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The EU's 2030 Climate and Energy Policy Framework: How net metering slips through its net

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Abstract

Net metering is a support scheme for the promotion of renewable energy sources (RES) that is linked with state-of-the-art trends, especially in the field of electricity, such as distributed generation, self-consumption and energy communities. Whilst the European Union (EU) Clean Energy Package has established a more coherent and comprehensive regime for RES support schemes in general, it makes no explicit reference to net metering schemes. This raises questions as to how and under which terms net metering schemes are compatible with EU law. Against this background, this article aims to analyse the relevant EU law provisions and conduct a comparative analysis of net metering regimes in four Member States to demonstrate that the national schemes enacted and applied have significantly different design features. The article argues that a more coordinated and specific approach on net metering at the EU level should emerge.

1 | INTRODUCTION

One of the main concerns and objectives of the European Union's (EU) 2030 Climate and Energy Policy Framework is the promotion of renewable energy sources (RES). Accordingly, the Clean Energy Package and the recast Renewable Energy Directive (RED II) set a Union collective target of 32 percent share of RES to be reached by 2030.[1] This EU target is not converted into national targets, but Member States are bound to contribute to the collective target. Another pivotal aspect of the modern supranational energy policy is the aspiration that energy consumers are empowered and are assigned a more active role in electricity markets. The recast Electricity Directive contains rules that aim to reform electricity markets accordingly.[2]

In promoting RES, Member States will need to employ various instruments, including support schemes.[3] From the various RES support schemes,[4] this article concentrates on net metering. Net metering is a direct price instrument and is inextricably linked with state-of-the-art trends, such as distributed generation – that is, a model of decentralized and small-scale electricity systems where electricity is produced close to the sites of consumption – and the promotion of renewable electricity generated by prosumers.[5] Prosumers are consumers who generate electricity for their own consumption, and also store and sell part of it. The RED II and the recast Electricity Directive do not explicitly refer to prosumers, but they use the terms 'renewable self-consumers' and 'active customers', respectively. Although these terms might have a slightly

[1]Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources [2018] OJ L328/82 (RED II) art 3(1).

[2]Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU [2019] OJ L158/125 (ED). See also S Lavrijssen, 'Power to the Energy Consumers' (2017) 26 European Energy and Environmental Law Review 172.

[3]See Commission (EU) 'European Commission Guidance for the Design of Renewables Support Schemes Accompanying the Document Delivering the Internal Market in Electricity and Making the Most of Public Intervention' (Staff Working Document) SWD(2013) 439 final, 5 November 2013.

[4]ibid; see also R Haas et al, 'A Historical Review of Promotion Strategies for Electricity from Renewable Energy Sources in EU Countries' (2011) 15 Renewable and Sustainable Energy Reviews 1003; P Menanteau et al, 'Prices Versus Quantities: Choosing Policies for Promoting the Development of Renewable Energy' (2003) 31 Energy Policy 799.

[5]T Iliopoulos, 'Regulating Distributed Electricity Generation in the EU' in L Reins (ed), *Regulating New Technologies in Uncertain Times* (TMC Asser Press 2019) 153.

different meaning, with the former placing the emphasis on the use of RES, and the latter on the addition of a new actor to the electricity markets, both reflect the concept of prosumers.

This article primarily examines net metering as a means to promote RES.[6] Whilst other support schemes, such as guaranteed tariffs for excess electricity or green certificates, can and have been applied to self-consumption,[7] net metering specifically addresses self-consumption and can thus decisively contribute to the expansion of a new paradigm of energy systems in the EU. Besides, net metering is gaining pace in several Member States. By 2013, only Belgium, Cyprus, Denmark, Greece, Italy and the Netherlands had been operating net metering regimes.[8] Since then, Finland, Hungary, Latvia, Lithuania, Portugal[9] and Slovenia[10] have followed.[11] In April 2019, also Spain introduced a net metering support scheme.[12]

We argue, however, that net metering schemes have slipped through the net of the Union legislator. The Clean Energy Package has established a more coherent and comprehensive regime for RES support schemes, for renewable self-consumers and active customers, for energy communities, and so on. Still, no specific rules or explicit references to net metering schemes have been introduced. Such an agnostic stance by the EU legislator leaves open the discussion as to the suitability of net metering to enhance RES generation and to foster the uptake of self-consumption and distributed generation.

Against this background, this article aims to examine whether net metering is compatible with EU law. The emphasis is placed on the interpretation of the RED II, but the relevant provisions of the recast Electricity Directive are also examined. By examining the place of net metering in the new legal framework, this article aspires to fill a gap in the existing literature, which has focused primarily on well-established RES support schemes, such as fixed tariffs or green certificates, and has dedicated little attention to net metering. Moreover, the article seeks to provide an original comparative legal analysis of the Cypriot, Greek, Italian and Belgian (Flemish) net metering schemes. These States are pioneers in net metering in the EU,[13] but the similarities and differences of the regimes enacted have not been studied so far. Such a study is expected to demonstrate how the paths that the States follow differ, but also to further advocate the need for a more coordinated supranational legal framework, which will ensure that the national regimes are fit to serve the supranational energy policy and that the integration of the electricity market will not decelerate.

The article is structured as follows. Section 2 first elaborates on the definition of net metering and its conceptual underpinnings. Next, Section 3 assesses net metering against the RED II and other relevant EU law provisions. Section 4 provides a comparative analysis of the Cypriot, Greek, Italian and Belgian (Flemish) net metering schemes. Section 5 concludes and puts forward suggestions on how to treat net metering regimes under the 2030 Framework in a more coordinated manner.

2 | THE CONCEPT OF NET METERING

Through net metering, self-consumers can feed a part of the electricity they produce into the grid and receive remuneration for it. This remuneration normally takes the form of a credit on the electricity bill.[14] There are different variations of net metering. Under 'classic' net metering regimes, the remuneration granted equals the electricity retail price. This equivalence means that in 'classic' net metering in practice meters run backwards: the amount of electricity that self-consumers feed into the grid is subtracted from the electricity drawn from the central grid.[15] The phrase 'meters run backwards' is particularly characteristic for describing how 'classic' net metering works. However, 'classic' net metering can also work with separate meters for electricity imports and exports, as long as the remuneration equals the retail price.[16]

But in a nuanced model, namely net billing, the electricity consumed from the central grid is priced higher than the electricity fed into the grid, and hence it is measured separately. More specifically, in net billing the electricity drawn from the central grid is still charged at the retail price, but the electricity fed into the grid by self-consumers is given a lower value. In other words, the credit granted to self-consumers as a remuneration is lower than the retail price.[17] Such a model makes it more profitable for self-consumers to actually consume the electricity they generate. Indeed, an increase in self-consumption results in less electricity being drawn from the

[6]The RED II terminology will therefore be followed as default, unless special references are made.

[7]See Commission (EU) 'Impact Assessment Accompanying the Document Proposal for a Directive of the European Parliament and of the Council on the Promotion of the Use of Energy from Renewable Sources (Recast)' SWD(2016) 418 final, 30 November 2016 (Impact Assessment) 140–142.

[8]A Poullikkas et al, 'A Review of Net Metering Mechanisms for Electricity Renewable Energy Sources' (2013) 6 International Journal of Energy and Environment 975.

[9]Decree-Law n.º 153/2014, 1.ª série – N.º 202 (20 October 2014) art 31.

[10]See P Virtič and R Kovačič Lukman, 'A Photovoltaic Net Metering System and its Environmental Performance: A Case Study from Slovenia' (2019) 212 Journal of Cleaner Production 334.

[11]RES Legal Europe, 'Compare Support Schemes' <http://www.res-legal.eu/compare-support-schemes/>.

[12]Royal Decree 244/2019, on the regulation of the administrative, technical and economic conditions of electricity self-consumption, 83, Sec.1/35674 (6 April 2019).

[13]Poullikkas et al (n 8) 975.

[14]S Jacobs, 'The Energy Prosumer' (2017) 43 Ecology Law Quarterly 519; A Butenko, 'Sharing Energy' (2016) 7 European Journal of Risk Regulation 701; D Raskin, 'The Regulatory Challenge of Distributed Generation' (2013) 4 Harvard Business Law Review Online 38.

[15]A Gautier, J Jacqmin and JC Poudou, 'The Prosumers and the Grid' (2018) 53 Journal of Regulatory Economics 100, 102.

[16]In addition, meters will not literally be running backwards as of the end of 2023, as Article 15(4) of the recast Electricity Directive (n 2) requires that the electricity fed into the grid and the electricity consumed from the grid are accounted separately. Article 15(4) requires distinct measurements of electricity imports and exports, but it does not contain an obligation as to the determination of the remuneration granted to self-consumers. Thus, in accordance with the terms set in the RED II, the remuneration granted can still reach the retail rate. Interpreting Article 15(4) of the Electricity Directive as banning net metering would lead to a conflict with, among others, Articles 4, 6 and 21 of the RED II.

[17]S Oliva, R Passey and MA Abdullah, 'A Semi-empirical Financial Assessment of Combining Residential Photovoltaics, Energy Efficiency and Battery Storage Systems' (2019) 105 Renewable and Sustainable Energy Reviews 206.

central grid, and therefore allows savings at the retail price. By contrast, feeding self-generated electricity into the grid is only remunerated at a lower price, due to the fact that selling electricity to the grid has less value.[18]

Furthermore, net metering and net billing may be operating also in their 'virtual' variations (so-called virtual net metering and virtual net billing). Under these variations, the electricity generated in one site is subtracted from the electricity bills of other sites that participate in the scheme. Therefore, more consumers can benefit from larger renewable energy installations or from self-consumption projects that work at full capacity. Virtual net metering and virtual net billing are instrumental to foster the promotion of renewable energy communities. According to the RED II's definition, renewable energy communities are autonomous legal entities, controlled by their shareholders, which own and develop renewable energy projects with the primary purpose to provide environmental, economic or social community benefits for their shareholders or the local areas where they operate, rather than financial profits.[19] A similar concept can be found in the recast Electricity Directive, which refers to 'citizen energy communities'. Yet, while renewable energy communities under the RED II only 'own and develop renewable energy projects', citizen energy communities under the Electricity Directive may generate energy from both renewable and non-renewable sources, and they may engage in a broader range of activities.[20] These two definitions are not mutually exclusive. Thus, while renewable energy communities fall within the overarching concept of citizen energy communities, citizen energy communities will be regarded as renewable energy communities pursuant to RED II, and therefore will be able to participate in net metering schemes, if they develop RES projects.

Another important feature of net metering is that it reinforces the development of smart meter technologies. Smart meters replace the conventional electricity meters and give consumers constant access to precise, real-time information about the amount of electricity they produce, consume or feed into the grid, as well as about the price at which electricity is charged or bought by the grid.[21] Importantly, apart from information purposes, smart metering can also complement net metering variations to ensure the remuneration granted to self-consumers is not flat, but reflects time-of-use prices. Such a real-time pricing model is more market responsive and is expected to motivate prosumers to feed electricity into the grid at peak hours when electricity demand is high and their input will have higher economic value. Thus, prosumers will actively contribute to mitigating grid congestion. Conversely, they will opt for self-consumption off-peak, when electricity supply largely meets demand.[22] Nevertheless, combinations of net metering and smart metering are not yet a widespread practice in EU Member States.[23]

3 | NET METERING AND THE RED II

Net metering schemes are linked with the promotion of RES, as they incentivize distributed generation, which mostly relies on photovoltaic (PV) panel installations and other renewable energy installations.[24] However, the RED II, and the Clean Energy Package at large, strikingly refrain from taking a clear stance on net metering. Accordingly, this section assesses net metering against the RED II provisions that apply to RES support schemes, while references are also made to the recast Electricity Directive and to State aid law that also apply to net metering regimes. The analysis demonstrates that net metering schemes can be designed in a manner that is compatible with supranational law.

The RED II sets an EU target of a 32 percent share of RES in 2030 and aims to establish a common set of rules for the promotion of RES, including certain common rules for the design and enactment of RES support schemes. Nevertheless, and rather surprisingly, no reference to net metering can be found in Article 2(5) of the RED II, which sets the definition of RES support schemes and an indicative list thereof. However, as the list therein contained is purely indicative, net metering is not excluded from the scope of the Directive.

Still, the non-inclusion of the term in the definition denotes the EU legislator's scepticism towards net metering. This is in line with the Commission's stance on net metering. The Commission has argued that net metering can be 'effective to jump-start distributed generation markets', but it raises concerns 'when large deployment levels are reached … because remuneration of the excess production from onsite renewable energy systems is made at a retail price that in most cases exceeds the value of that generation to the electricity system'.[25] In the Commission's view, such an excessive remuneration equates to windfall profits for self-consumers and entails a cross-subsidization at the expense of regular consumers. Further uptake of net metering leads electricity utilities not only to sell less, but also to purchase electricity at the retail price. This situation reduces their revenue and impels them to raise the prices charged to their customers, which mostly affects those not engaged in

[18]For a typology, see R Dufo-López and JL Bernal-Agustín, 'A Comparative Assessment of Net Metering and Net Billing Policies' (2015) 84 Energy 684; L Hughes and J Bell, 'Compensating Customer-Generators: A Taxonomy Describing Methods of Compensating Customer-Generators for Electricity Supplied to the Grid' (2006) 34 Energy Policy 1532.

[19]RED II (n 1) art 2(16).

[20]ED (n 2) art 2(11). On the concepts of renewable energy communities and citizen energy communities, see further J Roberts, 'Power to the People? Implications of the Clean Energy Package for the Role of Community Ownership in Europe's Energy Transition' (2020) 29 Review of European, Comparative and International Environmental Law 232.

[21]See also DP Brown and DEM Sappington, 'Optimal Policies to Promote Efficient Distributed Generation of Electricity' (2017) 52 Journal of Regulatory Economics 159, 161.

[22]R de Vos and J Sawin, *READy* (Elsevier 2012) 98–99. But see also NR Darghouth et al, 'Customer-Economics of Residential Photovoltaic Systems (Part 1): The Impact of High Renewable Energy Penetrations on Electricity Bill Savings with Net Metering' (2014) 67 Energy Policy 290.

[23]See J Ahola, 'National Survey Report of PV Power Applications in Finland' (International Energy Agency 2018).

[24]See Commission (EU) 'Renewable Energy: A Major Player in the European Energy Market' (Communication) COM(2012) 271 final, 6 December 2012, 9.

[25]See Commission (EU), 'Best Practices on Renewable Energy Self-Consumption' (Staff Working Document) SWD(2015) 141 final, 15 July 2015, 10.

self-consumption.[26] Moreover, an increase in electricity exchanges between self-consumers and the grid entails a more intense use of the grid, which in its turn requires extra resources be devoted to grid maintenance or upgrades. Such costs are often covered by all consumers, irrespective of their participation in net metering regimes. This may also result in cross-subsidization.[27] Moreover, the Commission criticizes net metering as granting self-consumers the possibility to use the grid to 'artificially store electricity produced at one point of time to consume it at another point of time, without reflecting the value of electricity which may vary substantially between the time periods'.[28] This is also the stance of the Council of European Energy Regulators (CEER). The CEER firmly recommended avoiding net metering schemes, as they imply the system acts as free storage for self-consumers, which undermines consumers' time-value sensibility to energy prices and hampers consumers' active participation in the energy market.[29]

But the above characteristics of net metering do not necessarily preclude net metering schemes' compatibility with EU law. Besides, the Commission has traditionally adopted a negative stance on all direct price instruments, which have been regarded as market-distortive.[30] Yet EU law does not prohibit Member States from enacting feed-in tariffs or premiums, which constitute price support schemes. According to Article 4 of the RED II, Member States may resort to such instruments as long as they comply with certain design requirements therein set. However, the same Article 4 of the RED II is silent *vis-à-vis* net metering schemes and thus obscures the question of their compatibility with EU law.

In the absence of net-metering-specific rules, the compatibility assessment should be based on the general principles of the RED II, which apply to RES support schemes at large. According to Article 4(2) of the RED II, incentives for renewable electricity production should operate in a 'market-based' and 'market-responsive' manner, taking grid stability issues into account. Net metering is not inescapably incompatible with the Article 4(2) principles. Classic net metering does not threaten the functioning of the electricity market in the early stages of its development and especially inasmuch as it addresses residential or generally small consumers. Moreover, it can give impetus to self-generation if limited in scope, so as to attract actors that otherwise would not be involved in RES investments.[31] Regarding the net billing variation, it is rather a market-based and market-responsive instrument. The real value of self-generated electricity is reflected, as it is priced lower than electricity supplied by the central grid. Thus, excessive remuneration and artificial free storage is avoided. Moreover, price signals incentivize the beneficiaries to respond by consuming and not trading the electricity they generate. This reduces grid congestion and limits the cost of grid maintenance and upgrades. Such net billing regimes will be even more market-responsive if combined with smart meters and real-time pricing. As for grid stability issues, they can be confronted through the imposition of grid charges that specifically apply to self-consumers.[32]

Net metering regimes also serve the supranational policy objective of enhancing self-consumers' active role in the energy transition.[33] Articles 21 and 22 of the RED II require Member States to ensure that renewable energy self-consumers and renewable energy communities are entitled to certain rights, including the right to 'receive remuneration, including, where applicable, through support schemes, for the self-generated renewable electricity that they feed into the grid, which reflects the market value of that electricity and which may take into account its long-term value to the grid, the environment and society'.[34] Given that net metering is by definition linked with self-consumption, the foregoing formulation can be understood as an implicit validation of net metering schemes. Net billing should generally be preferred as it is more market-oriented than classic net metering, but the fact that in accordance with Article 21 of the RED II, non-economic values, such as environmental protection, may be taken into account shows that classic net metering regimes may be enacted too.

Apart from RES promotion, Member States may resort to net metering to comply with the rules on the electricity market under the recast Electricity Directive. More specifically, net metering schemes can ensure some of the rights that this directive confers on active customers and on citizen energy communities. For instance, net metering can function as the mechanism to enable active customers and citizen energy communities to exercise their right to sell self-generated energy and receive a fair compensation for it, in accordance with Articles 15 and 16 of the recast Electricity Directive. During the legislative procedure, the European Parliament put forward an amendment that would have introduced a new Article 16a ('Electricity sharing') on virtual net metering to ensure electricity

[26] See Brown and Sappington (n 21); Iliopoulos (n 5) 165.

[27] Jacobs (n 14).

[28] Commission (EU) (n 25) 10

[29] CEER, 'CEER Position Paper on Renewable Self-Generation' (September 2016) 10. See also L Diestelmeier and D Kuiken, 'Legal Framework for Prosumers in the Netherlands' in M Roggenkamp and C Banet (eds), *European Energy Law Report XII* (Intersentia 2018) 156.

[30] D Jacobs, 'Designing Financing Mechanisms for Electricity from Renewable Energy Sources: The Role of the European Commission as an Agenda Shaper' in J Tosun, S Biesenbender and K Schulze (eds), *Energy Policy Making in the EU* (Springer 2015) 107. See also R Stavins, 'Correlated Uncertainty and Policy Instrument Choice' (1996) 30 Journal of Environmental Economics and Management 218.

[31] Dufo-López and Bernal-Agustín (n 18) 684. See also Gautier et al (n 15) 123; Commission (EU) (n 25) 10.

[32] A Gautier et al, 'Self-Consumption Choice of Residential PV Owners under Net-Metering' (2019) 128 Energy Policy 648; A Sauhats et al, 'Estimating the Economic Impacts of Net Metering Schemes for Residential PV Systems with Profiling of Power Demand, Generation, and Market Prices' (2018) 11 Energies 3222; Gautier et al (n 15) 102; J López Prol and KW Steininger, 'Photovoltaic Self-Consumption Regulation in Spain: Profitability Analysis and Alternative Regulation Schemes' (2017) 108 Energy Policy 742.

[33] RED II (n 1) recitals 65 and 70. See also Impact Assessment (n 7) 53.

[34] RED II (n 1) art 21(1)(d). While this right is not conferred with the same words on renewable energy communities, Article 22 of the RED II enshrines the renewable energy communities' right to sell renewable energy and to not be subject to discriminatory treatment with regard to their activities, rights and obligations as market participants. Given this, we argue that, similarly to renewable self-consumers, renewable energy communities also have the right to receive a fair remuneration and to participate in support schemes, such as net metering or net billing schemes.

sharing among members of energy communities.[35] However, this amendment was ultimately rejected, meaning that the Clean Energy Package remains silent on net metering.[36]

Of course, net metering schemes can only apply if they comply with primary EU law. In this regard, State aid law is particularly important. According to Article 107(1) of the Treaty on the Functioning of the European Union (TFEU),[37] selective aid granted by States or through State resources, which distorts or threatens to distort competition is in principle not compatible with the internal market and thus not allowed. Net metering schemes in general fall within the scope of this provision, as they involve the grant of aid by States and through State resources, in the sense that the costs entailed are normally borne by either public budgets or funds controlled by public entities. And, as debatable as this might be, self-consumers can reasonably be deemed as 'undertakings', given that the term is broadly interpreted to include any actor engaged in an economic activity.[38] Yet as long as net metering regimes only cover a limited number of household prosumers, they will probably have no effect on trade or competition, and therefore not trigger the application of Article 107(1) TFEU. The situation may differ, however, with regard to generalized net metering schemes that cover larger prosumers and energy communities and entail large capital transfers. However, even if a net metering regime indeed constitutes State aid, it can be deemed compatible with the internal market by the Commission on the grounds of environmental protection, in accordance with Article 107(3)(c) TFEU. This provision has been further elaborated by Guidelines,[39] which determine the criteria and conditions for such a compatibility assessment. Based on these Guidelines, the Commission has consistently found net metering regimes compatible with the internal market.[40] Conversely, there has been no net metering scheme that has been found incompatible with the internal market.

In conclusion, whilst net metering is not explicitly mentioned by any legal act of the Clean Energy Package, it is in general in accordance with it. However, certain design elements, such as the level of remuneration granted to beneficiaries, might cause compatibility concerns. Against this backdrop, the absence of EU net-metering-specific rules to guide Member States when designing such schemes might hamper harmonization in the implementation of net metering schemes. It would be quixotic to ask for an EU-wide net metering regime, but more coordination would be beneficial. As Member States have wide discretion in the manner they specify the general requirements for market-based, market-responsive and fairly remunerative net metering schemes, it is possible that many of them enact schemes that prove non-viable or unable to make prosumers smoothly accommodate themselves to the electricity market. The 2010s experience with other support schemes is instructive in this regard. Several Member States enacted direct price support schemes, mostly feed-in tariffs, which proved non-market-based, overall unfit to successfully serve the desired policy objectives and ultimately collapsed. This resulted in electricity markets' instability and frustrated RES promotion. A more prominent role of EU rules on feed-in tariff design would have mitigated – if not prevented altogether – this scenario.[41] Accordingly, Article 194 TFEU that was used as a legal basis for the RED II and the recast Electricity Directive, can well serve as a basis for introducing provisions on every direct price support scheme, including net metering, without infringing the Member States' sovereign rights in developing their energy policy.[42]

The next section examines the different challenges faced by Cyprus, Greece, Italy and Belgium (Flanders). We argue that the lessons learned from the operation of their regimes should be more concretely reflected in EU law, so that a collapse of national net metering regimes, similar to the collapse of the feed-in tariff regimes that happened in the 2010s, can be avoided.

4 | NET METERING SCHEMES IN MEMBER STATES

This section examines the net metering schemes of Cyprus, Greece, Italy and Belgium (Flanders). These States are among the trailblazers for net metering in the EU, but their regimes have been developed in significantly different ways. The following sub-sections examine the features characterizing each domestic regime and the reasons behind their design choices. As even the most mature net metering regimes are diverging, we suggest that the supranational legal framework should evolve in a way to achieve more coordination across domestic net metering regimes. Not only will an intervention of the EU legislator address compatibility issues, but it will also guide policymakers when deciding the features of net metering schemes. A more coordinated approach will create a more coherent landscape that will reduce the risk of a regulatory failure.

4.1 | Cyprus

Cyprus enacted a net metering scheme back in 2013[43] and granted producers of renewable electricity a minimum guaranteed price,

[35]European Parliament, 'Report on the Proposal for a Directive of the European Parliament and of the Council on Common Rules for the Internal Market in Electricity (Recast)', A8-0044/2018 (2018).

[36]While Article 16a was withdrawn, references to electricity sharing can be found in RED II (n 1) art 21(4) and ED (n 2) art 16(3)(e). Still, no reference to virtual net metering has been made. Further examining the concept and the practice of electricity sharing is beyond the scope of this article.

[37]Consolidated Version of the Treaty on the Functioning of the European Union [2016] OJ C202/47.

[38]See, e.g., Case C-309/99, *Wouters and Others*, ECLI:EU:C:2002:98 para 46.

[39]Commission (EU), 'Guidelines on State Aid for Environmental Protection and Energy 2014–2020' [2014] OJ C200/1.

[40]See, e.g., Commission (EU), SA.49180 (2018/NN), C(2018) 6847 final; Commission (EU), SA.38967 (2014/NN-2), C(2018) 6777 final; Commission (EU), SA.47623 (2017/N), C(2017) 3135 final; Commission (EU), SA.48143 (2017/N), C(2017) 9102 final.

[41]E Michalena and J Maxwell Hills (eds), *Renewable Energy Governance* (Springer 2013).

[42]On this discussion, see, e.g., K Haraldsdóttir, 'The Limits of EU Competence to Regulate Conditions for Exploitation of Energy Resources: Analysis of Article 194(2) TFEU' (2014) 23 European Energy and Environmental Law Review 208.

[43]At that time, only Belgium, Denmark, Italy and the Netherlands had been operating similar schemes. See also Poullikkas et al (n 8) 975.

which exceeded the market price. Feed-in tariffs and net metering were the instruments that bolstered the Cypriot energy transition. This has been a particularly challenging task because the electricity system of Cyprus is isolated and dominated by fossil fuels.[44] In 2012, the share of renewable electricity in Cyprus was 4.91 percent. In 2017, this had increased to 8.9 percent.[45] Net metering had a flying start in Cyprus. More and more producers have selected net metering instead of feed-in tariffs, with approximately 8,000 installations being covered by it in less than two years.[46] At the time of writing, about one-third of solar PV capacity is supported by net metering.[47]

The Cypriot net metering scheme is updated on an annual basis. Each year, the Ministry of Energy, Commerce and Industry announces a plan for the promotion of renewables self-consumption ('Self-Consumption Plan'),[48] through which interested parties are invited to apply for a net metering contract. The calls are open until a maximum installed capacity limit is reached. Net metering contracts have a duration of 10 years, or 15 years for non-residential consumers.[49] Regular updates give the authorities the chance to properly monitor and promptly amend the system when needed.

The 2018 and 2019 Self-Consumption Plans are identical, but they have brought important changes in comparison with the older plans. Concentrating on these recent plans, one can notice that the scheme now has two main components.

First, a classic net metering regime is available for residential and low-voltage non-residential solar PV users or, exceptionally, other renewable electricity technologies. This classic net metering regime applies for an aggregate installed capacity of 20 megawatts (MW): 5 MW for households and 15 MW for non-residential consumers. The maximum capacity per electricity bill is set at 10 kilowatts (kW) for both categories. Those who already benefit from other support schemes are not allowed to enter net metering.[50] Net metering beneficiaries should bear the whole installation cost of solar PV panels. This is a change from the pre-2018 regimes that subsidized vulnerable residential consumers.[51] The net metering system works with monthly or bimonthly billing periods. At the end of each period, the consumer pays for the electricity consumed, as long as it exceeds the electricity produced and is fed into the grid. If the electricity produced exceeds the electricity consumed, the excess amount will be offset against the net energy consumption of the next billing period. Every 12 months, any potential surplus will be reset to zero.[52]

Second, a net billing regime is available for commercial or industrial users and covers the whole range of renewable electricity technologies.[53] Net billing applies for an aggregate installed capacity of 40 MW, with each user's capacity set between 10 kW and 10 MW.[54] The foregoing net metering model applies here *mutatis mutandis*: the consumer pays for the electricity consumed from the grid, as long as its cost exceeds the value of the electricity fed into the grid. Otherwise, it is not the amount of the produced electricity that is being rolled over to the next billing period, but its value, thus seen as a credit. Any credit possibly aggregated is reset to zero every 12 months.[55]

In conclusion, following reforms and constant changes, Cyprus' net metering scheme is now a hybrid model: classic net metering support remains available to provide strong self-consumption incentives to residential and small non-residential consumers. Yet larger consumers, being in a position to significantly affect the electricity system, do not receive remuneration at a retail price that would equal the grid electricity price. They receive a lower price, which incentivizes them to consume the electricity they produce. This prevents cross-subsidization from traditional consumers.

Cyprus has already from 2013 introduced a grid charge on prosumers to cover costs related to the use of the grid.[56] The exact level and destination of the charges are amended each year by the regulator.[57] This adds another safety net against market distortion and cross-subsidization.

4.2 | Greece

Net metering was introduced in Greece in 2013[58] and a Ministerial Decision (MD) elaborated on how it would operate in December 2014.[59] Since 2014, the net metering regime has been reshaped, but

[44]Commission (EU), 'EU Energy in Figures 2018' (2018). See also AI Nikolaidis and CA Charalambous, 'Hidden Financial Implications of the Net Metering Practice in an Isolated Power System: Critical Review and Policy Insights' (2017) 77 Renewable and Sustainable Energy Reviews 706.

[45]Cyprus is on track to meet its 2020 target of a 13 percent share of RES, as set by the Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC [2009] OJ L140/16.

[46]Cyprus Energy Regulatory Authority, 'Yearly Report 2017' (2018) <https://www.cera.org.cy/Templates/00001/data/ektheseis/2017_gr.pdf> (in Greek).

[47]I Koumparou et al, 'Configuring Residential PV Net-Metering Policies: A Focus on the Mediterranean Region' (2017) 113 Renewable Energy 795.

[48]See Republic of Cyprus, 'Renewable Energy Sources (RES) for All – Plan for Electricity Production from Renewable Energy Sources for Self-Consumption' (March 2019) (in Greek) (Plan 2019).

[49]ibid arts 4.7 and 5.5; see also Republic of Cyprus, 'Renewable Energy Sources (RES) for All – Plan for Electricity Production from Renewable Energy Sources for Self-Consumption' (May 2018) (in Greek) (Plan 2018) arts 4.7 and 5.5; and Republic of Cyprus, 'Renewable Energy Sources (RES) for All – Plan for Electricity Production from Renewable Energy Sources for Self-Consumption' (April 2017) (in Greek) (Plan 2017) art 3.9.v.

[50]Unless their whole photovoltaic system installation starts being covered by net metering. See Plan 2019 (n 48) art 4.3; Plan 2018 (n 49) art 4.3.

[51]Plan 2019 (n 48) art 4.1; Plan 2018 (n 49) art 4.1; Plan 2017 (n 49) arts 3.4–3.5. The share of the vulnerable residential users' aggregate installed capacity under Plan 2017 was estimated to be 5 percent.

[52]Plan 2019 (n 48) art 4.3; Plan 2018 (n 49) art 4.3.

[53]Plan 2019 (n 48) art 5.1; Plan 2018 (n 49) art 5.1.

[54]Plan 2019 (n 48) arts 5.3 and 5.9; Plan 2018 (n 49) arts 5.3 and 5.9.

[55]Plan 2019 (n 48) art 5.5; Plan 2018 (n 49) art 5.5.

[56]Cyprus Energy Regulatory Authority, 'Decision 909/2013' (in Greek) <https://www.cera.org.cy/el-gr/apofasis/details/apofasi-909-2013>.

[57]The latest decision is Cyprus Energy Regulatory Authority, 'Decision 16/2019' (in Greek) <https://www.cera.org.cy/el-gr/apofasis/details/apofasi-16-2019>.

[58]Law 3568/2006, A' 129/27.6.2006. Article 14α was introduced by Law 4203/2013, A' 235/1.11.2013.

[59]Ministerial Decision Number APEIL/A/F1/oik.24461, B' 3583/31.12.2014 (MD 2014).

not radically changed, by two MDs in 2017[60] and in 2019.[61] Net metering was introduced with the aim of replacing the existing feed-in tariff scheme, which constituted the main instrument for the development of solar PV panels. The implementation of the scheme was poorly designed, and it resulted in a sudden boom of investments that proved too costly and non-viable in the medium term, and especially during the financial crisis.[62]

From 2019, net metering in Greece is open to any renewable electricity technology –not just solar PV.[63] The net metering scheme encompasses any natural or legal person who owns a site on which a renewable electricity installation is located or who is entitled to use it.[64] The capacity of an installation should not exceed 20 kW. Exceptionally, for medium-voltage self-consumers or consumers providing services of public interest, the maximum capacity cannot exceed 1 MW.[65] This upper limit was 500 kW before 2019.[66] Special rules apply for the islands that are not interconnected with the mainland electricity grid.[67] Aside from these per-installation limits, there is no maximum aggregated installed capacity. Net metering contracts have a duration of 25 years.[68]

Greece has opted for a classic net metering scheme: the electricity drawn from the grid and the electricity fed into the grid are measured and if there is an excess of the former, the electricity bill charges the consumer accordingly. If there is an excess of the latter, the consumer benefits from an electricity credit at the retail price that will be taken into account when the next electricity bill is issued.[69] The law does not provide for the frequency of the bills' issuance, but typically this happens every three or four months. Electricity credit is rolled over to the subsequent bills, but every three years any possibly remaining electricity credit is reset to zero.[70] Then the measurement starts again. This is in accordance with an explicit requirement introduced by the law, which provides that after the end of a billing period, which is currently set to last three years, any remaining electricity credit will be fed into the grid with no remuneration granted to the producer.

With the aim of further incentivizing net metering, Greece has not enacted any special grid charges for self-consumers. On the contrary, even the calculation basis for typical grid charges is only the electricity drawn from the grid, so that self-consumers do not bear any costs when feeding electricity into it.[71]

However, net metering has not gained pace yet. Indicatively, while the total capacity of new solar PV installations in 2018 was more than 41 MW, only 1,282 solar PV installations have entered the net metering scheme since 2015, with a total capacity of approximately 21 MW.[72] This can largely be attributed to the costs of entering net metering. While the Greek net metering regime grants a long-term contract, provides for long billing periods, remunerates the users with the retail price and has no special charges, it requires interested consumers to bear the costs for RES installation. These costs are expected to be recovered after years, which renders consumers hesitant, especially given the financial constraints faced by the Greek economy.

Besides the classic net metering scheme, Greece introduced a virtual net metering variation in 2017. Virtual net metering is open to natural or legal persons providing services of public interest, as well as to farmers. This makes Greece the first Member State having turned to such a large pool of potential virtual net metering prosumers. Under the virtual net metering regime, the electricity credit is allocated between the parties benefiting from a group of installations. Each member's bill is then either reduced accordingly or credited to be reduced in the future. The basic rules discussed earlier about contracts, installations' capacity limits, billing periods, and so on also apply here.[73]

In conclusion, Greece views distributed generation as a particularly important pillar for the promotion of RES, especially after the collapse of the feed-in tariffs that applied in the early 2010s. Accordingly, Greece applies a classic net metering regime that promises significant benefits to those entering it, with the aim of jump-starting distributed generation. Nevertheless, consumers have shown little interest in becoming involved in distributed generation, mostly because they find it difficult to cover the costs for such an investment.

4.3 | Italy

The Italian net metering scheme (*Scambio Sul Posto*, SPP) was formally established in 2003, but it started operating from 1 January 2009.[74] The Italian Energy Services Operator (*Gestore dei Servizi Energetici*, GSE), a public company owned by the Ministry of Economy, holds the pivotal role of managing the SSP and paying the remuneration, which covers part of the charges incurred by the customer for withdrawing electricity from the grid.[75] Importantly, all RES are eligible for the SSP, thus rendering the

[60]Ministerial Decision Number APEIL/A/F1/oik.175067, B' 1547/5.5.2017 (MD 2017).

[61]Ministerial Decision Number YPEN/DAPEEK/15084/382, A' 759/5.3.2019 (MD 2019).

[62]T Iliopoulos, 'Renewable Energy Regulation: Feed-in Tariff Schemes under Recession Conditions?' (2016) 4 European Networks Law and Regulation Quarterly 110.

[63]MD 2019 (n 61) art 3.

[64]ibid.

[65]ibid art 4(1).

[66]MD 2017 (n 60) art 2(1)(γ); MD 2014 (n 59) art 1(3).

[67]MD 2019 (n 61) art 4(2); see also MD 2017 (n 60) art 2(2).

[68]MD 2019 (n 61) art 12.

[69]ibid Article 5; see also MD 2014 (n 59) art 2.

[70]MD 2019 (n 61) art 5.

[71]ibid.

[72]Hellenic Association of Photovoltaic Companies, 'Statistics for the PV Market in 2018' (March 2019) (in Greek).

[73]MD 2019 (n 61) arts 6–7.

[74]Law Decree 387/2003 art 6; Law Decree 70/2009 art 6(6); Law 116/2014 art 25*bis*. Ministerial Decree July 6 2012 art 23 sets out the incompatibility between SSP and other support schemes (i.e. a feed-in tariff) introduced for small and medium RES plants *in lieu* of the previous quantity-based direct support scheme (i.e. tradable green certificates).

[75]See Autorità per l'Energia Elettrica e Gas (AEEG) Decision ARG/elt 74/08.

scheme technology-neutral.[76] Yet certain limitations are established in terms of the size of the eligible installations. Hence, only owners of one (or more) of the following installations may apply for the SSP:

- RES installations with an installed capacity of up to 20 kW, commissioned before 31 December 2007;
- RES installations with an installed capacity of up to 200 kW, commissioned between 31 December 2007 and 31 December 2014;
- RES installations with an installed capacity of up to 500 kW, entered into operation after 1 January 2015;
- High-efficiency combined heat and power installations with a capacity of up to 200 kW.[77]

The SSP applies on the condition that electricity must be supplied to and received from the grid strictly through one connection point.[78] However, installations owned by municipalities with less than 20,000 inhabitants (and the Ministry of Defence) are able to access SSP without being obliged to use the same connection point to supply and receive electricity (virtual net metering).[79]

Under the SSP, the electricity generated by a self-consumer in an eligible on-site installation and injected into the grid can be used to offset the electricity withdrawn therefrom.[80] This method can clearly lead to a surplus for self-consumers.[81] In this case, the owner of such an installation will receive a remuneration equal to the difference between the value of the electricity fed into the grid (e.g. for solar PV installations the energy fed in during daytime) and the value of the electricity consumed in a different period.[82] This remuneration can compensate for a possible negative balance in the following years. The balance is calculated once a year.[83] In addition, a compensation (*Conto Scambio*, CS) is granted to eligible SSP installations for the surplus of energy injected into the grid. The CS equals the net electricity value, therefore not including network and ancillary services costs. The GSE determines the compensation, taking into account: (i) the characteristics of the plant; (ii) the contractual conditions between the end user and his/her supplier; and (iii) the data that grid operators and suppliers are required to periodically report to the GSE.

Under the SSP the electricity fed into the grid is not deducted from the bill at the full electricity retail price. Furthermore, the SSP differs from traditional net metering, as the individual plant operator pays the supplier for the electricity consumed, while the GSE gives credit for the electricity fed in. Thus, the SSP is not based on direct payments, but on the balance of the energy fed in and consumed. Hence the SPP should rather be characterized as a net billing scheme.

The SSP has been acknowledged as instrumental for the uptake of residential solar PV in the Italian market.[84] In fact, the SSP combined with tax deductions (up to 50 percent) on the installation of solar panels has led to a remarkably high level of profitability and low payback period for residential solar PV, as compared to other support schemes in the EU.[85] As of 2018, the SSP scheme comprises more than 656,717 installations (99 percent solar PV) – a more than tenfold increase from 2009 (68,563) – equalling 5.6 gigawatts (GW) of installed capacity.[86] The total amount of electricity exchanged equals 2.4 terawatt-hours (TWh), leading to €268 million of compensation granted.[87] Yet due to its high profitability, SPP has also proven very poor in fostering electricity storage technologies in households and commercial facilities.[88] Thus, it is not surprising that the SSP has been mentioned in the Italian Draft Integrated National Energy and Climate Plan as a crucial means of support for RES plants, further stressing that it should eventually embed a premium for storage facilities.[89] This would ultimately enable it to level up the share of self-generation, to enhance energy security for medium- and low-voltage energy networks, while more heavily involving distribution system operators and energy utilities so as also to avoid over-generation from RES.[90]

4.4 | Belgium (Flanders)

Net metering started in Belgium already in 2001 when Flanders (the Flemish region of Belgium) began with the promotion of the use of RES. In Belgium, the promotion of RES is a fully regional competence. The (former) Flemish Electricity Decree,[91] in the meantime replaced by the Energy Decree of 8 May 2009, started the

[76]See AEEG Decision 570/2012/R/efr, art 1(1)(f).

[77]See AEEG Decision 612/2014/R/eel art 2*bis*(2)(e).

[78]570/2012/R/efr (n 76) art 1.

[79]Law no. 99/2009 art 27(4). Importantly, this regime applies only to RES installations; see also 570/2012/R/efr (n 76) art 2*bis*(3).

[80]SSP applies to all RES, though under two essential conditions. First, the beneficiary shall be located in an area with an electricity system connected to the grid and under the presence of at least one power plant. Second, this area should include one consumption unit directly connected to the same power plant. Such electricity transmission does not count as energy transmission and/or distribution activity, but as a self-generation activity – thus not comprising energy cooperatives and other consortia already equipped with their own internal grid.

[81]See 570/2012/R/efr (n 76) art 1(1).

[82]The reimbursement does not reflect the full market price of electricity, since it only includes the net cost of energy and some network charges, thus not encompassing taxes. Currently, this compensation amounts to 0,16€/kWh.

[83]See 570/2012/R/efr (n 76) art 8(2).

[84]See G Cerino Abdin and M Noussan, 'Electricity Storage Compared to Net Metering in Residential PV Applications' (2018) 176 Journal of Cleaner Production 186.

[85]See L De Boeck et al, 'Comparison of Support Policies for Residential Photovoltaics Systems in the Major EU Markets through Investment Profitability' (2016) 87 Renewable Energy 42, 53.

[86]Out of these installations, more than 390,000 have a 3–20 kW generation capacity, thus contributing to more than 50 percent of the energy fed into the grid (1,970 out of 3,570 GWh) and exchanged with GSE (1,255 out of 2,402 GWh). As compared to the previous year, 46,000 new installations joined the SSP scheme, equalling 348 MW generation capacity. See GSE, 'Rapporto Attività 2018' (GSE 2018) 85.

[87]ibid 86.

[88]See Cerino Abdin and Noussan (n 84).

[89]See 'Italian Draft Integrated National Energy and Climate Plan' (31 December 2018) <https://ec.europa.eu/energy/sites/ener/files/documents/ec_courtesy_translation_it_necp.pdf> 98.

[90]ibid 158.

[91]Decree of 17 July 2000 'houdende de organisatie van de elektriciteitsmarkt'.

promotion of RES with the introduction of green electricity certificates (one per 1,000 kWh of produced green electricity). The certificate scheme was open to any producer of green electricity. When the first solar panels were installed, it became clear that the main meter used in Flanders, the so-called Ferraris meter,[92] could also turn backwards.

However, some distribution system operators did not like this and started installing meters with a brake. The Flemish government, however, wanted to facilitate net metering. Therefore, in 2003 it adopted a new Technical Regulation on the Distribution of Electricity and integrated an article giving users of the distribution system the possibility to ask the distribution system operator to replace the measuring installation to allow net metering.[93] This regime, however, is only possible for production installations with a maximum capacity of 10 kW. Production installations above 10 kW do not have this choice and depend on their distribution system operator. All renewable electricity installations of up to 10 kW are eligible for the net metering scheme. Although this regime is still in place, the Flemish government is increasingly moving towards net billing.

Unfortunately, the double scheme of green electricity certificates and net metering did not have the expected success. Therefore, to boost the decentralized production of green electricity, the Flemish government seriously increased the value of a green electricity certificate in 2006 by fixing a minimum price by law. At the start, the minimum price was set at €450 per 1,000 kWh produced, and the price was guaranteed for 20 years. This was a huge success and led to an enormous increase in solar panels. After a few years, starting in 2010, the Flemish government realized that the regime was too costly and the guaranteed minimum price was gradually reduced (and in 2012 also the duration) for all installations, to even fully end in 2015 for the small installations with a maximum capacity of 10 kW. This has led to the current situation in which small installations with a maximum capacity of 10 kW only benefit from net metering, whereas the larger installations only benefit from green electricity certificates.

The net metering regime is a very simple one: the meter turns forward when electricity is consumed and backwards when electricity is produced. At the end of the year, the prosumer has to pay for the net consumption. In case the prosumer produces more electricity than he consumed, he does not get any compensation for that and he cannot transfer it to the next year. This is to incentivize prosumers to not install more than they need (although during the time of the system of green electricity certificates people were incentivized to install more than they needed). Furthermore, besides some other costs (like the rent for the meter), prosumers have to pay a prosumer tariff for the use of the grid (depending on the capacity of the installation and the distribution system operator).

In April 2019 (right before the European, national and regional elections of May 2019), Flanders decided to gradually replace all meters with digital meters, starting in July 2019.[94] This means that Flanders will move from net metering to net billing. Consumption and production will be measured separately. In the end, prosumers will pay for the difference between the two. Depending on the timing of the consumption or the production, the price may differ. It is expected that the consumption price will be more expensive as the price for electricity is higher when a lot of people want to consume (e.g. in the mornings and the evenings). Prosumers will therefore probably pay more for their electricity. On the other hand, the new regime foresees that the prosumers will no longer have to pay the prosumer tariff.

Given the potential rise of the electricity price, Flanders included an exception. Owners of solar panels have the possibility to keep the current net metering system until 15 years after the installation. This exception also applies to new installations before the end of 2020. However, the Flemish Energy Regulator decided to challenge this exception before the Constitutional Court. According to the regulator the exception is discriminatory, does not incentivize people to adapt their consumption pattern to their production pattern (as the digital meter would do) and violates the tariff competence of the regulator. The case is still pending.[95]

Flanders clearly has a long experience with net metering. Given the immoderate expansion of net metering, the Flemish government had to rationalize the support regime. Therefore, in 2019, Flanders started moving from net metering to net billing. It is expected that prosumers might receive a lower remuneration, but that they will also be incentivized to consume the energy directly when they generate it.

4.5 | Comparative analysis

The different regimes examined have several common features, but they also have interesting differences. Table 1 summarizes the main characteristics of each legal framework.

The most mature and widespread net metering regimes are resorting to net billing; this is the case for Cyprus, Flanders and Italy.

The Italian net billing system is well established, with many actors already involved in it. Accordingly, the authorities primarily aim to ensure the stability and viability of the system by offering a remuneration that is lower than the retail price, by charging grid costs and by setting the maximum capacity per contract at 500 kW. Thus, further expansion of self-consumption in Italy will take place within a risk-averse framework.

[92] An electromagnetic meter based on Eddy currents.

[93] Technical Regulation on the Distribution of Electricity of 14 October 2003 <https://www.vreg.be/sites/default/files/uploads/documenten/technische%20reglementen/trde.141003.pdf> 50 (Article 2.4.2 of part V).

[94] Decree of 26 April 2019 'tot wijziging van het Energiedecreet van 8 mei 2009, wat betreft de uitrol van digitale meters en tot wijziging van artikel 7.1.1, 7.1.2 en 7.1.5 van hetzelfde decreet'.

[95] Constitutional Court of Belgium, pending case number 7295, registered on 18 November 2019.

TABLE 1 Summary of net metering in Cyprus, Greece, Italy and Flanders

Member State	Net metering type	Contracts duration	Grid charges	Aggregated installed capacity limit	Consumers involved	Technologies
Cyprus	Net metering Net billing	10 or 15 years	✓	✓	Residential and low-voltage non-residential (up to 10 kW each) Commercial and industrial (10 kW–10 MW each)	Solar PV for net metering All renewable electricity for net billing
Flanders	Net metering Net billing	✗	✓	✗	Up to 10 kW	All renewable electricity
Greece	Net metering Virtual net metering	25 years	✗	✗	Residential and non-residential (up to 1 MW)	All renewable electricity
Italy	Net billing	1 year (automatic renewal)	✓	✓	Residential and non-residential (up to 500 kW)	All renewable electricity

By contrast, Flanders has only recently turned to net billing. This decision was prompted by immoderate expansion of net metering, which urged a rationalization of the support regime. With net billing, the remuneration granted will be reduced, therefore reducing overall costs; yet it will also incentivize participants to actually consume the energy they generate. Thus, net metering is expected to function as a demand response technique and increase the efficiency of the Flemish electricity system. At the same time, the very low cap for eligible capacity (10 kW) limits the Flemish net billing scheme to small self-consumers.

Cyprus takes steady and cautious steps. Accordingly, Cyprus has enacted the main framework of the net metering regime, but reforms it every year with a Self-Consumption Plan. This plan sets down the details and the limits of the total amount of capacity that can enter the scheme for that year; once this capacity is reached, no more applications will be accepted until the next plan is announced. This model gives the authorities the possibility to closely monitor how the regime works and to ensure it does not lead to stability or efficiency problems. In practice, Cyprus started with classic net metering to kick-start the promotion of solar power. A few years later, with the Cypriot support scheme being stable and more mature, net metering is now limited to smaller actors and net billing is introduced for commercial and industrial users who can significantly affect the system stability.

In Greece, net metering has been introduced to replace feed-in tariffs and revive the promotion of RES. Thus, Greece insists on a generous net metering regime to expand self-consumption. This regime is characterized by features that arguably would not fit in other net metering schemes, such as the Italian or Flemish schemes. But it might prove effective to attract potential investors in a less developed self-consumption landscape. In this regard, the Greek regime is characterized by: (i) remuneration at the retail price; (ii) long-term contracts; (iii) billing periods every three years, so that electricity surpluses can be retained and rolled over 36 months, and not 12 as is normally the case; (iv) higher threshold of maximum capacity per contract; (v) no grid charges; (vi) special provisions for certain islands; (vii) most interestingly, the possibility of virtual net metering that allows more investors to act together and maximize their gains. Yet thus far the Greek net metering regime has not achieved the desired results. This is mainly due to the high upfront costs of RES installations. A solution could be to combine net metering with tax reductions or time-limited subsidies, at least for more vulnerable consumers and for a limited period of time, learning from the successful Italian and Cypriot experiences.

The preceding analysis demonstrates that different circumstances have led to the development of distinctive net metering regimes across Member States. Against this fragmented picture, however, EU law does not provide directions to national or regional authorities when designing and enacting their net metering support schemes. This might lead to uncertainty regarding the compatibility of a domestic net metering regime with EU law, especially when it comes to the assessment of certain core elements, such as the selection of a certain net metering

variation, the extent of the remuneration and other incentives granted to participants or the charges for grid use. In this regard, institutional conflicts could arise between Member States and the Commission regarding the legality and distortive nature of a given net metering scheme. A more coherent supranational legal framework would diminish such risks, while adding to the viability of net metering regimes, thus enhancing the functioning of electricity markets and further achieving EU energy policy objectives. Moreover, a more coordinated approach, whereby EU law determines the circumstances that make a certain net metering model preferable or sets down criteria determining when a certain regime is market-based and market-oriented might prove beneficial. For instance, it is reasonable to assume that the above-mentioned Flemish regulatory failure would have been prevented if such a coordinated approach had been established. In another example, it is uncertain whether EU law currently has the tools to ensure the Greek remunerative net metering regime is not extended beyond a mere jump-start phase of distributed generation.

5 | CONCLUSION

The EU legislator has consciously decided not to adopt specific rules on net metering. This choice bespeaks the effort to reconcile some Member States' interest to keep in place their domestic net metering regimes with the Commission's general sceptical stance on net metering. The Commission has advised Member States to limit net metering to phase-in periods and accord preference to instruments fostering self-consumption, as opposed to only self-generation.[96]

The EU legal framework for RES and electricity markets contained in the Clean Energy Package, while extensively dealing with support schemes for RES, decentralization or consumers' empowerment, fails to explicitly address net metering. In this sense, net metering has slipped through the net of the EU legislator. However, the comparative analysis of net metering regimes shows that Member States are far from abandoning net metering. On the contrary, more Member States are resorting to net metering and net billing regimes as a fundamental tool to support decentralized energy generation (especially solar PV). Moreover, net metering regimes entail several inherent variations across different contexts, mostly depending on their maturity, objectives and ambition. Several questions hence remain as to how net metering regimes will be able to scale up in the light of the predicted increase of distributed generation (also in the form of energy communities). If these schemes do not prove sufficiently flexible to accommodate a potential large increase of distributed generation in the next few years, they will certainly be subject to draconian modifications with regard to participants' remuneration. As the Flemish case demonstrates, this will in turn drastically reduce consumers' profitability, decelerate the expansion of distributed generation and ultimately hamper legal certainty to the detriment of future RES investments.

We therefore argue that a more coordinated supranational legal regime *vis-à-vis* net metering should emerge, drawing from domestic experiences in Member States. Such a coordinated regime would set the basic rules to calibrate net metering regimes' core design features. This is already the case with supranational law on other support schemes, such as feed-in premiums, where Articles 4–6 RED II introduce specific substantive and procedural rules regarding their design. The enactment of these rules followed the collapse of poorly designed direct price instruments used by Member States.[97] Similar rules should also be adopted for net metering before the EU experiences a breakdown of self-consumption support too, with unaffordable net metering regimes collapsing in view of poor design. In other words, EU law should build on lessons learned from how feed-in tariffs, feed-in premiums and net metering regimes have been operating and provide a framework ensuring the smooth promotion of RES and distributed generation. To give but one example, the RED II and the Electricity Directive could include provisions prioritizing net billing as a more market-oriented instrument, as well as setting down principles or circumstances that justify the adoption of classic net metering schemes that remunerates self-consumers at the retail price. Moreover, EU law could steer net metering schemes with regard to key design elements, and coordinate their deployment with the desired functioning of electricity markets and networks, as well as with other policies, such as the EU emissions trading system. Fragmentation of support schemes for renewables has ultimately segregated RES electricity from the market, thus leading to a decrease in demand for emissions allowances and pushing down allowance prices.[98] The EU legislator should not miss the opportunity to both alleviate national authorities' administrative burden with regard to adjusting and reforming net metering schemes, while ensuring a minimum degree of harmonization to effectively achieve the EU's energy and climate objectives.

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[96]See Commission (EU) 'Delivering a New Deal for Energy Consumers' (Communication) COM(2015) 339 final, 15 July 2015, 10–12.

[97]See Commission (EU) (n 3). See also Michalena and Maxwell Hills (n 41).

[98]See I Espa, 'Promoting Renewables in the Energy Union: Current Strategies and the Challenges Ahead' (2017) 2 European Investment Law and Arbitration Review Online 225, 235–236.

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