Competitiveness of corporate sourcing of renewable energy

Annex B to Part 2 *of the Study on the competitiveness of the renewable energy sector*

Country overview

ENER/C2/2016-501

28 June 2019

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List of main acronyms and abbreviations[1]

CSR	Corporate social responsibility
EU	European Union
GO	Guarantee of origin
ICT	Information and communication technologies
NECP	National energy and climate plan
PPA	Power purchase agreement
PV	Photovoltaic
RE	Renewable energy
RES	Renewable energy sources
RES-E	Renewable energy sources for electricity generation
RES-HC	Renewable energy sources for heating or cooling generation
SME	Small and medium-sized enterprise

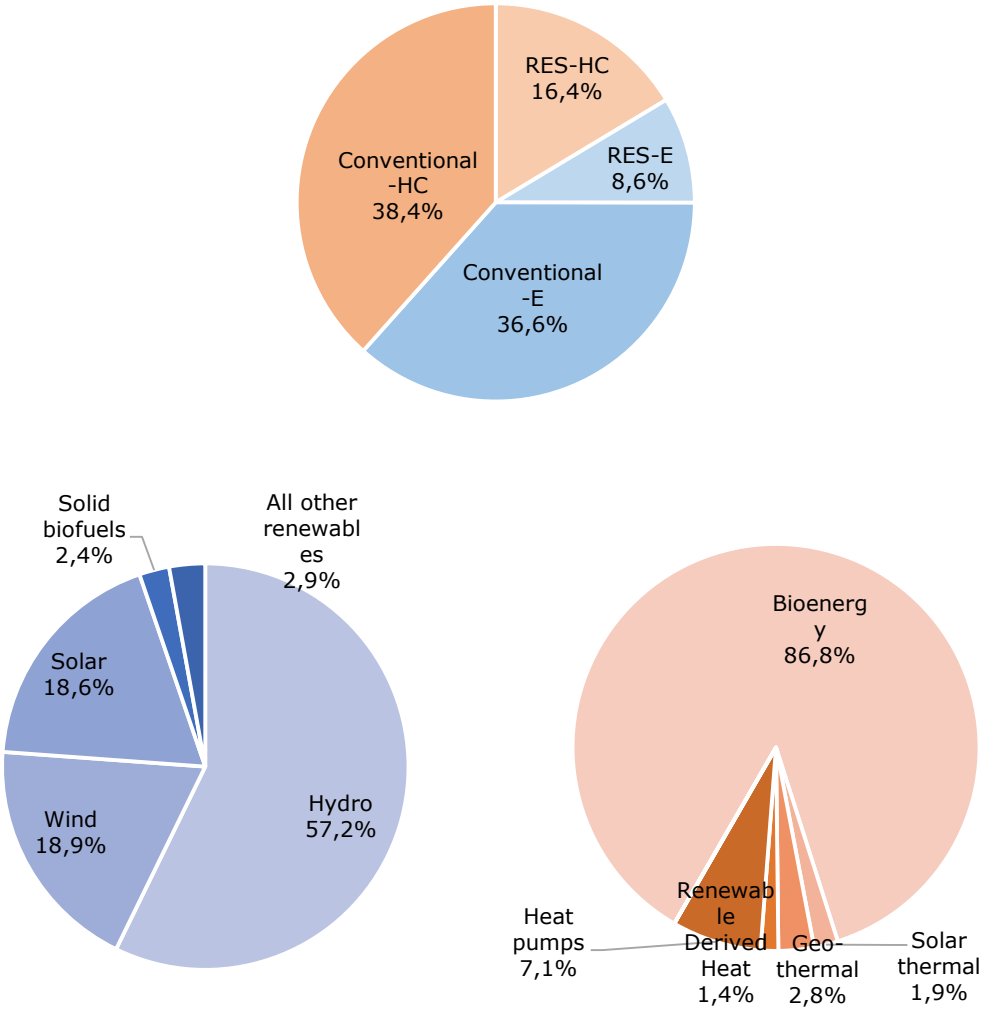
[1] This list includes only acronyms and abbreviations that are used in all the country background analyses. Country-specific acronyms or abbreviations are spelt-out the first time they appear in the main text of each chapter.

1 Country background analysis: Bulgaria

1.1 Statistics

In 2017, **RE accounted for about 25%** of the final energy consumption in Bulgaria (Figure 1). Hydropower represents the main source of RES-E (57%), followed by solar and wind whose respective shares are equivalent and account for almost one-fifth of the final consumption of renewable electricity. In line with many EU Member States, bioenergy plays a key role when it comes to the final consumption of RES-HC (87%). Based on information available in the draft NECP[2], Bulgaria aims to achieve an overall target of **25%** in terms of RE in the gross final consumption of energy (including transport) by 2030, with a specific target of **17%** for RES-E and **44%** for RES-HC.

Figure 1 Final energy consumption (centre), consumption of RES-E (left, down) and RES-HC (right, down) by energy source (Bulgaria, 2017, transport excluded)

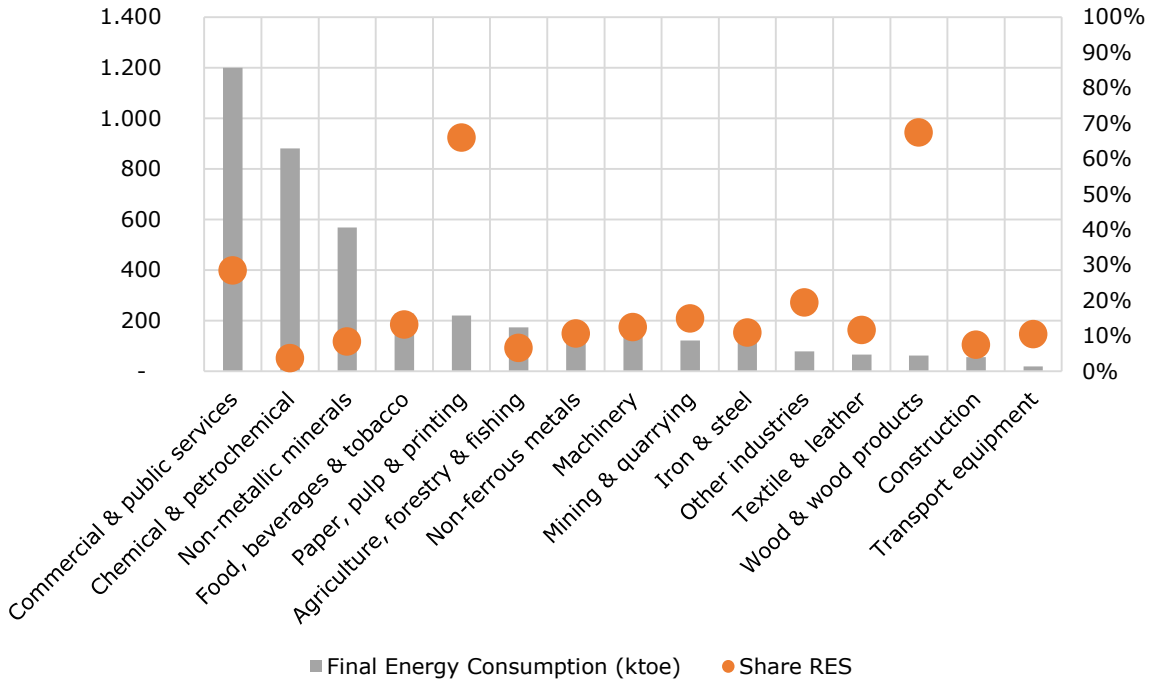


Source: Authors' elaboration on Eurostat: Energy Balances and SHARES.

[2] For further details, please see:
https://ec.europa.eu/energy/sites/ener/files/documents/ec_courtesy_translation_bg_necp.pdf

Except for services where the use of renewable represents almost 30% of the final energy consumption, most of the **economic sectors** that are responsible for a large share of the national final energy consumption resort to a low portion of renewables to meet their energy needs, usually below 15%. (Figure 2). Similar to other countries, Bulgaria registers high use of RES in wood and paper sectors.

Figure 2 Final energy consumption and share of renewables out of final energy consumption by sector (Bulgaria, 2017)



Note: Figures on final consumption of RES-E are missing. Therefore, it is assumed that the share of RES-E in the final consumption of electricity is equal to the share of RES-E in total national electricity generation.

Source: Authors' elaboration on Eurostat: Energy Balances and SHARES.

The Sustainable Energy Development Agency (SEDA) is the executive agency within the Ministry of Energy whose remit is to develop and maintain a system for the issuance, transfer and cancellation of **GOs**[3] **for RES**. When submitting the application for issuing a GO, producers are supposed to provide to SEDA the information aligned with Directive 2009/28/EC in relation to ownership, site and technology. Further submissions of GO to SEDA will only involve providing the measuring protocols issued by the distribution network operator.[4] A GO is valid for 12 months following the month when the energy was produced and is used only for the approval of the amount of RE delivered to final consumers. GOs are cancelled two weeks either after application for transfer to a final consumer or after export. Bulgaria is not a member of AIB and no requests for the import of GO into the country have been made.

[3] A GO is issued to a producer for each standard amount of energy of 1 MWh produced by the RE plant, except for amounts which the producer: (i) uses for its own needs; (ii) uses for power supply of its own branches and projects; (iii) sells at freely agreed prices and/or on the balancing market.
[4] For further details, please see: https://www.seea.government.bg/documents/BG%20Questionaire%20for%20the%20recognition%20of%20GO_v1_Nov2018.pdf

Up until August 2018, **the provision of GOs to a third party was not possible** and only the exported energy was deducted from the share of energy in the energy mix of an electricity supplier, with GOs being cancelled afterwards. Following amendments to the Energy Act, the **GOs which do not receive price support can be transferred** and deducted from the account of the supplier.

Should the regulatory framework accommodate anytime in the future RE generators to conclude corporate power purchase agreements, Bulgaria would become amongst the Member States to facilitate the sourcing of renewable electricity.[5]

1.2 Relevant national support policies

The following support schemes are in place in Bulgaria to foster the development of **RES generation**: long-term power purchase agreements (PPAs), feed-in-tariffs (FITs) and premium tariffs.[6]

Feed-in tariff. The Act on Renewable Energy Sources (ERSA) is the statutory basis for FITs and the mechanisms to promote RES under ERSA also include: (i) a mandatory off-take at preferential prices of the electricity generated from RES and (ii) a right to priority connection to the grid. The Energy and Water Regulatory Commission (EWRC) regulates both the price for selling electricity on the wholesale market, as well as the FITs at which renewable producers sell their electricity. Although the FITs are fixed for the entire duration of the PPA, sometimes FITs rates can be variable.[7]

RES electricity is purchased by public supplier NEK or end suppliers at the preferential fixed price set by EWRC which is effective as of the date of commissioning of the plant up to an amount which is determined by EWRC for each type of RES plants. The price of RES electricity is fixed and is not subject to modifications within the term of the PPA.

Premium tariff. In 2018 amendments to ERSA came into force which sought to further the liberalization of the Bulgarian energy market. A new support scheme has been introduced whereby all RES generators with an installed capacity of 4 MW or above are supposed to trade electricity on the energy exchange. The difference between the PPA price and the stock price is offset by means of a premium being paid by the Electricity System Security Fund (ESSF) to generators.[8]

The use of renewable **heating and cooling** is promoted in Bulgaria by means of a grant from the Energy Efficiency Fund.[9]

Box 1 NECP: Key policies and measures that may affect corporate sourcing of RE

Between 2021 to 2030, support via preferential prices will be provided only to new renewable installations with a total installed capacity not higher than 30 kW that are

[5] For further details, please see: https://renewablesnow.com/news/bulgaria-mulls-corporate-ppas-tenders-for-renewables-to-boost-clean-energy-sector-609908/

[6] For further details, please see: http://www.res-legal.eu/search-by-country/bulgaria/single/s/res-e/t/promotion/aid/premium-tariff-compensation-contracts/lastp/111/

[7] For further details, please see: https://uk.practicallaw.thomsonreuters.com/2-523-7911?transitionType=Default&contextData=(sc.Default)&firstPage=true&comp=pluk&bhcp=1

[8] For further details, please see: http://www.res-legal.eu/search-by-country/bulgaria/single/s/res-e/t/promotion/aid/premium-tariff-compensation-contracts/lastp/111/

[9] For further details, please see: http://www.res-legal.eu/search-by-country/bulgaria/single/s/res-e/t/promotion/aid/premium-tariff-compensation-contracts/lastp/111/

mounted on roofs or façade structures of buildings and are connected to the electricity distribution grid or in real estate adjacent to such buildings in urbanised areas. This may, therefore, favour some form of self-generation/self-consumption by corporates. Any new support scheme for other types of RE installations will rely upon auctions compliant with the current European rules in terms of state aid. In addition, Bulgaria aims to introduce some measures to facilitate the uptake of PPAs in the coming years.

Source: Draft Integrated National Energy and Climate Plan for Bulgaria[10]

1.3 Corporate sourcing: Available data

No websites or publications listing private companies sourcing RE are available in Bulgaria. The Agency for Sustainable Energy Development in Bulgaria has in its website[11] a register with the issued GOs starting since 2012. The register includes information on the issued, transferred and cancelled GOs for RES generated in a specific year. The register includes data on the RE generator, address, commissioning date, capacity in MW and the name of the organisations which has received it. The data can be exported in excel (currently available only in Bulgarian). According to the specific secondary legislation in Bulgaria, GOs could be traded only together with the energy for which they have been issued. Thus, the company-buyer has to buy the energy produced by RES, and together with that to obtain the GO in its role as an end supplier[12].

1.4 Corporate sourcing of renewables: drivers and barriers

After undergoing an increase in the level of RE installed capacity between 2010 and 2012, both the regulator and the Government sought to **limit the development of RE capacity and reduce incentives for existing plants**. Since 2012, the feed-in tariff has proved unsustainable for solar PV and wind producers and, as a result, **most planned investments have been abandoned**. Specifically, following the adoption of legislative amendments in March 2015, a new mandatory contribution amounting to five percent was levied on the income derived from generating electricity and the applicability of the most important incentives (long-term PPAs, obligation to purchase the energy and FIT) was confined to the smallest RES plants and some biomass projects, such as:

- Projects with a total installed capacity up to 30 KW inclusive, which are envisaged to be mounted on rooftops and facades of buildings connected to the electricity distribution grid and on real property in urban areas; or
- Projects with a combined cycle and indirect use of biomass, which are to be built in urban areas, on agricultural sites, or in industrial areas.

While projects which have been commissioned before March 2015 benefit from the promotion scheme until the termination of the respective PPAs, those which benefit from either **European or national support schemes** fall into a separate FIT scheme.

According to interviewees with national stakeholders, the drivers for Bulgarian companies' decision to source renewable energy are cost leadership, resilience to

[10] For further details, please see: https://ec.europa.eu/energy/sites/ener/files/documents/ec_courtesy_translation_bg_necp.pdf

[11] For further details, please see: https://portal.seea.government.bg/Warranty/WarrantyView and https://www.seea.government.bg/bg/registers#registar-garantzii

[12] For further details, please see: https://www.energo-pro.bg/en/News/58/ENERGO-PRO-Trading-sold-the-first-issued-in-Bulgaria-guarantees-of-origin-for-green-energy-to-a-Hungarian-company

electricity prices, regulatory compliance, differentiation, green supply chains, and revenues (e.g. from support schemes). The main barriers appear limited in-house skills and the state of the electricity market, which includes a variety of risks for both project developers and off-takers. The electricity market does not provide fair competition to industrial consumers as it is not liquid enough, with market distortions occurring because of the large state producers. Moreover, it is not fully integrated with neighbouring countries due to the lack of cross-border transmission capacity and other barriers. For example, international competition is reduced by export fees (to be removed in 2019), which maintain the national electricity prices lower.

The main drivers propelling Bulgarian companies to **self-generate renewable electricity** appear stability of electricity costs and lower electricity costs compared to grid electricity. On the other hand, the main barriers are long-term investment risk, regulatory barriers (e.g. building code, environmental permit) and the variability of renewables.

Regarding **renewable PPAs**, the main drivers are no up-front capital requirements, economies of scale (allowing multiple buyers), lower prices compared to grid electricity and control over the type of renewable energy. The main barriers appear the long contract duration, creditworthiness and required bank guarantees, the regulatory framework needed to manage GOs, and the price risk and uncertainty of future electricity price development.

Bulgarian companies' decision to rely on **unbundled GOs** is mainly driven by the positive impact on CSR, combined with no investment risk, up-front capital required and a short-term commitment. The main barrier is the missing regulatory framework to manage GOs, especially on a cross-border basis (for instance GOs are not easily transferable to another EU country as Bulgaria is not part of the AIB).

Regarding **green energy suppliers**, the main drivers are up-front capital not required (thus no investment risk), trust in the energy supplier combined with lower energy prices than those applied by traditional suppliers and positive impacts on CSR. The main barrier is the electricity price volatility, especially for short-term contracts.

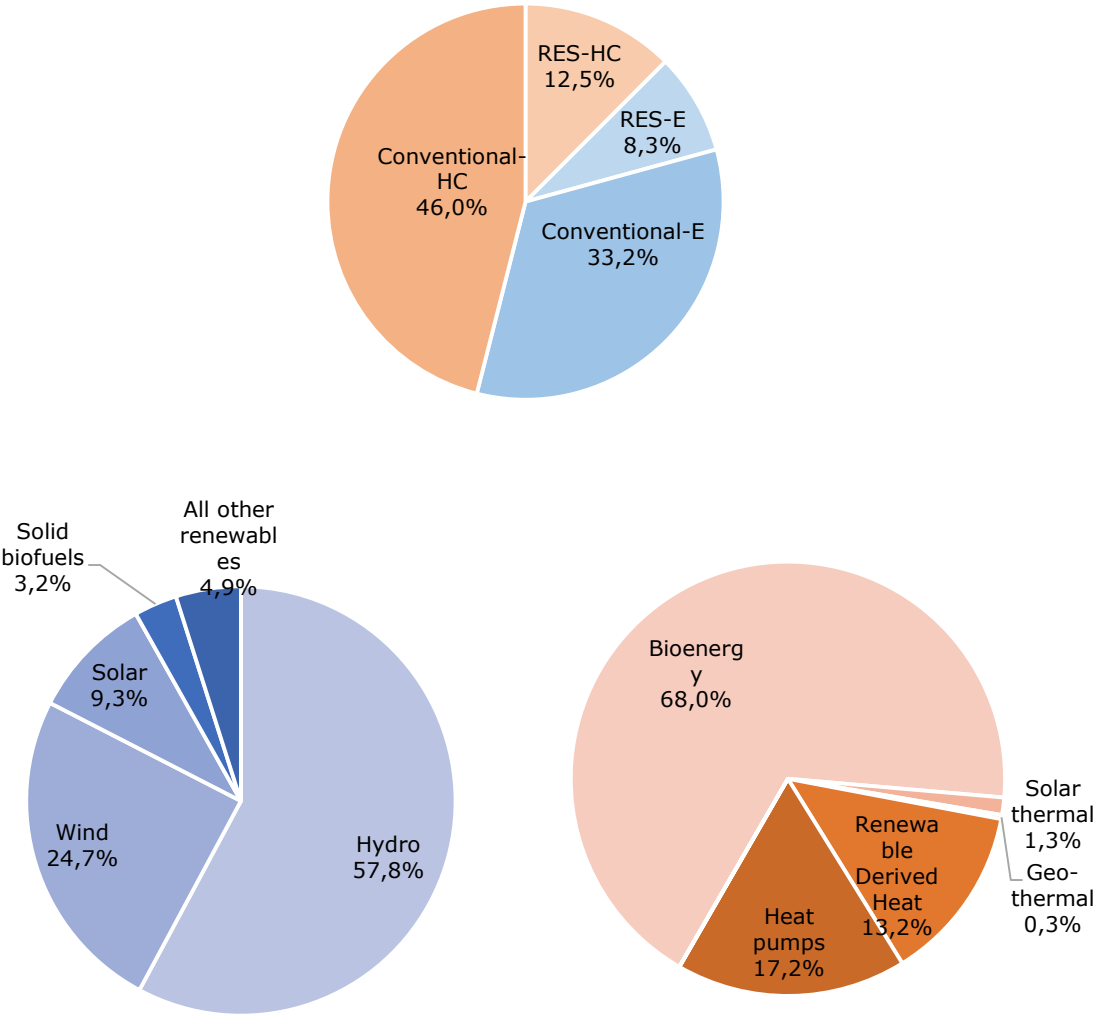
2 Country background analysis: France

2.1 Statistics

In 2017, **RE accounted for about 21%** of the final energy consumption (transport sector excluded) in France (Figure 3). While most of the renewable electricity was generated by hydropower (58%), wind and solar also represent sizable shares of RES-E generation. In line with data registered in other EU countries, the lion's share of RES-HC production relies on bioenergy (68%), followed by heat pumps (17%) and renewable derived heat (13%). According to the most recent version of the NECP[13], France aims to achieve a target of **32%** in terms of RE in the gross final consumption of energy by 2030 (transport included), with a specific target of **40%** for RES-E and **38%** for RES-HC.

Figure 3 Final energy consumption (centre), consumption of RES-E (left, down) and RES-HC (right, down) by energy source (France, 2017, transport excluded)

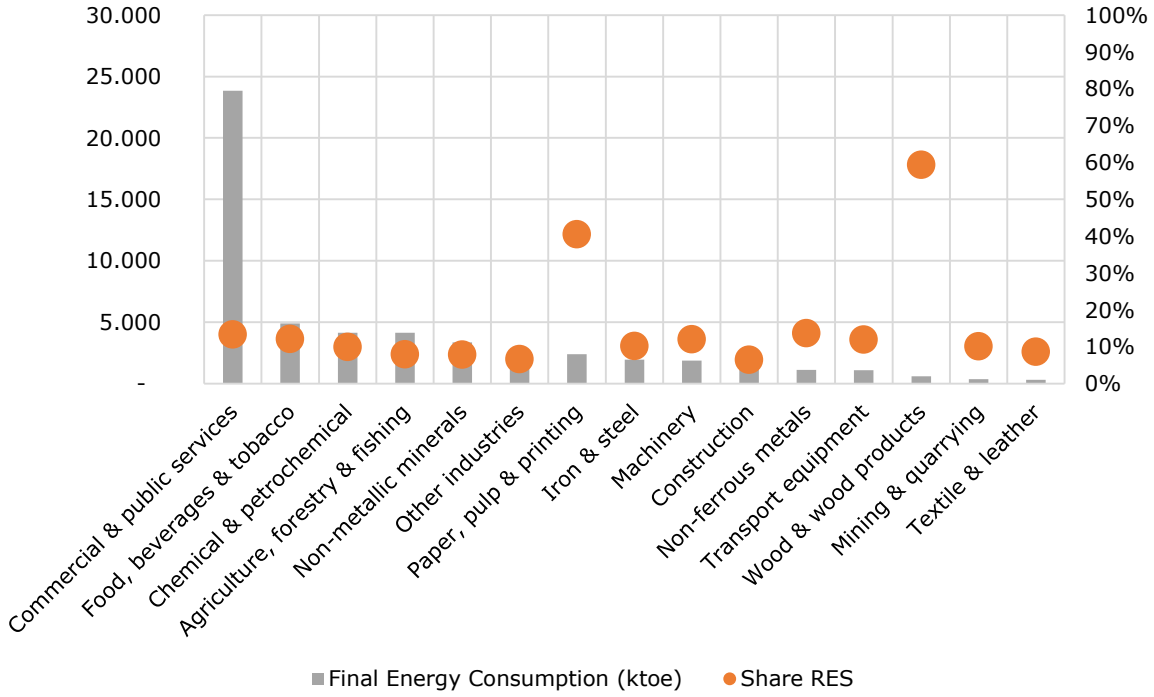
[13] For further details, please see: https://ec.europa.eu/energy/sites/ener/files/documents/france_draftnecp.pdf



Source: Authors' elaboration on Eurostat: Energy Balances and SHARES.

The services sector consumes the largest volume of energy, and less than 20% of it comes from RES (Figure 4). In the vast majority of sectors, excluding the wood and paper industries, RE represents 10% or less of the final gross energy consumption.

Figure 4 Final energy consumption and share of renewables out of final energy consumption by sector, France, 2017

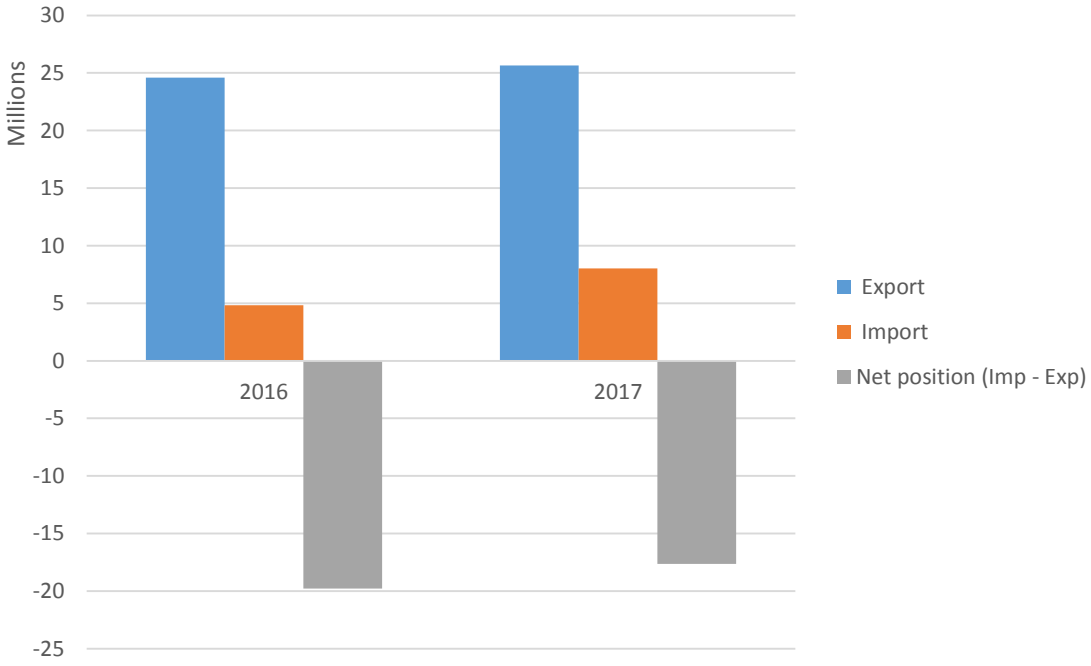


Note: Figures relative to RES-E are not available. Therefore, for each sector, it is assumed that the share of RES-E corresponds to the national share of RES-E in total electricity final consumption of each sector.

Source: Authors' elaboration on Eurostat: Energy Balances and SHARES.

According to statistics of the AIB (Association of Issuing Bodies) — obtained from Powernext, the French issuing body — French electricity consumers are opting for **electricity from renewable sources in rising volumes**. The volume concerned reached 22.0 TWh in 2017 as against 15.8 TWh in 2016. At the same time, the French import of renewable electricity GOs went up from 4.8 TWh in 2016 to 8.0 TWh in 2017. Virtually all of the aforementioned volumes regard hydropower. The same goes for French exports of GOs, which went up slightly from 24.6 TWh in 2016 to 25.7 TWh in 2017. French cross-border trade in renewable electricity GOs is depicted in Figure 5 below. As France is a net exporter of GOs, the share of RES-E in final energy consumption for the selected sectors is most likely lower than what presented above in Figure 4.

Figure 5 Yearly GOs' exports, imports and net position (France 2016, 2017)



Source: Authors' elaboration on AIB statistics.

Prices of cross-border traded **RES-E GOs** have risen substantially.[14] In March 2019 cross-border traded RES-E GOs fetched around €0.85/GO, even hydropower GOs fetched some €0.80/GO. Until 2017, hydro GOs were traded for not more than €0.30/GO. This may indicate rising scarcity on European RES-E GOs, triggered by surplus demand in major import markets, notably Germany and the Netherlands. French RES-E producers exported 24.6 TWh of RES-E GOs in 2016 and 25.7 TWh in 2017, of which 24.6 TWh and 25.6 TWh of hydropower GOs respectively. This brings in rising regulatory rents for operators of legacy hydro plants.[15]

According to Bloomberg, from 2013 to 2017 no **corporate renewable PPAs** have been concluded between operators of French renewable electricity generating assets and corporate consumers of electricity. This is not surprising as France has committed to GO legislation which does not facilitate the issuance of GOs to operators of renewable power generation installations that benefit from French support schemes. For multinational companies wishing to reduce their carbon footprint through entering into corporate PPAs, it is financially more attractive to do so in EU Member States with more lenient GO legislation.

[14] Greenfact.com publishes proprietary price information on European GO markets (accessible for paying customers). Commerg.com publishes a complementary weekly newspaper for subscribers registered via the company's website.

[15] This windfall profits issue, since it was raised in a recent CEPS article, has gained in monetary significance. For the article see: Jaap Jansen, *Should all producers of renewable energy automatically receive GOs?* CEPS Commentary, 12 March 2018.

2.2 Relevant national support policies[16]

In France, there are a number of policy instruments aiming to stimulate the generation of RES-E and RES-HC.

RES-E. Electricity from renewable sources is promoted through a variety of instruments, contingent on the technology category concerned. Instruments include a *feed-in tariff (tariff d'achat)* and a *floating premium tariff* on top of the sales price of the renewable electricity on the electricity market. Depending on the technology category, the reference price to be applied to periodically set the feed-in premium is determined by one of two alternative methods: either by *direct guaranteed contracts (guichet ouvert)* on the basis of *administrative orders (arrêtés)* or by *tenders (procédure en mise de concurrence) or competitive dialogue procedure*. Additionally, *tax benefits* are also available. Utility-scale onshore and offshore wind, as well as utility-scale PV projects, are typically the technologies of choice of multinational companies for entering into corporate renewable PPAs. These technologies are supported by floating premiums with the reference price set by tenders or a competitive dialogue procedure. Corporate self-generation technologies such as rooftop PV are supported by a feed-in tariff or an administratively determined floating premium tariff and in some instances also by tax measures.

RES-HC. The generation of heat through RE plants is promoted through several energy subsidies, tax regulation mechanisms as well as through a zero-interest loan.

GO legislation. Generally, in France operators of renewable power generating assets benefiting from a support mechanism are not eligible to be issued GOs over their production fed into the public power network. Legally the government[17] is entitled to designate an agency to organize auctions of GOs representing RE the producer of which received benefits from a support mechanism. It is reported that Powernext will be mandated to organize the first auctions at some point in 2019.[18]

Box 2 NECP: Key policies and measures that may affect corporate sourcing of RE

Cross-cutting measures in all sectors are expected to be adopted to increase the share of renewables in final energy consumption. For instance, the Heating Fund is intended to promote projects for heat production from RES and energy recovery for companies as well as for collective housing and communities. In addition, all new buildings will have to rely on a minimum share of renewable for heating purposes as of 2020. On top of these measures, complementary measures may be adopted for specific sectors, should the RE targets not be achieved. However, for the time being, such measures are not detailed in the draft NECP.

A framework support for small installations is set up to encourage electricity self-

[16] The information in this section regarding RES-E and RES-HC support policies was obtained from the website of RES Legal: http://www.res-legal.eu/search-by-country/france/

[17] According to government ordinance No. 2018-243 of 5 April 2018: https://www.legifrance.gouv.fr/affichTexte.do;jsessionid=D64B316C82045B5745F6F7DD523F0FC4.tplgfr31s_3?cidTexte=JORFTEXT000036775035&dateTexte=&oldAction=rechJO&categorieLien=id&idJO=JORFCONT000036774999

[18] For further details, please see: https://origo-renouvelable.com/fr/les-encheres-de-garanties-dorigine-en-france-sont-prevues-pour-2019/. According to ADEME, the French government has estimated that such auctions will bring in negligible (annual) revenues to the tune of €17 million against (annual) implementation costs amounting to €4.5 million. The key drawback of such auctions is that it creates/reinforces oversupply on the European GO market, rendering it more difficult for long-term RE PPAs on the basis of non-subsidised energy to take-off. For project developers considering to launch unsubsidised RE generation projects and their financers the market price GO can fetch will be an important consideration.

consumption:

- Small solar installations (<100 kW) on buildings may benefit from a long-term agreement (20 years) which includes investment support for 5 years coupled with a feed-in-tariff for the electricity surplus produced;
- Larger installations (between 100 and 500 kW) may benefit from market-based support schemes for both self-consumption or surplus generated.

Source: Draft Integrated National Energy and Climate Plan for France[19]

2.3 Corporate sourcing: Available data

No public websites or publications listing private companies sourcing RE are available in France. Renewable generators, project developers and electricity market players consider the list of their clients as highly confidential. It should be mentioned though that **several French companies are members of the RE100 initiative**, including Axa, Crédit Agricole, Danone, Estée Lauder, Groupe L'occitane, La Poste and Schneider Electric.[20]

2.4 Corporate sourcing of renewables: drivers and barriers

Self-generation. So far, self-generation has been driven by public support schemes (see above). It is being applied mainly by companies in the wood and wood products as well as in the paper and pulp industries and by farmers (roof-top PV on their barns).

RE PPAs. As long as multinational companies are only prepared to source RE at minimal additional costs compared to conventional energy, the general policy framework for RE PPAs involving RE projects sited in France is less enabling. This relates to the prohibition in France to issue GOs to RE generators who benefit from a support scheme. So far, multinational companies have shown a strong preference to conclude RE PPAs in EU Member States with a more lenient GO legislation. Countries facilitating these practises include notably Denmark, Ireland, the Netherlands, Sweden and the UK.[21] As mentioned already, up to 2017 Bloomberg has registered zero renewables-based PPAs in France. The general willingness expressed by corporates to source RE via PPAs has been confirmed by recent announcements of large French corporates (SNCF, ADP, Solvay), as part of their long-term climate policies.[22] However, the French 'compensation mechanism' offers a higher risk-reward benefit, and, therefore hinders the development of PPAs.

The good news is that, sooner rather than later, France is poised to benefit as well from corporate RE PPAs, and in an appreciably more credible way than is currently the case with RE PPAs benefitting from support mechanisms in EU Member States with lax GO legislation. That is, France is likely to welcome within short non-subsidised new RES-E projects merely on the strength of long-term corporate RE PPAs. This imminent trend stems from the fast decreasing costs of French utility-scale wind and PV projects and rising concerns of French consumers to bring about reductions in GHG emission by

[19] For further details, please see: https://ec.europa.eu/energy/sites/ener/files/documents/france_draftnecp.pdf
[20] For further details, please see: http://there100.org/companies
[21] Article 19 of Directive (EU) 2018/2001 on GOs leaves transposition into national law much up to subsidiarity, allowing these practices but also allows Member States to opt for a prohibition of GO issuance to RE generators benefitting from a support scheme. Prominent Member States opting to include the latter prohibition in national law are France and Germany.
[22] For further details, please see: https://www.lesechos.fr/23/06/2018/lesechos.fr/0301847198518_energie-verte---les-entreprises-remettent-a-plat-leurs-modeles.htm

their choices of low carbon products in the wake of the Paris Climate Agreement reached in December 2015. As noted in the previous section, at least seven large French companies have joined the RE100 initiative, implying that these companies commit to set and implement targets to source their electricity requirements from renewable sources.

Green tariffs. In France, green energy suppliers provide different types of offers, mainly based on hydropower. Notably for SMEs, green tariffs are an option to raise their ecological profile. Yet higher electricity prices compared to electricity prices associated with standard electricity contracts are considered to be a barrier. ADEME[23] has reviewed the green tariffs on offer in France. ADEME's first advice is to foster "premium green tariff contracts" through higher transparency regarding the quality of green tariff offers, where suppliers of premium green tariffs procure their green electricity on offer directly from French renewable power producers on the basis of long-term contracts. They identified four providers of premium green tariff providers: Enercoop, Ilek, Energie d'ici and EkWateur (green tariff entitled: "petits producteurs indépendants"). For application in the medium term, ADEME advises: i) to impose an obligation for green tariff providers to offer premium green tariffs only; and ii) to reduce the validity of using GOs to much less than one year after the electricity represented was injected into the grid.[24]

Unbundled GOs. The use of unbundled GOs by French companies is limited. Unbundled GOs have to be procured from the market on top of the costs for electricity procurement, hence at additional costs. This method of acquiring green credentials does not mitigate the purchaser's exposure to price volatility. Nor is this method considered to give much credibility to claimed green credentials.

[23] Agence de l'Environnement et de la Maitrise de l'Energie

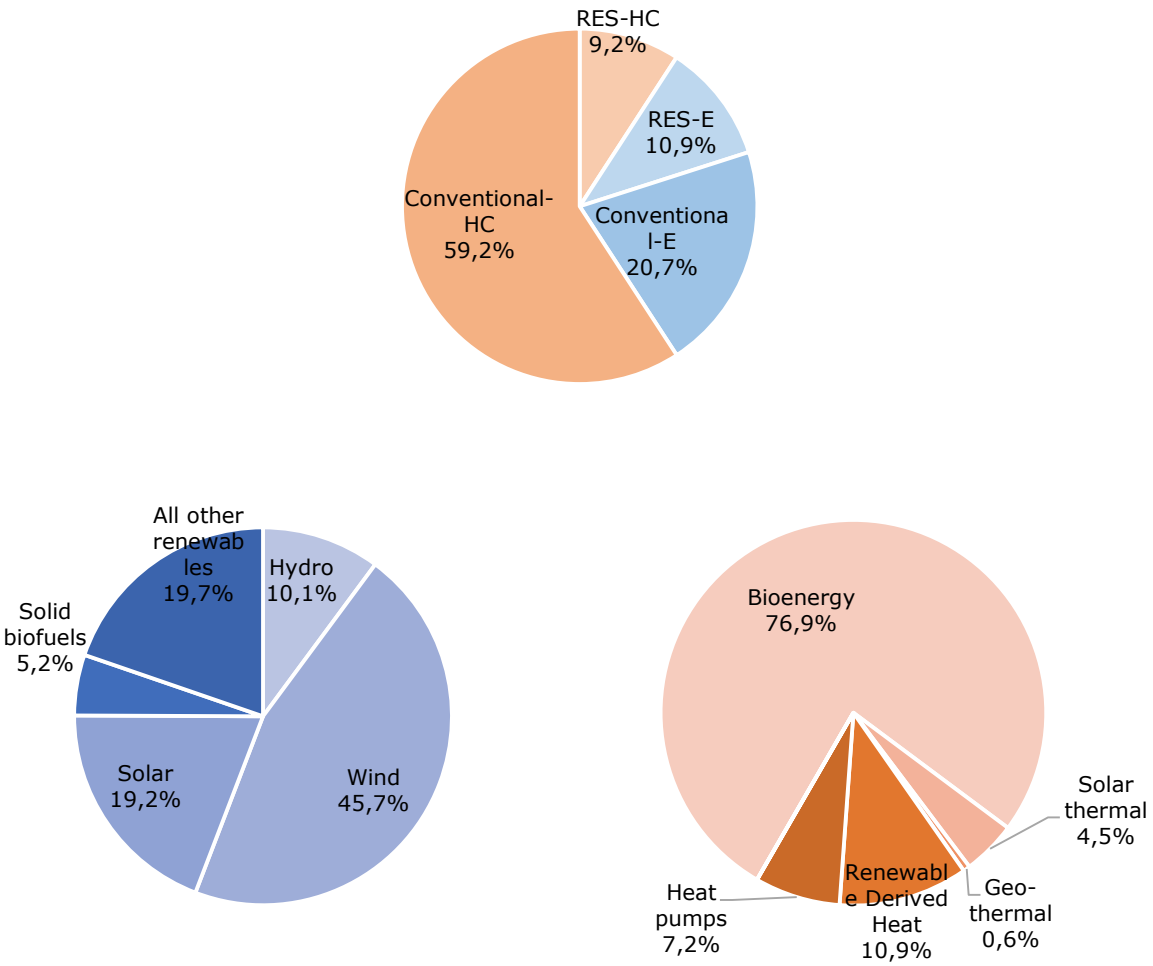
[24] For further details, please see: https://www.ademe.fr/sites/default/files/assets/documents/avis-de-lademe_offres_vertes_decembre2018.pdf. Recommendations by ADEME are not supported by the authors of this report. In fact, while the criterion of direct delivery by a local (French) producer seems to be too weak, the recommendation to reduce the validity period of GOs to less than one year may create unwarranted scarcity on the GO market and render the capacity to offer green tariffs extremely demanding.

3 Country background analysis: Germany

3.1 Statistics

In 2017, in Germany, **RE accounted for about 20%** of the final energy consumption, excluding transport (Figure 6). Note that in this Figure, RES-E and RES-HC correspond to domestic renewable electricity and heating and cooling production. Hence, these statistics do not provide insight into specific choices by German consumers in favour of RE or non-RE. About 46% of German renewable electricity was generated by wind (onshore and offshore), with solar and hydro also having sizable shares of RES-E generation (19% and 10% respectively). It is expected that the shares of wind and solar will increase. The bulk of RES-HC production relies on bioenergy. Overall, according to the last version available of the NECP[25], Germany aims to achieve a target of **30%** RE in the gross final consumption of energy by 2030 (transport included), with specific targets of **50%** for RES-E and **27%** for RES-HC.

Figure 6 Final energy consumption (centre), consumption of RES-E (left, down) and RES-HC (right, down) by energy source (Germany, 2017, transport excluded)

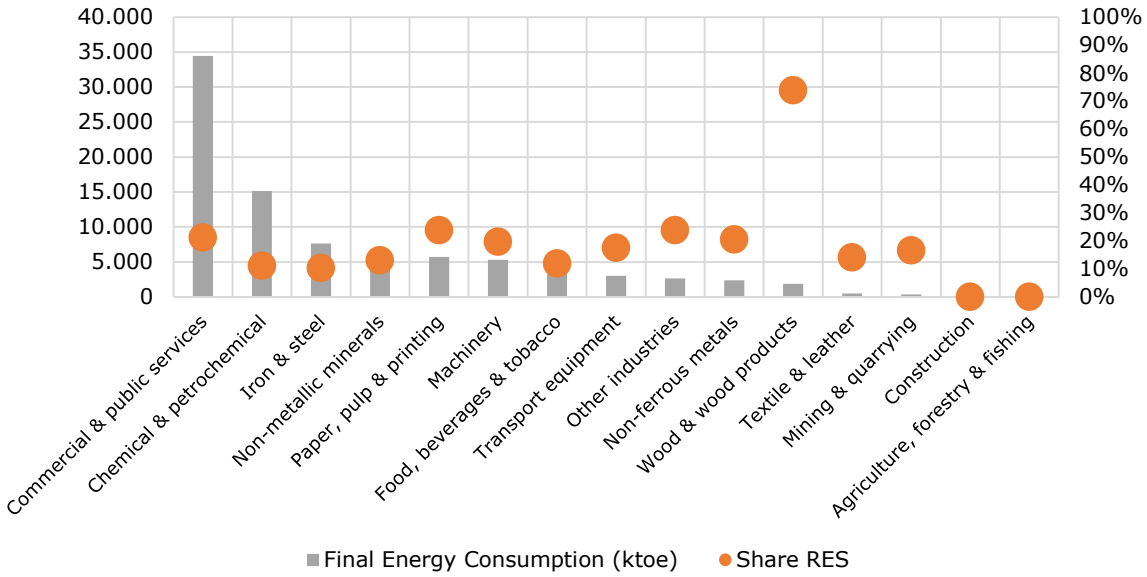


[25] For further details, please see: https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/governance-energy-union/national-energy-climate-plans

Source: Authors' elaboration on Eurostat: Energy Balances and SHARES.

In Germany, services, basic chemicals (including oil refineries), and iron and steel are the industrial sectors that consume the largest volume of energy. Except for the relatively small wood-working industry, the share of captive RE production out of final energy consumption is **below 25%** in all sectors (Figure 7).

Figure 7 Final energy consumption and share of renewables out of final energy consumption by sector, Germany, 2016



Note: Figures relative to RES-E are not available. Therefore, for each sector, it is assumed that the share of RES-E corresponds to the national share of RES-E in total electricity final consumption of each sector.

Source: Authors' elaboration on Eurostat: Energy Balances and SHARES.

Germany is a **major RE consumer**, when - as distinct from Eurostat statistics on electricity consumption - consumer choices are considered. According to statistics of **GO** issuing body *Umweltbundesamt* (UBA), the German Environment Agency, delivered to the Association of Issuing Bodies, in 2016 and 2017 84.0 TWh and 91.7 TWh of RES-E was consumed, whereas 14.6 TWh and 16.3 TWh of RES-E GOs were originated (issued) in Germany. The latter volumes do only reflect German RES-E production that was not subsidised by the German EEG[26] support scheme. This concerns German power from hydro (11.5 TWh in 2017), non-subsidised biomass (2.8 TWh) and unspecified (2.0 TWh). **German law forbids the issuance of GOs to generators for electricity benefitting from EEG subsidies**[27], i.e. the ones using wind, PV and some types of bio-generic installations. This is based on three considerations:

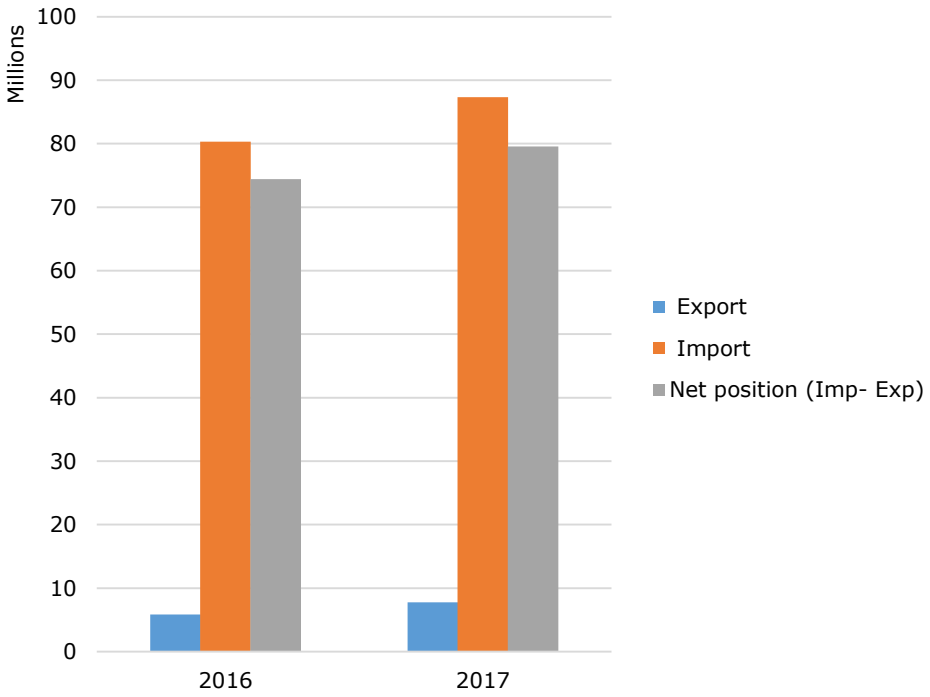
- Consumer protection. Those consumers who finance supported electricity via the support scheme should also receive the 'green value' in return.

[26] *Erneurbare Energien Gesetz* (Renewable energy Law).
[27] Generators benefitting from EEG subsidies have the option to change from EEG subsidies to marketing their electricity without subsidy, but with GOs issued to them by UBA.

- Legitimisation of the EEG. If the consumer would not receive the green value anymore in return for the EEG levy, this might put the constitutionality of the EEG levy at risk
- Functioning of the GO market. Issuing GOs for supported electricity in Germany would lead to excess supply in the GO market, thus further reducing the price for GOs.

In 2016 and 2017, 80.3 TWh and 87.3 TWh of RES-E GOs respectively were imported into Germany, of which the lion's share hydro-based. Export of RES-E GOs originated in Germany amounted to 5.9 TWh and 7.8 TWh in 2016 and 2017 respectively, of which the bulk hydro GOs. Figure 8 below shows German annual imports and exports of GOs for renewable electricity. Germany is the largest European importer with a net import of 74.4 TWh and 79.5 TWh respectively.

Figure 8 Yearly GOs' exports, imports and net position (Germany 2016, 2017)



Source: Authors' elaboration on AIB statistics.

Recently prices of **RES-E GOs have risen sharply**.[28] According to market parties interviewed, imported RES-E GOs fetch around €1.50/GO across-the-board, even Nordic hydro. Until recently, Nordic hydro was traded for €0.30/GO. This may indicate rising scarcity on European RES-E GOs, triggered by surplus demand in major import markets, notably Germany and the Netherlands, giving rise to surging regulatory rents cashed in by operators of legacy hydro plants.[29]

[28] Greenfact.com publishes proprietary price information on European GO markets (accessible for paying customers). Commerg.com publishes a complementary weekly newspaper for subscribers registered via the company's website.

[29] Hence, this windfall profits issue, since it was raised in a recent CEPS article, has gained in monetary significance. For the article see: Jaap Jansen, *Should all producers of renewable energy automatically receive GOs? CEPS Commentary*, 12 March 2018.

From 2013 to 2017, according to Bloomberg, 1 **RE PPA** has been signed by a German bank for a total capacity of 205 MW of small hydro capacity.[30] As it stands, we do not avail of details for this PPA. Reportedly, Mercedes-Benz Cars has recently signed a PPA with Statkraft, a power generation and trading company, to source electricity from six community wind farms in Lower Saxony, which will start in 2021 and ensure the continued operation of the sites (commissioned in 1999-2001) without additional public subsidies.[31]

3.2 Relevant national support policies

In Germany, as confirmed by the draft NECP, there are a number of policy instruments aiming to stimulate the generation of RES-E and RES-HC.[32]

RES-E. Electricity from RES is mainly supported through a market premium scheme. The eligibility period for EEG support is 20 years from the first commissioning day onwards. For most new installations, the award and the level of the market premium are determined through a tendering scheme, while most existing eligible installations benefit from administratively determined support levels. Plants with a capacity of up to 100 kW and other plants in exceptional cases can benefit from a feed-in tariff. The criteria for eligibility and the tariff levels are set out in the Renewable Energy Sources Act (EEG 2017).[33] The EEG also introduced support schemes to promote flexible biogas plants. Moreover, low-interest loans for investments in new plants are provided for by different KfW-Programmes (Renewable Energy Programme –Standard, Programme offshore wind energy, Consortium Loan Energy and Environment, Renewable Energy Programme Premium).

RES-HC. The Market Incentive Programme (MAP) stipulates support schemes for the promotion of heat produced from RE. BAFA (*Bundesamt für Wirtschaft* und *Ausfuhrkontrolle*, i.e. Federal Office of Economics and Export Control) is providing investment support for the use of renewables for heat in existing buildings and for process heat. KfW (*Kreditanstalt für Wiederaufbau*, a federal state development bank) offers low-interest loans.

3.3 Corporate sourcing: Available data

No public websites or publications listing private companies sourcing RE are available in Germany. Renewable generators, project developers and electricity market players consider the list of their clients as highly confidential. It should be mentioned though that several German companies are members of the RE 100 initiative, e.g. BMW, Allianz and Commerzbank.[34]

3.4 Corporate sourcing of renewables: drivers and barriers

Self-generation is applied by some multinational companies and by farmers (roof-top PV on their barns). For small companies, the main drivers in Germany are exemptions from charges, levies and taxes for self-generated electricity (full

[30] European Commission elaboration on Bloomberg Energy Finance.
[31] For further details, please see: http://newenergyupdate.com/wind-energy-update/germanys-first-corporate-wind-ppa-offers-model-6-gw-ageing-assets?utm_campaign=NEP%20WIN%2006FEB19%20Newsletter%20A&utm_medium=email&utm_source=Eloqua&elqTrackId=9fcef5e4c3ee4c0c8a0588eceec62580&elq=a5f77755296e4b83b78206e4719d3b58&elqaid=42687&elqat=1&elqCampaignId=24066
[32] This section mainly draws on RES Legal: http://www.res-legal.eu/search-by-country/germany/summary/c/germany/
[33] For further details, please see: https://www.erneuerbare-energien.de/EE/Redaktion/DE/Standardartikel/EEG/eeg-2017.html
[34] For further details, please see: http://there100.org/companies

exemption for old installations and small installations below 10 kW, reduced exemptions for installations above 10 kW).[35] Renewable self-generators with small installations are also eligible to receive a feed-in-tariff or feed-in-premium for the electricity they feed into the grid. However, the incentive provided by the feed-in-tariff/premium is generally smaller than the incentive provided by the exemptions from charges, levies and taxes. For large companies, the main driver for self-generation is (was) the until recently very attractive EEG subsidies. The second driver, mainly for large companies, is marketing a 'green' corporate brand and low carbon products. Over the last decade, administratively determined subsidy rates have been revised drastically downward and aggregate volumes of new PV installations eligible for EEG support has been capped to annual levels decreasing each year. More recently, tendering for EEG support has been applied for new RES-E installations with a capacity larger than 75 kW (wind onshore, solar) and 150 kW (biomass), putting even more downward pressure on support rates. Apart from the support cap applying notably to PV and offshore wind and other regulatory constraints, which negatively affects available projects for RES sourcing, the main barriers are the up-front investment costs and the lack of staff with specialised knowledge on arranging the construction of a PV installation and managing it. Currently, legal constraints on certification of German renewable electricity production, generated with EEG support, are in force. Notably, the long duration of the EEG support period (20 years) renders the alternative, no EEG support but reliance on the alternative additional cash flow from GO revenues, less attractive. Yet should the recently implemented auction approach for granting EEG subsidies push down the reference energy price sufficiently for granting EEG feed-in premiums, the attractiveness of zero-subsidy RE-PPAs may rise. This will be the case for a certain EEG-eligible technology, when the price of electricity plus GOs in such a contract is to become less than the expected average electricity price per MWh plus the expected average GO price. Indeed, the first RE-PPA without EEG subsidy was announced recently.[36]

The general policy framework for **RE PPAs** involving RE projects sited in Germany is less enabling. Only energy from non-EEG-supported RES-E projects can be sourced at generally inhibiting additional electricity costs. Two major factors account for the lower attractiveness of '*Standort Deutschland*' for RES-sourcing by means of PPAs:

- German legislation and, more specifically, the German EEG support scheme.
- Generators of RE benefitting from the EEG are not allowed to receive GOs over their production.

It has already been explained above that the prohibition of issuance of GOs to generators benefitting from EEG subsidies has been enshrined in German law for good reasons. Indeed, issuance of GOs over RE on which a producer benefits from EEG support is forbidden altogether. Typically, the EEG offers floating premium subsidies to eligible RES-E project developers over a 20-year period. The alternative for such actors to relinquish EEG subsidies in order to generate alternative cash flow from the proceeds of GO sales is poised to be rejected by project financiers as guaranteed EEG subsidies provide much more certainty to them.

In addition, German electricity-intensive companies are eligible for state compensation for the pass-on of the EU allowance (EUA) price of the EU ETS in German wholesale electricity prices. State aid/compensation for electricity-intensive industries is intended

[35] See also the draft NECP, available at: https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/governance-energy-union/national-energy-climate-plans

[36] It regards a 15-year RE-PPA contract signed in February 2019 between EnBW AG and Energykontor AG for delivery of EEG-subsidy-free power plus GOs. For further details, please see: https://www.enbw.com/company/press/press-releases/press-release-details_203904.html

to prevent a significant risk of carbon leakage due to EUA costs passed on in electricity prices of that very industries, if their competitors from third countries do not face similar CO2 costs in their electricity prices and the beneficiary is unable to pass on those costs to product prices without losing significant market share. For electricity delivery contracts which do not include CO_2 costs, however, no state aid is granted. It has been reported that, in practice, energy-intensive companies forgo their entitlement to the compensation for indirect ETS costs when they procure electricity via a RE PPA.[37] This makes RE PPAs perceptively even less attractive for energy-intensive corporates. However, the German directive on state compensation for CO_2 costs does not necessarily imply loss of entitlement to German state support, provided the companies concerned can prove that also with a renewable PPA contract they incur CO_2 cost through the pass-on of the EUA price in the contractual electricity price, agreed in the RE-PPA contract concerned.[38]

In Germany, apart from subscribing to green tariffs (see below), direct demand from end-consumers for **unbundled GOs** is minimal. German companies are not likely to buy such products, as the differentiation value in terms of CSR is negligible. Notably, in Germany, a wide-spread mistrust has been reported to exist regarding "greenwashing" the source of electricity by means of GO certificates.

By contrast, especially for small companies wishing to buy renewable electricity, subscribing to a **green tariff product** from a trusted supplier presents a good alternative to self-generating of RES-E. No up-front financing is needed, nor manpower specialised in operating RES-E installations. The most attractive green tariff products for CSR purposes are those sourcing their delivered energy from specific national or even better local sources ('premium offers'). Under the prevailing regulatory framework, this is difficult to accommodate for green power suppliers, as EEG-subsidised RE plants are not allowed to receive GOs. Since 2019, EEG market premium subsidized RE plants are however allowed to receive guarantees of regional origin (GRO) ("Regionalnachweise"). By using GROs, the supplier can disclose that the EEG share in its energy mix has been produced in the consumer's region.

As for **RES-HC** GOs, their market value is minimal so far and likewise market liquidity. As such, depending on local conditions solar thermal or use of (notably industrial) waste heat from bio-sources might well be cost-competitive to heat from natural gas.

Given decreasing EEG support levels to new RES-E installations over time and rising GO prices as well as competitive pressure on large companies to score well on CSR and lowering carbon emissions, **RES sourcing** is poised to become much more important in Germany than it is at present. A limiting factor currently at play is the uncertainty on how the agreed recast Renewable Energy Directive will be transposed into German Law. As for now, Germany intends to keep the existing prohibition to issue GOs for supported electricity in place. In the same, auctioning of GOs for supported electricity is not under consideration.

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[37] See for instance Umwelt bundesamt/DEHSt, State aid for indirect CO_2 costs of emissions trading (electricity price compensation) in Germany for 2016, March 2017, notably the following statement on page 11: "When no CO2 costs are incurred in connection with the electricity consumed, no aid will be granted. This is the case, for example, when undertakings generate their own electricity from installations not subject to emissions trading". For further details see: https://www.strompreiskompensation.de/SPK/SharedDocs/downloads/EN/Auswertungsbericht_2016_Englische_Version.pdf?__blob=publicationFile&v=2

[38] The German directive on state compensation for CO2 costs states that the incurred costs are relevant for compensation eligibility. No explicit link to participation in the EU ETS is made. See: UBA (2017). German directive on state compensation for CO2 costs, Section 5.2.6, available at: https://www.dehst.de/SPK/SharedDocs/downloads/DE/rechtliches/Foerderrichtlinie_21-08-2017.pdf?__blob=publicationFile&v=4

The exclusion from ETS compensation schemes of electricity-intensive companies wishing to source electricity from RES might well be reconsidered. RES-sourcing companies using green tariff offerings or using self-procured RES-E GOs are susceptible to indirect ETS costs in electricity prices just like their counterparts sourcing non-RES-E electricity. Moreover, in contract negotiations between RES-E project developers and potential off-takers in a renewable electricity PPA due regard is taken of the wholesale market electricity price. The latter includes the price-increasing effect of the ETS allowance price.

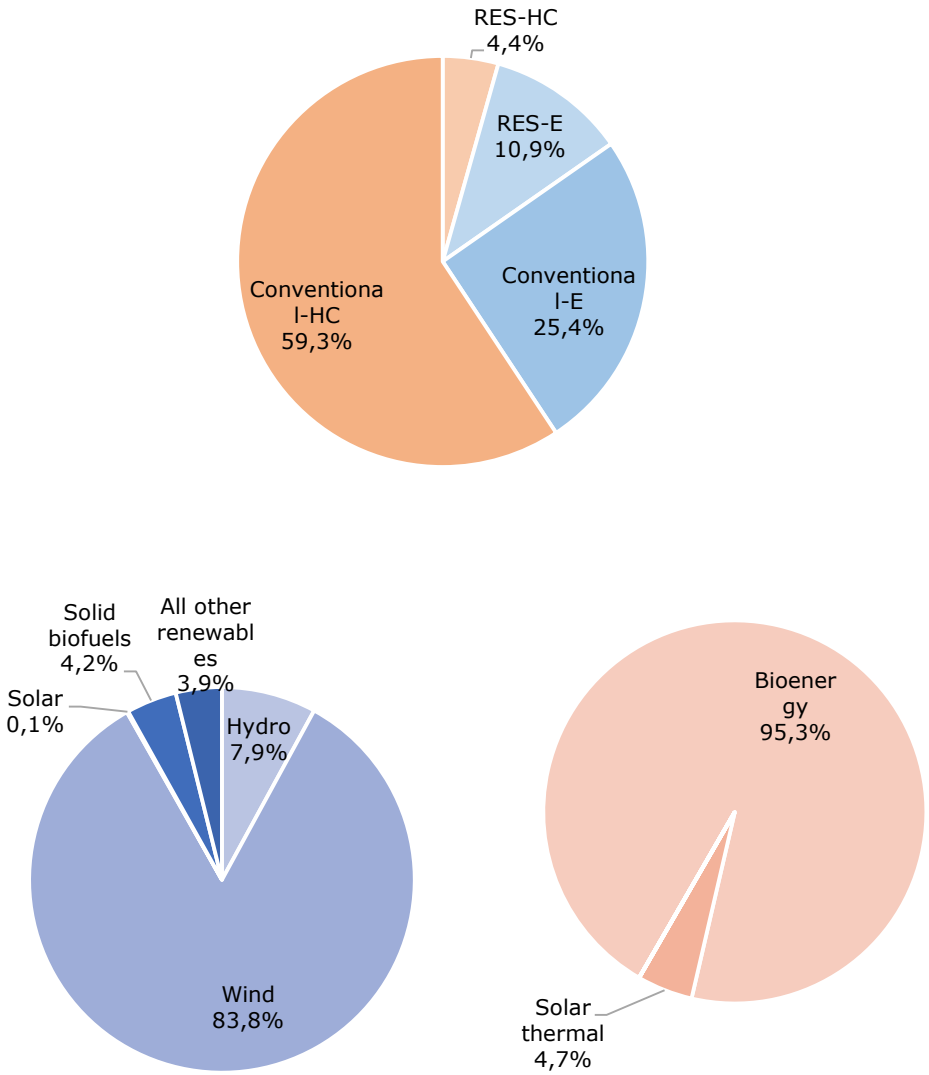
As from 2020 onwards, the EEG support period for the first RES-E installations benefitting from EEG support will expire. This will increase the supply of RES-E GOs with GOs from these installations and hence the potential for sourcing German renewable electricity. Evidently, the additionality of RES-E using energy from legacy RES-E installations is nought, unless the installations concerned were to be dismantled after the expiry of the — mostly 20-year — EEG-eligible period. Due to rising maintenance costs, this might be the case indeed sometimes for e.g. legacy wind turbines but is less likely for 20-year hydropower installations.

4 Country background analysis: Ireland

4.1 Statistics

In 2017, **RE accounted for about 15%** of the final energy consumption in Ireland (Figure 9 Final energy consumption (centre), consumption of RES-E (left, down) and RES-HC (right, down) by energy source (Ireland, 2017, transport excluded)). While most of the renewable electricity was generated by wind, in line with data registered in other EU Member States, the lion's share of RES-HC production relies on bioenergy. For the time being, the draft NECP[39] does not mention any specific country level target for 2030.

Figure 9 Final energy consumption (centre), consumption of RES-E (left, down) and RES-HC (right, down) by energy source (Ireland, 2017, transport excluded)

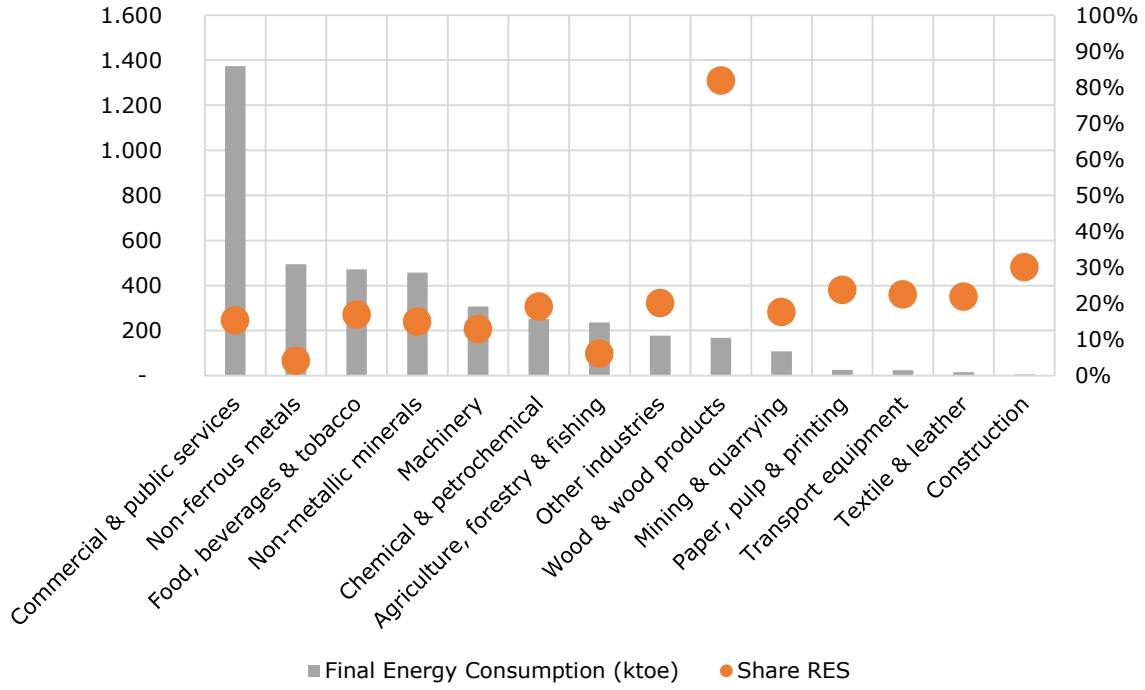


Source: Authors' elaboration on Eurostat: Energy Balances and SHARES.

[39] For further details, please see: https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/governance-energy-union/national-energy-climate-plans

Interestingly, most of the economic sectors that are responsible for a large share of the national final energy consumption resort to renewables to **meet less than 20% of their energy needs** (Figure 10).

Figure 10 Final energy consumption and share of renewables out of final energy consumption by sector (Ireland, 2017)



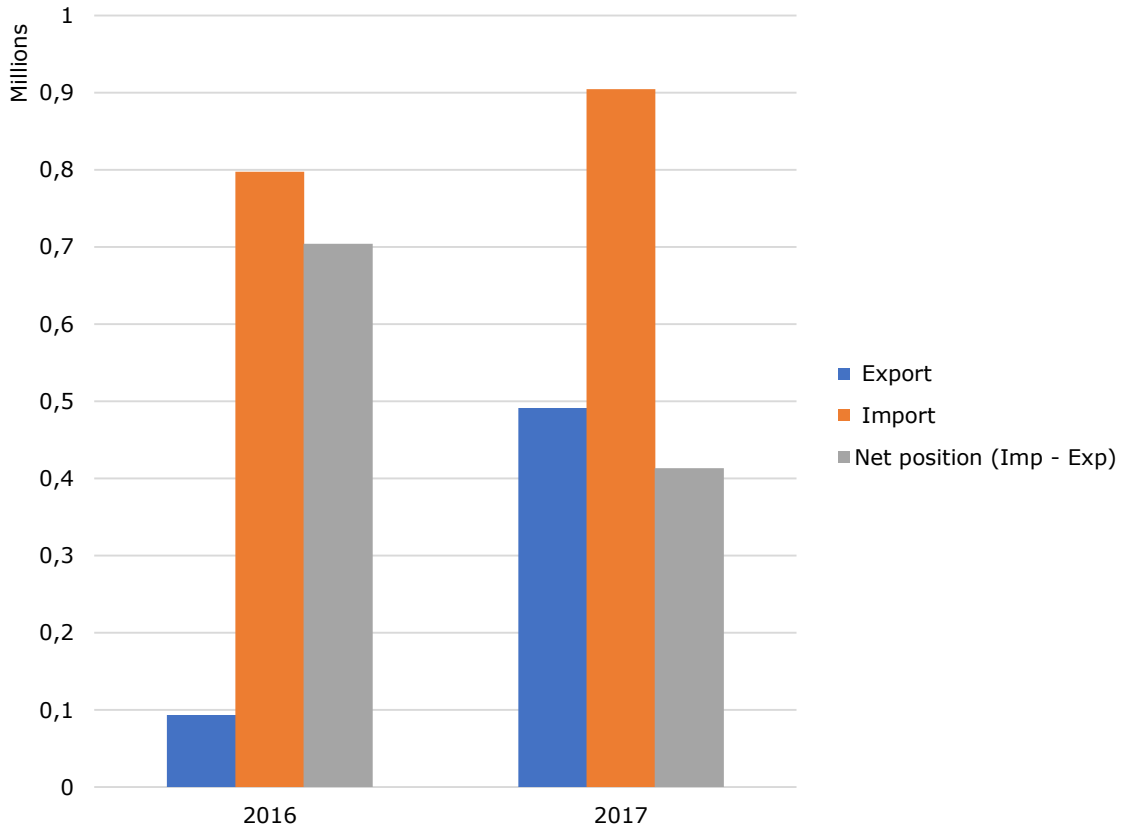
Note: Figures relative to RES-E are not available. Therefore, for each sector, it is assumed that the share of RES-E corresponds to the national share of RES-E in total electricity final consumption of each sector.

Source: Authors' elaboration on Eurostat: Energy Balances and SHARES.

In 2016, Irish imports of GOs exceeded exports for about 700,000 units (Figure 11), which are equivalent to some 61 ktoe,[40] i.e. about 2% of the total electricity generation. In 2017, exports of GOs increased up to almost 500,000 units, thus reducing the net position to around 400,000 units of GOs imported exceeding those exported, which equals to some 36 ktoe, i.e. about 1% of the total electricity generated in the country. As **imports of GOs exceeded exports**, Figure 10 is most likely (slightly) underestimating the share of RES-E in the final consumption of electricity for the selected sectors.

[40] One GO is equivalent to 1MWh of electricity and 1 MWh is equivalent to approximately 8.6E-5 ktoe.

Figure 11 Yearly GOs' exports, imports and net position (Ireland 2016, 2017)



Source: Authors' elaboration on AIB statistics.

With regard to the **RE PPAs** in Ireland, in 2016 and 2017 three PPAs have been signed (two wind onshore and one solar PV), for a total capacity of 187.4 MWh. All the PPAs have a single off-taker belonging to either the ICT sector or food industry.[41]

4.2 Relevant national support policies

Support schemes for both RES-E and RES-HC are in place. These schemes make new investments in RE more appealing. However, there is no special incentive for corporate sourcing of RE. In addition, very generous support schemes have historically hampered self-consumption of renewables and made PPAs less interesting.

RES-E. REFIT was the primary support scheme in place in Ireland and it focuses on feed-in tariffs. The scheme was designed to provide a specific feed-in tariff over a 15-year period; it was divided into three rounds. Currently, the scheme is no longer accepting new projects. As of 2019, the so-called Renewable Electricity Support Scheme (RESS) will start functioning; the new scheme will consist of an auction-based contract for difference, with volume and budget caps. This is confirmed by the draft NECP,[42] which also mention that measures to facilitate RE PPAs may be considered in 2019.

[41] European Commission elaboration on Bloomberg Energy Finance.
[42] For further details, please see: https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/governance-energy-union/national-energy-climate-plans

RES-HC. The Support Scheme for Renewable Heat (SSRH) entered into force in 2018. It provides support based on heat output for biomass and anaerobic digestion, similar to the REFIT scheme. Heat pumps are eligible for 30% installation support investment under this scheme. According to the NECP, at a later stage, the SSRH may provide operational support for biomass boilers and anaerobic digestion heating systems, pending state aid approval from the Commission.

4.3 Corporate sourcing: Available data

No websites or publications listing private companies sourcing RE are available in Ireland. Whereas some information on RE projects that benefited from public support schemes can be retrieved, it is not possible to identify which project is linked to corporate sourcing of renewable electricity. Renewable generators, project developers and electricity market players consider the list of their clients as highly confidential.

A subset of Irish companies that are expected to be active in sourcing renewable electricity are part of the **Large Industry Energy Network** (LIEN),[43] supported by the Sustainable Energy Authority of Ireland (SEAI), which groups over 200 large energy corporate consumers. More specifically, the network consists of companies that spend over €1 million per year on energy. There are three requirements for a company to become a part of LIEN, in addition to the aforementioned spending requirement, which comprise: i) developing concrete RE action plans; ii) setting targets; and iii) reporting to the group.

4.4 Corporate sourcing of renewables: drivers and barriers

Self-generation is very interesting when it comes to CSR, especially because there is a visible link between the company premises and the renewable power plant. It also has major impacts in terms of additionality. Finally, self-generation is interesting because companies are exempted from energy taxation on self-consumed electricity and can stabilise their electricity costs. Reportedly, there are less than 20 companies relying on self-generation of renewable electricity in Ireland. This is because: i) the solar PV market has never taken off due to suboptimal weather conditions; and ii) 'private wires' are not allowed, so wind farms can only be installed by companies that have enough room near their plants and are located at a certain distance from housing. High up-front costs are another factor hampering this option for corporate sourcing of renewables.

Only electricity producers or suppliers can cancel **GOs** in Ireland. Hence, there is no option for energy consumers to cancel unbundled GOs. This legal constraint is also expected to generate legal obstacles to PPAs, as GOs cannot be transferred to off-takers.

Most of the renewable generation has been supported by the REFIT scheme; in addition, generators of subsidised renewable electricity cannot claim GOs. Therefore, **RE PPAs** so far have not been appealing for both generators and off-takers. Under the new RESS scheme, supported generators will still not be entitled to GOs; this may limit corporate's interest in RE PPAs, especially for those companies that are more interested in environmental sustainability than price hedging. Developers that will not succeed in receiving subsidies may still search for corporate off-takers to fund their projects; nevertheless, for the time being, they are not entitled to transfer GOs to off-takers. In addition, some developers believe that there is a commercial gap between what corporates are prepared to pay and what is required to ensure a viable investment in RE in Ireland. In spite of these challenges, there are high expectations

[43] For further details, please see: https://www.seai.ie/energy-in-business/lien/

linked to RE PPAs and, reportedly, law firms are already working on 'draft' contracts to reduce transaction costs. At any rate, the success of this option will mainly depend on the outcomes of the RESS scheme.

About 50% of the business customers in Ireland ask for some form of **green energy offers**, which are very easy to find. In general, green electricity is slightly more expensive than conventional electricity, as suppliers need to buy and cancel GOs (which, as things now stand, are rather cheap). There are some small suppliers that purchase electricity only from a very small number of renewable generators (in some cases, even just one) and sell it to one or more companies; they can, therefore, sell renewable electricity at the market price, as renewable generators are supported by the REFIT scheme and there is no need for the supplier to cancel GOs to prove green sourcing. Premium green offers are not common, as most business customers opt for 'cheap' RE; some companies prefer to buy Irish renewable electricity (Irish GOs are slightly more expensive than imported GOs).

Although Ireland is home to more than 60% of the RE100 companies,[44] corporate sourcing of RE has been quite limited so far. The main driver behind the decision of sourcing renewable electricity are: i) CSR considerations, including environmental sustainability targets set by multinational companies operating in Ireland; and ii) price stability, predictability and security of energy inputs. Nonetheless, higher prices compared with conventional electricity may make renewable electricity not appealing for a large number of companies operating in Ireland.

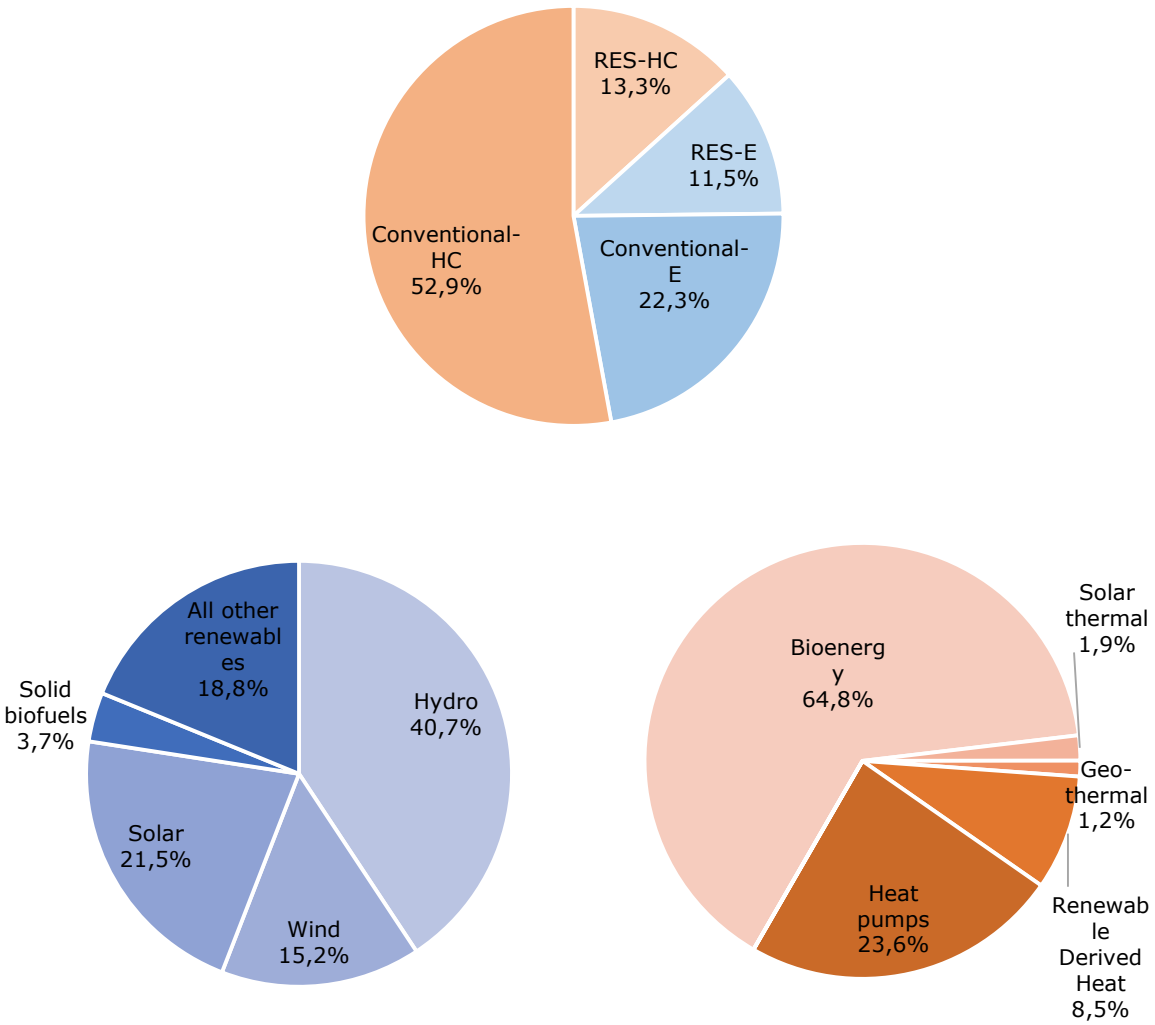
[44] For further details, please see: http://there100.org

5 Country background analysis: Italy

5.1 Statistics

In 2017, **RE accounted for almost 25%** of the final energy consumption in Italy (Figure 12). While most of the renewable electricity was generated from hydropower, solar power accounted for more than one-fifth of the RES-E generation, with wind and all other renewables representing about one-sixth each. In line with EU and international data, the lion's share of RES-HC production relies on bioenergy, followed by heat pumps, which are quite common in the country. Based on data available in the draft NECP[45], Italy aims to achieve a target of **30%** RE in the gross final consumption of energy by 2030, with a target of **55%** for RES-E and **33%** for RES-HC.

Figure 12 Final energy consumption (centre), consumption of RES-E (left, down) and RES-HC (right, down) by energy source (Italy, 2017, transport excluded)

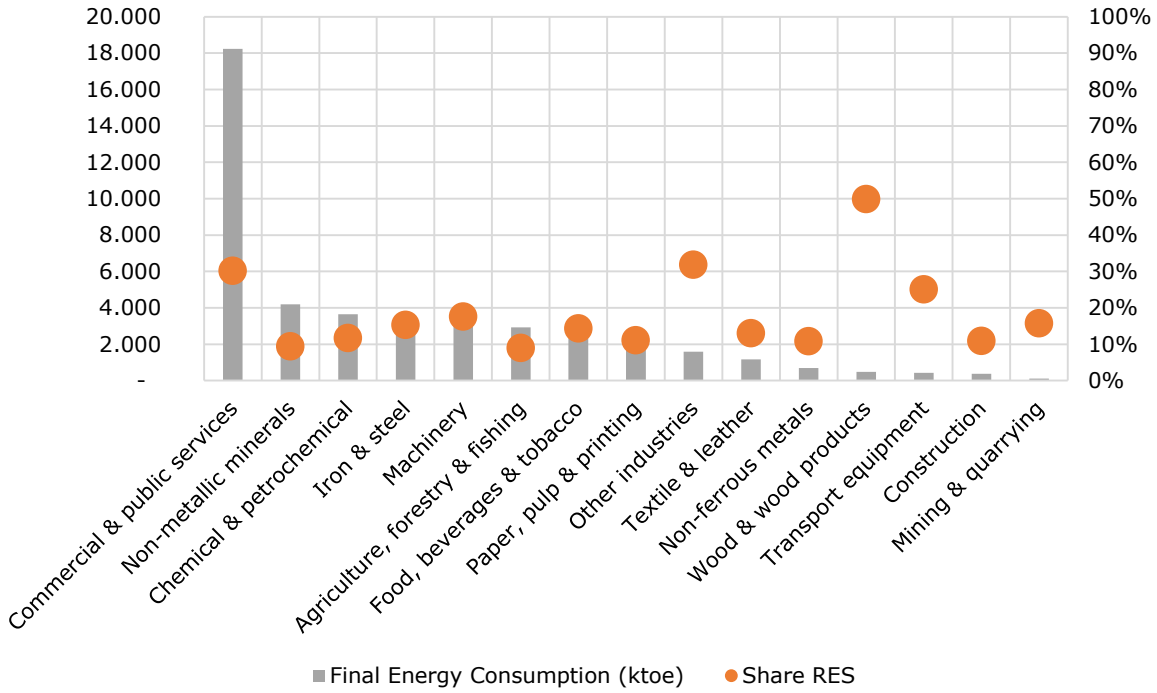


[45] For further details, please see: https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/governance-energy-union/national-energy-climate-plans

Source: Authors' elaboration on Eurostat: Energy Balances and SHARES.

Most of the economic sectors that are responsible for a large share of the final energy consumption resort to renewables to **meet less than 20% of their energy needs** (Figure 13).

Figure 13 Final energy consumption and share of renewables out of final energy consumption by sector (Italy, 2017)



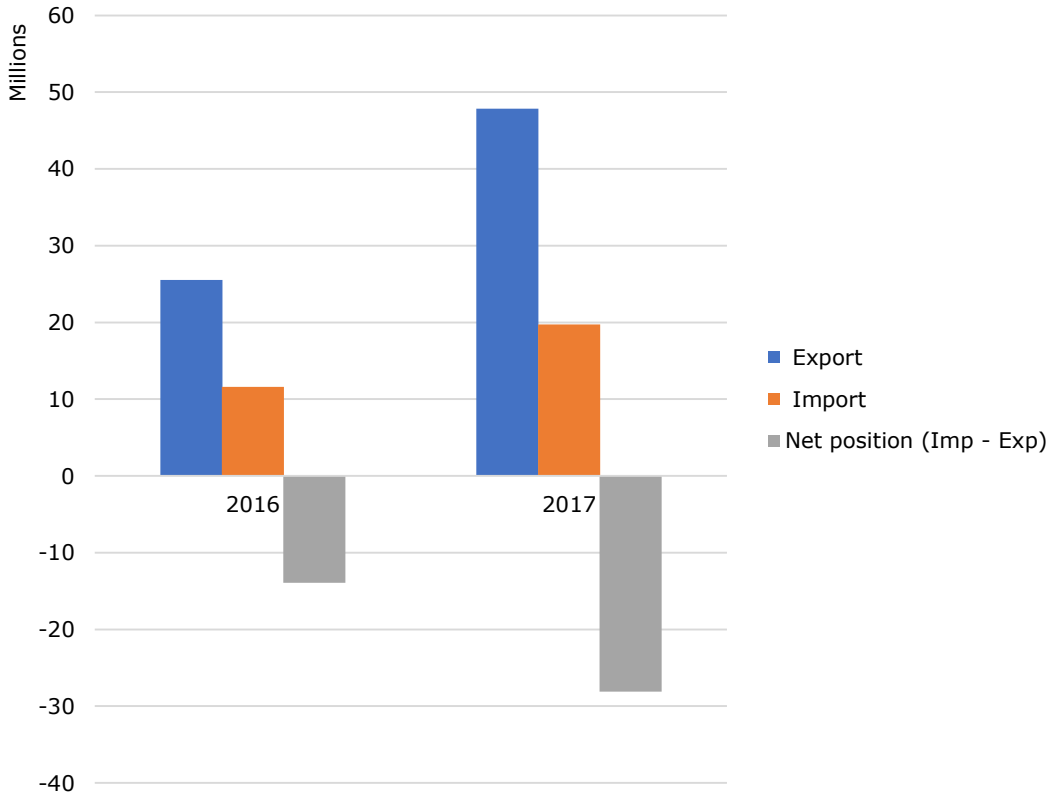
Note: Figures relative to RES-E are not available. Therefore, for each sector, it is assumed that the share of RES-E corresponds to the national share of RES-E in total electricity final consumption of each sector.

Source: Authors' elaboration on Eurostat: Energy Balances and SHARES.

In 2016, Italy exported about 25 million GOs and imported 11.6 million GOs; therefore, exports exceed imports by almost 14 million units, which equals to some 1,197 ktoe[46], i.e. about 4% of the national electricity generation (Figure 14). In 2017, **the number of GOs exported almost doubled** (48 million units) **and exceeded imports** by 28 million units, which are equivalent to 2,416 ktoe and correspond to about 8% of the total national electricity generation. This is equivalent to say that the share of RES-E in final energy consumption for the selected sectors is most likely lower than what presented above in Figure 13.

[46] One GO is equivalent to 1MWh of electricity and 1 MWh is equivalent to approximately 8.6E-5 ktoe.

Figure 14 Yearly GOs' exports, imports and net position (Italy 2016, 2017)



Source: Authors' elaboration on AIB statistics: Energy Balances and SHARES.

The Italian market for **RE PPAs** is still largely unexplored but is slowly expanding thanks to the growing interest of corporates that are willing to enter long-term agreements with generators of renewable electricity. Up to the end of 2017, the Bloomberg Energy Finance database recorded only one RE PPA (3 MW, single off-taker).[47] However, a number of PPAs are now in place in the country. For instance, Wienerberger Italia (the Italian subsidiary of the Wienerberger Group, i.e. the largest producers of bricks and roof tiles in the EU) has recently entered a PPA with ENGIE Italia.[48] More specifically, the four Wienerberger Italia plants will be supplied with solar PV electricity generated by power plants owned by ENGIE in Italy. The agreement will last 5 years (2018-2022), at a fixed price. Another large RE PPA has been signed recently by Centrica, a UK energy company, and Glennmont Partners (an investment company specializing in clean energy infrastructure investments). As a result of the agreement, 13 onshore wind farms will be deployed in Southern Italy and Sicily (with a total capacity of 315MW).[49]

Furthermore, the British renewable investor Octopus has just signed a five-year solar deal with Shell Energy Europe, through which it will supply renewable electricity at a fixed price from six solar PV plants that are currently being built, with a capacity of

[47] European Commission elaboration on Bloomberg Energy Finance.
[48] For further details see: https://wienerberger.it/servizi/press-area/wienerberger-e-engie-firmano-il-primo-ppa-green-in-italia
[49] For further details see: https://www.centrica.com/news/centrica-launches-support-renewable-energy-italy

70.5 MW.[50] Octopus has also renewed an existing subsidy-free two-year PPA with the RE trader EGO Group for a further five years[51]: the PPA entails the supply of power at a fixed price from five solar PV plants with a total capacity of 68 MW located in Central Italy. The five PV plants are part of a project finance deal (€23 million) that Octopus signed with MPS Capital Services Banca per le Imprese SpA (an Italian corporate and investment bank, subsidiary of Banca Monte dei Paschi di Siena, MPS). Reportedly, a new RE PPA will be signed in the coming months in the steel sector in Northern Italy.

5.2 Relevant national support policies

Several support schemes for investments in both RES-E and RES-HC technologies have been in place in Italy. Nevertheless, there is no special incentive for corporate sourcing of RE. In addition, very generous feed-in tariff schemes have historically hampered self-consumption of renewables and made RE PPAs less interesting. It is worth mentioning that the support schemes detailed in what follows cannot be used for new RE projects, as Italy is in the process of **devising new support schemes compliant with the most recent EU rules**.

RES-E. Feed-in tariff schemes to support the generation of electricity from RES were for the first time introduced in 1992. Since then, a plethora of support schemes have been introduced in Italy, featuring feed-in tariff, premium tariffs, quotas and tender schemes and allowing to sell electricity to the market or to self-consume (at least part of) the generated electricity (net-metering). This piecemeal approach led to a quite complex system of support to RES-E, where different incentives are provided based on the relevant size, energy source, technology and year of construction of the plant. Interestingly, RE generators are entitled against the grid operator to priority connection, priority use and grid expansion (if needed). The RES legal project,[52] funded by the European Commission, identifies the following schemes that have been applied in the recent past:

- Three **feed-in/premium tariff schemes** applying to RE power plants, except for solar power. Under these schemes, the premium tariff for large plants (above 5MW) is only set via a tendering process. This was an important step toward a market-based approach to RE incentives, which could make PPAs more interesting for large generators, especially in case they can get a better deal than the tender outcome.
- One scheme aiming to **reduce market access/transaction costs** for RE generation and applying to all types of electricity generation from renewable sources, solar power included. In a nutshell, the "Gestore Servizi Energetici"[53] acts as an intermediary between the generator and the market. Under this scheme, small plants (generally up to 0.5MW) may opt for a minimum tariff (feed-in tariff); by contrast, the price paid to larger plants depends on market price. Therefore, for solar PV the transition toward a market-based approach is almost completed and this could open the market for PPAs.
- Premium-tariff II. This premium over the market price applies to concentrated solar power (or hybrid installations), which is a less mature technology.
- Net-metering ('scambio sul posto'). Small plants (up to 0.5MW) generating electricity from RE can rely on net-metering. Once a year the balance between energy fed-in and energy consumed is calculated. The generator will receive a

[50] For further details see: https://af.reuters.com/article/commoditiesNews/idAFL8N1YG2E7
[51] For further details see: https://www.pv-magazine.com/2018/12/17/octopus-signs-second-italian-private-ppa-in-a-week/
[52] For further details see: http://www.res-legal.eu/search-by-country/romania/tools-list/c/romania/s/res-e/t/promotion/sum/184/lpid/183/
[53] For further details see: https://www.gse.it/en

compensation in case of positive difference between the electricity exported to the grid and the electricity consumed; vice versa the generator will have to pay for the negative difference. This scheme could be particularly interesting for small companies that are interested in investing in self-generation while relying on grid electricity for a stable supply.

- Two types of tax discounts: a reduced value-added tax on components and services related to investments in wind power and solar power plants and investments in grids distributing this electricity, which is less of interest for companies as the value-added tax is usually recoverable; a reduced real estate tax for buildings equipped with RE installations, which could generate some saving also for companies.

RES-HC. Support schemes for RES-HC are more limited and mainly focus on heating systems and boilers. Hence, currently, there is no incentive for companies to use RES-HC for their production activities.

Box 3 NECP: Key policies and measures that may affect corporate sourcing of RE

Heating and cooling and energy efficiency

Incentives to increase the use of thermal RES are linked to energy efficiency measures. These include:

- Tax deductions for energy efficiency measures, targeting thermal renewables;
- The thermal energy account "Conto Termico", providing incentives related to the production of heat from renewable sources;
- White Certificates system, issued for energy savings resulting from high-efficiency cogeneration installations, including also installations based on RES; and
- Mandatory integration of energy from renewable sources in buildings.

Consumption of self-generated electricity

Supporting instruments for self-consumption are currently being defined and will include:

- Streamlining of authorisations for self-consumers and RE communities;
- Exemption from self-consumption charges for small plants:
- Reinforcing minimum quota obligations for RES in new buildings or buildings subject to major renovation;
- Progressive extension of the minimum quota obligation for RES from new buildings or buildings undergoing major renovation to existing buildings.

The regulatory framework for self-consumption and RE communities will be further defined as part of a study funded by the Structural Reform Support Programme, "Support to elaborate legal and regulatory frameworks on closed distribution system and self-consumption assessment in Italy".

Corporate sourcing of renewables and PPAs

Italy intends to promote the use of PPAs for large RE plants. The framework is to be defined. This will include the identification of: the possible types of PPA; relative minimum requirements for entering in a contract; and potential legislative/regulatory barriers to be addressed.

Source: Draft Integrated National Energy and Climate Plan for Italy.[54]

5.3 Corporate sourcing: Available data

No websites or publications listing private companies sourcing RE are available in Italy. In addition, the association of green electricity suppliers (Assorinnovabili) has recently merged with the association of electricity suppliers (Assoelettrica); therefore, it is more **difficult to identify electricity companies supplying only green electricity**. Renewable generators, project developers and electricity market players consider the list of their clients as highly confidential.

All national support schemes for RE are managed by GSE. GSE applies an open data policy; therefore, **lists of all beneficiaries of support schemes** have been published on a yearly basis since 2014. However, the datasets do not allow to differentiate between: i) electricity generators; ii) energy service companies; and iii) companies self-generating electricity for meeting their own energy needs. Reportedly, GSE will soon put in place a trading platform for corporate PPAs, which could be useful to map such RES projects.

5.4 Corporate sourcing of renewables: drivers and barriers

In Italy, **self-generation** of renewable electricity is quite well-established among companies, but it meets only a limited percentage of their electricity demand, especially when it comes to energy-intensive sectors. Industrial clusters usually self-generate using highly efficient co-generation systems. Solar PV is the most popular technology adopted by companies for renewable self-generation, followed by hydroelectric power and waste heat and cold. The most relevant drivers for self-generation of renewable electricity in Italy include: i) the stability of electricity costs; ii) the cost competitiveness compared to grid electricity; iii) the savings on taxes and indirect EU ETS costs; and iv) the revenues stemming from the support schemes (which have been slowly diminishing over the last years). When it comes to barriers, companies are mainly concerned with the long-term investment risks and by the inadequate return on investment. Furthermore, regulatory obstacles on certain installations can discourage firms from self-generating: reportedly, Italian local authorities have not authorised the installation of renewable self-generation sites which would have been swiftly authorised in other Member States. The complexity of the authorisation process was also emphasised by an Italian company covered by one of the case study performed in the context of this study. Finally, the uncertainty due to frequent (and retroactive) changes in support schemes may impinge on companies' decision to self-generate.

RE PPAs are becoming more attractive for Italian companies. As mentioned above, the Italian renewable market has been heavily subsidised over the years, and currently, the government is trying to phase out subsidies and encourage the development of the PPA market. Solar PV and wind onshore are the most common technologies for RE PPAs in Italy. The main drivers contributing to corporate sourcing of RE via PPAs include: i) the lack of investment risk; ii) the compatibility with large renewable projects; iii) the stability of electricity prices; and iv) lower prices than 'standard' grid electricity. However, the transition from a subsidised system to a "market-based" environment seems to be hindered by several barriers, mainly regulatory and financial. In fact, currently, the authorisation procedures for the installation of renewable plants are not applied in a consistent way at the local level (e.g. by regional or local authorities), which very often leads to major delays and

[54] For further details, please see: https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/governance-energy-union/national-energy-climate-plans

discourages investment. Furthermore, barriers linked to creditworthiness standards and bank guarantees requested by the seller currently hamper the possibility to sign direct PPAs, as the Italian banking system provides very expensive bank guarantees. Finally, reportedly, companies are concerned by the fact that the contract duration for PPA may be limited by competition law (contracts above 5 years may be forbidden to avoid vertical foreclosure).[55] Companies are also concerned about the reliability of the counterpart and by the lack of intermediaries to mitigate risks.

In Italy the **GO system** is currently organized by GSE (Gestore Servizi Energetici) through auctions (for renewable electricity withdrawn according to an incentive regime) and by allocating certificates directly to power plants (for electricity which remains at producer's disposal). Since 2013, each electricity supplier has been requested to cancel an amount of GOs equivalent to the renewable power sold the same year. Energy producers, electricity suppliers and energy traders have the possibility to trade GOs. The positive factors driving companies' decision to buy and cancel **unbundled GOs** are the lack of investment risks and up-front investments; by contrast, the electricity price volatility, which remains since unbundled GOs do not affect the price paid to electricity suppliers, is perceived as a negative factor by those players interested in RE for price hedging purposes.

Green energy offers are by far the most common approach to corporate sourcing of renewable electricity in Italy. The main advantage of relying on green energy offers is that they do not entail any investment risk, but only operating costs. The barriers faced by companies that are relying on green energy suppliers include: i) concerns about the fact that the contract duration for green energy offers may be limited by competition law (if above 5 years); and ii) higher price per MWh compared to 'standard' grid electricity.

Overall, Italian companies choose renewable sources to improve their CSR strategy and differentiate from competitors. Reportedly, having a low carbon footprint thanks to RE helps to keep a leadership position in the market. When it comes to the barriers faced by companies, it is worth stressing that company culture plays an important role. Companies do not fully trust renewable sourcing because of the continuous regulatory changes in the support schemes and because it is perceived as not profitable enough and too risky. Financial barriers also hinder the transition to renewable sourcing, as companies are not willing to finance projects with returns on investment longer than 5-10 years. Furthermore, investments in self-generation are still perceived as too costly, especially because they also involve high connection costs to the grid. Infrastructural barriers are also perceived as a concern for companies that are relying on renewable sourcing. In fact, due to the morphological features of the country, renewable sites are located far from the sites where the energy is used, and network constraints are in place. Therefore, costly investments in strengthening the network are needed in order to encourage companies to choose renewable sourcing.

With regards to **RES-HC**, renewable sources help Italian companies differentiate from their competitors, contributing to their CSR, and support them in meeting green requirements requested by customers. RE for heating or cooling also increase price stability and contribute to regulatory compliance with environmental legislation, including EU ETS thresholds. When it comes to barriers, the fluctuating nature of RE (e.g. solar thermal) coupled with limited in-house skills and expertise as well as lack

[55] For further details, see:
http://www.confindustria.it/wps/wcm/connect/www.confindustria.it5266/bd6b198a-fac0-4f0e-b3ce-1744e993dc63/Libro+Bianco+-+Executive+Summary.pdf?MOD=AJPERES&CONVERT_TO=url&CACHEID=bd6b198a-fac0-4f0e-b3ce-1744e993dc63

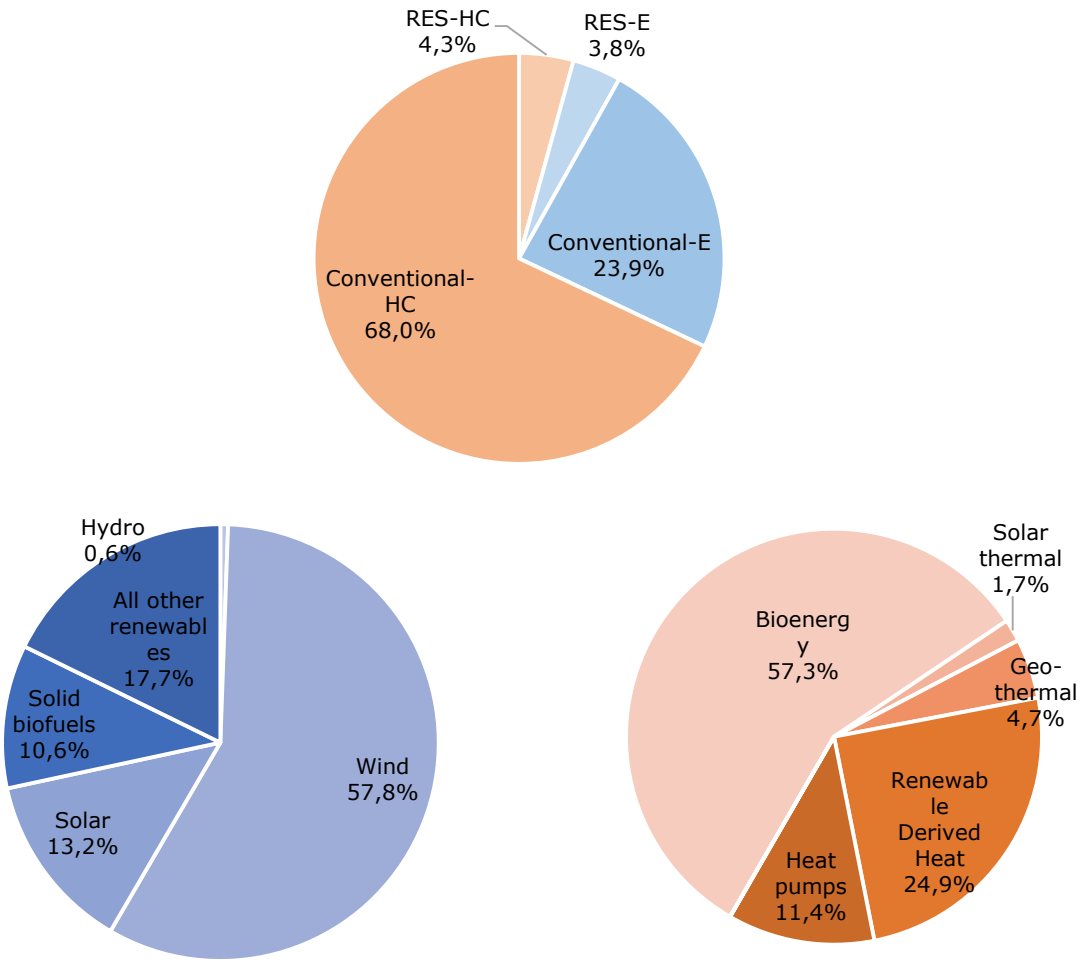
of reliable external consultants still affects companies' transition to RES-HC solutions. Other obstacles detected by Italian companies include: i) inadequate company culture (focusing on more profitable investments); ii) policy uncertainty (especially when it comes to support schemes); and iii) technical barriers (companies believe that RES-HC may negatively affect their production process).

6 Country background analysis: the Netherlands

6.1 Statistics

In 2017, **RE accounted for about 8%** of the final energy consumption, excluding transport, in the Netherlands (Figure 15). Note that in this Figure, RES-E and RES-HC correspond to domestic renewable electricity and heating and cooling production. Hence, these statistics do not provide insight into specific choices by Dutch consumers in favour of RES or non-RES electricity. More than 55% of Dutch renewable electricity was generated by wind (onshore and offshore). It is expected that the shares of wind and solar will increase at the detriment of solid biofuels (notably biomass co-firing of coal power plants). The lion's share of RES-HC production relies on bioenergy with a significant runner-up position for renewable derived heat. Based on data available in the draft NECP,[56] Netherlands aims to achieve a target of **27%** RE in the gross final consumption of energy by 2030.

Figure 15 Final energy consumption (centre), consumption of RES-E (left, down) and RES-HC (right, down) by energy source (the Netherlands, 2017, transport excluded)

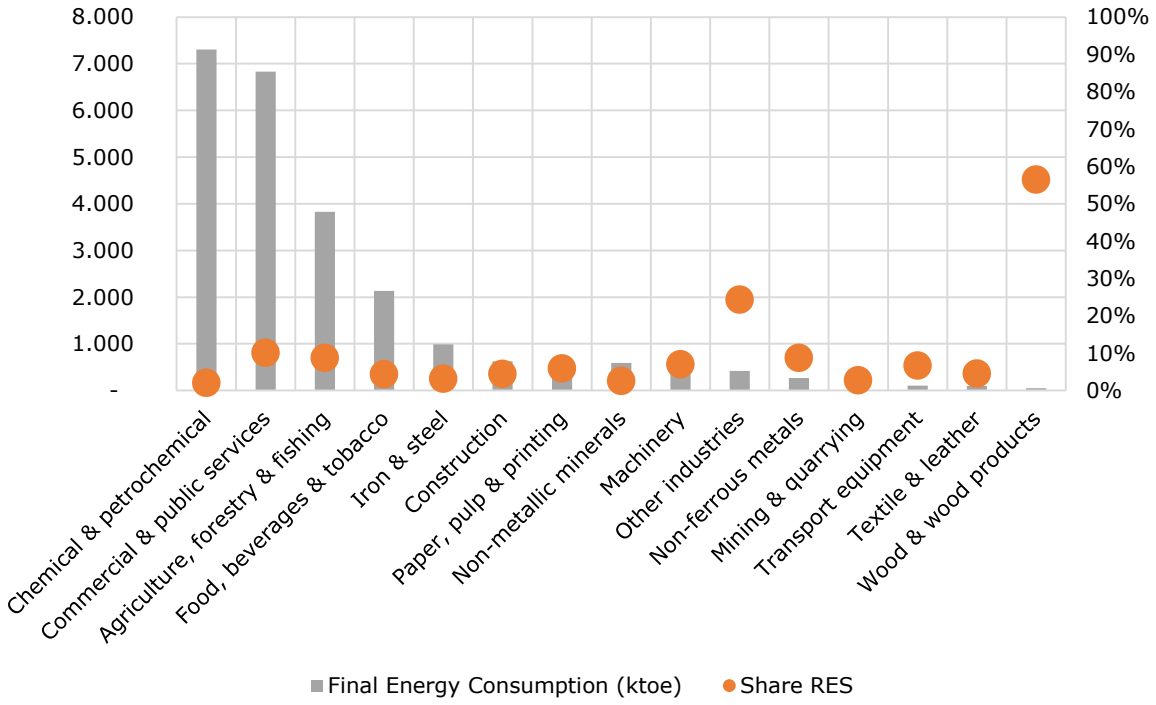


[56] For further details, please see: https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/governance-energy-union/national-energy-climate-plans

Source: Authors' elaboration on Eurostat: Energy Balances and SHARES.

In the Netherlands, the chemical and oil refinery industry, services, and agriculture are the sectors consuming the largest volume of energy. The share of captive RE production for own use in Dutch final industrial energy is, by and large, still very small (Figure 16).

Figure 16 Final energy consumption and share of renewables out of final energy consumption by sector (the Netherlands, 2017)



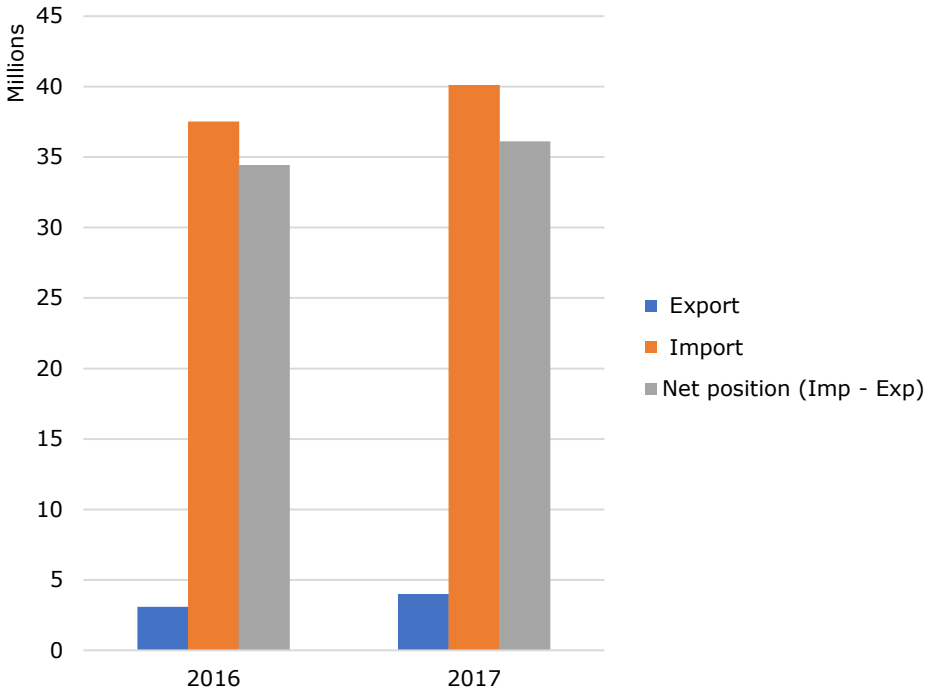
Note: Figures relative to RES-E are not available. Therefore, for each sector, it is assumed that the share of RES-E corresponds to the national share of RES-E in total electricity final consumption of each sector.

Source: Authors' elaboration on Eurostat: Energy Balances and SHARES.

The Netherlands is a **major RE consumer**, when - as distinct from Eurostat statistics on energy consumption - consumer choices are considered. According to statistics of issuing body CertiQ, a subsidiary of Dutch electricity TSO TenneT, in 2016 and 2017 48,0 TWh and 49,4 TWh of RES-E was consumed, whereas for 14,4 TWh and 15,8 TWh of RES-E GOs were originated in the Netherlands (Figure 17). In 2016 and 2017 37,5 TWh and 40,1 TWh of RES-E GOs respectively were imported into the Netherlands[57]. Figure 17 below shows Dutch annual imports and exports of GOs for renewable electricity. The Netherlands is a **large importer**. In 2017 for the first time Norway (Norwegian hydro) had to relinquish the pole position as country of origin for Dutch RES-E GO imports to Italy (Italian wind).

[57] CertiQ, Annual report 2017, Arnhem, 2018. Note that there can be small differences between import figures and surplus domestic RES-E consumption due to the fact that in compliance with Directive 2009/28/CE for proving RES-E consumption in a certain calendar year GOs issued in the year in question *and in the preceding year* can be used.

Figure 17 Yearly GOs' exports, imports and net position (the Netherlands, 2016-2017)



Source: Authors' elaboration on AIB statistics.

Recently prices of RES-E GOs have risen sharply.[58] According to market parties interviewed, to date Dutch wind GOs have risen up to €8/GO. Imported RES-E GOs fetch around €1.50/GO across-the-board, even Nordic hydro. Until recently, Nordic hydro was traded for €0.30/GO. This is a clear indication of **rising scarcity on European RES-E GOs**, triggered by surplus demand in major import markets, notably Germany and the Netherlands, giving rise to surging regulatory rents cashed in by operators of legacy hydro plants. Furthermore, in 2017 issuing body CertiQ has issued 4.3 TWh of RES-H GOs against 3.3 TWh in 2016. In the Netherlands "green gas" (biomethane) GOs are issued by a separate issuing body, Vertogas, subsidiary of natural gas TSO Gasunie.

From 2013 to 2017, **10 RE PPAs** have been signed in the Netherlands, for a total capacity of 473 MW.[59] All PPAs have a single off-taker; 7 out of 10 off-takers belong to the ICT sector. Whereas the large majority of the agreements involved wind onshore generation, two agreements relied on small-scale hydropower. Not unlike elsewhere in the EU, to date most business entrepreneurs in the Netherlands are not disposed to pay a premium for sourcing renewable electricity. Yet a rising number of companies is, notably large business electricity consumers. This is witnessed by the increasing number of *eindverbruikers* accounts (accounts by business energy, notably RES-E, users) at the GO register of Dutch issuing body CertiQ: i.e. 701 accounts in 2017 against 517 accounts in 2015. In 2017 the 701 companies concerned used some 15

[58] Greenfact.com publishes proprietary price information on European GO markets (accessible for paying customers). Commerg.com publishes a complementary weekly newspaper for subscribers registered via the company's website.
[59] European Commission elaboration on Bloomberg Energy Finance.

TWh of RES-E, compared to a total RES-E consumption in the Netherlands of almost 50 TWh.

6.2 Relevant national support policies

The main policy used to **incentivise investment in RE** projects in the Netherlands is the SDE[60] (which was amended and renamed as the SDE+ in 2011). SDE and SDE+ incentives are structured as floating feed-in premiums awarded to successful tenderers in an annual multi-stage tender procedure and financed through a levy on the energy bill of end consumers. Additional instruments to promote RE include loans, additional subsidy schemes, net-metering (for low- and medium-scale renewable electricity generation technology) and various tax benefits. For offshore wind, a technology-specific tendering window is available under the SDE+ programme. SDE+ subsidizes 'green gas' (biogas and biomethane) heat and, potentially, carbon capture and storage as well.[61]

Box 4 NECP: Key policies and measures that may affect corporate sourcing of RE

Renewable electricity

SDE+, the largest stimulation scheme for the production of RE, is set to be expanded in 2020. Under the new scheme (SDE++), grants will be awarded based on the amount of CO_2 and greenhouse emissions avoided, continuing to target RE.

Renewable self-consumption

Renewable self-consumption is incentivised through the repayment of VAT for solar panels used by small consumers. In addition, a netting scheme offers further benefits for owners of solar panels that are connected to a small-consumer connection (3X80A). The netting scheme will be replaced by a subsidy for feeding back energy lowering at the same time the financial benefits and ultimately phasing the scheme out by 2030, in order to encourage more self-consumption.

Source: Draft Integrated National Energy and Climate Plan – The Netherlands[62]

6.3 Corporate sourcing: Available data

No public websites or publications listing private companies sourcing RE are available in the Netherlands. Renewable generators, project developers and electricity market players consider the list of their clients as highly confidential. Whereas some information on RE projects that benefited from public support schemes can be retrieved, it is not possible to identify which projects are linked to corporate sourcing of renewable electricity.

6.4 Corporate sourcing of renewables: drivers and barriers

Self-generation is an increasingly popular approach to mostly large-scale companies in the Netherlands. Such companies have the administrative resources to develop e.g. roof-top PV on company buildings for own account. This enables these companies to make the most credible marketing claims that they have reduced their corporate and product footprints respectively while benefitting from the SDE+ support scheme. Many

[60] *Stimulering Duurzame Energie* (stimulation of sustainable energy)
[61] For further details, please see: https://www.eurobserv-er.org/eurobserver-policy-files-for-all-eu-28-member-states/
[62] For further details, please see: https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/governance-energy-union/national-energy-climate-plans

other companies rent out their roofs to roof-top PV project developers at an agreed annual rent. The project developers concerned implement these projects at a small profit margin, benefitting either from SDE+ or (with the companies owning the roofs contingent on the roof lease agreement) from net metering support. The main driver for self-generation in the Netherlands is the potential positive marketing impact and public relations in terms of CSR.

RE PPAs are becoming more important in the Netherlands as well, notably in terms of energy volumes. Dutch law allows the combination of operational support to (eligible) RE production and claiming the renewable feature over the same production. Yet it is worth mentioning that the pioneering reform of the SDE+ subsidy scheme in the early 2010s has significantly enhanced support effectiveness. It transformed from a scheme granting floating premium support based on administratively pre-set reference unit base costs to one granting such support on the basis of auction offers of reference unit base costs. The latest offshore wind tender was won by Vattenfall offering in their bid zero SDE+ support. We do not avail of information as to whether Vattenfall has concluded RE PPAs with off-taking companies. Yet this is becoming increasingly attractive as the price of "Dutch wind" GOs has already increased to around €8, whilst long-term cash flow certainty will render such non-subsidised projects more easily bankable. Increasing GO prices 'lubricate' negotiations between project developers and off-takers to conclude long-term PPAs with a proper allocation of electricity price risk among the contract parties. Two large onshore wind PPAs were recently concluded with a consortium of AKZO, DSM, Google and Philips as off-takers of the lion's share of the future project production. The projects concerned, receiving much media attention, are Krammer (202 MW) and Bouwdokken.[63] The main drivers for RE PPAs in the Netherlands are the potential positive marketing impact of RE consumption and derived low carbon claims and public relations in terms of CSR, legal accommodation of access to renewable support subsidies and absence of pre-financing needs. The Netherlands is an attractive host country for RE PPA projects because of good wind resources and lenient GO legislation, allowing off-takers to claim the renewable feature of energy acquired through a RE PPA whilst co-benefitting (in tandem with the project developers concerned) from publicly mandated subsidies. Contingent on how the underlying contracts are structured, long-term PPAs protect the revenue stream of project developers against falling wholesale electricity prices and off-takers against the downside of rising wholesale electricity prices. Barriers include the hassle and availability of capable staff to enter RE PPA negotiations. Moreover, contingent on how RE PPA contracts are structured, the downside for off-takers (project developers) is that future electricity prices will show a long-term declining (rising) trend. Therefore, periodic electricity price adjustment covenants might be included in (some of) such contracts.

In the Netherlands demand from end-consumers for **unbundled GOs** is minimal, apart from subscribing to green tariffs based on unbundled RES-E GOs. Dutch companies are not likely to buy such products if cheaper standard electricity products are on offer, as the differentiation value of the former is negligible.

In the Netherlands, there are many suppliers of **green tariff products** waging a cut-throat competition against each other. As Dutch consumers are used to subscribing to green tariffs that "cost nothing extra" (to them), green energy suppliers deliver typically at a loss. Given the recent rise in GO prices, more and more green energy suppliers will be forced to command a green energy premium. Hence, it is expected that the main attraction for companies to subscribe to a green tariff, i.e. negligible

[63] For further details, please see: https://www.theclimategroup.org/news/dutch-wind-consortium-receives-first-power-new-wind-farm-netherlands

extra costs, will fade away. For construction companies, green tariffs based on Dutch RE have financial bonus advantages when tendering for government projects. The main barrier for other companies to subscribe to a green tariff is its low differentiation potential, unless the sourcing has special features, e.g. "Zeeuws wind" (wind from Zeeland province) for companies located in Zeeland.

As for **RES-HC** GOs, their market value and is minimal so far and likewise market liquidity. It is an open question as to whether this will change with the rising involvement of Dutch society in the ongoing "energy transition". As such, the Dutch horticulture sector is quite innovative in applying energy-saving and circular-economy concepts. In some horticulture areas such as Westland and around Heerhugowaard projects are implemented or in the pipeline to use district heating sourced from waste heat of the oil refinery industry (Westland) and waste treatment plants (horticulture firms around Heerhugowaard).

The Dutch experience with corporate renewable sourcing has some country-specific aspects. Yet it also shows resemblance with notably Sweden, Denmark and Norway in the following respects:

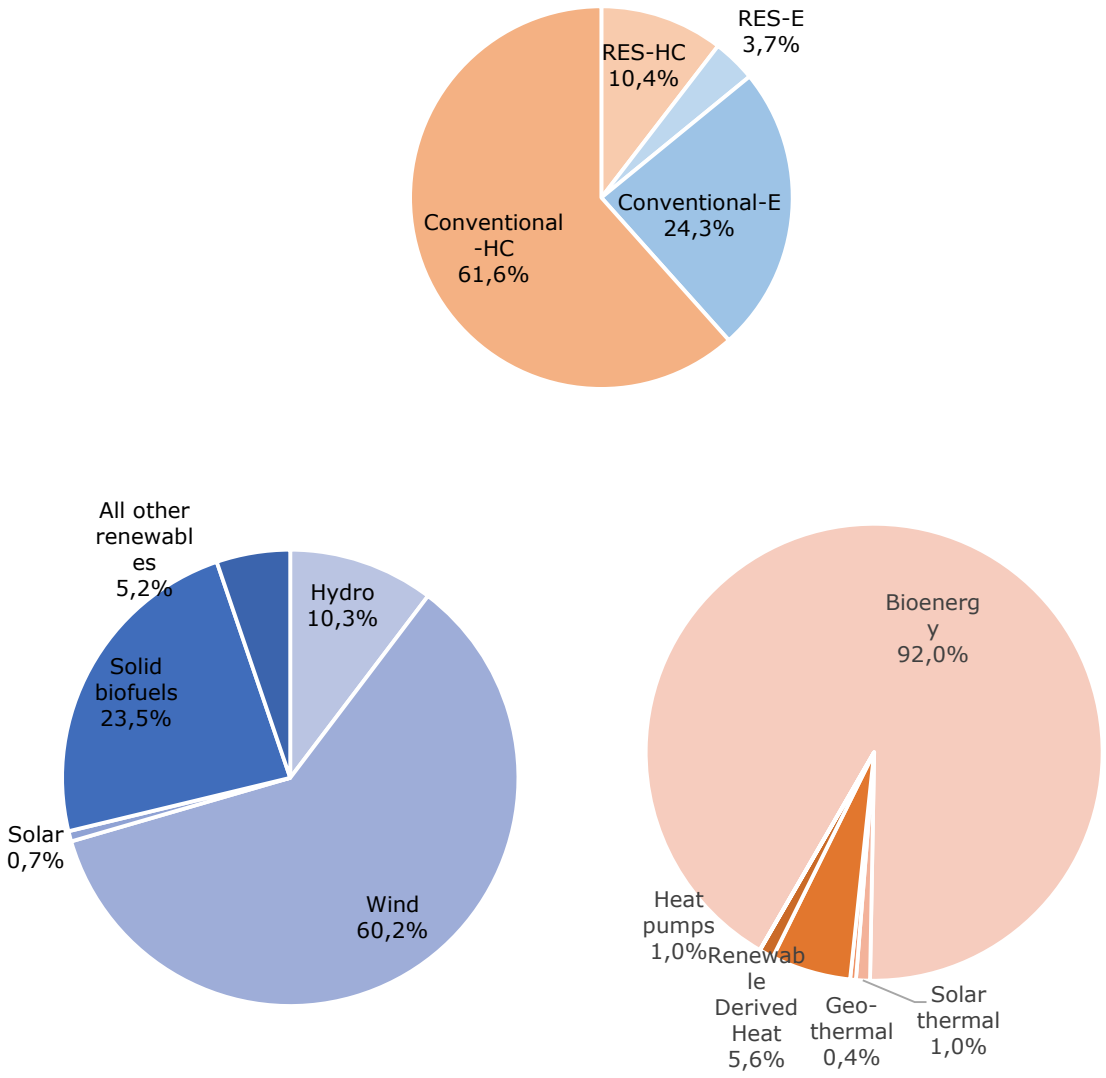
- By and large, the Dutch population has a relatively pronounced environmental concern and associated preference for "green" energy, provided the extra costs are low if positive at all. Moreover, the relatively large Dutch institutional investors, such as pension funds, exert increasing pressure on the (notably large, stock-listed) corporate actors to reduce their environmental footprint.
- The consequence is that positive CSR reporting and signalling in product marketing becomes more and more important for corporate actors. The most effective marketing can be done on the basis of direct sourcing from clearly identifiable sources, preferably local wind or PV.
- The lenient transposition of EU legislation on GOs in Dutch law (as is the case as well in the Nordic countries), allowing eligible RE producers to receive benefits from the national support scheme and marketable GOs as well increases the attractiveness for multinational companies to source renewable electricity from Dutch (and Nordic) projects. The auctioning feature of SDE+ support facilitates the allowance for expected GO revenues in SDE+ support bids, submitted by RE project developers.
- If the sharp upward price trend of "European" GOs is to consolidate, this will enable the phase-out of offshore and onshore wind in the near future and utility-scale PV in the mid-term future. Corporate sourcing is poised to grow in importance as a driver for accelerating this process, along with rising concerns among the general public regarding climate change.

7 Country background analysis: Poland

7.1 Statistics

In 2017, **RE accounted for about 14%** of the final energy consumption in Poland (Figure 18). While over half of the renewable electricity was generated from wind, solid biofuels accounted for almost one fourth and hydropower for one-tenth of the RES-E generation. Production from solar energy has a very small share, representing less than 1% of RES-E generation. Almost all RES-HC production comes from bioenergy, followed by renewable derived heat (about 6% of the total). Based on data available in the draft NECP[64], Poland aims to achieve a target of **21%** RE in the gross final consumption of energy by 2030, with specific targets of **30%** for RES-E and **25%** for RES-HC.

Figure 18 Final energy consumption (centre), consumption of RES-E (left, down) and RES-HC (right, down) by energy source (Poland, 2017)

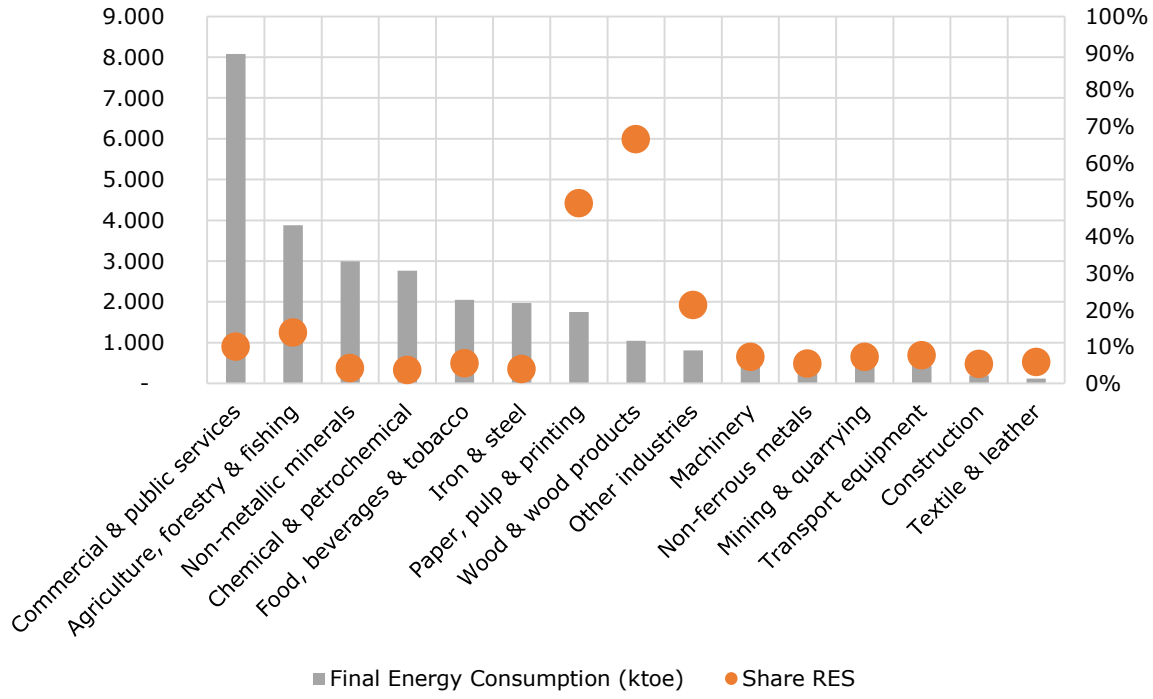


[64] For further details, please see:
https://ec.europa.eu/energy/sites/ener/files/documents/ec_courtesy_translation_pl_necp_part_1.pdf

Source: Authors' elaboration on Eurostat: Energy Balances and SHARES.

Looking at the share of renewables by sector (Figure 19), in line with other Member States, only the paper and woods sectors are leading in the use of RE. Services, i.e. the sector consuming most of the energy, **meet less than 10%** of their energy needs via renewable sources. The same applies to most of the sectors that are responsible for a large share of the final energy consumption.

Figure 19 Final energy consumption and share of renewables out of final energy consumption by sector (Poland, 2017)



Note: Figures relative to RES-E are not available. Therefore, for each sector, it is assumed that the share of RES-E corresponds to the national share of RES-E in total electricity final consumption of each sector.

Source: Authors' elaboration on Eurostat: Energy Balances and SHARES.

The **Energy Regulatory Office**, which is the body issuing GOs in Poland, does not publish data on import and export of GOs. Poland is however not a member of the AIB, and therefore cannot easily trade its GOs with other Member States, therefore imports and exports of GOs can be considered negligible.

The Bloomberg Energy Finance database does not have information on any **RE PPAs** signed in Poland up to 2017. However, desk research shows that the first RE PPA has been signed in August 2018 between **Mercedes Benz and the Taczalin Wind farm**. As a result of this agreement Mercedes Benz will buy electricity generated by the 45MW wind farm to power its manufacturing facility in Jawor, 10km away from the power plant.

7.2 Relevant national support policies

Support schemes for both RES-E and RES-HC are in place. The ways in which producers and consumers of energy have been incentivized to use renewable sources have changed throughout the last years, as Polish laws have adapted to increasing

European requirements for RES share in overall energy consumption, as well as the trend to shift from direct subsidies to an auction system.

RES-E. RES-E has historically been mostly supported through quota systems, which require to meet quotas of certificates of origin. With the introduction of a new RES Act, the incentive scheme has been changed and is currently based on auctions. The RES legal project,[65] funded by the European Commission, identifies the following schemes that are currently in force:

- Tenders (auctions) are currently the main incentive for RE use in Poland. The Act of 20 February 2015 on RES has introduced a tender procedure for 15-year contracts establishing a fixed price for the provision of electricity for the duration of the contract. Generally, two types of auctions can be distinguished: i) tenders for feed-in tariffs give the winner of the tender a guaranteed feed-in tariff for 15 years and are relevant to installations with a capacity of up to 500kW; ii) premium tenders, which are relevant to installations with a capacity of more than 500kW, guarantee winners a premium (pay-as-bid) for 15 years to compensate the difference between the price offered in the tender and the current market price.
- The quota system was until 2016 the main support scheme and combined quota obligations for green certificates (certificates of origin) with a certificate trading scheme. As an alternative to meeting the quota (by redeeming certificates of origin that were previously issued by the Energy Regulatory Office to RE producers), energy players defined in the Energy Law (such as industrial customers, electricity generators, electricity suppliers, end-users who are members of the commodity exchange and brokerage houses) could pay a fee. In case they failed to do any of the two, a penalty would be imposed on non-compliant entities. Currently, this system is only in place for installations which have been launched before 1 July 2016, as they can choose to be part of the auction or the quota system.
- Support schemes for prosumers apply only for small, individual consumers who also produce energy on a small scale and not for profit. There is no fixed tariff, but prosumers can enter unconsumed energy to the electricity network, where it is "stored". When the prosumer faces gaps in energy production and cannot meet its energy demand, he can, without bearing any additional costs, use that stored energy in relation 1 to 0.8 in the case of micro-installations with capacity up to 10 kW and 1 to 0.7 in the case of micro-installations with capacity above 10 kW (but below 50 kW).
- Taxes are levied on the sale of electricity except for the sale of electricity from renewable sources, which is exempt from excise duty, however only if additional conditions are satisfied.

RES-HC. Support schemes for RES-HC are more limited and encompass two different types of loans and a subsidy. The National Fund for Environmental Protection and Water Management grants low-interest loans to support the purchase and installation of RES installations and provides a separate loan funding programme for the years 2016-2023 for projects aiming to increase the efficiency of heating and cooling systems in existing enterprises. Additionally, there are grants available, which can cover a part of the loan for renovations meant to increase energy efficiency or the use of RES for heating purposes.

[65] For further details, please see: http://www.res-legal.eu/search-by-country/poland/tools-list/c/poland/s/res-e/t/promotion/sum/176/lpid/175/

Box 5 NECP: Key policies and measures that may affect corporate sourcing of RE

Production of biofuels and RE and heat

Under the draft NECP, two measures are defined and already set up:

- Funds for €150 million are allocated to support the production of RE and heat as part of the Operational Programme Infrastructure and Environment 2014-2020. Support to produce biofuels is possible within the framework of seven Regional Operational Programmes;
- The development of storage technologies in order to stabilise variable RES and installations for generating heat from RES will be supported via grants, repayable aid and guarantee funds.

Other measures

Poland envisages the implementation of further solutions to promote the production of RE as:

- Support schemes for the development of off-shore energy generation;
- The development of district heating. The framework is to be defined but may provide financial, organisational and legal support to build new infrastructure for district heating and cooling produced from RES.

Source: Draft Integrated National Energy and Climate Plan for Poland.[66]

7.3 Corporate sourcing: Available data

No websites or publications listing private companies sourcing RE are available in Poland. The Energy Regulatory Office (URE), a central body of the state administration responsible for the regulation of the energy sector as well as the promotion of competition,[67] provides a publicly available map of RES in Poland with information on production volumes of RE divided by the different types of sources. However, authorities do not collect information on buyers of energy and electricity market players prefer not to share information on their clients because of their confidential nature.

7.4 Corporate sourcing of renewables: drivers and barriers

Self-generation is currently not a popular approach to corporate sourcing in Poland. This lack of popularity can be linked to the influence of conventional energy producers, which have not been supporting legislation favouring self-generation. For this reason, there are no special benefits in terms of tax or lower costs available to self-generators, except for the possibility to be exempted from an excise duty, which is available to all sellers of RE (as long as further conditions are satisfied). This, in turn, leads to an inadequate return on investment and creating higher costs for self-generators compared to other ways of supplying energy. These negative aspects are likely to change, however, as companies start seeing the benefits of self-generation, especially linked to the stability of electricity costs and full control over the power installation and security of supply. In the last two years, a new initiative related to regional energy clusters has been developing. Energy clusters allow for cooperation between several small self-generating entities and therefore enable hedging the weaknesses of each entity by diversifying energy production points. Furthermore, cooperation allows

[66] For further details, please see: https://ec.europa.eu/energy/sites/ener/files/documents/ec_courtesy_translation_pl_necp_part_1.pdf
[67] For further details, please see: http https://www.ure.gov.pl/en

for reliability in terms of energy supply and prices as well as lessening the administrative burdens. Further development of rules regulating regional cooperation between small self-generators is likely to lead to a higher interest in this approach to corporate souring, especially for SMEs.

RE PPAs are still a new approach to corporate sourcing; the first PPA in Poland was signed between Mercedes Benz and the Taczalin Wind farm in August 2018. Bigger companies see many advantages of this solution, which makes it likely that more PPAs will be negotiated in the coming years. The biggest advantages for companies are stable energy costs and lowering their dependence on changing governmental energy schemes and regulations. Furthermore, in case of new investments, the ability of generators to rely on a PPA significantly increases the chances to receive funding and banking loans, which is beneficial to both the energy producers (lower financial costs) and consumers (lower prices).

The main driver pushing companies to purchase **unbundled GOs** is an economic one, as the price of GOs is rather low. Buying GOs, therefore, represents a relatively efficient solution for greening electricity consumption. The sales of GOs has hit a record high in June 2018, which can be linked to very low prices of the guarantees. Unbundled GOs are considered the easiest and cheapest way to source RE. Currently, there is no market for premium GOs and no differentiation is being made relating to the type of GOs. Similar considerations apply to **green energy offers**, which represent by far the easiest solutions for corporate sourcing of RE, as the electricity supplier takes care of bundling electricity with GOs.

Even though the role of CSR is increasing, companies in Poland opt for renewable solutions mostly for financial reasons linked both to lower prices but also increased price stability. Companies sourcing energy clearly see the benefits of long-term agreements with fixed prices, which mitigate the fluctuating nature of energy prices. SMEs are especially negatively affected by high energy prices but often have also more limited expertise and knowledge on available solutions and therefore are also less willing to enter complex, long-term PPAs. They are, however, likely to increasingly invest in self-generation, especially if the regulatory environment for cooperation in the form of energy clusters will be further clarified.

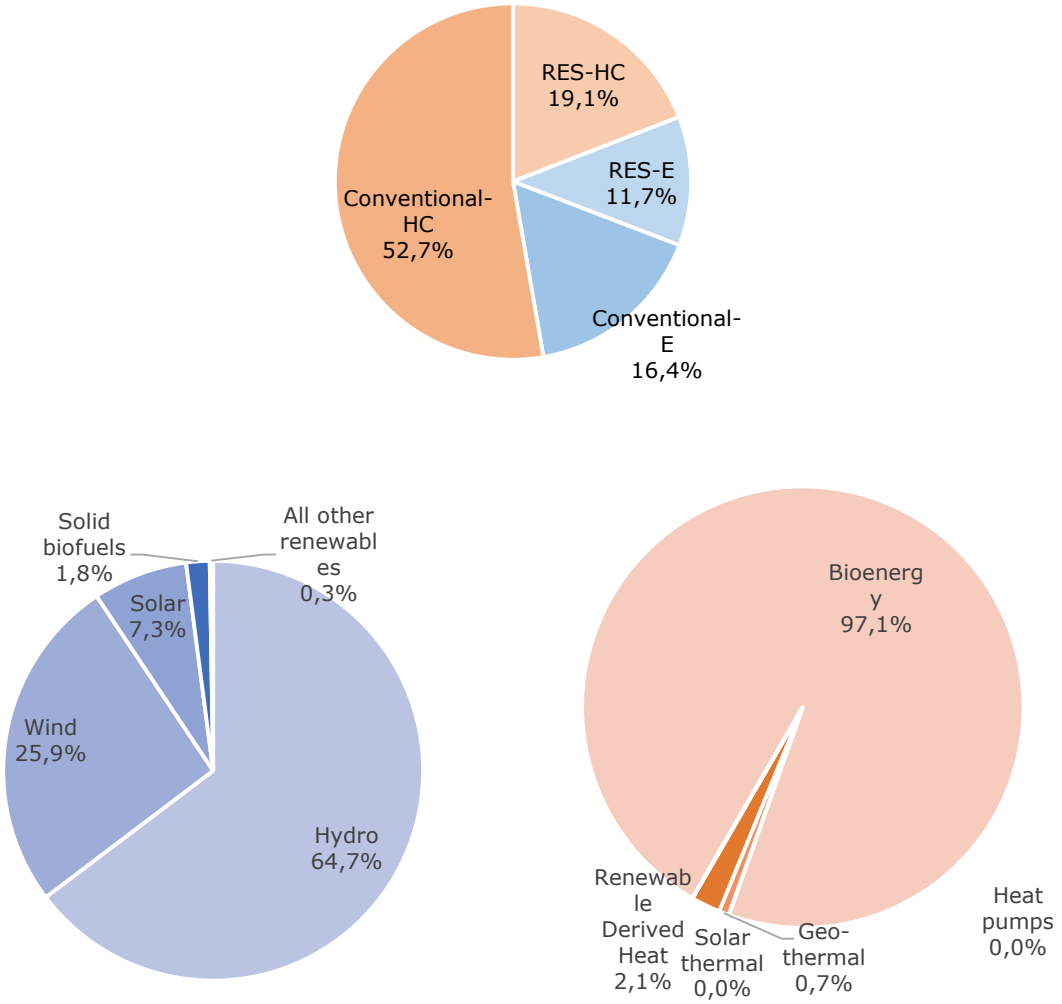
The share of **RES-HC** in overall heating and cooling is still relatively limited in Poland. Most renewable biomass units, biogas farms in Poland, as well as landfill biogas power-plants and sewage treatment plants use cogeneration techniques. Due to the rising costs of conventional heating and cooling, new regulative proposals to incentivise the purchase of RES-HC and growing environmental concerns among consumers, there is an increasing interest for renewable solutions. The interest of district heating companies for installing renewable district heating systems combined with heat storage is growing rapidly. Additionally, benefits from self-consumption of waste heat are becoming more visible to energy users, especially due to lower prices linked with eliminating the costs of energy inputs.

8 Country background analysis: Romania

8.1 Statistics

In 2017, **RE accounted for about 30.8%** of the final energy consumption in Romania (Figure 20). The largest share of renewable electricity was generated from hydropower plants (two-thirds), the remaining one-third of the RES-E generation being accounted for by wind and solar power. When looking at the RES-HC consumption, bioenergy and renewable derived heat represent 99%, while geothermal energy is almost negligible. Overall, according to the draft NECP[68], Romania aims to achieve a target of **28%** RE in the gross final consumption of energy by 2030, with a target of **40%** RES-E and **31%** RES-HC.

Figure 20 Final energy consumption (centre), production of RES-E (left, down) and consumption of RES-HC (right, down) by energy source (Romania, 2017, transport excluded)

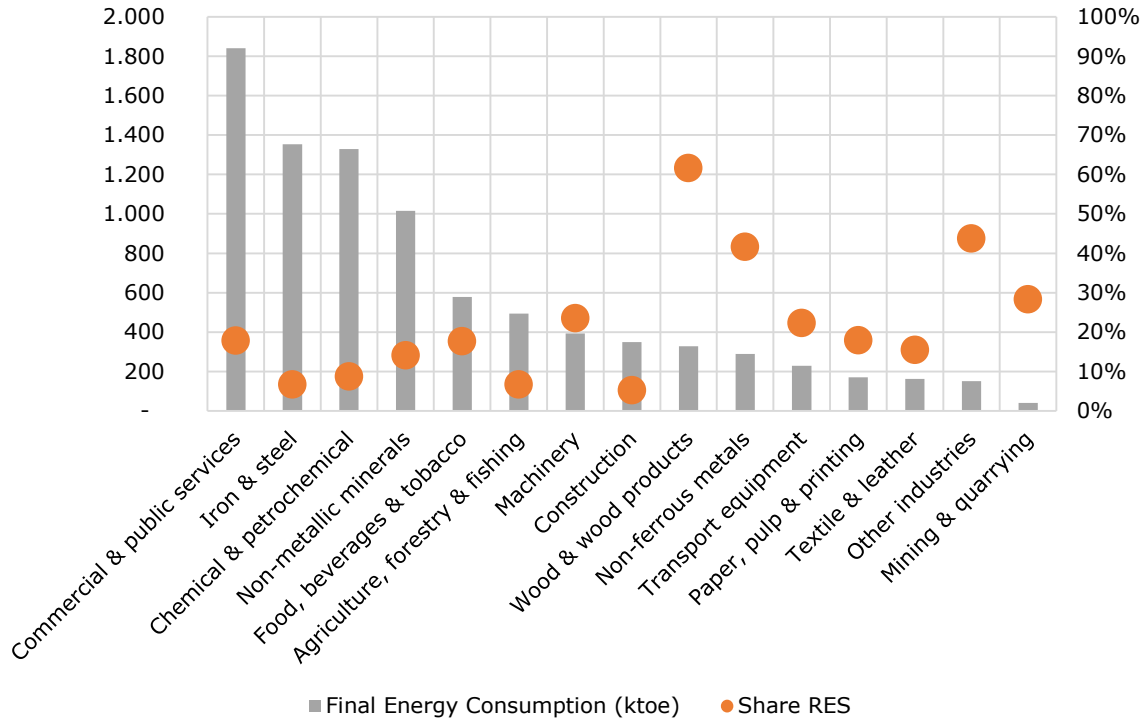


[68] For further details, please see: https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/governance-energy-union/national-energy-climate-plans

Source: Authors' elaboration on Eurostat: Energy Balances and SHARES.

Paying attention to the final energy consumption by sector (Figure 21), Romania's big industrial sectors responsible for a large share of the final energy consumption rely on renewables to **meet less than 20%** of their energy needs.

Figure 21 Final energy consumption and share of renewables out of final energy consumption by sector (Romania, 2017)



Note: Figures relative to RES-E are not available. Therefore, for each sector, it is assumed that the share of RES-E corresponds to the national share of RES-E in total electricity final consumption of each sector.

Source: Authors' elaboration on Eurostat: Energy Balances and SHARES.

According to the Bloomberg Energy Finance database, in Romania, until 2017, there were **no PPAs for RE**. The Romanian Energy Regulatory Authority (ANRE)[69] is the competent authority for issuing **GOs**. At present, there are no plans to be connected to the European Energy Certificate System (EECS), and there is **limited demand for exports or imports of GOs** (this could change though, and Romania may also join the Association of Issuing Bodies).

8.2 Relevant national support policies

Frequent legislative changes have led to a declining interest in renewables. Romania does not have a comprehensive support scheme in place for new RES-E installations commissioned after 1 January 2017. RES-HC support is provided via subsidy programmes that promote relevant technologies.

[69] For further details, please see: https://www.anre.ro/

RES-E. The RES-E market in Romania had a difficult development after 2014, when a reduction of issued Green Certificates (GC) and a delay in the delivery of GC has led to significant financial losses to producers of electricity and, in turn, to a decrease in investment. The main financial support scheme for RES-E was a system based on quota obligations, tradeable certificates and minimum and maximum prices. However, since January 2017, the quota system is no longer available for new installations. The government has approved a new law (Emergency Ordinance No.24/2017) that brought amendments to the country's main Renewable Energy Law No. 220/2008. With this approach, Romania managed to clarify some legal uncertainties and brought some stability and transparency to the GC support scheme. According to the 2017 version of the Romanian National Energy Strategy, there are no plans to support new installations. Therefore, corporate sourcing of renewables may play a central role in future investments. Romanian grid operators are obliged to connect RE plants to their grids (without discriminating against certain plant operators), and to prioritise transmission of electricity from renewable sources.

The RES legal project[70] identifies the following schemes that are currently in force:

- Quota system: available only for all installations and technologies commissioned until December 2016;
- Subsidy Measure 4 "Investment in physical assets" in the agricultural sector, via the National Rural Development Programme. The subsidy, part of the National Rural Development Programme and financed by the European Agricultural Fund for Rural Development (EAFRD), promotes the use of RES for the farm's own consumption;
- Subsidies to promote energy production from less exploited energy sources, namely biomass, biogas and geothermal energy – approved in April 2017 (Government Decision no. 216/2017). The scheme aims to increase the electricity and thermal energy production from these sources by 60MW until 2023.

RES-HC. The RES-HC market in Romania is supported by subsidy programmes of the Romanian Environmental Fund, National Rural Development Programme and Ministry of Regional Development, Public Administration and European Funds. Programmes that may be relevant for corporates include the "Subsidy Measure 4" and the "Subsidies to promote energy production for less exploited energy sources" (see above).

Box 6 NECP: Key policies and measures that may affect corporate sourcing of RE

Renewable self-consumption

The regulatory framework for self-consumption is set in a new piece of legislation adopted in 2018 (Law no. 184/2018) establishing the system for promoting the production of energy from renewable sources of energy. The scheme for self-generation includes the following aspects:

- It targets prosumers that own power generation units from renewable sources with an installed power capacity of maximum 27 kW per household in individual houses, apartment blocks, residential areas, commercial or industrial areas;
- Prosumers have the possibility to sell electricity generated to suppliers;
- Prosumers are exempt for excise duty on the amount of electricity produced from renewable sources for self-consumption as well as for the amount of electricity

[70] For further details, please see: http://www.res-legal.eu/search-by-country/romania/tools-list/c/romania/s/res-e/t/promotion/sum/184/lpid/183/

sold to suppliers;
- Individual prosumers are exempted from the annual and quarterly green certificates purchase obligation for electricity produced and used for own final consumption.

Biomass

A measure was introduced in 2012 to encourage power generation from biomass. The measure comes in the form of procedures for issuing certificates of origin of biomass from agriculture and related industries used as fuel or raw material in power generation.

Corporate sourcing of renewables and PPAs

Primary and secondary legislation will be amended to offer the possibility to conclude PPAs with final customers.

Source: Draft Integrated National Energy and Climate Plan for Romania.[71]

8.3 Corporate sourcing: Available data

No websites or publications listing private companies sourcing RE are available in Romania. Renewable generators, project developers and electricity market players consider the list of their clients as highly confidential. Generally speaking, in Romania, there is **limited transparency** about private companies that are currently sourcing RE. The national regulator (ANRE) monitors the planned RE projects in Romania; however, it is not possible to identify which projects are linked to corporate sourcing of renewable electricity.

8.4 Corporate sourcing of renewables: drivers and barriers

Self-generation of renewable electricity in the private sector in Romania is mainly driven by the stability of electricity costs, which tend to be lower than the prices for grid electricity. In addition, companies investing in self-generation consider the positive impact of the visible association with the renewable power plant (mostly windmills), which leads to a decisive impact on CSR. The essential barriers affecting the private sector's decision to self-generate renewable electricity are the high up-front investment costs, the regulatory barriers (including costs for permits), the companies' perception of the risks derived from regulatory uncertainty (due to frequent changes in support schemes) and the inadequate return on investment.

RE PPAs are perceived as highly attractive for private companies in Romania, essentially due to reduced investment risks, the stability of electricity prices and the lack of up-front capital costs. Other highly-relevant elements for the corporate sector are the compatibility with large renewable projects with economies of scale (especially wind farms), price revision clauses and the positive impact on CSR practices. What has been hindering companies' decisions to opt for RE PPAs has been mainly the existing regulatory barriers and chiefly impediments to direct contracting between RE producers and buyers linked to the obligation for all generators to sell electricity in the centralised market. In addition, buyers believe that difficulties to agree on commercial terms and the uncertainty of future electricity price development may also affect PPAs.

[71] For further details, please see: https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/governance-energy-union/national-energy-climate-plans

Businesses are also concerned by the technical and operative reliability of RE producers, which may hinder the security of supply. The regulatory restrictions for PPAs in Romania have negatively affected investments in RES-E and market competition since 2013. The government attempted to remedy the situation in 2017 through its Emergency Ordinance 24/2017 amending the Law 220/2008, which was conceived to adjust the existing support scheme and unlock the financial constraints faced by RE generators. However, these regulatory changes did not lead to the expected results; in fact, several independent RE producers emphasised that they had limited options for selling their green certificates on the regulated markets, which do not allow for small trading volumes. There are encouraging developments, though, for small RE generators. Under the most recent legislative amendments (Law 184/2018), RE producers with power plants capacity under 3 MW are exempted from the national electricity and gas law (which requires electricity trading on the OPCOM[72] market in a centralised, transparent and non-discriminatory manner) and can sell their electricity directly to consumers (by concluding directly-negotiated PPAs outside of the centralised markets).

The acquisition of **unbundled GOs** from RE generators in Romania has been growing, driven mostly by factors such as short-term commitment, reduced investment risk and ease of sourcing. There are more than 100 commercial consumers in Romania that are willing to purchase unbundled GOs, usually at a price in the area of €0.50 to €1.00/MWh. These are usually multinationals or large private sector consumers (such as supermarkets) that have a global CSR strategy. More detailed information on corporate's purchase and cancellation of unbundled GOs is not publicly available; in fact, the national regulator releases only monthly lists[73] of generators and electricity suppliers that hold GOs. Nevertheless, this option of corporate sourcing of RE is severely affected by the poor regulatory framework to manage GOs (especially for cross-border transactions), price volatility and lack of trust in the GOs system.

Green energy suppliers are attractive for companies wanting to source RE predominantly due to the trust in the supplier and ease of sourcing. In terms of price per MWh, this option is quite efficient, also because it is compatible with large renewable projects with economies of scale (such as the large wind farm projects in the Southern region of the country). The predominant obstacles to this approach include the electricity price volatility (especially for short-term contracts), the lack of control on the type of RE that is sourced (as most do not allow to select specific types of RES-E) and the higher electricity costs compared to traditional national grid electricity (costs of GOs on top of electricity prices). The regulatory framework in Romania is perceived by companies as in need of adjustment in order to allow for energy suppliers to properly manage the GOs. The RES legislation has been evolving in Romania, the Parliament having voted Law 184/2018, which now will allow for the creation of virtual power plants. This concept entails that two (or more) RE producers using the same or different RE technology (biomass, wind, solar PV, hydro) would have the right to create a virtual power plant to sell electricity as a single producer.

In relation to sourcing **RE for heating or cooling** purposes, the market in Romania is still underdeveloped. Companies perceive, however, as potential benefits the reduction of energy consumption and operational costs, as well as compliance with climate change and environmental legislation. Many challenges remain to be addressed in this market, especially the long payback period (which is at odds with the focus on high,

[72] Societatea Operatorul Pieței de Energie Electrică și Gaze Naturale "OPCOM" S.A https://www.opcom.ro/pp/home.php

[73] For further details, please see: https://www.anre.ro/ro/legislatie/surse-regenerabile/garantii-de-origine/lista-detinatori-garantii-origine

short-term return expected by most companies when investing) and the existing policy uncertainty and regulatory barriers.

All in all, companies operating in Romania source RE mainly to comply with climate change and environmental legislation and with environmental sustainability targets set by international headquarters. Imperative is also the contribution to CSR practices while increasing their energy efficiency and reducing operational costs. Additional factors include the greening of the supply chain as increasingly requested by customers, and potential revenues from RE support schemes (which, however, are currently very limited). The main private sector entities for sourcing RE in Romania are currently multinationals or large private sector consumers, while **domestic companies are not showing interest for RE** mostly due to: i) inadequate company culture; ii) limited expected impact on their competitiveness; and iii) focus on high-return investment projects. Considering the current development in renewable generation costs with near grid-parity level being almost reached, there might not be a need for new RES support schemes in Romania for new projects (mostly wind farms). Nevertheless, some of the more predictable drivers for moving forward in the coming years will be the green certificates system and, also, the renewables target[74] that Romania will set for itself (which have been already put forward in the draft NECP). Additionally, the proposed national energy strategy will play a role in supporting these developments. In the future, Romania might also see the introduction of PPAs and auctions for RE. Future legislative developments could introduce alternative support mechanisms that will allow RE generators to opt between the GC and a feed-in premium (FIP) support scheme. For the time being, however, companies are highly disadvantaged by the existing policy uncertainty (especially in support schemes and electricity price regulation), infrastructural barriers of the Romanian power grid, and market obstacles.

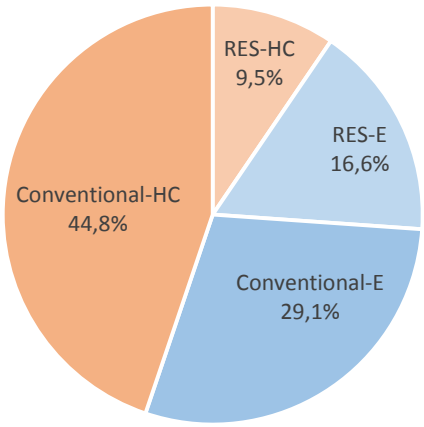
[74] See "The 2019-2030 National Energy Strategy of Romania, with a perspective to 2050" http://www.mmediu.ro/app/webroot/uploads/files/Strategia_Energetica_dec_2018%20.pdf

9 Country background analysis: Spain

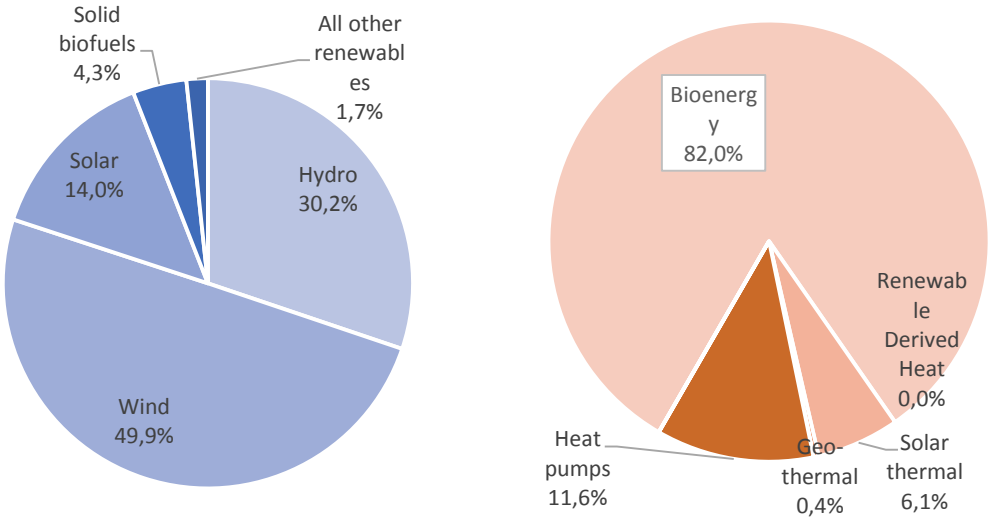
9.1 Statistics

In 2017, **26% of the final energy consumption in Spain was represented by RE** (Figure 22)**.** Most of the renewable electricity was generated by wind, followed by hydro, whereas a smaller share of the renewable electricity generation was represented by solar and solid biofuels. Regarding renewable heating and cooling, bioenergy is the main source used in Spain, followed by heat pumps which account for more than one-tenth of RES-HC. Overall, according to the draft NECP[75], Spain aims to achieve a target of 42% RE in the gross final consumption of energy by 2030, with a specific target of 74% for RES-E; Spain did not put forward any specific target for RES-HC yet.

Figure 22 Final energy consumption (centre), consumption of RES-E (left, down) and RES-HC (right, down) by energy source (Spain, 2017, transport excluded)



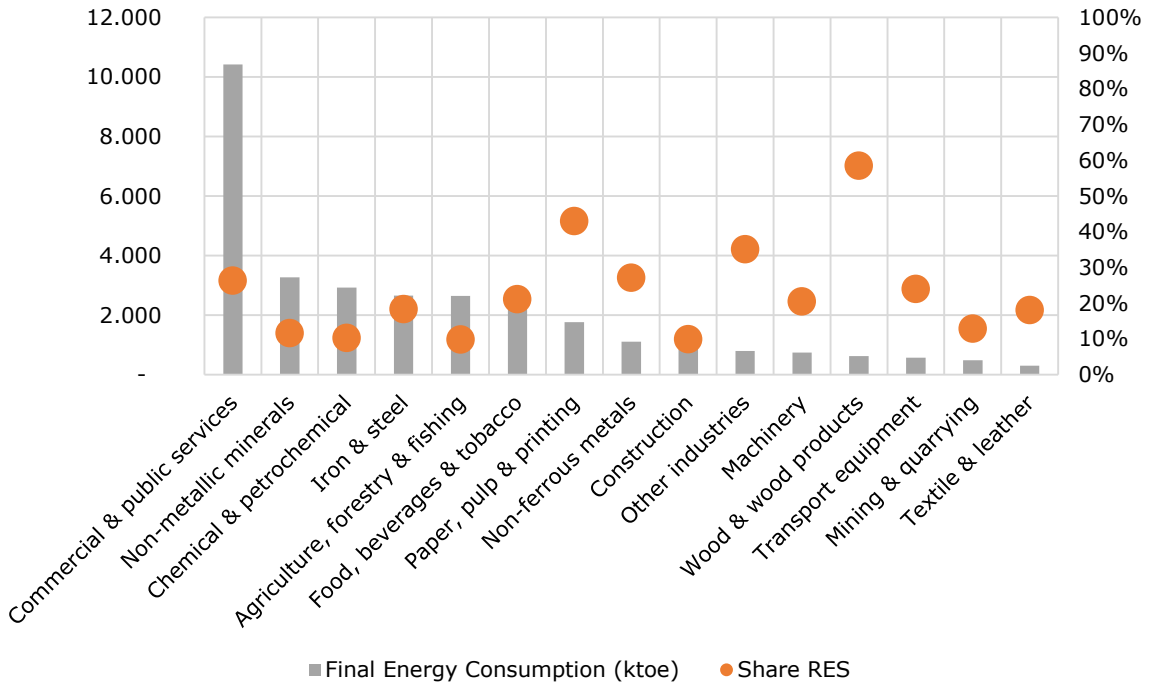
[75] https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/governance-energy-union/national-energy-climate-plans



Source: Authors' elaboration on Eurostat: Energy Balances and SHARES.

The service sector is the largest consumer of energy in Spain and RE represents slightly over 25% of the overall sectoral final energy consumption. In this respect, the pulp, paper and print industry and the wood industry are the sectors with the largest share of RE consumed (Figure 23)

Figure 23 Final energy consumption and share of renewables out of final energy consumption by sector (Spain, 2017)



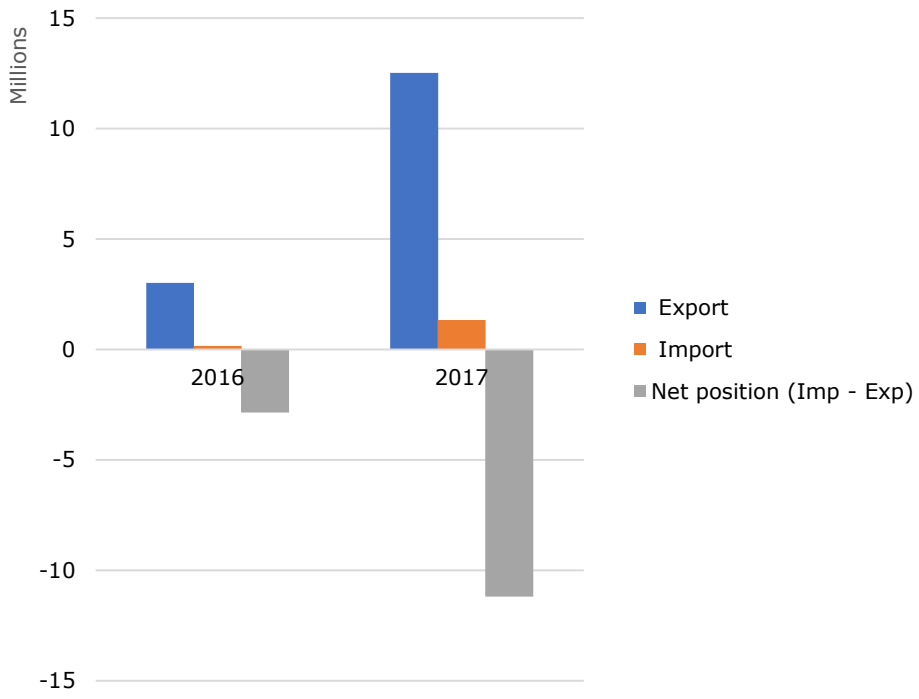
Note: Figures relative to RES-E are not available. Therefore, for each sector, it is assumed that the share of RES-E corresponds to the national share of RES-E in total electricity final consumption of each sector.

Source: Authors' elaboration on Eurostat: Energy Balances and SHARES.

Both in 2016 and in 2017, Spain was a net exporter of GOs. In 2016, exports exceeded imports by almost 3 million (Figure 24*),* which are equivalent to 245.3 ktoe,[76] i.e. about 1% of the national electricity generation. In 2017, about 12.5 million GOs were exported, whereas only one million units were imported, thus leading to a net position of about 11 million, i.e. about 3.5% of the total electricity generation[77]. This is equivalent to say that the share of RES-E in final energy consumption is most likely lower than that presented in Figure 23. Interestingly, RE generators benefitting from support schemes may ask for the issuance of the related GOs; however, there are legal limitations to exporting such GOs (the support received for the equivalent production has to be paid back).

According to the Bloomberg Energy Finance[78] database, no RE PPA was active in Spain up to the end of 2017. In 2018, for the first time, **corporate RE PPAs** were active in Spain and the market is becoming more dynamic in this respect. An internal database compiled by the RE-Source Platform has recorded 13 PPAs in the country in the recent past. For instance, Calidad Pascual (a Spanish food company) signed a wind PPA with EDP Renováveis.[79] In the same vein, two large-scale contracts for PV electricity were signed by the utility Iberdrola: one with the financial services provider Kutxabank and one with the Basque country telecoms operator Euskatel.

Figure 24 Yearly GOs' exports, imports and net position (Spain 2016, 2017)



Source: Authors' elaboration on AIB statistics.[80]

[76] One GO is equivalent to 1MWh of electricity and 1 MWh is equivalent to approximately 8.6E-5 ktoe.
[77] As data on RES generation in 2017 is not available, it is assumed that the amount of RES generated in 2017 is the same as in 2016.
[78] European Commission elaboration on Bloomberg Energy Finance.
[79] For further details, please see: https://renewablesnow.com/news/spanish-food-firm-calidad-pascual-signs-wind-ppa-with-edp-577172/
[80] Stakeholders' interviewed for this study pointed out that not all the GOs are scrutinized by AIB. Intra-group exports in multinational energy companies are not reported to the AIB, although they are issued and

9.2 Relevant national support policies

The Real Decreto RD 413/2014 set out a compensation regime, based on premium tariffs ("Régimen Retributivo Específico"), aiming to support RE plants. The previous support scheme (the "Régimen Especial") was suspended at the beginning of 2012. Tax credits for solar thermal and for biofuels in transport also apply and a quota system for biofuels is in place.

RES-E. The generation of electricity from renewable sources in Spain was supported via a price regulation system under which generators could choose between a guaranteed feed-in tariff and a bonus (paid on top of the wholesale market price). The Real Decreto 1/2012, however, suspended this support scheme before its final phasing out in 2013 (Real Decreto-Ley 9/2013). In fact, in 2009, the Real Decreto 6/2009 established that all regulated costs, including those borne by the State to support RES-E generation, were to be fully covered by 2013 via the so-called '*peajes de acceso*', a system charge. Nevertheless, a later estimate predicted that this target would have not been achieved by 2013. Against this background, and considering the high growth of system costs, the RES-E subsidy regime was adapted as part of a thorough reform of the regulated costs to contain the tariff deficit. In 2014, the Real Decreto (RD 413/2014) set up the so-called 'specific compensation regime' ("Régimen Retributivo Específico") to further support RE plants via a market-based auction. In addition, in Spain, RE plants are entitled to priority access, connection and use of the grid. Priority dispatch in the electricity markets with no further cost is guaranteed for renewable electricity, as long as the security of the grid infrastructure is preserved

RES-HC. No national support scheme for RES-HC is currently in place in Spain. However, it is worth mentioning that some support programmes have been developed over the years, mostly at the regional level, including (i) a mechanism promoting investments in RES-HC implemented through agreements with the Autonomous Communities, (ii) a deferred payment pilot programme to finance heat production in buildings for Energy Service Companies (ESCOs) through the Instituto para la Diversificación y Ahorro de la Energía (IDEA) and (iii) a renewable heat incentive system (ICAREN) which is currently being studied to set up a specific remuneration framework. In addition, the promotion of biofuels consists of a quota system and a tax regulation mechanism. This quota system obliges both retail and wholesale operators, as well as consumers relying on providers other than retail and wholesale operators, to consume a certain amount of biofuels every year. The amount is established in percentage and compliance is proven to the national energy commission (CNE) through certificates. At the end of each year, relevant parties must turn in the certificates corresponding to their biofuel sale/consumption. The CNE is in charge of checking compliance and collecting fees for non-compliance from obligated parties. The penalty fees paid by the parties who did not reach their quota are redistributed among the parties who sold or consumed more biofuels than their set quota.

Box 7 NECP: Key policies and measures that may affect corporate sourcing of RE

Heating and cooling efficiency

The country set up a subsidy scheme and a credit line for specific installation and renovation related to thermal energies.

reported accurately to the National Competition Authority (Comisión Nacional de los Mercados y la Competencia - CNMC) as exported GOs. Based on data published by CNMC, both in 2016 and 2017 exports of GOs exceeded imports by more than 8 million units, i.e. almost 10% of the total renewable electricity generated in the country.NRA's report all GOs exported (AIB and non-AIB)

Renewable gas

Spain intends to design support mechanisms which maximize the use of renewable gas, supported if necessary by a certification system.

Corporate sourcing of renewables and PPAs

Bilateral long-term contracts with RES-E producers will be encouraged with the objective of providing price stability for renewable electricity purchase.

Source: Draft Integrated National Energy and Climate Plan for Spain.[81]

9.3 Corporate sourcing: Available data

The Spanish government publishes the list of private companies active in the generation of renewable electricity. In addition, the Spanish Renewable Association (APPA) provides a statistical overview of the consumption and economic impacts of renewables in Spain.[82] However, apart from announcements in media, **no publicly available data** allows to prepare a comprehensive list of companies sourcing RE or projects linked to corporate sourcing of RE.

9.4 Corporate sourcing of renewables: drivers and barriers

Until recently, **self-generation** in Spain was not considered an interesting option for corporate sourcing from an economic standpoint. More specifically, in the past, self-generators had to pay the so-called "sun tax"[83] (a charge on the volume of electricity self-consumed meant to contribute to network costs and other system costs) and other non-recoverable taxes on the energy they self-consumed, making self-generation too expensive for corporate purposes. In fact, the cost of self-consumed electricity was still higher than the price offered by energy suppliers for standard grid electricity. One of the main actors who was investing in self-generation has been the public administration, which aims to achieve environmental sustainability targets. Nevertheless, given the recent changes in the government's approach to RE, the situation in Spain might change soon, making self-generation a more appealing solution. In particular, with the cancellation of the so-called "sun tax" by the Royal Decree-Law 15/2018, Spanish companies (especially SMEs) will be able to produce their own electricity and benefit from: i) lower and more stable electricity costs; ii) full control over the type of RE; and iii) savings on taxes and other non-energy components of the electricity price. Positive impacts in terms of CSR are also expected to drive companies' decision to self-generate. Nonetheless, while the regulatory barriers are being removed by the current government, the uncertainty related to future changes in the policy context is still a major concern for Spanish companies deciding to invest in self-generation.

The development of **RE PPAs** is very recent in Spain, and the interest of companies in these contracts is growing, in particular after the government's announcement of new rules to foster PPAs. In addition, the Spanish electricity market is one of the most liquid in the EU, with about 400 retailers (many of which are aggregators of multiple generators), thus ensuring cost-effective balancing services. However, perceived barriers persist and may discourage companies from signing these agreements. The average duration of a PPA is quite long (10 years), compared with the energy

[81] For further details, please see: https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/governance-energy-union/national-energy-climate-plans
[82] For further details, please see: https://appa.es/wp-content/uploads/descargas/Estudio_APPA_2016.pdf
[83] This charge did not apply to RE plants below 10kW. As the average household power capacity is below 5kW, it did not affect average households.

procurement strategy of most consumers (2-4 years); this long-term risk for consumers may be partially addressed via (price revisions) clauses. In addition, as energy taxation is subject to frequent changes, large (international) companies tend to prefer short-term contracts (1-2 years) rather than long term commitments; in fact, PPAs allow to fix the energy component, while the off-taker is still fully exposed to changes in the regulatory components of the electricity price (the so-called 'regulatory risk'), which may inflate energy costs and harm the economic viability of global businesses such as energy-intensive industries. Companies' culture (especially of SMEs) has been quite hostile to PPAs, as they are perceived as complex non-standard contracts generating very high negotiation costs. Furthermore, the Spanish generation system has overcapacity and there is limited interest to develop new projects beyond the 8,800 MW allocated in 2016 and 2017 RES auctions. Another obstacle to RE PPAs is represented by the financial sector, which is not used to fund such type of contracts and therefore offers expensive bank guarantees to the parties involved. In Spain, there is also a limitation imposed on large suppliers (market share above 10%) to enter in a new long-term contract with RE generators or represent them. This could limit the role that large suppliers can play to connect consumers with new generators; it does not affect, however, consumers that want to deal directly with generators.

The interest in **unbundled GOs** in Spain is increasing, even if it remains a niche market because for most of the players (especially SMEs) it is complex to trade GOs without relying on a trader; therefore, most of the companies opt for green energy offers (easier to source). When it comes to GOs linked to PPAs, in general, the consumer is interested in getting and cancelling GOs, especially for CSR purposes; nevertheless, some consumers only look at RE PPA for price hedging purposes and have limited interest in GOs.

Reportedly, public administrations are committed to using at least 30% of green energy in their final energy consumption ('exemplary role'). Additionally, some public procurement rules may favour private companies with an A label, i.e. companies relying 100% on green energy. This makes **green energy offers** quite attractive to them. In the practice, most of the companies opting for green energy offers are just interested in cheap RE and do not demand 'premium offers' focusing on specific technologies (e.g. solar or wind) or new and non-supported installations. Therefore, the market for premium green offers is not developed in Spain. In principle, however, any supplier could draft a specific contract linked to a certain type of green electricity/GO.

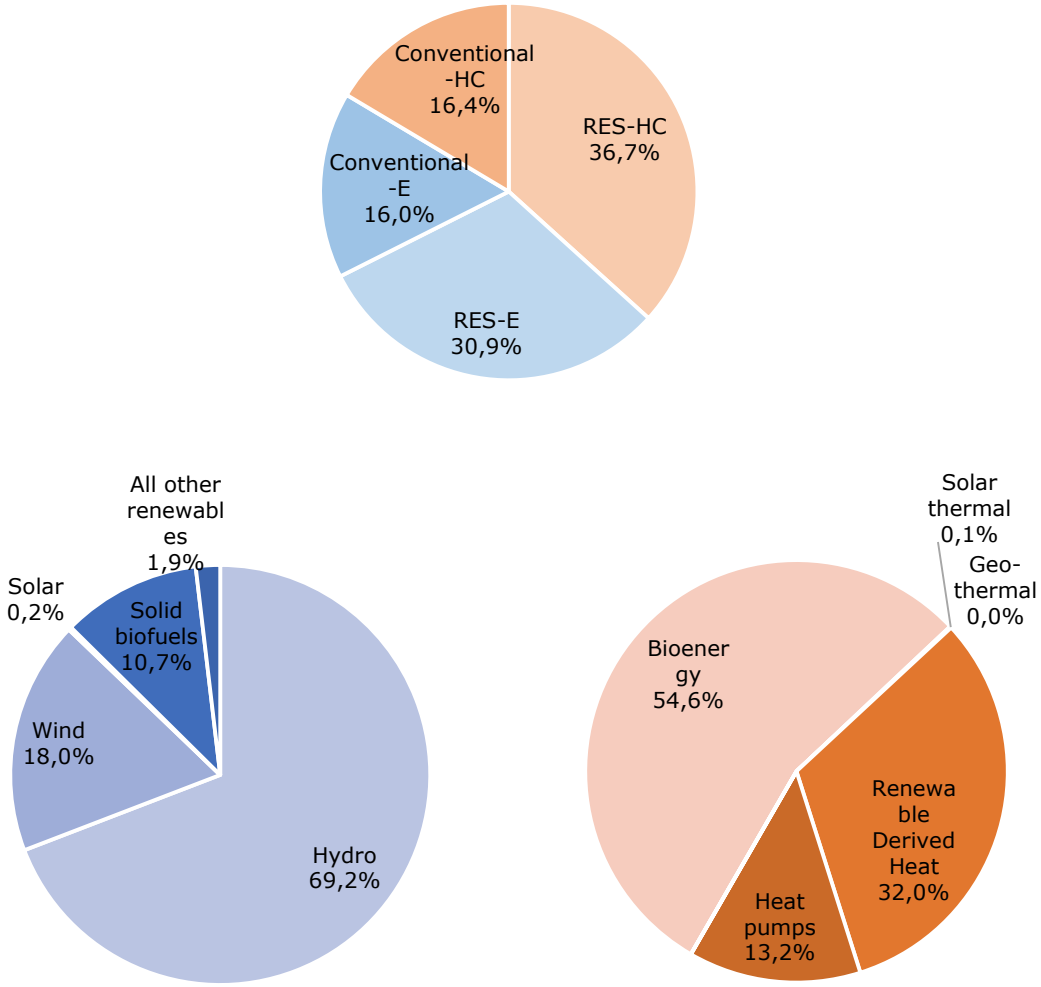
With regard to the **opportunities** pushing Spanish companies' decision to go green, differentiation seems to be the main driver. Cost reduction is another important factor, as currently, green offers are cheaper than 'brown' ones. Participation in green supply chains is also seen as a reason to source RE. In addition, some companies are willing to switch to 100% renewables in order to receive the A label for green public procurement purposes. Given the **recent changes in the regulatory environment**, it is not clear what will be the upcoming challenges for Spanish companies deciding to go green. The uncertainty in the policy context due to past political and regulatory interventions is perceived as a barrier that can discourage companies from switching to renewable sourcing as well as generators/project developers to invest in new RE power plants. In the same vein, another major barrier to corporate sourcing of RE is the **risk-averse mindset of Spanish SMEs**, which sometimes do not have a long-term strategy (especially for energy procurement) and lack the required know-how to uptake the green energy transition.

10 Country background analysis: Sweden

10.1 Statistics

In 2017, **RE accounted for almost 68%** of the final energy consumption in Sweden (Figure 25). While most of the renewable electricity was generated by hydropower, wind and solid biofuels also have sizable shares of RES-E generation. In line with data registered in other EU countries, the lion's share of RES-HC production relies on bioenergy. Based on data available in the draft NECP[84], Sweden's energy use in 2030 is to be 50% more efficient than in 2005. Even though the Swedish Energy Agency points to a 65% share of energy from RES in the gross final consumption of energy by 2030, the draft NECP does not include any explicit national target.

Figure 25 Final energy consumption (centre), consumption of RES-E (left, down) and RES-HC (right, down) by energy source (Sweden, 2017, transport excluded)

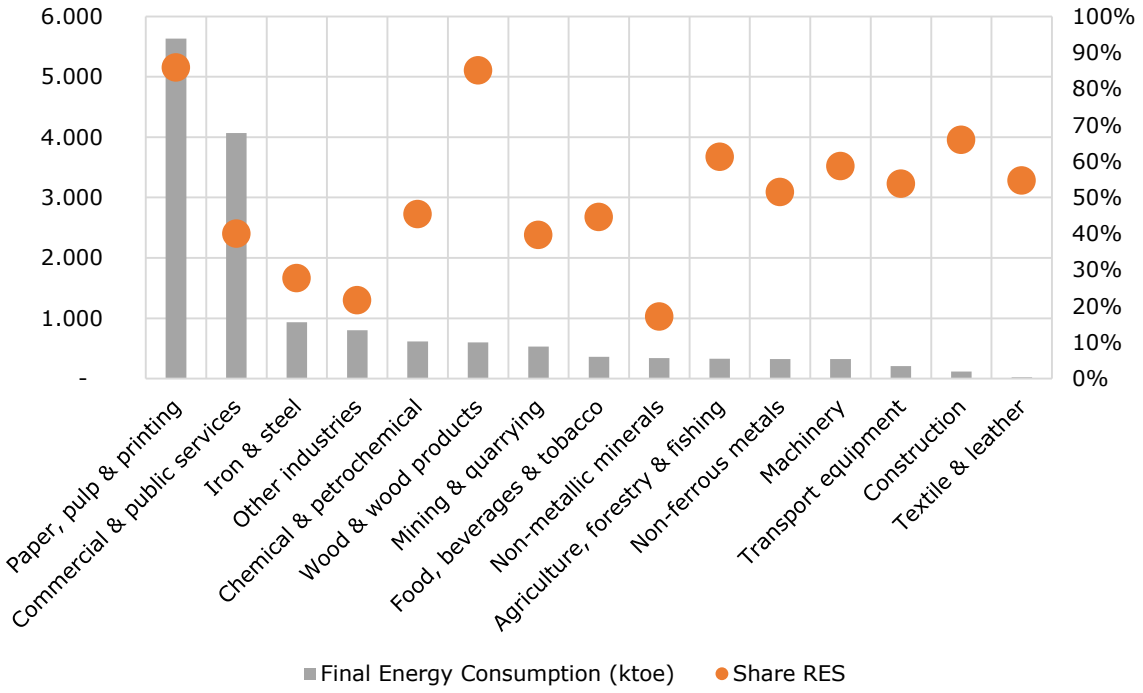


[84] For further details, please see: https://ec.europa.eu/energy/sites/ener/files/documents/sweden_draftnecp.pdf

Source: Authors' elaboration on Eurostat: Energy Balances and SHARES.

In Sweden, the paper, pulp, and printing sector consumes the largest volume of energy, and almost 80% of it comes from renewable sources (Figure 26). The second Swedish most energy-intensive sector, i.e. services, relies on about 40% of RE to meet its energy needs. Most of the sectors perform quite well in terms of consumption of RE.

Figure 26 Final energy consumption and share of renewables out of final energy consumption by sector (Sweden, 2017)



Note: Figures relative to RES-E are not available. Therefore, for each sector, it is assumed that the share of RES-E corresponds to the national share of RES-E in total electricity final consumption of each sector.

Source: Authors' elaboration on Eurostat: Energy Balances and SHARES.

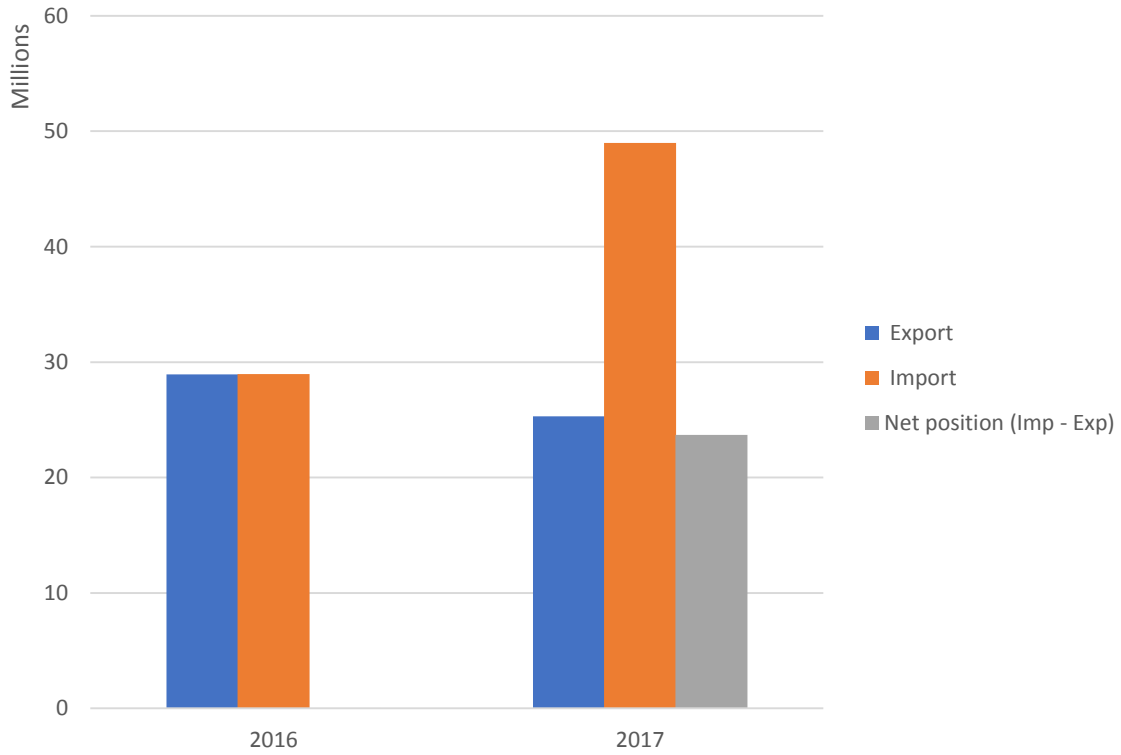
In 2016, Swedish exports and imports of green GOs accounted for almost 29 million units each; imports exceeded exports by just 25,000 units (Figure 24), which are equivalent to 2.2 ktoe. Interestingly, in 2017 imports of green GOs exceeded exports by 23.7 million, which correspond to 2,036 ktoe[85], i.e. more than 15% of the electricity generated in Sweden[86]. As **imports of GOs exceeded exports**, Figure 26 is most likely underestimating the share of RES-E in the final consumption of electricity for the selected sectors.

From 2013 to 2017, **14 RE PPAs** have been signed in Sweden, for a total capacity of 1,084 MW.[87] All PPAs have a single off-taker; 12 out of 14 off-takers belong to the ICT

[85] One GO is equivalent to 1MWh of electricity and 1 MWh is equivalent to approximately 8.6E-5 ktoe.
[86] As data on RES generation in 2017 is not available, it is assumed that the amount of RES generated in 2017 is the same as in 2016.
[87] European Commission elaboration on Bloomberg Energy Finance.

sector. Whereas the large majority of the agreements involved wind onshore generation, two agreements relied on small-scale hydropower.

Figure 27 Yearly GOs' exports, imports and net position (Sweden, 2016-2017)



Source: Authors' elaboration on AIB statistics.

10.2 Relevant national support policies

Support schemes for both RES-E and RES-HC are in place. Public support mechanisms in Sweden are quite diverse, providing a quota system, tax incentives, and a subsidy scheme. In addition, the grid operator is obliged to connect any new generation to the grid – this includes district heating.

RES-E. The three support mechanisms for RES-E in Sweden are the quota system, tax incentives, and a subsidy. These mechanisms are confirmed by the draft NECP.[88]

- Quota system. The Electricity Certificates Act obliges electricity suppliers to prove that certain amounts of electricity they supply come from renewable sources. The quotas are measured using tradable GO certificates. This is equivalent to say that also those companies that are buying conventional grid electricity are using a certain minimum share of renewable electricity;
- Tax incentives. Electricity supplied from a plant below 50kW is not taxable. For electricity generated by wind, wave, or solar, the kW threshold is higher (125 kW wind or wave power, 255 kW solar power; peak power). In addition, for wind energy, there is a reduction in the real estate tax. This may incentive small-scale self-generation;

[88] For further details, please see: https://ec.europa.eu/energy/sites/ener/files/documents/sweden_draftnecp.pdf

- Subsidies. Grants for solar PV installations (covering about 30% of the investment costs) are available also for companies. This may incentivise self-generation/self-consumption of solar power. In addition, some subsidies to encourage individuals to install storage systems for self-produced electricity are in place.

RES-HC. In Sweden, nitrous oxide and carbon dioxide created as a by-product for heating purposes is taxed. Thus, heating generated from renewable sources is exempt from these taxes. This increases costs for companies relying on conventional sources for heating and cooling.

10.3 Corporate sourcing: Available data

No public websites or publications listing private companies sourcing RE are available in Sweden. Renewable generators, project developers and electricity market players consider the list of their clients as highly confidential. Whereas some information on RE projects that benefited from public support schemes can be retrieved, it is not possible to identify which projects are linked to corporate sourcing of renewable electricity.

10.4 Corporate sourcing of renewables: drivers and barriers

Self-generation is a quite popular approach to corporate sourcing in Sweden. It is worth mentioning that a considerable share of the current hydropower generation was initially built by industrial companies to meet their energy needs. Currently, on-site self-generation seems to be the most profitable option, as some taxes apply to off-site generation; therefore, the generation capacity is limited by on-site space available. SMEs tend to invest more in solar PV, whereas big players, such as pulp and paper companies, use biomass. About wind, large companies may share the initial financial burden by forming a coalition to build wind farms. The use of hydropower for self-generation/self-consumption decreased after the deregulation of the electricity market when many industrial companies decided to focus on their core business and sold their small hydropower plants to utilities; however, some companies have recently purchased small-scale hydropower plants. The main drivers for self-generation in Sweden are: the potential positive impact in terms of CSR, especially when there is a visible link between the renewable power plant and the company premises; the stability of electricity costs; and lower costs compared to grid electricity, also linked to savings on taxes, non-energy components of the electricity price and indirect EU ETS costs. Also, the full control over the power installation and the security of supply may have a positive impact on companies' decision to self-generate. When it comes to barriers, regulatory obstacles on wind farm installations can discourage firms from self-generating; in fact, authorities are giving fewer permits to install onshore wind plants, especially when they are close to urban areas. In the same vein, environmental rules do not allow for installing new hydropower plants and make it quite difficult to increase the generation capacity of the existing ones. The fluctuating/variable nature of RE from sun and wind may also discourage some companies to invest in self-generation.

RE PPAs are widespread in Sweden as they guarantee positive impacts in terms of CSR, the stability of prices thanks to price hedging as well as lower electricity prices compared to grid electricity (depending on the specific agreement). They may even be more interesting than self-generation, as no up-front capital is required, and they allow to source cheap renewable electricity from large-scale (cost-effective) projects. PPAs are mostly interesting for large consumers for two main reasons: the off-taker needs to use a sizeable amount of power to be interested in purchasing energy directly from a generator; PPAs still represent a quite complex deal requiring strong expertise in energy management, which is usually missing in SMEs. While there is no major regulatory or policy barrier affecting the market for renewable PPAs, price risk

and uncertainty of future energy prices and the fluctuating/variable nature of solar and wind power may make this option less attractive.

The main driver pushing companies to buy **unbundled GOs** is an economic one, as the price of GOs is rather low and it represents a relatively efficient solution for greening electricity consumption. However, this approach to corporate sourcing of renewable electricity is more difficult to communicate for CSR purposes, as GOs are still negatively perceived from the media.

Green energy suppliers provide many types of offers (renewables, local renewables, hydropower, wind, bio-power), which are very easy to access; however, there are some extra fees to be paid for premium offers, linked to the specific type of GOs to be cancelled. The main driver for companies deciding to rely on green energy suppliers is the possibility to communicate it for CSR purposes. Among the obstacles, it is worth mentioning the lack of interests in/awareness of green energy offers, especially for small companies which are not electricity-intensive and just look at the price they pay to source electricity.

Overall, companies in Sweden opt for renewable solutions for CSR purposes, thus contributing to the environmental sustainability of their business, and to participate in green supply chains. Regulatory barriers (e.g. difficulties in obtaining the environmental permits for wind farms) and infrastructural barriers (due to inadequate grid infrastructure in certain areas) together with limited expertise and (in the case of SMEs) company culture focusing on minimising costs are still limiting the green energy transition.

When it comes to **RES-HC**, reportedly, renewable sources have the potential to reduce production costs and ensure cost-leadership. For instance, energy-intensive sectors are investing in technologies allowing for self-consumption of waste heat. However, such solutions tend to be cost-effective only when excess heat can be sold to district heating systems. In this respect, infrastructural and market barriers may affect companies' decision: i) a certain production site may be far from district heating grids and costs to build grid interconnections may be too high; ii) early adopters are better placed than newcomers, as waste heat cannot travel long distances and local district network may be already served by other players.