Competitiveness of corporate sourcing of renewable energy

Part 2 of the Study on the competitiveness of the renewable energy sector

Final report

ENER/C2/2016-501

28 June 2019

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List of acronyms and abbreviations

AIB	Association of issuing bodies
CEPS	Centre for European Policy Studies
CSR	Corporate social responsibility
DG COMP	Directorate-General for Competition
DG ENER	Directorate-General for Energy
EECS	European Energy Certificate System
Electricity Market Directive	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
Electricity Market Regulation	Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity
EU	European Union
EIB	European Investment Bank
ETS	Emission trading system
GDP	Gross domestic product
GO	Guarantee of origin
GVA	Gross valued added
MWh	Megawatt hours
MS	Member State
NECP	National energy and climate plan
PPA	Power purchase agreement
PV	Photovoltaic
RE	Renewable energy
REDII	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 (recast)
RES	Renewable energy sources
SME	Small and medium-sized enterprises

Abstract

This report constitutes the second part of a larger Study on the "Competitiveness of the Renewable Energy Sector", conducted by COWI and CEPS for DG ENER of the European Commission. The report focuses on the impact of corporate sourcing of renewable energy on the competitiveness of the European industry. European companies rely on renewables to meet their energy needs for three main reasons: i) strengthening their competitive advantage and increasing their demand, as consumers' choices are increasingly driven by sustainability considerations; ii) attracting more capital, as investors are growingly concerned about the environmental footprint of their investments; and iii) improving their cost competitiveness, as renewables may reduce energy costs. At the same time, EU companies face some barriers when trying to source renewables. Many barriers are addressed by the new 'Clean Energy for All Europeans' package; others will require additional measures. The report also estimates the potential impacts of corporate sourcing of renewables on the EU economy. Should EU-based industrial and commercial companies commit to source renewable electricity to meet 30% of their total demand of electricity by 2030, the EU renewable energy sector could generate more than €750 billion in gross added value and above 220,000 new jobs.

Executive summary

Overview. This report constitutes the second part of a larger Study on the "Competitiveness of the Renewable Energy Sector", conducted by COWI and CEPS for DG ENER of the European Commission. More specifically, it focuses on the competitiveness of corporate sourcing of renewable energy and answers **two key questions**:

- What are the drivers and constraints behind corporate sourcing of renewable energy?
- What is the impact of renewable energy on the competitiveness of EU companies?

The report presents the main findings of the following **research activities**:

- an online survey, which was completed by 68 companies operating in the European Union;
- nineteen semi-structured interviews with representatives of 14 different stakeholders' groups;
- two stakeholders' workshops;
- ten country-level background analyses;
- an estimate of the expected socio-economic impacts of corporate sourcing of renewable electricity based on a gross input-output approach;
- six case studies on corporate sourcing of renewables covering a wide range of countries, sectors and renewable technologies;
- desk research.

The report identifies and discusses the main **drivers and challenges** behind the corporate sector's transition to renewable energy and puts forward **policy recommendations** to foster such a transition. Both actual and perceived drivers/barriers are identified and should be harnessed/removed to foster the green energy transition in the corporate sector.

This part of the Study mainly focuses on renewable electricity and account for four main **corporate sourcing options**:

- self-generation of renewable electricity for self-consumption purposes;
- renewable power purchase agreements;
- unbundled guarantees of origin;
- renewable (green) energy offers.

Drivers. Most of the companies operating in the European Union decide to source renewable electricity primarily to improve their **corporate social responsibility strategy**, thus differentiating their offer and generating a competitive advantage. A sound corporate social responsibility strategy also brings more value to shareholders, especially if one considers that investors are increasingly concerned about environmental sustainability. Many companies rely on renewable electricity to meet green requirements established by their customers and to participate in **green supply chains**. In some sectors (e.g. construction), corporate sourcing of renewable electricity also paves the way for opportunities stemming from green public procurement. Impacts of renewable electricity on production costs are less clear, as some companies emphasise cost reductions linked to renewable electricity while others point at negligible impacts in terms of cost savings. At any rate, for most of the companies, a **reduction in energy costs** is the 'deal maker'/'deal breaker' for sourcing renewable energy.

Barriers. Policy uncertainty and **regulatory barriers** are deemed to be the most relevant challenges to corporate sourcing of renewable electricity, followed by higher electricity costs compared to 'standard' grid electricity[1], company culture preferring investments with higher returns, the fluctuating nature of renewable electricity (e.g. wind and solar) and financial barriers. When it comes to **policy uncertainty**, changes in support schemes and, more importantly, changes in the regulated components of the electricity prices (e.g. network costs, RES levies, etc.) hinder the decision to source renewable electricity. Rules change too fast and are quite different across Member States, thus making the sourcing strategy of companies operating in multiple EU countries less efficient. Despite corporate social responsibility strategies and environmental consciousness, so far most of the companies are willing to source renewable energy only if it does not cost more than conventional energy.

Policy recommendations. Against this background, supporting corporate sourcing of renewables requires actions that can be categorised in three main groups:

- **Fostering corporate investments in renewable technologies**.
  - Investment support in the form of grants, subsidised loans or tax deductions/credits would contribute to reduce the payback period of investments in renewable technologies and increase the expected returns.
  - Member States should create a one-stop-shop to authorise renewable installations and ascertain that the authorisation process is completed in a certain timeframe.
  - Ensuring that 'private wires' can be built in all Member States would allow relying on 'near-site' renewable installations that can be connected behind the meter. Taxation should not discourage 'near site' solutions.
  - Supporting research and innovation projects in renewable technologies is expected to reduce energy generation costs for the less mature technologies and increase the cost competitiveness of investments in such technologies.
- **Fostering corporate demand for renewable energy.**
  - Energy costs for renewable electricity purchased via power purchase agreements or green energy offers could be reduced by providing e.g. tax credits or exemptions from (some) energy taxes. Network costs and energy taxation should not discourage self-consumption.
  - Public policies may help mitigate price risk and uncertainty about future electricity prices by stabilising those components of the electricity price that depend on the regulatory framework.
  - EU ETS compensation schemes should ensure that electricity-intensive companies wishing to source renewable electricity are not disadvantaged vis-à-vis their competitors relying on conventional electricity.
  - National support schemes could be reformed to ascertain that support is granted in a cost-effective manner via a market-based approach. This will make power purchase agreements a more interesting option for generators of renewable electricity.
  - Policymakers could work to coordinate the development of cross-border transmission infrastructure and open-up existing networks to increased

[1] This is mostly a perceived barrier that, however, can materialise in a number of circumstances.

transmission capacity allocation, thus encouraging cross-border power purchase agreements.

- Public supported bank guarantees for renewable power purchase agreements may make such agreements interesting for a larger number of companies.
- Regulatory barriers affecting the transfer of guarantees of origin to off-takers should be removed.
- Improving trust in guarantees of origins and green energy offers is key to ensure that more companies will consider these options for corporate sourcing.
- Raising awareness about the available renewable solutions and positive impacts on business performance could have a substantial impact on companies' demand for renewable energy.
- Efforts should be made to remove any ambiguity in the interpretation of rules affecting corporate sourcing of renewables, as uncertainty increases 'perceived' regulatory barriers.
- It should be ensured that in all Member States generators and buyers can contract directly with each other. In addition, technical solutions should be devised to ensure that a corporate power consumer can have multiple supply contracts.

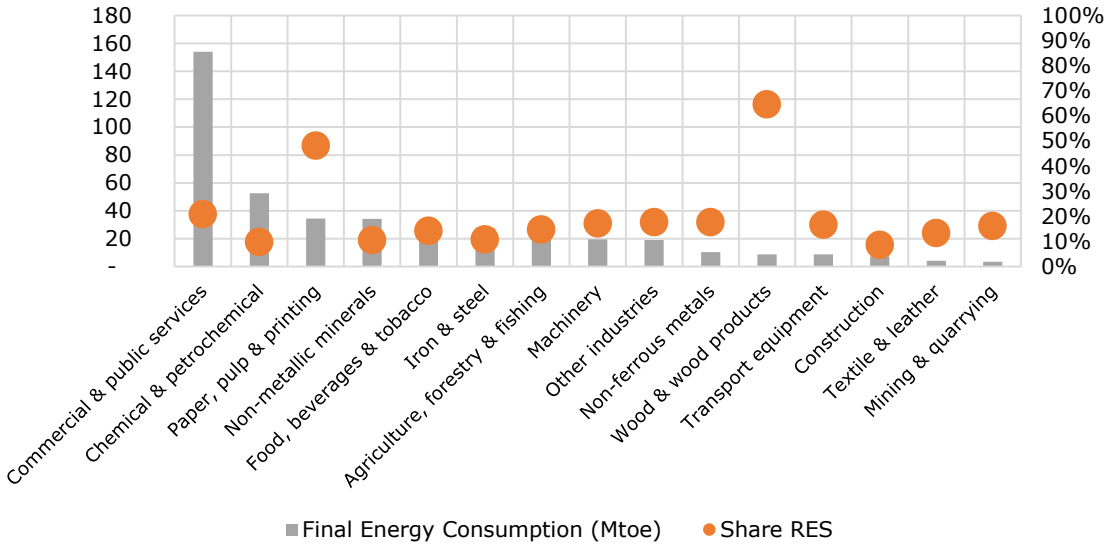
- **Fostering demand for green products and services**.
  - Raising awareness among consumers on the societal benefits of green energy is key to increase their willingness to pay for 'greener' products/services and, in turn, make more profitable for companies to participate in the green energy transition and serve new green markets.
  - Incentivising green consumption would also increase the demand for green products/services.
  - Green public procurement is a powerful tool to foster corporate sourcing of renewables by companies participating in the public procurement process as well as to create green supply chains involving also the suppliers of such companies.

1 Introduction

This **Final Report** constitutes the second part of a larger Study on the "Competitiveness of the Renewable Energy Sector", conducted by COWI and CEPS for DG ENER of the European Commission. The report focuses on the **competitiveness of corporate sourcing of renewable energy** (RE), thus shedding a light on companies that decide to rely on RE to meet their energy needs. More specifically, it identifies and discusses the **main drivers and challenges behind the corporate sector's transition to RE** and puts forward **policy recommendations to foster such a transition**. It also provides an overview of the expected impact of corporate sourcing of renewable electricity on jobs and gross valued added (GVA) in 10 Member States (MSs) of the European Union (EU).

Corporate sourcing is expected to play a central role when it comes to achieving the binding 32% RE target by 2030.[2] In fact, the corporate sector is responsible for about 40% of the overall final energy consumption and 70% of the total final electricity consumption in the EU, while resorting to a low share of renewables to meet its energy needs, on average below 20% (Figure 1). As further detailed in what follows, the need to foster corporate sourcing of RE has been acknowledged by the Clean Energy for all Europeans package[3] and, more specifically, by REDII, which has the potential to foster all the options for corporate sourcing (see Box 1) including renewable power purchase agreements (PPAs).

Figure 1 Final energy consumption and share of renewables out of final energy consumption by sector (EU, 2017)



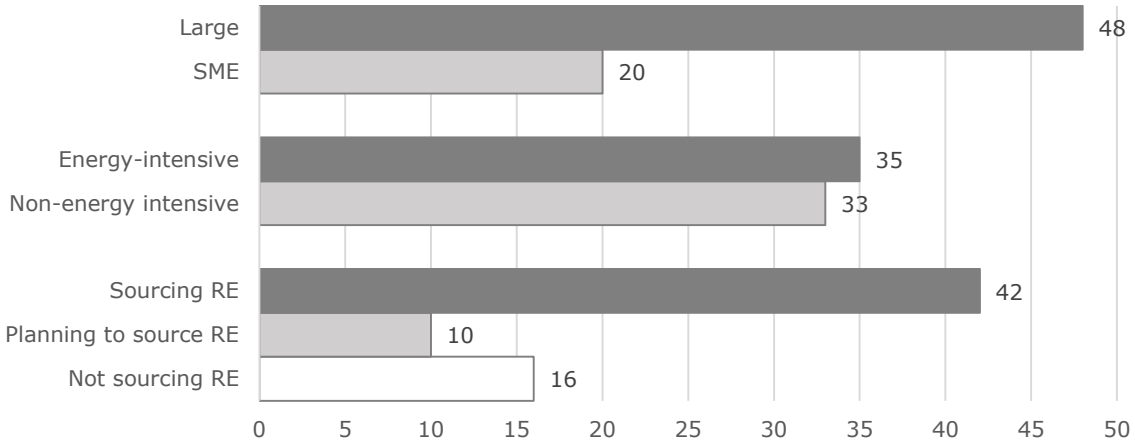
Note: Figures on final consumption of renewable electricity are missing. Therefore, it is assumed that the share of renewable electricity in the final consumption of electricity is equal to the share of renewable electricity in total national electricity generation. The service sector includes also public services.
Source: Authors' elaboration on Eurostat: Energy Balances and SHARES.

[2] See Article 3 of the 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 (recast) (hereinafter, 'REDII').
[3] For further details, please see: https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/clean-energy-all-europeans.

The report draws upon the main findings of the following research activities conducted between May 2018 and April 2019:

- An **online survey**, which was completed by 68 companies operating in the EU. Respondents include, *inter alia*, 20 small and medium-sized enterprises (SMEs), 35 companies operating in more than one country, 35 energy-intensive companies, 42 companies that are actively sourcing RE and 10 companies that are planning to source RE in the next three years (Figure 2). Interestingly, the clear majority of respondents do not participate in the RE100 initiative;[4] therefore, the main findings of this survey may complement those of similar studies presenting the views of RE100 members (see Annex C, for further details).

Figure 2 Number of companies participating in the online survey



Source: Authors' elaboration on survey results.

- Nineteen **semi-structured interviews** with representatives of 14 **different stakeholders' groups** including RE associations, associations representing the energy industry, associations representing specific industrial sectors, companies operating in energy-intensive industries and international organisations active in the field of renewables (see Annex C, for further details).
- Ten **country-level background analyses**, based on 20 interviews (two per MSs) and desk review of Eurostat data, data provided by the Association of Issuing Bodies (AIB), draft integrated national energy and climate plans (NECPs) and 'grey' literature on corporate sourcing of RE at the national level. The following countries were covered:[5] Bulgaria, France, Germany, Ireland, Italy, the Netherlands, Poland, Romania, Spain and Sweden (see Annex B, for further details).
- An estimate of the expected **socio-economic impacts of corporate sourcing of renewable electricity** in the 10 MSs covered by the country-level background

[4] For further details, please see: http://there100.org/

[5] The countries were selected in cooperation with DG ENER by relying on the following criteria: main RE technology adopted; main support schemes to foster RE uptake; economic performance in terms of gross domestic product (GDP) per capita; progress made toward the 2020 RE target; geographical coverage of different EU regions; economic structures in terms of prevalent sectors; and familiarity with corporate power purchase agreements (PPAs).

analyses. Estimates are based on a gross input-output approach and rely on a scenario analysis featuring three different levels of corporate's uptake of RE (see Annex D, for further details).

- Six **case studies** on corporate sourcing of renewables (see Annexes A.1 to A.6, for further details) covering the following companies (and sectors): i) AGRIS (plant propagation/horticulture) ii) Alcoa and Norsk Hydro (primary aluminium); iii) Altair Chimica (inorganic basic chemicals); iv) Google (tech company); v) Metro (wholesale of food and non-food products); and vi) WWRD (glass tableware).
- **Desk research** including a review of the most recent literature on the topic, which is referred to in the footnotes of this report and Annexes, as well as of the current EU legislation and of any relevant material shared by stakeholders participating in interviews and/or in the **two stakeholders' workshops** organised in the context of this part of the Study[6].

Against this background, the remainder of the present report is structured as follows:

- Chapter 2 details the **main drivers** for corporate sourcing of renewable electricity by sourcing option. It also presents the expected socio-economic impact stemming from corporate sourcing of renewable electricity as well as the drivers behind companies' decisions to source RE for heating and/or cooling purposes.
- Chapter 3 discusses the **main barriers** to corporate sourcing of renewable electricity by sourcing option. It also provides an overview of the main obstacles to corporate sourcing of RE for heating and/or cooling purposes.
- Chapter 4 puts forward **policy recommendations** to foster the green energy transition in the corporate sectors. The recommendations revolve around three main pillars: i) fostering corporate investment in renewable technologies; ii) fostering corporate demand for RE; and iii) fostering overall demand for green products.

Box 1 Options for corporate sourcing of renewable electricity

In line with the classification adopted by IRENA,[7] this report considers four options for corporate sourcing of renewable electricity:

- **Self-generation of renewable electricity** via e.g. solar photovoltaic (PV) or wind turbines for self-consumption purposes. This option includes both direct ownership of the RE installations as well as third-party developers installing on-site generation systems under e.g. a lease contract. Although the latter case entails some form of (behind the meter) PPAs, they are usually classified under the self-generation category.[8]

[6] The kick-off workshop was held on 31 May 2018 at CEPS and aimed to engage all relevant stakeholders; it featured a general presentation of this part of the Study by DG ENER followed by a detailed presentation of the envisaged research activities by CEPS (for further details, please see: https://www.ceps.eu/events/corporate-sourcing-renewable-energy). A second stakeholders' workshop was held on 29 January 2019 at CEPS and aimed to validate the preliminary results of this part of the Study, presented in the Second Progress Report; it featured a presentation of the main findings by CEPS, followed by a panel discussion with representatives of the RE-Source Platform, Eurometaux, Google and CEFIC and concluded by remarks from DG ENER (for further details, please see: https://www.ceps.eu/events/stakeholder-workshop-corporate-sourcing-renewable-energy). Both events allowed for participation from remote, were attended by over 100 participants and included Q&A sessions to provide clarification and collect feedback.

[7] IRENA (2018), *Corporate sourcing of renewables: market and industry trend – REmade Index 2018*, International Energy Agency, Abu Dhabi: UAE.

[8] In line with this definition, Article 21.5 of REDII envisages that "the renewables self-consumer's installation may be owned by a third party or managed by a third party for installation, operation, including metering and maintenance, provided that the third party remains subject to the renewables self-consumer's instructions". In the same vein, Article 15 of the new Electricity Market Directive (Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for

- **Renewable power purchase agreements** (PPAs), i.e. contracts under which a legal or natural person agrees to purchase renewable electricity directly from an energy generator. This option includes both physical and virtual PPAs. RE PPAs are still in their infancy in the EU; in fact, while the first agreements were signed in the UK in 2012 only in the recent past the number of deals started growing at an exponential rate and across multiple MSs.[9]
- **Unbundled guarantees of origin** (GOs), i.e. purchasing GOs (from e.g. an RE generator or a third-party broker) that certify the renewable attributes of electricity without acquiring the electricity for which the GOs were issued. Companies use such unbundled GOs to match (at least part) of their consumption of electricity. The GO system was for the first time introduced at the EU level by article 5 of the 2001 Renewable Energy Directive.[10]
- **Renewable (green) energy offers** from utilities or electricity suppliers; such suppliers provide green grid electricity by either direct sourcing from independent RE generators or by bundling electricity with GOs (to prove that their electricity is green).

Stakeholders consulted for this Study pointed out that most of the companies prefer to diversify their procurement risk by **relying on multiple options to source renewables**. For instance, they combine self-generation with one or more PPAs while they keep on buying a share of electricity either from a supplier (occasionally green) or on the wholesale market; they may also rely on unbundled GOs to green the last variable portion of their electricity consumption.

When it comes to the relevance of each option, unbundled GOs are the most common sourcing option (46% of the total renewable electricity sourced) among RE100 members, followed by renewable energy offers (35%), RE PPAs (16%) and self-generation (about 2%).[11] By contrast, IRENA data show that self-generation is the most common corporate sourcing options (35%), followed by unbundled GOs (28%), RE PPA (25%) and green energy offers (7%).[12] Representative data focusing on EU companies are not available. Based on consultation activities carried out for this Study, RE PPAs are still a niche option in the EU, although with a great potential to scale up; unbundled GOs seem to be less relevant when it comes to SMEs, which prefer to rely on green energy offers.

The Final Report is complemented by four Annexes:

- Annex A (composed of six separate documents, from A.1 to A.6) presents **six case studies** on corporate sourcing of RE.
- Annex B comprises 10 county-level background analyses.
- Annex C summarises the **main findings of the online survey and in-depth interviews** conducted in the context of this part of the Study.

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electricity and amending Directive 2012/27/EU) is expected to allow active customers (including self-generators) to delegate to a third party the management of the installations required for their activities.

[9] European Commission elaboration on Bloomberg Energy Finance.

[10] Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market *OJ L 283, 27.10.2001, p. 33–40.*

[11] RE100 (2018), *Moving to truly global impact - Influencing renewable electricity markets*, RE100 Progress and Insights Annual Report, November 2018

[12] IRENA (2018), *Corporate sourcing of renewables: market and industry trend – REmade Index 2018*, International Energy Agency, Abu Dhabi: UAE.

- Annex D provides an estimate of the **expected socio-economic impacts** of corporate sourcing of renewable electricity up to 2030.

Before presenting the key findings of this part of the Study, the **main limitations** of the adopted methodology need to be discussed:

- **Drivers and barriers behind the corporate sector's transition to RE were mainly detected via consultation activities** (see above). Whereas the results of the consultation activities were validated and complemented via desk research and expert assessment[13], both actual (e.g. positive impact in terms of environmental sustainability, legal barriers to direct contracting between generators and buyers) and perceived (e.g. easiness to source unbundled GOs, negative impacts of the variability of the renewable electricity generation on the production process) drivers and barriers are reported in what follows. In fact, both actual and perceived drivers/barriers should be harnessed/removed to foster the green energy transition in the corporate sectors. To the extent possible, existing solutions to perceived barriers as well as clarification regarding perceived drivers are presented in the report.
- As the findings presented in this Final Report were chiefly identified via consultation activities, **the analysis is backward looking and presents drivers and barriers that have been experienced so far by EU companies**. This is equivalent to saying that some of the drivers may be amplified and some of the barriers may be addressed by the rules contained in the Clean Energy for all Europeans package[14] or by the new policies and measures proposed by MSs in the NECPs. In this respect, to the extent possible, the potential impacts of new legislation on the detected drivers and barriers are discussed in the footnotes of this report. As a matter of fact, new drivers, as well as new barriers, may also stem from new EU rules (and national implementation of these rules); such potential drivers and barriers are not covered by this report.
- As the online survey was answered by 68 companies, the survey's results are not statistically representative of the EU corporate sector. In this respect, key findings of the survey were complemented via in-depth interviews with relevant stakeholders' groups and validated via a stakeholders' workshop held in January 2019[15]. At any rate, the **drivers and barriers presented below do not necessarily represent the views of the EU corporate sector**. In the same vein, they do not necessarily represent the views of all consulted stakeholders.
- This part of the larger Study on the "Competitiveness of the Renewable Energy Sector" **mainly focuses on renewable electricity**. This specific focus was agreed upon with DG ENER by considering that the first part of the Study is entirely devoted to the renewable heating and cooling sector. Nevertheless, information on drivers and barriers affecting corporate sourcing of renewable heating and cooling were collected via both the online survey and, to the extent possible, the case study analysis. One case study (AGRIS, see Annex A.4) only focuses on renewable heating.

[13] An Advisory Group composed by IRENA, SolarPower Europe and Wind Europe provided useful comments on the Second Progress Report of this Study, which presented draft findings of the consultation activities.
[14] See footnote 3.
[15] For further details, please see footnote 6.

2 Drivers

Based on the consultation activities and desk research conducted for this part of the Study, most of the companies operating in the EU decide to source renewable electricity primarily to **improve their corporate social responsibility** (CSR) **strategy**,[16] thus differentiating their offer and generating a competitive advantage (Figure 3 shows the results of the online survey conducted for this Study).[17] This competitive advantage is expected to increase the demand for products/services provided by companies relying on RE. Nevertheless, while consumers and customers show **growing interest in 'greener' products**, the willingness to pay a 'premium price' for such products appears to be still limited. A sound CSR strategy also brings **more value to shareholders**, especially if one considers that (institutional) investors are increasingly concerned by environmental sustainability.[18] These conclusions were largely confirmed by most of the companies participating in the case study analysis, such as Altair Chimica, Alcoa, Norsk Hydro, Google, Metro and WWRD (see Annexes A.1, A.2, A.3, A.5 and A.6). In this context, it is worth mentioning that EU law places a large emphasis on CSR and requires large corporates to disclose information on how they manage social and environmental challenges.[19]

Many companies rely on renewable electricity to meet green requirements established by their customers and to **participate in green supply chains**. In this respect, **large companies can play a pivotal role** in making supply chains greener and incentivising their suppliers (including SMEs) to embrace the green energy transition. In some sectors (e.g. construction), corporate sourcing of renewable electricity also paves the way for opportunities stemming from **green public procurement**.

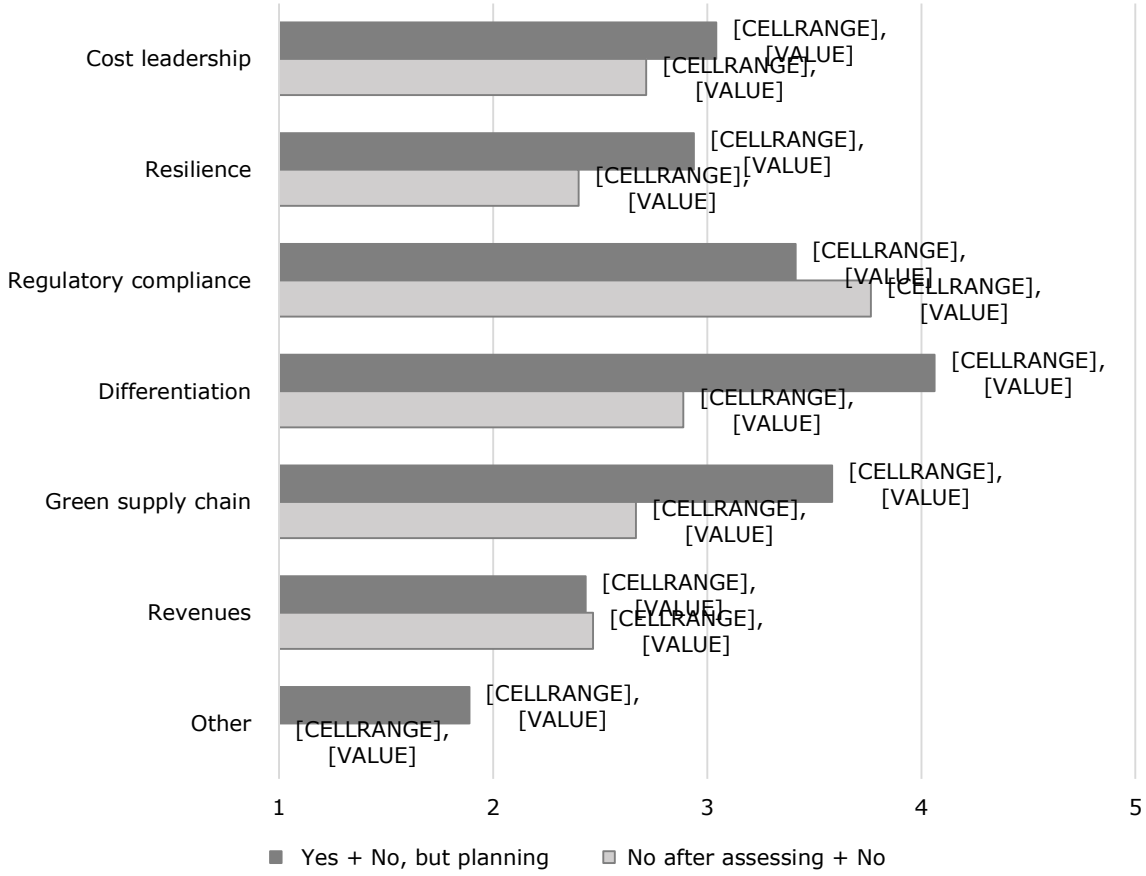
[16] This result is fully aligned with the RE100 Annual Report, which shows that CSR is the main driver for renewable electricity sourcing by RE100 companies, followed by the need to manage greenhouse gas emissions and then by cost savings. For further details, please see: RE100 (2018), *Moving to truly global impact - Influencing renewable electricity markets*, RE100 Progress and Insights Annual Report, November 2018. In addition, 90% of the companies participating in a recent survey conducted by BayWa r.e. confirms that they use RE to have a better public image (for further details, please see: BayWa r.e., *Energy Report 2019*).

[17] This competitive advantage seems to lead to an increased demand for products/services provided by green companies: 25 out of 68 respondents to the online survey confirmed that the decision to source renewable electricity increased (or is expected to increase) the demand for their products; some of them estimated an increase between 1 and 10%. A recent study conducted by Capgemini shows that companies that are participating in the RE100 initiative (http://there100.org/) are achieving above-average financial performance. Although, the Capgemini study does not suggest causality, it shows that companies embracing the green energy transition are also leaders in their sectors (for further details, please see: Capgemini (2018), *Making business sense: How RE100 companies have an edge on their peers*, Energy transition and profitability, Insight Report, September 2018).

[18] Please see, for instance, the role played by sustainable (and green) finance in the EU: https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance_en

[19] For further details, please see: Directive 2014/95/EU of the European Parliament and of the Council of 22 October 2014 amending Directive 2013/34/EU as regards *disclosure of non-financial and diversity information by certain large undertakings and groups*. *OJ L 330, 15.11.2014, p. 1–9*.

Figure 3 Results of the online survey - Renewable electricity: opportunities (number of respondents, left; average evaluation, right)[20]



Note: 1=Not at all; 2=To a limited extent; 3=To some extent; 4=To a high extent; 5=To the fullest extent; regulatory compliance here mainly refers to complying with internal sustainability targets and rules set by headquarters to implement a CSR strategy rather than national or EU legal obligations.
Source: Author's elaboration on the online survey.

[20] The following question was asked to companies that are sourcing or planning to source renewable electricity: "To what extent does your company's decision to source renewable electricity have (or is expected to have) a positive impact on the following dimensions?". The following question was asked to companies that are not sourcing renewable electricity: "Although your company is NOT sourcing renewable electricity, to what extent does your company believe that renewable electricity will have a positive impact on the following dimensions?". The relevant dimensions were further detailed as follows: i) cost leadership - renewable electricity may help reduce energy expenses and cut production/operating costs.; ii) resilience - renewable electricity may increase the price stability, predictability and security of energy inputs; iii) regulatory compliance - renewable electricity may contribute to compliance with climate change and environmental legislation; iv) differentiation - renewable electricity may contribute to corporate social responsibility and the environmental sustainability of the company, thus generating a competitive advantage; v) green supply chain -renewable electricity is needed to meet green requirements requested by their customers; vi) revenues- renewable electricity may allow the company to get subsidies or tax credits linked to support schemes for renewables; and vii) other - this may include non-energy related factors.

Impacts of renewable electricity on production costs are less clear, as some companies emphasise cost reductions linked to renewable electricity[21] while others point at negligible impacts in terms of cost savings. This may be due to two main reasons: i) whereas generation costs for electricity from renewable energy sources (RES) are going down fast, only new projects (or installations that have reached the end of their subsidy scheme and are looking to extend their useful life) seem to be cost competitive; ii) while generation costs are relevant for self-generation, they are somehow less relevant for PPAs and, especially, green energy offers, as generators and suppliers look at the wholesale electricity price when negotiating with buyers.[22] At any rate, for most of the companies, a **reduction in energy costs** is the 'deal maker' (or 'deal breaker') for sourcing RE.[23] This was for instance confirmed by the Google case study, which shows that stable and low RE prices reduce electricity expenses and operating costs in the long-term (see Annex A.3), and by the Metro case study, which shows that Metro mostly invests in green energy if it is cheaper than conventional energy in the long run (see Annex A.6). Impacts on cost competitiveness were also mentioned by Alcoa and Norsk Hydro (see Annex A.2) as well as by Altair Chimica (see Annex A.5).

Companies that are not sourcing renewable electricity do not see major benefits in terms of CSR strategy/differentiation, participation in green supply chains or increased resilience (i.e. price stability, predictability and/or security of energy inputs).

Interestingly, renewable electricity by itself can only partially contribute to increasing **resilience** due to the fluctuating nature of some RES such as wind or solar; resilience may only be ensured by complementing renewable electricity sourcing with e.g. balancing/shaping agreements (in case of PPAs) or net metering solutions (in case of self-generation). This general conclusion is confirmed by consulted **energy-intensive companies**, which emphasised that renewable electricity so far does not help reduce operating costs or increase resilience.

In the case of **self-owned installations** (which, reportedly, are quite rare) revenues stemming from support schemes (subsidies, tax credits) seem to have a limited role in corporates' decisions to source renewable electricity; companies would be more interested in investment support.

Box 2 Socio-economic impact of corporate sourcing of renewable electricity

Estimates based on a gross input-output approach in the 10 MSs covered by this Study (Bulgaria, France, Germany, Ireland, Italy, the Netherlands, Poland, Romania, Spain and Sweden) show that the **cumulative GVA** stemming from manufacturing, construction, operation and maintenance of new renewable electricity installations linked to corporate sourcing ranges between **€12 billion** (lower bound scenario) **and €758 billion** (upper bound scenario) by 2030. The yearly average effects in terms of GVA are estimated to range between €0.9 and €50.5 billion up to 2030, depending on the relevant scenario. Based on the same approach, in the countries under analysis, the yearly average employment effects generated by new renewable electricity installations associated with corporate sourcing are estimated to go from **4,600 to 221,200 additional full-time equivalents** up to 2030, depending on the selected

[21] By way of example, 25 out of 28 respondents to the online survey confirmed that the decision to source renewable electricity reduced (or is expected to reduce) the company's operating costs; most of them estimate a reduction between 1% and 10%.

[22] Generators and sellers use the generation costs as background information when negotiating, but their alternative route to market is always the wholesale price.

[23] A recent study conducted by BayWa r.e confirms that costs are the main factor that companies consider when deciding to invest in RE. For further details, please see: BayWa r.e., *Energy Report 2019*.

scenario.
The **lower bound scenario** aims to provide a conservative estimate based on the most recent data about companies' strategies in terms of RE sourcing and the assumption that they will continue to act in the same way. Therefore, it is assumed that active corporate sourcing of renewable electricity will amount to 3.5% of the additional electricity demand of industry and service sectors, which is the share recently reported by IRENA at the global level.[24] This provides a benchmark (baseline scenario) against which additional impacts can be measured. The **upper bound scenario** is built on the assumption that all the additional renewable electricity capacity required to fulfil the projections included in the EU Reference Scenario 2016 of the EU Commission[25] will be funded via corporate sourcing. This scenario would require a commitment by EU-based industrial and commercial companies to source renewable electricity to meet about 28% of their total demand of electricity (in 2030) and to ensure that such commitment generates additionality, i.e. new investments in renewable electricity. Therefore, this scenario considers a rapid scale-up of corporate sourcing activities in all selected countries.

2.1 Self-generation of renewable electricity

The main factor driving companies' decision to self-generate (and self-consume) electricity is the **improvement in terms of CSR and environmental sustainability**, followed by the positive impact on stakeholders (including employees) stemming from the visible link between the company's premises and the renewable power plant. **Lower generation costs** compared to the price paid for grid electricity also play a central role for most of the companies operating in the EU. Self-generation ranks high in terms of stability of electricity costs, additionality and savings on taxes and other non-energy components of the electricity price. In many cases, to reduce risks, companies prefer to lease e.g. their rooftops to solar PV project developers and buy the generated electricity rather than have the direct ownership of the renewable installations; as discussed in Box 1, this option still falls within the definition of self-generation.

2.2 Renewable power purchase agreements (PPAs)

Besides featuring **positive impacts in terms of CSR and environmental sustainability**, RE PPAs have important advantages because they **do not entail up-front investments costs** for off-takers, have limited investment risk, ensure the **stability of electricity prices** and may guarantee **electricity prices lower than grid electricity**. The key role played by the stability of the electricity prices was confirmed by the case studies conducted with primary aluminium producers as well as with Google (see Annexes A.2 and A.3); primary aluminium producers revealed that this specific benefit, however, is cost-effective only in those markets where generation and consumption profiles can be balanced at a competitive cost. RE PPAs allow to purchase electricity from **large-scale (cost-effective) renewable projects** (especially when multiple buyers are allowed[26]), thus potentially meeting a large share (in principle up to 100% in some sector) of the off-taker's electricity demand. RE PPAs

[24] IRENA (2018), *Corporate sourcing of renewables: market and industry trend – REmade Index 2018*, International Energy Agency, Abu Dhabi: UAE.
[25] The 2016 edition of the EU Reference Scenario envisages that by 2030 24.3% of the EU overall final energy consumption and 42.5% of the EU final electricity consumption will come from renewables. For further details, please see: https://ec.europa.eu/energy/en/data-analysis/energy-modelling
[26] Article 22 of REDII allows companies to participate in "renewable energy communities", i.e. grouping of final customers that can, *inter alia*, purchase electricity via PPAs.

may also ensure **additionality**, especially if they involve new installations that are not subsidised.

Companies that primarily sign PPAs for price hedging purposes have limited interest in GOs. By contrast, off-takers that mainly look at RE PPAs to improve their CSR strategy are interested in **getting and cancelling GOs** for the electricity purchased (this finding was confirmed by Google, see Annex A.3). In this respect, in those MSs (such as France and Germany) where renewable projects benefitting from public support schemes are not allowed to receive GOs over their production, this second group of companies may have reduced interest in signing PPAs for subsidised projects. Therefore, RE PPAs are more common in those MSs (e.g. the Netherlands and Sweden) that allow companies to receive operational support for (eligible) RE production and claim GOs over the same production. In this respect, the growing GO prices make GOs a more central item in negotiations between project developers and off-takers to conclude long-term PPAs.

Reportedly, **'strike prices' in RE PPAs are becoming competitive also for non-subsidised RE plants**; in fact, generation costs are decreasing fast and, in the absence of public support, generators (especially when projects are sold to institutional investors) may accept relatively lower prices in exchange for long-term revenue streams.[27]

2.3 Unbundled Guarantee of Origins (GOs)

The main driver to choose unbundled GOs to source renewable electricity is the **positive impact on CSR** together with the fact that **GOs are considered easy to source**, do not require any up-front investment or investment risk and allow for a **short-term commitment**. Interestingly, companies that are not relying on unbundled GOs believe that GOs are a low-cost solution and they hardly generate additionality, thus showing a lack of trust in the GO system. It is worth remarking that **GOs provide plenty of information about the underlying renewable electricity** (e.g. where and when it was generated, from which installation and technology, whether the installation was benefitting from public support schemes, etc.);[28] this allows corporates to buy GOs from specific types of renewable installations (e.g. from solar and wind plants, recently built plants, plants in a certain location), thus ensuring some additionality. Finally, available evidence shows that the price for certain types of GOs (in some countries and for some technologies) is growing fast, thus increasing the costs to rely on this option. Many corporates choose to combine the different corporate sourcing methods and use GOs to green the last variable portion of their electricity demand.

2.4 Green energy offers

The main decision driver leading to green energy offers is the **positive impact in terms of CSR** and environmental sustainability (especially when premium offers are available), followed by a number of additional factors such as: i) **no up-front capital required**; ii) **short-term commitment**; iii) no investment risk; iv) **easy to source** (e.g. finding offers and contracting); v) trust in the supplier (to avoid 'greenwashing' and ensure the continuity of supply[29])[30]; and vi) compatibility with large renewable

[27] Reportedly, in Spain the forward price is at around 50€/MWh and generation costs for solar power are slightly below 30€/MWh, while a RE PPA may be signed at around 40€/MWh.
[28] The minimum amount of information to be indicated on a GO is spelt out in Article 19.7 of REDII.
[29] Some companies, especially those operating in energy-intensive sectors, are concerned by the quality of the electricity supply and, more specifically, by the impact of power outages on their production process. In

projects with economies of scale. Most of these drivers were also confirmed by WWRD, a company relying on a green energy offer to meet 100% of its electricity needs (see Annex A.1).

Box 3 Corporate sourcing of RE for heating and/or cooling: drivers

RE for heating and/or cooling purposes is expected to **contribute to CSR strategies** and **help differentiate green products/services**, thus creating a competitive advantage. In addition, heating and/or cooling from RES allows **complying with climate change and environmental legislation**, in particular with thresholds for CO_2 emissions established by the EU emission trading system (ETS) as well as comparable national rules affecting all companies, including those that are not covered by the EU ETS. **Reduction in production costs**, resilience (price stability, predictability and security of energy inputs) and participation in green supply chains also represent interesting opportunities to rely on RES for heating and/or cooling purposes. For instance, the reduction of fuel costs was the main driver for AGRIS, a Greek company relying on solid biomass boilers (see Annex A.4). Additional opportunities are stemming from **combined heat and power solutions** based on RES (e.g. biomass and biogas), which contribute to increasing energy efficiency, reduce energy costs and make renewable heating more attractive from a financial standpoint. Connection to a **district heating network** may also make the difference, as excess heat can be monetised; in this respect, early adopters are better placed than newcomers, as heat cannot travel long distances and local district network may be already served by other players. Finally, the emergence of renewable heating and cooling GO systems could further stimulate the use of RE for heating and/or cooling purposes; such systems may face, however, major implementation issues that need to be addressed via pilot projects.

this respect, they will accept to sign green energy offers only if they trust the supplier and believe that continuity of supply is fully ensured.

[30] Some stakeholders have also stressed that local/regional utilities can play a key role in developing green energy offers that ensure additionality.

3 Barriers

Policy uncertainty and regulatory barriers are deemed to be the most relevant challenges to corporate sourcing of renewable electricity, followed by higher electricity costs compared to 'standard' grid electricity[31], company culture preferring investments with higher returns, the fluctuating nature of renewable electricity (e.g. wind and solar) and financial barriers (Figure 4 shows the results of the online survey conducted for this Study). When it comes to policy uncertainty, changes in support schemes and, more importantly, changes in the regulated components of the electricity prices hinder the decision to source renewable electricity. The latter issue was especially emphasised by energy-intensive companies, including the primary aluminium producers covered via case study analysis (see Annex A.2). Reportedly, **rules change too fast and are quite different across MSs**, thus making the sourcing strategy of companies operating in multiple EU countries less efficient.[32] Despite CSR strategies and environmental consciousness, so far **most of the companies are willing to source RE only if it does not cost more than conventional energy**.

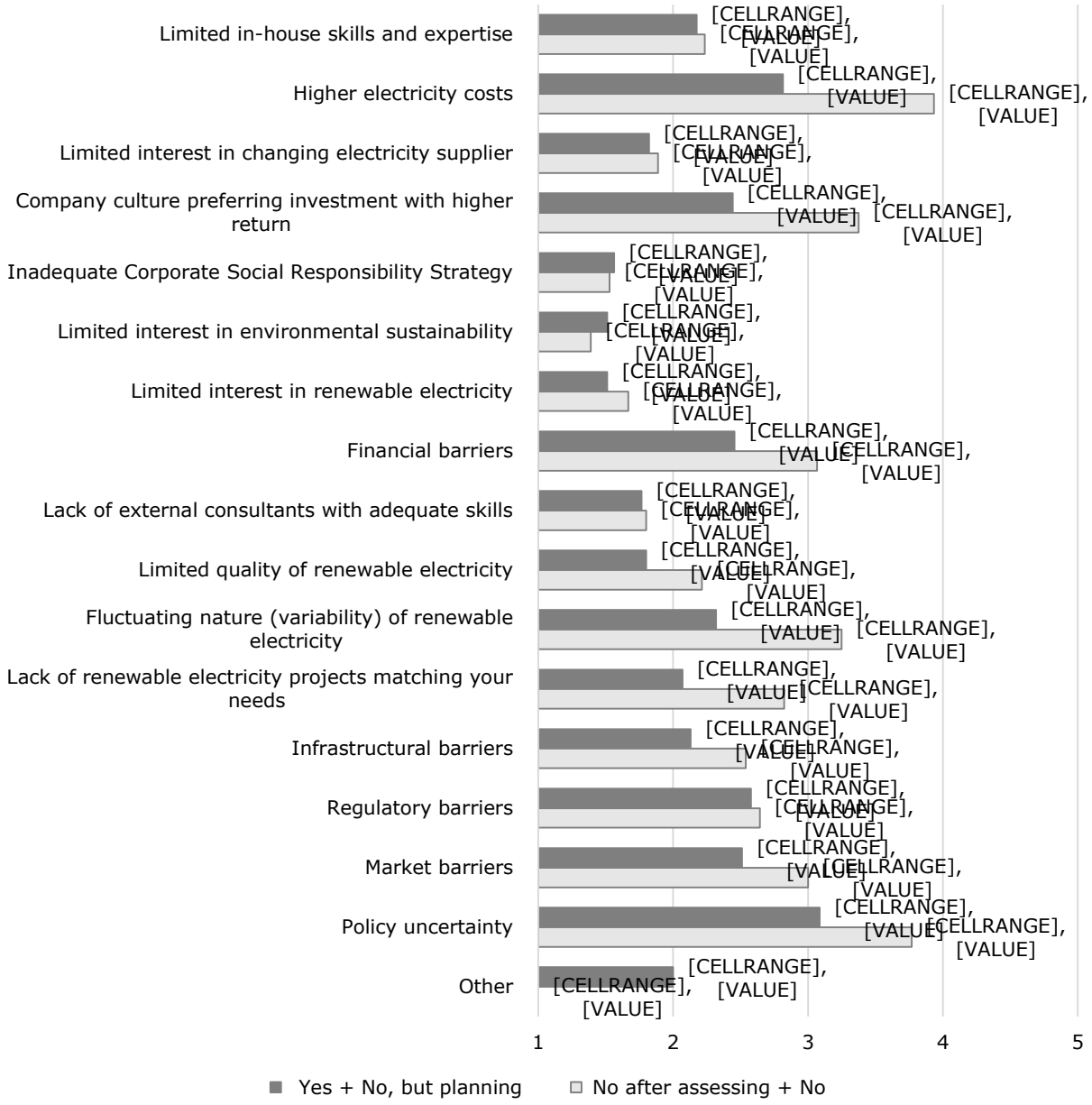
A specific barrier affects **energy-intensive industries** that are exposed to a significant risk of carbon leakage due to EU ETS allowance costs passed on in electricity prices. In principle, according to the relevant Commission's guidelines,[33] such companies can be granted **state aid to reduce the EU ETS indirect costs** they face. However, stakeholders argue that in some MSs (e.g. Germany) the implementation of the EU guidelines does not allow companies purchasing renewable electricity to get compensated for indirect EU ETS costs. This would generate disparities between companies buying green electricity via e.g. PPAs and green energy offers and those buying conventional electricity. In fact, they both pay a price for electricity that is largely aligned with the wholesale electricity price and accounts for indirect EU ETS costs. Nonetheless, companies purchasing conventional electricity are compensated for part of the price they pay, whereas companies buying green electricity would not be eligible for such compensation. This reduces any incentive to purchase renewable electricity, which would cost substantially more than conventional electricity. These findings were confirmed by the case study on primary aluminium (see Annex A.2).

[31] This is mostly a perceived barrier that, however, can materialise in a number of circumstances, as further discussed when analysing barriers to specific options for corporate sourcing of renewables.

[32] Differences across Member States are further discussed in what follows (when analysing barriers that affect specific options for corporate sourcing of renewable electricity) and detailed in Annex B. With regard to self-generation, for instance, Member States have applied so far very different support schemes for renewable technologies and in some countries such schemes were deeply modified across the years, sometimes also with retroactive effects. In the same vein, the installation of e.g. solar PV on rooftops depend on building codes, which vary both between and within Member States. Again, in a small number of Member States there are major barriers to transfer GOs to off-takers that affect both RE PPAs and unbundled GOs. In another subset of Member States barriers to direct contracting between generators and buyers have jeopardised RE PPAs so far.

[33] Communication from the Commission — *Guidelines on certain State aid measures in the context of the greenhouse gas emission allowance trading scheme post-2012* (SWD(2012) 130 final) (SWD(2012) 131 final), OJ C 158, 5.6.2012, p. 4–22.

Figure 4 Results of the online survey - Renewable electricity: challenges (number of respondents, left; average evaluation, right)[34]



Note: 1=Not at all; 2=To a limited extent; 3=To some extent; 4=To a high extent; 5=To the fullest extent.
Source: Author's elaboration on the online survey.

[34] The following question was asked to companies that are sourcing or planning to source renewable electricity: "To what extent did your company face the following challenges when deciding to source renewable electricity?". The following question was asked to companies that are not sourcing renewable electricity: "To what extent can the following challenges explain why your company does not source renewable electricity?".

Box 4 Summary of the main barriers detected in selected EU countries

In what follows, a concise overview of the **main regulatory barriers** affecting corporate sourcing of RE in the 10 MSs covered by the country-level analysis is provided (see Annex B, for further details). As further emphasised below, it appears that most of the detected barriers can be overcome by properly implementing the provisions of the 'Clean Energy for All Europeans' package.

Bulgaria. The national market for electricity appears not to be competitive and liquid enough, thus inflating balancing/shaping costs for RE PPAs. This is both because it is dominated by large state-owned players and connections with neighbouring markets are still limited by constraints in cross-border transmission capacity. In this respect, article 3 of the Electricity Market Directive reiterates the need for a "competitive, consumer-centred, flexible and non-discriminatory electricity markets"; in the same vein, article 3 of the Electricity Market Regulation emphasises, *inter alia*, the need to remove barriers to cross-border electricity flows and cross-border transactions. Finally, as Bulgaria is not a member of the AIB, GOs cannot be easily traded with other MSs, thus limiting the opportunities stemming from corporate sourcing strategies based on unbundled GOs and/or green energy offers. Such barriers may be reduced by the proper implementation of Article 19 of REDII, which calls for GO systems that are harmonised across MS.

France. In France, it is prohibited to issue GOs to renewable electricity generators who benefit from a support scheme. This limitation affects the majority of renewable installations in the country. This rule, which has limited the development of RE PPAs, is still allowed under article 19 of REDII. While several electricity suppliers are offering premium green energy offers, the transparency of the market for green tariffs could still be increased. In line with article 19 of REDII, the introduction of a green label to promote the use of RE from new installations may contribute to addressing this barrier.

Germany. Also, in Germany, and in line with article 19 of REDII, generators of renewable electricity are not allowed to receive GOs over their production and this has limited so far the development of RE PPAs. In addition, in practice, energy-intensive companies based in Germany forgo their entitlement to the compensation for indirect EU ETS costs when they procure renewable electricity, thus jeopardising the green energy transition of large energy consumers.

Italy. The complexity of the authorisation process and the uncertainty linked to frequent (and retroactive) changes in support schemes may impinge on companies' decision to self-generate renewable electricity. The former issue is addressed by article 16 of REDII requesting to establish a one-stop-shop to authorise RE installations; the latter by article 6 of REDII contributing to the stability of financial support to renewables. In addition, very generous support schemes have limited the interest for renewable generators to seeking for corporate off-takers. Such schemes would not be compliant with article 4 of REDII, which requires that support "is granted in an open, transparent, competitive, non-discriminatory and cost-effective manner". When it comes to RE PPAs, bank guarantees requested by the seller constitute a large barrier, especially for SMEs, as the Italian banking system provides very costly guarantees.

The Netherlands. While no major country-specific barrier has been detected, the market for green energy offers may face some challenges in the coming years. In fact, so far Dutch consumers are used to subscribing green tariffs at no extra cost compared with conventional electricity. However, given the recent rise in GOs prices, more and more green energy suppliers will be forced to ask for a premium price, thus reducing the demand for their offers.

Poland. National rules so far have not facilitated self-generation/self-consumption of renewable electricity. Better rules may be ensured by the proper implementation of article 21 of REDII. As Poland is not a member of AIB, the market for GOs faces some limitations, which affect both companies relying on unbundled GOs to green their electricity consumption and purchasing green energy offers. In fact, for the time being, there is no market for premium green energy offers in the country. Article 19 of REDII may contribute to overcoming these barriers by favouring both the establishment of harmonised GO systems and the introduction of a Union-wide green label for RE generated by new installations.

Romania. High costs for permits and frequent changes in support schemes have negatively affected self-generation/self-consumption of renewables. Similarly to the Italian case, the combined effect of article 6 and article 16 of REDII may contribute to addressing these issues. The obligation for all generators to sell electricity in the centralised market have *de facto* ruled out the option of signing corporate PPAs. Such obligation appears to be at odds with a fully liberalised electricity market as well as with article 15 of REDII, which aims, *inter alia*, to remove regulatory and administrative barriers to PPAs. Also, Romania is not a member of AIB, with effects on GOs and green energy offers similar to those registered in Bulgaria and Poland. As mentioned above, article 19 of REDII may foster a more harmonised GO system across EU countries.

Spain. Up to 2018, charges applied to self-consumption of renewable electricity generated by plants above 10kW have limited the economic appeal of self-generation of renewables. These charges are, to a large extent, incompatible with article 21 of REDII. While the market for RE PPAs seems to grow fast, bank guarantees requested to sign PPAs are still quite expensive. In addition, large suppliers of electricity (market share above 10%) cannot enter new long-term contracts with renewable generators or represent them, thus limiting the role that they can play to connect generators and off-takers. Finally, the market for premium green energy offers is still underdeveloped in Spain. As mentioned, the green label envisaged under article 19 of REDII may facilitate the creation of such a market.

Sweden. There are no major regulatory or policy barriers affecting corporate sourcing of renewables in Sweden. Nevertheless, some installers of renewable power plants lament the strict permitting rules, thus limiting further development of onshore wind plants and new hydropower plants. In this respect, articles 15 and 16 of REDII may streamline the authorisation, certification and licensing procedures applied to RE installations.

3.1 Self-generation of renewable electricity

The most prominent obstacles to overcome when it comes to self-generation of renewable electricity are: i) **regulatory barriers** (which are mostly MS-specific, such as land use and zoning rules and environmental permits for ground-mounted solar PV and wind turbines or building codes for rooftop solar PV);[35] ii) **inadequate return on investment** (relatively long pay-back period and high grid connection costs); and iii) **risks stemming from regulatory uncertainty**. Reportedly, the latter barrier includes, among others, risks connected to the interpretation of complex legal provisions (for instance, the guidelines prepared by the German Federal Grid

[35] Article 21.6 of REDII requires, *inter alia*, Member States to: i) assess the regulatory and administrative barriers to renewable self-consumption; ii) remove unjustified barriers; and iii) facilitate self-consumption.

agency[36]), risks related to changes in support schemes (which were modified retroactively in e.g. Italy, Romania and Spain)[37] and risks linked to changes in energy taxation and network costs. In fact, in some MSs, self-consumption was subject to taxes (e.g. the so-called 'sun tax' in Spain, which has now been cancelled) or may be taxed in the future, as self-generation may increase network costs (which eventually need to be recovered by distribution and transmission system operators).[38] Interestingly, in some MSs such as Italy (as confirmed by the case study conducted with Altair Chimica – see Annex A.5), regulatory barriers are also generated by the need to get multiple authorisations issued by a plethora of authorities (which are not bound by any time limit to complete the process).[39]

The decision not to rely on self-generation is also affected by: vi) **limited generation capacity** due to limited space available on-site (solar PV installed on the rooftop provide only a share of the electricity demanded; on-site wind farms are rather uncommon), especially when 'private wires' are not allowed or near-site generation is taxed;[40] and v) the variability (**fluctuating nature**) of electricity from some RES (e.g. solar and wind), which is mostly a perceived barrier. Both factors require relying on grid electricity to complement self-consumed electricity.[41] Capacity constraints linked to on-site renewables were emphasised by Google, which cannot rely only on on-site projects to meet the energy needs of large data centres (see Annex A.3). Finally, **limited awareness,** especially by SMEs, of RE solutions represents a large obstacle to corporate investment in self-generation as well as to use of on-site renewables via third-party financing. For instance, many **SMEs** are very concerned by the impact of 'intermittent' generation on their production process and the risk of power cuts; this perceived obstacle can be, however, easily addressed via e.g. net-metering mechanisms and, more generally, education about renewable electricity supply.

3.2 Renewable power purchase agreements (PPAs)

Price risk linked to the uncertainty of future electricity price development and the long duration of the contract (compared with the short-term energy procurement strategy of most companies) represent the most prominent barriers to RE PPAs.[42]

[36] This was one of the findings of the case study conducted with Metro (see Annex A.6 to this report). For further details on the guidelines, please see: https://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/Sachgebiete/Energie/Unternehmen_Institutionen/ErneuerbareEnergien/Eigenversorgung/Finaler_Leitfaden.pdf?__blob=publicationFile&v=2

[37] This risk will be more limited in the future as Article 6 of REDII calls for stability of financial support granted to RE projects.

[38] Article 21 of REDII sets rules for charges and fees applied to self-consumers. More specifically, Article 21.2 spells out that self-generated electricity from RES remaining within the premises of the self-consumers cannot be subject to any charges or fees, unless one of the circumstances listed in Article 21.3 applies.

[39] Article 15 of REDII aims, *inter alia*, to address such barrier by ensuring that any national rules concerning the authorisation, certification and licensing procedures applied to RE installations are proportionate and necessary. Article 15 also calls for predictable timeframes for administrative procedures. Article 16 of the same Directive requires Member State to ensure that permit-granting process for RE installations will be handled by one single contact point in their administration (one-stop-shop) and sets a maximum duration for the permit-granting process equal to two years. Article 8 of the new Electricity Market Directive (see footnote 8) is expected to introduce simplified and streamlined authorisation procedures for new capacity when it comes to small decentralised and/or distributed generation.

[40] Article 7 of the new Electricity Market Directive (see footnote 8) is expected to allow self-generators to rely on private wires without being subject to disproportionate administrative procedures or costs.

[41] Nevertheless, some stakeholders have emphasised that the price per MWh of grid electricity may increase due to lower consumption. In fact, electricity prices are lower for companies consuming larger amounts of electricity (for further details, please see: CEPS et al. (2019), *Composition and Drivers of Energy Prices and Costs: Case Studies in Selected Energy Intensive Industries*, European Commission).

[42] Operators in some Member States are concerned by the fact that the contract duration for PPAs may be limited by competition law (contracts above 5 years may be forbidden to avoid vertical foreclosure or

Other obstacles include **creditworthiness standards and/or bank guarantees** requested by generators (such guarantees may be very expensive, especially for **SMEs**)[43], higher electricity costs compared to grid electricity (depending on the bargaining power of the PPA parties and on the relevant MS[44]) and regulatory barriers restricting corporate PPAs.[45] The latter include, *inter alia*, **barriers to direct contracting between generators and buyers** (which have been in place in some MSs such as Greece, Poland and Romania), **barriers to sign contracts with more than one generator/supplier** (which have been reported in Spain but affect most of the MSs where only one supplier is allowed per point of supply[46])[47] and **barriers to transfer GOs to off-takers** in case of both subsidised (in e.g. France, Germany) and non-subsidised projects (in e.g. Ireland, where GOs can only be cancelled by electricity generators and suppliers)[48].

In most of the MSs, generators of renewable electricity so far have not been interested in signing PPAs. This is because they were granted **stable revenues by (generous) public support schemes** providing a 100% protection from market risks ('crowding-out effect'). This is also confirmed by the case studies conducted with Alcoa, Norsk Hydro and Google, which are companies operating in multiple MSs (see Annexes A.2 and A.3). However, the progressive introduction of **market-based support schemes** may make PPAs more interesting for generators.[49] In fact, in a well-designed auction: i) not all generators will be able to get public support, therefore they may search for private buyers in a 'secondary' market for projects that lose in tenders; ii) public support in €/MWh may go down and for some generators may become more interesting to search for corporate buyers rather than participating in public auctions. For the time being, uncertainty related to the design of future supporting schemes is slowing down investment in RE installations.

For **energy-intensive companies**, the **variability of renewable electricity sources** is perceived as the most relevant obstacle to PPAs, as it may generate quite high balancing/shaping costs (especially in those markets that are less liquid or for off-takers with a highly variable consumption profile, such as those relying on electric arc furnaces). It is worth remarking that many intermediaries provide balancing/shaping services, thus reducing the complexity of RE PPAs; however, the costs to access such services may increase the final price per MWh paid by the off-taker.[50] Some markets lack long-term hedging products (such as firming and shaping

require specific approval by DG COMP). This interpretation of EU competition law, however, does not take into account that most of the renewable generators have no or limited market power.

[43] The credit risk of both parties (generator and buyer) is still one of the main challenges in a long-term PPA.

[44] This is more common in Member States with generous support schemes for RE installations.

[45] Article 15 of REDII requires, *inter alia*, Member States to: i) assess the regulatory and administrative barriers to long-term RE PPAs; ii) remove unjustified barriers; and iii) facilitate the uptake of such agreements. Policies and measures facilitating the uptake of RE PPAs needs to be detailed in the NECPs. Nonetheless, no specific measure has been included yet in the draft NECPs analysed to prepare the country background analyses annexed to this report (see Annex B).

[46] This is the so-called 'supplier hub' principle. This barrier affects only physical PPAs and can be overcome by virtual PPAs.

[47] Article 4 of the new Electricity Market Directive (see footnote 8) is expected to allow customers to purchase electricity from more than one supplier, provided that the required connection and metering points are established.

[48] This second issue may be solved by suppliers (or traders with GO accounts) acting on behalf of corporate power consumers in exchange for a fee.

[49] Article 5 of REDII requires, *inter alia*, that support for electricity from RES is granted in an open, transparent, competitive, non-discriminatory and cost-effective manner.

[50] It is worth remarking that some companies going for 100% renewable electricity sign agreements with yearly matching of power consumed and power bought, which remove concerns linked to the variable consumption profile.

services) that would enable corporate buyers of RE to de-risk the variability of renewable supply if the electricity is bought 'as produced'. The key role played by balancing/shaping agreements is confirmed by the case studies conducted with Alcoa, Norsk Hydro and Google (see Annexes A.2 and A.3). Cross-border PPAs face also barriers in terms of limited cross-border interconnection capacity and inadequate market coupling, which increase the basis risk.[51]

Finally, **RE PPAs are less interesting for SMEs** due to two main reasons: i) unless a multi-buyer PPA or aggregated PPA structure is used, the off-taker needs to have a significant power consumption to be interested in purchasing energy directly from a generator; and ii) RE PPAs still represent a quite complex deal entailing high transaction costs and requiring strong expertise in energy management, which is usually missing in SMEs. The second barrier may be addressed by the preparation of a European draft template contract for virtual and physical PPAs.[52]

3.3 Unbundled Guarantee of Origins (GOs)

The most relevant barriers affecting companies considering to purchase unbundled GOs are: i) the **increase in electricity costs**, as the cost of GOs is additional to the price paid to the electricity supplier (especially in light of the recent trends featuring an increase in GO prices); and ii) **the inadequate framework to manage GOs**, especially for cross-border trade. In addition, this option does not allow to increase the stability of electricity prices (price hedging); in fact, unbundled GOs increase such variability if one considers that the **final price per MWh is also affected by trends in GOs price** (currently low but increasing).

In some MSs, **energy consumers are not entitled to buy and cancel unbundled GOs**: in some countries (e.g. Ireland) only electricity producers or suppliers can cancel GOs, so there is no option for unbundled GOs; in other countries (e.g. Belgium), electricity consumers cannot directly buy and cancel GOs, but they can potentially rely on traders to deal with unbundled GOs. Some stakeholders emphasised that **unbundled GOs are not necessarily easy to source**, especially for SMEs, as they need to be purchased via a broker. In fact, the market is still not liquid enough, they are traded over-the-counter (no active trading platform is available, despite attempts from exchanges to set such platforms up[53]) and prices can be very different depending on the type of certificate (primarily based on country and technology).

With regard to the cross-border trade of GOs, the European Energy Certificate System (EECS) provides an efficient framework, which is accepted by most EU MSs; however, **trade barriers between EECS members and non-members still exist**. There is also a **general lack of trust from the public** (compounded by negative stories in the media) in unbundled GOs which are deemed to be a tool for 'greenwashing', due to limited transparency on the type of GOs purchased and cancelled. Reportedly, in those markets where green energy offers are available (the majority of EU countries), unbundled GOs represent a niche option for corporate sourcing of renewables. Nevertheless, this finding is not corroborated by a recent study by Capgemini, which shows that the share of renewable electricity sourced via green energy offers by

[51] This is the risk stemming from different wholesale market prices for electricity in different countries due to limited market integration.
[52] In this respect EFET (the European Federation of Energy Traders), in cooperation with RE-Source, published a standard PPA for corporates and utilities. For further details, please see: https://efet.org/Files/EFET%20PPA%20Final%20Full%20PDF.PDF
[53] EEX is an example of a trading platform/exchange that has a GO trading platform that is not active.

RE100 companies is similar to the share sourced by relying on unbundled GOs;[54] however, the Capgemini study focuses on large companies and it is likely that SMEs prefer green energy offers to unbundled GOs, which are more complex to source and manage.

3.4 Green energy offers

The two barriers that score relatively higher when it comes to green energy offers are the **limited additionality** (due to reliance on GOs from subsidised projects and/or legacy investments in hydropower) and the **higher electricity costs compared to 'standard' grid electricity** (which will become more and more of an issue if the GO price continues to grow). The additionality problem is particularly relevant in those MSs where utilities are not providing the so-called 'premium' offers, i.e. green energy offers allowing consumers to buy specific types of renewable electricity (e.g. solar from new installations, or wind produced in a certain MS, or a mix of renewables that exclude hydropower). Electricity suppliers, therefore, may play a pivotal role to meet the growing demand for 'premium' offers. In addition, national energy regulators or EU policy-makers can help ensure additionality and increase trust in green energy offers. For instance, they may set clear rules for the use/transfer of GOs from subsidised RE and legacy investments (e.g. hydropower plants) or they may regulate the marketing of green energy offers and foster the market for premium offers. In this respect, WWRD, an Irish company covered via case study analysis and relying on a green energy offer (see Annex A.1), emphasised that the **national energy regulator** may play a key role to increase trust in the green electricity market and ascertain that the increasing demand for green energy offers by corporates translates into **additional investments in RES in Ireland and the EU**. An EU credible quality label for green energy offers could also be introduced.

Box 5 Corporate sourcing of RE for heating and/or cooling: barriers

Policy uncertainty (e.g. changes in support schemes) and **higher costs compared to conventional heating and cooling** are relevant challenges faced by companies interested in purchasing RE for heating and/or cooling purposes. **Financial barriers** to invest in renewable technologies (which tend to have a long payback period and generate high investment risks) and the **insufficient amount of RES available** (for instance, some companies have claimed difficulties in accessing biogas; in the same vein, biomass requires sustainable production and large areas for storage; geothermal energy is only available in some EU regions) represent two additional, prominent barriers. By way of example, WWRD, an Irish company covered by the case study analysis (see Annex A.1), explained that: i) biogas is not available in the gas distribution network where the plant is connected; and ii) required investments to recover waste heat generated by the production process entailed a too long payback period. In the same vein, Alcoa emphasised that it is still quite difficult to procure the quantity of biomass required by a refining plant at a reasonable price (see Annex A.2). AGRIS explained that the support received by the Greek government played an important role to reduce the payback period of the investment the company made in solid biomass boilers (see Annex A.4).

[54] For further details, please see: Capgemini (2018), *Making business sense: How RE100 companies have an edge on their peers*, Energy transition and profitability, Insight Report, September 2018.

4 Policy recommendations

After reviewing the main drivers and barriers behind the corporate sector's transition to RE, a set of recommendations were identified to ascertain that an increasing number of companies based in the EU will embrace the green energy transition (by way of example, Box 6 summarises the main recommendations stemming from the case study analysis). In fact, **corporate sourcing of RE appears to play a pivotal role to achieving the 2030 binding RE target** for the EU, in a context where the expected reduction in public support needs to be compensated by new private investment. As further detailed below, some recommendations have already been accounted for by EU policy-makers (e.g. in REDII or the new Electricity Market Directive) and will need to be carefully implemented by MSs. Some others require additional efforts at both the EU and national level.

Box 6 Key policy recommendations from case studies

The six case studies on corporate sourcing of renewables performed in the context of this Study (see Annexes A.1 to A.6, for further details) allowed to identify a number of policy recommendations that are summarised in what follows.

- **AGRIS S.A.** is a medium-sized company based in Greece and operating in the **horticulture sector**. The company relies on eight **biomass boilers** to meet the heating demand of the greenhouses at its main production unit. The case of AGRIS demonstrates that substitution of fossil fuels with biomass fuels for heating in a business environment can lead to quite significant cost savings as well as increased environmental protection through the reduction of CO_2 emissions in the atmosphere. This case study calls for: i) investment support for renewable heating systems; ii) taxation fostering rather than jeopardising the uptake of biomass fuel compared to fossil fuel; iii) the design of a system of GOs for renewable heating and cooling;[55] and iv) more investment in research and development for less mature RE technologies.
- **Alcoa and Norsk Hydro** are two global leaders in the **aluminium sector**. In extra-EU countries, both companies rely on **hydropower and wind PPAs** and have experience in the **generation of renewable electricity**. Nevertheless, after assessing the available options, for the time being, they have not been able to source renewable electricity in the EU. This case study devises, *inter alia*, the following policy recommendations aiming to enable electricity-intensive industries to further contribute to the uptake of RE in the EU: i) MS should stabilise the regulated components of the electricity prices; ii) the European Commission should publish multiannual guidelines enabling compensation for indirect EU ETS costs and for RE support schemes and such long-term guidance should be accompanied by a stable budgetary and regulatory framework at the national level; and iii) current RE support schemes should be revised by introducing market-based auction mechanisms favouring RE PPAs.
- **Altair Chimica** is a medium-sized company (belonging to the Esseco Group) based in Italy and producing **chlorine and potassium /sodium hydroxide and derivatives**. Altair Chimica has recently installed on the roof of one of its plants **solar PV** panels that are expected to produce about 150MWh per year. This case study identifies three main policy measures to foster self-generation and self-consumption of renewable electricity: i) providing credit schemes or subsidies to shorten the payback period of investments in renewables; ii)

[55] Article 19 of REDII envisages the introduction of GOS for all types of RE, including heating and cooling.

ascertaining that energy taxation does not discourage self-consumption; and iii) streamlining the authorization process to install renewable technologies.

- **Google** is a **global technology company** providing products and services "to organise the world's information and make it universally accessible and useful". Depending on the geography where RE is purchased, the company goal of matching 100% of its total electricity consumption with renewables is achieved either through direct purchases from renewable developers via **RE PPAs** or through partnerships with **utility providers**. Based on the findings from this case study, policy recommendations revolve around the following three themes: i) national support schemes should be reformed to take advantage of the declining cost of RE technologies and to further encourage cost decline; ii) governments should ensure that GOs are issued and can be delivered to all buyers of renewable electricity through a corporate PPA and that GO systems are harmonized across countries; and iii) barriers to cross-border PPAs should be removed.
- **METRO AG** is an international company operating in the **wholesale sector** and delivering food and non-food products to professional customers such as hotels, restaurants and other businesses in the caterer branch as well as to traders and SMEs. Part of the electricity consumed by METRO AG in the EU comes from **self-generation** and **green energy offers**; METRO AG has also experience with RE PPA in extra-EU countries. When it comes to heating and cooling, only one store relies on biomass and about 170 stores use some form of heat recovery from cooling equipment. METRO AG relies on a company-specific CO_2 pricing to assess the profitability of its investments; therefore, it advocates for the introduction of carbon pricing and other measures favouring those companies that are more environmentally friendly. The case study also emphasises the need for investment support and public investment in research and development to make self-generation/self-consumption of RE more attractive.
- **WWRD** is a small **manufacturer of luxury crystal glass tableware** products based in Ireland; as a key part of its business model, the company is a 'tourism factory' that allows tourists to visit its manufacturing plants and learn more about the production of crystal glass. WWRD purchases 100% of the electricity consumed via a **green energy offer**. The case study shows that small companies put trust in national energy regulators to ascertain that the increasing demand for green energy offers by corporates translates into additional investments in RES in the EU. It also confirms that long-term contractual commitment required by RE PPAs may discourage SMEs from entering such agreements. Finally, the case study calls for public support to invest in RE solutions for heating and cooling purposes.

Against this background, supporting corporate sourcing of renewables requires actions that can be categorised in three main groups (see Table 1 for a summary of the recommendations):

- **Fostering corporate investments in renewable technologies**. This set of actions mainly aim to reduce costs to self-generate/self-consume RE and, in turn, improve the cost competitiveness of companies deciding to invest in RES to meet their energy needs.
    - Whereas self-generation does not seem to be driven by revenues linked to 'feed-in tariff style' support schemes, as the intention is to self-consume most of the generated power rather than inject it into the grid, **investment support** in the form of grants, subsidised loans or tax

deductions/credits would contribute to reduce the payback period of investments in renewable technologies and increase the expected returns, which are two prominent challenges for self-generation of electricity (via small scale, on-site installations) and use of RE for heating and/or cooling purposes, especially for SMEs (which face relatively stronger financial constraints).[56] Ideally, in line with Article 6 of REDII, funding to investment support should be stabilised to avoid 'stop and start' subsidy scheme.

- Lengthy, costly and uncertain authorisation processes discourage companies from investing in renewable technologies. In line with Article 16 of REDII, MSs should create a **one-stop-shop to authorise renewable installations** and ascertain that the **authorisation process is completed in a certain timeframe**, thus reducing transaction costs and investment risks. In this respect, it would be useful for MSs to set specific timeframes for each technology, as time limits for some (e.g. offshore wind) are not necessarily appropriate for others (e.g. rooftop PV).
- Limited generation capacity due to limited space available on-site affect the generation capacity on which companies can rely when it comes to self-generation. In fact, solar PV panels installed on rooftops usually provide only a share of the electricity demanded and on-site wind farms are rather uncommon. In this respect, in line with Article 7 of the new Electricity Market Directive, **ensuring that 'private wires' can be built in all MSs** would allow relying on 'near-site' renewable installations that can be connected behind the meter. In this context, **taxation should not discourage 'near site' solutions**.
- **Supporting research and innovation projects in RE technologies** is expected to further reduce energy generation costs for the less mature renewable technologies and increase the cost competitiveness of corporate's investments in such technologies, also in the field of renewable heating and cooling. In this context, special attention should be paid to RE in the upcoming Horizon Europe programme.[57]

- **Fostering corporate demand for RE**. This category includes a list of actions aiming to reduce risks and costs borne by companies deciding to source RE, thus ultimately increasing their cost competitiveness.
  - In spite of CSR strategies and environmental consciousness, so far most of the companies are willing to source RE only if it does not cost more than conventional energy. In this respect, besides supporting investment in self-generation, energy costs for renewable electricity purchased via PPAs or green energy offers could be reduced by providing e.g. **tax credits or exemptions** from (some) energy taxes. In the same vein, in line with Article 21 of REDII, **network costs and energy taxation** should not discourage self-consumption.
  - Public policies may help **mitigate price risk and uncertainty about future electricity prices** by stabilising those components of the electricity price that depend on the regulatory framework, i.e. network

[56] These barriers were confirmed by a recent study conducted by BayWa r.e. For further details, please see: BayWa r.e., *Energy Report 2019*.

[57] For further details, please see: https://ec.europa.eu/info/designing-next-research-and-innovation-framework-programme/what-shapes-next-framework-programme_en

costs and non-recoverable taxes. On the one hand, MSs should provide long-term guidance when it comes to regulated components of the electricity prices; on the other hand, the EU should draft multiannual guidelines enabling compensation for indirect EU ETS costs and for levies linked to RE support schemes.

- The *de facto* exclusion (reportedly, in some MSs such as Germany) from ETS compensation schemes of electricity-intensive companies wishing to source renewable electricity might well be reconsidered. **Companies using green energy offers or relying on unbundled GOs are susceptible to indirect ETS costs** in electricity prices just like their competitors sourcing conventional electricity. Moreover, in contract negotiations between project developers and potential off-takers in an RE PPA due regard is taken to the wholesale market electricity price, which includes the price-increasing effect of the ETS allowance price.
- In line with Article 4 of the REDII, **national RE support schemes could be reformed** to take advantage of the declining cost of RE technologies and to further encourage cost reduction. The introduction of competitive, **market-based auction mechanisms** for support schemes is an encouraging development in this regard and all countries should move toward this model, although further care is needed to ensure that the design of the auction is compatible with corporate sourcing. This reform will make PPAs a more interesting option for generators of renewable electricity. Competitive renewable electricity prices that reflect the fundamentals of the technology costs and performance are key to expanding corporate PPAs throughout Europe.
- **Encouraging cross-border PPAs** is an important element in expanding the contribution of corporate RE PPAs in Europe's energy transition. While cross-border PPAs are legally possible in Europe's electricity market, in practice, there are some barriers, such as basis risk, perceived lack of additionality, lack of transmission capacity, lack of transparent long-term auctions for transmission capacity, etc. Policymakers could work to coordinate the development of cross-border transmission infrastructure and open-up existing networks to increased transmission capacity allocation. In line with Articles 8, 9 and 10 of REDII, this will ensure that RE can be generated where it is the most efficient and delivered to areas where it is demanded, which will help Europe build out RE at the lowest cost and allow for competitively-priced, cross-border PPAs. In this context, the rules spelt out in Section 1 of Chapter 3 of the Electricity Market Regulation[58] is expected to improve capacity allocation with positive effects, *inter alia*, on cross-border PPAs.
- Bank guarantees requested to off-takers can be very costly, especially for SMEs. In addition, such guarantees reduce the ability of companies to borrow additional money for investment. In this respect, **public supported guarantees for RE PPAs** may make such agreements interesting for a larger number of companies. In this regard, EU MSs

[58] Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity.

could find inspiration in the Norwegian system[59], or the European Investment Bank (EIB) could offer a similar public guarantee. At any rate, the credit risk connected with a long-term PPA should not be overlooked.

- **Regulatory barriers affecting the transfer of GOs to off-takers should be removed** to foster demand for RE PPAs, especially by those companies that are interested in sourcing RE to improve their CSR strategy and environmental sustainability, i.e. the large majority of companies purchasing green electricity. In fact, GOs are central to the business case for corporate sourcing of RE. In line with Article 19 of REDII, policymakers should also ensure that GO systems are harmonized across countries, which will help reduce administrative burdens of managing, transferring, and cancelling GOs and will increase market transparency.
- **Improving trust in GOs and green energy offers** is key to ensure that companies that have a genuine interest in increasing their environmental sustainability will consider these options for corporate sourcing. For instance, national energy regulators or EU policy-makers could set stricter rules for the use/transfer of GOs from subsidised RE and legacy investments (e.g. hydropower plants) or could regulate the marketing of green energy offers and foster the market for 'premium' offers (which are quite appealing options for SMEs to start sourcing renewable electricity). In the same vein, utilities and energy suppliers may consider meeting the growing demand for 'premium' green energy offers. National regulators and civil society could also encourage corporates to specify the types of unbundled GOs they rely upon by indicating e.g. country, technology, and commissioning date. In this respect, Article 19 of REDII proposes, *inter alia*, to establish an EU green label aiming to promote the use of RE coming from new installations.
- Awareness represents still a major barrier especially affecting SMEs, i.e. the lion's share of companies operating in the EU, which are risk-averse and have limited in-house skills and expertise when it comes to energy procurement. **Raising awareness about the available renewable solutions and positive impacts on business performance**, including the potential cost savings and mitigation of energy price volatility, could have a substantial impact on companies' demand for RE.[60] Information campaigns or awareness raising projects to better educate new buyer groups that do not have any previous experience with corporate sourcing of renewables could make the difference.
- Efforts should be made to **remove any ambiguity in the interpretation of rules affecting corporate sourcing of renewables,** as uncertainty increases 'perceived' regulatory barriers. Article 15 of REDII is likely to contribute to this end. In addition,

[59] The case study on primary aluminium (see Annex A.2) points out that some PPAs are facilitated by the Norwegian Export Credit Guarantee Agency, which provides alternative collateral for the bank guarantee requested by renewable power generators.

[60] Ideally, more transparency on price paid for green electricity vis-à-vis conventional electricity could make the difference. However, prices offered to corporate clients for green energy offers or strike prices in RE PPAs are considered as highly confidential.

solutions similar to the Dutch Green Deals[61] or the EU Innovation Deals[62] could be considered, thus allowing stakeholders to cooperate with national authorities and EU institutions in order to identify and address regulatory barriers stemming from the national interpretation of EU legislation.

- Regulatory barriers may also affect direct negotiation between generators and buyers. It should be **ensured that in all MSs generators and buyers can contract directly with each other**. In addition, in line with Article 4 of the new Electricity Market Directive, technical solutions should be devised to ensure that a corporate power consumer can have multiple supply contracts, otherwise this obstacle may limit physical PPAs.

- **Fostering demand for green products and services.** These actions are expected to contribute to making CSR and differentiation strategies more profitable as more consumers, companies and public administrations will prefer products and services offered by companies sourcing RE.
  - **Raising awareness among consumers on the societal benefits of RE** via e.g. communication campaigns or education is key to increase their willingness to pay for 'greener' products/services and, in turn, make more profitable for companies to participate in the green energy transition and serve new green markets. This would directly affect companies serving the final consumer and indirectly their suppliers, which would be called to participate in green supply chains.
  - In the same vein, **incentivising green consumption** via e.g. subsidies and incentives for 'greener' products, taxes and charges for less green products, standard and mandatory labels, would increase demand for green products/services, with effects similar to those generated by raising awareness.[63]
  - As EU, national and local public administrations are major consumers of products and services, **green public procurement[64]** is a powerful tool to foster corporate sourcing of renewables by companies participating in the public procurement process as well as to create green supply chains involving also the suppliers of such companies. In addition, public administrations can also play an exemplary role by sourcing RE.

Table 1 Overview of the policy recommendations

Category	Recommendation	Level of implementation	Link with relevant EU rules
Fostering corporate investments in renewable technologies	Providing stable investment support	MS	Article 6 - REDII
	Establishing a one-stop-shop to authorise renewable installations and complete the authorisation process in a	MS	Article 16 - REDII

[61] For further details, please see: https://www.ellenmacarthurfoundation.org/case-studies/green-deal
[62] For further details, please see: https://ec.europa.eu/info/research-and-innovation/law-and-regulations/innovation-friendly-legislation/identifying-barriers_en
[63] For an overview of good practices to promote sustainable consumption, please see: OECD (2008), *Promoting sustainable consumption, Good practices in OECD countries*.
[64] The EU has already set up a voluntary Green Public Procurement initiative. For further details, please see: http://ec.europa.eu/environment/gpp/index_en.htm

Category	Recommendation	Level of implementation	Link with relevant EU rules
	certain timeframe		
	Ensuring that 'private wires' can be built in all MSs and taxation does not discourage 'near site' solutions	MS	Article 7 - Electricity Market Directive
	Supporting research and innovation projects in renewable technologies	EU and MS	Horizon Europe
Fostering corporate demand for RE	Introducing energy taxation mechanisms that reduce costs of RE and not discourage self-consumption	MSs	Article 21 - REDII
	Stabilising the components of the electricity price that depend on the regulatory framework	EU (limited to guidelines) and MS	
	Ensuring that EU ETS compensation schemes do not disadvantage electricity-intensive companies sourcing renewable electricity	MSs	
	Introducing national support schemes relying on market-based auction mechanisms	MSs	Article 4 - REDII
	Developing cross-border transmission infrastructure and opening-up existing networks to increased transmission capacity allocation	EU (facilitating cross-border coordination) and MS (coordination with other MSs)	Articles 8, 9 and 10 - REDII Section 1, Chapter 3 – Electricity Market Regulation
	Providing public supported bank guarantees for RE PPAs	EU (possibly through the EIB) and MS	
	Removing regulatory barriers affecting the transfer of GOs to off-takers and harmonizing the GO systems across countries	EU (facilitating cross-border harmonisation) and MS	Article 19 - REDII
	Improving trust in GOs and green energy offers	EU and MS	Article 19 - REDII
	Raising awareness about the available renewable solutions and positive impacts on business performance	EU and MS	
	Removing any ambiguity in the interpretation of rules affecting corporate sourcing of renewables	EU and MS	Article 15 - REDII
	Ensuring that in all MSs: i) generators and buyers can contract directly with each other; and ii) multiple supply contracts can be chosen by corporate power consumer	MS	Article 4 - Electricity Market Directive
Fostering demand for green products and services	Rising awareness among consumers on the societal benefits of renewable energy	EU and MS	

Category	Recommendation	Level of implementation	Link with relevant EU rules
	Incentivising green consumption	MS	
	Supporting green public procurement	EU and MS	Green public procurement initiative

Source: Author's own elaboration.