 1996, who recommend TGC for the liberalized state power markets in the USA; for another typical example see Berry and Jaccard 2001.

[18] Rabe 2007.

[19] Schmalensee 2012; Geri and McNabb 2011, p. 160; Rowlands 2010, p. 185, reports the same figure for 2009.

[20] Wiser, Pickle and Goldman 1998, pp. 471 and following for California.

[21] Boots 2003.

introduced TGC.[22] They were joined in 2002 by Denmark[23] and in 2003 by Sweden.[24] TGC were also adopted by a number of EU-13 Member States. Poland started already in 1997,[25] Romania in 2004.[26] Latvia introduced in 2006 a mixture of PTS, TGC and FIT.[27] Most of those Member States that opted for TGC were either front-runners in market opening and/or traditionally considered as open to Anglo-Saxon and liberal ideas.[28] Both in Sweden and Denmark, policy-makers relied on the "recommendation from Brussels" (i.e., the 1999 staff working document) to justify the introduction of TGC as preparation for expected regulatory action at the EU level.[29] The 1999 staff working document seems to also have been influential for policy changes in Poland and Italy and the introduction of TGC, rather than FIT, in the United Kingdom and Belgium, as well as debates on TGC in the Netherlands.[30] Germany saw a lively academic and political debate on this subject, which rages still today. However, as the initial feed-in tariff had been introduced by a broad parliamentary majority, based on a proposal emanating not from the government, but directly from parliament, Germany never modified its choice. Its domestic coalition of policy entrepreneurs that first introduced FIT in 1990 has rather been the architect of a strong coalition defending the concept of FIT against pressures to introduce a harmonized EU-wide TGC.[31] Indeed, the countries that had successfully blocked the attempt of the Commission to introduce a harmonized TGC in 1998/1999 stuck to their systems and promoted their merits.[32] The ensuing rivalry between TGC and FIT would dominate the policy and academic debate for the first half of the 2000s. First, it seemed as if TGC would be capable of making inroads into the Member States that had opted for FIT.[33] In the second half of the 2000s, it became increasingly clear

[22] Haas 2001, pp. 22 and following.
[23] Nielsen and Jeppesen 2003. Note, however, that that system was never implemented, Meyer, Niels 2007, p. 353 and following.
[24] Bergek and Jacobsson 2010. [25] Paska, Salek and Surma 2009, pp. 143 and following.
[26] Diaconu, Oprescu and Pittman 2008, p. 13.
[27] Purina 2010, p. 30, qualifies it as TGC, but that description appears to find no backing in the actual legislation.
[28] Lovinfosse and Varone 2002, p. 6; Lauber 2002a, p. 1 and following; Lauber 2002b, p. 297.
[29] Meyer Niels 2007, p. 353 for Denmark; Bergek and Jacobsson 2010, pp. 1256 and following for Sweden. See in general for the impact of discussion at the EU level on national support schemes Lovinfosse 2008, Lovinfosse and Varone 2004.
[30] Nilsson, Nilsson and Ericsson 2009, p. 4460; Busch 2003; and Busch and Joergens 2011, p. 109 and following.
[31] Stefes 2010. [32] Busch 2003. [33] Busch and Joergens 2011, p. 107.

that TGC had failed to deliver the amount of renewable electricity that was foreseen as target, whereas most of the countries using FIT over-achieved their targets. The 2005 Commission report on support systems therefore recommends well-designed FIT or feed-in premiums as the most effective policy tool. Denmark, which had long contemplated the introduction of TGC, froze that decision for an undetermined period.[34] Italy started to introduce FIT for certain types of electricity, and then switched completely as of 2013 (however coupled with a PTS for installations of more than 5 MW). The United Kingdom introduced FIT for installations with less than 5 MW in 2010. Certain proponents of FIT cried quickly "victory."[35] However, that view is too simplistic. It would rather seem that Member States differentiate between very small producers (for which the easy to administer FIT is more appropriate) and larger power plants (which have the necessary knowledge to compete in PTS or TGC systems). Such developments can be observed in Italy, the United Kingdom, the Netherlands, Denmark (for off-shore wind), Cyprus (for solar) or France. Finally, in order to comply with new Guidelines on the approval of State aid by the Commission, which have entered into force in 2014, Estonia and the United Kingdom have converted to a PTS scheme, and Denmark and Germany have introduced pilot tenders for 2015 and 2016 (see detailed discussion of those new Guidelines in Section 7.3.2.3.)

In the course of the decade, national support schemes matured, as policy-makers and regulators gained more and more experience, and the academic debate flourished. Member States also started to exchange best practices. Many Member States reformed their price-based support schemes, and abandoned the "avoided costs" approach. Today, the level of FIT and feed-in premiums corresponds generally to average production costs plus reasonable profit.[36] That led to so-called stepped tariffs, where the FIT is differentiated according to the source of renewable energy used.[37] The success of quantity-based support schemes and the resulting increase in electricity prices (where costs for the support scheme are passed on to final consumers) or in budgetary expenditure

[34] Meyer, Niels 2007, p. 353 and following.

[35] Jacobs 2012 speaks of a "bottom-up convergence" of support schemes, and Busch and Joergens 2011, p. 97 and following, describe the same finding as "diffusion." Nilsson, Nilsson and Ericsson 2009, p. 4460, refer to the "rise and fall of GO trading."

[36] France still uses avoided costs with a premium for avoided externalities (Brassard 2010, p. 29 and following).

[37] Couture and Gagnon 2010; Mendonca et al. 2010; Ragwitz et al. 2012.

(where support is financed from the general budget) led a number of Member States to significantly reduce the level of support and/or to cap support at a certain capacity level (either per installation or for the maximum installed capacity countrywide). Given the important share of intermittent renewable sources in some Member States, a debate has also emerged with regards to market integration of renewable electricity.

Some Member States also continue to rely on exemptions from the tax on electricity. In 2003, Directive 2003/96/EC (hereafter: the Energy Taxation Directive), which restructured the Community framework for the taxation of energy products and electricity,[38] introduced a harmonized minimum level of that tax of 0.5 EUR/MWh for commercial use and 1.0 EUR/MWh for noncommercial use. The actual amount of that excise duty varies widely between Member States. Generally speaking, the tax rates are substantially higher in Northern Europe than in Southern, Central and Eastern Europe.[39] Article 15 Energy Taxation Directive permits Member States to exempt renewable electricity or apply a reduced rate. Based on www.res-legal.eu, it would seem that the following Member States were making use of the possibility provided for by Article 15 Energy Taxation Directive: Lithuania, the Netherlands (only renewable electricity that is consumed by the producer), Poland, Slovakia, Sweden (only noncommercial producers/suppliers) and the United Kingdom.[40]

3.3 Overview of the evolution in time of support schemes in the different Member States

Some Member States have not modified the choice of their support schemes over time; others have experimented with different regulatory options (the extreme being the United Kingdom, which started with PTS in 1990, introduced TGC in 2000, added a FIT in 2010 and reverted to PTS in 2014). Some Member States also have used different regulatory options for the different types of renewable energy, or depending on the size of the renewable plant. Table 3.1 provides an overview covering

[38] OJ L 283 of 31/10/2003, p. 51.
[39] Hasselknippe and Christiansen 2003, p. 15; Speck 2008, p. 59.
[40] Due to frequent changes in legislation and difficulties in identifying and accessing all relevant legal texts, literature reviews such as Cansino et al. 2010, p. 5 and following, on the use of the exemption from excise duties as a support instrument are not reliable.

Table 3.1 Support schemes adopted by the Member States

Country (State aid approval)[1]	PTS	TGC	FIT	Other
Austria (N317/A/2006 and NN162/A/2003; N317/A/2006 and NN162/A/2003; N446/2008; C 24/09 and 2011/528/EC; SA.33384 (2011/N))	1998–2002: In one state	2000–2002 for small hydropower (quota: 8% of total energy consumption), stopped due to administrative problems	1998–2002: All states but one; price fixed at state level Since 2002: Federal FIT	Investment grants for small hydro and PV on buildings Investment grants for biomass
Belgium (N 149/2000; N 550/2000; N 415a/2001; N 14/2002; N 608/2004; N 254/06)	No	Since 2002: Flanders Since 2004: Wallonia Since 2004: Brussels	Since 2002: FIT at the federal level for offshore wind Since 2006: Flanders FIT for solar	Investment grants at regional level. For Flanders, the two support systems are mutually exclusive.
Bulgaria (–)	No	No	Since 2005: FIT	Investment grants from structural funds
Croatia	No	No	1994–2007: FIT implemented by State-owned monopolist for small installations Since 2007: FIT laid down in law	
Cyprus (N143/2009; N 432/2006)	Call for tenders for PV in 2012	No	Since 2003: FIT consists of two elements, the “avoided costs” (based on oil-fired power plant) and the technology-specific premium	Investment grants

Table 3.1 (*cont.*)

Country (State aid approval)[1]	PTS	TGC	FIT	Other
Czech Republic (SA.35177 (2014/NN))	No	No	Since 2005: Choice between FIT and feed-in premium	Investment grants from structural funds
Denmark (N 4/92; N 310/92; N 1037/95; N 416/99; N 278/2001; N 505/2001; N 466/2002; N 342/2003; N 448/03; N 618/03; N 602/2004; N 567/2007; N 354/2008; N 356/2008; N 359/2008; SA.36204 (2013/N); SA.37122 (2013/N); N 394/2007 – accelerated depreciation)	Calls for offshore wind Pilot tenders in 2015 and 2016 to comply with Environmental Guidelines 2014	Introduced as of 2003 (quota 20%), but abandoned due to administrative difficulties to implement it	1984–1992: FIT negotiated between utilities and owner association 1992–2002: FIT consisting of 85% of retail price plus refund of CO_2 tax (excise duty) 2002–2004: Refund of CO_2 tax Since 2004: Feed-in premium plus refund of CO_2 tax	1979–1989: Investment grants Soft loans for small installations Accelerated depreciation for windmills
Estonia (SA.36023 (2014/NN); N 373/2008 – investment aid)	Since 2015 to comply with Environmental Guidelines 2014	No	1998–2003: FIT, 90% of retail price 2003–2010: Choice between FIT and feed-in premium 2010–2014: Feed-in premium	Investment grants from structural funds
Finland (N 884/96; N 66/98; N 515/98; N 74b/2002; N 893/2006; SA. 31107 (2011/N); SA. 31204 (2011/N); SA. 32470 (2011/N); N 75/2002 and N 359/2007 – investment aid)	No	No	1994–1996: Exemption from electricity tax Since 1997: Compensation for electricity tax (which is equivalent to a feed-in premium) Since 2011: FIT consists of two elements, the market price and the premium, which is the difference between market price and guaranteed price	Investment grants
France (SA.36511 (2014/C))	Since 1996	No	Since 1955/1994: FIT, substantially modified in 2001. Until 2007 limited for installations under 12 MW.	Reduced VAT
Germany (N 442/90; C 63/99 (ex NN 84/99); NN 27/2000; NN 68/2000; SA.33995 (2013/C); SA.38632 (2014/N))	Pilot tenders in 2015 and 2016 to comply with Environmental Guidelines 2014	No	Since 1990: FIT Since 2012: Choice between FIT and feed-in premium	Soft loans
Greece (N 323/2001 and N 428/2004 – investment aid; SA.28179 – investment aid, block-exempted)	No	No	Since 1994: FIT	Investment grants from structural funds

Table 3.1 (*cont.*)

Country (State aid approval)[1]	PTS	TGC	FIT	Other
Hungary (–)	Since 2008 (wind)	No	Since 2007: FIT	Investments grants from structural funds
Italy (–)	Since 2013 for all forms above 5 MW	2001–2012	1992–2000: FIT Since 2013: Choice between FIT and feed-in premium	Reduced VAT Reduced real estate tax
Latvia (N 351/2008 – investment aid; 428/2008 and N 150/2010 – investment aid)	No	No	1996–2005: FIT	Since 2006: Combination of PTS, TGC and FIT: The State sets the percentage of RES; however, the price is regulated and not freely negotiated, and right to sell is acquired in a tender, which is not based on price, but on maturity of the project Investment grants from structural funds
Lithuania (N 197/2008 and SA. 33094 (2011/N) – investment aid)	Since 2011 for plants with capacity of over 30 kW	No	Since 2002: FIT Since 2011: Limited to plants with less than 30 kW capacity	Exemption from excise duty Soft loans (financed from structural funds and EU ETS revenues) Investment grants from regional funds
Luxembourg (N 842/2000; C 43/02; and 2009/476/EU SA.37232 2014/NN)	No	No	Since 1994: FIT	Investment grants
Malta (–)	No	No	Since 2010: FIT for solar electricity	
Netherlands (N 509/92; N 752/97; N 707/2002; N 708/2002; N 543/05; N 478/2007; SA.34411 (2012/N); SA.34411 (2015/N))	Since 2007: Reverse PTS in price tranches on the basis of price for different sources	1998–2000: voluntary 2001–2002: obligatory. Allows for international trading.	2003–2007: Feed-in premium in addition to exemption from excise duty	1989–2007: Exemption from excise duty Corporate tax relief Ad hoc investment grants for off-shore wind
Poland (N6/2007 - investment aid)	No	Since 1997	1993–1997: Voluntary FIT in contracts between (publicly owned) utility and producer	Exemption from excise duty Soft loans (from penalty payments for noncompliance with TGC) Investment grants
Portugal (–)	No	No	Since 1988: FIT	
Romania (SA.33134 (2011/N); N 437/2009)	No	Since 2005	No	Investment grants

Table 3.1 (*cont.*)

Country (State aid approval)[1]	PTS	TGC	FIT	Other
Slovakia (–)	No	No	Since 2006: FIT	Exemption from excise duty Investment grants from structural funds
Slovenia (N 354/2009; 2007/580/EC)	No	No	Since 2001: FIT Since 2009: Choice between FIT and feed-in premium	Soft loans Investment grants
Spain (–)	No	No	Since 1980: FIT Since 1999: Choice between FIT and feed-in premium Since 2012: Suspension of support mechanism	
Sweden (NN 143/96; N 4/2000; N 732/2000; N 827/2001; N 789/2002; N 294/2003; N 454/97 – investment aid; N 66/2009 – investment aid)	No	Since 2003	1988–2002: FIT for small installations 1994–2002: Feed-in premium	Investment grants for solar Reduced real estate tax for wind
United Kingdom (N 34/90; N 410/93; N 153/98; N 504/2000; N 600/2003; N 362/2004; N 474/2005; N 851/2006;N 414/2008; N 590/2008; N 22/2009; N 65/2010; N 76/2010; N 94/2010; N 259/2010; N 556/2010; N 557/2010; SA.36196 (2014/N); N 209/2002, N 477/2003 and N 533/2006 – investment aid; SA.33984 (2012/N) – soft loan)	1990–2001 Since 2014 in order to comply with 2014 Environmental Guidelines	2002–2014 Since 2010 limited to plants over 5 MW	Since 2010 for plants with less than 5 MW	Exemption from excise duty Investment grants Soft loans

Sources: www.res-legal.eu (provided by the Commission); State aid decisions cited in the first column.
Overview: Groba, Indvik and Jenner 2013; ENDS 2010; IEA 2008; CEER 2008; Reiche and Bechberger 2004, p.5; Haas et al. 2004, p. 3; WWF and EREF 2002, p. 5; Communication from the Commission on the implementation of the Community Strategy and Action Plan on Renewable Energy Sources (1998–2000),[2] pp. 39 and following; Haas 2001, p. 12; Del Rio and Gual 2004; Dusonchet and Telaretti 2010.
For single countries: Busch 2003, p. 9 and 13; Batail 2001, p. 293; Boots 2003; Ioannis, 2001; Meyer 2006; Szarka 2007, pp. 68 and following; Paska, Salek and Surma 2009, pp. 143 and following; Streimikiene, Burneikis and Punys 2005; Spassov, Krustev and Nikolovska 2011, pp. 286 and following.
[1] Decisions concern operating aid, if not indicated otherwise.
[2] COM (2001) 69 final of 16.2.2001.

all twenty-eight Member States. The table is based, wherever available, on primary sources of national law linked through www.res-legal.eu, a project sponsored by the Commission, or the description of primary sources in Commission decisions on State aid. Where that technique did not allow a definitive conclusion, it relies on the sources cited, which are the result of desk research based on the different publications used for this book. However, it has to be stressed that due to frequent changes in support schemes and contradictory information contained in the different sources, which cannot be clarified without linguistic and legal knowledge of the respective Member State, the overview may not be free of errors.[41]

[41] See for another recent compilation, which relies on some of the sources used here, but comes to a very different outcome in particular with regard to the year in which the support measures were introduced, Groba, Indvik and Jenner 2013, p. 387. The diverging information on that point leads to a risk of distorting research, such as the one of Groba, Indvik and Jenner, which aims to verify whether support schemes actually had an impact on renewable deployment.