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# TILEC Discussion Paper

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## **The Interplay between Liberalisation and Decarbonisation in the European Internal Energy Market**

**Anna-Alexandra Marhold**

**Abstract:** This contribution explores the interplay between liberalisation and decarbonisation of the European electricity market. The focus of this piece is to see whether liberalisation of the EU electricity market, in Europe realised by means of the unbundling regime, inherently promotes decarbonisation of the grid. In other words, it seeks to explore if decarbonisation of the electrical grid is a positive externality of liberalising the market, absent of any other policies promoting the scale up of renewables in the grid. To this end, it examines existing economic and econometric literature on the issue and places it in the greater context of internal energy market legislation and European energy policy.

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**Keywords:** EU Law; Energy Market Liberalisation; Decarbonisation; Internal Energy Market for Electricity; Unbundling; Energy Security; Renewable Energy; Market Failures; Externalities

**JEL Codes:** D62; F02; F15; F64; H23; H41; K00; K01; K21; K32; L4; L44; L49; L52; L71; L72; N14; N54; N74; O3; O52; P18; Q01; Q28; Q34; Q4; Q48; Q5;

## 1 Introduction

In European Union (hereafter: EU) competition law, consumer protection is at the heart of the system. With respect to EU energy policy, *de facto* an extension of competition law to the EU energy sector, this means that guaranteeing a reliable energy supply at reasonable prices for businesses and consumers is paramount. In this spirit, the EU has been progressively working towards the completion of the Internal Energy Market (hereafter: IEM) and a coherent EU energy policy since the 1980's, increasingly liberalizing European electricity and gas markets.<sup>1</sup> Ownership Unbundling (hereafter: OU) and Third Party Access (hereafter: TPA), set out in 2009 Third Energy Package (hereafter: TEP) legislation, are key elements with a dual goal in this respect: they facilitate liberalization as well as a Europe-

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<sup>1</sup> See European Commission, 'A Fully Integrated Internal Energy Market' <[https://ec.europa.eu/commission/priorities/energy-union-and-climate/fully-integrated-internal-energy-market\\_en](https://ec.europa.eu/commission/priorities/energy-union-and-climate/fully-integrated-internal-energy-market_en)> accessed 21 July 2017.

wide integration of energy markets.<sup>2</sup> These legal instruments essentially mandate the breaking up previously vertically integrated energy companies and allow the introduction of competition in the market where possible.

In its efforts to decarbonize its economy and increase its security of supply, the EU moreover promotes the scale up of clean energy and energy efficiency.<sup>3</sup> This can be understood from the perspective of mitigating the adverse effects of climate change and CO<sub>2</sub> emissions: the Union must meet its obligations undertaken under international climate agreements, such as the recent 2015 Paris Agreement.<sup>4</sup> To this end, the Union has extensive legislation in place to legitimize support schemes for renewable energy under EU law, i.e. by means of the Renewable Energy Directive, 2014 EU Guidelines on State Aid for Environmental Protection and Energy, the EU General Block Exemption Regulation (GBER) and supporting case law.<sup>5</sup> In the wake of the imminent energy transition, the Commission furthermore released legislative proposals for a new ‘clean’ energy package to replace current TEP legislation in late 2016. The centre of gravity of the new proposals, under negotiation at present, is on decarbonising the economy and the promotion of sustainable development.<sup>6</sup>

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<sup>2</sup> Ownership unbundling is taken up in Article 9(1) of the Electricity (2009/72/EC) and Gas Directives (2009/73/EC); Third Party Access is taken up in Article 32 of the Directives.

<sup>3</sup> See the EU 2020 Climate and Energy Package <[https://ec.europa.eu/clima/policies/strategies/2020\\_en](https://ec.europa.eu/clima/policies/strategies/2020_en)> accessed 21 July 2017.

<sup>4</sup> COP21 Paris Agreement: United Framework Convention on Climate Change (UNFCCC), UN Doc FCCC/CP/2015/L.9/Rev.1 ‘Adoption of the Paris Agreement’ (12 December 2015).

<sup>5</sup> European Commission, Guidelines on State aid for environmental protection and energy 2014-2020 (2014/C 200/01) C 200/1. 28.6.2014 (hereafter: Guidelines) and European Commission, Commission Regulation (EU) No 651/2014 of 17 June 2014 declaring certain categories of aid compatible with the internal market in application of Articles 107 and 108 of the Treaty Text with EEA relevance; OJ L 187, 26.6.2014, p. 1–78 (hereafter: GBER).

<sup>6</sup> DG Energy, ‘Commission Proposes New Rules for a Consumer Centred Clean Energy Transition’, 30 November 2016 <<http://ec.europa.eu/energy/en/news/commission-proposes-new-rules-consumer-centred-clean-energy-transition>> both websites accessed 21 July 2017.

It therefore comes as no surprise that in achieving a greater energy security for the Union the EU must walk on a tightrope between these two objectives of competitiveness and attaining a clean energy transition. While not conflicting objectives in and of themselves, it has proven to be challenging to reconcile liberalisation on the one hand, while meeting climate targets and decarbonizing the electricity grid on the other.

This contribution is interested in exploring the interplay between liberalisation and decarbonisation of the European electricity market. The focus of this piece is to see whether liberalisation of the EU electricity market, in Europe realised by means of the unbundling regime, inherently promotes decarbonisation of the grid. In other words, it seeks to explore if decarbonisation of the electrical grid is a positive externality of liberalising the market, absent of any other policies promoting the scale up of renewables in the grid. We will limit ourselves to discussing the electricity grid, as the electricity sector is at the centre of many clean and renewable energy support schemes, as opposed to gas or nuclear.

After this introduction, section 2 will first provide some background and economic rationales of the IEM. section 3 will explore the interplay between liberalisation and decarbonisation. It will reveal that there is indeed a causal link between them, to certain degree. However, as the contribution will determine in section 4, liberalisation legislation alone is not enough to make clean energy compete with fossil fuels in the EU electricity market. Understandably, EU renewable energy policy attempts to correct for these market failures. By means of a conclusion, section 5 will recap the issues discussed.

## **2 The Materialisation of the EU Internal Energy Market**

By way of background and understanding the economic rationale of the EU energy system and the place of support schemes for clean and renewable energy, this section will lay out some fundamentals of EU Internal

Energy Market legislation pertaining to electricity. Subsequently, it will examine whether, and to what extent, decarbonisation of the European electricity grid can be considered an inherent positive externality of liberalization legislation, absent any additional measures to scale up renewable energy.

The EU Internal Market for Electricity, part of the IEM is the result of gradually introducing a more coherent EU-wide energy legislation and policy from the 1980s onwards. The culmination of the process has - so far - been the launch of the Energy Union package in 2015 and the Clean Energy Package proposed by the European Commission in 2016.<sup>7</sup> The ultimate objective is to have a fully interconnected EU energy market, that is at the same time liberalized, decarbonized and can guarantee 'security of energy supply' for Europe's citizens.

'Security of energy supply' is an elusive term. As a matter of fact, there is no clear-cut and legally binding definition of 'security of supply', neither on the international level, nor in the context of EU law.<sup>8</sup> In the words of the EU itself:

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<sup>7</sup> European Commission, 'Energy Union Package – A Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy', 25 February 2015, <[https://ec.europa.eu/energy/sites/ener/files/publication/FOR%20WEB%20energyunion\\_with%20annex\\_en.pdf](https://ec.europa.eu/energy/sites/ener/files/publication/FOR%20WEB%20energyunion_with%20annex_en.pdf)> and DG Energy, 'Commission Proposes New Rules for a Consumer Centred Clean Energy Transition', 30 November 2016 <<http://ec.europa.eu/energy/en/news/commission-proposes-new-rules-consumer-centred-clean-energy-transition>> both websites accessed 21 July 2017.

<sup>8</sup> The EU in its energy security strategy in so many words confirms that there is no legal definition of energy security on the European level, see European Commission, Commission Staff Working Document, 'In-depth study of European Energy Security', SWD(2014) 330final, Brussels 2.7.2014, 166, accompanying document European Commission, 'European Energy Security Strategy', COM(2014) 330 final, Brussels, 28.5.2014.

*‘DG Energy undertook steps to ensure that the assessment of security of supply becomes more quantifiable and transparent. This overview shows that although there is no clear definition at the EU level of what security of supply means, there is a clear focus on measures to establish security of supply.’ [Emphasis my own]<sup>9</sup>*

While the EU has elaborated on some criteria in its Energy Security Strategy (to be discussed below), a clear legal definition of the term is lacking.<sup>10</sup> The status quo is that a vast number of academics and policy makers have been vigorously discussing and trying to frame the definition of ‘energy security’ and ‘energy security of supply’ legally or otherwise, albeit without a clear consensus.<sup>11</sup>

The most straightforward point of reference then is International Energy Agency, which describes the concept of ‘energy security’ in the broadest sense as ‘the uninterrupted availability of energy sources at an affordable price’.<sup>12</sup> The United Nations offers an additional description and characterizes ‘energy supply security’ as ‘the continuous availability of energy in varied forms, in sufficient quantities, and at reasonable prices’.<sup>13</sup> One can

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<sup>9</sup> Despite a lacking legal definition on EU level, the Union believed the concept of energy security was clear and important enough to put forward a European Energy Security Strategy, preceding its Energy Union Package, European Commission, European Energy Security Strategy, Brussels, 28.5.2014, COM (2014)330; This strategy was accompanied by an in-depth study of Europe’s energy security European Commission, Commission Staff Working Document, ‘In-depth study of European Energy Security’, Brussels, 2.7.2014, SWD(2014) 330 final/3.

<sup>10</sup> Ibid.

<sup>11</sup> See e.g. Energy Charter Secretariat 2015, pp. 10ff; The Council of European Energy Regulators (CEER) 2010; Dreyer and Stang 2013, pp. 1; and generally, Lilliestam and Patt 2012 and Metais 2013.

<sup>12</sup> See International Energy Agency, ‘What is Energy Security?’

<<http://www.iea.org/topics/energysecurity/subtopics/whatisenergysecurity/>>

<sup>13</sup> Energy Charter Secretariat 2015, pp. 113.



further distinguish two dimensions of energy security: long-term energy security, which implies timely investments taking into account sustainable development needs, and short-term energy security, implying that the system should react adequately to sudden changes in supply and demand.<sup>14</sup>

Despite the fuzziness of the concept of energy security, it is commonly understood energy security covers elements of i) a reliable supply that is ii) accessible, and, iii) affordable. In the opinion of the author, a fourth, overarching element should be added, which is that the supply should be sustainable. It follows that by guaranteeing energy security, energy markets should be resilient in the event of shocks (In the European context, one could e.g. think of the recurring gas transit disputes between Russia and Ukraine that took place in the 2000s that affected a great number EU MS directly).<sup>15</sup> Notwithstanding the absence of a legal definition, it is obvious that security of supply is of vital importance for the European Union. The EU has therefore put forward an Energy Security Strategy.<sup>16</sup> Several elements of this strategy are highly relevant for the completion, liberalization of the internal market for electricity. These are, amongst others: moderating energy demand, building a well-functioning and fully integrated internal market, increasing energy production in the Union, further developing energy technologies and improving coordination of national energy policies.<sup>17</sup>

The dimension of liberalizing the energy market for electricity and gas can be understood as extending the idea of the European single market by

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<sup>14</sup> Ibid; Also see International Energy Agency 2016, pp. 86.

<sup>15</sup> See e.g. on this generally Marhold 2011.

<sup>16</sup> *Supra* note 8.

<sup>17</sup> *Supra* note 8, pp. 3.

breaking up vertically integrated energy companies and introducing competition to these industries where possible.<sup>18</sup> The consumers, in the form of EU citizens, are ultimately at the heart of EU competition policy, and this is one of the underlying rationales for liberalization policies in the energy market: by making companies compete fairly with one another, efficiency is encouraged, quality and innovation increases, prices decrease and consumers have an overall broader choice, apart from a more secure supply.<sup>19</sup> Through Internal Energy Market legislation, two policy goals thus merged into one: The completion of the EU single market by means of extending competition policy to the energy market, on the one hand, and, introducing and advancing a coherent Union-wide, increasingly integrated energy policy, on the other.<sup>20</sup>

The reason that liberalization and interconnection of network industries in the EU was introduced later to the energy sector than to most other goods and services sectors was twofold: First, energy was, for decades, a purely national matter linked to state security and security of energy supply of the separate EU Member States. There were historically relatively little cross-border interconnections of electricity grids and gas pipelines across Europe. Until today, energy remains a shared competence between the Union and its Member States, as is evidenced by Article 4.2(i) of the Treaty on the Functioning of the European Union (hereafter: TFEU).<sup>21</sup> This entails that both the EU and Member States may legislate in

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<sup>18</sup> Pollitt in a brief paper provides a historical overview of the 'liberalization era' and its effects: Liberalization is characterized by its attention for competition, and unbundling is one of the tools. Privatization is often an effect of liberalization but not always, and part of the reason liberalization is not yet complete is that governments are afraid to lose the control or the power to cross-subsidize, see Pollitt 2012, pp. 128.

<sup>19</sup> DG Competition, 'Why is Competition Policy Important for Consumers?' <[http://ec.europa.eu/competition/consumers/why\\_en.html](http://ec.europa.eu/competition/consumers/why_en.html)> accessed 21 July 2017.

<sup>20</sup> See for an overview Marhold 2016, pp. 250-254; Also see European Commission (DG Energy), 'Markets and Consumers – Integrated Energy Markets for European Households and Business' <<https://ec.europa.eu/energy/en/topics/markets-and-consumers>> accessed 21 July 2017.

<sup>21</sup> Consolidated Version of the Treaty on the Functioning of the European Union, 2008 O.J. C

this area, as long as they respect the ‘duty of sincere cooperation’ among themselves flowing from Article 4(3) of the Treaty on the European Union (hereafter: TEU).<sup>22</sup> In short, the duty of sincere cooperation entails that the EU and its Member States must refrain from acting against each other’s respective interests.

The specific article setting out EU energy policy is taken up in Article 194 TFEU.<sup>23</sup> The Article in paragraph one lays out the objectives of EU energy policy, while paragraph two subsequently determines that the European Parliament and the Council can establish the measures necessary to achieve these objectives. Paragraph two of this article further emphasizes the shared nature of the competence: the EU may, for instance, not determine the internal energy mix of its Member States.<sup>24</sup> It states that *‘Such measures shall not affect a Member State’s right to determine the conditions for exploiting its energy resources, its choice between different energy sources and the general structure of its energy supply, without prejudice to Article 192(2)(c).’*<sup>25</sup> This is somewhat paradoxical, at minimum, as the Union has set binding targets for shares of renewable energy in its Member States, although justification for this can be partially found in mentioned Article 192(2)(c) TFEU for environmental protection.<sup>26</sup> We can nevertheless discern a tension here between the targets and require-

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115/47 (hereafter: TFEU).

<sup>22</sup> Consolidated Version of the Treaty on European Union, 2010 O.J. C 83/01 (hereafter: TEU).

<sup>23</sup> Article 194 TFEU.

<sup>24</sup> Article 194.2 TFEU.

<sup>25</sup> Ibid.

<sup>26</sup> Art 192(2)(c) TFEU: *‘By way of derogation from the decision-making procedure provided for in paragraph 1 and without prejudice to Article 114, the Council acting unanimously in accordance with a special legislative procedure and after consulting the European Parliament, the Economic and Social Committee and the Committee of the Regions, shall adopt: measures significantly affecting a Member State’s choice between different energy sources and the general structure of its energy supply.’*

ments set out in the EU Renewable Energy Directive discussed in this contribution and Member States' sovereignty (including sovereignty over their natural resources) to decide their energy mix. Regarding renewable energy, we can conclude that while the EU at Union level may prescribe overall renewable energy targets, the Union is not a position to decide on the actual energy mix of its Member States, nor does it have a say in what energy resources Member States can and should use.<sup>27</sup> Perhaps this is one of the motives why the Commission in the new Clean Energy Package has proposed to do away with binding renewable energy targets on the national level, instead solely providing a binding target on the EU level, as a possible compromise to Member States in this area.<sup>28</sup>

A second reason why liberalization was introduced later into the European energy sector (though connected to the previous point), is that the electricity and gas industry has traditionally either been state-owned and/or operated by vertically integrated companies, often behaving as a natural monopoly owing to the sunk cost connected to energy production and infrastructure investments.<sup>29</sup> It thus became evident that the breaking up of these industries was to be a challenging process that could only succeed if implemented in phases. It should be noted that while the electricity and gas sector differ significantly from one another, certain core legislative changes in EU law (such as OU and TPA) were designed to apply to both sectors. This is simply because the electricity as well as the gas industry have certain characteristics in common, i.e. they are 'network-bound', tied to fixed infrastructures and their operational processes, from energy production to transmission and distribution, where historically heavily regulated on state level.

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<sup>27</sup> See on this e.g. Sveen 2014, pp. 157 ff.

<sup>28</sup> European Commission, Proposal for a Directive of the European Parliament and of the Council on the promotion of the use of energy from renewable sources (recast), COM/2016/0767 final/2 - 2016/0382 (COD), 23.02.2017, under 1.1.

<sup>29</sup> See generally on this Daintith and Hancher 1986.

During the first phase of implementing the IEM in the late 1980s, cross-border transit opened for both electricity and gas, implying that Member States could no longer oppose transnational flows of energy. In the early 2000s, the Second Energy Package introduced the legal unbundling of gas and electricity sectors, mandating the minimum threshold of legal separation of the production and sale of energy from transmission and distribution activities of energy.<sup>30</sup> By 2009, the Commission adopted the Third Energy Package in the form of an Electricity and Gas Directive (2009/72/EC and 2009/73/EC respectively), introducing the most stringent form of unbundling, known as Ownership Unbundling (OU). The new Clean Energy Package proposed by the Commission in the fall of 2016 attempts to take this a step further by emphasizing the need to introduce flexibility onto the grid, inter alia to accommodate prosumers and smart energy systems into the existing structure.<sup>31</sup>

As the 2016 package is merely a set of proposals on the negotiation table at present, we take a step back to the Third Energy Package that is currently still in force. Ownership Unbundling, set out in Article 9 of the 2009 Electricity Directive, prescribes the complete separation of companies' electricity generation and sales activities from their transmission network activities, requiring them to be operated by strictly independent entities.

<sup>32</sup> Although all EU Member States must attain full OU in both their electricity and gas sectors, it remains difficult to realize this in all Member States in a timely manner today and milder forms of unbundling are still

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<sup>30</sup> Directives 2003/54/EC for electricity and 2003/55/EC for gas, OJ 2003 L 176.

<sup>31</sup> See European Commission, Communication on 'Clean Energy For All Europeans' Brussels, 30.11.2016 COM(2016) 860 final, 8.

<sup>32</sup> Johnston and Block 2012, pp. 73; ECJ, C-439/06 *Citiworks AG* (22 May 2008) and Article 9 of the Electricity Directive 2009/72/EC.

accepted (the case in the gas sector in e.g. Hungary, Croatia and Lithuania).<sup>33</sup> Unbundling and integrating energy markets is additionally accompanied by significant challenges: It for instance exposes the need to attract sufficient infrastructure investments in the European electricity market and the need to manage capacity remuneration mechanisms that Member States have in place.<sup>34</sup>

Another cornerstone of liberalization of the energy market the EU introduced in the Third Energy Package is the concept of Third Party Access (TPA), taken up in Article 32 of the Electricity Directive.<sup>35</sup> TPA ensures that Member States have a system in place where third parties (usually competitors to the natural energy monopoly) can access the transmission and distribution grid under objective, transparent and non-discriminative terms.<sup>36</sup> One of the essential components of TPA is the regulation of tariffs, which have to be published, 'applicable to all eligible customers, including supply undertakings and applied objectively and without discrimination between system users.'<sup>37</sup> Transmission System Operators as well

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<sup>33</sup> In fact, none of Member States has managed to fully transpose the Electricity and Gas Directives (due date for transposition of the Directive was 2011). Note in this respect that while 'full ownership unbundling' remains the basic model and target for EU MS, vertically integrated energy companies can resort to two other alternatives: the independent system operator (ISO) and independent transmission operator (ITO) model. Under the former model, the transmission network can remain in the ownership of the energy company. Nevertheless, the transmission network itself must be managed by an ISO, which must perform all day-to-day network operator functions and must be completely separated from the energy company. In the ITO scenario, the transmission networks can also remain under the ownership of an energy consortium, but the transmission subsidiaries would be set up as independent joint stock companies carrying their own brand name and subject to stringent regulatory control. Most EU Member States whose transmission systems are controlled by vertically integrated undertakings prefer this last scheme of unbundling to comply with the Third Energy Package.

<sup>34</sup> See e.g. European Parliament Briefing, *Understanding the Electricity Markets in the EU* (Brussels, November 2016) and Glachant, Saguan, Rioux and Douguet 2013.

<sup>35</sup> Article 32 of Electricity Directive 2009/72/EC.

<sup>36</sup> *Ibid.* See also Article 37(6) on the regulation of tariffs. The European Court of Justice (ECJ) in *Citiworks* confirmed that TPA is paramount and essential for both competition to function in the market as well as completing the internal electricity market, ECJ, C-439/06 *Citiworks AG* (22 May 2008), paras 40 and 44.

<sup>37</sup> Article 32(1) Electricity Directive 2009/72/EC.

as Distribution System Operators are the guarantors of TPA.<sup>38</sup> In the electricity sector, for instance, there is currently an emphasis on building more cross-border capacity by direct current interconnectors (Article 17 of Regulation 714/2009), meaning that these can qualify if it meets certain conditions.<sup>39</sup>

### **3 Liberalising the EU Electricity Sector: Decarbonisation as a Positive Externality?**

After laying out the rudiments of the European energy landscape above, we now turn to the essential question on the nexus between liberalization legislation and decarbonisation of the electricity grid. What we are particularly interested in is to discover whether liberalization policies in the electricity sector are inherently accompanied by the positive externality of leading to more clean energy inputs on the supply side of the market. We choose to address this question with respect to the electricity sector only, as this sector, as opposed to the gas sector, is dealing with a secondary energy commodity in the sense energy statistics.<sup>40</sup> This proposition demands some elaboration. While electricity can certainly be classified as ‘energy’, in the sense that it provides power input, it is only a ‘secondary energy commodity’ in that it needs to be generated by means of transforming a primary energy commodity first. Primary energy commodi-

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<sup>38</sup> Johnston and Block 2012, pp. 75. However, since a right balance must be attained between competition policy and attracting sufficient investments in energy infrastructure, the EU maintains an exemption policy to TPA. In the electricity sector, for instance, there is currently an emphasis on building more cross-border capacity by direct current interconnectors (Article 17 of Regulation 714/2009), meaning that these can qualify if it meets certain conditions). Article 17, Regulation 714/2009/EC. See for a more in-depth analysis Van der Vijver 2012, pp. 336.

<sup>39</sup> Article 17, Regulation 714/2009/EC.

<sup>40</sup> OECD, International Energy Agency and Eurostat 2005, pp. 18 ff.

ties are either clean, also known as 'green' (sun, wind, hydro) or non-renewable, 'brown' (e.g. fossil fuels such as coal and petroleum).<sup>41</sup> As opposed to natural gas, which is a primary, non-renewable energy commodity by definition, measuring changes in the supply side of the mix in the electricity sector is therefore considerably easier.

It is for this reason that the electricity sector provides a suitable case study for exploring our question, the relevance of which is twofold: First, it helps us to understand if there is a causal link between liberalization and decarbonisation (i.e. an increase of clean energy feeding into the grid as a positive externality, by creating more space on the grid for clean energy producers), and to what extent. Second, in case this question can be answered in the affirmative, it may additionally provide some indicators on why liberalization legislation alone is not enough for clean energy to compete with 'brown' inputs in the electricity sector.

When considering the policies the EU has taken up in its energy directives over the past two decades, especially regarding Ownership Unbundling and Third Party Access in the electricity sector, one could make the following assumption: Through the implementation of this legislation 1) a larger share of producers of clean electricity can access the grid more easily; 2) thereby increasing the share of clean electricity in the energy mix. This way, it could be argued, unbundling and TPA policies have a positive externality, namely contributing to the decarbonisation of the grid by means of the diversification of energy inputs into the grid, by increasing the share of clean sources for the generation of electricity (e.g. wind, solar, hydro-electric, etc). It could thus be argued that if this is the case, liberalization legislation would simultaneously serve a public interest goal, namely contributing to a cleaner environment and sustainable development.

There is mixed evidence in economic and econometric literature to support this assumption. A branch of literature exploring the interplay be-

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<sup>41</sup> This distinction is widely used in economics literature.



tween market liberalization and innovation provides some interesting insights on these matters. Jamasb and Pollitt, for instance, have studied the patenting activities of transmission and distribution companies in the UK, by collecting data on renewable and non-renewable energies in the 2000s.<sup>42</sup> Their research demonstrates that while there was first a downward trend with respect to patenting activities at the start of liberalization policies, this was followed by a surge in these activities during the 2000s.<sup>43</sup> Nevertheless, at the same time, Jamasb and Pollitt concluded that liberalization as such was accompanied by a decline in overall R&D expenditures and cuts in the public budget.<sup>44</sup> Nemet and Kammen, furthermore, found a negative correlation between liberalization and an increase in patents for wind and solar power technologies in the US in the mid 2000s.<sup>45</sup>

Concerning the scale-up of renewable technologies specifically, Jamasb and Pollitt in their subsequent research contradict their earlier outcomes and conclude that an increase in environmental policies and support schemes introduced by the government does lead to an inherent growth in public R&D spending and the patenting of renewables.<sup>46</sup> Furthermore, other studies have indicated that innovation in clean energy was more likely to thrive in countries with more liberalized markets and that there was a causal link between the degree of liberalization and the success rate of clean energy policies.<sup>47</sup> Nesta, Vona and Nicolli, for instance, observe that *'In particular, the combination of environmental policies and market liberalization is the most effective method of inducing innovation in renewable energy, particularly near the technological frontier. This find-*

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<sup>42</sup> Jamasb and Pollitt 2011, pp. 309.

<sup>43</sup> *Ibid.*

<sup>44</sup> *Ibid.*

<sup>45</sup> Nemet and Kammen 2017, pp. 746.

<sup>46</sup> See generally Jamasb and Pollit 2011 and 2015.

<sup>47</sup> Nesta, Vona and Nicolli 2014, pp. 396.

*ing corroborates the complementarity hypothesis that environmental policies are more effective in competitive markets’.*<sup>48</sup> This indicates that while liberalisation of the market contributes to increasing the share of renewables in the grid, it may not be enough to correct sufficiently for market failures.

Analogous studies have been conducted in the European ‘brown’ electricity sector. In a 2016 study, Cambini, Caviggioli and Scellato studied EU electricity market regulation and innovation in the period from 1990-2009 by considering the growing number of patents in the traditional energy sector, based on Eurostat and International Energy Agency Data.<sup>49</sup> The authors indeed found an increase in patent activities in the traditional electricity sector as a result of market liberalisation, measured along the three factors of entry barriers, public ownership and vertical integration.<sup>50</sup> Especially, the econometric results found that policies aimed at reducing vertical integration, i.e. unbundling, have a positive influence on innovation in the European electricity sector.<sup>51</sup> However, a further 2014 study by Nicolli and Vona points out that lowering entry barriers is in fact a more significant force in facilitating renewable energy innovation, than privatization and unbundling.<sup>52</sup> Notwithstanding, they also conclude that this varies heavily across technologies (e.g. the well-developed wind industry profits from this).<sup>53</sup> Finally, the introduction of a more stable regulatory framework, in this particular study the Kyoto Protocol, amplifies the inducement effect of energy policies and privatization.<sup>54</sup>

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<sup>48</sup> Nesta, Vona and Nicolli 2014, pp. 409.

<sup>49</sup> Cambini, Caviggioli and Scellato 2016 23, pp. 734.

<sup>50</sup> *Ibid.*

<sup>51</sup> *Ibid.*

<sup>52</sup> Nicolli and Vona 2016, pp. 190.

<sup>53</sup> *Ibid.*

<sup>54</sup> *Ibid.*

What can we conclude from this evidence? Although the results point in various directions and are primarily deduced from using patents as a variable for measuring innovation in (renewable) energy, we can nevertheless draw some relevant inferences. It seems that in the primary phases of applying liberalization policies such as unbundling, patents in renewables and R&D spending first decrease. However, we also observe that subsequently, the market regains itself. Then, we witness an increase in innovation, especially in combination with governmental environmental policies and support schemes for renewables, by a growing number of patents in the 'green' and 'brown' European electricity sector alike. Especially policies promoting vertical unbundling appear to promote innovation in the sector, which seems to correspond with the fact that most energy industries have been historically vertically integrated. From this information, one can conclude that liberalization of the EU electricity market inherently does promote innovation, also in the renewable energy industry, measurable in the form of more patents in renewable energy technology. This given is notwithstanding any additional legislation for the scale up of clean and renewable energies.

However, the evidence also points to the fact that this is the most effective in countries where environmental *and* liberalization policies are combined. Moreover, while there may be strong indicators that liberalization *in se* does contribute, at least to some extent, to more clean energy technology innovation in the European electricity sector, this does not mean that it corrects for market failures adequately. Despite liberalization legislation, clean energy is still not on a par with 'brown' energy in the electricity grid. Several causes for this are discussed here.

First, the prices for fossil fuels (especially petroleum) vis-à-vis those for clean energy, while fluctuating over the decades, were considerably low

overall.<sup>55</sup> This fact was coupled with the reality that Europe was growing increasingly dependent on imported fossil fuels.<sup>56</sup>

Second, the traditional 'brown' industries have a first-mover advantage due to the early investments these firms have made to suit their production and transmission activities, vis-à-vis access the producers of clean and renewable energies.<sup>57</sup> While the number of players in the market may actually be increasing, it remains more challenging to change supply side of electricity mix and for clean energy firms to access the market.<sup>58</sup> Furthermore, there is a whole string of other, non-cost barriers that prevent clean energy capacity to compete with fossil fuels on a level playing field. These are comprised of both regulatory and non-regulatory barriers, e.g. administrative, physical, social (information asymmetry), financial barriers etc.<sup>59</sup>

#### **4 EU Renewable Energy Policy: Legal Instruments Correcting for Market Failures**

As the EU has undertaken binding commitments under international climate treaties (most recently under the 2015 Paris Agreement), it must make active efforts to curb emissions to prevent the further heating up of the earth.<sup>60</sup> The previous section demonstrated that there is indeed a causal link between liberalisation and decarbonisation of the EU energy

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<sup>55</sup> Johnston and Block 2012, pp. 303.

<sup>56</sup> Johnston and Block, 2012, pp. 306.

<sup>57</sup> See also generally Petropoulos and Willems 2017.

<sup>58</sup> Johnston and Block 2012, pp. 304.

<sup>59</sup> Johnston and Block 2012, pp. 320.

<sup>60</sup> Paris Agreement, *supra* note 4.

market. While liberalisation by means of unbundling is one of the cornerstones of the Union's energy policy, it evidently of itself is not enough to realize a significant decarbonisation of the European energy sector by means of scaling up the share of renewables in the market. Additional regulation to mitigate the negative externalities of CO<sub>2</sub> emissions is thus clearly necessary.

Liberalisation of the electricity market does correct adequately for market failures and for renewable energy to compete with brown energy on the grid on a level playing field. EU legislation to support renewable energy has been put in place with exactly this rationale in mind, to balance out this inequality and promote the share of renewables in the IEM.

The EU Renewable Energy Directive 2009/28/EC, also known as the Second Renewables Directive, is still the central legal instrument therein.<sup>61</sup> It sets ambitious goals for MS, for instance that the share of renewables in the overall EU energy mix should be 20, or even 30, per cent by 2020 (Article 3).<sup>62</sup> Moreover, it, among others, offers a framework for promoting renewable electricity, sets out mandatory national action plans for its 27 MS to ensure they reach their goals through binding renewable energy targets (Article 4 and 5), rules to overcome barriers to the development of renewable energy and ensure access to grid (Article 13,16).<sup>63</sup> More importantly, the Directive recognizes that for MS to meet that renewable energy targets, the need for support schemes to foster this goal is recognized in various articles of the Directive as a legitimate means to an end.<sup>64</sup>

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<sup>61</sup> EU Renewable Energy Directive 2009/28/EC.

<sup>62</sup> Article 3, EU Renewable Energy Directive 2009/28/EC

<sup>63</sup> *Ibid*; Johnston Block 2012, pp. 307-308.

<sup>64</sup> Article 2(k): “support scheme’ means any instrument, scheme or mechanism applied by a Member State or a group of Member States, that promotes the use of energy from renewable sources by reducing the cost of that energy, increasing the price at which it can be sold, or increasing, by means of a renewable energy obligation or otherwise, the volume of such energy purchased. This includes, but is not restricted to, investment aid, tax exemptions or reductions,

The 20 percent target of renewable energy in the overall EU energy mix by 2020 that is set by the EU is a complex construct by its conception and design: First, the 20 target is an aggregate target for the whole EU, not for all the MS separately.<sup>65</sup> The Directive in its Preamble states that:

*'Member States have different renewable energy potentials and operate different schemes of support for energy from renewable sources at the national level. The majority of Member States apply support schemes that grant benefits solely to energy from renewable sources that is produced on their territory. For the proper functioning of national support schemes it is vital that Member States can control the effect and costs of their national support schemes according to their different potentials.*

*[...]*

*In order to ensure the effectiveness of both measures of target compliance, i.e. national support schemes and cooperation mechanisms, it is essential that Member States are able to determine if and to what extent their national support schemes apply to energy from renewable sources produced in other Member States and to agree on this by applying the cooperation mechanisms provided for in this Directive.<sup>66</sup>*

Complex calculations were made to reach the overall Union total of twenty percent. The percentage of renewable energy targets each of the Member States must reach is taken up in their individual national action plans, ranging from 10 per cent (for Malta) to 49 per cent (for Sweden).<sup>67</sup>

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*tax refunds, renewable energy obligation support schemes including those using green certificates, and direct price support schemes including feed-in tariffs and premium payments'.*

<sup>65</sup> EU Renewable Energy Directive, Preamble para 17.

<sup>66</sup> EU Renewable Energy Directive 2009/28/EC, Preamble para 25.

<sup>67</sup> See EU Renewable Energy Directive, Annex I, 'National overall targets for the share of energy from renewable sources in gross final consumption of energy in 2020'.

Elements that were taken into consideration was the starting situation of each MS in 2005, plus an assessment of what percentage was possible to reach considering its fuel mix, economic development and realistic potential. Two remarks must be made in this respect. First, it should be mentioned that although the targets set by the EU for each of the Member States are binding, it is unclear what repercussions (apart from possible infringement proceedings by the Commission) follow in case the targets are not met. While the Commission requires MS to report on their progress every two years and the Commission itself engages in monitoring and reporting, nowhere in the directive itself does it state what the consequences are of non-compliance and/or a failure to meet the targets.<sup>68</sup> It is therefore quite remarkable that MS have taken their commitments so seriously, as Eurostat has indeed reported a steady increase in the energy mix of renewables since the introduction of the binding targets.<sup>69</sup>

Support schemes for the scale up of clean energy in the EU come in various forms, such as investment aid, tax exemptions or reductions, tax refunds, renewable energy obligation support schemes including those using green certificates, and direct price support schemes including feed-in tariffs and premium payments.<sup>70</sup> The feed-in tariff is by far the most popular support scheme for increasing the share of clean energy in the electricity grid up until now, although the EU plans to phase this instrument out over time.<sup>71</sup> Through the feed-in tariff, producers of clean energy receive a fixed, long-term guaranteed price per unit of energy fed into the grid. At present, there is a multiplicity of support schemes in the EU, differing in design, set-up and goal. There is no harmonization across MS of these schemes, resulting in a plethora of successful and less successful examples

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<sup>68</sup> Article 22 and 23, EU Renewable Energy Directive.

<sup>69</sup> See Eurostat news release, 'Renewable energy in the EU: Share of renewables in energy consumption in the EU still on the rise to almost 17 per cent in 2015' (14 March 2014) and detailed Eurostat results at: <<http://ec.europa.eu/eurostat/web/energy/data/shares>> accessed 21 July 2017.

<sup>70</sup> *Ibid.*

<sup>71</sup> Johnston and Block 2012, pp. 332; the EU wants to move away from FIT schemes towards Feed in premia.

of the scale up of clean energy in the electricity grid.<sup>72</sup> There seems to have been a conscious decision for not harmonizing EU's clean and renewable energy support schemes across Europe, one of which was the fact that both the schemes and renewable energy technologies as such are in the early stages of development that it would be premature to harmonize them across MS on the EU level.<sup>73</sup> While is this certainly a valid reason, for the purpose of this article it means that the schemes are difficult to map and monitor comprehensively at present.<sup>74</sup>

Nevertheless, disregarding international commitments, on EU level, support schemes for clean energy generally must abide by EU State Aid legislation.<sup>75</sup> According to EU State Aid rules, the Treaty generally prohibits State Aid unless it contributes to certain areas of economic development of a MS. It is defined as an advantage in all forms conferred on a selective basis to undertakings by national public authorities according to Article

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<sup>72</sup> One could think of the FIT scheme in Germany, that was constructed as an add-on to the consumer's bill. At the other spectrum there is Spain, where after initial subsidization of the renewable energy sector, the country had to cut back on support and incurred large amounts of debt because of, inter alia, the financial crisis and the design of the scheme.

<sup>73</sup> Johnston and Block 2012, pp. 339-340.

<sup>74</sup> The most comprehensive effort is the Beyond 2020 project, <<http://www.res-policy-beyond2020.eu/index.html>> accessed 21 July 2017, researching the design and impact of a harmonized policy for renewable electricity in Europe. Their comprehensive final report discusses pathways and possibilities for the harmonization of renewable energy across Europe, see Beyond 2020 2014.

<sup>75</sup> Articles 107-109 TFEU.



107.1 TFEU.<sup>76</sup> If found to be violation of EU State Aid law, the MS in question must abolish the aid.<sup>77</sup> However, some categories of State Aid, specified by decision of the Council, may be compatible with EU law.<sup>78</sup> Moreover, Article 109 TFEU stipulates that the council may determine that certain aid is exempted from regular state aid rules.<sup>79</sup>

As discussed above, it is clear that the EU allows support schemes for the purposes for the scale up of renewable energy to correct for market failures. As the Renewable Energy Directive in Annex 1 states: *'In order to be able to achieve the national objectives set out in this Annex, it is underlined that the State aid guidelines for environmental protection recognize the continued need for national mechanisms of support for the promotion of energy from renewable sources.'*<sup>80</sup>

Moreover, two more sets of regulations dating from 2014 are relevant in this respect: The 2014 Block Exemption Regulation Declaring Certain Categories of Aid Compatible with the Internal Market and the Commission Guidelines on State Aid for Environmental Protection and Energy.<sup>81</sup> The first document determines that state aid for environmental protection, including that for early adaptation to future Union standards, investment aid for energy efficiency measures, aid for high-efficiency cogeneration, investment aid for the promotion of energy from renewable sources, operating aid for the promotion of electricity from renewable sources, including those in small scale installations *'[...] shall be compatible with the internal market within the meaning of Article 107(3) of the Treaty and shall be exempted from the notification requirement of Article 108(3) of the Treaty, provided that the conditions laid down in this Article and in Chapter I are fulfilled.'*<sup>82</sup> The

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<sup>76</sup> Article 107.1 TFEU.

<sup>77</sup> Article 108.2 TFEU.

<sup>78</sup> Article 107.3 (e) TFEU.

<sup>79</sup> Article 109 TFEU.

<sup>80</sup> EU Renewable Energy Directive 2009/28/EC, Annex 1, footnote 1.

<sup>81</sup> EC, Commission Regulation No 651/2014 of 17 June 2014 declaring certain categories of aid compatible with the internal market in application of Articles 107 and 108 of the Treaty, OJ L187/1 (26.6.2014) (hereafter: Block Exemption Regulation) and Guidelines on State aid for environmental protection and energy 2014-2020, 2014/C OJ C200/1 (28.6.2014).

<sup>82</sup> GBER, *supra* note 5, Section 7, Articles 36-43.

Guidelines on State Aid for Environmental Protection and Energy sets out additional rules for these types of state aid to be compatible with the rules, with a higher goal of reaching the 20/20/20 targets.<sup>83</sup>

## 5 Conclusion

The evidence discussed in this contribution shows that liberalising the IEM by means of Unbundling and Third Party Access requirements in the energy sector inherently contributes to decarbonisation of the electricity grid.<sup>84</sup> Unfortunately, we have also come to the straightforward conclusion that liberalization legislation alone does not correct enough for market failures such as curbing CO<sub>2</sub> emissions by scaling up the amount of clean energy producers on the grid or active in the energy mix. Notwithstanding unbundling, clean energy is still not on a par with traditional, non-renewable energy. While liberalisation legislation contributes to decarbonising the grid by facilitating innovation, it has not been enough to correct for the negative externalities of carbon emission and it has not been able to make renewable energy compete with brown energy on the grid on a level playing field.<sup>85</sup> All in all, intervention from above is thus necessary to scale up the share of clean energy in the electricity grid on the supply side, while simultaneously developing policies to incentivize energy efficiency on the demand side.

In order for the EU to meet both objectives of liberalization and decarbonisation, legislation supporting the scale up of clean energy is thus necessary. Since 2009, the Commission has introduced binding targets for Member States for the share of renewables in their energy mix through

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<sup>83</sup> Guidelines on State Aid for Environmental Protection and Energy *supra* note 5, Preamble, under (3).

<sup>84</sup> See *supra* section 2.

<sup>85</sup> See on this specifically Struckmann and Sapi 2017, pp. 663 ff.

the Renewable Energy Directive, to 20, or even 30, per cent by 2020.<sup>86</sup> The introduction of these binding targets in 2009 has caused a steady rise in the share of renewables in their energy mix, evidences by data from Eurostat.<sup>87</sup> Aside from these binding targets, EU law moreover provides for legal and policy space under State aid law, by means the Guidelines and the GBER.<sup>88</sup> It is our good hope that, once adopted, the new clean energy package will step up the efforts in this direction and will deliver a set of rules allowing Europe to leapfrog to a truly decarbonized economy.

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<sup>86</sup> EU Renewable Energy Directive 2009/28/EC.

<sup>87</sup> See Eurostat, ‘Energy from Renewable Sources’ <[http://ec.europa.eu/eurostat/statistics-explained/index.php/Energy\\_from\\_renewable\\_sources](http://ec.europa.eu/eurostat/statistics-explained/index.php/Energy_from_renewable_sources)> accessed 21 July 2017.

<sup>88</sup> See *supra* note 5.

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