BEUC The European Consumer Organisation

Current practices in consumer-driven renewable electricity markets

BEUC mapping report

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Executive Summary

This report gives an overview of current practices in 'green electricity' markets and in renewable self-generation from the point of view of European consumers. While monitoring examples from several Member States, this report serves as a background document for BEUC's recommendations on how to improve regulatory framework in the European Union (EU), summarised in BEUC's policy papers "A welcome culture for consumers' solar self-generation" and "Trustworthy 'green electricity' tariffs".[1] As the European Consumer Organisation, BEUC has been calling for affordable and sustainable energy to all citizens. Two options bearing a huge potential in this regard will be assessed in this report:

- Opting for 'green' tariffs that deliver renewable electricity to final consumers, as well as
- Producing renewable electricity on their own premises.

At a moment when consumers' choice emerges at the heart of the EU's new Energy Union strategy, it is yet not clear if consumers fully can use their rights and benefit from these options. Instead of meaningful 'green' tariffs, selling renewable electricity and using consumers' money to enhance energy transition, we see misleading advertisement and a low level of transparency. This is particularly obvious regarding the environmental benefits claimed by suppliers. In the field of renewable self-generation, some serious barriers hamper consumers who are willing to engage, aiming at cuts in energy costs as well as in greenhouse gases.

A. Voluntary 'green electricity' markets

BEUC has identified a number of problems consumers are currently facing. Therefore, the following boxes provide an overview of actions that need to be taken to tackle current deficiencies of so-called 'green electricity' offers which were available in 15 Member States in 2014.[2]

Deficiencies from consumers' perspective: what is green in 'green electricity'?

In most Member States analysed in this report, it remains unclear what exactly is the 'green' in a 'green electricity' offer. Since neither the Member States nor the EU level provide an unequivocal, binding definition, doors are left wide open for misleading offers. As a consequence, consumers have difficulties to identify environmental advantages or disadvantages of such electricity tariffs. When opting for a 'green' tariff, consumers naturally expect the supplier to deliver renewable electricity and that their choice contributes to an increase in renewable electricity generation – which is not necessarily the case. Guarantees of origin (GOs) function as a tracking tool for disclosure of the renewable share in the fuel mix used for producing electricity. Since GOs can be traded independent of the electricity sold to consumers, suppliers may still market non-renewable energy sources behind a dazzling "100% green" façade.

BEUC's three-steps for trustworthy and consumer-friendly 'green' tariffs

Starting with transparency, consumers right to know where the electricity comes from she/he pays for must be implemented in a way that stops misleading offers. Secondly, as a prerequisite, a reliable tracking mechanism for renewable and other energy sources must be based on GOs and must be fully implemented by all Member States. BEUC supports the mainstreaming of GOs beyond the mere

[1] BEUC: A welcome culture for consumers' solar self-generation. Policy recommendations, BEUC-X-2016-001, 6 January 2016 and BEUC: Trustworthy 'green electricity' tariffs. Policy recommendations for more transparency, better choice and environmental benefits, BEUC-X-2016-002, 6 January 2016.

[2] The mapping report analyses 13 countries, covering the most important 'green electricity' markets.

verification of the renewable share in fuel mix disclosure ('full disclosure') in order to make fuel mix disclosure more consistent for consumers and to establish a level-playing field for all stakeholders. However, 'full disclosure' alone does not solve the problem that suppliers often just pretend to offer a somehow 'clean' tariff. That is why, thirdly, all offers marketed with an environmental claim need to be tied to measurable criteria regarding the additional environmental benefits.

1. **Increase the transparency of 'green' tariffs**

What should be improved in future legislation?

- Electricity tariffs must be **meaningful and comparable**, especially with regard to the informative value of the fuel mix. Therefore, future legislation on public service obligations and consumer protection must define **key parameters to be published in a template layout** by all suppliers. A standardised format should include the supplier's average mix as well as the tariff product mix. Different renewable and fossil fuel sources should be disclosed. The RE-DISS II project has provided an example for a complete and meaningful disclosure of the fuel mix (see Fig. 7, p. 21).
- Consumers must be able to **understand that GOs alone do not prove any cash flow but serve as a statistical tracking tool** only. They need to be able to differentiate between meaningful and misleading offers. For this reason, the relevant information must be published in advertising and on the bill. The country of origin of the GOs used for disclosure purposes must be published in the standard format.
- Mainstream **GOs should be the only tracking tool for all energy sources** ('full disclosure'). This would help create a level-playing field for all energy sources and help calculating all fuel mixes in an accurate and consistent manner across Europe.
- GOs – which are nothing more than a statistical tracking instrument – should **not be applicable to national renewable energy target fulfilment**, meaning that electricity suppliers still must build real new power plants. Buying GOs is not enough to comply with binding national targets.

2. Enable consumers to make a well-informed choice

What should be improved in future legislation?

- Member States must **fully meet the minimum requirements on fuel mix disclosure** in a consumer-friendly manner, including the mandatory publication of the fuel mix and the environmental indicators (CO_2 emissions, radioactive waste) in any pre-contractual information.
- Misleading 'green' tariffs must be stopped. The supplier must **prove the environmental bonus that accrues from the consumers' choice**. Only under this condition, a tariff would be legitimated to be marketed with a 'green' claim.
- Member States must enforce properly the Unfair Commercial Practices Directive and adopt more ambitious regulations **against the use of misleading wording** in relation to 'green' claims. This could help restore confidence in electricity markets with trustworthy offers.
- Electricity market regulators must develop **binding rules on how to present the fuel mix** and information related to the environmental performance of electricity tariffs in **price comparison tools**, based on a standardised format.

3. Ensure consumers' money creates environmental benefits

What should be improved in future legislation?

- When evaluating the current Renewable Energy Directive, policy-makers need to recognise that trade in GOs has hardly ever contributed to the construction of new installations. **A statistical tracking tool should not be burdened with the role of a refinancing scheme.**
- The future Renewable Energy Directive should address that offers with environmental claims must match consumers' expectations: consumers' money should verifiably lead to **additional investments** in renewable generation capacities.
- Electricity market regulators must establish and/or improve **criteria for measurable impacts** of 'green' tariffs, e.g. that a certain amount per kilowatt-hour is channelled to third-party supervised funds that refinance additional generation capacities. This is key to help consumers to differentiate and compare such offers. In this context, suppliers should engage in substantiating the additional environmental benefits achieved with consumers' money.
- Private 'green electricity' quality labels can provide valuable guidance to consumers in case regulators fail to establish criteria for measurable impacts of 'green' tariffs. It is indispensable that these **quality labels are credible, well-designed and remain fully independent** from suppliers. The criteria applied should be as transparent as ambitious, going **beyond mandatory minimum requirements**.

B. Renewable self-generation

Following the description of various problems, BEUC identified three steps to overcome barriers that consumers are facing when they want to start self-generation projects on their premises.

Deficiencies from consumers' perspective: instability, lack of reliability, high financial risks

First of all, instability in renewable energy policy and retroactive changes thwart consumers' investments in the majority of the analysed Member States. Administrative barriers, established in the past to regulate big utilities, discourage consumers. They disproportionately increase investment costs of private self-generation projects. Secondly, consumers' plans to invest in self-generation are hampered by a lack of reliable and structured information on technological options and potentials while the quality of offers and services often differs widely. Finally, consumers face high financial risks related to the difficulty of access to capital and long amortisation. This can be further worsened by a lack of stable and sufficient remuneration schemes for excess electricity fed onto the grid.

BEUC's three-steps for a welcome culture for renewable self-generation

In many Member States, renewable self-generation is not yet a self-runner. The simpler and the more reliable the rules, the lower the costs of renewable self-generation and the faster the market uptake. Distribution system operators (DSO) must immediately grant discrimination-free priority grid access to renewable self-generation to enable 'prosumer's to feed their self-generated electricity into the grid. Consumers' willingness to invest in self-generation should not be restricted because of limited network capacities nor blocked by prohibitive regulation or charging of grid access and grid use. Consumers' small self-generation projects need a stable and specific remuneration scheme for investment security, e.g. well-designed feed-in tariffs (FiTs) or net metering. Undue financial burdens such as taxes or fees imposed on self-consumed electricity, which help maintaining incumbents' business models and market positions, need to be removed.

1. **Need to provide a simple and reliable framework for consumers' self-generation**

What should be improved in future legislation?

- The future Renewable Energy Directive must **provide a dedicated long-term strategy for an adequate support** to consumers' small-scale renewable self-generation projects.
- Based on the Commission's State Aid Guidelines, Member States should be urged to **establish or to improve national self-generation strategies that target private households**.
- Member States and regulators must **ensure that a simplified administrative framework responds to the specific needs of consumers who want to invest in a small-scale self-generation project**.
- Regional and local authorities should be encouraged and supported to **establish one-stop shops for consumers**.

2. Guarantee priority grid access and use to consumers' self-generation

What should be improved in the future legislation?

- In the future legislative framework for the electricity market design, grid operators must **grant priority grid access to small-scale renewable self-generators without setting any caps**, e.g. on the size of consumers' installation. The **duration of the permit procedure should be short and straightforward**, without excessive charging for grid connection and use.
- In the future legislative framework, grid operators should be obliged to immediately optimise and expand their network in order to **guarantee to self-generators the purchase, transmission and distribution of their electricity**.
- With regard to network fees, it is worth to **consider more differentiated schemes that foster flexibility options of demand and supply**, involving all electricity producers and consumers. However, retroactive changes are unacceptable.

3. Ensure fair and appropriate refinancing for all consumers

What should be improved in the future legislation?

- The future Renewable Energy Directive must ensure **stable and adequate safeguards** for small-scale renewable self-generation projects, including a **remuneration scheme for electricity fed into the grid**.
- Member States must **remove undue financial burdens such as taxes or fees imposed on self-consumed electricity** because such practice unduly increases the costs and helps maintaining incumbents' business models and market positions.
- Member States should take into consideration that **consumers who cannot afford or are not willing to invest into self-generation technologies must neither be left behind nor be charged with inadequate costs** related to a possible market split into privileged 'prosumers' on the one side and consumers on the other side.
- In order to enable all households to benefit from renewable self-generation, the future Renewable Energy Directive should pay **more attention to the role of tenants and foster the self-generation potential of multi-storey dwellings**. In principal, tenants should have the same opportunities to participate in self-generation projects as home owners.

1. Introduction

With the present mapping report BEUC assesses current practices in voluntary and consumer-driven renewable electricity markets. We analyse two key options for consumers:

- Opting for 'green' tariffs that deliver renewable electricity to final consumers as well as
- Producing renewable electricity on their own premises.

At a moment in time when the EU debates a new framework for a secure and sustainable energy supply, the role of consumers' needs to clarified: How can they contribute to energy transition? How can consumers' interest in renewable self-generation be translated in reasonable and safe investments? How can their willingness to support climate protection through their purchases be fostered? How do consumers' 'green' choices interact with the need to enhance consumer-centric energy markets? How can consumers be protected against undue claims and marketing messages?

This first chapter will present the research methodology of the report and define the scope of the two options of 'green electricity' tariffs and renewable self-generation.

1.1 Structure of this report

After a definition of 'green electricity' tariffs and of self-generation (**chapter 1.2 and 1.3**), the report will provide an overview of both, the status quo of current voluntary 'green electricity' markets (**chapter 2**) and renewable self-generation (**chapter 3**). We will describe generally the main challenges from the point of view of consumers' expectations and consumers' rights.

In **chapter 4**, we will then analyse in detail the current practices in 'green electricity' markets and self-generation in thirteen countries (twelve Member States plus Norway). We will do this with the help of a template which compiles the key indicators of national energy markets that condition consumers' green choice. For each country case study, the specific degree of transparency of 'green' offers will be analysed. Consumers' access to renewable self-generation in the Member States will be subject to the same analysis. This assessment of national policy and market conditions is based on the feedback of BEUC's national member organisations to an exhaustive questionnaire in 2015, on interviews with experts as well as on desk research using comparative data from public studies and databases of Member States and EU institutions. In order to summarise each country chapter, a traffic lights scale classifies each Member State's progress on different issues of transparency and market access from the point of view of consumers. The criteria and methodology of the traffic lights system is explained in the introductory part of chapter 4.

Finally, in **chapter 5**, the report will provide a summary of BEUC's assessment of best practice in Member States. These findings back BEUC's recommendations on how to improve transparency of 'green electricity' offers and renewable self-generation.

The 'green electricity' world often uses its own technical terms and jargon. For this reason, we have added a **glossary** providing brief descriptions of the most important vocabulary used in this report. Since vague wording and unclear definitions often cause confusion in the debate about voluntary and consumer-driven renewable electricity markets, we will first provide the definition of 'green electricity' tariffs and of self-generation that we use in this report.

Fig. 1: 'Green tariffs' and countries covered in this report

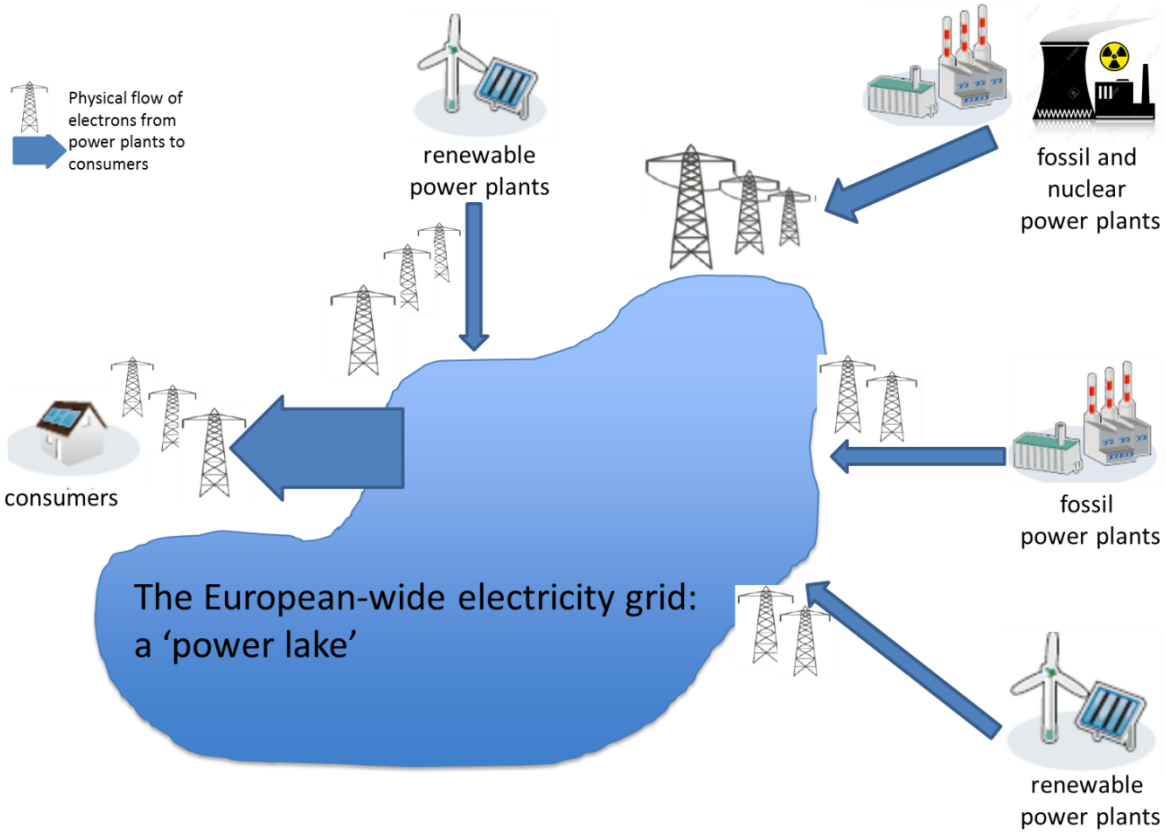
In the 15 green coloured EU Member States consumers can opt for at least one 'green' tariff backed by 100% renewable GOs (Austria, Belgium, Denmark, Estonia, Finland, France, Italy, Germany, Luxemburg, the Netherlands, Portugal, Slovenia, Spain, Sweden and the United Kingdom). The 12 flagged countries are covered in this report (Austria, Belgium, Cyprus, Denmark, Germany, Greece, Italy, the Netherlands, Portugal, Slovenia, Spain and the United Kingdom. Norway additionally is featured in this report as the only non-EU Member State. 'Green' tariffs are also available in the non-EU Member States Norway and Switzerland.

1.2 What is a 'green electricity' tariff?

First of all, 'green electricity' is a term coming from advertising. In most Member States which liberalised electricity markets, it is used to describe special tariffs which are marketed with certain environmental claims by electricity suppliers. Consumers normally choose voluntarily such a tariff product whose presentations suggests an environmentally positive effect, mostly linked to the use of renewable energy sources. However, there is no commonly agreed definition of such offers. In the Renewable Energy Directive 2009/28/EC, a definition of renewable energy sources can be found, but no definition of 'green' tariffs. Regarding this confusion, in this report we assume that 'green' tariffs are final consumer tariffs that claim to deliver electricity produced solely with 100% renewable energy sources as defined in the Directive.

An electron transmitted via the electricity grid has no colour. Physically, no differentiation can be made. For example, when consumers plug in their fridge, technically it is not possible to know from which power plant the kilowatt-hours emanate from. Therefore, the European-wide electricity grid can be compared with an anonymous lake. All power plants are feeding into this lake, creating a mix, and all consumers are ponding from it – yet it is always water. And of course, the electricity supplier will not lay a new cable from a single wind mill to the consumer's socket to deliver renewable electricity.

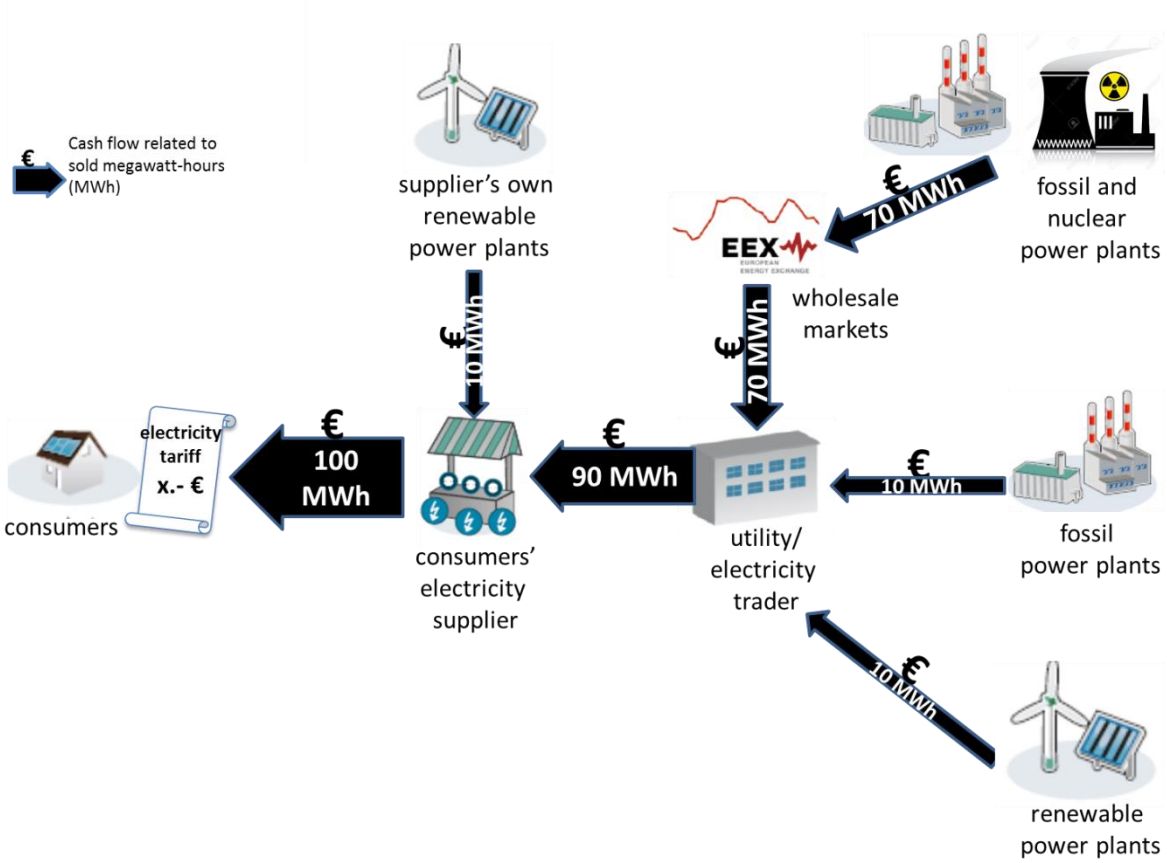
Fig. 2: The physical flow of electrons[3]



However, the sources of electricity consumption remain not unidentifiable. Consumers pay a bill for the electricity supplied by a specific company. This supplier provides the amount of electricity needed by its consumers through running his specific own power plants and/or buying electricity from electricity traders, utilities or other plant operators that can be identified. After all, it is exactly this particular commercial flow of kilowatt-hours that is billed under a certain tariff to the final customers.

[3] The following BEUC infographic series is based on elements of an illustration previously published by the German Renewable Energy Agency (Agentur für Erneuerbare Energien, AEE), http://www.unendlich-viel-energie.de.

Fig. 3: The cash flow related to sold kilowatt-hours



So when paying her/his bill, how does the consumer know that she/he gets renewable electricity? The EU has established in the Internal Electricity Market Directive 2009/72/EC the consumers' right to be informed about the sources of the electricity they consume and the environmental impact associated with the electricity generation (such as greenhouse gas emissions, radioactive waste) for their tariff. At least once a year, every supplier has to disclose the fuel mix of the electricity generation on the bill.

In order to disclose the share of renewable energy sources, a statistical tracking tool, the Guarantees of Origin (GOs), was introduced by the Renewable Energy Directive. GOs are certificates that can be issued for one renewable megawatt-hour produced in a renewable power plant in Europe. Suppliers use these GOs for fuel mix disclosure purposes in order to prove that the electricity demand covered under a 'green' tariff is equal to renewable electricity generation.

One decisive aspect with regard to transparency has to be noticed: As GOs can be sold and traded independent of the megawatt-hour produced, a supplier that produces and/or trades only fossil fuel based electricity can buy GOs from producers of renewable electricity and then use them as a proof that his electricity comes from a renewable resource. Because of the decoupling of trade in GOs from trade in electricity, the European-wide GO market is very liquid. Compared to the price of one megawatt-hour of electricity, GO prices are very low. This practice enables suppliers who mainly produce and/or buy non-renewable sourced electricity to market their tariff as 100% renewable, to some extent hiding behind the 'green façade' of renewable GOs. Even in countries where the demand in renewable electricity exceeds the available renewable electricity production on the national level, suppliers can compile a 100% 'green' tariff at low cost by using cheap GOs.

Fig. 4: The statistical flow of GOs for fuel mix disclosure

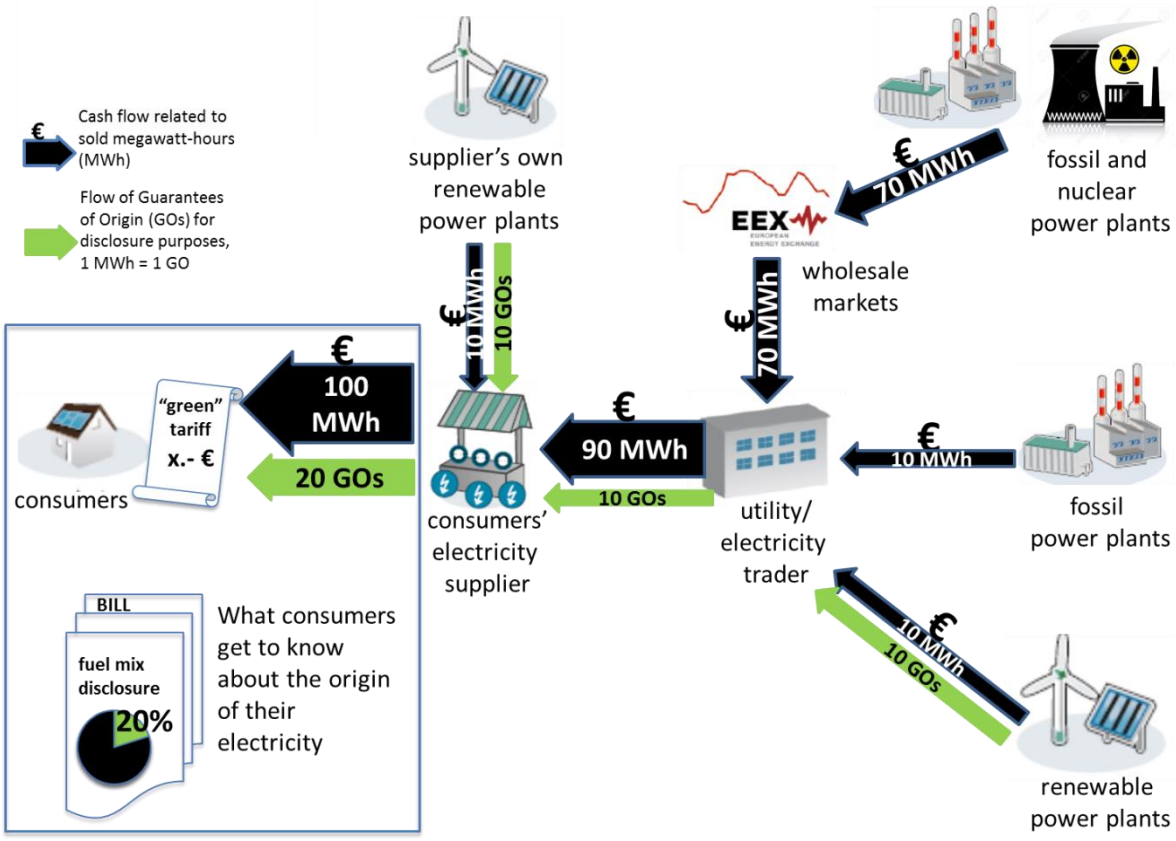
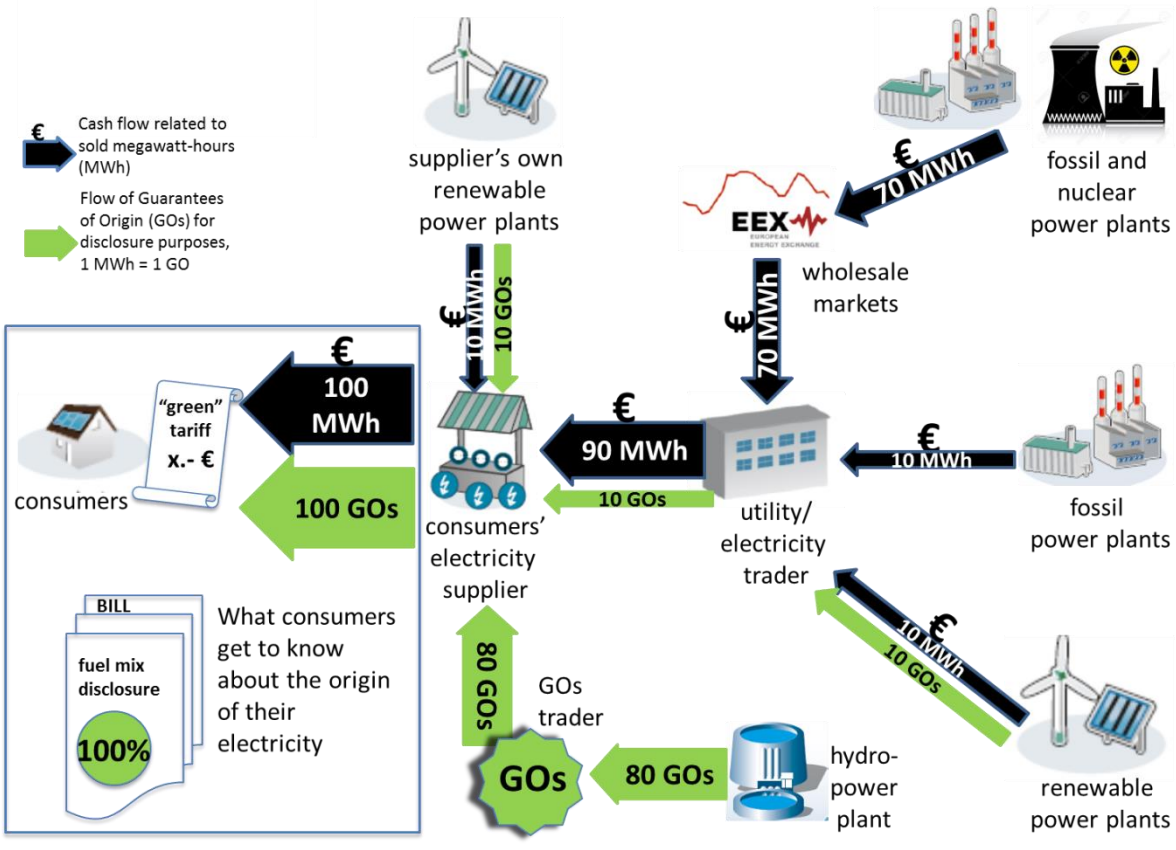


Fig. 5: Renewable GOs covering non-renewable megawatt-hours



To finalise the disambiguation of 'green electricity', this voluntary market should not be confused with national support schemes for renewable energy as they are described in the National Renewable Energy Action Plans related to the Renewable Energy Directive. There is no direct link between consumers' choice for a 'green' tariff and the fulfilment of the EU 2020 targets that aim at increasing the share of renewable energy in the final consumption. However, when opting for so-called 'green electricity' offers, consumers' demand indirectly could incentivise the installation of new, additional renewable generation capacities that help reaching the 2020 targets.

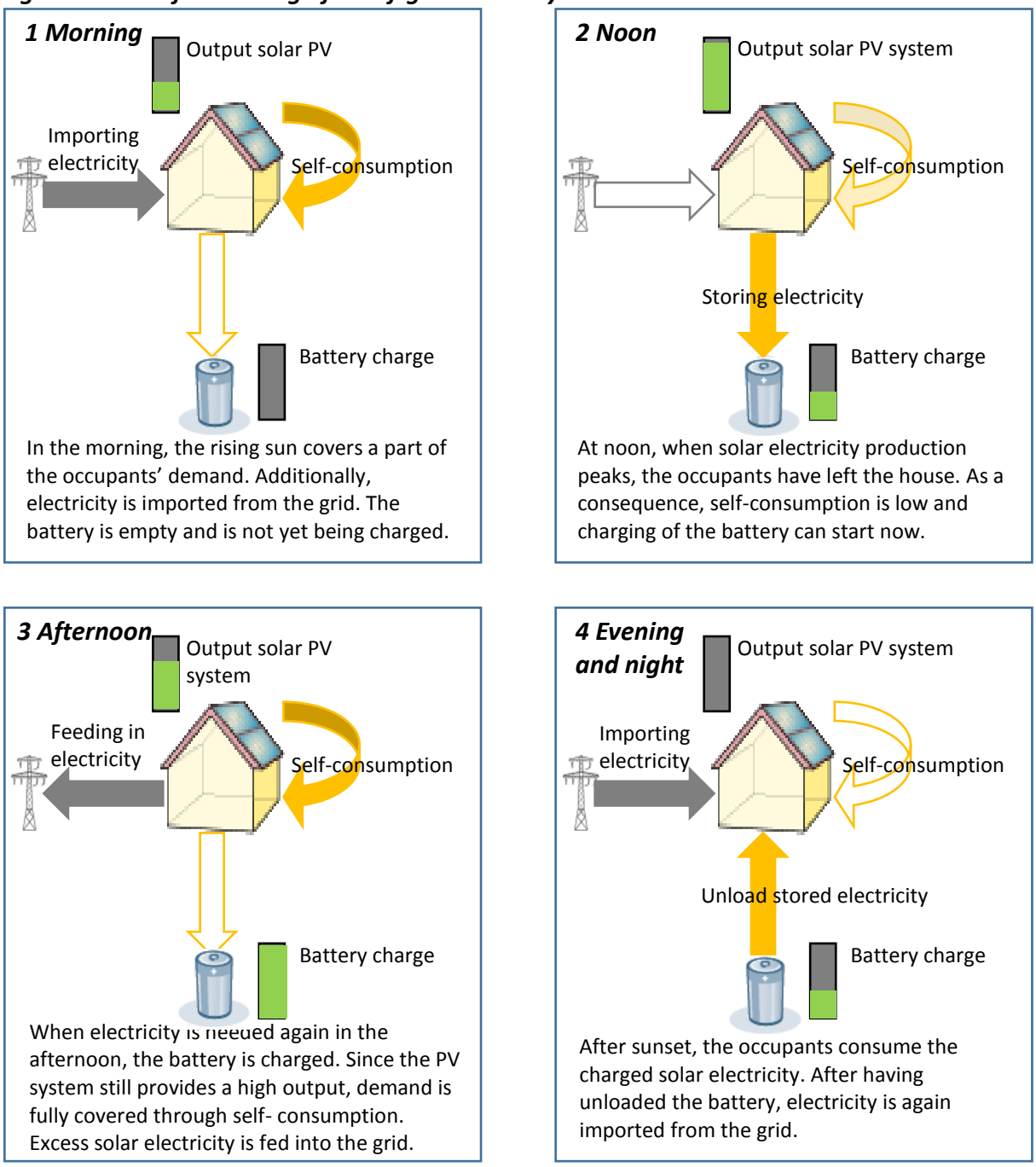
1.3 What is renewable self-generation?

Self-generation is power and/or heat generation on the premises of a private consumer who uses self-generated heat, or electricity, to cover his/her own demand to a certain degree (so called self-consumption). It also entails feeding excess electricity production into the public grid or storing it. Thereby, the consumer transforms into a 'prosumer', another term coming from advertising. Except some rare cases of remote regions and off-grid niche applications (e.g. in a garden), self-generators will always stay connected to the grid since they continue being consumers as well as exporters of excess electricity during certain hours. In an interconnected electricity supply system, complete self-sufficiency of single households is neither desirable nor economically rational.

In this report, we approach self-generation mainly from the point of view of households' renewable electricity generation while tenants living in multi-storey dwellings could also adopt self-generation. Currently, solar photovoltaic (PV) electricity represents the most common self-generation technology in the EU and bears one of the most important self-generation potentials. For these reasons, the part of this report dealing with self-generation focuses on solar PV. While other devices such as micro-wind turbines or biomass cogeneration units also can play an important role in households' self-generation, their divergent stage of market development in relation to solar PV complicates a conjoint analysis.

While electricity storage devices such as batteries can play an important part in complementing self-generation, as shown in the following infographic, they are not indispensable. Their role in facilitating self-generation will not be assessed in this report.

Fig. 6: Possible functioning of a self-generation system at household level[4]



Although the heating sector is much more important in view of its share in consumers' energy bills,[5] Member States' diverse frameworks for heating require a more specific approach and therefore fall outside the scope of this report. Furthermore, renewable heating systems have to be tailored to local

[4] Infographic based on Hochschule für Technik und Wirtschaft Berlin, http://pvspeicher.htw-berlin.de/onlinetools/ and German Renewable Energy Agency (Agentur für Erneuerbare Energien, AEE): Strom speichern. Renews Spezial, Nr. 75, December 2014, p. 17.

[5] European Commission: Energy prices and costs in Europe. SWD(2014) 21/2 final, January 2014; European Commission: EU energy in figures. Statistical pocketbook 2014, July 2014.

potentials and specific building demands. In this context, consumer organisations have launched the CLEAR project that advises consumers on the use of renewable self-generation technologies.[6]

2. Challenges for consumer-friendly 'green electricity' in the EU

In this section, we will provide an overview of the status quo of current voluntary 'green electricity' markets in the EU and of consumers' expectations regarding these offers. We will then explain how the consumers' right to know where their electricity comes from is implemented.

2.1 Relevance of voluntary 'green' offers for consumer-centric electricity markets

2.1.1 Emerging 'green electricity' markets in the EU

In 2013, consumers were able to opt for so called 'green electricity' offers in 15 EU Member States. The annual monitoring report of the Agency for the Cooperation of Energy Regulators (ACER) and the Council of European Energy Regulators (CEER) counts 280 electricity suppliers offering more than 650 'green' tariffs to household consumers in the capital cities of these 15 Member States.[7] The most suppliers selling 'green' tariffs can be found in Germany, Sweden, the Netherlands and Finland. These 'green' tariffs tend to be slightly more expensive than non-green offers. However, the monitoring report shows that in some cases they are cheaper.[8]

Only in Luxemburg and in the Netherlands, the share of customers holding a 'green electricity' contract exceeds non-green contracts (100% 'green' contracts in Luxemburg[9] and 64%[10] in the Netherlands). In Germany, representing the EU's largest 'green electricity' market in terms of tariffs, customers and electricity consumption, 'green' tariffs in 2014 covered 17% of retail market consumption.[11] In Belgium, 28% of electricity supplied to final customers in 2014 was covered by renewable GOs.[12] The retail market share in the United Kingdom is estimated at only 0.5%.[13]

2.1.2 An uncompleted internal energy market with low switching activity

Amongst the reasons for establishing the recently proposed Energy Union, the European Commission highlights the importance of citizens actively participating in the market.[14] Despite having the legislation (especially the Third Energy Package) in place, the internal electricity market is yet to be finalised. Consumers could and should actively revive market functioning by switching their

[6] The CLEAR project (Consumers Learn about, Engage with and Adopt Renewable energy technologies) guides consumers through all the stages leading to the purchase of domestic renewable self-generation technologies. It covers the most important devices for self-generation of electricity and heat, such as solar PV modules, solar thermal collectors, heat pumps and wood pellet stoves; see http://www.clear-project.eu.

[7] Agency for the Cooperation of Energy Regulators (ACER)/Council of European Energy Regulators (CEER): Annual Report on the Results of Monitoring the Internal Electricity and Natural Gas Markets in 2013, October 2014, p. 42-45.

[8] ACER/CEER: Annual Report, p. 42-45.

[9] CEER: Advice on customer information on sources of electricity, March 2015, p. 9. Consumers do not necessarily have opted pro-actively for a 'green' tariff but might have found themselves paying continuously for their incumbent tariff which was converted into a 'green' tariff at the instigation of their supplier.

[10] Autoriteit Consument & Markt (Authority for Consumers and Markets): Trendrapportage marktwerking en consumentenvertrouwen in de energiemarkt - eerste helft 2014, November 2014, p. 20.

[11] Bundesnetzagentur (Federal Network Agency)/Bundeskartellamt (Federal Cartel Office): Monitoringbericht 2014, November 2014, p. 176.

[12] CREG/CWaPE/Brugel/VREG: Communiqué de presse commun des régulateurs belges de l'énergie relatif au développement des marchés de l'électricité et du gaz naturel en Belgique pour l'année 2014. Press release, 19 June 2015, http://www.cwape.be/docs/?doc=2414.

[13] CEER: Advice on customer information on sources of electricity, March 2015, p. 9.

[14] European Commission: Energy Union Package. COM(2015) 80 final, February 2015, p. 2.

electricity suppliers. By doing this, they could drive competition. However, in some Member States switching remains quite difficult, as also acknowledged by the Energy Union strategy.[15] BEUC members have repeatedly organised collective electricity and gas switching campaigns in several Member States in order to enable consumers to get a better deal.[16]

Nevertheless, the ACER/CEER European market monitoring shows that consumers still refrain from taking a more active role: In most Member States, less than 10% of consumers changed their electricity supplier during 2013.[17] Switching often is perceived as complex, risky and time-consuming. Consumers hesitate to use their rights on liberalised electricity markets.[18] Still, a low level of competition in some markets hampers switching.

2.1.3 'Green electricity' as a means to engage consumers in liberalised markets

Consumers are increasingly interested in environmental aspects of energy issues and want to engage individually in favour of energy transition towards renewable energy supply. In this context, the use of (local) renewable energy sources (RES) gains in importance to contribute to climate protection.[19]

Against the backdrop of consumers' willingness to support renewables, this motivation could function as one of the key drivers for involving consumers in electricity markets. Opting for renewable electricity supply provides a constructive and sympathetic approach to get consumers actively involved in market action once the motivation for renewables translates into the motivation to switch to a 'green' tariff. However, in most Member States, 'green electricity' offers still remain a niche market which has not yet demonstrated its potential to trigger a more active role of consumers on liberalised electricity markets.

2.2 Which attitude consumers have towards 'green' offers

2.2.1 'Green' offers relevant, but not crucial for switching

When switching their electricity supplier, Europeans mainly search for an offer with a lower price. Nevertheless, a smaller, but relevant part of consumers indicate that the supplier's fuel mix also plays a role. When asked about their individual actions in favour of climate protection in a 2014 Eurobarometer survey, 7% of European citizens said that they switched to an electricity supplier which offers a greater share of renewable energy sources than their previous one.[20] In a survey commissioned by BEUC' German member organisation Verbraucherzentrale Bundesverband (VZBV) in December 2011, 45% of consumers mentioned that they find it very important or important to consume renewable electricity under their tariff.[21]

[15] Ibid, p. 11.
[16] BEUC: Collective energy switch. Factsheet, June 2014; http://www.beuc.eu/publications/beuc-x-2014-042_jkl_collective_energy_switch_factsheet.pdf
[17] ACER/CEER: Annual Report, p. 72.
[18] BEUC: Making the Internal Energy Market Work. A BEUC reality check on the European Commission Communication, March 2013.
[19] European Commission: Flash Eurobarometer 367. Attitudes of Europeans towards building the single market for green products, July 2013; Special Eurobarometer 409. Climate Change, March 2014; Special Eurobarometer 416. Attitudes of European Citizens towards the environment, September 2014.
[20] European Commission: Special Eurobarometer 409. Climate Change, March 2014; Special Eurobarometer 416.
[21] Forsa: Erwartungen der Verbraucher an Ökostrom und Konsequenzen für Ökostrom-Labelkriterien, December 2011, p. 7.

2.2.2 Some consumers are willing to pay more for 'green electricity' offers

A relevant part of European consumers is willing to accept adequate increase of their expenses for a renewable electricity tariff under the condition that they know that their money is spent to some extent for investments in new renewable electricity generation capacities.[22] A UK survey revealed that 27% of respondents said that they were willing to pay an average of £6 (ca. 8.50 euro) more per month to fund renewable energy.[23] Other surveys previously conducted in France and Germany confirm that consumers accept to pay up to around 10% more for a 100% renewable electricity offer, compared to their incumbent tariff.[24] A survey of BEUC's Dutch member organisation Consumentenbond showed that almost a third of 4,800 surveyed consumers is willing to pay extra for electricity if it is produced in a sustainable way; up to 12 euro per month according to a report of the Dutch regulator ACM.[25]

2.2.3 Consumers opt for 'green' tariffs to support additional renewable generation

In advanced liberalised electricity markets, consumers are well aware of possibly misleading tariff offers that only pretend to be clean but do not deliver additional environmental benefits. When German consumers were asked in VZBV survey why they hesitated to switch to a 'green' tariff, the uncertainty about the credibility of the offer was cited as the most important barrier by more than 40% of the consumers surveyed.[26] When opting for 'green electricity', consumers expect their supplier to shift towards renewable generation, thus to create additional benefits that would not have occurred without the consumers' choice. A study commissioned by the UK regulator Office of Gas and Electricity Markets (Ofgem) confirmed that the concept of additionality is key in consumers' perception of 'green electricity' and that they tend to presume that it forms the core of 'green' tariffs.[27] In the ACM survey done in 2013, 41% of Dutch consumers expect additionality of production capacity when purchasing a 'green electricity' tariff.[28] In the VZBV survey, 69% of consumers say that by choosing a 'green' tariff they want to contribute to the installation of additional renewable power plants in Germany to support a more rapid increase of the share of renewables.[29]

In practice, additionality of an offer could be verified and reached by…

- Surcharging 'green' tariffs with a certain amount per kilowatt-hour which is channelled to third-party supervised funds. Capital would then be directed into new, additional generation capacities, independent of the suppliers' investment strategy; or

[22] Ofgem: Green tariffs: additionality and messaging. Research summary, June 2014.
[23] Ernst & Young: Energy bills top consumers' worry list of household expenses, EY survey finds. Press release, 13 April 2015.
[24] Agence de l'environnement et de la maîtrise de l'énergie (ADEME): Les Français et les Energies Renouvelables. Baromètre 2010, February 2011; DIW: Ökostrom – starker Rückhalt in der Bevölkerung. DIW-Wochenbericht 7/2012, February 2012; Forsa/Verbraucherzentrale Bundesverband (VZBV): Erwartungen der Verbraucher an Ökostrom und Konsequenzen für Ökostrom-Labelkriterien, December 2011.
[25] Consumentenbond: Klantentevredenheidsenquete onder CBi-panel, December 2013 (covering 12 Dutch energy suppliers); Autoriteit Consument & Markt (ACM): Trendrapportage Marktwerking en Consumentenvertrouwen in de energiemarkt. Eerste halfjaar 2013, November 2013, p. 9.
[26] Forsa: Erwartungen der Verbraucher an Ökostrom und Konsequenzen für Ökostrom-Labelkriterien, December 2011, p. 9.
[27] Office of Gas and Electricity Markets (Ofgem): Green tariffs: additionality and messaging. Research summary, June 2014.
[28] Autoriteit Consument & Markt (ACM): Trendrapportage Marktwerking en Consumentenvertrouwen in de energiemarkt. Eerste halfjaar 2013, November 2013, p. 10.
[29] Forsa: Erwartungen der Verbraucher an Ökostrom und Konsequenzen für Ökostrom-Labelkriterien, December 2011, p. 15.

- Investing 'green' tariffs' revenues in new efficient generation capacities which would not have been launched under the conditions of existing (eventually insufficient) public support schemes.

Departing from a basic understanding of energy market dynamics, an informed consumer naturally would expect that his/her choice for 'green electricity' increases demand for renewable electricity. Therefore, renewable generation capacities logically would have to be added. Consequently, fossil fuel fired power plants would have to be phased out progressively.

However, the detachment of renewable GO trading from simultaneous renewable electricity delivery undermines this narrative. Since the mere disclosure of the fuel mix on the basis of renewable GOs entails no relevant impact on investment decisions, there is a risk that consumers' expectations in terms of additionality are not met by a relevant share of 'green electricity' offers available in Member States. We assume that most consumers searching and/or opting for 'green' tariffs are not aware of the technical GOs trading within the complex statistics of fuel mix disclosure. Bluntly said, one can presuppose that consumers primarily think to pay for renewable kilowatt-hours – and not for renewable GOs to appear in the fuel mix disclosure.

2.3 How consumers are informed about the energy sources used for their electricity

2.3.1 Minimum requirements for fuel mix disclosure

European consumers have a right to know which energy sources were used to generate the electricity which they are paying for. At least once a year, consumers receive a statement with their electricity bill which indicates the fuel mix with the share of renewable energy, nuclear energy and fossil fuels in percent, used for the specific tariff they have purchased.

The minimum standards for this legal disclosure of the fuel mix are fixed in the Internal Electricity Market Directive 2009/72/EC:

> *"Member States shall ensure that electricity suppliers specify in or with the bills and in promotional materials made available to final customers:*
>
> *(a) the contribution of each energy source to the overall fuel mix of the supplier over the preceding year in a comprehensible and, at a national level, clearly comparable manner;*
>
> *(b) at least the reference to existing reference sources, such as web pages, where information on the environmental impact, in terms of at least CO_2 emissions and the radioactive waste resulting from the electricity produced by the overall fuel mix of the supplier over the preceding year is publicly available;*
>
> *As regards points (a) and (b) of the first subparagraph with respect to electricity obtained via an electricity exchange or imported from an undertaking situated outside the Community, aggregate figures provided by the exchange or the undertaking in question over the preceding year may be used.*
>
> *The regulatory authority or another competent national authority shall take the necessary steps to ensure that the information provided by suppliers to their customers pursuant to this Article is reliable and is provided, at a national level, in a clearly comparable manner."*[30]

These minimum requirements ask Member States to establish rules to make sure that…

[30] Directive 2009/72/EC concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC, 13 July 2009, Art. 3, 9.

- … consumers are able to know the fuel mix of an electricity supplier not only once a year with their bill but already before opting for it. Consumers should be able to compare the fuel mix at national level.
- … suppliers inform consumers about the environmental impacts associated to the fuel mix used for electricity production, at least by publishing a link to a website.
- … in case the origin of electricity is unknown, a residual mix may be used, i.e. an average national fuel mix that excludes the information which is shown to consumers for the known shares of the origin of electricity.
- … the national regulators care for reliable and comparable information.

The use of GOs as tracking tool for legal disclosure of renewable energy sources within the fuel mix is in parallel specified in the Renewable Energy Directive 2009/28/EC. Going beyond the provisions of the Renewable Energy Directive, Member States may use GOs not only for disclosure of the renewable share, but also for the remaining non-renewable energy sources in the fuel mix. In this case, the technical term is 'full disclosure'. It is a purely voluntary approach that expands and generalises the use of GOs. Countries that have made GOs the only tracking tool[31] avoid using national average figures (the so-called residual mix) that apply to all suppliers.

In practice, Member States can respect the minimum requirements in a more or less consumer-friendly way, e.g. prescribing a graphical format and a detailed list of the different fossil and renewable energy sources as well as CO_2 emissions and radioactive waste in an informative, meaningful template layout on the bill. Depending on the scope, three different fuel mixes can be disclosed and compared:

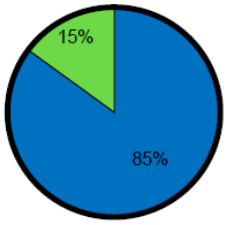
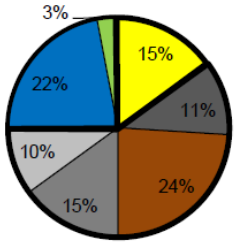
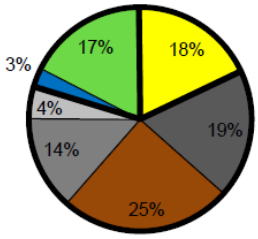
- the supplier mix, representing the overall fuel mix of all electricity sold by one single supplier,
- the product mix, representing the particular fuel mix of one tariff product, e.g. a 'green' tariff,
- the production mix or generation mix, focalising not on the electricity delivered to a final customer by a supplier through a particular tariff product, but representing the electricity production of a supplier or of a Member State.

The following infographic shows an exhaustive presentation of the fuel mix, going beyond the minimum requirements by differentiating the different mixes and the different energy sources.

[31] By the end of 2015, "full disclosure" has been established in Austria, Switzerland and (voluntarily) in Sweden.

Fig. 7: How to display the fuel mix to in communication with consumers

The RE-DISS II project provided an example for a meaningful and comparable implementation of mandatory fuel mix disclosure. It includes all key parameters and could serve as a template layout.[32]

	Your Product "Green"	Average of your "Sample Supplier"	For comparison: [National] production mix
Nuclear Hard Coal Lignite Natural gas Other fossil Hydro power Other renewable			
Nuclear	0,0%	15,0%	17,9%
Hard Coal	0,0%	11,0%	18,6%
Lignite	0,0%	24,0%	24,9%
Natural gas	0,0%	15,0%	13,7%
Other fossil	0,0%	10,0%	4,5%
of which oil	0,0%	0,0%	1,1%
of which unspecified & other	0,0%	0,0%	3,3%
Hydro power	85,0%	22,0%	3,0%
Other renewable	15,0%	3,0%	17,4%
of which wind	5,0%	1,0%	8,1%
of which biomass	10,0%	2,0%	5,0%
of which photovoltaic	0,0%	0,0%	3,2%
of which geothermal	0,0%	0,0%	0,5%
of which unspecified & other	0,0%	0,0%	0,6%
High-efficient cogeneration of electricity and heat	5,0%	7,0%	8,5%
CO_2 emissions	0 g/kWh	494 g/kWh	529 g/kWh
Radioactive waste	0 µg/kW	450 µg/kW	537 µg/kW
The mark (◆) indicates the level of emissions of CO_2 and radioactive waste related to the fuel mix of your product and of the average fuel mix of your supplier compared to national average.			
Additional information with respect to your product **"Green"**	100% of this electricity production has been documented based on Guarantees of Origin.		
	85% of these Guarantees of Origin represent electricity production in [Country A]. 15% of these Guarantees of Origin represent electricity production in [Country B].		
	0% of this electricity production has received public support.		

We will thoroughly analyse how consumers' rights are implemented in different Member States in **chapter 4**. In their national implementation, some Member States prescribe additional information to be disclosed by suppliers when marketing their tariffs or on their customers' bill.

Since a binding definition of 'green' tariffs is missing, the provisions for the fuel mix disclosure are key. This information serves virtually as the only basis on which suppliers present a 'green' tariff. As a consequence, the regulation for the fuel mix disclosure is even more important for suppliers' pre-contractual communication with their potential clients. Independent of the regulation of the fuel mix disclosure, the more general Unfair Commercial Practices Directive 2005/29/EC applies to marketing of these tariffs and to the environmental claims associated with them.

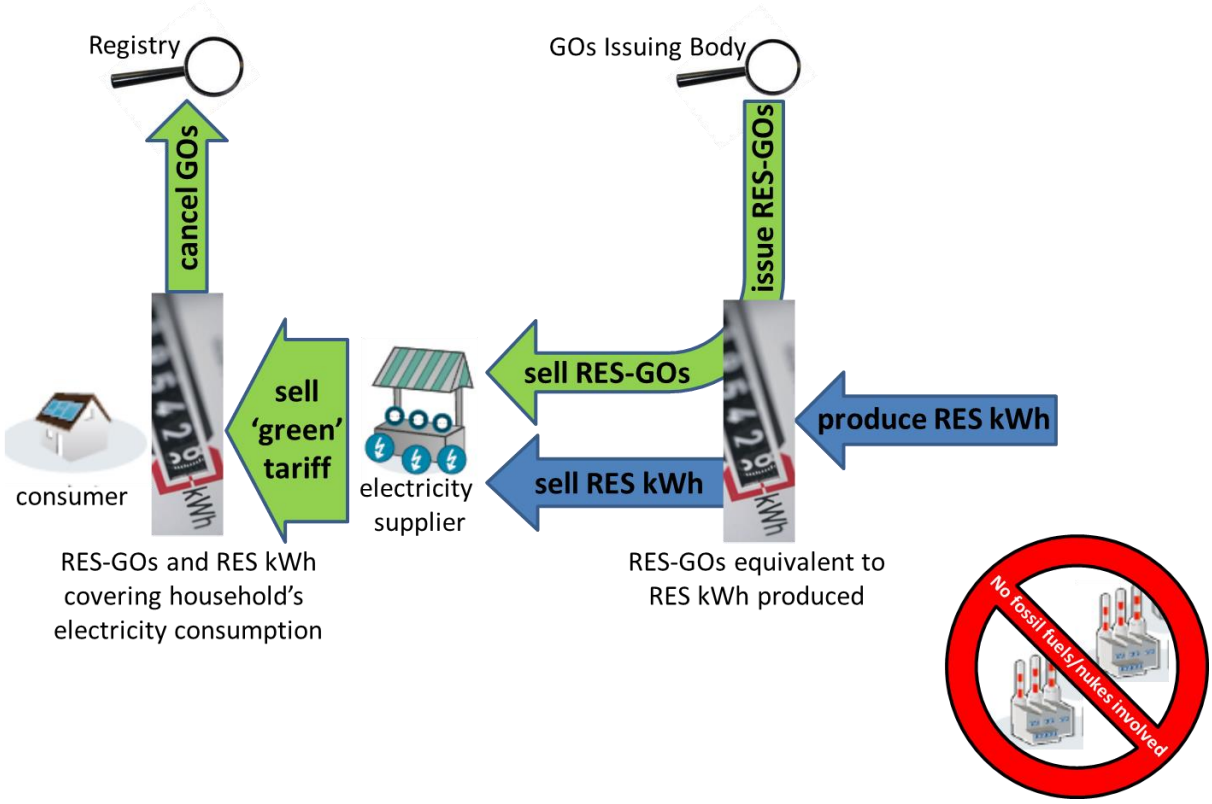
[32] RE-DISS II project: RE-DISS Guidelines for the Regulation of the Front-Side Disclosure of Electricity. Version 1.0, http://www.reliable-disclosure.org/upload/175-RE-DISSII_Disclosure-Guidelines_Regulation_Competent-Bodies_v1.pdf, 22 July 2015; RE-DISS II project: RE-DISS Disclosure Guidelines for Electricity Suppliers, http://www.reliable-disclosure.org/upload/174-RE-DISS_II_Disclosure-Guidelines_Suppliers_v1.pdf, 22 July 2015.

2.3.2 Functioning of Guarantees of Origin as a tracking tool

'Green electricity' coming out of the sockets does not possess any colour. GOs constitute the key instrument for displaying attributes related to the electricity. They indicate the source of one megawatt-hour of electricity, produced in a certain generation unit in Europe. Every producer of renewable electricity in the EU is entitled to receive a GO from an Issuing Body, equivalent to the quantity of renewable electricity produced by his power plant. The producer can then sell the GO together with produced electricity to an electricity trader or directly to a supplier.

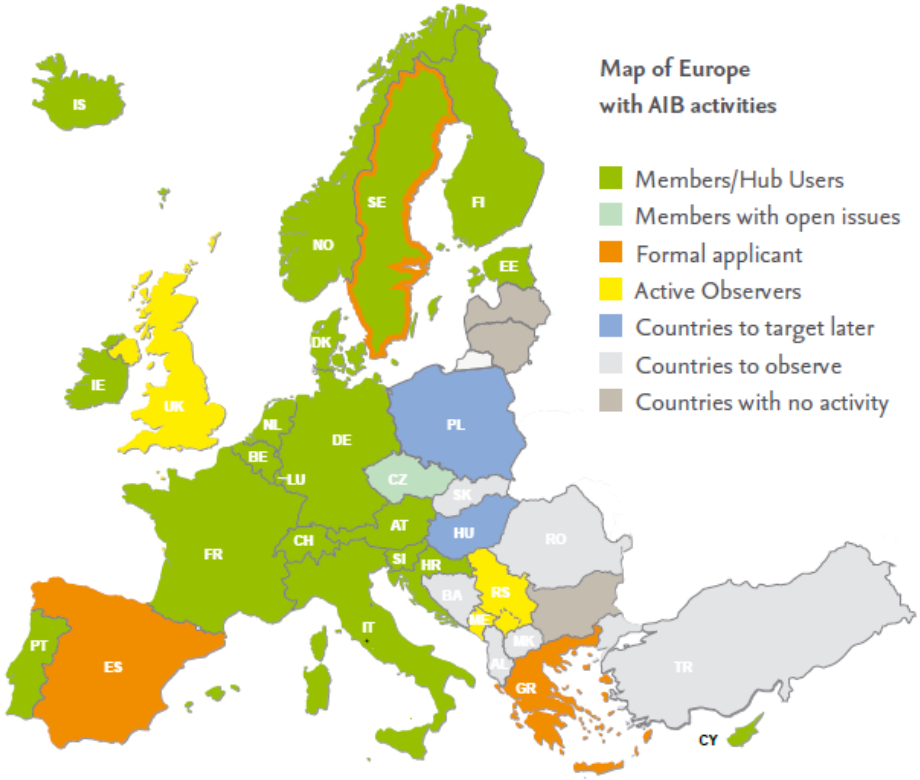
All these commercial transactions have to be tracked by a national registry. The supplier who possesses renewable GOs finally sends an invoice to his customers, jointly with the binding fuel mix disclosure. Once the GO is used for the purpose of legal disclosure to a final consumer, it is cancelled in the registry. All along this chain, the GO transfer ensures that the correct share of renewable energy sources can be disclosed within the fuel mix on the customers' bills, even if the commercial transactions cross European borders.

Fig. 8: Functioning of GO tracking tool: Renewable GOs matching renewable electricity cash flows



The use of GOs as a carrier of information is harmonised in the European Electricity Certificate System (EECS). It functions as a common tracking scheme for all national Issuing Bodies and registries. While commercial trade in GOs normally is executed between plant operators, brokers and suppliers, cancellation and statistical transfers are executed under the EECS, technically by using a common IT hub. The EECS is governed by the Association of Issuing Bodies (AIB), a non-governmental non-profit association of 23 national institutions that issue GO certificates and/or run national registries.

Fig. 9: State of AIB activities and harmonised use of GOs in Europe[33]



The majority of EU Member States are represented through at least one AIB member. AIB members are national regulators, national transmission grid operators, electricity market operators, energy agencies or private companies that manage the GO tracking on the national level. However, tracking of GOs is not yet fully harmonised within the Member States and with neighbouring countries.

In 2014, GOs were issued for backing at least 300 TWh of electricity in Europe (EU and EEA). AIB expects the total amount to rise up to a maximum of 360 TWh since GOs still were issued for 2014 when the following statistics[34] were published. Renewable GOs for Scandinavian hydropower largely dominate with 130 TWh issued in Norway.

[33] Association of Issuing Bodies (AIB): Newsletter 23, June 2015, p. 4.
[34] AIB: Annual Report 2014. Guaranteeing, June 2015.

Fig. 10: GOs issued per country and per year of production 2006-2014 (TWh)[35]

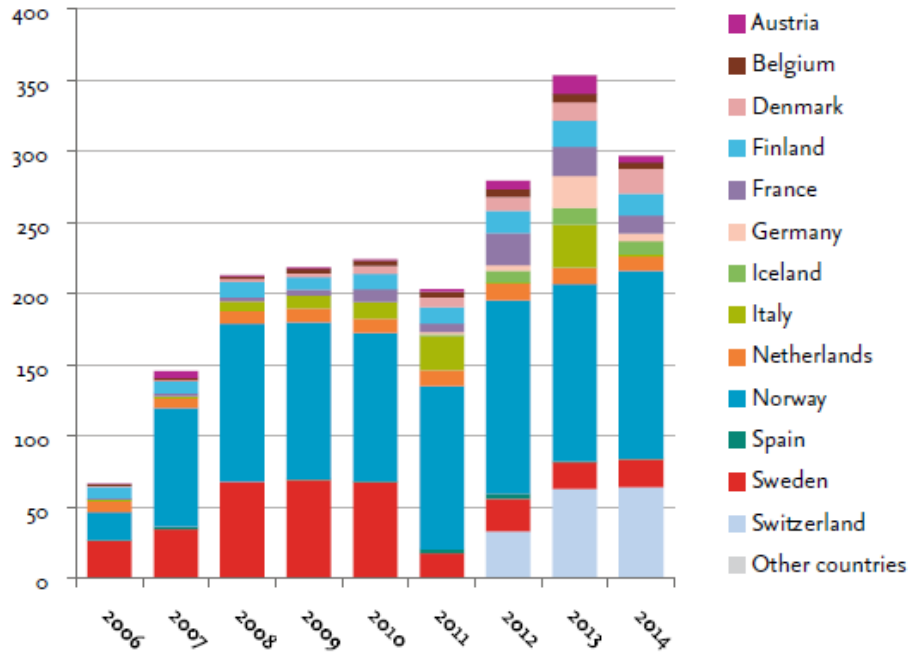
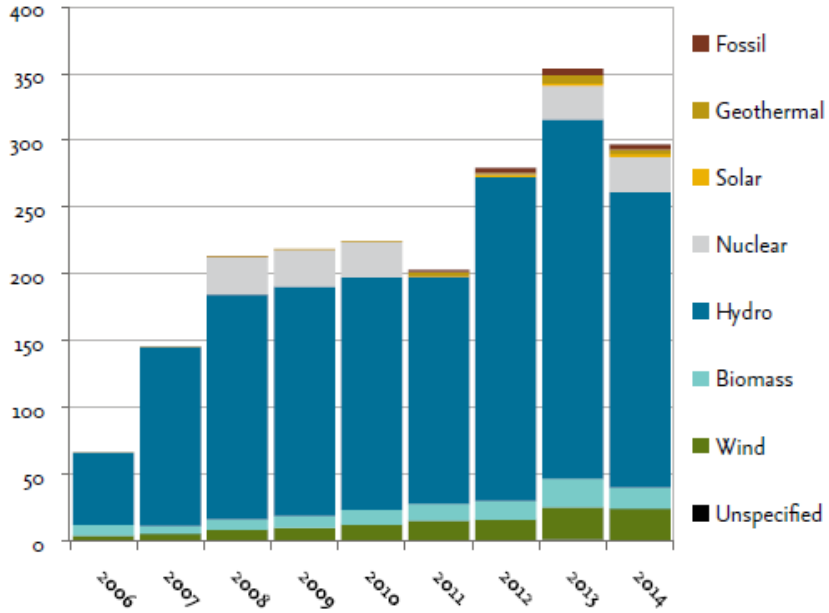


Fig. 11: GOs issued per technology 2006-2014 (TWh)[36]

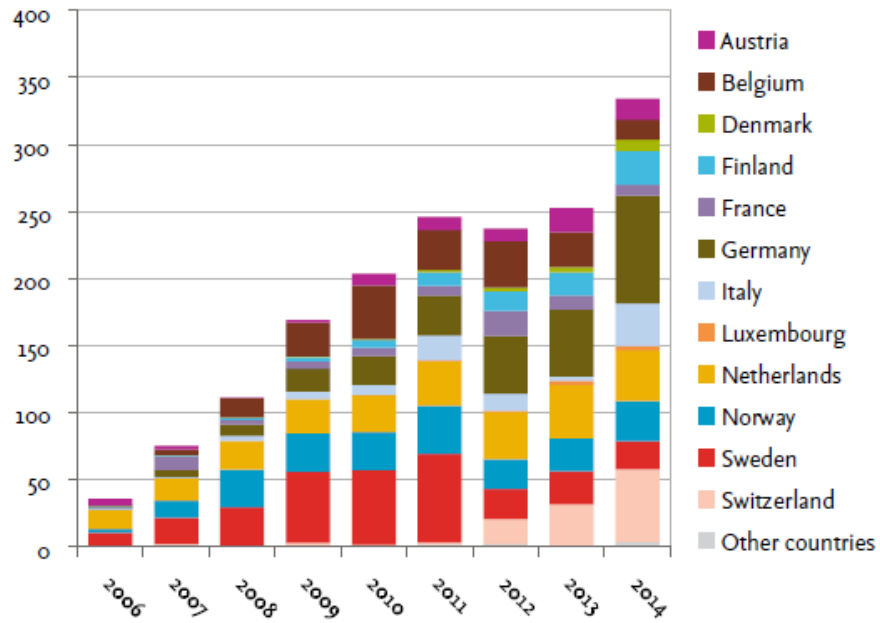


Cancellation of GOs in 2014 is slightly higher than the amount issued because suppliers can use GOs for disclosure purposes at a later point of time. Renewable GOs cover approximately 30% of all renewable electricity produced in the EU and in the EEA. This means that GOs are not yet mainstreamed as the unique tracking tool for renewable electricity. For more than two thirds of European renewable electricity production, no GOs are issued. Germany, the Netherlands and Switzerland account for the biggest shares of GOs use in 2014. During this year, GOs backing around

[35] AIB: Annual Report 2014. Guaranteeing, June 2015, p. 8.
[36] AIB: Annual Report 2014. Guaranteeing, June 2015, p. 8.

250 TWh of electricity were imported, mainly by Germany and the Netherlands. Norway, followed by the other Scandinavian countries is by far the leading exporter of GOs.

Fig. 12: Cancelled GOs per year of transaction 2006-2014 (TWh)[37]



2.4 Shortfalls of 'green electricity' markets

2.4.1 Do consumers know what they pay for?

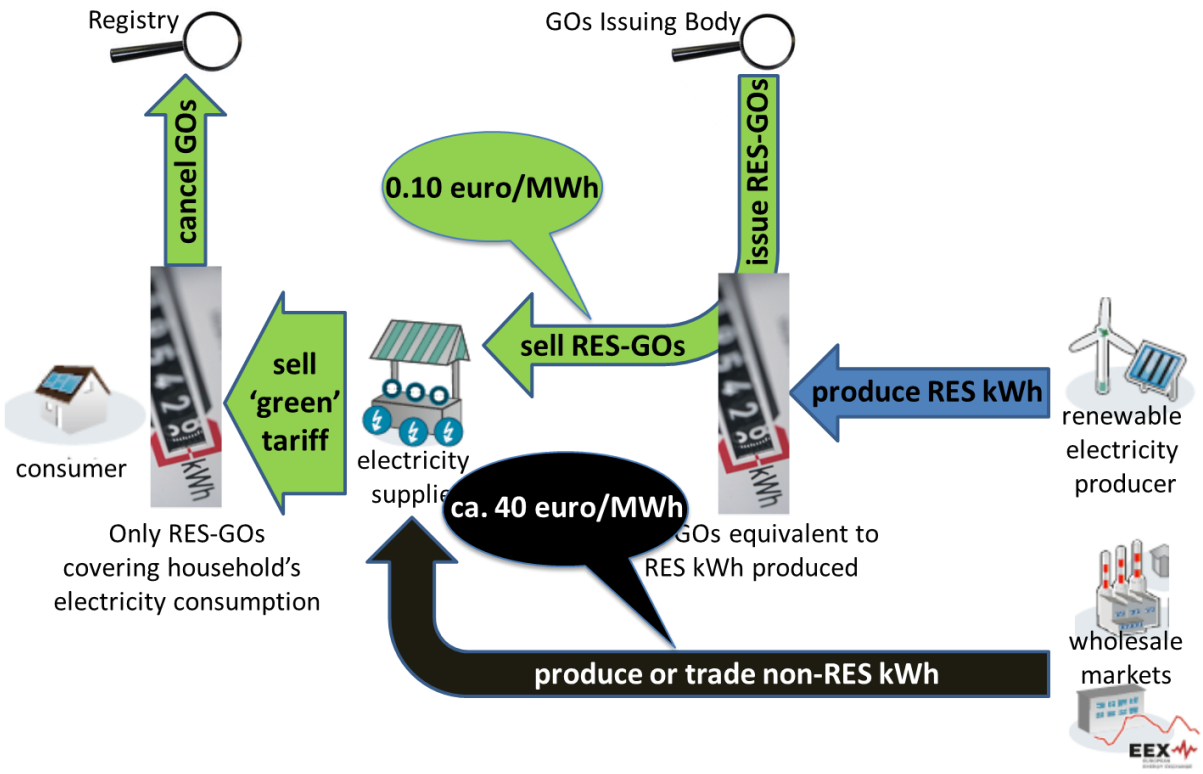
As described in the previous chapter and in the introduction (see **chapter 1.2 What is a 'green electricity' offer**), the statistical flow of GOs for fuel mix disclosure does not necessarily match the cash flow related to renewable kilowatt-hours produced by a renewable power plant. The fuel mix disclosure does not reveal if renewable GOs were used to cover non-renewable electricity sold to satisfy consumers demand in kilowatt-hours.

Starting from the point of view of consumers expectations (see **chapter 2.2.3 Consumers opt for 'green' tariffs to support additional renewable generation**), this practice can cause misunderstandings. Far from being illegal or inaccurate, it however tends to be at least misleading if a consumer thinks that she/he is refinancing renewable power plants, ideally supporting investments in new generation capacities.

But renewable GOs can indeed be used uniquely for the purpose of legal disclosure on the customer's bill while the customer continues to pay for electricity from fossil fuel fired power plants. The supplier will only transfer the negligible costs of renewable GOs (ca. 0.10 Euro/MWh) to the consumer which constitutes the consumer's single indirect monetary contribution linked to renewable electricity generation.

[37] AIB: Annual Report 2014. Guaranteeing, June 2015, p. 9.

Fig: 13: Consumers do not necessarily pay for renewable electricity production under a 'green' tariff



When analysing 'green' tariffs' fuel mixes, it has to be kept in mind that GOs do neither mean that the consumer pays for a certain share of renewable electricity nor that the chosen supplier has produced the share of renewable electricity which is disclosed in advertisement and on the bills. The customer's 'green' choice does not necessarily lead to the production of new renewable electricity dedicated to her/his specific demand.

Often the customer is just the statistical receiver of GOs that were issued for renewable megawatt-hours produced somewhere in Europe. Those megawatt-hours would have been produced anyway without the customer's purchase of a 'green' tariff: the renewable power plants whose GOs are used were built thanks to national support schemes or just because they were competitive and/or amortised already decades ago, e.g. big hydropower plants. As a consequence, this practice does not necessarily lead to any environmental benefit in terms of greenhouse gas emissions reduction. Information on the fuel mix as well as the environmental claims might have little informative value, compared to consumers' expectations that additional renewable generation capacities would be triggered thanks to their choice.[38]

2.4.2 A statistical tracking tool is not a refinancing scheme

In the debate about 'green electricity' markets, the role of GOs often appears to be unclear. Issuing and buying GOs cannot be regarded as a support scheme for renewable energy plants. The revenue generated by selling GOs normally remains very limited because of the oversupply of renewable GOs in the single European GO market. Although in some countries consumers' demand in renewable electricity under 'green' tariffs exceeds national renewable electricity production, the decoupling of trade in GOs from the electricity produced, the European GO market is long. Huge amounts of GOs,

[38] CEER: Advice on customer information on sources of electricity. March 2015, p. 24/25.

mainly issued for renewable electricity produced in Norwegian hydropower stations, lowers the GO price.

As a consequence, buying hydropower GOs at 0.07 euro – 0.16 euro/MWh[39] causes additional costs of less than 0.50 euro per year for an average household's electricity consumption. While it is very cheap for suppliers to compile a 'green' tariff backed by 100% renewable GOs, renewable project developers will not be able to refinance new generation capacities with such negligible revenues from the sale of their GOs. For wind turbines with levelised costs of electricity generation currently at 44 – 107 euro/MWh[40], GO revenues will not provide a relevant contribution to refinancing new projects. Investment security is provided to new renewable energy plants through reliable refinancing models that are related to the wholesale markets and/or dedicated national support schemes.

Even under the assumption of a rising demand in renewable GOs leading to higher GO prices, the impact on investment decisions related to new renewable generation capacities would probably remain limited. In this case, GOs' effect could be chocked off either because suppliers avoid offering too expensive 'green' tariffs, or because consumers are not willing to pay.

2.4.3 Uncompleted implementation of GO tracking systems in the Member States

It has to be noted that not all Member States have yet implemented GOs as tracking tool. Furthermore, those Member States that apply GOs for the purpose of legal disclosure, have followed different approaches during the implementation process. No uniform fuel mix disclosure scheme or harmonised information template for consumers exists in the EU although the European Commission's Energy Union strategy postulates that European consumers should be able to opt for electricity tariffs from any other Member State, regardless of their domiciliation.

Moreover, since Issuing Bodies and National Registries for GOs have not been established in every Member State, a risk of double-counting persists.[41] The European E-Track project and the RE-DISS projects have developed detailed recommendations on how to harmonise fuel mix disclosure in order to avoid incoherence and improve reliability.[42] The recent CEER Advice on customer information on sources of electricity[43] also provides a very valuable overview of the challenges of a reliable and coherent fuel mix disclosure system. It provides recommendations to Member States on how to implement the minimum criteria in a more consumer-friendly manner.

[39] This is the range of GO Nordic Hydro prices at European Energy Exchange (EEX) between 2013 and 2015, http://www.eex.com/en/market-data/power/derivatives-market/guarantees-of-origin#!/2015/04/30, 21 April 2015.
[40] Fraunhofer ISE: Levelized cost of electricity renewable energy technologies, November 2013, p. 21.
[41] For a list of Issuing Bodies using the common hub of the Association of Issuing Bodies (AIB), see http://www.aib-net.org/portal/page/portal/AIB_HOME/FACTS/AIB%20Members/AIB%20Members.
[42] Reliable Disclosure Systems for Europe, http://www.reliable-disclosure.org.
[43] CEER: Advice on customer information on sources of electricity. March 2015.

2.5 Summary: Challenges for 'green electricity' markets from consumers' perspective

At the moment, "green electricity's" potential for the consumer empowerment and market functioning still meets a lot of barriers. Consumers already experience complicated information related to switching electricity offers. Confusing 'green' offers may add on this complexity:

1. *Lack of definition*
   In most Member States, it remains unclear what exactly is a 'green electricity' offer. No unequivocal definition, excluding fossil fuels or nuclear power, exists at the EU level. While some 'green' tariffs combine a limited share of renewables and other 'low carbon' sources like efficient fossil fuel fired cogeneration, others pretend to solely contain renewable energy sources. Suppliers frequently use terms like 'sustainable' or 'clean' energy, often accompanied by attributes such as 'environmentally friendly', 'carbon neutral' or 'ecological'. Behind these dazzling names, suppliers may still market non-renewable energy sources.

2. *Lack of knowledge*
   Consumers are neither engineers nor electricity traders. Yet the Consumer Markets Scoreboard deplores the very low level of comparability of electricity offers.[44] Not surprisingly, it turns out to be rather difficult for many consumers to identify environmental advantages or disadvantages of electricity tariffs. A recent EU-wide survey confirmed that consumers estimate their knowledge about how their electricity is produced as quite low.[45] When opting for a 'green' tariff, consumers without broader technical knowledge naturally expect the supplier to deliver renewable electricity directly to their homes. Easily understandable explanation that renewable electricity is delivered to them only arithmetically speaking is missing. Member States' regulation increases confusion by maintaining insufficient and divergent consumer information on the sources of electricity, which often is provided only on suppliers' websites.[46]

3. *Lack of environmental benefits*
   As GOs may be traded independent of the electricity produced and sold, the supplier might continue to run fossil and nuclear generation capacities and/or trading with 'grey' electricity. GOs represent a good and necessary tracking tool, but nothing more. Their impact on new investments in renewable electricity generation capacities still is very limited and probably overestimated. Nevertheless, consumers easily can confound them with a proof that new renewable kilowatt-hours are delivered or that GOs even express an environmental quality assessment. According to the experience of consumer organisations, many 'green electricity' offers do not necessarily foster any environmental benefits, e.g. an increase in renewable generation capacities, a reduction in greenhouse gas emissions or an improvement in biodiversity. Private quality labels may guide consumers to certified tariffs. But they use divergent minimum criteria and assume transparent offers with comparable information as a precondition.

[44] European Commission: Consumer Markets Scoreboard. 10th edition, June 2014, p. 32.
[45] Ipsos/London Economics/Deloitte: Functioning of retail electricity markets for consumers in the EU. Presentation, Citizens' Energy Forum, London, 13 March 2015.
[46] CEER: Status Review on customer access to information on energy costs, sources and energy efficiency schemes, December 2013, p. 15-24.

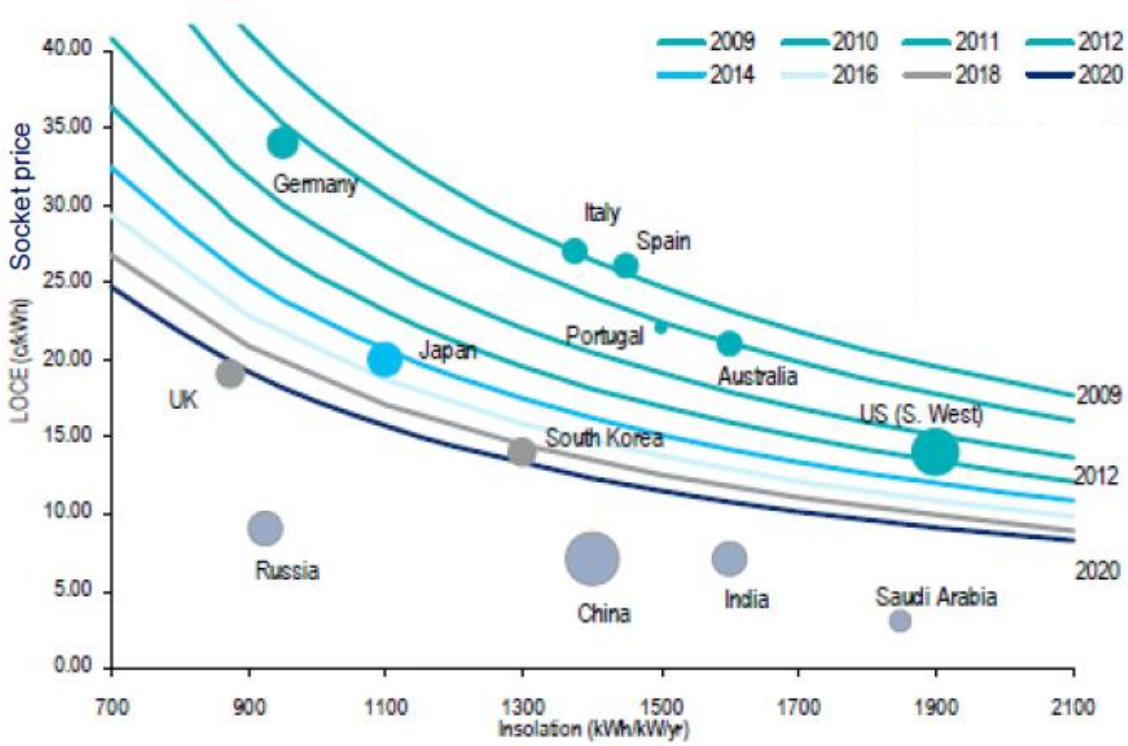
3. Consumers and renewable self-generation in the EU

Besides opting for 'green electricity' offers, self-generation of renewable electricity offers another way how consumers can contribute to energy transition (provided they have access to sufficient capital and space). This chapter will assess the functioning and the challenges of this developing market. As already explained in the introductory part, the report focusses on solar PV electricity in households. However, BEUC stresses that the potential of renewable self-generation for tenants and multi-storey dwellings should not be neglected.

3.1 State of self-generation markets in the EU

In every Member State, consumers have the possibility to invest in renewable self-generation technologies to produce electricity on the premises. When asked about their individual contribution to climate protection, 5% of Europeans replied that they already implemented renewable energy installations in their homes, according to a 2013 Eurobarometer survey.[47] Analysing solar PV as the most important self-generation technology, market development in the Member States differs widely, depending on the stage of market liberalisation, on the legal framework and on the variety of support schemes. Besides that, the so called grid parity (also called socket parity) is one of the most decisive benchmarks for consumers' involvement in the national solar PV market: it defines the point in time when self-generated solar PV electricity is cheaper than electricity bought from a supplier via the grid.

Fig. 14: Producing solar PV electricity is getting cheaper than households' retail prices[48]

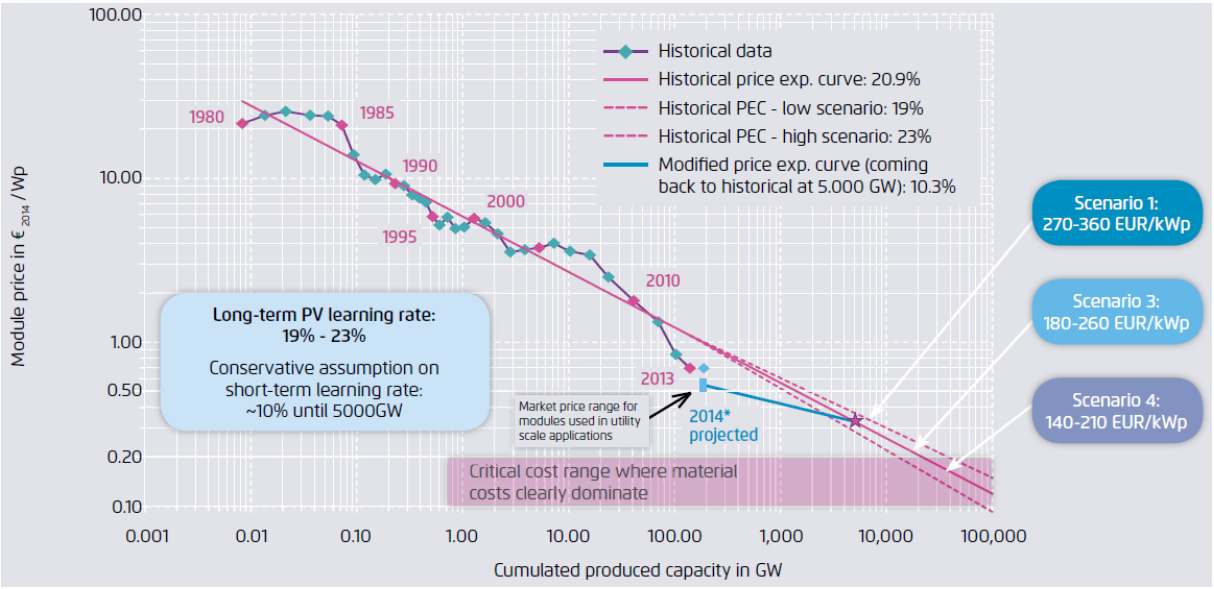


The infographic shows how the cost curves of solar electricity (blue graphs = levelised cost of electricity generation, LCOE, in different years) get closer to households' electricity prices ('socket price') in many European countries. If a bubble is above

[47] European Commission: Special Eurobarometer 409. Climate Change, March 2014.
[48] International Energy Agency – Renewable Energy Technology Deployment (IEA-RETD): Is a Prosumer Revolution Imminent? Presentation, Kyoto, 20 November 2014.

the curve for a particular year, the cost of solar is below average retail electricity prices per kilowatt-hour in that country at that time. The bigger the bubble, the more important is the size of the electricity market.

Fig. 15: Future module prices in different scenarios based on the historical "learning rate"[49]



The larger solar PV markets, the lower investment costs: PV modules became an affordable renewable self-generation technology for a growing number of European households. Module prices are expected to further decrease.

Solar PV electricity covered 3.5% of the EU's electricity demand in 2014.[50] During that year, PV modules with a total capacity of 6,883 MW (2013: 10,170 MW) were newly installed in the EU, totalling 86,674 MW.[51] In 2013, almost a quarter of the added capacity (2,415 MW) was installed in the residential sector, e.g. on one-family houses or multi-storey dwellings. Amongst these, the most important solar PV capacities were installed in the German, in the British and Italian residential sector.[52]

According to estimations of the industry association Solar Power Europe (SPE), more than half of the newly installed PV installations in 2013 were achieved due to measures allowing owners or residents to directly self-consume solar electricity at the premises. Though, the self-consumption alone was not identified as the main driver for investing in solar PV systems. Solar electricity mostly is fed into the grid and self-consumption remains a very limited practice across Europe.[53]

3.2 Renewable self-generation as consumers' contribution to EU targets

The use of distributed RES is a practical and widespread approach to improve security of supply with the help of the sustainable domestic energy sources Europe possesses. Renewable energy already reduced significantly EU's natural gas demand.[54] In 2010, the use of renewable energies in the EU

[49] Fraunhofer ISE/Agora Energiewende: Current and future cost of photovoltaics. Long-term scenarios for market development, system prices and LCOE of utility-scale PV systems. February 2015, p. 6.
[50] Solar Power Europe (SPE): Global market outlook for solar power 2015 – 2019, June 2015, p. 26.
[51] EurObserv'ER: Photovoltaic Barometer 2014, May 2015.
[52] European Photovoltaic Industry Association (EPIA): Global market outlook for photovoltaics 2014-2018, June 2014, p. 30.
[53] EPIA: Shares of self-consumption in Europe. PV contribution to the electricity demand in the EU 28 in 2013. Presentation, April 2015.
[54] ACER/CEER: Annual Report, p. 165.

avoided imported fuel costs of at least 30 billion euro a year.[55] Without this domestic source, energy supply would already cost consumers far more than it currently does.

Renewable self-generation improves Europe's resilience of supply on the long term because it is anchored at the very fundaments of the Energy Union, which is the European citizens. The Commission's Energy Union strategy can rely on its citizens' willingness to support energy transition and should more actively embrace it. Millions of European consumers already have invested in renewable energy supply for electricity generation, heating and cooling.[56] By doing so, self-generators also contribute to the fulfilment of the EU 2020/2030 targets for renewable energy, energy efficiency and greenhouse gas emissions reductions.

3.3 Engaging consumers with the energy markets through self-generation

Self-generation technologies initiate a more general shift of consumers' role from the point of view of the energy markets: the incumbent hierarchical model of a top-down oriented energy supply with a limited number of dominant suppliers is likely to evolve towards a decentralised system with more bottom-up energy supply by self-generators, respectively so-called 'prosumers'.

Self-generators proved that they contribute to key objectives of the Energy Union strategy:

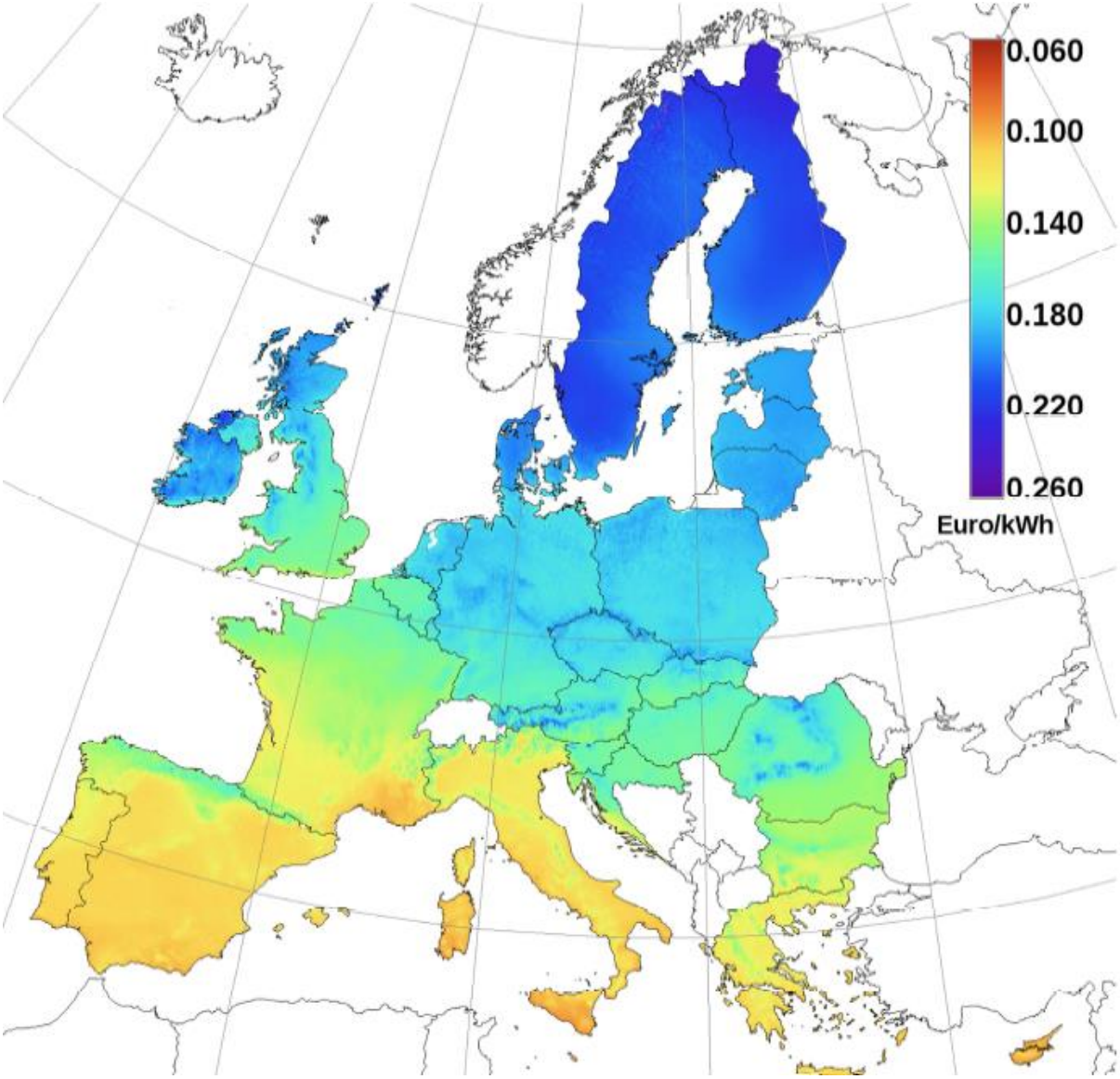
- They help to enhance competition.[57] For instance, they started to break up market concentration as well as oligopolistic electricity markets in some Member States through investing in renewable energy generation capacities.[58] Self-generators and citizens' renewable energy investments also significantly increase the number of market participants.
- They help to increase energy security, diversify generation capacities and the fuel mix.
- They decrease wholesale market prices. Especially high shares of solar PV excess electricity fed into the grid impact on the merit order by diminishing the previous price peaks at noon.[59]

Against the backdrop of still uncompleted internal energy markets, renewable self-generation is not a self-runner. Although solar PV installations at the premises have become cheaper and undercut retail electricity prices in most of the Member States, the impressive cost reduction of the technology alone will not guarantee the market penetration.

The debate about 'prosumer' potentials and about self-generator's role on energy markets mainly focuses on private owners of detached houses. Access to renewable self-generation, going hand in hand with energy efficiency measures in the building sector, is also relevant for cutting energy costs of consumers affected by energy poverty. However, in most Member States, tenants do not yet find a favourable framework allowing them to profit from in-house renewable energy use, e.g. from solar PV electricity produced on the rooftop of their multi-storey dwelling.

[55] European Commission: Energy Economic Developments in Europe, January 2014, p. 118.
[56] European Commission: Special Eurobarometer 409. Climate Change, March 2014; REN21: Renewables 2014. Global Status Report, June 2014.
[57] For instance, the Commission highlights the importance of the growth in renewable generation capacities for competition on the Italian and Spanish electricity markets. European Commission: EU Energy Markets in 2014, October 2014.
[58] In 2014, Germany counted around 1.5 million individual solar PV installations (source: BSW-Solar), mainly owned by private households and farmers, see: Poize, Noémi/Rüdinger, Andreas: Projets citoyens pour la production d'énergie renouvelable : une comparaison France-Allemagne, Working Papers n°01/14, IDDRI, January 2014.
[59] ACER/CEER: Annual Report, p. 110. Concurrently, fundamental changes of the German wholesale electricity markets were nudged by the massive expansion of distributed solar PV after 2009.

Fig. 16: Levelised costs of electricity generation of unsubsidized PV systems[60]



'Prosumer' households running their own solar PV panel often produce more solar electricity than they can consume at the same time, e.g. when insolation and electricity production is peaking at noon, family members tend to be at their working place or at school (see **chapter 1.3 What is renewable self-generation?**)

Consequently, self-generators need to sell their excess electricity production into the grid.[61] At this point, 'prosumer' households cannot be compared with incumbent electricity suppliers. They enter

[60] For 80% of EU households, self-generation of solar electricity would be cheaper than buying it from the grid.
[60] Joint Research Centre (JRC): Cost Maps for Unsubsidised Photovoltaic Electricity 2014, September 2014. Assumptions: 1,400 euro/kW system price plus national VAT rate, LCOE with 20 years payback, 5% p.a. interest, 2%/year maintenance. The actual spread between the retail price on the one hand and the levelised generation cost of solar PV electricity may differ because the JRC model applied EU average data and did not take into account any eventual public support granted (e.g. tax exemptions) that could increase or decrease retail prices respectively generation cost.
[61] Electricity storage devices for households could gradually increase the share of self-generated electricity in total electricity consumption of households. Although prices of storage devices decrease, these technologies will not redundantise households' grid connection. As explained in chapter 1.1.2, we do not regard households' total self-sufficiency as reasonable.

the market under completely different conditions. They are acting neither like utilities, nor like well-informed engineers. But solar PV installations still represent huge investment sums for most of European consumers. Their access to capital and their expectations in terms of returns on investment naturally are other than those of established market stakeholders. While opting for a 'green' tariff is partly linked with acceptance of higher individual payments (see **chapter 2.2.2 Some consumers are willing to pay more for 'green electricity' offers**), investing in self-generation is an investment to cut household energy costs within a foreseeable period of time.

In 2014, the CLEAR project conducted a survey amongst more than 5,000 consumers in five Member States[62] on the drivers and barriers that are perceived by consumers with regard to adopting renewable self-generation technologies. The main reason for intending to buy a renewable energy solution mentioned by consumers was lowering their energy cost (63% of consumers surveyed in five Member States), followed by environmental conscience (53%). Amongst those consumers who were thinking about or who were rejecting a renewable energy technology installation, 56% mentioned the high investment cost, followed by 15% who replied that they did not know much about the technologies. Only 23% of respondents were probably or definitely willing to pay more for renewable energy solutions, 36% clearly refused. Consumers' willingness to contribute to combat climate change and prevent the exhaustion of fossil fuels was identified as the most important driver for investment in renewable energy technologies, followed by financial aspects like expected energy savings and the increase of the property value. However, while consumers generally share the positive aspects of renewable energy technologies, the survey revealed a high level of scepticism regarding the financial benefits of an investment. Naturally, consumers essentially want to know if it pays off. Still, important information needs have to be met.[63]

Consumers who invest in self-generation face an absurd market situation. Although they help abating external costs of the incumbent energy supply system, they are disadvantaged: their fossil competitors' electricity appears to be cheaper because the external costs are not shown on the bill for fossil energy sources. In order to overcome this market distortion, adequate support for renewable self-generation is required.

[62] Belgium, Italy, the Netherlands, Portugal, Spain.

[63] Gesellschaft für Konsumforschung (GfK): CLEAR – WP 2.1. Consumer survey 1 – Attitudes, opinion, drivers and barriers and satisfaction with regard to Renewable Energy Systems. Presentation, Madrid, 27 October 2014.

3.4 Summary: Challenges for consumer-friendly self-generation

From a consumer's perspective, the shortfalls of self-generation in the EU can be summed up as follows:

1. *Lack of political and administrative reliability*
   The ongoing decline in renewable energy investments in the EU in 2014 was not only caused by the economic crisis. The renewable energy sector was also affected by political incertitude as many Member States revised their policies, especially in the solar PV sector, while the non-binding EU 2030 targets until now fail to initiate new dynamics.[64] At the same time, administrative barriers, e.g. long and complex permission procedures, established in the past to regulate big utilities, discourage consumers. They disproportionately increase investment costs of private self-generation projects.[65]

2. *Lack of knowledge*
   Consumers' plans to invest in self-generation are hampered by a lack of reliable and structured information on technological options and potentials while the quality of offers and services often differs widely. A single one-stop shop mostly is missing. Research has identified some emerging trends that have the potential to become policy challenges if these are not tackled early on. Potential challenges include a lack of access to independent advice during the sales process, problems during the installation process as well as dissatisfaction with the performance and maintenance including aftercare by installers.[66]

3. *Lack of access to capital*
   Consumers face financial risks related to the difficulty of access to capital, high upfront investment costs and long amortisation. In private households, electricity generation and consumption timely often do not match, e.g. solar PV peaks at noon when a family is not at home. Substituting electricity imports from the grid by home-grown electricity alone usually does not allow to pay off an investment, regardless of the technology and local potentials.[67] Redemption is questioned by a lack of stable and sufficient remuneration schemes for excess electricity fed into the grid, or even by retroactive changes that fundamentally endanger the project's viability.

[64] Eurobserv'ER: The State of Renewable Energy in Europe. Edition 2014, March 2015, p. 4-7; International Energy Agency (IEA): Energy Policies of IEA Countries. European Union 2014 Review. Executive Summary, December 2014, p. 11.
[65] PV GRID project: Final project report, August 2014.
[66] See the report of BEUC's UK member Citizens Advice: Staying FIT. Learning from consumer experience of solar PV systems to inform the development of low-carbon policies, June 2015.
[67] International Energy Agency – Renewable Energy Technology Deployment (IEA-RETD): Residential Prosumers – Drivers and Policy Options (RE-PROSUMERS), September 2014.

4. Analysis of current practices in 'green electricity' markets and self-generation in Member States and in Norway

This chapter scrutinises Member States' and Norway's engagement for consumer-friendly practices regarding 'green electricity' markets and renewable self-generation.

Each of the thirteen country case studies applies a common research template. This template consists of a catalogue of research questions divided into three categories:

1. Conditions for consumers' 'green' choice, situating the Member State in the context of EU (renewable) electricity markets

2. Evaluation of 'green' tariffs' transparency

3. Evaluation of consumers' access to self-generation

At the end of each country chapter, a traffic lights scale classifies each Member State's progress in the three categories:

Good practice; issue showing good solutions related to transparency and/or market access from the point of view of consumers' rights	
Average performance; issue with some problems and some solutions related to transparency and/or market access from the point of view of consumers' rights	
Bad practice; issue with relevant problems related to transparency and/or market access from the point of view of consumers' rights	

The catalogue of research questions investigates on the challenges which were described and summarised in **chapter 2.5 Summary: Challenges for 'green electricity' markets from consumers' perspective** and in **chapter 3.6 Summary: Challenges for consumer-friendly self-generation**.

In the **annexe**, the catalogue of research questions is presented in detail to make clear how each country's practices were assessed. In general, the better the national practices answer these questions, the better the ranking for the subcategories. From a methodological point of view, the report is conducting a primarily qualitative research. Whenever possible, comparable European-wide quantitative data was used to scrutinise and compare common indicators in order to finally rank the country's specific performance. Findings from several EU-funded comparative research projects also were included.

However, in most of the subcategories, the traffic lights classification relies on rather subjective assessments because of the highly diverse market conditions amongst Member States. For example, provisions made in the framework of an advanced market may appear ambitious in the context of a young emerging market but still might fail to address specific problems of the advanced market. In this case, a standardised questionnaire providing feed-back from BEUC's national member organisations (as of April 2015) was used to rate the country's practice from the point of view of consumer protection. In a second step, the country chapters then have been finalised with BEUC's national experts.

Editorial deadline for the mapping report was 26 November 2015. Any change in national legislation or updates in statistics were not considered after this date.

Overview of Member States' practices

Conditions for consumers' 'green' choice	Austria	Belgium	Cyprus	Denmark	Germany	Greece	Italy	The Netherlands	Norway	Portugal	Slovenia	Spain	United Kingdom
Stage of market liberalisation	Fully liberalised market with still high concentration and low switching activity.	High concentration, but also high switching.	Formally liberalised, but still dominated by monopolist, no switching possible.	Liberalised, but low competition.	Fully liberalised, increasing competition, broad choice of offers.	Only formally liberalised market, dominated by monopolist, de facto no switching options.	High interconnectivity, but standard offer prevails on the retail market.	High concentration, but also high switching activity.	Forerunner of liberali-sation, moderately concentrated and well-performing.	Formally liberalised market dominated by the privatised former state monopolist.	Fully liberalised, small market with relevant competition.	Liberalisation is not fully accomplished, high switching activity.	Relatively high switching level and accomplished Third Energy Package but still high concentration.
Renewable energy policy	Well-functioning feed-in tariff scheme but annual stop-go.	Several retroactive changes, lack of coherence.	Net-metering, without remuneration of excess electricity, frequent changes in support schemes.	Traditional forerunner of energy transition in the EU with far-reaching targets for renewables.	Uncertainty regarding transition from feed-in tariffs to tenders.	Retroactive changes and very unstable regulatory framework.	Frequent changes, small solar PV exempt from retroactive cuts.	Dedicated net-metering with remuneration of excess electricity but prohibitive tenders.	Minimum quota with technology-neutral certificate scheme.	Dedicated regulation for self-consumption, prohibitive against export of excess electricity, incertitude because of previous moratorium.	FiT and premium tariff with dedicated but phased-out support for small self-generation, new tender system not operational.	Many retroactive changes, all support schemes phased-out.	Clear framework for solar PV self-generation under review, generally lagging behind targets.
'Green electricity' market size and choice	High number of offers, forerunner market.	Broad choice, advanced market.	No 'green' offers available on the market.	Stagnating market, stable number of tariffs and suppliers.	Broad choice, biggest EU market.	No 'green' offers available on the market.	Medium market size and choice.	Broad choice, Europe's highest share of consumers opting for 'green' tariffs.	Europe's dominant GO exporter, but domestic use of GO-backed tariffs is still in its infancy.	Very small niche market.	Small, but relevant offer.	Broad choice.	Relatively small number of 'green electricity' offers.
Relevance of renewable self-generation	High interest and good progress, grid parity.	Clear grid parity, solar PV self-generation is widely spread amongst households.	Very high potential because of low generation costs and the island's need to diversify.	Solar PV bears important potential for cost reduction in the context of high retail prices.	Biggest EU market for solar PV, clear case for grid parity in the context of high retail prices.	Consumers are interested but discouraged by the regulatory headwinds and instability.	EU's second biggest solar PV market with highly attractive cost advantages of self-consumption.	Still young, but booming market for small solar PV self-generation.	No clear case for grid parity, solar PV still before the stage of market introduction.	Still very young but promising solar PV market for consumers because of clear grid parity.	Solar PV grid parity just reached.	Clear grid parity, but lack of policy, instability and recession hinder potential to be tapped.	High interest and good progress despite lack of clear grid parity.

Transparency of 'green' tariffs													
Definition of 'green electricity' offers	Legally anchored: use of 100% renewable GOs matching with electricity purchased.	Only 100% renewable GOs tariffs can be marketed as 'green', but no qualitative criteria.	No definition existing.	Voluntary agreement for tariff products marketed with claims on environmental effects.	No definition existing.	No definition existing.	No definition existing.	Only 100% GO-backed tariffs to be marketed as renewable.	Only 100% GO-backed tariffs to be marketed as renewable, but comparison of tariffs missing.	No definition existing.	No clear definition, but reference to additionality of environmental effects.	No binding definition, but de facto only 100% renewable GOs tariffs are marketed as 'green'.	No clear definition but binding minimum requirements targeting environmental claims.
How 'green' tariffs are offered to consumers	Suppliers are allowed to market 'green' tariffs only according to the legal definition.	No binding provisions, but understandable and meaningful disclosure reports.	No provisions or obligations existing.	Suppliers have to comply with one of three categories for qualitative minimum criteria.	No clear provisions existing, risk of misleading advertising.	No provisions or obligations existing.	No clear provisions existing, no differentiation in the official price comparison tool.	No sufficient provisions existing, risk of misleading advertising.	Strict rules avoiding misleading environmental claims, but no unified communication.	No binding information, informative online fuel mix comparison tool.	Relatively transparent offers and unambiguous PCT.	No binding provisions, thin information from the regulator.	Suppliers are obliged to communicate on environmental benefits but renewable GOs do not necessarily match electricity.
How 'green' tariffs and the fuel mix are disclosed on the bill	Forerunner of full disclosure, meaningful and transparent, beyond minimum EU criteria.	No provisions that go beyond minimum criteria, environmental indicators on website only.	A fuel mix disclosure system is in preparation but not yet fully implemented.	No differentiation between suppliers' fuel mixes, informative value remains low.	Transparent and advanced fuel mix disclosure.	PPC changed from monthly to annual disclosure, environmental information missing.	Lack of minimum information, risk of double-counting and incoherence of supplier mixes.	Partially advanced, but fuel mix calculation is not necessarily meaningful and transparent.	Misleading disclosure of the production mix.	Contract-based disclosure of the fuel mix, GO tracking scheme not fully implemented.	Information slightly beyond the Directive's minimum requirements.	Meaningful and understandable template, but no product mix developed.	No provisions that go beyond minimum criteria, environmental indicators on website only.
How environmental benefits of 'green' tariffs are proven to consumers	No binding information on additionality, only voluntary supplier information on the bill.	No provisions or obligations existing, but informative annual supplier ranking by NGOs.	No provisions or obligations existing.	Clear rules for additionality, but purchase of GOs without age limit is allowed.	No provisions or obligations existing.	No provisions or obligations existing.	No provisions or obligations existing.	No provisions or obligations, but NGOs' and consumers organisation's elaborate annual ranking.	Strict rules avoiding misleading marketing.	No provisions or obligations, information can vary from supplier to supplier.	Mandatory information on additionality on supplier's website just introduced.	No provisions or obligations existing.	Binding report on additionality of the tariff but unclear criteria question comparability.
How 'green electricity' quality labels guide consumers	Voluntary quality label, run by ministry and consumer organisation, incentivises new generation capacities.	Informative annual supplier ranking by NGOs.	No 'green electricity' quality labels exist.	A to D class labelling guides consumers to trustworthy offers with additional benefits, discourages unlabelled.	Many labels offer guidance but competing schemes make consumer's orientation difficult.	No 'green electricity' quality labels exist.	Little activities and relevance of labels.	Consumer organisation ranks suppliers and products, competing private label certifies product mixes.	Strict rules for the role of quality labels, but no labels active on the market.	No 'green electricity' quality labels exist.	Little activities and relevance of labels.	Little activities and relevance of labels.	Mandatory reporting on additionality replaces voluntary quality label.

Consumers' access to self-generation													
How grid access and use are guaranteed to self-generating consumers	Inappropriate costs for grid connection and grid extension.	Priority access, but retroactive network fee for self-generators.	Simplified grid connection for small self-generators, but cost for grid extension may be charged.	No priority, but normally hassle-free access.	Hassle-free priority grid access.	Relatively hassle-free simplified grid connection for small self-generators, but extra connection fee.	Hassle-free priority grid access.	Normally swiftly but without priority granted, local rejections remain possible.	No priority access, grid operator may deny connection.	Dedicated, but relatively complex and lengthy registration process.	Priority grid access without restrictions.	Prohibitive network fee on self-consumption and long waiting periods for permits.	No relevant restrictions for small projects, although no priority grid access is granted.
How consumers' excess electricity production is treated	Effective feed-in tariff and grants, but restricted access and lack of appropriate remuneration scheme for small installations.	Adequate net metering, but prohibitive 'green certificates' scheme.	No remuneration within the net-metering scheme.	Hourly net metering is rather prohibitive but saves taxes and fees, market premium pay-off remains questionable.	Appropriate feed-in tariff, provided consumer substitutes expensive retail electricity.	Little and instable FiT remuneration, net metering scheme.	High potential for self-consumption units involving several modules and stakeholders, but mostly insufficient remuneration schemes.	Attractive net metering with remuneration of excess electricity fed-in.	No appropriate remuneration scheme, new grant for investment to be assessed in future.	New regulation focusses on self-consumption only with guaranteed but insufficient remuneration for excess fed into the grid.	FiT/premium tariff is insufficient because of too sharp cuts, replaced by a not operational tender system.	No support, consumers must negotiate electricity sale at the wholesale market.	Relatively simple and effective feed-in tariff system guaranteed appropriate remuneration until 2015.
Which typical risks consumers face when starting a self-generation project	Dependency on suppliers' conditions when selling excess electricity, latency because of yearly stop-go.	High uncertainty, except for small solar PV net metering systems.	Lack of access to capital to cover high upfront investment costs, frequent changes of support schemes.	Relatively low risk, amortisation difficult to calculate, self-consumed electricity risks network fee charged	Relatively low risk, amortisation and reliability questioned by a deterring surcharge on self-consumption.	Questioned remuneration and continuous regulatory changes undermine amortisation.	Limited access to capital due to incalculable pay-off period, high administrative costs.	Frequent policy changes, still some reluctance of banks due to bad experiences with unreliable market premium scheme.	Amortisation of solar PV self-generation projects tends to be very difficult.	Access to capital, lack of information, insufficient remuneration for excess electricity, regulatory incertitude.	Lack of financial viability due to absence of any remuneration scheme for newly installed renewable self-generation.	Lack of access to capital, prohibitive approach of policy framework, long amortisation period.	Difficult access to capital for self-generators, some speculative selling practices.

4.1 Austria

National key indicators

Electricity consumption of households (residential) 2013: 17.687 TWh[68]
Renewable electricity generation 2013: 48.890 TWh (68.1% of total gross electricity consumption, EU28 average: 25.4%)[69]
Average electricity price 2014 (medium size households, incl. taxes and levies): 20.2 ct/kWh (EU28 average: 20.3 ct/kWh) [70]
Annual electricity bill of an average household in the capital Vienna: 789 euro[71]

4.1.1 Conditions for consumers' 'green' choice

Stage of market liberalisation

Overview: Austria fully implemented the Third Energy Package into national law in 2010. Thanks to its geographical situation, Austria possesses important hydropower generation capacities and provides pumped hydro storage capacities to its neighbour countries, mainly Germany. Wholesale markets are fully coupled with Germany, forming a single price zone.

Market concentration: At domestic retail level, it remained high with the three largest suppliers detaining 56% of market share across all consumer groups and local utilities dominating within their region. The largest power-generation company held 57% of the market share in 2012.[72] Austria knows no relevant foreign cross-border market entrants. Household electricity suppliers' mark-ups were above 1.5 ct/kWh in 2013.[73]

Choice: 40 different tariff offers from 25 electricity suppliers available to household consumers in the capital Vienna in 2013[74]

Switching activity: Annual switching rate 2013: 1.8% (EU28 average: 5.6%)[75], average 2008-2012: ca. 1.5% (EU28 average: 4%).[76] Overall consumer satisfaction with the electricity market has the second highest score in the EU.[77] Annual savings to be encashed by consumers in the capital through switching are estimated at 150 euro.[78]

[68] Eurostat: Supply, transformation and consumption of electricity - annual data, Electrical energy – residential http://ec.europa.eu/eurostat/tgm/table.do?tab=table&plugin=1&language=en&pcode=tsdpc310, 27 April 2015.
[69] Eurostat: Energy from renewable sources, http://ec.europa.eu/eurostat/web/energy/data/shares, 28 April 2015.
[70] Eurostat: Electricity prices per type of user, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_pc_204&lang=en, 28 April 2015.
[71] Incumbents' standard offers, 4,000 kWh consumption, see ACER/CEER annual report, p. 33.
[72] European Commission: EU Energy markets in 2014, October 2014, p. 124-126.
[73] ACER/CEER annual report, p. 56-58.
[74] ACER/CEER annual report, p. 42.
[75] ACER/CEER: Annual report, p. 79.
[76] ACER/CEER: Annual report, p. 69.
[77] European Commission: EU Energy markets in 2014, October 2014, p. 125.
[78] ACER/CEER: Annual report, p. 72.

Renewable energy policy

Target compliance: 2020 target for the share of renewable electricity in final consumption: 70.6% (2013: 68.1%). Starting from a historically very high share of hydropower, Austria fulfilled its interim targets and is about to reach its 2020 target.[79] The European Commission's progress report 2015 expects that Austria will clearly accomplish the 2020 overall target for the renewable share in final energy consumption (electricity, heating & cooling, transport).[80]

Main electricity support scheme: Renewable electricity always has been supported with feed-in tariffs (FiT), introduced with the first Green Electricity Act in 2002, revised in 2006 when FiT were lowered.

Recent changes and trends: The 2012 amendment of the Green Electricity Act introduces technology-specific targets (additional 1,000 MW of hydropower, 2,000 MW of wind power, 200 MW of biomass/biogas units and 1,200 MW PV by 2020) which allowed to reduce the tailback of waiting projects.[81]

'Green electricity' market size and choice

Choice: 23 different 'green' tariff offers from 16 electricity suppliers available to household consumers in the capital Vienna in 2013. [82] The Austrian regulator E-Control identified 81 different 100% renewable energy suppliers (according to legal fuel mix disclosure) in September 2014.[83] Many of these 'green electricity' suppliers are small local utilities that do not market their tariffs directly to every consumer throughout the whole country.

Market size and development: Consumers were able to switch suppliers since 2001. The first 'green electricity' suppliers, specialised in providing exclusively renewable electricity tariffs, were founded just before the liberalisation of the retail electricity market.[84] Approximately 650,000 clients purchase 'green' tariffs in 2014.[85] In 2015, BEUC's national member organisation VKI observed 'green' tariffs, certified under its quality label, being cheaper than local default tariffs.

Relevance of renewable self-generation

Grid parity: With levelised electricity generation costs of solar PV of around ca. 14 to 19 ct/kWh, grid parity was reached in all parts of the country in 2014. However, it is not a self-runner since spreads may be relatively small in relation to an average retail electricity price of 20 ct/kWh.[86]

[79] 2020 Keep on track project: EU Tracking Roadmap 2015. Keeping track of renewable energy targets towards 2020, June 2015, p. 20-22.
[80] European Commission: Renewable energy progress report, June 2015, p. 5.
[81] 2020 Keep on track project: National report: Austria, February 2015.
[82] ACER/CEER annual report, p. 42.
[83] E-Control: Lieferanten von Ökostrom, http://www.e-control.at/konsumenten/oeko-energie/lieferanten-von-oekostrom, 17 July 2015.
[84] Österreichisches Umweltzeichen: Oekostrom AG, https://www.umweltzeichen.at/cms/de/produkte/gruene-energie/content.html?akt_id=6628, 17 July 2015.
[85] Estimation by national BEUC member organisation. Some "green electricity" suppliers publish key figures: Naturkraft Energievertriebsgesellschaft mbH sold 1.4 TWh to their clients in 2012/2013; Oekostrom AG sold 0.2 TWh to more than 40,000 clients in 2014, http://www.naturkraft.at/kennzahlen.html, http://oekostrom.at/press/geschaftsbericht-2014-oekostrom-ag-zeigt-wieder-stabiles-jahresergebnis/, 17 July 2015
[86] Joint Research Centre (JRC): Cost Maps for Unsubsidised Photovoltaic Electricity 2014, September 2014. The actual spread between the retail price on the one hand and the levelised generation cost of solar PV electricity may differ because the JRC model applied EU average data and did not take into account any eventual public support granted (e.g. tax exemptions) that could increase or decrease retail prices respectively generation cost.

Generation capacity: In 2014, the installed capacity of 15,886 solar PV units supported within the FiT scheme[87] reached 324 MW, production 0.215 TWh (0.4% of final electricity consumption). Around 4,800 newly installed solar PV installations were added during 2013 under the FiT scheme. The total capacities of permits issued by authorities covers solar PV installations of 960 MW by the end of 2013, while only 626 MW actually were installed. By the end of 2014, installed capacity rose up to 771 MW (2013: 631 MW), producing 0.766 TWh of solar electricity (2013: 0.582 TWh)[88] equal to 1.1%[89] of gross electricity consumption (EU28 average: 3.5%) while ca. 40% of capacity were installed in the residential sector.[90]

Capacity per inhabitant: With 90.6 W, the installed capacity per inhabitant is clearly below the EU average (171.5 W).[91]

4.1.2 Evaluation of 'green' tariffs' transparency

Definition of 'green electricity' offers

Disambiguation: The Green Electricity Act and the Electricity Act state that suppliers are only allowed to market a tariff as a 'green' tariff if it is fully backed by cancelled renewable Guarantees of Origin (GOs).[92] National regulator E-Control lists the suppliers of 100% renewable electricity that comply on the E-Control website.[93]

Qualitative minimum criteria: No further formal requirements related to environmental benefits of 'green' offers apply.

Matching: Within the national GO registry it is assured that the quantity of renewable electricity produced by domestic power plants and sold within a 'green' tariff automatically matches with renewable GOs from the domestic renewable power plants that produced the kilowatt-hours sold to final customers.[94] As a consequence, when opting for a 'green' tariff backed by Austrian GOs, consumers always pay for the kilowatt-hours from exactly those sources that are disclosed on their bill. It has to be noted that this rule only applies to domestic renewable power plants and GOs issued to them. Suppliers can still compile a 'green' tariff by purchasing renewable or non-renewable electricity abroad and use imported renewable GOs for disclosure purposes. BEUC's national member VKI estimates that around 30% of the volume of the 'green' tariffs market are backed by imported renewable electricity and imported GOs. The country of origin of the GO appears in the fuel mix disclosure statement (see "How 'green' tariffs and the fuel mix are disclosed on the bill – Advancement of fuel mix disclosure") Renewable electricity supported under the FiT scheme is backed by GOs and then equally allocated on a pro-rata base to all Austrian suppliers' fuel mixes. But suppliers of a 'green' tariff can also buy directly renewable electricity and GOs from plant operators who consequently renounce the FiT payments.

[87] E-Control: Ökostrombericht 2014, Juli 2014, p. 19, 46.
[88] E-Control: Ökostrombericht 2014, Juli 2014, p. 46; EurObserv'ER: Photovoltaic Barometer 2014, May 2015, p. 10.
[89] Solar Power Europe (SPE): Global market outlook for solar power 2015 – 2019, June 2015, p. 26.
[90] Solar Power Europe (SPE): Global market outlook for solar power 2015 – 2019, June 2015, p. 22.
[91] EurObserv'ER: Photovoltaic Barometer 2014, May 2015, p. 7-9.
[92] E-Control: Guarantees of origin, http://www.e-control.at/konsumenten/oeko-energie/oekostrom-erkennen/herkunftsnachweis, 17 July 2015.
[93] E-Control: Lieferanten von Ökostrom, http://www.e-control.at/konsumenten/oeko-energie/lieferanten-von-oekostrom, 17 July 2015.
[94] Ökostromgesetz 2012, §10 (7), BGBl., 29 July 2011.

How 'green' tariffs are offered to consumers

Suppliers' information duties: See "Definition of 'green electricity' offers" and "How 'green' tariffs and the fuel mix are disclosed on the bill". There are no further official qualitative standards.

Online price comparison tools (PCTs): The national online price comparison tool run by E-Control displays the fuel mix of the supplier, in line with the abovementioned definition of 'green' tariffs.[95] 'Green' tariffs easily can be identified at first glance thanks to a green bar that visualises the share of renewables. Users can also restrict their research to 'green' tariffs only.

Disclosure report: E-Control provides an annual disclosure report. It also publishes a lot of easy understandable online and printed background information on the difference between the GO tracking system and the electricity produced, traded and sold to consumers in order to make them aware of their right to know the origin of their electricity.[96]

How 'green' tariffs and the fuel mix are disclosed on the bill

Functioning of legal fuel mix disclosure: Since opening of the electricity market in 2001, the supplier's fuel mix as well as the related CO_2 emissions and the radioactive waste have to be mentioned in every advertisement.[97] A product mix or a national average mix as a benchmark normally are not published. As the first Member State, Austria put a 'full disclosure' system in place in 2003 with GOs issued by the local grid operator on request of every plant operator (renewable and non-renewable). Suppliers' legal fuel mix disclosure must be based on cancelled GOs, covering renewable and non-renewable electricity. If the origin of electricity is unknown, e.g. in the case of imports, the European average European Network of Transmission System Operators for Electricity (ENTSO-E) mix deducted by the share of renewables applied until 2013. Now all fuel mix disclosure is based on GOs.

Advancement of fuel mix disclosure: The shares of different renewable energy sources are disclosed separately (hydropower, wind power, solar PV electricity, geothermal power, electricity from solid biomass and biogas units). Fossil fuels are also disclosed separately.[98] The country of origin of the used (renewable) GOs also has to be published. This good practice enables consumers to verify if their supplier imported GOs or referred to locally issued GOs. In the case of disclosure of imported renewable GOs, consumers are hinted at the fact that their product eventually does not fully match renewable kilowatt-hours with renewable GOs. If suppliers want to cover non-renewable electricity sold to their customers with imported renewable GOs, this leads to an explicit note under the fuel mix statement.[99]

Informative value: As of 2013, a new ordonnance on electricity disclosure introduces the mandatory use of GOs for domestic clients (commercial clients: as of 2015). The use of the anonymous average ENTSO-E mix for unknown electricity sources will be phased out. The share of 'unknown origin' significantly dropped to 7% in 2013 which means that 93% of electricity consumption disclosed are tracked by GOs. By doing so, Austria became a forerunner of 'full disclosure', using a very accurate,

[95] E-Control: Tarifkalkulator, http://www.e-control.at/konsumenten/service-und-beratung/toolbox/tarifkalkulator, 17 July 2015.
[96] E-Control's provides an annual fuel mix disclosure report and several brochures and website articles, http://www.e-control.at/konsumenten/oeko-energie/oekostrom-erkennen, 17 July 2015.
[97] E-Control: Labelling and disclosure, http://www.e-control.at/konsumenten/oeko-energie/oekostrom-erkennen/stromkennzeichnung, 17 July 2015.
[98] E-Control: Erkennen, woher Ihr Strom wirklich kommt. Konsumentenbroschüre Stromkennzeichnung, Dezember 2013, p. 7.
[99] RE-DISS II project: Selected options for implementation of 'front side' disclosure aspects. Background information and consultation, April 2014, p. 10.

coherent and transparent tracking scheme, welcomed by researchers and by BEUC's national member organisation VKI.[100] No residual mix is needed any more.

How environmental benefits of 'green' tariffs are proven to consumers

Legal provisions: Suppliers may include a supplementary voluntary information as a part of the legal fuel mix disclosure on consumers' bills, explaining that 100% of the renewable GOs used for disclosure have been purchased as tied to the renewable electricity,[101] but there are no further requirements related to suppliers' information duties on environmental benefits.

Additionality: Suppliers of 'green electricity' tariffs are not obliged to communicate about additionality of their offers to consumers. No regulatory provisions apply for qualitative environmental aspects related to the impacts of purchasing a 'green' tariff.

How 'green electricity' quality labels guide consumers

Relevance of labels: One 'green electricity' quality label, 'Österreichisches Umweltzeichen', certifies 100% renewable energy tariffs. Starting from the abovementioned definition of 'green' tariffs, the label confirms the environmentally ambitious standards of tariffs that comply with the label's minimum criteria.

Functioning of labels: The minimum criteria of the 'Österreichisches Umweltzeichen' aim at incentivising investments in new renewable generation capacities by requesting a minimum share of recently built domestic power plants. The label excludes 'green' tariffs that are based on imported GOs (see "Definition of 'green electricity' offers – Matching"). The label is run by the Federal Ministry of Agriculture, Forestry, Environment and Water Management in cooperation with the national BEUC member organisation VKI.

4.1.3 Evaluation of consumers' access to self-generation

How grid access and use are guaranteed to self-generating consumers

Procedure: Grid operators have to answer renewable power plants' applications for connection within two weeks. After a technical text, a connection agreement is concluded between the plant operator and the grid operator.

Legal status: Only in the case of insufficient grid capacities, priority grid access is given to renewable power plants.

Commensurability of costs: Self-generators have to pay a grid-access fee covering the costs of the connection and additional charges related to metering.[102] If reinforcement of the grid is necessary to secure sufficient feed-in capacity, another contract between the plant operator and the grid operator needs to be established, clarifying the cost allocation. No legal provisions define these procedures. Against this backdrop, experts criticise that grid operators can easily deny the installation of additional small PV systems[103] and that solar PV self-generators might be confronted with unforeseen additional grid connection costs.[104]

[100] RE-DISS II project: Country profile: Austria, April 2015.
[101] RE-DISS II project: Selected options for implementation of 'front side' disclosure aspects. Background information and consultation, April 2014, p. 22.
[102] RES-LEGAL project: Austria – Connection to the grid, http://www.res-legal.eu/search-by-country/austria/single/s/res-e/t/gridaccess/aid/connection-to-the-grid-22/lastp/94/, 17 July 2015.
[103] 2020 Keep on track project: National report: Austria, February 2015.
[104] PV GRID project: Final project report, August 2014, p. 31.

How consumers' excess electricity production is treated

Rationale of the support scheme: A subsidy of 275 euro per kW installed capacity is granted by the Federal Climate and Energy Fund to private households and companies that install a roof-top or ground-mounted solar PV systems with a maximum installed capacity of 5 kW (375 euro for building integrated installations).[105] Self-generators need to register online before having installed the system. No remuneration scheme for produced electricity is provided in this case.

Remuneration: In 2015, solar PV systems with an installed capacity of more than 5 kW up to 200 kW (2014: 350 kW) are entitled to a FiT of 11.5 ct/kWh (12.5 ct/kWh in 2014).[106] Additionally, 30% of investment costs are granted as a direct subsidy, but capped at 200 euro per kW. Payments only can be claimed on an annual first-come-first-served basis only as long as funds are still available (8 million Euro in 2015). The Clearing and Settlement Agency 'Ökostromabwicklungsstelle' (OeMAG) concludes a contract with the self-generator and buys the renewable electricity at FiT prices during 13 years and resells it at wholesale markets. The differential costs are charged as a levy upon electricity consumers' bills.[107] Another remuneration option may be used by self-generators who have installed solar PV systems below 5 kW. Since they are not entitled to the FiT, they can sell their excess electricity to OeMAG. But OeMAG only guarantees to pay a wholesale market price (3.3 ct/kWh for the second half of 2015).[108] Alternatively, self-generators can sell their solar electricity to 15 suppliers that offer different prices per kilowatt-hour, exceeding OeMAG's guaranteed average wholesale market price by up to 300% under certain conditions. Normally, self-generators can only claim these more advantageous prices if they are clients of the supplier or command the solar PV installation itself from the supplier. The capacity and/or the amount of electricity purchased by the suppliers normally are capped.[109] Solar PV systems between 5 kW and 200 kW (2014: 350 kW) of installed capacity are also entitled to investment subsidies granted by federal programmes and by federal states. But in this case, installations have to renounce FiTs and sell excess electricity to OeMAG at the wholesale market price or alternatively to a supplier under specific conditions.

Investment security: The support scheme for solar PV units below 5 kW provides a limited investment security. Self-generators might get a good deal by installing a solar PV panel with their supplier's support and selling excess electricity to the supplier. They depend on the willingness and on the conditions fixed by this company. However, a sufficient number of suppliers offer more or less attractive conditions for self-generators. While the FiT scheme for solar PV units above 5 kW of installed capacity, linked with an investment subsidy, is appropriate, access to the FiT payments is problematic. Since consumers' and companies' interest in building a FiT supported solar PV system largely exceeds the annual funding, entry to the scheme is granted on a first-come-first-served basis. This leads to the situation that only applicants filling in the online form for registration the most

[105] RES-LEGAL project: Austria – Subsidy III (Investment subsidy for small PV), http://www.res-legal.eu/search-by-country/austria/single/s/res-e/t/promotion/aid/subsidy-iii-investment-subsidy-for-small-pv/lastp/94/, 17 July 2015.
[106] RES-LEGAL project: Austria – Feed-in tariff (ÖSG 2012), http://www.res-legal.eu/search-by-country/austria/single/s/res-e/t/promotion/aid/feed-in-tariff-green-electricity-act/lastp/94/, 17 July 2015. If a self-generator plans to install a solar PV system under the FiT scheme, a license first has to be requested from the governor of the federal state. Then, entry into the FiT scheme can be demanded. Provided the annual funding is not yet depleted, the self-generator is allowed to conclude a contract with OeMAG.
[107] 2020 Keep on track project: National report: Austria, February 2015.
[108] E-Control: Ihr Wegweiser in Sachen Photovoltaik. Leitfaden Photovoltaik.
[109] Photovoltaic Austria: PVA-Plattform für Überschuss-Einspeiser, http://www.pvaustria.at/strom-verkaufen/, 17 July 2015.

quickly in the minutes after the publication of the new annual funding were queued in a promising position.[110]

Which typical risks consumers face when starting a self-generation project

Financial risks: The yearly stop-go concerning to the funding of the FiT scheme thwarts consumers who are willing to invest in solar PV installations. The annual cap can lead to latency of projects and hampers a more even and balanced market development.

Administrative barriers: Grid access needs a more stable base and clear rules to make sure that private households that want to invest in solar PV systems are not scared off. Administrative costs for residential PV tend to be relatively high compared to other Member States.[111]

Legal framework: Self-generators have to find a supplier willing to buy their excess electricity. Of course, contractual conditions in this case can vary. General conditions may also vary according to the different legal frameworks and support programmes in different Austrian Federal States. Until now, self-generators' situation has not been undermined by retro-active changes. However, government plans to tax all yearly self-consumption of solar electricity beyond 5,000 kWh scared self-generators but were weakened in 2014. Starting in 2015, solar PV units with less than 26 kW of installed capacity, or 25,000 kWh self-consumed solar electricity are exempt from the electricity tax (1.5 ct/kWh).[112]

Quality of offers and services: Quality standards for planning and building small installations could be improved.

Information on self-generation options: Little independent information is offered and a one-stop shop is missing.

[110] Feedback from national BEUC member organisation, PV GRID project: Final project report, August 2014, p. 31; Photovoltaic Austria: Neuerlich gigantischer Ansturm auf PV-Förderung, Press release, 16 January 2014.
[111] PV GRID project: Final project report, August 2014, p. 31.
[112] 2020 Keep on track project: National Policy Update. 5th Policy Briefing, September 2014, p. 2; Photovoltaic Austria: Steuerliche Beurteilung von PV-Anlagen, http://www.pvaustria.at/steuerliche-beurteilung-von-pv-anlagen/, 17 July 2015.

4.1.4 Summary of 'green electricity' markets and self-generation in Austria

Conditions for consumers' 'green' choice		Remarks
Stage of market liberalisation		Fully liberalised market with still high concentration and low switching activity.
Renewable energy policy		Well-functioning feed-in tariff scheme but annual stop-go.
'Green electricity' market size and choice		High number of offers, forerunner market.
Relevance of renewable self-generation		High interest and good progress, grid parity.

Transparency of 'green' tariffs		
Definition of 'green electricity' offers		Legally anchored: use of 100% renewable GOs matching with electricity purchased.
How 'green' tariffs are offered to consumers		Suppliers are allowed to market 'green' tariffs only according to the legal definition.
How 'green' tariffs and the fuel mix are disclosed on the bill		Forerunner of full disclosure, meaningful and transparent, beyond minimum EU criteria.
How environmental benefits of 'green' tariffs are proven to consumers		No binding information on additionality, only voluntary supplier information on the bill.
How 'green electricity' quality labels guide consumers		Voluntary quality label, run by ministry and consumer organisation, incentivises new generation capacities.

Consumers' access to self-generation		
How grid access and use are guaranteed to self-generating consumers		Inappropriate costs for grid connection and grid extension.
How consumers' excess electricity production is treated		Effective feed-in tariff and grants, but restricted access, remuneration depends on conditions offered by suppliers.
Which typical risks consumers face when starting a self-generation project		Need to find a good deal for selling excess electricity, latency because of yearly stop-go.

Evaluation scale for transparency and market access

Good practice; issue showing good solutions related to transparency and/or market access from the point of view of consumers' rights	
Average performance; issue with some problems and some solutions related to transparency and/or market access from the point of view of consumers' rights	
Bad practice; issue with relevant problems related to transparency and/or market access from the point of view of consumers' rights	

4.2 Belgium

National key indicators

Electricity consumption of households (residential) 2013: 19.807 TWh[113]
Renewable electricity generation 2013: 11.276 TWh (12.3% of total gross electricity consumption, EU28 average: 25.4%)[114]
Average electricity price 2014 (medium size households, incl. taxes and levies): 21.0 ct/kWh (EU28 average: 20.3 ct/kWh) [115]
Annual electricity bill of an average household in the capital Brussels: 910 euro[116]

4.2.1 Conditions for consumers' 'green' choice

Stage of market liberalisation

Overview: Belgium fully implemented the Third Energy Package in January 2012. Electricity generation is dominated by nuclear power plants for which a phase-out by 2025 was planned but repeatedly postponed. The three Belgian regions of Flanders, Brussels and Wallonia share competences in energy policy with the federal government and have each their own regulator and own legislation.[117]

Market concentration: The electricity generation as well as the retail electricity market are highly concentrated. Market shares of the biggest suppliers decrease, but the largest one, former monopolist Electrabel, still held 45% of the retail market in 2011. The European Commission exhorts decision-makers to ensure that decreasing wholesale market prices are passed on to consumers. Competition has increased thanks to important switching activities of consumers.[118] Household electricity suppliers' mark-ups were around 1.8 ct/kWh in 2013.[119]

Choice: 16 different tariff offers from 6 electricity suppliers available to household consumers in the capital Brussels in 2013[120]

Switching activity: Annual switching rate 2013: 14.6% (EU28 average: 5.6%)[121], average 2008-2012: ca. 10% (EU28 average: 4%).[122] Overall consumer satisfaction with the retail electricity market is

[113] Eurostat: Supply, transformation and consumption of electricity - annual data, Electrical energy – residential http://ec.europa.eu/eurostat/tgm/table.do?tab=table&plugin=1&language=en&pcode=tsdpc310, 27 April 2015.
[114] Eurostat: Energy from renewable sources, http://ec.europa.eu/eurostat/web/energy/data/shares, 28 April 2015.
[115] Eurostat: Electricity prices per type of user, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_pc_204&lang=en, 28 April 2015.
[116] Incumbents' standard offers, 4,000 kWh consumption, see ACER/CEER annual report, p. 33. The ACER/CEER annual report's database does not provide separate figures for the Flemish or for the Walloon region which are mainly described in this chapter.
[117] This chapter leaves out the energy policy of the Brussels Capital Region and focusses on the two regions of Flanders and Wallonia which are the most important in terms of population. Whenever policies do not overlap and if relevant, this chapter provides a differentiated analysis of Flanders and Wallonia.
[118] European Commission: EU Energy markets in 2014, October 2014, p. 28-32.
[119] ACER/CEER annual report, p. 57-58.
[120] ACER/CEER annual report, p. 42.
[121] ACER/CEER: Annual report, p. 79.
[122] ACER/CEER: Annual report, p. 69.

slightly above the EU average.[123] Annual savings to be encashed by consumers in the capital through switching are on average around 140 euro.[124]

Renewable energy policy

Target compliance: 2020 target for the share of renewable electricity in final consumption: 20.9% (2013: 12.3%). Between 2009 and 2013, renewable electricity production more than doubled in Belgium and interim targets were accomplished.[125] However, the European Commissions' progress report expects Belgium to fail in fulfilling its 2020 overall target for renewable electricity, heating and the renewables' share in transport.[126] The regions and the Federal Government have not yet agreed on shared responsibilities for achieving the targets and a national energy strategy is missing.

Main electricity support scheme: All regions mainly apply a quota system based on trade in 'green certificates' for most renewable energy sources except offshore wind turbines. Different quotas in Flanders and Wallonia have to be fulfilled by grid operators (in Flanders) or by all suppliers (in Wallonia). Grid operators respectively suppliers have to procure a sufficient number of 'green certificates' from renewable energy plant operators who receive a certain number of these certificates per technology. The number of allocated 'green certificates' in Flanders and Wallonia is a function of a pre-determined return on investment rate, calculated with regard to assumed investment costs as well as technology-specific banding factors (Flanders), respectively with regard to wholesale electricity prices (Wallonia). Certificates' prices may vary when renewable energy plant operators sell their 'green certificates' to third parties. In both regions, grid operators are obliged to purchase 'green certificates' at a minimum price. Instead of 'green certificates', both regions offer net metering schemes for small solar PV units up to 10 kW of installed capacity.[127] For investments in solar PV panels on dwellings older than five years (ten years, starting from January 2016), a reduced VAT rate of 6% applies.[128]

Recent changes and trends: After booming of solar PV installations between 2009 and 2013 with very generous remuneration in both regions, support was stopped abruptly. In this context, the 'green certificates' schemes have undergone frequent changes by the regional governments. In Flanders, solar PV installations below 10 kW theoretically were entitled to 'green certificates' still until June 2015, but most installations were de facto already excluded from allocation before because of disadvantageous banding factors that hindered them to exceed the minimum production threshold of the calculation formula.[129] In Wallonia, issuing certificates to solar PV installations below 10 kW was stopped in March 2013. Only installations over 10 kW still can claim 'green certificates' in

[123] European Commission: EU Energy markets in 2014, October 2014, p. 31.
[124] ACER/CEER: Annual report, p. 72.
[125] 2020 Keep on track project: EU Tracking Roadmap 2015. Keeping track of renewable energy targets towards 2020, June 2015, p. 22-24.
[126] European Commission: Renewable energy progress report, June 2015, p. 5.
[127] RES-LEGAL project: Belgium: Summary, http://www.res-legal.eu/search-by-country/belgium/summary/c/belgium/s/res-e/sum/108/lpid/107/, 2 December 2014.
[128] Test-Achats/Test-Aankoop: Panneaux photovoltaïques : toujours intéressants ? http://www.test-achats.be/maison-energie/energie/dossier/panneaux-photovoltaiques-toujours-interessant/11, 1 July 2015.
[129] Vlaamse regulator van de elektriciteits- en gasmarkt (VREG): Berekening aantal certificaten voor zonnepanelen vanaf 2013, http://www.vreg.be/nl/berekening-aantal-certificaten-voor-zonnepanelen-vanaf-2013, 12 August 2015.

Wallonia.[130] It was replaced by a dedicated grant for investments in solar PV units below 10 kW ('Qualiwatt').

'Green electricity' market size and choice

Choice: 9 different 'green' tariff offers from 4 electricity suppliers available to household consumers in the capital Brussels in 2013. [131]

Market size and development: Despite the relatively small size of the three regional electricity markets, the offer of 'green' tariffs is broad and advanced. Both, specialised suppliers selling uniquely 'green' tariffs as well as incumbent suppliers offering only one 'green' tariff amongst others, hold relevant market shares. Choosing 'green' tariffs was very attractive for consumers thanks to an exemption from a federal tax on electricity until 2012. While 48% of electricity supplied to final customers was covered by renewable GOs in 2012, this share dropped significantly after the phase-out of the tax exemption to 28% in 2014. However, the number of contracts representing a 'green' tariff, is still increasing in Flanders which means that more small consumers with lower electricity consumption switch to 'green' tariffs. Disclosure reports of the regional regulators reveal that most of the tariffs still are backed with imported GOs from Scandinavia (58% in 2014), mainly from hydropower plants. The Scandinavian GOs covered 84% of electricity in 2012.[132]

Relevance of renewable self-generation

Grid parity: With levelised electricity generation costs of solar PV of around ca. 14 to 16 ct/kWh, grid parity was reached in all parts of the country in 2014. The average retail electricity price exceeded costs of solar PV by 5 to 7 ct/kWh, providing some savings from self-consumption.[133]

Generation capacity: In 2014, the installed capacity of 355,800 solar PV units[134] reached 3,105 MW, of which ca. 60% were installed in the residential sector[135] (2013: 3,040 MW), producing 2.768 TWh of solar electricity equal to 3.5%[136] of gross electricity consumption (EU28 average: 3.5%; 2013: 2.640 TWh, 2.9%).[137] One in 13 Belgian households is a solar PV self-generator.[138]

Capacity per inhabitant: With 277.2 W, the installed capacity per inhabitant is the third highest in the EU, clearly above the EU average (171.5 W).[139]

[130] Commission Wallonne pour l'Energie (CWaPE): Qualiwatt – Principes, http://www.cwape.be/?dir=6.2.01, 12 August 2015.
[131] ACER/CEER annual report, p. 42.
[132] CREG/CWaPE/Brugel/VREG: Communiqué de presse commun des régulateurs belges de l'énergie relatif au développement des marchés de l'électricité et du gaz naturel en Belgique pour l'année 2014. Press release, 19 June 2015, http://www.cwape.be/docs/?doc=2414.
[133] Joint Research Centre (JRC): Cost Maps for Unsubsidised Photovoltaic Electricity 2014, September 2014. The actual spread between the retail price on the one hand and the levelised generation cost of solar PV electricity may differ because the JRC model applied EU average data and did not take into account any eventual public support granted (e.g. tax exemptions) that could increase or decrease retail prices respectively generation cost.
[134] Association pour la promotion des énergies renouvelables (APERE): Photovoltaïque : à peine 65 MWc installés en 2014. Press release, 17 March 2015.
[135] Solar Power Europe (SPE): Global market outlook for solar power 2015 – 2019, June 2015, p. 22.
[136] Solar Power Europe (SPE): Global market outlook for solar power 2015 – 2019, June 2015, p. 26.
[137] EurObserv'ER: Photovoltaic Barometer 2014, May 2015, p. 10.
[138] APERE: Photovoltaïque : à peine 65 MWc installés en 2014. Press release, 17 March 2015.
[139] EurObserv'ER: Photovoltaic Barometer 2014, May 2015, p. 7-9.

4.2.3 Evaluation of 'green' tariffs' transparency

Definition of 'green electricity' offers

Disambiguation: In Flanders and in Wallonia, only tariffs that are fully backed with renewable GOs are allowed to be marketed as 'green' tariffs. In their yearly disclosure reports, the regional regulators VREG and CWaPE list the fuel mixes (supplier mix and product mix in Flanders, supplier mix in Wallonia only) of all suppliers that are active on the market. With the help of this list, 'green' tariffs that are covered by 100% renewable GOs are easy to identify in Flanders. The definition of a 100% renewable GO backed tariff also applied to the federal tax exemption on electricity tariffs granted until 2012.[140] Supported renewable electricity generation is entitled to tradable GOs.

Qualitative minimum criteria: Neither federal nor regional legislation does presuppose any requirements related to environmental benefits of 'green' offers.

Matching: Consumers cannot rely on any binding information when they want to know whether a GO-based 'green' offer is backed with power purchase contracts from renewable power plants or not. Some suppliers openly market their 'green' tariffs as 100% covered by renewable electricity production from generation capacities e.g. wind turbines which they possess or from which they purchase electricity to cover their customers' demand. In this case, consumers can know for which kilowatt-hours they pay, provided the voluntary information of the supplier is transparent and trustworthy. VREG's annual disclosure report shows that probably most of 'green' tariffs in Flanders might be based on power purchase agreements of non-renewable electricity that is backed by renewable GOs, mainly imported from Scandinavian hydropower plants (55% of disclosed renewable GOs in 2014). While the share of Scandinavian GOs significantly dropped from 85% in 2012, the disclosure of renewable GOs from Flanders and Wallonia increased.[141] This trend goes in parallel with the general decline of the amount of electricity sold under 'green' tariffs in Flanders after the end of the federal tax exemption in 2012. The picture is comparable to the Walloon case where the share of Scandinavian GOs was at 61%, complemented by 24% Walloon GOs in 2013, representing 56% of hydropower GOs.[142] BEUC's national member organisation Test-Achats/Test-Aankoop early criticised suppliers' practice of purchasing renewable GOs in order to hide their mainly non-renewable portfolio as "greenwashing", recommending to look not only on the fuel mix. Test-Achats/Test-Aankoop argues that consumers should better know what they are paying for and supported a ranking developed in cooperation with Greenpeace Belgium. The ranking helps consumers to better analyse the supplier's portfolio and investment strategy in order to know if they really make a difference through a meaningful increase of renewable electricity production.[143] Greenpeace Belgium annually updated this ranking and Test-Achats/Test-Aankoop displays the score in its online price comparison tool (see "How green tariffs are offered to consumers – Online price comparison tools (PCTs)").

How 'green' tariffs are offered to consumers

Suppliers' information duties: No binding regulatory framework addresses suppliers' communication about 'green' tariffs. No legal provisions apply to the marketing of 'green' tariffs. In general, a

[140] VREG: Rapport van de Vlaamse Regulator van de Electriciteits- en Gasmarkt van 30 juni 2015 met betrekking tot de oorsprong van de in 2014 geleverde elektriciteit in Vlaanderen, June 2015.
[141] VREG: Rapport van de Vlaamse Regulator van de Electriciteits- en Gasmarkt van 30 juni 2015 met betrekking tot de oorsprong van de in 2014 geleverde elektriciteit in Vlaanderen, June 2015, p. 19.
[142] CWaPE: Fuel mix, http://www.cwape.be/?dir=3.6.00, 13 August 2015.
[143] Lesage, Olivier/Vanparys, Roger: Electricité verte, pas si verte que ça ! In: Test-Achats 551, March 2015, p. 30-33.

supplier may advertise a 'green' tariff with reference to the product's fuel mix covered by 100% renewable GOs in order to present itself as environmentally friendly.

Online price comparison tools (PCTs): In its best practice guidelines for PCTs, the federal regulator CREG does not mention any provisions that touch upon the disclosure and comparability of the fuel mix.[144] Six PCTs signed this best practice guidelines. Three of them are run by the regional regulators. The Flemish regional regulator runs the V-TEST price comparison tool.[145] Users automatically see a column indicating the renewable share as a green column with the percentage figure, based on the product mix. The column is entitled "How green is this electricity?" Neither the supplier mix nor the entire product fuel mix are disclosed. Users have the possibility to rank offers according to the share of renewables. The PCT run by the Walloon regional regulator CWaPE has the same features and discloses the percentage of renewables, but not the full product or supplier mix. The PCT run by Test-Achats/Test-Aankoop[146] displays both the renewable share of the product mix and the position of the supplier in the environmental organisations' annual ranking (see "How environmental benefits of 'green' tariffs are proven to consumers – Additionality"). The other two private PCTs also add a 'Greenpeace score' in the listing. In Flanders, the V-TEST PCT additionally provides a link to easy understandable background information and to a second online tool, entitled 'The Green Electricity Checker'.[147] Consumers can verify the current fuel mix of the electricity tariff they purchase. After entering the number of the meter, the current product mix is presented on a monthly updated base. With the help of the online tool consumers are invited to scrutinise if their supplier currently really complies with the claimed fuel mix. VREG announced an upcoming addition of the country of origin of the cancelled GOs. By doing so, 'The Green Electricity Checker' becomes a sort of monthly online disclosure report, but accessible only to individual customers who enter their meter number online. It lacks in any comparability function.[148]

Disclosure report: The three regional regulators and the federal regulator publish a brief annual overview of the development of the use of renewable GOs and the fuel mix.[149] In Flanders, the regional regulator VREG provides a very exhaustive and easy understandable annual disclosure report,[150] including the detailed supplier mix and the product mix of all suppliers. Additionally, the countries of origin of the GOs are disclosed (see "Definition of 'green electricity' offers – Disambiguation"). Since September 2015, an easy accessible online tool enables consumers to compare the suppliers' fuel mixes as well as the product fuel mixes of all Flemish electricity suppliers. Different renewable energy sources as well as the country of origin of the GOs are disclosed, likewise the annual disclosure report.[151] The Walloon regulator provides a list of all supplier mixes of the year

[144] CREG: Charte de bonnes pratiques pour les sites Internet de comparaison des prix de l'électricité et du gaz pour les consommateurs résidentiels et les PME, July 2013.
[145] V-TEST: http://vtest.vreg.be, 13 August 2015.
[146] Test-Achats/Test-Aankoop: Gaz & électricité : ma consommation au meilleur prix, http://www.test-achats.be/maison-energie/energie/calculateur/energie-qui-deviendra-votre-fournisseur, 13 August 2015.
[147] VREG: Controleren hoe groen uw stroom is (GROENCHECK); http://www.vreg.be/nl/controleren-hoe-groen-uw-stroom-groencheck, 13 August 2015.
[148] VREG: Rapport van de Vlaamse Regulator van de Electriciteits- en Gasmarkt van 30 juni 2015 met betrekking tot de oorsprong van de in 2014 geleverde elektriciteit in Vlaanderen, June 2015, p. 28.
[149] CREG/CWaPE/Brugel/VREG: Communiqué de presse commun des régulateurs belges de l'énergie relatif au développement des marchés de l'électricité et du gaz naturel en Belgique pour l'année 2014. Press release, 19 June 2015, http://www.cwape.be/docs/?doc=2414.
[150] VREG: Rapport van de Vlaamse Regulator van de Electriciteits- en Gasmarkt van 30 juni 2015 met betrekking tot de oorsprong van de in 2014 geleverde elektriciteit in Vlaanderen, June 2015.
[151] VREG: Herkomst stroom vergelijken (HERKOMSTVERGELIJKER); http://www.vreg.be/nl/herkomst-stroom-vergelijken-herkomstvergelijker, 19 October 2015.

2013 with less explicative and less updated background information. Additionally, only a general overview of the different renewable sources and of the country of origin is published with regard to the whole Walloon market.[152]

How 'green' tariffs and the fuel mix are disclosed on the bill

Functioning of legal fuel mix disclosure: Fuel mix disclosure is binding in Flanders since 2003, in Wallonia since 2007. In Flanders, the share of renewable electricity in the fuel mix has to be disclosed on the basis of GOs. The same applies for high efficient cogeneration. Non-renewable sources are calculated contract-based, tracking power purchase respectively the generation capacities suppliers own with the help of a questionnaire. In case of unknown shares, the residual mix calculated within the RE-DISS project applies. In this context, experts recommend a more coherent approach avoiding the use of uncorrected generation statistics from suppliers for the sake of reliability and accuracy.[153] In principle, Wallonia applies comparable rules, but also offers the use of GOs for disclosure of non-renewable sources. Again, the tracking system for the non-renewable share of the product mix could be made more reliable.[154] In Belgium, this is of particular interest because the dominating suppliers all belong to huge European energy groups with a transnational portfolio. For a coherent calculation of the fuel mix, consumers should know with regard to which geographical unit the calculation has been done.

Advancement of fuel mix disclosure: In Flanders, the legal fuel mix disclosure is not fully in line with the minimum requirements of the Directive and not overly exhaustive. The supplier mix and the product mix are both shown. The minimum differentiation of renewables, fossils fuels and nuclear power applies, with a separate percentage figure for high efficient cogeneration (which is not a fuel itself). But no environmental indicators such as the CO_2 emissions and radioactive waste need to be published, neither in advertising, on consumers' bills nor on suppliers' websites. Regulatory provisions for the calculation of these indicators are still missing. On the other hand, a more detailed set of information is provided to consumers who log into the regional regulator's 'Green Electricity Checker'. The announced disclosure of the country of origin of the GOs would be informative and go beyond the minimum requirements. In Wallonia, the fuel mix disclosure is in line with the Directive, but not ambitious. It distinguishes renewables, high-efficient cogeneration, natural gas, other fossil sources and nuclear power. The supplier mix and the product mix are both shown. Suppliers may choose whether they publish the environmental indicators on the bill or mention a link to information on their website.

Informative value: In the Flemish framework for fuel mix disclosure, the environmental indicators which form a minimum requirement of the Directive are lacking. Offering a monthly fuel mix calculation to consumers via a sophisticated online tool cannot fully offset these shortfalls. It does not necessarily increase consumers' understanding of 'green' tariffs when they are invited to double-check their personal tariff's fuel mix calculation on a separate website. In Wallonia, the suppliers can hide the environmental indicators of CO_2 and radioactive waste on their websites. All this information could be published in a more accessible way in advertising, in pre-contractual information, in PCTs and on the bills. Furthermore, from the point of view of consumers, national average values could help to visualise the tariff's respectively the supplier's performance. Regardless of opting for a 'green' tariff or not, a minimum share of supported renewable electricity is brought

[152] CWaPE: Fuel mix, http://www.cwape.be/?dir=3.6.00, 13 August 2015.
[153] RE-DISS II project: Country profiles: Belgium-Flanders, http://www.reliable-disclosure.org/upload/89-RE-DISSII_Country_Profile_BE_FL_2014_V03.pdf, 1 June 2014.
[154] RE-DISS II project: Country profiles: BE-Wallonia, http://www.reliable-disclosure.org/upload/153-V03_template_RE-DISSII_Country_Profile_Wallonia_2014v3.pdf, 30 August 2014.

about as a result of the 'green certificates' scheme to every consumer in Belgium. However, consumers do not find any information related to this fact in advertising or on the bills while the apparent resemblance of 'green' tariffs and 'green certificates' might create confusion amongst consumers.

How environmental benefits of 'green' tariffs are proven to consumers

Legal provisions: No regulatory provisions apply for proving qualitative environmental aspects related to the impacts of purchasing a 'green' tariff. It is up to the supplier to prove eventual environmental benefits enabled by consumers' choice.

Additionality: Suppliers of 'green' tariffs are not obliged to communicate about additionality of their offers to consumers. The annual ranking of all Belgian suppliers, established by Greenpeace Belgium and other environmental organisations fills this gap. The methodology takes into account not only the fuel mix but also investments of suppliers into new renewable electricity generation capacities. In this manner, the additional environmental benefit of a consumer's choice for a certain supplier shall be clarified, based on an analysis of the supplier's portfolio and investment strategy.[155]

How 'green electricity' quality labels guide consumers

Relevance of labels: In the 'green electricity' markets of both regions, private 'green' electricity labels do not play any role. The annual ranking launched by environmental organisations after the liberalisation of the electricity market in Flanders in 2003, provides an independent overview of suppliers' environmental performance and credibility.

Functioning of labels: No private 'green electricity' quality labels are active. For the additionality approach of the annual ranking see "How environmental benefits of 'green' tariffs are proven to consumers - Additionality".

4.2.4 Evaluation of consumers' access to self-generation

How grid access and use are guaranteed to self-generating consumers

Procedure: A technical acceptance has to be emitted by an accredited controller and then transferred to the distribution grid operator. Experts observed that legal deadlines for grid connection sometimes are not met and that distribution grid operators treat requests differently.[156] In general, grid access for small-scale solar PV installations is more or less hassle-free and simple for net metering units up to 10 kW.[157] In Flanders, self-generators who want to participate in the net metering scheme may do so, even in case their installation exceeds 10 kW, provided that they run a special application with regard to their grid operator for a separate grid access point or meter. Moreover, a contract with the balance responsible entity has to be signed. Self-generators who want to access the 'green certificates' scheme with their solar PV unit do not have to apply for a license and normally should be issued automatically their 'green certificates' from the regional regulator.[158]

[155] Greenpeace Belgium: Méthodologie classement des fournisseurs d'électricité verte 2014, http://greenpeace.rack66.com/roge/file/gp_methodologie_classement-fournisseurs-energie-verte_2014_fr.pdf, 13 August 2015.
[156] PV GRID project: Final project report, August 2014, p. 32.
[157] PV GRID project: Belgium: Systems with netmetering (LV & 10 kVA max), http://www.pvgrid.eu/database/pvgrid/belgium/wallonia/residential-systems/2217/systems-with-netmetering-lv--10-kva-max-1.html, 13 August 2015.
[158] RES-LEGAL project: Grid issues in Belgium, http://www.res-legal.eu/search-by-country/belgium/tools-list/c/belgium/s/res-e/t/gridaccess/sum/108/lpid/107/, 2 December 2014.

Legal status: Flanders and Wallonia both guarantee priority access as well as priority grid use to renewable power plants. In Flanders, the grid operator is obliged to adapt the consumer's meter in order to enable him/her to participate in the net metering scheme. In Wallonia, the consumer just has to inform his/her grid operator that he/she will start net metering. For low voltage connections on the distribution grid level, simplified access procedures apply. In both regions, distribution grid operators are responsible to implement grid extensions if needed.[159]

Commensurability of costs: Initially, self-generators were not obliged to finance grid access, extension or use. But with the rising number of small-scale solar PV units, Flanders and Wallonia have retroactively introduced several burdens charging self-generators with costs related to the maintenance of the overall network system. In January 2013, a grid injection fee was greenlighted in Flanders for the duration of three years applying to new and existing solar PV units below 10 kW operating under the net metering scheme. Besides a fixed annual fee of up to 66 euro per kW of installed capacity, the regulation presupposed the installation of a smart meter at the expense of the solar PV system owner. The Brussels Court of Appeal ruled in November 2013 that this network fee was discriminating and that there was no legally approved calculation methodology behind it. As a consequence, a revised 'prosumer tariff' without smart meter was approved by the regional regulator VREG, starting in July 2015.[160] The retroactive introduction was justified with an allegedly unfair behaviour of net metering participants who escape from paying parts of the consumption-based network fee. The additional extra fee depends on the local distribution grid operator and amounts up to 109 euro per kW so that a small 3 kW unit would be charged with 327 euro per year.[161] The new 'prosumer tariff' deducts between 35% and 60% from a typical net metering system's benefits. Therefore, it can be regarded as a serious encroachment and inappropriate. Nevertheless, the introduction of a comparable extra fee is announced in Wallonia, too.[162] Earlier, grid injection fee for solar PV installations was already introduced by Walloon distribution grid operators, amounting up to 0.8 ct/kWh.[163]

How consumers' excess electricity production is treated

Rationale of the support scheme: Self-generators who participate in the net metering schemes in Flanders and Wallonia reduce their electricity bill by the amount of kilowatt-hours fed into the grid, so called netting. The self-generator's meter just runs backwards. Only the annual net consumption is invoiced by the supplier and if annual production exceeds the self-generators' electricity import from the grid, his/her bill will be zero. The second scheme, based on 'green certificates', aims to reach a determined rate of return on investment for power plant operators in function of the current cost of development and the wholesale electricity market price.[164] In Flanders, access to the certificates scheme is only granted to solar PV units on sufficiently isolated rooftops.[165] The restrictions in the 'green certificates' scheme leave Flemish consumers de facto only the net metering scheme. Wallonia also pushes consumers to adopt the net metering scheme for solar PV units below 10 kW

[159] RES-LEGAL project: Grid issues in Belgium, http://www.res-legal.eu/search-by-country/belgium/tools-list/c/belgium/s/res-e/t/gridaccess/sum/108/lpid/107/, 2 December 2014.
[160] 2020 Keep on track project: Analysis of deviations and barriers 2014/2015, June 2015, p. 94-108.
[161] VREG: Veelgestelde vragen prosumententarief netgebruikers, April 2015.
[162] Test-Achats/Test-Aankoop: Panneaux photovoltaïques : toujours intéressants ? http://www.test-achats.be/maison-energie/energie/dossier/panneaux-photovoltaiques-toujours-interessant/13, 1 July 2015.
[163] EDORA: Tarifs à l'injection – position d'EDORA, http://www.edora.org/2012/position.php?id_position=18&year=&filtre=, 23 March 2010.
[164] 2020 Keep on track project: 6th policy briefing. National policy update, April 2015, p. 4-5.
[165] Test-Achats/Test-Aankoop: Panneaux photovoltaïques : toujours intéressants ? http://www.test-achats.be/maison-energie/energie/dossier/panneaux-photovoltaiques-toujours-interessant/4, 1 July 2015.

and still provides limited remuneration under the more complicated 'green certificates' scheme for bigger installations. Besides that, a dedicated grant for investments in solar PV units below 10 kW was introduced in 2014 ('Qualiwatt') to replace the skipped certificate scheme for the small-scale category. During a period of five years the distribution grid operators pays an individually calculated grant (maximum ca. 820 euro/year) that should guarantee a return on investment within eight years. The grant presupposes that self-generators already benefit from certain savings in electricity consumption thanks to self-consumption.[166]

Remuneration: Once a consumer's annual bill is totally compensated under the net metering scheme, no further remuneration is paid for any kilowatt-hour fed into the grid. Concerning the 'green certificates' scheme, for solar PV units installed in Flanders before June 2015, a technology- and capacity-specific banding factor applies. The banding factor accounts for the specific technology costs and efficiencies for amortisation to deduct a certain minimum production entitled to one certificate. However, the banding factor disadvantages small solar PV. It changes approximately every six months and since the factor was often set very low or at zero, small solar PV units hardly reached the minimum threshold of 1,000 kWh necessary for receiving one certificate. Legally, installations in Flanders are entitled to receive certificates during up to 15 years. In Wallonia, with regard to the 'green certificates' scheme for solar PV with more than 10 kW, 2.5 certificates are issued for each Megawatt-hour produced by units installed during the year 2014.[167] Units installed before 2014 receive up to 4.0 certificates per Megawatt-hour, units beyond 250 kW receive only 1.0 certificate. Certificates are issued during 10 years and eventually another five years at a reduced rate (which has been fixed at 0% for solar PV). The de facto limitation of the remuneration period can also be regarded as an indirect retroactive cut. Starting from 2015, all certificates allocation rates to solar PV units in Wallonia are calculated every six months by the regional regulator based on the installation's efficiency and a performance coefficient which depends on the wholesale market price. The support will decrease slightly in 2016.[168]

Investment security: The remuneration schemes for small solar PV units below 10 kW under the net metering scheme and under the Walloon investment grant are not overly generous any more, but still amortisation is possible with a fair and secure return on investment for self-generators. However, consumers became distrustful after the frequent changes and cuts. After the cuts in 'green certificates' prices and retroactive 'prosumer tariff' in Flanders, they fear further taxes and other charges on their investment which lead to a decreased number of installations.[169] In a survey commissioned by BEUC's national member Test-Achats/Test-Aankoop under the CLEAR project, 64% of all respondents said that an extra fee like the 'prosumer tariff' prevents them from investing in a solar PV system.[170] On the opposite, the 'green certificates' scheme in Wallonia for solar PV with more than 10 kW rather thwarts consumers because of the high number of uncertainty factors that

[166] Test-Achats/Test-Aankoop: Panneaux photovoltaïques : toujours intéressants ? http://www.test-achats.be/maison-energie/energie/dossier/panneaux-photovoltaiques-toujours-interessant/11, 1 July 2015.
[167] An additional 0.5 certificate is granted if the panels were assembled in the European Economic Area, see RES-LEGAL project: Quota system (certificats verts), http://www.res-legal.eu/search-by-country/belgium/single/s/res-e/t/promotion/aid/wallonia-quota-system-certificats-verts/lastp/107/, 2 December 2014.
[168] RES-LEGAL project: Wallonia: Quota system (certificats verts), http://www.res-legal.eu/search-by-country/belgium/single/s/res-e/t/promotion/aid/wallonia-quota-system-certificats-verts/lastp/107/, 2 December 2014.
[169] 3E: Crucial energy choices in Belgium – An investigation of the options. Our energy future, June 2014, p. 29; estimation from BEUC's national member organisation Test-Achats/Test-Ankoop.
[170] GfK: CLEAR – WP2.2. Consumer survey 2 – Identification of best approach to implement the group offer. Report Belgium, January 2015.

might endanger a project's economic viability. Because of the oversupply of renewable electricity and concurrent cuts in the 2020 targets, 'green certificate' prices collapsed.[171] Uncertainty increased with a new rule introduced in 2014 which obliges renewable project developers to reserve certificates covering the estimated electricity production before the installation of the power plant. While certificates were assigned automatically before, now there is an increased competition of operators to obtain certificates, increasing the risks of latency or failure.[172]

Which typical risks consumers face when starting a self-generation project

Financial risks: In general, the net metering scheme offers a relatively stable investment framework for consumers who want to launch their small-scale solar PV project. However, the introduction of retroactive grid charges on self-generation can endanger the economic viability of such installations.[173] For installations with more than 10 kW, the 'green certificates' scheme is disadvantageous and very insecure, bearing high risks in terms of amortisation.

Administrative barriers: Renewable self-generation might suffer from low coherence of the different levels of decision-making (Federal Government, regions, municipalities), e.g.: a tax deduction for solar PV is deleted on the federal level without compensation on regional level; municipalities may introduce own taxes on generated renewable electricity.[174]

Legal framework: The frequent changes in the complex support schemes and the retroactive changes clearly undermine consumers' position in the legal framework for renewable self-generation. The outcome of support scheme payments partially becomes incalculable. The framework increasingly fails to deliver transparency and predictability. In the case of the 'green certificates', consumers hardly can estimate the economic viability of an investment in solar PV.

Quality of offers and services: BEUC's national member Test-Achats/Test-Aankoop warns against unfair commercial practices of solar PV project developers that offer so-called 'free installations' to consumers. These third party investors often encashed the 'green certificates' without paying an appropriate remuneration to the consumers. In most cases, consumers probably would have got a better deal by taking out a loans for the investment in an own solar PV installation.[175] Test-Achats/Test-Aankoop started a collective purchase of solar PV systems in June 2015.[176]

Information on self-generation options: A survey under the CLEAR project showed that Belgians know very well what solar PV panels are (71% of people surveyed say so) but remain very sceptical and lack in information on self-generation technologies.[177] The most important information sources about renewable energy technologies that consumers opt for are manufacturers, friends and the consumer organisation. Consumers mostly search for how much money they would save compared to fossil energy sources. Compared with four other countries surveyed, Belgium scores highest with regard to the share of rejecters (42%), i.e. people who say that they would not consider buying solar PV panels

[171] 2020 Keep on track project: Analysis of deviations and barriers 2014/2015, June 2015, p. 94-108.
[172] 2020 Keep on track project: Analysis of deviations and barriers 2014/2015, June 2015, p. 94-108.
[173] Test-Achats/Test-Aankoop: Quelle rentabilité ? http://www.test-achats.be/maison-energie/energie/dossier/panneaux-photovoltaiques-toujours-interessant/13, 13 August 2015.
[174] 2020 Keep on track project: Analysis of deviations and barriers 2014/2015, June 2015, p. 94-108.
[175] Test-Achats/Test-Aankoop: Tiers investisseur : Que faire en cas de problème ? http://www.test-achats.be/maison-energie/energie/dossier/panneaux-photovoltaiques-toujours-interessant/8, 13 August 2015.
[176] Test-Achats/Test-Aankoop: Achat groupé & installation de panneaux photovoltaïques, https://mon-energie-renouvelable.be/p/achatgroupe_panneauxphot, 13 August 2015.
[177] GfK: Belgian respondents aren't fully convinced yet of Renewable Energy. Press release, 10 June 2015.

at all.[178] Test-Achats/Test-Aankoop provides a very exhaustive online information tool[179] to guide consumers who are interested in investing in renewable self-generation, raising awareness for potentials.

[178] GfK: CLEAR – WP2.1. Consumer survey 1 – Attitudes, opinion, drivers and barriers and satisfaction with regard to Renewable Energy Systems, October 2014.
[179] http://www.mijnhernieuwbareenergie.be, http://www.mon-energie-renouvelable.be

4.2.5 Summary of 'green electricity' markets and self-generation in Belgium

Conditions for consumers' 'green' choice		Remarks
Stage of market liberalisation		High concentration, but also high switching.
Renewable energy policy		Several retroactive changes, lack of coherence.
'Green electricity' market size and choice		Broad choice, advanced market.
Relevance of renewable self-generation		Clear grid parity, solar PV self-generation is widely spread amongst households.

Transparency of 'green' tariffs		
Definition of 'green electricity' offers		Only 100% renewable GOs tariffs can be marketed as 'green', but no qualitative criteria.
How 'green' tariffs are offered to consumers		No binding provisions, but understandable and meaningful disclosure reports.
How 'green' tariffs and the fuel mix are disclosed on the bill		No provisions that go beyond minimum criteria, environmental indicators on website only.
How environmental benefits of 'green' tariffs are proven to consumers		No provisions or obligations existing, but informative annual supplier ranking by NGOs.
How 'green electricity' quality labels guide consumers		Informative annual supplier ranking by NGOs.

Consumers' access to self-generation		
How grid access and use are guaranteed to self-generating consumers		Priority access, but retroactive network fee for self-generators.
How consumers' excess electricity production is treated		Adequate net metering, but prohibitive 'green certificates' scheme.
Which typical risks consumers face when starting a self-generation project		High uncertainty, except for small solar PV net metering systems.

Evaluation scale for transparency and market access

Good practice; issue showing good solutions related to transparency and/or market access from the point of view of consumers' rights	
Average performance; issue with some problems and some solutions related to transparency and/or market access from the point of view of consumers' rights	
Bad practice; issue with relevant problems related to transparency and/or market access from the point of view of consumers' rights	

4.3 Cyprus

National key indicators

Electricity consumption of households (residential) 2013: 1.437 TWh[180]
Renewable electricity generation 2013: 0.285 TWh (6.6% of total gross electricity consumption, EU28 average: 25.4%)[181]
Average electricity price 2014 (medium size households, incl. taxes and levies): 22.9 ct/kWh (EU28 average: 20.3 ct/kWh) [182]
Annual electricity bill of an average household in the capital Nicosia: 947 euro[183]

4.3.1 Conditions for consumers' 'green' choice

Stage of market liberalisation

Overview: Cyprus has been lagging behind and harmonised in 2012[184] the national legislation with the Third Energy Package. Until now, no interconnectors with neighbouring countries enable the island state to import or export electricity while the island's electricity supply mainly relies on diesel or heavy fuel oil generators. The European Commission's assessment of national energy markets recommends to make use of the island's renewable energy potential for reasons of security of supply.[185]

Market concentration: Although formally liberalised since January 2014, the only market participant at both wholesale and retail level is the state-owned company Electricity Authority of Cyprus (EAC). The Regulator licensed new entrants but they are not fully operational yet.[186]

Choice: 1 tariff offer from 1 electricity supplier available to household consumers in the capital Nicosia in 2013.[187] The dominant public company EAC offers only one single regulated tariff. The pricing methodology is subject to the consumed capacity[188] and the time zone (peak or off-peak).

Switching activity: Although since January 2014, consumers formally can switch, EAC remains the only company offering electricity.

Renewable energy policy

Target compliance: 2020 target for the share of renewable electricity in final consumption: 16% (2013: 6.6%). Cyprus reaches its National Renewable Energy Action Plan interim targets 2013 and the European Commission's progress report 2015 expects Cyprus to tightly accomplish the 2020 overall

[180] Eurostat: Supply, transformation and consumption of electricity - annual data, Electrical energy – residential http://ec.europa.eu/eurostat/tgm/table.do?tab=table&plugin=1&language=en&pcode=tsdpc310, 27 April 2015.
[181] Eurostat: Energy from renewable sources, http://ec.europa.eu/eurostat/web/energy/data/shares, 28 April 2015.
[182] Eurostat: Electricity prices per type of user, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_pc_204&lang=en, 28 April 2015.
[183] Incumbents' standard offers, 4,000 kWh consumption, see ACER/CEER annual report, p. 33.
[184] Cyprus Energy Regulatory Authority (CERA): National Report for 2013, July 2015.
[185] European Commission: EU Energy markets in 2014, October 2014, p. 91-94.
[186] European Commission: EU Energy markets in 2014, October 2014, p. 91-94.
[187] ACER/CEER annual report, p. 42.
[188] Electricity Authority of Cyprus (EAC): Domestic Use Tariffs, July 2013, https://www.eac.com.cy/EN/CustomerService/Tariffs/Documents/Domestic%20Use%20-%20Aug%202013.pdf.

target for the renewable share in final energy consumption (electricity, heating & cooling, transport).[189]

Main electricity support scheme: For solar PV, net metering applies in Cyprus. For other renewables, the Ministry of Energy issues subsidies for the installation of new generation capacities, FiTs or auctions on an annual base.[190] EAC is obliged by law to purchase energy produced from renewable energy sources. For large-scale renewables installations stable FiTs are provided for up to 20 years.[191]

Recent changes and trends: Households, public administration, industrial and commercial units are entitled to a net metering scheme for solar PV electricity generation since 2013. Households can use this scheme until a cap of 13.5 MW of totally installed capacity is reached. [192] The 'Solar Energy for All' scheme, introduced in 2013, addresses vulnerable households who want to invest in solar self-generation. [193] Natural persons belonging to vulnerable social groups are entitled to a grant of 900 euro per kW installed capacity when purchasing a solar PV installation until 3 kW. The scheme is capped at a totally installed capacity of 1.2 MW.[194]

'Green electricity' market size and choice

Choice: No 'green' tariff offers are available.[195]

Market size and development: No market participants exist.

Relevance of renewable self-generation

Grid parity: With levelised electricity generation costs of solar PV of around ca. 9 to 11 ct/kWh, Cyprus ranks amongst the European regions which can provide the cheapest solar PV electricity and there is a clear case for grid parity since several years. The average retail electricity price exceeded costs of solar PV by 12 to 14 ct/kWh in 2014, providing very attractive savings from self-consumption.[196]

[189] 2020 Keep on track project: EU Tracking Roadmap 2015. Keeping track of renewable energy targets towards 2020, June 2015, p. 31-33; European Commission: Renewable energy progress report, June 2015, p. 5.
[190] Eclareon: Keep-on-Track! Project National Report: Cyprus, February 2014.
[191] Partasides, George: Feed-in Tariff specifications, features, amendments and current and future challenges in Cyprus. IRENA Workshop on renewable energy policies, Abu Dhabi, 12 January 2013. Companies under this scheme have to give 2% of their annual income (before VAT) to the neighbouring municipalities where the installations are based.
[192] RES-LEGAL project: Cyprus - Net-Metering (for households, local administration buildings and commercial industrial units). http://www.res-legal.eu/search-by-country/cyprus/single/s/res-e/t/promotion/aid/net-metering-for-households-local-administration-buildings-and-commercial-industrial-units/lastp/115/, June 2015.
[193] Electricity Authority of Cyprus (EAC): Photovoltaic Roofs, https://www.eac.com.cy/EN/EAC/RenewableEnergySources/Pages/photovoltaicroofs.aspx, July 2015.
[194] RES-LEGAL project: Cyprus - Net-Metering (for households, local administration buildings and commercial industrial units). http://www.res-legal.eu/search-by-country/cyprus/single/s/res-e/t/promotion/aid/net-metering-for-households-local-administration-buildings-and-commercial-industrial-units/lastp/115/, June 2015.
[195] ACER/CEER annual report, p. 42.
[196] Joint Research Centre (JRC): Cost Maps for Unsubsidised Photovoltaic Electricity 2014, September 2014. The actual spread between the retail price on the one hand and the levelised generation cost of solar PV electricity may differ because the JRC model applied EU average data and did not take into account any eventual public support granted (e.g. tax exemptions) that could increase or decrease retail prices respectively generation cost.

Generation capacity: In 2014, the installed capacity reached 30 MW[197] (2013: 17.6 MW), producing 0.104 TWh of solar electricity equal to 1.4%[198] of gross electricity consumption (EU28 average: 3.5%; 2013: 0.056 TWh, 1.2%).[199]

Capacity per inhabitant: With 75.5 W, the installed capacity per inhabitant is less than half of the EU average (171.5 W).[200]

4.3.2 Evaluation of 'green' tariffs' transparency

Definition of 'green electricity' offers

Disambiguation: No 'green' tariff offers are available.

Qualitative minimum criteria: Since a legal definition of 'green' tariffs is missing, legislation does not presuppose any requirements related to environmental benefits of such offers.

Matching: No rules make sure that consumers get to know if they pay their supplier for kilowatt-hours generated or purchased from renewable power plants.

How 'green' tariffs are offered to consumers

Suppliers' information duties: Concerning the conditions for offering a 'green' tariff, no dedicated framework exists.

Online price comparison tools (PCTs): Switching is not feasible.

Disclosure report: No official listing or comparison of fuel mixes exist.

How 'green' tariffs and the fuel mix are disclosed on the bill

Functioning of legal fuel mix disclosure: No regulation on disclosure of the fuel mix has been implemented yet, but the national regulator, the Cyprus Energy Regulatory Authority (CERA), has prepared a disclosure system which was passed in May 2015. The regulation on the disclosure of the fuel mix foresees additional information concerning CO_2 emissions and radioactive waste related to an offer's fuel mix.

Advancement of fuel mix disclosure: The bill sent out by EAC does not yet include any special information about the composition of the fuel mix.[201] The minimum provisions of the Directive concerning fuel mix disclosure should be implemented once the disclosure system passed by CERA applies. The supplier mix as well as the product mix will be disclosed by default.[202]

Informative value: Consumers right to obtain official and reliable information on the fuel mix on their bill or in (pre-) contractual information is not yet respected but a fuel mix disclosure system is in preparation.

How environmental benefits of 'green' tariffs are proven to consumers

[197] EurObserv'ER: Photovoltaic Barometer 2014, May 2015, p. 10.
[198] Solar Power Europe (SPE): Global market outlook for solar power 2015 – 2019, June 2015, p. 26.
[199] EurObserv'ER: Photovoltaic Barometer 2014, May 2015, p. 10.
[200] EurObserv'ER: Photovoltaic Barometer 2014, May 2015, p. 7-9.
[201] Electricity Authority of Cyprus (EAC): Billing information, https://www.eac.com.cy/EN/CustomerService/YourBill/DomesticBillExplainedPDFs/DomesticBillExplainedENbig2.pdf, July 2015.
[202] Information provided by the Transmission System Operator of Cyprus (DSM) which is in charge of legal fuel mix disclosure and acting as the issuing body for GOs.

Legal provisions: No rules apply to communicating environmental benefits of 'green' tariffs.

Additionality: Suppliers of 'green electricity' tariffs would not be obliged to communicate about additionality of their offers to consumers. No rules apply for measuring the environmental benefits of consumers' choice for 'green' tariffs. The consumer would not be able to verify the relevance or consistence of the environmental claims made by a supplier with regard to its 'green' tariff.

How 'green electricity' quality labels guide consumers

Relevance of labels: No 'green electricity' quality labels are active in Cyprus.

Functioning of labels: No 'green electricity' quality labels are active in Cyprus.

4.3.3 Evaluation of consumers' access to self-generation

How grid access and use are guaranteed to self-generating consumers

Procedure: Consumers who want to start a self-generation project below 5 MW installed capacity can be exempted from the attribution of an operation licence which is issued by CERA.

Legal status: Self-generators have the right to be connected and use the electricity grid on the base of a contract with the grid operator. Renewable power plants cannot rely on priority access to the grid but have to be connected in a non-discriminatory way. The grid operator is obliged to assess grid connection demands within 90 days. After the project's approval, the solar PV installation has to be connected within three months at latest.[203]

Commensurability of costs: If the grid has to be expanded, costs are transferred to the plant operator.[204] In order to access the net-metering scheme, consumers have to pay a fee of 250 euro. For small self-generation units, this may represent a relatively high amount in relation to the total investment cost. Assumed that typical solar PV self-generation units with 3 kW of installed capacity produce approximately 5,000 kWh per year, BEUC's national member organisation, Cyprus Consumer Association (CCA), regards this amount as too high and suggests to restrict it to the actual administrative costs.

How consumers' excess electricity production is treated

Rationale of the support scheme: The electricity offsetting is carried out every two months by the self-generator's electricity supplier. Surplus electricity can be virtually transferred to the following billing period until the end of one year. The total electricity production of the solar PV self-generation unit is taken into account each time EAC sends a bill to the consumer. If during a billing period the solar PV system has generated more electricity than was consumed, this surplus electricity will be transferred as credit to the following billing period. EAC will reconcile the total production at the end of the calendar year where any excess generation 'stays in the grid' as electricity generated by EAC at zero cost. BEUC's national member organisation, Cyprus Consumer Association (CCA), considers that this is unfair and should be revised in favour of the consumer.

Remuneration: Within the net-metering scheme, excess electricity is not remunerated but the meter runs backwards, decreasing the amount of kilowatt-hours to be invoiced at the consumer's expenses.

[203] RES-LEGAL project: Grid issues in Cyprus, http://www.res-legal.eu/search-by-country/cyprus/tools-list/c/cyprus/s/res-e/t/gridaccess/sum/116/lpid/115/, June 2015.
[204] RES-LEGAL project: Grid issues in Cyprus, http://www.res-legal.eu/search-by-country/cyprus/tools-list/c/cyprus/s/res-e/t/gridaccess/sum/116/lpid/115/, June 2015.

Investment security: Compared to the high retail electricity prices, net metering as an indirect remuneration scheme may turn out to be relatively advantageous, provided that the consumer configures the size of his solar PV unit as small to cover exactly his estimated annual electricity consumption.

Which typical risks consumers face when starting a self-generation project

Financial risks: Limited access to finance is one of the main barriers to consumers. Notably, consumers who are not eligible for financial support face difficulties in disbursing the necessary funds for the investment.

Administrative barriers: Solar PV self-consumption tends to become even more attractive for consumers on the isolated island market with its very advantageous spread between high retail electricity costs and very low solar electricity generation costs. But this potential could remain untapped because of the annual stop-go regarding the regulatory framework. As grants and schemes are often published short-term, depending on limited annual budgets, they can only work out for a limited period of time, before reaching a low cap.[205]

Legal framework: Self-generators have no possibility to sell their excess electricity to third parties. Although the Cypriote government provides a number of dedicated schemes in favour of small-scale solar PV projects, experts state that uncertainty prevails because of the frequent policy changes In addition, conditions are significantly worse for slightly bigger commercial solar PV projects.[206] Charging 'prosumers' with grid connection costs can also hinder self-generation projects in an inappropriate way.

Quality of offers and services: Solar PV self-generation still is a relatively new and small market in Cyprus.

Information on self-generation options: Consumers participating in the net metering scheme rely on the information provided by solar panel providers and installers. BEUC's national member, Cyprus Consumers' Association (CCA) stresses the need for more reliable information about the relevant criteria for comparing offers (including specifications such as peak power, Nominal Operating Cell Temperature (NOCT), panel efficiency, guarantees, cost, certification ...). Similarly, more information is required for other self-generation technologies. No one-stop shop for consumers exists.

[205] Eclareon: Keep-on-Track! Project National Report: Cyprus, February 2014.
[206] 2020 Keep on track project: National report: Cyprus, February 2015.

4.3.4 Summary of 'green electricity' markets and self-generation in Cyprus

Conditions for consumers' 'green' choice		Remarks
Stage of market liberalisation		Formally liberalised, but still dominated by monopolist, no switching possible.
Renewable energy policy		Net-metering, without remuneration of excess electricity, frequent changes in support schemes.
'Green electricity' market size and choice		No 'green' offers available on the market.
Relevance of renewable self-generation		Very high potential because of low generation costs and the island's need to diversify.

Transparency of 'green' tariffs		
Definition of 'green electricity' offers		No definition existing.
How 'green' tariffs are offered to consumers		No provisions or obligations existing.
How 'green' tariffs and the fuel mix are disclosed on the bill		A fuel mix disclosure system is in preparation but not yet fully implemented.
How environmental benefits of 'green' tariffs are proven to consumers		No provisions or obligations existing.
How 'green electricity' quality labels guide consumers		No 'green electricity' quality labels exist.

Consumers' access to self-generation		
How grid access and use are guaranteed to self-generating consumers		Simplified grid connection for small self-generators, but cost for grid extension may be charged.
How consumers' excess electricity production is treated		No remuneration within the net-metering scheme.
Which typical risks consumers face when starting a self-generation project		Lack of access to capital to cover high upfront investment costs, frequent changes of support schemes.

Evaluation scale for transparency and market access

Good practice; issue showing good solutions related to transparency and/or market access from the point of view of consumers' rights	
Average performance; issue with some problems and some solutions related to transparency and/or market access from the point of view of consumers' rights	
Bad practice; issue with relevant problems related to transparency and/or market access from the point of view of consumers' rights	

4.4 Denmark

National key indicators

Electricity consumption of households (residential) 2013: 10.307 TWh[207]
Renewable electricity generation 2013: 15.450 TWh (43.1% of total gross electricity consumption, EU28 average: 25.4%)[208]
Average electricity price 2014 (medium size households, incl. taxes and levies): 30.4 ct/kWh (EU28 average: 20.3 ct/kWh) [209]
Annual electricity bill of an average household in the capital Copenhagen: 1,221 euro[210]

4.4.1 Conditions for consumers' 'green' choice

Stage of market liberalisation

Overview: Denmark is one of Europe's pioneer countries in wind energy and strives to cover half of its electricity supply by 2020 with wind turbines. The Danish electricity market was liberalised in 2003 but around 90% of consumers stick to regulated prices of their default supplier which will cease by October 2015. Retail electricity prices are the highest in the EU.[211]

Market concentration: Competition remains low on the retail electricity market. As a part of the Nord Pool Spot, on the wholesale market level Denmark is strongly linked with its neighbours. Household electricity suppliers' mark-ups still were at an average level of around 1.2 ct/kWh in 2013.[212]

Choice: 124 different tariff offers from 23 electricity suppliers available to household consumers in the capital Copenhagen in 2013[213]

Switching activity: Annual switching rate 2013: 6.2% (EU28 average: 5.6%)[214], average 2008-2012: ca. 3% (EU28 average: 4%).[215] Overall consumer satisfaction with the electricity market has the highest score in the EU.[216] Annual savings to be encashed by consumers in the capital through switching are on average 110 euro.[217]

Renewable energy policy

Target compliance: 2020 target for the share of renewable electricity in final consumption: 51.9% (2013: 25.6%). Provided that the growth rates in the electricity sector continue, the 2020 electricity target probably will be reached.[218] With growth rates in renewable heating and the renewables'

[207] Eurostat: Supply, transformation and consumption of electricity - annual data, Electrical energy – residential http://ec.europa.eu/eurostat/tgm/table.do?tab=table&plugin=1&language=en&pcode=tsdpc310, 27 April 2015.
[208] Eurostat: Energy from renewable sources, http://ec.europa.eu/eurostat/web/energy/data/shares, 28 April 2015.
[209] Eurostat: Electricity prices per type of user, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_pc_204&lang=en, 28 April 2015.
[210] Incumbents' standard offers, 4,000 kWh consumption, see ACER/CEER annual report, p. 33.
[211] European Commission: EU Energy markets in 2014, October 2014, p. 43-47.
[212] ACER/CEER annual report, p. 57-58.
[213] ACER/CEER annual report, p. 42.
[214] ACER/CEER: Annual report, p. 79.
[215] ACER/CEER: Annual report, p. 69.
[216] European Commission: EU Energy markets in 2014, October 2014, p. 51.
[217] ACER/CEER: Annual report, p. 72.
[218] 2020 Keep on track project: EU Tracking Roadmap 2015. Keeping track of renewable energy targets towards 2020, June 2015, p. 37-39.

share in transport maintained, according to the European Commission's progress report, Denmark might exceed its overall 2020 target.[219]

Main electricity support scheme: Denmark offers a variable market premium and bonuses on top of the wholesale market price to all renewable energy sources. Tariff rates are fixed in an administrative procedure, except tenders for offshore wind parks. Net metering on an hourly base is the default scheme for all solar PV installations that are owned by the consumer, who then benefits from tax exemptions. Building-integrated solar PV installations can apply for a subsidy to recover a part of investment cost. This support is granted by the national transmission system operator Energinet.dk after applicants successfully replied to a tender.

Recent changes and trends: 2013 and 2014 saw a sharp decline in consumers' investment in solar PV systems after the government changed the annual net metering to an hourly scheme in view of a loss of tax revenues from the Public Service Obligation.[220]

'Green electricity' market size and choice

Choice: 34 different 'green' tariff offers from 9 electricity suppliers available to household consumers in the capital Copenhagen in 2013.[221] 32 different 'green' tariffs from 10 suppliers were available in September 2015.[222]

Market size and development: Consumers can switch tariffs and suppliers since 2003. In 2009, 10 out of 50 suppliers offered a 'green' tariff.[223] The number of suppliers offering a dedicated 'green' tariff has not increased since then. However, according to BEUC's national member organisation Forbrugerrådet Tænk, the quality of the products has improved and bigger companies are now also offering them. Depending on the consumer's choice for a fixed or a variable price contract, the number of offers may differ. No estimations concerning the number of customers or the amount of electricity sold under 'green' tariffs is known. Since only 6% of all tariff products are based on disclosure of Guarantees of Origins (GOs) and the use of GOs is only mandatory in the case of claims referring to renewable energy, the market share of 'green' tariffs presumably cannot exceed this percentage.[224]

Relevance of renewable self-generation

Grid parity: With levelised electricity generation costs of solar PV of around ca. 18 to 20 ct/kWh, grid parity was reached in all parts of the country in 2014. The average retail electricity price exceeded costs of solar PV by 10 to 12 ct/kWh, providing attractive savings from self-consumption.[225]

Generation capacity: In 2014, the installed capacity of more than 530,000 solar PV units[226] reached 602 MW, of which ca. 75% were installed in the residential sector[227] (2013: 572 MW), producing

[219] European Commission: Renewable energy progress report, June 2015, p. 5.
[220] EurObserv'ER: Photovoltaic Barometer 2014, May 2015; Latour, Marie: Net-metering and self-consumption schemes in Europe. Presentation, 30 September 2013.
[221] ACER/CEER annual report, p. 42.
[222] Elpristavlen, http://www.elpristavlen.dk, 28 October 2015.
[223] Price Waterhouse Coopers: Green Electricity Making a Difference. An International Survey of Renewable Electricity Labels. May 2009, p. 45.
[224] RE-DISS II project: Country profiles: Denmark, http://www.reliable-disclosure.org/upload/168-RE-DISSII_Country_Profile_DK_2015V03.pdf, 22 April 2015.
[225] Joint Research Centre (JRC): Cost Maps for Unsubsidised Photovoltaic Electricity 2014, September 2014. The actual spread between the retail price on the one hand and the levelised generation cost of solar PV electricity may differ because the JRC model applied EU average data and did not take into account any eventual public support granted (e.g. tax exemptions) that could increase or decrease retail prices respectively generation cost.

0.557 TWh of solar electricity equal to 1.7%[228] of gross electricity consumption (EU28 average: 3.5%; 2013: 0.518 TWh, 1.4%).[229]

Capacity per inhabitant: With 106.9 W, the installed capacity per inhabitant is below the EU average (171.5 W).[230]

4.4.2 Evaluation of 'green' tariffs' transparency

Definition of 'green electricity' offers

Disambiguation: Instead of a binding legal definition of tariffs marketed with an environmental claim, a voluntary agreement applies. The energy industry in 2009 declared to aim at providing consumers "with a true declaration of information" and to ensure that 'green' tariffs' claims are made accurately and objectively. In practice, a Working Group concerning labeling of electricity products with climate choice in 2010 developed three classes of tariff products with additional environmental benefits, based on tiered qualitative minimum requirements.[231] As a round table platform, the Working Group gathered stakeholders from electricity suppliers and traders, from the transmission system operator and the Danish Energy Agency as well as environmental organisations and BEUC's national member organisation Forbrugerrådet Tænk. The agreed document that detailed the minimum requirements officially was supported and welcomed by the Minister for Climate and Energy.[232]

Qualitative minimum criteria: Instead of defining 'green' tariffs, the Working Group's document focusses on tariffs that include a voluntary surcharge of the price per kilowatt-hour paid by the consumer to initiate additional environmental benefits from the point of view of climate protection (so-called 'climate choice'). Tariffs that are bundled with any donations for carbon offsetting without relation to the specific electricity consumption are not included, e.g. if a supplier provides electricity from wind turbines and promises to donate a certain amount of money for solar PV lamps in Africa. According to the Working Group's document, the contribution can be realised through three different approaches: a first category gives suppliers the opportunity to implement environmental benefits through cancellation of CO_2 allowances or CO_2 credits. Approved reductions within the United Nations' register are deleted and can no longer be converted into emission permits for companies.[233] The second category suggests that suppliers collect the supplementary amount spent by consumers on top of the kilowatt-hour price in a separate fund. The fund provides capital for investments to be made by the supplier or a subsidiary into new renewable generation capacities. The third category allows suppliers to back their tariffs with renewable GOs from recently build plants (not older than two respectively ten years). By purchasing recently issues GOs, demand for these GOs could increase. Future overshooting demand then could help making investments in new generation capacities more promising. The mere use of any renewable GOs without age limits is also

[226] EurObserv'ER: Photovoltaic Barometer 2014, May 2015, p. 10.
[227] Solar Power Europe (SPE): Global market outlook for solar power 2015 – 2019, June 2015, p. 22.
[228] Solar Power Europe (SPE): Global market outlook for solar power 2015 – 2019, June 2015, p. 26.
[229] EurObserv'ER: Photovoltaic Barometer 2014, May 2015, p. 10.
[230] EurObserv'ER: Photovoltaic Barometer 2014, May 2015, p. 7-9.
[231] Dansk Elhandel: Working Group concerning labeling of electricity products with climate choice. Memo, first revised version, 31 January 2011.
[232] Salamon, Martin: Defining 'green electricity' offers. The Danish experience. Presentation, Brussels, 12 May 2015. The adoption of the declaration has lead to a general clean-up of product descriptions and of the development of new products.
[233] Other recognised approval schemes from projects outside the EU Emission Trading System (ETS) or UN schemes may also apply under certain conditions. Given the current deficiencies of the Emission Trading Scheme, environmental organisations do not support this category at the moment.

conceded because the revenues of GOs could ensure an economic incentive for the maintenance of existing wind power plants.[234]

Matching: The Working Group's definition of 'climate choice' tariffs implies that the tariff product is backed with simultaneous electricity purchase. However, it is not explicitly required to match the purchase of renewable GOs with the purchase of renewable kilowatt-hours from the identic renewable power plant. Consumers cannot rely on any binding information when they want to know whether a 'climate choice' tariff is backed with power purchase contracts from renewable power plants or not.

How 'green' tariffs are offered to consumers

Suppliers' information duties: The Working Group's document sets rules for suppliers' communication on environmental claims related to 'climate choice' tariffs. The Danish Electricity Trading Association monitors the implementation of the voluntary agreement. Deviations will lead to actions towards the supplier and public statements by the Consumer Ombudsman, by the consumer organisation and by environmental organisations that participate in the Working Group. The voluntary enforcement can be seen as an addition to the existing, more general Consumer Ombudsman's guidance on environmental and ethical claims in marketing.[235]

Online price comparison tools (PCTs): The official PCT[236] is run by the Danish Energy Association, an industry's umbrella group of energy companies. The three categories for qualitative minimum criteria of environmental benefits are displayed in a very transparent way, but only if consumers willingly tick 'climate choice' tariffs. The comfortable research options allow users to opt for each of the three categories and their subcategories to be shown or not. Detailed information is provided on the differences related to additional environmental benefits. However, the fuel mix is not disclosed on the PCT, neither for 'climate choice' tariffs nor for other offers.

Disclosure report: No official listing or comparison of fuel mixes exist.

How 'green' tariffs and the fuel mix are disclosed on the bill

Functioning of legal fuel mix disclosure: Fuel mix disclosure is binding for all suppliers since 2005. The transmission system operator provides a general label which applies for all products without any specific claims. It is equal to the national average default mix. The share of renewable energy in the fuel mix disclosure must be based on renewable Guarantees of Origin (GOs). A harmonised GO tracking scheme is operational and run by the transmission system operator under the auspices of the Danish Energy Agency. All supported renewable electricity is entitled to receive tradable GOs. For the calculation of their fuel mix, suppliers may apply a contract-based tracking scheme, but this is not further specified in the regulation. In contrast to many other Member States, no supplier mix is published.[237]

Advancement of fuel mix disclosure: Implementation of fuel mix disclosure partially is below and partially beyond the minimum provisions fixed in the Directive. Concerning the different energy sources, consumers find wind power, solar PV and hydropower presented as one cumulated block in

[234] Dansk Elhandel: Working Group concerning labeling of electricity products with climate choice. Memo, first revised version, 31 January 2011.
[235] Salamon, Martin: Defining 'green electricity' offers. The Danish experience. Presentation, Brussels, 12 May 2015.
[236] Elpristavlen, http://www.elpristavlen.dk, 10 August 2015.
[237] RE-DISS II project: Country profiles: Denmark, http://www.reliable-disclosure.org/upload/168-RE-DISSII_Country_Profile_DK_2015V03.pdf, 22 April 2015.

the fuel mix, separated from a block 'biomass, biogas and energy from waste'. Nuclear power and the different fossil fuels are disclosed separately. Supported renewable electricity that already received consumers' funding through the Public Service Obligation is not disclosed separately. The country of origin of the GOs is not disclosed neither. On the other hand, environmental indicators (CO_2 emissions, radioactive waste) are presented on a very detailed level with figures for all kinds of emissions (CO_2, CH_4, N_2O, SO_2, NO_x, NMVOC and particles) as well as further residuals such as the quantities of coal fly ash etc.[238]

Informative value: Disclosure of the fuel mix is mostly coherent, but not very informative because 94% of tariff products just use the national average default values to label their tariff. Only 6% of tariffs' fuel mix disclosure is based on GOs. Furthermore, almost no differentiation between the suppliers' fuel mixes is available. The exhaustive list of greenhouse gas emissions and residuals related to the product fuel mix does not necessarily help consumers to evaluate the environmental performance of the suppliers on the market. Therefore, the initial guidance function of the fuel mix disclosure is only partially assured.

How environmental benefits of 'green' tariffs are proven to consumers

Legal provisions: No binding legal provisions apply but the Working Group's document (see "Definition of 'green electricity' offers – Qualitative minimum criteria") provides detailed rules on how to communicate and how to furnish proof of the additional environmental benefits that are expected to be generated by a 'climate choice' tariff.

Additionality: Under the Working Group's scheme (see "Definition of 'green electricity' offers – Qualitative minimum criteria"), the first category to implement environmental benefits through cancellation of CO_2 allowances or CO_2 credits requires an auditor's annual confirmation that there is consistency between the sales under the tariff and the total amount of allowances or credits that have been cancelled. Suppliers have to describe the additionality of the specific emission reduction projects to their customers. The second category which allows suppliers to put revenues aside in an investment fund requires an annual third party assessment of the appropriateness of the investment and its electricity production in relation to the revenues and the electricity consumption under the tariff. In pre-contractual information, consumers have to be informed about the renewable technology and the country where the investment is directed to. Consumers should get an annual overview of the spending of their surcharge. Profits from newly installed plants should be reinvested in new renewable power plants. The third category comprises the use of renewable GOs which in practice is already implemented by the national GO registry. A third party auditor additionally should confirm the fulfilment of the provisions fixed in the Working Group's document. Suppliers have to communicate to the customers the power plant's age and the country where it is located.[239]

How 'green electricity' quality labels guide consumers

Relevance of labels: BEUC's national member organisation Forbrugerrådet Tænk as well as the environmental organisations participating in the Working Group perceive the rules fixed in the third category of the Working Group's document (see "Definition of 'green electricity' offers – Qualitative minimum criteria") as too weak to prove additionality of a 'climate choice' tariff. Buying a GO from existing old renewable power plants that reach amortisation on the wholesale market, thanks to the

[238] RE-DISS II project: Country profiles: Denmark, http://www.reliable-disclosure.org/upload/168-RE-DISSII_Country_Profile_DK_2015V03.pdf, 22 April 2015.
[239] Dansk Elhandel: Working Group concerning labeling of electricity products with climate choice. Memo, first revised version, 31 January 2011.

market premium or any other public support scheme doesn't provide nearly any additional environmental benefit. For this reason, they recommend a more meaningful presentation of the different assumed environmental benefits. As a consequence, the environmental organisation Det Økologiske Råd (The Danish Ecological Council) launched the online comparison tool Grøntelvalg (Green electricity choice).[240] It ranks existing tariff offers from A- to D-class and exposes tariffs that have no or very little environmental impact. This tool transfers the rather technical criteria catalogue of the Working Group's document to a meaningful orientation for consumers' choice.

Functioning of labels: The Grøntelvalg A-class is granted to tariffs with a fixed high supplementary amount on every kilowatt-hour to be spent for investments in new generation capacities. The B-class tariffs entail a lower supplementary amount on every kilowatt-hour, spent on new capacities in Denmark or abroad, or the tariffs state that they purchase electricity from newly installed plants. In 2015, only 10 'green' tariffs were classified in these most ambitious two categories. The C-class and D-class unite tariffs with low or no additionality because these tariffs are based on renewable GOs and/or electricity purchase from old power plants. 'Carbon neutral' offers that are backed by cancellation of emission certificates within the European Emission Trading System (ETS) are excluded from the classification as presumably being without any impact, due to the oversupply of emission rights.[241] No other private 'green electricity' labels are active in Denmark.

4.4.3 Evaluation of consumers' access to self-generation

How grid access and use are guaranteed to self-generating consumers

Procedure: Access is organised in a relatively simple and reliable way. Consumers who want to participate in the net metering scheme have to apply at the national transmission system operator Energienet.dk at least one month before they want to start. New installations must submit the application together with the request for grid connection.[242]

Legal status: Plant operators are not granted priority but non-discriminatory grid access.

Commensurability of costs: Net metering is exempted from the Public Service Obligation (levy allocating the differential costs of the market premium support scheme). Grid operators fear a loss in revenues from network fees. A debate on a reform of network fees could change self-generators' status and impose a fee on their use of the network.[243]

How consumers' excess electricity production is treated

Rationale of the support scheme: Within the market premium scheme, a dedicated rate category for small solar PV self-generation with up to 6 kW of installed capacity per household is applicable for ten years. The solar PV system is supposed to be enabled to local self-consumption and the limited remuneration nudges self-generators to optimise their individual self-consumption share. The maximum amount of market premium, bonuses and the market price digresses annually. Alternatively, net metering is offered on an hourly basis to all renewable power plants that are fully owned by the consumer. The hourly netting forces consumers to optimise self-consumption and to avoid excess electricity to be fed into the grid. Consumers who run a solar PV self-generation with up to 50 kW are fully exempt from the Public Service Obligation on self-consumed electricity which

[240] Grøntelvalg, http://www.grøntelvalg.dk, 10 August 2015.
[241] Grøntelvalg, http://www.grøntelvalg.dk, 10 August 2015.
[242] RES-LEGAL project: Grid issues in Denmark, http://www.res-legal.eu/search-by-country/denmark/tools-list/c/denmark/s/res-e/t/gridaccess/sum/95/lpid/96/, 18 November 2014.
[243] Londo, Marc: Self-generation and self-consumption. National examples and possible ways forward with a focus on solar-PV. Presentation, London, 13 March 2015.

normally is charged on every kilowatt-hour. Installations with more than 50 kW are partially exempted. Tenants may also benefit from the exemptions if their landlord owns the renewable power plant and technical access to net metering is provided, combined with an hourly billing system.

Remuneration: Feeding in electricity from solar PV units is remunerated with a maximum of 1.30 DKK/kWh (17 ct/kWh), but limited to ten years and annually cut by 0.14 DKK/kWh (2 ct/kWh). The payment is capped. Only installations up to a cumulative annual threshold of 20 MW are granted remuneration.[244] 'Common' solar PV projects are remunerated with 1.45 DKK/kWh (19.4 ct/kWh) and 'common' solar PV projects without self-consumption facility receive 0.90 DKK/kWh (12 ct/kWh). Hybrid installations including 'strategically important technology' may opt for a bonus of 0.26 DKK/kWh (3 ct/kWh) during ten years and 0.06 DKK/kWh (0.8 ct/kWh) for a further ten years. No direct remuneration for excess electricity is granted but the self-generator's meter runs backwards on an hourly basis for every surplus kilowatt-hour fed into the grid during this period of time.[245] The change in policy was motivated by high levels of indirect remuneration through the yearly accounting.

Investment security: The market premium scheme provides a stable remuneration which is, however, limited to ten years only. Amortisation of a self-generation project will be possible with high self-consumption rates, given that very high retail prices of 30 ct/kWh can be offset. On the other hand, the net metering scheme disadvantages a real engagement in self-generation because of the penalising time limit. Consumers would configure the size of their solar PV unit rather small in order not to exceed to often their maximum hourly electricity consumption. In this case, even under the condition of high self-consumption rates, amortisation might be lengthened and the attractiveness of taking on new installations is reduced for many households. It remains unclear to what extend tenants really can benefit from self-consumption under the scheme. There has thus been a preference of private houseowners over tenants in the way the system has been set up. Business models involving tenants or third parties might be restricted because landlords themselves would have to own and run the solar PV systems.

Which typical risks consumers face when starting a self-generation project

Financial risks: Consumers in Denmark face difficulties with regard to the amortisation of their installation under the new hourly net metering scheme which reduces the implied subsidies from other consumers to self-generators via tax-exemption and non-payment of networks fees.

Administrative barriers: No major problems concerning accessibility or bureaucracy occur.

Legal framework: Consumers' status as self-generators is protected and a dedicated support scheme is provided. No retroactive changes applied until now.

Quality of offers and services: No major problems or complaints known referring to the range of choice and commercial practices.

Information on self-generation options: No one-stop shop for consumers exists.

[244] Baekhoj Kjaer, Soren/Benz, Christian/Gonlazez, Abraham: Impact of new Danish hourly based net metering on the acceptable solar PV system cost. Presentation, Paris, 11 October 2013.
[245] RES-LEGAL project: Promotion in Denmark, http://www.res-legal.eu/search-by-country/denmark/tools-list/c/denmark/s/res-e/t/promotion/sum/95/lpid/96/, 18 November 2014.

4.4.4 Summary of 'green electricity' markets and self-generation in Denmark

Conditions for consumers' 'green' choice		Remarks
Stage of market liberalisation		Liberalised, but low competition.
Renewable energy policy		Traditional forerunner of energy transition in the EU with far-reaching targets for renewables.
'Green electricity' market size and choice		Stagnating market, stable number of tariffs and suppliers.
Relevance of renewable self-generation		Solar PV bears important potential for cost reduction in the context of high retail prices.

Transparency of 'green' tariffs		
Definition of 'green electricity' offers		Voluntary agreement for tariff products marketed with claims on environmental effects.
How 'green' tariffs are offered to consumers		Suppliers have to comply with one of three categories for qualitative minimum criteria.
How 'green' tariffs and the fuel mix are disclosed on the bill		No differentiation between suppliers' fuel mixes, informative value remains low.
How environmental benefits of 'green' tariffs are proven to consumers		Clear rules for additionality, but purchase of GOs without age limit is allowed.
How 'green electricity' quality labels guide consumers		A to D class labelling guides consumers to trustworthy offers with additional benefits, discourages unlabelled.

Consumers' access to self-generation		
How grid access and use are guaranteed to self-generating consumers		No priority, but normally hassle-free access.
How consumers' excess electricity production is treated		Hourly net metering is rather prohibitive but saves taxes and fees, market premium pay-off remains questionable.
Which typical risks consumers face when starting a self-generation project		Relatively low risk, amortisation difficult to calculate, self-consumed electricity risks network fee charged

Evaluation scale for transparency and market access

Good practice; issue showing good solutions related to transparency and/or market access from the point of view of consumers' rights	
Average performance; issue with some problems and some solutions related to transparency and/or market access from the point of view of consumers' rights	
Bad practice; issue with relevant problems related to transparency and/or market access from the point of view of consumers' rights	

4.5 Germany

National key indicators

Electricity consumption of households (residential) 2013: 136 TWh[246]
Renewable electricity generation 2013: 152.283 TWh (25.6% of total gross electricity consumption, EU28 average: 25.4%)[247]
Average electricity price 2014 (medium size households, incl. taxes and levies): 29.8 ct/kWh (EU28 average: 20.3 ct/kWh)[248]
Annual electricity bill of an average household in the capital Berlin: 1,204 euro[249]

4.5.1 Conditions for consumers' 'green' choice

Stage of market liberalisation

Overview: Being one of the forerunners of liberalised electricity markets, German consumers and companies were able to switch their supplier since 1998. The Third Energy Package is fully implemented into national law. On the wholesale markets, intraday and day-ahead trading are coupled with several neighbouring countries.

Market concentration: Electricity markets remain dominated by four largest suppliers (78% of the electricity fed into the grid in 2012 outside of renewable electricity with priority grid access produced under the feed-in tariff law). German customers can chose amongst a very broad range of offers from a high number of suppliers. The European Commission generally evaluates the electricity market as reasonably competitive.[250] While retail prices rank amongst the highest in the EU, wholesale market prices decreased because of overcapacities and the rapid expansion of renewable generation capacities, putting wholesale prices and the four largest suppliers under pressure. Household electricity suppliers' mark-ups still were amongst the highest in the EU with more than 2.5 ct/kWh in 2013.[251]

Choice: 376 different tariff offers from 146 electricity suppliers available to household consumers in the capital Berlin in 2013[252]

Switching activity: Annual switching rate 2013: 5.7% (EU28 average: 5.6%)[253], average 2008-2012: ca. 6% (EU28 average: 4%).[254] Overall consumer satisfaction with the electricity market has the highest score in the EU.[255] Annual savings to be encashed by consumers in the capital through switching are by far the highest in the EU with on average 375 euro.[256]

[246] Eurostat: Supply, transformation and consumption of electricity - annual data, Electrical energy – residential http://ec.europa.eu/eurostat/tgm/table.do?tab=table&plugin=1&language=en&pcode=tsdpc310, 27 April 2015.
[247] Eurostat: Energy from renewable sources, http://ec.europa.eu/eurostat/web/energy/data/shares, 28 April 2015.
[248] Eurostat: Electricity prices per type of user, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_pc_204&lang=en, 28 April 2015.
[249] Incumbents' standard offers, 4,000 kWh consumption, see ACER/CEER annual report, p. 33.
[250] European Commission: EU Energy markets in 2014, October 2014, p. 48-53.
[251] ACER/CEER annual report, p. 57-58.
[252] ACER/CEER annual report, p. 42.
[253] ACER/CEER: Annual report, p. 79.
[254] ACER/CEER: Annual report, p. 69.
[255] European Commission: EU Energy markets in 2014, October 2014, p. 51.
[256] ACER/CEER: Annual report, p. 72.

Renewable energy policy

Target compliance: 2020 target for the share of renewable electricity in final consumption: 38.6% (2013: 25.6%). Provided that the high growth rates in the electricity sector continue, the 2020 electricity target probably will be reached easily.[257] However, since growth in renewable heating and the renewables' share in transport is lagging behind, Germany might just fulfil tightly its overall 2020 target (18%).[258]

Main electricity support scheme: Renewable electricity always has been supported with feed-in tariffs (FiT), introduced with a precursor of the current Renewable Energy Sources Act in 1991.

Recent changes and trends: With the 2014 revision of the Renewable Energy Sources Act, for more and more newly installed units, the fixed feed-in tariffs are replaced by a market premium that fills up the gap between the wholesale market price and the reduced level of the former feed-in tariff. This means that the plant operator running a renewable power plant installation above a certain installed capacity, has to sell the kilowatt-hours directly to the wholesale markets. In case the monthly wholesale market price is lower than the theoretical level of the feed-in tariff – which is mostly the case – a market premium is paid to cover the difference. As a consequence, plant operators have an incentive to market their electricity in a more flexible way, targeting price peaks on the wholesale markets. A fundamental reorientation will take place with the introduction of tenders, starting with ground-mounted solar PV power plants in 2015. Above a certain threshold of installed capacity of their power plant, project developers have to respond to a tender in order to be able to apply for the market premium. The level of the premium will be fixed through an auction, following a competitive bidding procedure uniting all planned projects. The revised 2014 Renewable Energy Sources Act also sets caps to limit the maximum deployment of newly installed renewable generation capacity during a year.[259] Small-scale solar PV installations under 500 kW (<100 kW in 2016) are still are entitled to fixed FiTs but it is not clear if FiTs, mainly used by private households, house-owners and small community projects, will persist in the medium term.

'Green electricity' market size and choice

Choice: 201 different 'green' tariff offers from 107 electricity suppliers available to household consumers in the capital Berlin in 2013.[260] A research commissioned by the Federal Environment Agency Umweltbundesamt (UBA) counted 810 suppliers offering at least one 'green' tariff in October 2012, totalling 3,839 different 'green' tariffs that partially were only sold on a regional level by small local utilities. 23 suppliers surveyed exclusively offered 'green' tariffs. For most of the suppliers, 'green' tariffs do not make up more than 25% of their total turnover.[261] Half of the suppliers sell their 'green' tariff to less than 1,000 customers.[262] A relevant share of German consumers is willing to pay more for 'green electricity', provided that this leads to meaningful environmental benefits.[263]

[257] 2020 Keep on track project: EU Tracking Roadmap 2015. Keeping track of renewable energy targets towards 2020, June 2015, p. 49-51.
[258] European Commission: Renewable energy progress report, June 2015, p. 5.
[259] Federal Ministry for Economic Affairs: 2014 Renewable Energy Sources Act. Plannable. Affordable. Efficient. http://www.bmwi.de/EN/Topics/Energy/Renewable-Energy/2014-renewable-energy-sources-act.html, 24 July 2015.
[260] ACER/CEER: Annual report, p. 42.
[261] Umweltbundesamt (UBA): Marktanalyse Ökostrom. Endbericht, März 2014, p. 53.
[262] Hamburg Institut: Weiterentwicklung des freiwilligen Ökostrommarktes, November 2013, p. 26.
[263] Deutsches Institut für Wirtschaftsforschung (DIW): Ökostrom – starker Rückhalt in der Bevölkerung. DIW-Wochenbericht 7/2012, February 2012; Forsa/VZBV: Erwartungen der Verbraucher an Ökostrom und Konsequenzen für Ökostrom-Labelkriterien, December 2011.

Market size and development: Germany is by far the biggest EU market for 'green electricity' tariffs in terms of customers and supplied electricity. The first 'green' tariffs and new specialised 100% renewable electricity suppliers appeared with the market opening in 1998. The national regulator Bundesnetzagentur (BNetzA) identified 7.45 million household customers (number of metering points) that were supplied under 'green' tariffs in 2013. Additionally, 673,225 mainly commercial customers bought electricity backed by renewable GOs. In total, 48.3 TWh of 'green' electricity were sold in 2013, covering 10.6% of net electricity consumption and 17% of all customers (number of metering points).[264] Between 2005 and 2010, the number of consumers rose from 0.6 to 2.3 million, with supplied electricity tripling. After another sharp increase in 2011, market growth slowed down until 2014. Approximately 15% of consumers were set on 'green' tariffs in 2014 without willingly opting for it because their supplier decided to back existing tariffs automatically by backing sold kilowatt-hours with renewable GOs.[265]

Relevance of renewable self-generation

Grid parity: With levelised electricity generation costs of solar PV of around ca. 15 to 19 ct/kWh, grid parity was reached in all parts of the country in 2014. The average retail electricity price exceeded costs of solar PV by 11 to 15 ct/kWh, providing very attractive savings from self-consumption.[266]

Generation capacity: In 2014, the installed capacity of approximately 1.5 million solar PV units[267] reached 38,236 MW, of which ca. 15% were installed in the residential sector[268] (2013: 36,337 MW), producing 34.93 TWh of solar electricity equal to 7.1%[269] of gross electricity consumption (EU28 average: 3.5%; 2013: 31 TWh, 5.2%).[270] In 2014, the amount of solar electricity that was self-consumed by households or commercial consumers was estimated around 1.7 TWh[271] (5% of total solar electricity production, <0.5% of the overall national final electricity consumption).

Capacity per inhabitant: With 474.1 W, the installed capacity per inhabitant is the highest in the EU, more than the double of the EU average (171.5 W).[272]

4.5.2 Evaluation of 'green' tariffs' transparency

Definition of 'green electricity' offers

Disambiguation: There is neither an official definition nor a listing of 'green' suppliers or offers despite the fact that the national regulator annually monitors the total purchase of 'green' tariffs that are backed by 100% renewable GOs.[273] According to the Renewable Energy Sources Act,

[264] Federal Network Agency/Federal Cartel Authority: Monitoring report 2014, November 2014, p. 166-170.
[265] Köpke, Ralf: Ökostrommarkt im Stagnationsmodus. Energie & Management, Special Ökostrom, July 2014, p. 3-7.
[266] Joint Research Centre (JRC): Cost Maps for Unsubsidised Photovoltaic Electricity 2014, September 2014. The actual spread between the retail price on the one hand and the levelised generation cost of solar PV electricity may differ because the JRC model applied EU average data and did not take into account any eventual public support granted (e.g. tax exemptions) that could increase or decrease retail prices respectively generation cost.
[267] Bundesverband Solarwirtschaft: Statistische Zahlen der deutschen Solarstrombranche (Photovoltaik), June 2015.
[268] Solar Power Europe (SPE): Global market outlook for solar power 2015 – 2019, June 2015, p. 22.
[269] Solar Power Europe (SPE): Global market outlook for solar power 2015 – 2019, June 2015, p. 26.
[270] Federal Ministry for Economic Affairs and Energy: Development of renewable energy sources in Germany 2014, February 2015.
[271] Prognos: Letztverbrauch 2019. Planungsprämissen für die Berechnung der EEG-Umlage. November 2014, p 14; IE Leipzig: Mittelfristprognose zur EEG-Stromeinspeisung bis 2019. October 2014, p. 94-104.
[272] EurObserv'ER: Photovoltaic Barometer 2014, May 2015, p. 7-9.
[273] Federal Network Agency/Federal Cartel Authority: Monitoring report 2014, November 2014, p. 166-170.

renewable electricity supported with FiTs is not entitled to receive GOs. Therefore, the most important share of German renewable electricity production is excluded from the GO tracking scheme and consequently from being marketed as a 'green' tariff. Automatically, the supported renewable electricity is equally allocated on a pro-rata base to all German suppliers' fuel mixes. The previous versions of the Renewable Energy Sources Act until 2014 provided only a definition of 'green' tariffs that were entitled to an exemption from the FiT surcharge: in case a supplier compiled a 'green' tariff consisting of at least 50% of power purchase agreements with renewable power plant operators who in exchange resigned from their FiT remuneration, the 'green' tariff was exempt from the surcharge distributing the differential costs of the FiT scheme (2011: 3.5 ct/kWh, 2012: exemption capped to a maximum of 2 ct/kWh). At least 20% of the electricity sold had to come from solar PV units and/or wind turbines. Since the surcharge exemption was relatively low and plant operators preferred to receive the fixed FiT, only 3.0 TWh were sold under this special 'green' tariff marketing scheme in 2013.[274] The revised version of the Renewable Energy Sources Act 2014 earmarks a decree for a new version but it was not yet published in 2015.

Qualitative minimum criteria: Since a legal definition of 'green' tariffs does not exist, German legislation does not presuppose any requirements related to environmental benefits of such offers.

Matching: Consumers cannot rely on any binding information when they want to know whether a GO-based 'green' offer is backed with power purchase contracts from renewable power plants or not. The national GO registry, run by the Federal Environment Agency Umweltbundesamt (UBA), gives suppliers the opportunity to couple the quantity of renewable electricity sold within a 'green' tariff with renewable GOs from the same renewable power plants that produced the kilowatt-hours.[275] However, suppliers of 'green' tariffs rarely opt for this matching mechanism[276] and UBA's market enquiry shows that probably most of 'green' tariffs in Germany consist of non-supported German or foreign hydropower electricity or non-renewable electricity that is backed by renewable GOs, mainly imported from Norwegian and Austrian hydropower plants.[277]

How 'green' tariffs are offered to consumers

Suppliers' information duties: No binding regulatory framework addresses suppliers' communication about 'green' tariffs. No legal provisions apply to the marketing of 'green' tariffs. Normally, only tariffs backed by 100% renewable GOs are offered as 'green' tariffs, but some suppliers also market tariffs with 50% renewables and 50% high efficient CHP electricity as 'green', respectively as an environmentally friendly offer.[278]

Online price comparison tools (PCTs): No specific rules apply to 'green' tariffs when they are displayed. Germany knows no independent PCTs. Some existing private PCTs present so-called 'climate tariffs' and 'green tariffs', disclosing the share of renewables based on the product fuel mix. Tariffs that are certified by private 'green electricity' quality labels can be sorted differently.[279] The PCT offered by the private 'green electricity' quality label OK Power contains tariffs that are certified

[274] Federal Ministry for Economic Affairs and Energy: EEG in Zahlen: Vergütungen, Differenzkosten und EEG-Umlage 2000-2015, October 2014.
[275] Coupling of GOs and electricity sold can be done also without the national registry but offers to verify and approve this coupling based on an auditor's confirmation
[276] Mohrbach, Elke/Weimeister, Magdalena: Umweltgutachter & Qualitätsmerkmale. German Federal Environment Agency GO Registry Workshop presentation, January 2014.
[277] UBA: Marktanalyse Ökostrom. Endbericht, März 2014, p. 53-72.
[278] UBA: Marktanalyse Ökostrom. Endbericht, März 2014, p. 17, p. 42-44.
[279] See examples of private online price comparison tools: http://www.verivox.de, https://www.check24.de/strom, 27 July 2015.

under the OK Power label, under the Grüner Strom Label (GSL) or mentioned in the EcoTopTen ranking of Öko Institute.[280] The tariffs compared in this PCT have in common that they all provide an additional environmental benefit.

Disclosure report: No official listing or comparison of fuel mixes exist.

How 'green' tariffs and the fuel mix are disclosed on the bill

Functioning of legal fuel mix disclosure: The use of Guarantees of Origin (GOs) is binding for disclosure of the renewable share of a tariff since the disclosure year 2013. Only renewable energy plant operators whose electricity production is not supported within the FiT scheme are entitled to GOs. Supported renewable electricity is equally allocated on a pro-rata base to all German suppliers' fuel mixes. For remaining non-renewable shares of the fuel mix, no official residual mix is calculated. Instead, a non-binding voluntary guidance document of the electricity industry federation defines rules how suppliers individually should calculate their fuel mix on the base of their power purchase contracts.[281]

Advancement of fuel mix disclosure: German legislators introduced binding fuel mix disclosure in 2005. The detailed fuel mix has to be published in advertising and pre-contractual information. Provisions exceed minimum information required by the Directives: the national average values for the fuel mix and for environmental indicators (CO_2 emissions and radioactive waste) must be provided as a benchmark in addition to the supplier mix. The 'green' tariff's product mix has to be disclosed separately, together with the supplier mix and the national average values. The share of supported renewables is disclosed separately from other renewables that are backed by renewable GOs. However, only fossil fuels are disclosed separately, but not the shares of different renewable energy sources like wind or biomass. The country of origin of GOs is not published.[282]

Informative value: The fuel mix disclosure system can be regarded as complex but coherent. The contract-based methodology of the non-binding guidance document[283] secures a high degree of accuracy. It makes sure that those shares of the fuel mix that are not covered by GOs reflect the supplier's specific portfolio, e.g. the kilowatt-hours produced and/or traded by the supplier. So the fuel mix shows the consumer approximately which electricity actually she/he paid for. Disclosing the share of supported renewable electricity separately is an important aspect of transparency in the German context where consumers pay a surcharge of 6 ct/kWh (2015)[284] to cover the differential costs of the FiT scheme.

How environmental benefits of 'green' tariffs are proven to consumers

Legal provisions: No regulatory provisions apply for proving qualitative environmental aspects related to the impacts of purchasing a 'green' tariff.

Additionality: Suppliers of 'green electricity' tariffs are not obliged to communicate about additionality of their offers to consumers. However, about a two thirds of 'green' offers[285] is certified

[280] OK Power: Tarifrechner, http://tarifrechner.ok-power.de, 5 November 2015.
[281] Bundesverband der Energie- und Wasserwirtschaft (BDEW): Leitfaden Stromkennzeichnung, October 2014.
[282] RE-DISS II project: Country profiles: Germany, http://www.reliable-disclosure.org/upload/77-RE-DISSII_Country_Profile_Germany_2014_v1.pdf, 16 April 2014.
[283] Bundesverband der Energie- und Wasserwirtschaft (BDEW): Leitfaden Stromkennzeichnung, October 2014.
[284] Federal Ministry for Economic Affairs and Energy: EEG surcharge in cent per kilowatt hour, http://www.bmwi.de/EN/Topics/Energy/Renewable-Energy/2014-renewable-energy-sources-act,did=677210.html, 27 July 2015.
[285] Hamburg Institut: Weiterentwicklung des freiwilligen Ökostrommarktes, November 2013, p. 62.

by one the private 'green electricity' quality labels. Through referring to quality labels criteria, suppliers can demonstrate certain environmental benefits.[286]

How 'green electricity' quality labels guide consumers

Relevance of labels: In contrast to other Member States, a number of private 'green electricity' labels are active in Germany. Well known national inspection and certification companies like TÜV Nord, TÜV Süd and other TÜV entities run several quality labels with different minimum criteria. Two quality labels have been established by stakeholders from civil society, the OK Power label and the Grüner Strom Label (GSL), founded by environmental NGOs, consumer organisations and research. The labels' schemes differ on to promote additionality of offers - which makes comparison for consumers difficult.

Functioning of labels: The quality labels offer a broad range of measures that can be used by suppliers of labelled 'green' tariffs to prove additionality. They can be divided into three main concepts. Firstly, a model based on traded electricity obliges suppliers to buy and supply only electricity from recently installed power plants. Secondly, some labels demand or suggest to collect a certain surcharge on the electricity price which is dedicated to a fund for investments in new generation capacities or other innovative contributions to energy transition, e.g. storage facilities. A third approach requires suppliers to invest in additional renewable generation capacities or other contributions to energy transition in proportion to the amount of renewable electricity sold to final customers. All quality labels require GOs to track the share of renewables. All German labels exclude double-marketing of supported renewable electricity. Matching the disclosed GOs with renewable kilowatt-hours from the identic power plant is possible, but only binding within the GSL label. According to market surveys, consumers have problems to identify the gradually different minimum criteria of existing labels.[287] A regional branch of BEUC's national member organisation has established a ranking of private 'green electricity' quality labels.[288]

4.5.3 Evaluation of consumers' access to self-generation

How grid access and use are guaranteed to self-generating consumers

Procedure: Grid connection procedures are hassle-free and quick and reliable. Consumers inform the local grid operator who is obliged to provide a timetable for connection. No formal contract between the self-generator and the grid operator has to be concluded.[289]

Legal status: Grid operators are obliged to connect renewable power plants with priority. To these ends, it is the grid operator's duty to optimise and expand the grid.

Commensurability of costs: No charges related to grid connection and expansion occur. Self-generators are not burdened with grid-related costs. Grid operators cover these costs which are allocated to all electricity consumers via the network fees.[290] Solar PV self-generators have to comply with technical provisions regarding grid frequency codes. Owners of units up to 30 kW either have to

[286] UBA: Marktanalyse Ökostrom. Endbericht, März 2014, p. 53-72.
[287] Mattes, Anselm: Grüner Strom: Verbraucher sind bereit, für Investitionen in erneuerbare Energien zu zahlen. DIW-Wochenbericht, 7/2012, February 2012, p. 3-9.
[288] Verbraucherzentrale Niedersachsen: Marktwächter Energie – Überblick: Die wichtigsten Ökostrom-Labels, https://www.marktwaechter-energie.de/untersuchungen/ueberblick-oekostrom-labels/, 5 November 2015.
[289] RES-LEGAL project: Grid issues in Germany, http://www.res-legal.eu/search-by-country/germany/tools-list/c/germany/s/res-e/t/gridaccess/sum/136/lpid/135/, 11 December 2014; PV GRID project: Final project report, August 2014, p. 36.
[290] RES-LEGAL project: Grid issues in Germany.

limit the effective power exported to the grid to 70% of the installed capacity or equip the unit with a remote curtailment device.[291]

How consumers' excess electricity production is treated

Rationale of the support scheme: Solar PV units up to 500 kW (2016: <100 kW) are entitled to a fixed FiT during 20 years while in parallel being nudged to increase self-consumption. Alternatively to the FiT, plant operators can market their electricity at the wholesale market, e.g. with the help of an intermediary, and claim a market premium on top of the wholesale price, equalling the fixed FiT.[292] Small self-generation projects find an appropriate framework with the FiT class of up to 10 kW.

Remuneration: The amount per kilowatt-hour depends on the date of bringing into service as a digression rate is calculated every quarter, depending on the volume of newly installed capacity during the precedent year. The more capacity is added, the higher the decrease of the FiT. If the annual cap for newly installed capacity is not exceeded, the digression rate is lowered. Generally, small units up to 10 kW receive higher FiTs (June 2015: 12.4 ct/kWh) than units up to 40 kW (12.06 ct/kWh) or up to 500 kW (10.79 ct/kWh).

Investment security: As the FiT respectively the market premium fall short of covering the generation costs, a high level of self-consumption is necessary to make projects economically viable. Self-consumption is further triggered through a cap on FiT payments to units with more than 10 kW: they only are entitled to FiT payments for 90% of the total amount of electricity produced.[293] So the remuneration offers a safeguard for electricity fed into the grid but does not cover generation costs alone. Consumers need to offset high retail prices to make investments attractive.

Which typical risks consumers face when starting a self-generation project

Financial risks: The revised Renewable Energy Sources Act of August 2014 imposed a reduced surcharge to cover the differential costs of the FiT scheme on the self-consumed electricity. Consumers who avoid claiming the FiT by increasing their self-consumption will have to pay approximately 2 ct/kWh to refinance the FiT payment scheme. Although limited in revenue, this new rule shrinks economic advantages and could have a deterrent effect on consumers' investments in solar PV units. The general policy transition to tenders questions the successful FiT scheme. The BEUC national member organisation fears that tenders could exclude certain stakeholders[294] because they could be too risky or inaccessible, e.g. for private households or cooperatives.

Administrative barriers: No major problems concerning accessibility or bureaucracy occur.

Legal framework: Consumers' status as self-generators is very well protected, based on priority grid access and priority purchase of excess electricity. No retroactive changes applied until now.

Quality of offers and services: In general, a broad choice of transparent offers from installers are available.

[291] RES-LEGAL project: Germany – Feed-in tariff (EEG feed-in tariff), http://www.res-legal.eu/search-by-country/germany/single/s/res-e/t/promotion/aid/feed-in-tariff-eeg-feed-in-tariff/lastp/135/, 11 December 2014.
[292] In case the wholesale spot market prices fall below zero during six consecutive hours, plant operators loose the market premium. The purchase contract with an intermediary replaces the grid operator's obligation to buy excess electricity at the FiT price.
[293] Federal Network Agency: Zahlen, Daten und Informationen zum EEG, http://www.bundesnetzagentur.de/cln_1422/DE/Sachgebiete/ElektrizitaetundGas/Unternehmen_Institutionen/ErneuerbareEnergien/ZahlenDatenInformationen/zahlenunddaten-node.html, 28 July 2015.
[294] VZBV: EEG-Reform 2014: Weichenstellung für eine erfolgreiche Energiewende? March 2014, p.2.

Information on self-generation options: There is no central one-stop shop but the Federal Network Agency provides sufficient information concerning regulation. Grid operators' offers may differ widely.

4.5.4 Summary of 'green electricity' markets and self-generation in Germany

Conditions for consumers' 'green' choice		Remarks
Stage of market liberalisation		Fully liberalised, increasing competition, broad choice of offers.
Renewable energy policy		Uncertainty regarding transition from feed-in tariffs to tenders.
'Green electricity' market size and choice		Broad choice, biggest EU market.
Relevance of renewable self-generation		Biggest EU market for solar PV, clear case for grid parity in the context of high retail prices.

Transparency of 'green' tariffs		
Definition of 'green electricity' offers		No definition existing.
How 'green' tariffs are offered to consumers		No clear provisions existing, risk of misleading advertising.
How 'green' tariffs and the fuel mix are disclosed on the bill		Transparent and advanced fuel mix disclosure.
How environmental benefits of 'green' tariffs are proven to consumers		No provisions or obligations existing.
How 'green electricity' quality labels guide consumers		Many labels offer guidance but competing schemes make consumer's orientation difficult.

Consumers' access to self-generation		
How grid access and use are guaranteed to self-generating consumers		Hassle-free priority grid access.
How consumers' excess electricity production is treated		Appropriate feed-in tariff, provided consumer substitutes expensive retail electricity.
Which typical risks consumers face when starting a self-generation project		Relatively low risk, amortisation and reliability questioned by a deterring surcharge on self-consumption.

Evaluation scale for transparency and market access

Good practice; issue showing good solutions related to transparency and/or market access from the point of view of consumers' rights	
Average performance; issue with some problems and some solutions related to transparency and/or market access from the point of view of consumers' rights	
Bad practice; issue with relevant problems related to transparency and/or market access from the point of view of consumers' rights	

4.6 Greece

National key indicators

Electricity consumption of households (residential) 2013: 17.446 TWh[295]
Renewable electricity generation 2013: 12.532 TWh (21.2% of total gross electricity consumption, EU28 average: 25.4%)[296]
Average electricity price 2014 (medium size households, incl. taxes and levies): 17.7 ct/kWh (EU28 average: 20.3 ct/kWh)[297]
Annual electricity bill of an average household in the capital Athens: 698 euro[298]

4.6.1 Conditions for consumers' 'green' choice

Stage of market liberalisation

Overview: The Third Energy package has been implemented in 2011. End-user prices were regulated until June 2013. In the context of the financial crisis and the bailout, the future of the state-owned company Public Power Corporation (PPC) is unclear. PPC repeatedly was affected by liquidity deficiencies due to unpaid bills and the tensions in the financial system.[299]

Market concentration: The retail market is dominated by PPC. In 2012, two major alternative suppliers exited the market due to accumulated large debt obligations with the transmission system and market operators. After their bankruptcy, PPC regained the control, with a de facto market monopoly. The supplier's average mark-ups are relatively high with around 2.5 ct/kWh.[300]

Choice: 4 different tariff offers from 4 electricity suppliers available to household consumers in the capital Athens in 2013[301]

Switching activity: Annual switching rate 2013: 0.1% (EU28 average: 5.6%)[302], average 2008-2012: ca. 1% (EU28 average: 4%).[303] Overall consumer satisfaction with the electricity market is the fourth lowest in the EU.[304] Annual savings to be encashed by consumers in the capital through switching are on average around 20 euro.[305]

[295] Eurostat: Supply, transformation and consumption of electricity - annual data, Electrical energy – residential http://ec.europa.eu/eurostat/tgm/table.do?tab=table&plugin=1&language=en&pcode=tsdpc310, 27 April 2015.
[296] Eurostat: Energy from renewable sources, http://ec.europa.eu/eurostat/web/energy/data/shares, 28 April 2015.
[297] Eurostat: Electricity prices per type of user, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_pc_204&lang=en, 28 April 2015.
[298] Incumbents' standard offers, 4,000 kWh consumption, see ACER/CEER annual report, p. 33.
[299] European Commission: EU Energy markets in 2014, October 2014, p. 65-69. Unpaid bills amounted to 1.7 billion Euro in spring 2015, see 2020 Keep on track project: 2015 Policy Recommendations Report, June 2015, p. 32.
[300] ACER/CEER annual report, p. 57-58.
[301] ACER/CEER annual report, p. 42.
[302] ACER/CEER: Annual report, p. 79.
[303] ACER/CEER: Annual report, p. 69.
[304] European Commission: EU Energy markets in 2014, October 2014, p. 67.
[305] ACER/CEER: Annual report, p. 72.

Renewable energy policy

Target compliance: 2020 target for the share of renewable electricity in final consumption: 39.8% (2013: 21.2%). Greece is reaching its interim targets within the National Renewable Energy Action Plan submitted within the EU 2020 targets.[306] However, according the European Commission's progress report 2015, Greece will slightly fail to fulfil its overall 2020 target, including the renewable shares in electricity, heating and cooling and transport's energy consumption.[307]

Main electricity support scheme: PPC is obliged to purchase electricity generated from renewable energy sources. Since 2006, fixed feed-in tariffs (FiT) for roof-top solar PV installations up to 10 kW of installed capacity guarantee secure cash flows for a time period of 25 years. In parallel, a net metering scheme applies for solar PV.[308]

Recent changes and trends: The level of revenues for renewable electricity from the market was insufficient to cover the payments granted to renewable electricity generators. This situation created accumulated deficits in the payment scheme. Against this background, retroactive cuts in FiTs apply to roof-top solar PV installations that started production between 2011 and 2013. Additionally, in 2012 the parliament adopted a temporary tax on revenues of all renewable energy installations, including renewable self-consumption, in order to reduce the deficit. This means that FiT payments generally are cut by 10-15%.

'Green electricity' market size and choice

Choice: 'Green' offers are not provided by any electricity supplier on the Greek market.

Market size and development: 'Green' offers are not provided by any electricity supplier on the Greek market.

Relevance of renewable self-generation

Grid parity: With levelised electricity generation costs of solar PV of around ca. 10 to 13 ct/kWh, Greece ranks amongst the European regions which can provide the cheapest solar PV electricity. There is a clear case for grid parity in Greece since several years. The average retail electricity price exceeded costs of solar PV by about 4 to 7 ct/kWh.[309]

Generation capacity: No figures are available on the number of renewable power plants installed under the FiT scheme respectively under the net metering scheme. Between November 2010 and December 2012, more than 1,500 licences had been given by the Ministry of Energy, but it is not known how many investments were going on.[310] In 2014, the installed capacity of solar PV units[311] reached 2,603 MW, of which ca. 15% were installed in the residential sector[312] (2013: 2,586 MW),

[306] 2020 Keep on track project: EU Tracking Roadmap 2015. Keeping track of renewable energy targets towards 2020, June 2015, p. 52-54.
[307] European Commission: Renewable energy progress report, June 2015, p. 5.
[308] RES-LEGAL project: Greece – Net-Metering (Law No.3468/2006 amended by Law No.4203/2013), http://www.res-legal.eu/search-by-country/greece/single/s/res-e/t/promotion/aid/net-metering-law-no34682006-amended-by-law-no42032013/lastp/139/, November 2014.
[309] Joint Research Centre (JRC): Cost Maps for Unsubsidised Photovoltaic Electricity 2014, September 2014. The actual spread between the retail price on the one hand and the levelised generation cost of solar PV electricity may differ because the JRC model applied EU average data and did not take into account any eventual public support granted (e.g. tax exemptions) that could increase or decrease retail prices respectively generation cost.
[310] Data provided by BEUC member EKPIZO, March 2015.
[311] EurObserv'ER: Photovoltaic Barometer 2014, May 2015, p. 10.
[312] Solar Power Europe (SPE): Global market outlook for solar power 2015 – 2019, June 2015, p. 22.

producing 3.856 TWh of solar electricity equal to 7.6%[313] of gross electricity consumption (EU28 average: 3.5%; 2013: 3.648 TWh, 6.2%).[314]

Capacity per inhabitant: With 236.8 W, the installed capacity per inhabitant ranks fourth in the EU, behind Germany, Italy and Belgium (EU average: 171.5 W).[315]

4.6.2 Evaluation of 'green' tariffs' transparency

Definition of 'green electricity' offers

Disambiguation: Concerning the conditions for offering a 'green' tariff, no dedicated framework exists.

Qualitative minimum criteria: Since a legal definition of 'green' tariffs is missing, Greek legislation does not presuppose any requirements related to environmental benefits of such offers.

Matching: No supplier provides any 'green' offer until present.

How 'green' tariffs are offered to consumers

Suppliers' information duties: No binding regulatory framework addresses suppliers' communication about 'green' tariffs. No legal provisions apply to the marketing of 'green' tariffs.

Online price comparison tools (PCTs): No supplier provides any 'green' offer until present.

Disclosure report: No supplier provides any 'green' offer until present.

How 'green' tariffs and the fuel mix are disclosed on the bill

Functioning of legal fuel mix disclosure: The Supply Code includes the implementation of fuel mix disclosure but there is not yet any legal provision for the methodology of the calculation. A registry for GOs is operational since 2010. Three competent bodies act for different geographic regions but no provisions for acceptance of GOs exist.[316]

Advancement of fuel mix disclosure: On the electricity bills, PPC used to disclose the fuel mix used for electricity generation as well as the contribution and the growth rate of renewables on a monthly base. The underlying infographic has been removed from August 2014 onwards to be replaced by an annual statement which is in line with the minimum requirements on fuel mix disclosure fixed in the Electricity Supply Code.[317] Fuel mix disclosure does not go beyond the basic requirements of the Directive. It is lacking in information about the carbon footprint and the radioactive waste related to the offer's fuel mix. [318]

Informative value: As a consequence of the removal of the monthly fuel mix disclosure, consumers receive less information with regard to the development of renewable energy sources. The annually calculated CO_2 emissions and the radioactive waste production related to an offer's fuel mix should be disclosed.

[313] Solar Power Europe (SPE): Global market outlook for solar power 2015 – 2019, June 2015, p. 26.
[314] EurObserv'ER: Photovoltaic Barometer 2014, May 2015, p. 10.
[315] EurObserv'ER: Photovoltaic Barometer 2014, May 2015, p. 7-9.
[316] RE-DISS II project: Country profiles: Greece, http://www.reliable-disclosure.org/upload/152-V03_template_RE-DISSII_Country_Profile_GREECE_2014v3.pdf, September 2014.
[317] Regulatory Authority for Energy (RAE): Response to a BEUC inquiry on disclosure of fuel mix in Greece by PPC, 12 August 2015.
[318] RE-DISS II project: Country profiles: Greece, September 2014.

How environmental benefits of 'green' tariffs are proven to consumers

Legal provisions: No regulatory provisions apply for proving qualitative environmental aspects related to the impacts of purchasing a 'green' tariff.

Additionality: No supplier provides any 'green' offer until present.

How 'green electricity' quality labels guide consumers

Relevance of labels: No supplier provides any 'green' offer until present and no quality labels applies.

Functioning of labels: No 'green electricity' quality labels are available.

4.6.3 Evaluation of consumers' access to self-generation

How grid access and use are guaranteed to self-generating consumers

Procedure: In general, permission procedures in Greece for small roof-top solar PV installations up to 10 kW do not cause major problems to consumers who want to start a renewable self-generation project. Solar PV installations in the residential sector normally can count on a relatively swift and hassle-free approval compared to other renewable energy plants in Greece.

Legal status: Self-generators are given full access to the grid for a time horizon of 25 years. The contractual licence with their suppliers is binding and self-generators can fully exercise their right for net metering services. However, renewable power plants cannot rely on priority access to the grid. Households that produce renewable electricity and want to feed solar PV electricity into the grid exceptionally do not need a production licence issued by the Regulatory Authority on Energy (RAE).

Commensurability of costs: Consumers who want to start a self-generation project need to demand a grid connection from the DSO. After having received a connection offer, the self-generator needs to sign a compensation agreement and submit a guarantee letter with an amount of 60 Euro per kilo-watt of installed capacity.[319] For grid connection costs, a unique fee of 300 Euro applies to installations below 55 kW.[320]

How consumers' excess electricity production is treated

Rationale of the support scheme: The FiT scheme established a dedicated small self-generation category for remuneration of solar PV units up to 10 kW.

Remuneration: Within the FiT scheme, solar PV roof-top installations up to 10 kW are virtually entitled to a fixed payment of 12 ct/kWh, starting from February 2014. The remuneration automatically decreases to 11.5 ct/kWh in 2015 and 11 ct/kWh in 2016.[321] In order to calculate the actual payments to the self-generator, the virtual sum (FiTs multiplied with kilowatt-hours fed in the grid) is first deducted from the plant operator's annual electricity bill. If the sum of feed-in tariff payments exceeds the operator's bill, only this exceeding amount will be paid to the operator. All in all, the FiT scheme offers only very limited remuneration for excess electricity so that the economic viability of self-generation projects is questioned. No remuneration of excess electricity exists within the net-metering scheme.

[319] RES-LEGAL project: Greece – Connection to the grid, http://www.res-legal.eu/search-by-country/greece/single/s/res-e/t/gridaccess/aid/connection-to-the-grid-15/lastp/139, June 2015.
[320] Econews: Φωτοβολταϊκά: πώς πάνε οι αιτήσεις για το net metering, http://www.econews.gr/2015/06/26/fotovoltaika-net-metering-aitiseis-123188/, 26 June 2015.
[321] Ministry of Environment and Energy (YPEKA): http://www.ypeka.gr/LinkClick.aspx?fileticket=CPlp8mM2iTg%3d&tabid=555&language=el-GR

Investment security: The market is very unstable because of constantly changing regulatory frameworks and retroactive changes. Against this backdrop, almost no new solar PV self-generation capacities were added in 2014. Concerns over self-generation remain because of the delayed payments due to the devastating financial condition of the market stakeholders. In some cases, self-generators have to wait for up to six months to receive their payments.

Which typical risks consumers face when starting a self-generation project

Financial risks: Financial risks are the main obstacles for consumers willing to start self-generation. The taxation imposed on revenues from self-generation can be identified as a main barrier which discourages people from investing in the underlying technology. In addition, the amortisation of the existing projects has been prolonged, prompting serious concerns over the sustainability of the investment.

Administrative barriers: BEUC's national member organisation as well as renewable energy experts complain about administrative deficiencies and bureaucracy causing insecurity and hindering investments in self-generation projects.[322]

Legal framework: Recent retro-active changes affect amortisation of self-generation projects.

Quality of offers and services: No problems or complaints known referring to the range of choice and commercial practices.

Information on self-generation options: No major problems or complaints. Greece can look back of broad experiences with an established solar PV market. However, a central one-stop shop simplifying consumer's uptake of renewable self-generation is missing.

[322] 2020 Keep on track project: 2015 Policy Recommendations Report, June 2015, p. 32.

4.6.4 Summary of 'green electricity' markets and self-generation in Greece

Conditions for consumers' 'green' choice		Remarks
Stage of market liberalisation		Only formally liberalised market, dominated by monopolist, de facto no switching options.
Renewable energy policy		Retroactive changes and very unstable regulatory framework.
'Green electricity' market size and choice		No 'green' offers available on the market.
Relevance of renewable self-generation		Consumers are interested but discouraged by the regulatory headwinds and instability.

Transparency of 'green' tariffs		
Definition of 'green electricity' offers		No definition existing.
How 'green' tariffs are offered to consumers		No provisions or obligations existing.
How 'green' tariffs and the fuel mix are disclosed on the bill		PPC changed from monthly to annual disclosure, environmental information missing.
How environmental benefits of 'green' tariffs are proven to consumers		No provisions or obligations existing.
How 'green electricity' quality labels guide consumers		No 'green electricity' quality labels exist.

Consumers' access to self-generation		
How grid access and use are guaranteed to self-generating consumers		Relatively hassle-free simplified grid connection for small self-generators, but extra connection fee.
How consumers' excess electricity production is treated		Little and instable FiT remuneration, net metering scheme.
Which typical risks consumers face when starting a self-generation project		Questioned remuneration and continuous regulatory changes undermine amortisation.

Evaluation scale for transparency and market access

Good practice; issue showing good solutions related to transparency and/or market access from the point of view of consumers' rights	
Average performance; issue with some problems and some solutions related to transparency and/or market access from the point of view of consumers' rights	
Bad practice; issue with relevant problems related to transparency and/or market access from the point of view of consumers' rights	

4.7 Italy

National key indicators

Electricity consumption of households (residential) 2013: 66.983 TWh[323]
Renewable electricity generation 2013: 103,312 TWh (31.3% of total gross electricity consumption, EU28 average: 25.4%)[324]
Average electricity price 2014 (medium size households, incl. taxes and levies): 24.5 ct/kWh (EU28 average: 20.3 ct/kWh)[325]
Annual electricity bill of an average household in the capital Rome: 1,090 euro[326]

4.7.1 Conditions for consumers' 'green' choice

Stage of market liberalisation

Overview: The Italian energy market is compliant with EU legislation. In the first half of 2013 the national regulator, the Regulatory Authority for Electricity Gas and Water (Autorità per l'energia elettrica il gas e il sistema idrico, AEEGSI) fully unbundled the electricity transmission sector. Italy traditionally is an electricity importing country, highly interconnected with neighbouring countries. No regulated prices apply but 80% of consumers did not choose a supplier and remained with their local distribution grid operator that functions as a default supplier. They provide a standard offer on the basis of transferring electricity that they purchased from the Single Buyer.

Market concentration: Because of the importance of the standard offer, the biggest supplier covered 85.4% of the retail market demand in 2012. Like in Germany, the massive increase in renewable generation capacities, especially solar PV, let wholesale market prices fall down and enhanced competition. However, according to the European Commission, competition on the retail market remains at a medium level.[327] Suppliers' mark-ups are at medium level of approximately 1 ct/kWh in 2013.[328]

Choice: 30 different tariff offers from 12 electricity suppliers available to household consumers in the capital Rome in 2013[329]

Switching activity: Annual switching rate 2013: 7.6% (EU28 average: 5.6%)[330], average 2008-2012: ca. 4% (EU28 average: 4%).[331] Overall consumer satisfaction with the electricity market is the fifth lowest in the EU.[332] Annual savings to be encashed by consumers in the capital through switching are on average 50 euro.[333]

Renewable energy policy

[323] Eurostat: Supply, transformation and consumption of electricity - annual data, Electrical energy – residential http://ec.europa.eu/eurostat/tgm/table.do?tab=table&plugin=1&language=en&pcode=tsdpc310, 27 April 2015.
[324] Eurostat: Energy from renewable sources, http://ec.europa.eu/eurostat/web/energy/data/shares, 28 April 2015.
[325] Eurostat: Electricity prices per type of user, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_pc_204&lang=en, 28 April 2015.
[326] Incumbents' standard offers, 4,000 kWh consumption, see ACER/CEER annual report, p. 33.
[327] European Commission: EU Energy markets in 2014, October 2014, p. 86-90.
[328] ACER/CEER annual report, p. 57-58.
[329] ACER/CEER annual report, p. 42.
[330] ACER/CEER: Annual report, p. 79.
[331] ACER/CEER: Annual report, p. 69.
[332] European Commission: EU Energy markets in 2014, October 2014, p. 89.
[333] ACER/CEER: Annual report, p. 72.

Target compliance: 2020 target for the share of renewable electricity in final consumption: 26.4% (2013: 31.3%). The 2020 sectoral target for renewable electricity has already been accomplished in 2013. The renewable heating and cooling target also has been achieved, only renewables in the transport sector are lagging behind.[334] The European Commission estimates that the overall 2020 target (17%) will be reached.[335]

Main electricity support scheme: Italy applies a broad variety of instruments. All renewable power plants from 1 kW to 1 MW installed capacity, excluding solar PV units, are entitled to feed-in tariffs (FiTs) after applying for registration under certain conditions. Plants with a higher installed capacity have to respond to an annual tender published by the Manager of Electricity Services, Gestore dei Servizi Energetici (GSE). Alternatively, renewable power plants may opt for the sale of their electricity through GSE, based on market prices, respectively on a FiT for solar PV installations up to 100 kW. A third option for installations between 20 up to 500 kW (below 20 kW if commissioned before 2008) is annual net billing which may involve different production modules, including up to 5% highly efficient fossil cogeneration.[336] The 'static' net metering which indemnified self-generators with the retail electricity price has been replaced in 2013 by a more dynamic net billing scheme which compensates the kilowatt-hour fed into the grid with the hourly revenues from on-spot trading.

Recent changes and trends: Starting from January 2015, retroactive cuts for renewable power plants operating under the existing support schemes have been introduced. These changes aim to lower the differential costs that are allocated to consumers through a levy on their bills. After a boom in huge solar PV installations due to very advantageous FiT rates in 2011, the levy significantly rose. Solar PV units below 200 kW are not touched but the FiTs paid by GSE have been lowered and access to registration has been limited while only few projects responded to tenders.[337] The January 2015 changes also include a new fee for solar PV self-consumption systems in order to contribute to general system cost, equivalent to 5% of the consumed energy amount and entailing new as well as existing installations.

'Green electricity' market size and choice

Choice: 6 different 'green' tariff offers from 5 electricity suppliers available to household consumers in the capital Rome in 2013.[338]

Market size and development: Green offers appeared on the market since the beginning of the liberalisation in 2007. Suppliers already active on the market started offering 'green' tariffs for household consumers alongside with existing conventional offers. In 2012, 22 out 77 offers on the free market were 'green' offers (29%) and they cost around 7% more than the cheaper conventional offer available at that time. In 2015 the number of 'green' offers amounts to 54% of the total offers of the free market (50 out of 92 are 'green' offers) but their cost is still higher – on average – than

[334] 2020 Keep on track project: EU Tracking Roadmap 2015. Keeping track of renewable energy targets towards 2020, June 2015, p. 61-63.
[335] European Commission: Renewable energy progress report, June 2015, p. 5.
[336] RES-LEGAL project: Promotion in Italy, http://www.res-legal.eu/search-by-country/italy/tools-list/c/italy/s/res-e/t/promotion/sum/152/lpid/151/, 30 July 2015; Miraglia, Luca: The Italian net metering mechanism. Presentation, Brussels, 27 March 2015.
[337] 2020 Keep on track project: Analysis of deviations and barriers 2014/2015, June 2015, p. 279-283.
[338] ACER/CEER annual report, p. 42.

conventional offers: the cheapest 'green' offer is 10% more expensive than the cheapest conventional one.[339] Some utilities exclusively offer 'green' tariffs backed by renewable GOs.

Relevance of renewable self-generation

Grid parity: With levelised electricity generation costs of solar PV of around ca. 9 to 14 ct/kWh, grid parity was largely reached in all parts of the country in 2014. The average retail electricity price exceeded costs of solar PV by 10.5 to 15.5 ct/kWh, providing very attractive savings from self-consumption.[340]

Generation capacity: In 2014, the installed capacity of more than 530,000 solar PV units[341] reached 18,450 MW, of which ca. 15% were installed in the residential sector[342] (2013: 18,065 MW), producing 23.299 TWh of solar electricity equal to 7.9%[343] of gross electricity consumption (EU28 average: 3.5%; 2013: 21.587 TWh, 7%).[344]

Capacity per inhabitant: With 303.5 W, the installed capacity per inhabitant is the second highest in the EU, almost more than the double of the EU average (171.5 W).[345]

4.7.2 Evaluation of 'green' tariffs' transparency

Definition of 'green electricity' offers

Disambiguation: Concerning the conditions for offering a 'green' tariff, no dedicated framework exists. There is no official definition or listing of 'green' offers. AEEG does not monitor the sale of 'green' tariffs. Supported renewable electricity automatically receives GOs from GSE.

Qualitative minimum criteria: Since a legal definition of 'green' tariffs is missing, Italian legislation does not presuppose any requirements related to environmental benefits of such offers.

Matching: Consumers cannot rely on any binding information when they want to know whether a GO-based 'green' offer is backed with power purchase contracts from renewable power plants or not. Consequently, it remains unclear if they pay their supplier for kilowatt-hours generated or purchased from renewable power plants.

How 'green' tariffs are offered to consumers

Suppliers' information duties: No binding regulatory framework addresses suppliers' communication about 'green' tariffs. No legal provisions apply to the marketing of 'green' tariffs. In practice, tariffs backed by 100% renewable GOs are offered as 'green' tariffs.

Online price comparison tools (PCTs): The official online price comparison tool run by AEEGSI does neither provide any information related to the fuel mix nor any differentiation on 'green' offers.[346]

[339] Figures provided by BEUC's national member organisation Altroconsumo. When talking about the price of offers, we refer to the energy component of the retail electricity price per kilowatt-hour, leaving out all the other components like network fees, taxes and general system costs.
[340] Joint Research Centre (JRC): Cost Maps for Unsubsidised Photovoltaic Electricity 2014, September 2014. The actual spread between the retail price on the one hand and the levelised generation cost of solar PV electricity may differ because the JRC model applied EU average data and did not take into account any eventual public support granted (e.g. tax exemptions) that could increase or decrease retail prices respectively generation cost.
[341] EurObserv'ER: Photovoltaic Barometer 2014, May 2015, p. 10.
[342] Solar Power Europe (SPE): Global market outlook for solar power 2015 – 2019, June 2015, p. 22.
[343] Solar Power Europe (SPE): Global market outlook for solar power 2015 – 2019, June 2015, p. 26.
[344] EurObserv'ER: Photovoltaic Barometer 2014, May 2015, p. 10.
[345] EurObserv'ER: Photovoltaic Barometer 2014, May 2015, p. 7-9.

Disclosure report: No official listing or comparison of fuel mixes exist.

How 'green' tariffs and the fuel mix are disclosed on the bill

Functioning of legal fuel mix disclosure: The fuel mix has to be published in promotional material, on the supplier's website, and with the bill at least every four months. Disclosure is regulated with a dedicated decree since 2009 and fully implemented since 2011 under the supervision of GSE. The use of Guarantees of Origin (GOs) is binding for disclosure of the renewable share. Electricity not backed by GOs has to be disclosed on the base of an official national residual mix respectively based on the supplier's residual mix. All renewable energy plants, regardless if benefiting from a public support schemes or not, are entitled to GOs.[347] Experts warn against persisting risks of double-counting of GOs since the regulation would not exclude sufficiently the use of other tracking systems than GOs.[348]

Advancement of fuel mix disclosure: The decree on fuel mix disclosure specifies that the supplier's fuel mix and the national average mix as a benchmark have to be published, in line with the Directive. Implementation of the Directive's provisions is deficient since a regulation for the publication of environmental impacts of the fuel mix (CO_2 emissions, radioactive waste) fails so that consumers do not receive this information. In the fuel mix table, only fossil fuels are differentiated, but renewables only need to be mentioned as such. No further information is given on the country of origin of GOs or if renewable electricity has been granted any public support.

Informative value: Loopholes persist in the rules how to disclose the supplier's residual mix. In case of a supplier selling a dedicated part of the renewable share of its fuel mix as a 'green' tariff to some final customers, the remaining customers buying the default tariff should not just continue to receive the general supplier's fuel mix but the correctly calculated supplier's fuel mix respectively the default tariff's mix after deduction of the renewable share. Otherwise, the supplier could present itself to remaining customers being 'greener' than it is.[349]

How environmental benefits of 'green' tariffs are proven to consumers

Legal provisions: No regulatory provisions apply for proving qualitative environmental aspects related to the impacts of purchasing a 'green' tariff.

Additionality: Suppliers of 'green electricity' tariffs are not obliged to communicate about additionality of their offers to consumers. No rules apply for measuring the environmental benefits of consumers' choice for 'green' tariffs. The consumer cannot verify the relevance or consistence of the environmental claims made by a supplier with regard to its 'green' tariff.

[346] Online price comparison tool 'Trova offerte', http://trovaofferte.autorita.energia.it/trovaofferte/, 30 July 2015; CEER: Price Comparison Tools: case studies. Annex 1 to CEER Draft advice on Price Comparison Tools, October 2011.
[347] RE-DISS II project: Country profiles: Italy, http://www.reliable-disclosure.org/upload/144-RE-DISSII_Country_Profile_Italy_2014v2.pdf, 12 August 2014.
[348] RE-DISS II project: Country profiles: Italy, http://www.reliable-disclosure.org/upload/144-RE-DISSII_Country_Profile_Italy_2014v2.pdf, 12 August 2014.
[349] RE-DISS II project: Country profiles: Italy, http://www.reliable-disclosure.org/upload/144-RE-DISSII_Country_Profile_Italy_2014v2.pdf, 12 August 2014.

How 'green electricity' quality labels guide consumers

Relevance of labels: Until now, quality labels are not very prominent on the Italian 'green electricity' market. The label "100% Energia Verde" certifies the production and the sale of renewable electricity for commercial consumers, based on the former Renewable Energy Certification Scheme (RECS).[350] The latest certifications date back to 2012 and the label doesn't seem to be determinant nowadays nor to certify further adherents. The EKOenergy label has certified the 'green' tariff of one Italian supplier.[351]

Functioning of labels: The EKOenergy label applies certain environmental minimum criteria.

4.7.3 Evaluation of consumers' access to self-generation

How grid access and use are guaranteed to self-generating consumers

Procedure: A simple standard application process obliges the grid operator to conclude a contract for grid connection with the applicant within a limited period of time. Experts observed only little delays. In this case, applicants are entitled to a monetary compensation.[352]

Legal status: Grid operators are obliged to connect renewable power plants with priority. To these ends, it is the grid operator's duty to optimise and expand the grid.

Commensurability of costs: Self-generators pay an annual fee per connection point to cover the grid operator's administrative costs. The underlying fee ranges between 15 to 45 euro depending on the installed capacity. The fees for the Manager of Electricity Services were raised retrospectively, but still are not prohibitive. Self-consumed electricity is gradually charged with grid and system cost related fees but units below 20 kW are exempted.[353]

How consumers' excess electricity production is treated

Rationale of the support scheme: A number of dedicated provisions for small private self-generation projects are established. Generally, solar PV benefits from a reduced VAT rate (10% instead of 20%). Depending on the size of the installation and the users' consumption patterns, different schemes may offer adequate support. Installations beyond 20 kW (below 20 kW if commissioned before 2008) for huge consumers may opt for net metering. Solar PV self-generation projects may also benefit from guaranteed prices without being obliged to respond to the tender scheme. Within the sale scheme organised by GSE, solar PV units with up to 100 kW may choose between a guaranteed minimum FiT and the market price.[354]

Remuneration: Under the net billing scheme, solar PV installations (20 to 500 kW) reduce their electricity bill by the hourly value of the kilowatt-hours fed into the grid. Instead of the fixed retail price, the specific time-of-use price, generated at the wholesale market, is deducted from the bill of the self-generator. No direct remuneration is paid for the electricity fed into the grid which exceeds the consumer's annual electricity demand. However, if a surplus remains after the period of one year, it can be used to compensate a negative production balance in the following year. Another indirect support is granted through the exemption of self-consumption systems, uniting one or several modules with up to 20 MW (Sistemi Efficienti di Utenza, SEU) from grid and system costs

[350] http://www.centopercentoverde.org, 31 July 2015.
[351] EKOenergy: EKOenergy in Italy, http://www.ekoenergy.org/italy-2015/, 31 July 2015.
[352] PV GRID project: Final project report, August 2014, p. 38.
[353] European Commission: Best practices on Renewable Energy Self-consumption. SWD(2015)141, July 2015.
[354] RES-LEGAL project: Promotion in Italy, http://www.res-legal.eu/search-by-country/italy/tools-list/c/italy/s/res-e/t/promotion/sum/152/lpid/151/, 30 July 2015.

equal to around 40% of retail electricity prices. One or more renewable power plants or (fossil) cogeneration units directly feed a unique final user through a private connection. Producer and consumer share the same connection point to the grid but they do not necessarily have to be identic.[355] Additionally, solar PV units may benefit from different regional support schemes and local tax exemptions.

Investment security: Recent changes and retroactive cuts question the economic viability of consumers' investments. Existing and new solar PV self-generation projects need to explore alternative sources of remuneration. Self-consumption and sale of excess electricity to third parties may offer a financially attractive solution. The SEU model could provide new perspectives. Consumers' experiences with such market-based schemes need to be evaluated. Nevertheless, risks and transaction costs associated with such direct marketing of excess electricity seem to thwart consumers' willingness to launch their self-generation project, given the drops in newly installed units.[356] The regulator is planning a revision of the distribution of the grid costs among end users which will lead to a further decline in the economic convenience of a solar PV installation.

Which typical risks consumers face when starting a self-generation project

Financial risks: Low FiT remuneration, retroactive cuts and the insecurity linked to alternative marketing options for excess electricity question a calculable pay-off period of solar PV self-generation. Banks might refuse credits or demand an increased risk premium when lending money to consumers who plan an investment in self-generation. On the other side, the important spread between low costs of solar PV electricity generation and high retail electricity prices offers investment incentives beyond FiT schemes. This potential again might be menaced by the national regulator AEEGSI that asks for phasing out the tax exemption for self-generation units.[357]

Administrative barriers: Although permission procedures tend to be simple for small self-generation projects, local authorities may apply own rules and delay permission. Restrictions relating to protection of the environment, landscape and heritage might significantly lengthen the procedure. The share of administrative costs in total project development costs is estimated ranging amongst the highest in Europe.[358] The high number of frequently changed and diverging support schemes together with complicated regulations represents a barrier itself.

Legal framework: Although the retroactive cuts in force since 2015 do not directly apply to typical households' solar PV units below 200 kW, legislation openly demanded a lengthening of the amortisation period for existing projects. Alongside with the frequent policy changes, this creates insecurity and destroys reliability of the whole legal framework.[359]

Quality of offers and services: The major problems referred to by self-generators regard the relationship with distribution system operators (DSOs) when it comes to the local grid connection of their solar PV unit. According to BEUC's national member organisation Altroconsumo, the bureaucratic procedure is quite complex and it seems that DSOs have a scarce proactive attitude. DSOs perceive the connection activity for solar PV units as a further burden to their routine job and give a low priority to it. It seems also that when the grid connection demand is filed by an installer which is a society belonging to the same holding of the DSO, then its attitude changes and the DSO

[355] Cavaliere, Massimo: Reducing electricity bills for SMEs and consumers through self---consumption in Italy. Presentation, Brussels, 17 June 2015.
[356] EurObserv'ER: Photovoltaic Barometer 2014, May 2015, p. 7-9.
[357] 2020 Keep on track project: Analysis of deviations and barriers 2014/2015, June 2015, p. 282.
[358] PV GRID project: Final project report, August 2014, p. 38.
[359] 2020 Keep on track project: 2015 Policy Recommendations, June 2015, p. 37-38.

becomes more proactive. By consequence, the grid connection procedure becomes more fast and easy.

Information on self-generation options: As one of Europe's most important solar PV markets, self-generation options are well introduced. Local grid operators and AEEGSI form the first contact point for self-generation projects. The Manager of Electricity Services GSE acts as an intermediary between self-generators and the wholesale markets. However, the different support schemes and regulations are much too complicated to let consumers' self-generation gain momentum. A survey under the CLEAR project showed that Italians know well what solar PV panels are (65% of people surveyed say so) and are relatively well-informed about self-generation technologies. The most important information sources about renewable energy technologies that consumers opt for are manufacturers, the consumer organisation and friends. Consumers mostly search for how much money they would save compared to fossil energy sources. Compared with four other countries surveyed, Italian consumers score by far lowest with regard to the share of rejecters (13%), i.e. people who say that they would not consider buying solar PV panels at all.[360] BEUC's national member Altroconsumo provides a very exhaustive online information tool[361] to guide consumers who are interested in investing in renewable self-generation, raise awareness for potentials.

[360] GfK: CLEAR – WP2.1. Consumer survey 1 – Attitudes, opinion, drivers and barriers and satisfaction with regard to Renewable Energy Systems, October 2014.
[361] https://casarinnovabile.it

4.7.4 Summary of 'green electricity' markets and self-generation in Italy

Conditions for consumers' 'green' choice		Remarks
Stage of market liberalisation		High interconnectivity, but standard offer prevails on the retail market.
Renewable energy policy		Frequent changes, small solar PV exempt from retroactive cuts.
'Green electricity' market size and choice		Medium market size and choice.
Relevance of renewable self-generation		EU's second biggest solar PV market with highly attractive cost advantages of self-consumption.

Transparency of 'green' tariffs		
Definition of 'green electricity' offers		No definition existing.
How 'green' tariffs are offered to consumers		No clear provisions existing, no differentiation in the official price comparison tool.
How 'green' tariffs and the fuel mix are disclosed on the bill		Lack of minimum information, risk of double-counting and incoherence of supplier mixes.
How environmental benefits of 'green' tariffs are proven to consumers		No provisions or obligations existing.
How 'green electricity' quality labels guide consumers		Little activities and relevance of labels.

Consumers' access to self-generation		
How grid access and use are guaranteed to self-generating consumers		Hassle-free priority grid access.
How consumers' excess electricity production is treated		High potential for self-consumption units involving several modules and stakeholders, but mostly insufficient remuneration schemes.
Which typical risks consumers face when starting a self-generation project		Limited access to capital due to incalculable pay-off period, high administrative costs.

Evaluation scale for transparency and market access

Good practice; issue showing good solutions related to transparency and/or market access from the point of view of consumers' rights	
Average performance; issue with some problems and some solutions related to transparency and/or market access from the point of view of consumers' rights	
Bad practice; issue with relevant problems related to transparency and/or market access from the point of view of consumers' rights	

4.8 The Netherlands

National key indicators

Electricity consumption of households (residential) 2013: 25.132 TWh[362]
Renewable electricity generation 2013: 11.998 TWh (10.1% of total gross electricity consumption, EU28 average: 25.4%)[363]
Average electricity price 2014 (medium size households, incl. taxes and levies): 18.2 ct/kWh (EU28 average: 20.3 ct/kWh) [364]
Annual electricity bill of an average household in the capital Amsterdam: 820 euro[365]

4.8.1 Conditions for consumers' 'green' choice

Stage of market liberalisation

Overview: The Third Energy Package is fully implemented into national law and household consumers can switch their supplier since 2004. The Netherlands are the Member State with the most important natural gas extraction. This fossil fuel is at the origin of more than half of the country's electricity generation with a high share of efficient cogeneration. The Dutch electricity markets are closely linked to their neighbour countries through market coupling and interconnectors which are to rise further in capacities.[366]

Market concentration: While electricity generation is less concentrated, the three largest companies covered 80% of the retail market in 2014, though declining steadily since 2012.[367] Despite market coupling with Germany, the Netherlands were only gradually able to profit from the price drops following German generation overcapacities because of limited interconnector capacities. Household electricity suppliers' mark-ups still were high with more than 2 ct/kWh in 2013.[368]

Choice: 71 different tariff offers from 25 electricity suppliers available to household consumers in the capital Amsterdam in 2013[369]

Switching activity: Annual switching rate 2013: 13.1% (EU28 average: 5.6%)[370], average 2008-2012: ca. 10% (EU28 average: 4%).[371] Overall consumer satisfaction with the electricity market is slightly above the EU average.[372] Annual savings to be encashed by consumers in the capital through switching range around 115 euro.[373]

[362] Eurostat: Supply, transformation and consumption of electricity - annual data, Electrical energy – residential http://ec.europa.eu/eurostat/tgm/table.do?tab=table&plugin=1&language=en&pcode=tsdpc310, 27 April 2015.
[363] Eurostat: Energy from renewable sources, http://ec.europa.eu/eurostat/web/energy/data/shares, 28 April 2015.
[364] Eurostat: Electricity prices per type of user, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_pc_204&lang=en, 28 April 2015.
[365] Incumbents' standard offers, 4,000 kWh consumption, see ACER/CEER annual report, p. 33.
[366] European Commission: EU Energy markets in 2014, October 2014, p. 117-121.
[367] Autoriteit Consument & Markt (ACM): Trendrapportage Marktwerking en Consumentenvertrouwen in de energiemarkt. Tweede halfjaar 2014, April 2015, p. 2.
[368] ACER/CEER annual report, p. 57-58.
[369] ACER/CEER annual report, p. 42.
[370] ACER/CEER: Annual report, p. 79.
[371] ACER/CEER: Annual report, p. 69.
[372] European Commission: EU Energy markets in 2014, October 2014, p. 51.
[373] ACER/CEER: Annual report, p. 72.

Renewable energy policy

Target compliance: 2020 target for the share of renewable electricity in final consumption: 37%[374] (2013: 10.1%). With regard to the interim targets for electricity as well as to the overall 2020 target for the share of renewables in electricity, heating and cooling and transport, the Netherlands are one of the worst pupils in the EU class. The share of renewable energy even decreased slightly in 2013. Growth rates in the electricity sector are far too weak.[375] The European Commission's progress report expects the Netherlands to clearly fail to accomplish the 2020 goals.[376]

Main electricity support scheme: Renewable energy projects can apply for a market premium on wholesale market price during 15 years, adjusted by an annual correction value. The access is granted annually after application for one of the six chronologically following tenders. The later the tender is launched with regard to the annual timeline, the higher the remuneration. Since access is granted on a first come, first serve basis, applicants risk to be rejected at a later point of time, e.g. if the annual budget is nearly used up when the sixth tender with the highest premium is launched.[377] The market premium touches upon solar PV installations beyond 15 kW and remuneration is capped beyond 1,000 full load hours. Since 2008, smaller solar PV units are entitled to a net metering scheme, recently extended by including a range of tax exemptions and a right to be paid by a supplier for excess electricity fed into the grid.[378] Additionally, companies can claim low interest loans and tax exemptions for their investments in renewable power plants beyond 25,000 euro. Grants for investments in solar PV installations are offered to private households by a number of Dutch municipalities.[379]

Recent changes and trends: In the beginning of 2014, a retroactive value added tax (VAT) exemption[380] for investments in solar PV installations was granted for all purchases after 20 June 2013. Furthermore, the cap on net metering that limited netting to a maximum of 5,000 kWh was skipped. If the amount of electricity fed into the grid exceeds the annual electricity consumption, the electricity supplier now has to pay the self-generator at an individually fixed contract-based price.[381] These decisions clarified consumers' legal status and caused a steep boom in solar PV installations in the residential sector.[382] Additionally, energy tax exemptions were expanded to owner groups of apartments in multi-storey dwellings and to cooperatives which distribute self-generated solar

[374] Rijksoverheid: Nationaal actieplan voor energie uit hernieuwbare bronnen, June 2010, p. 20.
[375] 2020 Keep on track project: EU Tracking Roadmap 2015. Keeping track of renewable energy targets towards 2020, June 2015, p. 76-78.
[376] European Commission: Renewable energy progress report, June 2015, p. 5.
[377] 2020 Keep on track project: Analysis of deviations and barriers 2014/2015, June 2015, p. 335-343.
[378] Consumentenbond: Energie terugleveren: verdienen aan opgewekte stroom, http://www.consumentenbond.nl/zonnepanelen/extra-informatie/verdienen-aan-zelf-opgewekte-stroom/, 5 August 2015.
[379] RES-LEGAL project: Promotion in the Netherlands, http://www.res-legal.eu/search-by-country/netherlands/tools-list/c/netherlands/s/res-e/t/promotion/sum/172/lpid/171/, 5 August 2015.
[380] The VAT rate is 21%.
[381] Consumentenbond: Energie terugleveren: verdienen aan opgewekte stroom, http://www.consumentenbond.nl/zonnepanelen/extra-informatie/verdienen-aan-zelf-opgewekte-stroom/, 5 August 2015.
[382] PV Magazine: Dutch solar sales increase by 70%, http://www.pv-magazine.com/news/details/beitrag/dutch-solar-sales-increase-by-70_100020360/?utm_source=twitterfeed&utm_medium=twitter#axzz3hCF9fsil, 28 July 2015.

electricity to individual consumers respectively their meters.[383] Since January 2015, tenants also can benefit from energy tax exemptions for self-consumed solar electricity provided by their landlord's solar PV unit.[384]

'Green electricity' market size and choice

Choice: 50 different 'green' tariff offers from 20 electricity suppliers available to household consumers in the capital Amsterdam in 2013.[385] A quarter of Dutch consumers is willing to pay up to 12 euro monthly more for 'green electricity' and expect that this leads to meaningful environmental benefits ('additionality').[386]

Market size and development: Consumers can switch suppliers since 2004. Dutch consumers are the most active buyers of 'green electricity' offers in Europe. The number of customers is constantly growing. In 2014, 64% of all household customers held an electricity contract representing a 'green' tariff.[387] This leads to a total share of 40.0 TWh, equal to 35% of electricity supply which is backed by renewable Guarantees of Origin (GOs), representing an annual increase by 5.0 TWh. Since the introduction of fuel mix disclosure, the domestic renewable electricity production always fell below the demand in renewable GOs for 'green' tariffs. In 2013, renewable GOs backing 39.8 TWh were imported, while renewable GOs from domestic production only reached 12.1 TWh and exports went up to 6.2 TWh.[388] The biggest supplier offering only 'green' tariffs has about 390,000 customers.[389] BEUC's national member organisation Consumentenbond regularly organises collective switching campaigns including 'green electricity' offers only. Since 2011, more than 50,000 consumers each year switched to a 'green' tariff within Consumentenbond's switching campaigns.

Relevance of renewable self-generation

Grid parity: With levelised electricity generation costs of solar PV of around ca. 15 to 19 ct/kWh, grid parity was reached in most cases in 2014. The average retail electricity price in 2013 exceeded costs of solar PV by 0 to 3 ct/kWh.[390]

Generation capacity: In 2014, the installed capacity of solar PV units reached 1,100 MW,[391] of which ca. 75% were installed in the residential sector[392] (2013: 739 MW), producing 0.8 TWh of solar

[383] Consumentenbond: Gezamenlijk stroom opwekken aantrekkelijker per 1 januari 2014, http://www.consumentenbond.nl/zonnepanelen/nieuws/2013/gezamenlijk-stroom-opwekken-aantrekkelijker/, 19 December 2013.
[384] Ministerie van Economische Zaken: Duurzame energie aantrekkelijker voor huurders. Press release, 14 February 2014, http://www.rijksoverheid.nl/ministeries/ez/nieuws/2014/02/14/duurzame-energie-aantrekkelijker-voor-huurders.html?ns_campaign=nieuwsbrief-ministerie-van-economische-zaken&ns_channel=nb.
[385] ACER/CEER annual report, p. 42.
[386] Autoriteit Consument & Markt (ACM): Trendrapportage Marktwerking en Consumentenvertrouwen in de energiemarkt. Tweede halfjaar 2013, April 2014, p. 9; van der Wilt, Peter: Ranking Energy Suppliers on Sustainability. Presentation, Brussels, 12 May 2015.
[387] Autoriteit Consument & Markt (ACM): Trendrapportage Marktwerking en Consumentenvertrouwen in de energiemarkt. Tweede halfjaar 2014, April 2015, p. 18.
[388] Centraal Bureau voor de Statistiek: Hernieuwbare energie in Nederland 2013, August 2014, p. 20.
[389] WISE: Energie vergelijken. Online energievergelijkers en duurzaamheid, March 2015, p. 9.
[390] Joint Research Centre (JRC): Cost Maps for Unsubsidised Photovoltaic Electricity 2014, September 2014. The actual spread between the retail price (19.2 in 2013 and 18.2 in 2014) on the one hand and the levelised generation cost of solar PV electricity is larger because the JRC model did not deduct the tax exemption for solar PV installations in force since June 2013.
[391] EurObserv'ER: Photovoltaic Barometer 2014, May 2015, p. 9.
[392] Solar Power Europe (SPE): Global market outlook for solar power 2015 – 2019, June 2015, p. 22.

electricity equal to 0.9%[393] of gross electricity consumption (EU28 average: 3.5%; 2013: 0.561 TWh, 0.4%).[394] By the end of 2013, nearly 200,000 solar PV units were installed.[395]

Capacity per inhabitant: With 65.4 W, the installed capacity per inhabitant in 2014 is very low in comparison with the EU average (171.5 W).[396]

4.8.2 Evaluation of 'green' tariffs' transparency

Definition of 'green electricity' offers

Disambiguation: There is neither an official definition nor a listing of 'green' suppliers or offers despite the fact that the national regulator annually monitors the total purchase of 'green' tariffs by household customers that are backed by 100% renewable GOs.[397] Independent from 'green' tariffs and their legal fuel mix disclosure on the voluntary 'green electricity' market, renewable GOs form an integrated part of the market premium scheme for renewable power plants. Plant operators receive payment only after obtaining renewable GOs from CertiQ for their electricity production and presenting them as a proof to the Netherlands Enterprise Agency (Rijksdienst voor Ondernemend Nederland).[398] Consequently, 'green' tariffs may be backed by renewable GOs from power plants that received public support under the market premium scheme. Though, supported renewable electricity is not explicitly disclosed in the bills but several market stakeholders and suppliers present 'green' tariffs that are backed with these renewable GOs as the 'better' or as 'the real green tariffs'. Proponents urge suppliers to use only Dutch supported GOs because doing so would exclude misleading GO imports without environmental impact. They expect suppliers to support investments in new renewable generation capacities. They also assume a positive impact of a future overshooting demand for Dutch renewable GOs. Additional renewable power plants could then possibly be installed thanks to rising demand in renewable GOs.[399]

Qualitative minimum criteria: Since a legal definition of 'green' tariffs is missing, Dutch legislation does not presuppose any requirements related to environmental benefits of such offers.

Matching: Consumers cannot rely on any binding information when they want to know whether a GO-based 'green' offer is backed with power purchase contracts from renewable power plants or not. Some suppliers openly market their 'green' tariffs as 100% covered by renewable electricity production from generation capacities e.g. wind turbines which they possess or from which they purchase electricity to cover their customers' demand. In this case, consumers can know for which kilowatt-hours they pay, provided the voluntary information of the supplier is transparent and trustworthy. The CertiQ annual report as well as market enquiries by BEUC's national member

[393] Solar Power Europe (SPE): Global market outlook for solar power 2015 – 2019, June 2015, p. 26.
[394] EurObserv'ER: Photovoltaic Barometer 2014, May 2015, p. 10.
[395] Energieonderzoek Centrum Nederland (ECN)/Energie Nederland/Netbeheer Nederland: Energietrends 2014, September 2014, p. 18.
[396] EurObserv'ER: Photovoltaic Barometer 2014, May 2015, p. 7-9.
[397] ACM: Trendrapportage Marktwerking en Consumentenvertrouwen in de energiemarkt. Tweede halfjaar 2014, April 2015, p. 18.
[398] RES LEGAL project: Netherlands – Premium tariff (SDE+), http://www.res-legal.eu/search-by-country/netherlands/single/s/res-e/t/promotion/aid/premium-tariff-sde/lastp/171/, 6 August 2015.
[399] Hier Klimaat Bureau: Wat is echte groene stroom? http://hier.nu/hier/pagina/wat-is-echte-groene-stroom, 6 August 2015; WISE: Hoe moet het dan wel? http://www.wisenederland.nl/groene-stroom/hoe-moet-het-dan-wel, 6 August 2015. In principle, the argumentation is reasonable in view of the shortfall of the renewables share in the Netherlands. Nevertheless, it remains highly theoretical because even under the assumption of extremely rising prices for renewable GOs, project developers probably would not get a meaningful incentive to plan a new power plant from the GOs' revenues alone.

organisation Consumentenbond and environmental NGOs show that probably most of 'green' tariffs in the Netherlands might be based on power purchase agreements of non-renewable electricity that is backed by renewable GOs, mainly imported from Norwegian hydropower plants. As a consequence of growing public criticism against this 'greening' of 'grey' electricity, some suppliers began to reduce the use of GOs from Norwegian hydropower plants for disclosure purposes, increasing purchase of electricity and GOs from Dutch renewable power plants.[400] In this context, a cooperative of wind turbine owners offered as a reseller another supplier's 'green' tariff. The regulator imposed changes in the marketing of the tariff to make clear that consumers do not become customers of the cooperative but of another supplier.[401]

How 'green' tariffs are offered to consumers

Suppliers' information duties: No binding regulatory framework addresses suppliers' communication about 'green' tariffs. No legal provisions apply to the marketing of 'green' tariffs. A supplier may advertise a 'green' tariff with reference to the product's fuel mix covered by 100% renewable GOs in order to present itself as environmentally friendly without disclosing the overall supplier mix. By doing so, suppliers with a poor 'green' performance may hide behind the product mix of a 'green' tariff. In this context, BEUC's national member Consumentenbond together with environmental organisations developed an annual qualitative ranking of all national suppliers' environmental performance. The ranking is based on public information from suppliers, partially on estimations and default values since some suppliers do not provide sufficient information. Beyond the mere product fuel mix, it focusses on several criteria: The overall supplier fuel mix was weighted. The ranking then looked at the supplier's investments track record of the last five years. If a supplier build new renewable generation capacities or mothballed fossil ones, the ranking improves. Renewable and fossil energy sources are classified not just according to their carbon footprint but along a broader set of environmental aspects, e.g. using GOs from an old big hydropower plant ranks worse than offering wind power from newly installed capacities.[402]

Online price comparison tools (PCTs): No independent PCT exists. The Dutch regulator ACM set up binding rules for PCTs which vaguely include the provision of the most important fuels used. According to ACM, the consumer should be able to find out if a supplier offers a 'grey' or a 'green' tariff.[403] In 2015, the environmental organisation WISE evaluated 46 PCTs in 2015 with regard to the presentation of 'green' tariffs. The study revealed that many PCTs do not lay open the criteria for a tariff being presented as 'green'. Some PCTs use ambiguous wording or icons, some display a percentage figure. Another misleading aspect is that users who tick 'green' tariffs to be exclusively presented, get a list of dual fuel offers including fossil natural gas. In this case, consumers might think that the gas tariff would also be somehow 'green', e.g. consisting of biogas or being CO_2 neutral through compensation.[404] Given the debate about 'dirty' utilities hiding behind a niche 'green' offer in advertising, consumers are advised to check not only the product's fuel mix but to take into

[400] CertiQ: Jaarverslag 2014, p. 10; CE Delft: Stroomproducten in kaart consumenten- en kleinzakelijke markt. Overzicht bronsamenstelling en herkomst stroomproducten van Nederlandse elektriciteitsleveranciers. Update 2014, October 2014; CE Delft: Stroomproducten in kaart consumenten- en kleinzakelijke markt. Overzicht bronsamenstelling en herkomst stroomproducten van Nederlandse elektriciteitsleveranciers. Update 2015, October 2015; WISE: Tien jaar stroometiketten, May 2015.

[401] ACM: ACM dwingt energieaanbieders tot aanpassen online informatie. Press release, 6 August 2015.

[402] Consumentenbond/Greenpeace/Hivos/Natuur&Milieu: Onderzoek duurzaamheid elektriciteitsleveranciers, December 2014; Consumentenbond/Greenpeace/Hivos/Natuur&Milieu/Wereld Natuur Fonds/WISE: Onderzoek duurzaamheid Nederlandse stroomleveranciers, October 2015.

[403] ACM: Informatievoorziening op de consumentenmarkt voor energie, November 2014.

[404] WISE: Energie vergelijken. Online energievergelijkers en duurzaamheid, March 2015.

account the supplier's general environmental performance. The PCT established by Consumentenbond[405] is the only one that enables consumers to compare suppliers with such a broader scope since the online tool integrates the annual ranking figures (see "How 'green' tariffs are offered to consumers – Supplier's information duties").

Disclosure report: No official listing or comparison of supplier fuel mixes exist but Consumentenbond's annual ranking takes over the role of an informal disclosure report that covers all nation-wide Dutch suppliers. The environmental organisation WISE inventories 'green' tariffs' product mixes since 2007. Recently, the association HIER klimaatbureau which partly is sponsored by suppliers, started an online database of product mixes to check if consumers buy 'real' (meaning Dutch GO-based, according to HIER klimaatbureau) or 'false green' tariffs (based on imported GOs). Due to a lack of companies' information, it partially relies on estimations. The variety of offered information around the fuel mix of 'green' tariffs and suppliers reflects the advanced public debate on environmental benefits of consumers' choice in the Netherlands. At the same time, the diverging claims and criticism might confuse consumers with less expertise who are just looking for a first orientation.

How 'green' tariffs and the fuel mix are disclosed on the bill

Functioning of legal fuel mix disclosure: Suppliers are obliged to publish their fuel mix as well as the product specific fuel mix since 2005 in advertising material, on their website and at least in an annual statement in relation with the bill. The national regulator Autoriteit Consument & Markt (Authority for Consumers and Markets, ACM) is responsible for the supervision of the fuel mix disclosure. Renewable GOs are mandatory for disclosure of renewables in the fuel mix, while the remaining non-renewable share is to be either represented through the officially calculated residual mix or to be tracked on a voluntary base by GOs respectively bilateral contracts. The Netherlands can be regarded as a pioneer in GO tracking systems. Since 1998, a first renewable GO tracking system was introduced. It became operational on the national level since 2001 with CertiQ, a subsidiary company of the transmission system operator, as the issuing body. However, suppliers' possibility to opt for a contract-based calculation of the non-renewable share is missing transparency in terms of methodology. Experts see a possible loophole for double-counting and inaccuracy since a coherent monitoring of these data is missing.[406] The reliable identification of the non-renewable share of Dutch suppliers' fuel mixes is particularly important because of the high exchange with renewable GOs from abroad. When importing renewable GOs for disclosure purposes, Dutch suppliers export the same amount of non-renewable attributes to their trade partners. If the non-renewable sources of the exported Dutch attributes remain unclear, this vagueness is transferred to foreign markets. For these reasons, a more reliable calculation for the non-renewable sources with linkage to the established GO tracking system appears to be useful.

Advancement of fuel mix disclosure: The presentation of the fuel mix is clear and coherent, being fully in line with the Directive but not going far beyond its minimal criteria. Both the supplier mix and the product mix have to be published. The shares of fossil fuels have to be disclosed differentiated (natural gas, coal) as well as renewables (wind, solar, hydro, biomass, other). Suppliers also have to mention the CO_2 emissions and the radioactive waste on the bill and cannot hide the figures on a website. Since 2015, the supplier should inform his customers whether the (renewable) GOs used for

[405] Consumentenbond: Energievergelijker, https://www.consumentenbond.nl/energie/overstapservice-energie/, 7 August 2015.
[406] RE-DISS II project: Country profiles: Netherlands, http://www.reliable-disclosure.org/upload/94-RE-DISSII_Country_Profile_NL_2014_v03_Final.pdf, 13 June 2014.

purposes of legal disclosure come from the Netherlands or from abroad. But less than half of the suppliers follow this voluntary agreement concluded between the Ministry for Economic Affairs and the energy industry federation Energie Nederland.[407] Renewable GOs issued for supported kilowatt-hours are not mentioned in relation with fuel mix disclosure (see "Definition of 'green electricity' offers – Disambiguation").

Informative value: The contract-based disclosure of the non-renewable share is not sufficiently transparent. Extending the use of GOs for disclosure purposes on all energy sources could make the calculation of the fuel mix more coherent and accurate. Several consumer and environmental organisations advocate in favour of 'full disclosure' to establish a coherent level-playing field. With regard to consumers' awareness on misleading 'green' tariffs that cover non-renewable power purchase with imported hydropower GOs, mandatory disclosure of the country of origin could advance clarity. Still this information on the bill would not satisfy demands from consumer and environmental organisations in favour of scoping the whole utility and not limit the view on the product mix.

How environmental benefits of 'green' tariffs are proven to consumers

Legal provisions: No regulatory provisions apply for proving qualitative environmental aspects related to the impacts of purchasing a 'green' tariff. It is up to the supplier to prove eventual environmental benefits enabled by consumers' choice. A voluntary code of conduct on environmental claims in advertising[408] may apply.

Additionality: According to an ACM survey from 2013, 41% of consumers expect additionality of their supplier's production capacity in relation with their purchase of a 'green' tariff. Though, suppliers are not obliged to communicate about additionality of their offers to consumers. Consumentenbond's annual ranking de facto fills this gap by providing a full picture of a supplier's environmental performance. The consumer is given orientation on the supplier's additional contribution to the process of energy transition as a structural change of energy supply (see "How 'green' tariffs are offered to consumers – Supplier's information duties"). Some 'green' suppliers as well as some environmental organisations stress that opting for tariffs that are backed by Dutch renewable GOs would somehow be 'environmentally better'. From the point of view of additionality applied in this report, just using a Dutch wind energy GO, run under a public support scheme, instead of using a Norwegian hydropower GO alone would not yet confirm an additional environmental benefit.[409]

How 'green electricity' quality labels guide consumers

Relevance of labels: As a result of the annual Consumentenbond ranking, the supplier is marked with the 'Greenest electricity offer' label. This label provides reliable guidance and gives a strong signal to the market. The private 'green electricity' label Milieukeur is used for some 'green' tariffs. It was previously introduced in the Netherlands for a broad range of products and services.

[407] WISE: Tien jaar stroometiketten, May 2015, p. 5, p. 13.
[408] Stichting Reclame Code: Milieu Reclame Code (MRC), https://www.reclamecode.nl/nrc/pagina.asp?paginaID=271%20&deel=2, 7 August 2015.
[409] Using a renewable GO issued for a kilowatt-hour whose production was already initiated thanks to a public support scheme, would not correspond to the definition of additionality which we suggest in this report when it comes to scrutinise the additional environmental benefit. In this case, the renewable kilowatt-hour would have been produced anyway because of the availability of the public support scheme, not because of the consumer's individual choice.

Functioning of labels: The Consumentenbond label 'Greenest electricity offer' refers to the methodology of the annual ranking (see: "How 'green' tariffs are offered to consumers – Supplier's information duties"). On the basis of the product fuel mix, the Milieukeur label certifies that electricity consumed under a 'green' tariff is backed by 100% renewable GOs. It applies certain environmental minimum criteria related to the recognition of biomass GOs and refuses hydropower GOs that are issued for plants which are older than five years. All other renewable GOs are accepted. The label criteria clearly state that due to methodological problems, Milieukeur resigned from establishing additionality criteria.[410]

4.8.3 Evaluation of consumers' access to self-generation

How grid access and use are guaranteed to self-generating consumers

Procedure: In general, grid operators are obliged to enter into a contract with future renewable power plant operators. This agreement confers to the plant operator the right to use the grid and to claim eventually an extension of the grid. Consumers who want to start their self-generation project under the net metering scheme first need to apply for an offer from the local grid operator to feed electricity into the grid. Normally, grid connection is made swiftly without delay but experts criticise that municipalities may reject solar PV projects through local land development plans.[411] Unclear rules for solar PV near or on class listed monuments and sites of historic interest may also block permits.[412]

Legal status: No priority grid access is secured, only a discrimination-free connection.

Commensurability of costs: Grid operators do not explicitly charge self-generators for grid connection and grid use. However, households that participate in the net metering scheme continue to pay the capacity based network fee. The Netherlands are the only Member State to impose networks fees not depending upon actual consumption but as a fixed capacity based standing charge since 2009. Energy taxes only apply to the net consumption of electricity, i.e. the consumed electricity reduced by the amount of electricity fed into the grid. The tax exemption for the self-consumed electricity has to be requested annually at the consumer's tax office.[413]

How consumers' excess electricity production is treated

Rationale of the support scheme: The net metering scheme functions as a dedicated support scheme for small self-generation units and covers all renewable technologies. In fact, mainly small solar PV self-generation opt for this instrument. It primarily incentivises self-consumption but also provides a remuneration for export of excess electricity to the grid. Exemption from VAT is granted for the investment cost of the solar PV unit. Legally, self-generators are regarded as entrepreneurs, therefore electricity fed into the grid is charged with VAT but it can also be exempted under a ceiling of 1,345 euro of VAT payments per year.[414] Energy tax exemption is also granted to tenants who rent a solar PV unit as part of their lease contract in case they self-consume solar electricity or buy

[410] Milieukeur: Certificatieschema Milieukeur Groene Elektriciteit, January 2015.
[411] PV GRID project: Final project report, August 2014, p. 39.
[412] Holland Solar: Ruimte voor zonne-energie in Nederland 2020-2050. Analyse van ruimtelijke groiekansen en knelpunten voor zonne-energie toepassingen in Nederland, June 2015, p. 33.
[413] Consumentenbond: Energie terugleveren: verdienen aan opgewekte stroom, http://www.consumentenbond.nl/zonnepanelen/extra-informatie/verdienen-aan-zelf-opgewekte-stroom/, 5 August 2015.
[414] Consumentenbond: Subsidies en btw op zonnepanelen, http://www.consumentenbond.nl/zonnepanelen/extra-informatie/subsidies-op-zonnepanelen-en-zonneboilers/, 5 August 2015.

electricity from their landlord. The exemption is only granted if no third party is involved and if the solar PV unit is owned by the landlord himself.[415] Contrary to the net metering scheme, the market premium offers nearly any adequate access to private households' self-generation projects since it covers only solar PV systems beyond 15 kW. The complex tender procedure for acceding the market premium targets commercial project developers.

Remuneration: Self-generators who participate in the net metering scheme reduce their electricity bills by the amount of kilowatt-hours fed into the grid, so called netting. The self-generator's meter just runs backwards. Only the annual net consumption is invoiced by the supplier. If annual production exceeds the self-generators electricity import from the grid, his bill will be zero. For every surplus kilowatt-hour exported to the grid, the electricity supplier chosen by the self-generator has to pay a remuneration. Payments offered in 2015 reach up to 10.5 ct/kWh, depending on the conditions set by the electricity supplier.[416] The net metering scheme proved to be an easy accessible and understandable remuneration scheme for private house-owners. The recent extensions of advantageous tax exemptions could facilitate further accession of tenants to benefits of solar self-consumption. In a sharp contrast to this positive trend, the market premium does neither offer easy access, nor sufficient funding or appropriately high remuneration. If applicants fail to reach the higher premiums from the last ones of the six tender stages, ranging from 7 (stage one in April/May) to 14.7 ct/kWh (stage six in November/December) for solar PV systems in 2014, the project probably would have to be cancelled or postponed to the following year.

Investment security: The net metering scheme provides a secure and calculable framework for consumers' investments. Amortisation of consumers' investments in solar PV systems can be reached within approximately seven years under the assumption that 500 euro per year are saved on an average electricity bill.[417] On the other side, the market premium tenders bear a high risk of rejection which consequently creates reluctance and latency. Only a minor share of the total number of solar PV project applicants was granted the market premium in 2013 (133 MW). But access to the market premium does not necessarily involve realisation of the project. In 2013, only 15 MW of installed capacity of solar PV was added under the market premium scheme; the 2014 ratio tends to be equal.[418] Given the high number of abandonments and insecurity of remuneration, projects that have been granted market premium have to be put into operation within four years after support was granted.

Which typical risks consumers face when starting a self-generation project

Financial risks: The net metering scheme is a stable and reliable source of revenues, well-tailored to the needs of private households. On the other hand, the market premium scheme fails to deliver confidence. Due to the first come, first serve basis of the market premium tenders, advanced projects risk a delay or non-realisation. On top of that, the six tender stages let cheaper renewable

[415] Ministerie van Economische Zaken: Duurzame energie aantrekkelijker voor huurders. Press release, 14 February 2014, http://www.rijksoverheid.nl/ministeries/ez/nieuws/2014/02/14/duurzame-energie-aantrekkelijker-voor-huurders.html?ns_campaign=nieuwsbrief-ministerie-van-economische-zaken&ns_channel=nb.

[416] Klimaatgids: Terugleververgoeding: overzicht per energieleverancier, http://www.klimaatgids.nl/zonnepanelen/salderingsgrens-en-terugleververgoedingen-per-leverancier, 5 August 2015.

[417] Consumentenbond: Collectieve inkoop zonnepanelen van start, http://www.consumentenbond.nl/actueel/nieuws/2015/collectieve-inkoop-zonnepanelen-van-start/, 3 August 2015.

[418] Holland Solar: Ruimte voor zonne-energie in Nederland 2020-2050. Analyse van ruimtelijke groiekansen en knelpunten voor zonne-energie toepassingen in Nederland, June 2015, p. 44.

heating projects compete against cheap renewable electricity technologies. Against the backdrop of the different advancement of technologies, this is inappropriate. Consumers' more expensive small-scale projects like solar PV rooftop systems tend to be disadvantaged.

Administrative barriers: Grid access of small solar PV self-generation systems is not yet totally hassle-free but administrative hurdles are surmountable. The tender process for acceding the market premium is unsuitable from the point of view of consumers' access, thus represents a bad practice example.

Legal framework: No retroactive changes affected self-generation projects until now, but changing governments frequently shifted conditions of support schemes. For these reasons, banks remain reluctant and refrain from financing renewable energy projects.[419] With a functioning and long-lasting net metering scheme, these problems could be solved for the residential self-generation sector. The current scheme is guaranteed until 2020. However, the government already stated its intention to change conditions and replace the present net-metering scheme.[420]

Quality of offers and services: Solar PV self-generation still is a relatively new and small market in the Netherlands. BEUC's national member Consumentenbond launched a collective purchase of solar PV systems in August 2015.[421] A national quality label for solar PV systems and installers guides consumers.[422]

Information on self-generation options: Collective purchase actions like the one organised by Consumentenbond can partially offer a one-stop shop situation for consumers in search of unbiased information and access to this technology. A rising number of local initiatives driven by municipalities, local companies and citizens groups push for dissemination of best practice solar PV self-generation projects, focussing on locally added value and benefits for communities.[423] At the same time, they can contribute to provide a consumer-friendly contact point. A survey under the CLEAR project showed that Dutch know very well what solar PV panels are (69% of people surveyed say so). The most important information sources about renewable energy technologies that consumers opt for are the consumer organisation, manufacturers and the government/public sector. Consumers mostly search for the total running costs and how much money they would save compared to fossil energy sources. 22% of Dutch consumers say that they would not consider buying solar PV panels at all.[424] BEUC's national member Consumentenbond provides a very exhaustive online information tool[425] to guide consumers who are interested in investing in renewable self-generation, raise awareness for potentials.

[419] 2020 Keep on track project: Analysis of deviations and barriers 2014/2015, June 2015, p. 335-343.
[420] PV GRID project: Final project report, August 2014, p. 39.
[421] Consumentenbond: Collectieve inkoop zonnepanelen van start, http://www.consumentenbond.nl/actueel/nieuws/2015/collectieve-inkoop-zonnepanelen-van-start/, 3 August 2015.
[422] The „Zonnekeur" label was introduced by the Dutch solar PV industry, see http://www.zonnekeur.nl/.
[423] Distribution system operators, the renewable energy industry and the Federation of Dutch Municipalities set up an online information platform that provides contacts to local initiatives, see http://www.hieropgewekt.nl/.
[424] GfK: CLEAR – WP2.1. Consumer survey 1 – Attitudes, opinion, drivers and barriers and satisfaction with regard to Renewable Energy Systems, October 2014.
[425] http://www.consumentenbond.nl/zonnepanelen

4.8.4 Summary of 'green electricity' markets and self-generation in the Netherlands

Conditions for consumers' 'green' choice		Remarks
Stage of market liberalisation		High concentration, but also high switching activity.
Renewable energy policy		Dedicated net-metering with remuneration of excess electricity but prohibitive tenders.
'Green electricity' market size and choice		Broad choice, Europe's highest share of consumers opting for 'green' tariffs.
Relevance of renewable self-generation		Still young, but booming market for small solar PV self-generation.

Transparency of 'green' tariffs		
Definition of 'green electricity' offers		Only 100% GO-backed tariffs to be marketed as renewable.
How 'green' tariffs are offered to consumers		No sufficient provisions existing, risk of misleading advertising.
How 'green' tariffs and the fuel mix are disclosed on the bill		Partially advanced, but fuel mix calculation is not necessarily meaningful and transparent.
How environmental benefits of 'green' tariffs are proven to consumers		No provisions or obligations, but NGOs' and consumers organisation's elaborate annual ranking.
How 'green electricity' quality labels guide consumers		Consumer organisation ranks suppliers and products, competing private label certifies product mixes.

Consumers' access to self-generation		
How grid access and use are guaranteed to self-generating consumers		Normally swiftly but without priority granted, local rejections remain possible.
How consumers' excess electricity production is treated		Attractive net metering with remuneration of excess electricity fed-in.
Which typical risks consumers face when starting a self-generation project		Frequent policy changes, still some reluctance of banks due to bad experiences with unreliable market premium scheme.

Evaluation scale for transparency and market access

Good practice; issue showing good solutions related to transparency and/or market access from the point of view of consumers' rights	
Average performance; issue with some problems and some solutions related to transparency and/or market access from the point of view of consumers' rights	
Bad practice; issue with relevant problems related to transparency and/or market access from the point of view of consumers' rights	

4.9 Norway

National key indicators

Electricity consumption of households (residential) 2013: 37.053 TWh[426]
Renewable electricity generation 2013: 135.705 TWh (105.5% of total gross electricity consumption, EU28 average: 25.4%)[427]
Average electricity price 2014 (medium size households, incl. taxes and levies): 16.5 ct/kWh (EU28 average: 20.3 ct/kWh) [428]
Annual electricity bill of an average household in the capital Oslo: 608 euro[429]

4.9.1 Conditions for consumers' 'green' choice

Stage of market liberalisation

Overview: Electricity generation is almost entirely based on the large hydropower capacities. As one of the forerunners in Europe, liberalisation of retail electricity markets started in the first half of the 1990es. Norway forms a common wholesale market with Sweden and is integrated in the highly interconnected common Nordic/Baltic market place since 2000/2013.[430] Although not an EU member, Norway implements the key Directives of the EU as an EFTA member and as a party to the European Economic Area agreement (EEA). According to European regulators' annual monitoring, the electricity market is evaluated as moderately concentrated and well-performing.[431] There are no regulated prices in Norway. Network charges are the highest compared to other EU and EEA countries.[432]

Market concentration: Despite relatively high switching activities, the local incumbent suppliers which are often the distribution grid operators preserve their dominant position. On average, they hold around 70% of residential customers in their own local grid area.[433] Due to the high share of hydropower, hydrological conditions influence the wholesale market prices, e.g. electricity becomes more expensive in dryer years. Spot-based offers are common on the Norwegian retail electricity market. About half of consumers haven an electricity contract following the spot price directly.[434] Mark-ups of suppliers in the retail markets are relatively low around 1 to 1.5 ct/kWh.[435]

Choice: 100 different tariff offers from 35 electricity suppliers available to household consumers in the capital Oslo in 2013[436]

[426] Eurostat: Supply, transformation and consumption of electricity - annual data, Electrical energy – residential http://ec.europa.eu/eurostat/tgm/table.do?tab=table&plugin=1&language=en&pcode=tsdpc310, 27 April 2015.
[427] Eurostat: Energy from renewable sources, http://ec.europa.eu/eurostat/web/energy/data/shares, 28 April 2015.
[428] Eurostat: Electricity prices per type of user, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_pc_204&lang=en, 28 April 2015.
[429] Incumbents' standard offers, 4,000 kWh consumption, see ACER/CEER annual report, p. 33.
[430] Norwegian Water Resources and Energy Directorate (NVE): National report to the CEER, 2014.
[431] ACER/CEER annual report, p. 9.
[432] ACER/CEER annual report, p. 32.
[433] Norwegian Water Resources and Energy Directorate (NVE): National report to the CEER, 2014, p. 26.
[434] ACER/CEER annual report, p. 44.
[435] ACER/CEER annual report, p. 61.
[436] ACER/CEER annual report, p. 42.

Switching activity: Annual switching rate 2013: 15.3% (EU28 average: 5.6%)[437], average 2008-2012: ca. 10% (EU28 average: 4%).[438] Annual savings to be encashed by consumers in the capital through switching are 25 euro and relatively low compared with other EU Member States.[439]

Renewable energy policy

Target compliance: Renewable electricity generation exceeds national electricity demand. Norway is targeting a renewable share of 67.5% in final energy consumption (electricity, heating and cooling, transport) by 2020.

Main electricity support scheme: Since 2012, Norway operates a common renewable electricity certificate system with Sweden. Suppliers and consumers who directly buy on wholesale markets, or who produce and consume their own electricity on-site are obliged to prove that a certain share of the electricity supplied is backed by certificates. Only capacities installed after September 2009 are eligible, excluding hydropower plants beyond 1 MW. Renewable certificates are technology-neutral, meaning that every renewable megawatt-hour receives one single certificate with the same price, regardless of the renewable energy technology used. Small-scale solar PV installations do not participate in the certificate system. Net metering is offered only on a voluntary base provided that consumers and local distribution system operators conclude an agreement.[440] Self-generation units with up to 100 kW of installed capacity benefit from an electricity tax exemption of the self-consumed electricity. A new regulatory framework for solar PV self-generation currently is in preparation.

Recent changes and trends: As wholesale market prices slumped, the economic viability of planned investments in new wind power capacities is questioned. Under the coupled binational certificates scheme, wind turbines which were favoured to diversify the Norwegian electricity generation capacities tend to be installed in Sweden due to more advantageous fiscal conditions.[441] Still, consumers' renewable self-generation is literally inexistent.[442] In 2015, the state-owned energy agency Enova SF introduced a grant for residential solar PV systems. Consumers who document their expenses are entitled to a grant that covers a part of the investment. Besides this support scheme, the access of small-scale solar PV units to the certificate system with Sweden is discussed once the self-generator's electricity production and consumption will be metered separately.[443]

[437] ACER/CEER: Annual report, p. 79.
[438] ACER/CEER: Annual report, p. 69.
[439] ACER/CEER: Annual report, p. 72.
[440] Norges vassdrags- og energidirektorat (Norwegian Water Resources and Energy Directorate, NVE): Plusskunder, http://www.nve.no/no/Kraftmarked/Nettleie1/Beregning-av-tariffer-for-innmating-fra-produksjon/Plusskunder, 7 February 2013.
[441] Starn, Jesper: Norway May Miss Out on $6 Billion Wind Power Boom. In: Renewable Energy World, http://www.renewableenergyworld.com/news/2014/09/norway-may-miss-out-on-6-billion-wind-power-boom.html, 9 September 2014.
[442] Good, C./Persson, H./Kleven, Ø./Boström, T.: Towards cost-efficient grid-connected PV power plants in Northern Scandinavia. Preprint, proceedings of the 26th European Photovoltaic Solar Energy Conference, Hamburg, 5-9 September 2011.
[443] Energi Norge: Støtter valgfrihet for plusskunder, http://www.energinorge.no/nyheter-om-nett-og-system/stoetter-valgfrihet-for-plusskunder-article10897-239.html, 2 September 2015.

'Green electricity' market size and choice

Choice: Tariff offers from 31 electricity suppliers out of 121 suppliers available to household consumers in 2015 are backed with 100% renewable GOs. Only 25 suppliers actively offer specific tariffs backed by GOs. Only eight suppliers exclusively offer tariffs that are entirely backed by GOs.[444]

Market size and development: While Norway has always been the most important exporter of renewable GOs backing 'green' tariffs in other EU Member States, demand for tariffs backed by 100% renewable GOs is very low. For this reason, the huge export volume of hydropower GOs was at the origin of a liquid European trade in renewable GOs. At the same time, it contributes to the low price level of GOs in Europe. Neither a relevant share of Norwegian suppliers nor consumers seemed to be interested in domestic use of renewable GOs since Norwegian consumers assume that they are almost entirely supplied with hydropower anyway. However, Norwegian companies interested in carbon footprinting, tend to be more interested in the use of renewable GOs because of the ongoing reduction of low carbon renewable energy sources in the residual mix (see "How 'green' tariffs and the fuel mix are disclosed on the bill – Functioning of legal fuel mix disclosure").[445] An enquiry commissioned by BEUC's national member Forbrukerrådet in 2015 revealed that suppliers' presentation of renewable tariffs is lacking in visibility and coherence. Even suppliers that offer tariffs backed by 100% renewable GOs do not necessarily disclose any fuel mix related to the product or to the supplier on their websites. Furthermore, prices of such tariffs may differ extremely.[446]

Relevance of renewable self-generation

Grid parity: Electricity generation costs of solar PV in Norway can be compared with neighbouring Sweden (above ca. 20 ct/kWh). Grid parity is not reached in Norway in 2014. The average retail electricity price was at least 4 ct/kWh below the costs of solar PV.[447]

Generation capacity: In 2014, the installed capacity was limited to 12.8 MW of solar PV units (2013: 10.6 MW), mainly installed for off-grid use in remote areas, including 2.2 MW newly added capacity during that year (2013: 0.6 MW).[448] In 2014, 0.01 TWh (2013: 0.009 TWh) of solar electricity equal to 0.008% of gross electricity consumption (EU28 average: 3.5%) were produced (2013: 0.006%).[449]

Capacity per inhabitant: With 2.5 W, the installed capacity per inhabitant is by far one of the lowest in Europe (EU average: 171.5 W).[450]

[444] Bergen Energi: Guarantees of origin in Norway. Supply and use of power agreements with guarantees of origin, June 2015, p. 29.
[445] Angell, Bjørnar: Current situation in Norway. Presentation, Brussels, 11 May 2015; Bergen Energi: Guarantees of origin in Norway. Supply and use of power agreements with guarantees of origin, June 2015.
[446] Bergen Energi: Guarantees of origin in Norway. Supply and use of power agreements with guarantees of origin, June 2015, p. 31.
[447] Joint Research Centre (JRC): Cost Maps for Unsubsidised Photovoltaic Electricity 2014, September 2014. The actual spread between the retail price on the one hand and the levelised generation cost of solar PV electricity may differ because the JRC model applied EU average data and did not take into account any eventual public support granted (e.g. tax exemptions) that could increase or decrease retail prices respectively generation cost.
[448] International Energy Agency Photovoltaic power systems programme (IEA-PVPS): Annual report 2014, August 2015.
[449] IEA-PVPS: National Survey Report of PV Power Applications in Norway 2014, July 2015.
[450] EurObserv'ER: Photovoltaic Barometer 2014, May 2015, p. 7-9.

4.9.3 Evaluation of 'green' tariffs' transparency

Definition of 'green electricity' offers

Disambiguation: Suppliers are authorised to market only electricity tariffs backed by 100% renewable GOs as a renewable tariff. Presenting an electricity tariff as 'green' is not allowed under the industry norm which regards this wording as an unsubstantiated environmental claim (see: "How 'green' tariffs are offered to consumers - Suppliers' information duties").[451] However, there is no listing or comparison of suppliers offering renewable offers. The enquiry commissioned by Forbrukerrådet came to the conclusion that unified and coherent communication about fuel mix disclosure is lacking and therefore affecting consumers' understanding of renewable tariffs.[452]

Qualitative minimum criteria: Legislation does not presuppose any requirements related to environmental benefits of renewable tariff offers.

Matching: Consumers cannot rely on any binding information when they want to know whether a GO-based renewable tariff is backed with power purchase contracts from renewable power plants or not.

How 'green' tariffs are offered to consumers

Suppliers' information duties: Due to the traditionally high share of hydropower in consumption, in the special case of Norway consumers tend to assume that they are supplied with 100% renewable electricity anyway. A binding regulatory framework addresses suppliers' communication about environmental claims related to electricity tariffs. In 2007, energy companies, authorities and the consumer ombudsman set up the Norwegian industry norm for power agreements with GOs. It ensures that suppliers who want to market a renewable electricity tariff have covered their customers' electricity consumption with an equivalent amount of renewable GOs. The industry norm also applies rules to the marketing of such tariffs. Environmental claims must be submitted to the consumer ombudsman if requested. According to the consumer ombudsman, presenting electricity tariffs as 'green', 'sustainable', 'environmentally friendly' or 'clean' would be contrary to the Marketing Control Act. Legislation aims at avoiding the impression that purchase of the tariff would cause special environmental advantages compared to electricity from other suppliers.[453]

Online price comparison tools (PCTs): No rules for the disclosure of the fuel mix apply when it comes to presentation of electricity tariffs in online PCTs. BEUC's national member Forbrukerrådet launched an online PCT[454] in June 2015 to provide an independent tool that makes consumers aware of the environmental footprint of each tariff offer. The beta version displays by default only those electricity tariffs that are fully backed by 100% renewable GOs. It provides a short information text on the functioning of GOs in fuel mix disclosure. As Norwegian consumers normally expect their electricity to be 100% renewable – being used to a 100% renewable production mix – only such tariffs backed by 100% renewable GOs would match consumers' initial understanding of the fuel mix under the condition of massive GO export to EU Member States (see **chapter 2.3.2 Functioning of Guarantees of Origin as a tracking tool** and "How 'green' tariffs and the fuel mix are disclosed on the bill").

[451] Bergen Energi: Guarantees of origin in Norway. Supply and use of power agreements with guarantees of origin, June 2015, p. 15/16.
[452] Bergen Energi: Guarantees of origin in Norway. Supply and use of power agreements with guarantees of origin, June 2015, p. 33/34.
[453] Bergen Energi: Guarantees of origin in Norway. Supply and use of power agreements with guarantees of origin, June 2015, p. 15/16.
[454] http://www.strompris.no

Forbrukerrådet plans to extend the information on sustainability issues of tariffs after the beta phase of their online PCT.

Disclosure report: No listing or comparison of suppliers' fuel mixes or renewable tariffs exists.

How 'green' tariffs and the fuel mix are disclosed on the bill

Functioning of legal fuel mix disclosure: The national regulator Norwegian Water Resources and Energy Directorate (NVE) administers legal fuel mix disclosure. The national GO registry is run by the transmission grid operator Stattnett, acting as issuing body. Renewable power plants supported under the renewable certificates scheme are entitled to GOs. In case no GOs are used for disclosure, the national residual mix and the national production mix (2014: 98% hydropower) must be published. However, suppliers are allowed to avoid publication of any fuel mix information on consumers' bills and refer to websites for further information.[455] Neither the supplier mix nor the product mix are mandatory to be published. By disclosing the national production mix next to the residual mix, suppliers can dilute from the significantly lower share of hydropower (2014: 9%) which has dropped because the majority of renewable GOs issued for Norwegian hydro power plants is exported (see **chapter 2.3.2 Functioning of Guarantees of Origin as a tracking tool**). In exchange, the attributes of the non-renewable electricity covered by Norwegian hydropower GOs in the importing countries (mainly Germany and the Netherlands) are included in the calculation of the Norwegian residual mix. An important information is not necessarily made clear: that – from the point of view of European-wide harmonised fuel mix disclosure – Norwegian consumers primarily are supplied with electricity from fossil fuelled power plants (54%) and nuclear power (37%).[456] The Norwegian practice of production mix disclosure is criticised by other EU stakeholders as misleading and not in line with harmonised fuel mix disclosure.[457] Investigation by BEUC's national member Forbrukerrådet show that only a limited number of suppliers offers renewable GO-backed tariffs and that suppliers customer services fail to explain the functioning of GOs and fuel mix calculation to consumers.

Advancement of fuel mix disclosure: Information provided in fuel mix disclosure does not go beyond the basic requirements of the Directive. Fuels are only differentiated by renewables, fossil fuels and nuclear power. This information can be disclosed on the supplier's website, together with the environmental indicators CO_2 emissions and radioactive waste. The country of origin of the GOs is not published.

Informative value: The practice of production mix disclosure can be regarded as misleading to some extent. From the point of view of consumers, there probably is an important misperception of what is renewable electricity supplied in retail markets because of the combined presentation of the corrected residual mix, taking into account the hydropower GO exports, together with the national production mix. The latter one seemingly confirms Norwegian consumers' understanding that their country traditionally is supplied by almost 100% hydropower.[458] The demand for renewable GOs to

[455] RE-DISS II project: Country profiles: Norway, http://www.reliable-disclosure.org/upload/170-RE-DISSII_Country_Profile_Norway_2015_V02.pdf, 13 May 2015; information from the national regulator NVE provided to Forbrukerrådet, 11 May 2015.
[456] NVE: Varedeklarasjon 2014, http://www.nve.no/no/Kraftmarked/Sluttbrukermarkedet/Varedeklarasjon/Varedeklarasjonen-2014/, 30 June 2015.
[457] Bergen Energi: Guarantees of origin in Norway. Supply and use of power agreements with guarantees of origin, June 2015, p. 9.
[458] Furthermore, confusion might be caused by the mere wording because 'green'/'renewable certificates' are known as the main support scheme for new renewable generation capacities in Norway (see "Renewable energy policy").

back renewable tariffs in Norway is crucial for the whole trade in GOs in Europe. As long as Norwegian consumers accept that their residual mix consists of a fossil and nuclear power, Norwegian hydropower GOs are massively exported and keep renewable GOs at a low price level.

How environmental benefits of 'green' tariffs are proven to consumers

Legal provisions: The industry norm (see: "How 'green' tariffs are offered to consumers - Suppliers' information duties") effectively avoids that suppliers pretend any undue environmental benefits related to their tariffs.

Additionality: Suppliers of renewable tariffs are not obliged to communicate about additionality of their offers to consumers. According to the industry norm, only attributes documented on the renewable GO could be used for marketing of additional environmental benefits. Only third-party verified private quality labels are authorised by the industry norm.[459]

How 'green electricity' quality labels guide consumers

Relevance of labels: No private 'green electricity' quality labels are active on the Norwegian market.

Functioning of labels: No private 'green electricity' quality labels are active on the Norwegian market.

4.9.4 Evaluation of consumers' access to self-generation

How grid access and use are guaranteed to self-generating consumers

Procedure: The grid operator is obliged to connect any renewable power plant to the grid and submit a schedule to the applicant. The grid operator determines where and how to connect the installation in the most efficient manner.[460] Some distribution grid operators refuse to connect solar PV systems until new smart bidirectional meters have been installed by 2019.[461]

Legal status: No priority grid access is granted to renewable power plants, but the grid operator is obliged to connect new installations in a non-discriminatory way.[462]

Commensurability of costs: The costs of the grid connection and eventually necessary grid reinforcement are borne by the plant operator.[463] Under the voluntary net metering schemes offered by some suppliers, a specific energy charge is imposed on excess electricity fed into the grid.[464]

How consumers' excess electricity production is treated

Rationale of the support scheme: The first special provisions for small-scale solar PV units targeting consumers were introduced in 2015. Solar PV units up to a maximal capacity of 15 kW are entitled to a grant offered by the state-owned energy agency Enova SF, limited to 10,000 NOK (1,052 euro) and depending on the location where the solar PV unit is installed. An additional amount of 1,250 NOK (131 euro) is granted per kilowatt installed with a cap at 15 kW of installed capacity. Building-integrated solar PV systems play a role within a public support scheme for seven "plus energy

[459] Gaia Consulting Oy: Guarantees of origin and eco-labeling of electricity in the Nordic countries, June 2011, p. 38.
[460] RES-LEGAL project: Norway – Connection to the grid, http://www.res-legal.eu/search-by-country/norway/single/s/res-e/t/gridaccess/aid/connection-to-the-grid-10/lastp/379/, 25 November 2014.
[461] IEA-PVPS: National Survey Report of PV Power Applications in Norway 2014, July 2015, p. 12.
[462] RES-LEGAL project: Norway – Connection to the grid, http://www.res-legal.eu/search-by-country/norway/single/s/res-e/t/gridaccess/aid/connection-to-the-grid-10/lastp/379/, 25 November 2014.
[463] RES-LEGAL project: Norway – Connection to the grid, http://www.res-legal.eu/search-by-country/norway/single/s/res-e/t/gridaccess/aid/connection-to-the-grid-10/lastp/379/, 25 November 2014.
[464] IEA-PVPS: National Survey Report of PV Power Applications in Norway 2014, July 2015, p. 11.

buildings" run by the energy agency Enova SF. Municipalities exceptionally run single local support schemes for solar PV units.[465] Net metering is offered on a voluntary basis to solar PV installations with up to 100 kW of installed capacity.[466] Self-generators who want to feed excess electricity into the grid and participate in the net metering scheme need to ask their supplier to conclude a voluntary agreement for the purchase of hourly excess electricity.

Remuneration: The renewable certificate price was at around 2 ct/kWh on average in 2014.[467] Renewable power plants are entitled to certificates during 15 years after being authorised by the national regulator Norwegian Water Resources and Energy Directorate (NVE). The certificates are issued by the Norwegian transmission grid operator Stattnett. In fact, no solar PV system participates in the renewable certificate scheme because of the high access barriers to the scheme and the low remuneration. Suppliers that offer net metering on a voluntary base can remunerate excess electricity fed into the grid with the current spot price after deduction of a specific energy charge which can lead to negative remuneration of solar kilowatt-hours. The netting period is one year. Participants have to stay net consumers which means that the net metering scheme does not take effect in case more electricity is fed into the grid than imported from it.[468]

Investment security: Since the entrance fee of the renewable certificate market scheme is NOK 15,000 (1,587 euro), consumers who want to run small-scale solar PV self-generation units are scared off. Even if accessing the renewable certificate market, consumers would not be able to provide renewable electricity at competitive prices since generation costs of small-scale solar PV units normally exceed largely other cheaper renewable power plants like wind turbines that enter the certificates market. With regard to the recently introduced grants for investment in small-scale solar PV systems, it is too early to assess impacts. The generous subsidy offered in case of investment might improve the economic feasibility of an investment in solar PV self-generation. Still, self-consumption is not necessarily attractive, given the low retail electricity prices and the poor remuneration for excess electricity fed into the grid. The voluntary base of the net metering scheme increases uncertainty for consumers who are willing to self-generate.

Which typical risks consumers face when starting a self-generation project

Financial risks: Given the relatively high generation costs of solar PV electricity, the low wholesale market prices and the lack of an appropriate support scheme, amortisation of consumers' investments in grid-connected solar PV units is very difficult to achieve. Outcomes of the recently introduced first dedicated support scheme for solar PV have to be assessed in the future.

Administrative barriers: There are no major bureaucratic hurdles, but consumer-owned solar PV with grid connection still is virtually inexistent.

Legal framework: Consumers' status is weakened by the distribution grid operator's prerogative to deny access without bidirectional smart meters. A reliable standard protecting consumers when it comes to grid connection is lacking. Again, consumers depend on the suppliers' different conditions and willingness to accept net metering which does not provide a secure framework for consumers. The dedicated rules for small-scale solar PV self-generation are very young and stakeholders need

[465] IEA-PVPS: National Survey Report of PV Power Applications in Norway 2014, July 2015, p. 12.
[466] Osmundsen, Terje: Nye NVE-forskrifter avgjør solcellenes fremtid i Norge, http://energiogklima.no/blogg/terje-osmundsen/nye-nve-forskrifter-avgjor-solcellenes-fremtid-i-norge, 8 November 2014.
[467] RES-LEGAL project: Norway – Quota system, http://www.res-legal.eu/search-by-country/norway/single/s/res-e/t/promotion/aid/quota-system-3/lastp/379/, 25 November 2014.
[468] IEA-PVPS: National Survey Report of PV Power Applications in Norway 2014, July 2015, p. 11.

more experience to scale-up reliable market conditions that really enable consumers to benefit from solar PV self-generation.

Quality of offers and services: Despite the presence of solar PV cell manufacturers, solar PV units are a niche market which is mainly restricted to off-grid appliances.

Information on self-generation options: Solar PV self-generation is still at the stage of being a very small niche market. Neither an appropriate targeted consumer-oriented information nor a one-stop shop is offered to consumers.

4.9.5 Summary of 'green electricity' markets and self-generation in Norway

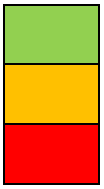
Conditions for consumers' 'green' choice		Remarks
Stage of market liberalisation		Forerunner of liberalisation, moderately concentrated and well-performing.
Renewable energy policy		Minimum quota with technology-neutral certificate scheme.
'Green electricity' market size and choice		Europe's dominant GO exporter, but domestic use of GO-backed tariffs is still in its infancy.
Relevance of renewable self-generation		No clear case for grid parity, solar PV still before the stage of market introduction.

Transparency of 'green' tariffs		
Definition of 'green electricity' offers		Only 100% GO-backed tariffs to be marketed as renewable, but comparison of tariffs missing.
How 'green' tariffs are offered to consumers		Strict rules avoiding misleading environmental claims, but no unified communication.
How 'green' tariffs and the fuel mix are disclosed on the bill		Misleading disclosure of the production mix.
How environmental benefits of 'green' tariffs are proven to consumers		Strict rules avoiding misleading marketing.
How 'green electricity' quality labels guide consumers		Strict rules for the role of quality labels, but no labels active on the market.

Consumers' access to self-generation		
How grid access and use are guaranteed to self-generating consumers		No priority access, grid operator may deny connection.
How consumers' excess electricity production is treated		No appropriate remuneration scheme, new grant for investment to be assessed in future.
Which typical risks consumers face when starting a self-generation project		Amortisation of solar PV self-generation projects tends to be very difficult.

Evaluation scale for transparency and market access

Good practice; issue showing good solutions related to transparency and/or market access from the point of view of consumers' rights
Average performance; issue with some problems and some solutions related to transparency and/or market access from the point of view of consumers' rights
Bad practice; issue with relevant problems related to transparency and/or market access from the point of view of consumers' rights



4.10 Portugal

National key indicators

Electricity consumption of households (residential) 2013: 12.314 TWh[469]
Renewable electricity generation 2013: 26.205 TWh (49.2% of total gross electricity consumption, EU28 average: 25.4%)[470]
Average electricity price 2014 (medium size households, incl. taxes and levies): 21.8 ct/kWh (EU28 average: 20.3 ct/kWh) [471]
Annual electricity bill of an average household in the capital Lisbon: 882 euro[472]

4.10.1 Conditions for consumers' 'green' choice

Stage of market liberalisation

Overview: The market has been liberalised lately and is compliant with the EU legislation.[473] Wholesale markets are linked closely with Spain. A phase-out of regulated prices initially was planned by the end of 2015 and has been delayed till the end of 2017. Thanks to an increase in renewable electricity production in recent years, the country's dependence on imports has been reduced significantly but still scores high.[474]

Market concentration: The former monopolist EDP has been privatised in 2013 but still dominates the electricity market as the country's most important producer and retailer. EDP is also the only licensed distribution system operator (DSO) on the mainland. The market share of the three biggest companies (EDP, Endesa, Iberdrola) was 85% in 2013.[475] Household electricity suppliers' mark-ups were around 1.1 ct/kWh in 2013.[476]

Choice: 17 different tariff offers from 5 electricity suppliers available to household consumers in the capital Lisbon in 2013[477]

Switching activity: Annual switching rate 2013: 26.8% (EU28 average: 5.6%)[478], average 2008-2012: ca. 4% (EU28 average: 4%).[479] The phase-out of regulated tariffs by the end of 2015 and a switching campaign run by DECO, BEUC's national member organisation, explain why Portuguese consumers were by far the most active switchers in 2013. Annual savings to be encashed by consumers with average electricity consumption in the capital through switching are estimated by ACER/CEER being

[469] Eurostat: Supply, transformation and consumption of electricity - annual data, Electrical energy – residential http://ec.europa.eu/eurostat/tgm/table.do?tab=table&plugin=1&language=en&pcode=tsdpc310, 27 April 2015.
[470] Eurostat: Energy from renewable sources, http://ec.europa.eu/eurostat/web/energy/data/shares, 28 April 2015.
[471] Eurostat: Electricity prices per type of user, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_pc_204&lang=en, 28 April 2015.
[472] Incumbents' standard offers, 4,000 kWh consumption, see ACER/CEER annual report, p. 33.
[473] The autonomous island regions of the Azores and of Madeira are out of the liberalisation obligation under EU regulation.
[474] European Commission: EU Energy markets in 2014, October 2014, p. 133-138.
[475] European Commission: EU Energy markets in 2014, October 2014, p. 133-138.
[476] ACER/CEER annual report, p. 57-58.
[477] ACER/CEER annual report, p. 42.
[478] ACER/CEER: Annual report, p. 79.
[479] ACER/CEER: Annual report, p. 69.

around 50 euro[480] but practical experiences of DECO show that consumers' savings actually tend to be rather around half of this amount.

Renewable energy policy

Target compliance: 2020 target for the share of renewable electricity in final consumption: 59.6% (2013: 49.2%). Despite important progress, Portugal would have to accelerate growth in renewable electricity production to reach its 2020 targets.[481] The European Commission's progress report 2015 expects that Portugal will tightly accomplish the 2020 overall target for the renewable share in final energy consumption (electricity, heating & cooling, transport).[482]

Main electricity support scheme: Portugal looks back on a long experience with FiTs (except for big hydropower plants) to boost the share of renewable electricity. The special requirements of micro- and mini-production units (up to 5.75 kW respectively 250 kW of installed capacity) were addressed with dedicated technology specific FiTs.[483] Decreasing wholesale market prices and high public burdens resulting from regulated prices and from the FiT scheme caused a tariff deficit of ca. 5 billion euro for the public purse. BEUC's national member organisation DECO warns that these costs could be fully passed on to consumers' regulated prices. Following the Memorandum of Understanding for the country's bailout in May 2011, a moratorium for the installation of new renewable power plants under the FiT scheme was introduced in February 2012.[484] After suspending the moratorium, only new micro- and mini-production units were still entitled to FiTs.

Recent changes and trends: A new framework for small production units up to 250 kW entered into force in January 2015, replacing the FiT scheme for micro- and mini-production and promoting self-consumption of renewable electricity. Installations that do only export electricity to the grid have to participate in a bidding system by offering discounts of a benchmark tariff set by the government.

'Green electricity' market size and choice

Choice: 1 'green' tariff offer from 1 electricity supplier available to household consumers in the capital Lisbon in 2013.[485] BEUC's national member organisation DECO estimates this tariff as being rather an attempt to occupy the market with an overpriced offer.

Market size and development: 'Green' tariffs are a small niche market in Portugal. According to estimations of the regulator, 'green' tariffs were covering approximately 0.5% of the retail market in 2014.[486] Apart from the 'Casa Verde' tariff of former state monopolist EDP, a cooperative started offering a 100% renewable electricity tariff to its members throughout the whole country.[487] However, these offers tend to be absolutely marginal at the moment.

[480] ACER/CEER: Annual report, p. 72.
[481] 2020 Keep on track project: EU Tracking Roadmap 2015. Keeping track of renewable energy targets towards 2020, June 2015, p. 82-84.
[482] European Commission: Renewable energy progress report, June 2015, p. 5.
[483] RES-LEGAL project: Portugal - Feed-in tariff (Tarifas feed-in), http://www.res-legal.eu/search-by-country/portugal/single/s/res-e/t/promotion/aid/feed-in-tariff-tarifas-feed-in/lastp/179, 26 November 2014.
[484] 2020 Keep on track project: 2013 Policy Recommendations Report, June 2013.
[485] ACER/CEER annual report, p. 42.
[486] CEER: Advice on customer information on sources of electricity, March 2015, p. 9.
[487] Energias de Portugal (EDP): 'Casa Verde' tariff, https://energia.edp.pt/particulares/energia/eletricidade/verde-2015.aspx; Coopérnico cooperative, http://www.coopernico.org/, July 2015.

Relevance of renewable self-generation

Grid parity: With levelised electricity generation costs of solar PV of around ca. 11 to 12 ct/kWh, there is a case for grid parity. The average retail electricity price exceeded costs of solar PV by 10 to 11 ct/kWh, providing attractive savings from self-consumption.[488]

Generation capacity: In 2014, the installed capacity reached 419 MW, of which ca. 30% were installed in the residential sector[489] (2013: 303 MW), producing 0.631 TWh of solar electricity equal to 1.3%[490] of gross electricity consumption (EU28 average: 3.5%; 2013: 0.479 TWh, 0,9%).[491] Around 20,000 households were owners of renewable self-generation units in 2015.[492]

Capacity per inhabitant: Despite high solar irradiation, with 40.2 W the installed capacity per inhabitant is less than a fourth of the EU average (171.5 W).[493]

4.10.2 Evaluation of 'green' tariffs' transparency

Definition of 'green electricity' offers

Disambiguation: An official definition of 'green' offers and related environmental benefits is missing but a code of conduct regulates to some extend the use of certain terms in relation with marketing. Suppliers that are claiming a certain fuel mix, e.g. in relation with a 'green' tariff, are not forced to back the tariff with Guarantees of Origin (GOs).[494] Renewable electricity that was produced under a public support scheme in Portugal is not entitled to receive Guarantees of Origin (GOs).

Qualitative minimum criteria: Since a legal definition of 'green' tariffs is missing, Portuguese legislation does not presuppose any requirements related to environmental benefits of such offers.

Matching: Consumers cannot rely on any binding information when they want to know whether a GO-based 'green' offer is backed with power purchase contracts from renewable power plants or not. Consequently, it is left to the willingness of the supplier to make clear if they pay for kilowatt-hours generated or purchased from renewable power plants. DECO criticises that it isn't clear for the consumer what she/he's actually paying for and how the supplier guarantees that all of his consumption really is supplied by renewable electricity.

How 'green' tariffs are offered to consumers

Suppliers' information duties: No binding regulatory framework addresses suppliers' communication about 'green' tariffs. No legal provisions apply to the marketing of 'green' tariffs. In practice, EDP annually provides an own 'certificate' to consumers who opted for the 'Casa Verde' tariff, stating that the consumption under the tariff would be backed by 100% renewable electricity.

Online price comparison tools (PCTs): The official online PCT run by the national regulator Entidade reguladora dos serviços energéticos (ERSE) does neither display the fuel mix nor any other

[488] Joint Research Centre (JRC): Cost Maps for Unsubsidised Photovoltaic Electricity 2014, September 2014. The actual spread between the retail price on the one hand and the levelised generation cost of solar PV electricity may differ because the JRC model applied EU average data and did not take into account any eventual public support granted (e.g. tax exemptions) that could increase or decrease retail prices respectively generation cost.
[489] Solar Power Europe (SPE): Global market outlook for solar power 2015 – 2019, June 2015, p. 22.
[490] Solar Power Europe (SPE): Global market outlook for solar power 2015 – 2019, June 2015, p. 26.
[491] EurObserv'ER: Photovoltaic Barometer 2014, May 2015, p. 10.
[492] Rough estimation by national BEUC member organisation.
[493] EurObserv'ER: Photovoltaic Barometer 2014, May 2015, p. 7-9.
[494] RE-DISS II project: Country profiles: Portugal, http://www.reliable-disclosure.org/upload/137-RE-DISS_Country_Profile_Portugalv4.pdf, 12 August 2014.

information related to 'green' tariffs.[495] ERSE collects fuel mix disclosure data of most of the electricity suppliers to present them in a separate easy accessible online comparison tool (Energy Labelling Simulator) for consumers. The product mixes are presented together with illustrative examples to visualise the environmental impacts of a supplier's electricity tariff, e.g. in terms of greenhouse gas emissions.[496] However, it would have been more coherent to visualise the fuel mix directly in the PCT where consumers expect the basic information on the different tariffs.

Disclosure report: No official listing or comparison of 'green' tariffs exist, but the Energy Labelling Simulator provides an opportunity to research suppliers' fuel mixes.

How 'green' tariffs and the fuel mix are disclosed on the bill

Functioning of legal fuel mix disclosure: Since 2008, a law forces suppliers to disclose the origin of electricity for the previous year. Suppliers use a guideline issued by ERSE to calculate the fuel mix, based on purchased electricity from wholesale markets, from bilateral contracts, provided by feed-in contracts or by GOs. GOs can be used for fuel mix disclosure, but a GO registry is not yet operable.[497]

Advancement of fuel mix disclosure: The practice of legal fuel mix disclosure does not go beyond minimum criteria fixed in the Directive. The environmental impacts in the form of CO_2 emissions and radioactive waste have to be disclosed on the bill. The fuel mix is disclosed in the form of an infographic which represents all energy sources used to provide electricity to customers, including different renewable (percentage of wind power, hydropower and 'other renewables') and fossil fuels. The country of origin of the GOs is not published.

Informative value: On the one hand, the specific national methodology to calculate a contract-based fuel mix instead of using a national average default mix brings consumers closer to the information what energy sources they actually paid for. On the other hand, this calculation method may fail to cover relevant unknown sources and is less coherent than an exclusively GO-based tracking system. Apart from the significance of the different tracking tools, the fuel mix disclosure in general tends to be not a very prominent aspect in the presentation of electricity offers on the Portuguese market.

How environmental benefits of 'green' tariffs are proven to consumers

Legal provisions: No regulatory provisions apply for proving qualitative environmental aspects related to the impacts of purchasing a 'green' tariff.

Additionality: Suppliers of 'green electricity' tariffs are not obliged to communicate about additionality of their offers to consumers. No rules apply for measuring the environmental benefits of consumers' choice for 'green' tariff. The consumer cannot verify the relevance or consistence of the environmental claims made by a supplier with regard to its 'green' tariff.

How 'green electricity' quality labels guide consumers

Relevance of labels: No 'green electricity' quality labels are active in Portugal.

Functioning of labels: No 'green electricity' quality labels are active in Portugal.

[495] Entidade reguladora dos serviços energéticos (ERSE): Simulador de Preços de Energia Elétrica, http://www.erse.pt/pt/electricidade/simuladores/simuladoresdecomparacaodeprecosnomercado/Paginas/resultadosimulacaoprecos.aspx, 4 August 2015.
[496] Entidade Reguladora dos Serviços Energéticos (ERSE): Energy Labelling Simulator, http://simuladores.erse.pt/rotulagem, July 2015.
[497] RE-DISS II project: Country profiles: Portugal, http://www.reliable-disclosure.org/upload/137-RE-DISS_Country_Profile_Portugalv4.pdf, 12 August 2014.

4.10.3 Evaluation of consumers' access to self-generation

How grid access and use are guaranteed to self-generating consumers

Procedure: The procedure tends to be complex and lengthy. Former micro- and mini-production unit plant operators had to register in a centralised national electronic registration system run by the Ministry of Economy, like small production units still have to do under the new 2015 regulation. This implies that a consumer commissions an authorised installer only after the registration is paid and confirmed. After installation, the device still has to be inspected in order to receive an exploitation certificate.[498] Once the exploitation certificate obtained, the owner can conclude a purchase contract for the excess electricity to be exported to the grid. Within ten days after having concluded this contract, the installation is connected to the grid. [499] A simplified registration process applies to installations below 1.5 kW. They just have to notify the registry. Installations below 0.2 kW generally are exempted from the process.[500]

Legal status: Renewable power plants are granted priority grid access.[501]

Commensurability of costs: New installations for self-consumption above 1.5 kW are subject to a tax to bear the electricity system costs. Once the installed capacity of self-consumption exceeds 1% of the total system installed capacity, this will apply to all new installations even below 1.5 kW. Although foreseeable, this additional charge might build an additional barrier to new projects.[502] Furthermore, when self-generators sell their excess electricity to the supplier of last resort, this intermediary automatically deducts 10% of the wholesale market price to compensate grid maintenance costs.

How consumers' excess electricity production is treated

Rationale of the support scheme: Special tariffs for small self-generation units were available until the phase out by the end of 2014. The new regulation for small production units, in force since January 2015, obliges self-generators to conclude a purchase contract with the supplier of last resort for the excess electricity they feed into the grid at a reduced wholesale market price. New projects are incentivised to reduce feed-in of solar PV electricity into the grid and maximise self-consumption at premises. The new regulation does not intend to create a business case for consumers to produce excess electricity to be fed into the grid. It is clearly wants to ensure that solar PV systems installed are well-balanced with regard to consumers' electricity demand. The focus is self-consumption with the help of small installations instead of self-generation including the export of excess electricity.

Remuneration: The reference FiT for micro-production units (phased out by end of 2014) was 14.5 ct/kWh, the reference tariff for mini-production units was 10.6 ct/kWh for solar PV. Special tariffs for small hydropower micro- and mini-production, for biomass and wind power mini-production units were available. The support for former scheme was annually capped, e.g. at 34 million kWh of total electricity generation from solar PV micro- and mini-production units or 30.35 MW maximum newly installed capacity. FiTs for solar PV micro-production were sharply lowered in 2014 and the annual

[498] Ministério do Ambiente, Ordenamento do Terrritório e Energia: Energy Self-consumption Policy in Portugal. Presentation, Brussels, 17 June 2015.
[499] RES-LEGAL project: Portugal - Connection to the grid, http://www.res-legal.eu/search-by-country/portugal/single/s/res-e/t/gridaccess/aid/connection-to-the-grid-2/lastp/179/, 26 November 2014.
[500] Ministério do Ambiente, Ordenamento do Terrritório e Energia: Energy Self-consumption Policy in Portugal. Presentation, Brussels, 17 June 2015.
[501] RES-LEGAL project: Portugal - Connection to the grid, http://www.res-legal.eu/search-by-country/portugal/single/s/res-e/t/gridaccess/aid/connection-to-the-grid-2/lastp/179/, 26 November 2014.
[502] 2020 Keep on track project: Analysis of Deviations and Barriers 2013/2014, June 2014.

cap reduced from 25 MW to 10 MW only.[503] Within the new regulation, consumers who have installed a solar PV unit for self-consumption and received the exploitation certificate, conclude a purchase contract with the supplier of last resort for the excess electricity they feed into the grid. They are generally entitled to be remunerated with the average monthly wholesale markets price (2015: ca. 3.8 ct/kWh), of which 10% are deducted as a contribution for grid maintenance. Consumers are not obliged to conclude purchase contracts for excess electricity exclusively with the supplier of last resort but can also try to negotiate bilateral agreements with other buyers or sell their electricity on other market places. The maximum time period for purchase contracts is ten years, to be renewed for another five years.[504]

Investment security: Low and fluctuating wholesale prices, over and above reduced by 10%, do not provide sufficient investment security for self-generation that would aim at the export of excess electricity. This rule rather penalises self-generators who want to feed excess electricity into the grid. However, small self-consumption units that are configured to cover consumers' actual consumption can amortise through optimised matching generation with demand.

Which typical risks consumers face when starting a self-generation project

Financial risks: As a consequence of the financial crisis, access to capital generally tends to be limited for average consumers willing to invest in self-generation. The moratorium in 2012 has created uncertainty and the lack of reliability of support schemes endures to some extend because the fundamentally revised support schemes still are not fully operational. Although the supplier of last resort is obliged to purchase excess electricity, the remuneration scheme for excess electricity is not sufficient. Compared to the previous FiT scheme, the amortisation period would be considerably longer if the consumer aims at exporting excess electricity. However, in case the new regulation is used as intended by legislators, meaning as a pure self-consumption scheme, small solar self-consumption kits tend to reach a payback of 7 to 9 years according to estimations of BEUC's national member organisation DECO, provided no excess electricity is fed into the grid.

Administrative barriers: National renewable energy experts warn that the functioning of the new 2015 framework small production units, could be questioned by the high regulatory complexity, asking for communication campaigns to explain consumers the benefits of self-consumption.

Legal framework: Small self-generation projects are addressed with dedicated schemes and rules. Nevertheless, the grid access remained lengthy. Compared with other Member States, Portugal scores very high in complaints about barriers to renewable electricity projects related to national regulation.[505] The new regulation, promoting self-consumption, is expected to simplify such problems.

Quality of offers and services: Solar PV self-generation still is a relatively new and small market in Portugal. BEUC's national member organisation DECO highlights that consumers do not necessarily get sufficient advice from installers. DECO warns consumers against distance selling of solar PV

[503] 2020 Keep on track project: Analysis of Deviations and Barriers 2013/2014, June 2014.
[504] Nogueira de Brito, Miguel/Brito Ferreira, Catarina: New regime for small-scale electricity generation, http://www.mlgts.pt/xms/files/Publicacoes/Artigos/2015/New_regime_for_small-scale_electricity_generation.pdf, 16 March 2015.
[505] RE-FRAME project: Results from 2013/2014, http://re-frame.eu/index.php?id=16, 4 August 2015.

panels and recommends to thoroughly check offers that are adapted to the specific conditions of the building.[506]

Information on self-generation options: The national BEUC member organisation also deplores a lack of structured and independent information on self-generation guiding consumers. The supplier of last resort is the most important intermediary but does not serve as a one-stop shop. A survey under the CLEAR project showed that Portuguese know well what solar PV panels are (56% of people surveyed say so). The most important information sources about renewable energy technologies that consumers opt for are manufacturers, the consumer organisation and friends. Consumers mostly search for how much money they would save compared to fossil energy sources. 28% of Portuguese consumers say that they would not consider buying solar PV panels at all.[507] BEUC's national member DECO provides a very exhaustive online information tool[508] to guide consumers who are interested in investing in renewable self-generation, raise awareness for potentials.

[506] DECO Proteste: Autoconsumo: 6 dicas para saber se este é o sistema indicado para si, http://www.deco.proteste.pt/casa/eletricidade-gas/testes-primeira-impressao/autoconsumo-seis-dicas-para-saber-se-este-e-o-sistema-indicado-para-si, 29 May 2015.
[507] GfK: CLEAR – WP2.1. Consumer survey 1 – Attitudes, opinion, drivers and barriers and satisfaction with regard to Renewable Energy Systems, October 2014.
[508] https://energias-renovaveis-emcasa.pt

4.10.4 Summary of 'green electricity' markets and self-generation in Portugal

Conditions for consumers' 'green' choice		Remarks
Stage of market liberalisation		Formally liberalised market dominated by the privatised former state monopolist.
Renewable energy policy		Dedicated regulation for self-consumption, prohibitive against export of excess electricity, incertitude because of previous moratorium.
'Green electricity' market size and choice		Very small niche market.
Relevance of renewable self-generation		Still very young but promising solar PV market for consumers because of clear grid parity.

Transparency of 'green' tariffs		
Definition of 'green electricity' offers		No definition existing.
How 'green' tariffs are offered to consumers		No binding information, informative online fuel mix comparison tool.
How 'green' tariffs and the fuel mix are disclosed on the bill		Contract-based disclosure of the fuel mix, GO tracking scheme not fully implemented.
How environmental benefits of 'green' tariffs are proven to consumers		No provisions or obligations, information can vary from supplier to supplier.
How 'green electricity' quality labels guide consumers		No 'green electricity' quality labels exist.

Consumers' access to self-generation		
How grid access and use are guaranteed to self-generating consumers		Dedicated, but relatively complex and lengthy registration process.
How consumers' excess electricity production is treated		New regulation focusses on self-consumption only with guaranteed but insufficient remuneration for excess fed into the grid.
Which typical risks consumers face when starting a self-generation project		Access to capital, lack of information, insufficient remuneration for excess electricity, regulatory incertitude.

Evaluation scale for transparency and market access

Good practice; issue showing good solutions related to transparency and/or market access from the point of view of consumers' rights	
Average performance; issue with some problems and some solutions related to transparency and/or market access from the point of view of consumers' rights	
Bad practice; issue with relevant problems related to transparency and/or market access from the point of view of consumers' rights	

4.11 Slovenia

National key indicators

Electricity consumption of households (residential) 2013: 3.229 TWh[509]
Renewable electricity generation 2013: 4.801 TWh (32.8% of total gross electricity consumption, EU28 average: 25.4%)[510]
Average electricity price 2014 (medium size households, incl. taxes and levies): 16.3 ct/kWh (EU28 average: 20.3 ct/kWh) [511]
Annual electricity bill of an average household in the capital Ljubljana: 610 euro[512]

4.11.1 Conditions for consumers' 'green' choice

Stage of market liberalisation

Overview: Full market liberalisation was implemented in July 2007. The Third Energy Package (unbundling of the market) was transposed into national law in February 2014.[513]

Market concentration: The wholesale market is dominated by three state-owned market players with a cumulative share of 84.8% of the production capacity. The retail market is less concentrated with a number of local utilities that remain dominant in their region.[514] Suppliers' mark-ups are relatively low with around 0.5 ct/kWh in 2013.[515]

Choice: 36 different tariff offers from 7 electricity suppliers available to household consumers in the capital Ljubljana in 2013.[516]

Switching activity: Annual switching rate 2013: 3.9% (EU28 average: 5.6%)[517], average 2008-2012: ca. 2.5% (EU28 average: 4%).[518] Slovenia has one of the lowest switching rates for electricity household consumers amongst liberalised markets in the EU. Annual savings to be encashed by consumers in the capital through switching are estimated at around 50 euro.[519]

Renewable energy policy

Target compliance: 2020 target for the share of renewable electricity in final consumption: 39.6% (2013: 32.8%). Slovenia is reaching its interim targets within the National Renewable Energy Action Plan submitted within the EU 2020 targets. However, the growth rate in renewable electricity still has

[509] Eurostat: Supply, transformation and consumption of electricity - annual data, Electrical energy – residential http://ec.europa.eu/eurostat/tgm/table.do?tab=table&plugin=1&language=en&pcode=tsdpc310, 27 April 2015.
[510] Eurostat: Energy from renewable sources, http://ec.europa.eu/eurostat/web/energy/data/shares, 28 April 2015.
[511] Eurostat: Electricity prices per type of user, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_pc_204&lang=en, 28 April 2015.
[512] Incumbents' standard offers, 4,000 kWh consumption, see ACER/CEER annual report, p. 33.
[513] European Commission: EU Energy markets in 2014, October 2014.
[514] European Commission: EU Energy markets in 2014, October 2014; Agencija za energijo: Key indicators of the electricity and natural gas markets in 2014, May 2015.
[515] ACER/CEER annual report, p. 57-58.
[516] ACER/CEER annual report, p. 42.
[517] ACER/CEER: Annual report, p. 79.
[518] ACER/CEER: Annual report, p. 69.
[519] ACER/CEER: Annual report, p. 72.

to increase.[520] The European Commission's progress report 2015 expects Slovenia to slightly fall short of its overall 2020 target for renewables in the electricity, in the heating and cooling and transport sectors.[521]

Main electricity support scheme: Slovenia started supporting market introduction of renewable electricity with a feed-in tariff scheme (FiT) which is to be replaced by a tendering scheme. Consumers' self-generation projects below 1 MW of installed capacity were entitled to FiTs but were also able to opt for a technology specific market premium which is paid on top of the market price. The lower the installed capacity, the higher the FiTs respectively the premiums are. Consumers were able to opt for the market premium for self-consumed electricity instead of receiving it as a supplement to the market price.[522]

Recent changes and trends: In order to avoid an increase in the deficits of the payment scheme, a yearly tender was introduced with the 2014 Energy Act amendment for all installations connected after 22 September 2014. Interested operators have to compete with their project proposals and might be granted access to payments after being ranked by the regulator, the National Energy Agency Agencija za energija. The first tender for projects to be built in 2015, scheduled in October 2014, was cancelled because of insufficient funds allocated by the government.[523] For the following 2015 tender, funding was allocated, but until October 2015, the call was not yet published because the pending approval of the scheme by the European Commission.[524] For solar PV self-generation units, a net metering scheme with for installations with up to 10 kW of capacity was pending at the editorial deadline of this report.

'Green electricity' market size and choice

Choice: 5 different 'green' tariff offers from 4 electricity suppliers available to household consumers in the capital Ljubljana in 2013.[525]

Market size and development: After consumers were able to switch suppliers in 2007, the first 'green' tariffs appeared on the market. No detailed data on the number of consumers having opted for 'green' tariffs is available. One of the suppliers (Elektro Celje Energija, ECE) has been offering only 'green electricity' to its household customers since 2013. ECE held a market share of approximately 14% in 2014 before merging with another supplier (Elektro Gorenjska prodaja) in 2015. Starting from October 2015, they will offer only 'green electricity' tariffs to all their household customers, representing a market share of approximately 20% in 2015.[526] Suppliers mainly offer electricity from their national hydropower plants.

[520] 2020 Keep on track project: EU Tracking Roadmap 2015. Keeping track of renewable energy targets towards 2020, June 2015, p. 91-93.
[521] European Commission: Renewable energy progress report, June 2015, p. 5.
[522] RES-LEGAL project: Slovenia – Premium tariff, http://www.res-legal.eu/search-by-country/slovenia/single/s/res-e/t/promotion/aid/premium-tariff/lastp/191/, 10 December 2014.
[523] Agencija za energijo: Support for produced electricity from RES, http://www.agen-rs.si/web/en/esp_support, 10 July 2015.
[524] Agencija za energijo: Vlada RS odobrila 10 milijonov evrov za podpore novim projektom OVE in SPTE, http://www.agen-rs.si/web/portal/-/vlada-rs-odobrila-10-milijonov-evrov-za-podpore-novim-projektom-ove-in-spte, 1 October 2015.
[525] ACER/CEER annual report, p. 42.
[526] Agencija za energijo: Annual Report on the Energy Sector in Slovenia for 2014, July 2015; estimation from BEUC's national member organisation ZPS; Elektro Celje Energija (ECE): Električna energija, https://www.ece.si/dom/elektrika/, 26 October 2015.

Relevance of renewable self-generation

Grid parity: With levelised electricity generation costs of solar PV of around ca. 15 to 17 ct/kWh, Slovenia is just at the edge of reaching grid parity. The average retail electricity price exceeded costs of solar PV by 1 to 2 ct/kWh at maximum.[527]

Generation capacity: In 2014, the installed capacity of solar PV units[528] reached 256 MW (2013: 248 MW), producing 0.245 TWh of solar electricity equal to 2.3%[529] of gross electricity consumption (EU28 average: 3.5%; 2013: 0.220 TWh).[530]

Capacity per inhabitant: With 124.2 W, the installed capacity per inhabitant is below EU average (171.5 W).[531]

4.11.2 Evaluation of 'green' tariffs' transparency

Definition of 'green electricity' offers

Disambiguation: An official definition of 'green' offers and related environmental benefits is missing. No official listing of 'green' tariffs exists. Renewable energy plant operators that are supported within the FiT/premium tariff scheme automatically receive renewable GOs that have to be transferred to the market operator BORZEN in order to track the correct quantity of produced electricity and finally receive the remuneration.[532] These renewable GOs for supported electricity are statistically reallocated to all final customers for the purpose of fuel mix disclosure.

Qualitative minimum criteria: Since the revision of the Energy Act in February 2014, suppliers have to publish links to webpages with information on the tariff's additionality on the bill.[533] There are no specially regulated claims on 'green electricity's' environmental benefits, but all claims related to such offers can be assessed under the national Unfair Commercial Practices Act.

Matching: Consumers cannot rely on any binding information when they want to know whether a GO-based 'green' offer is backed with power purchase contracts from renewable power plants or not. Holding Slovenske Elektrame (HSE), one of the dominant state-owned suppliers, is marketing renewable electricity from his hydropower capacities as a 'green' tariff product under a 'Blue Energy' brand (ca. 0.03 TWh in 2014[534]). Consumers can purchase this tariff from HSE or from other retail suppliers that also use this brand to sell renewable electricity. Other suppliers sell so-called 'Green Energy' tariffs which comprise mainly electricity from small hydropower stations.[535] Following product presentations and suppliers' portfolio, it appears to be likely that the supplier matches the

[527] Joint Research Centre (JRC): Cost Maps for Unsubsidised Photovoltaic Electricity 2014, September 2014. The actual spread between the retail price on the one hand and the levelised generation cost of solar PV electricity may differ because the JRC model applied EU average data and did not take into account any eventual public support granted (e.g. tax exemptions) that could increase or decrease retail prices respectively generation cost.
[528] EurObserv'ER: Photovoltaic Barometer 2014, May 2015, p. 10.
[529] Solar Power Europe (SPE): Global market outlook for solar power 2015 – 2019, June 2015, p. 26.
[530] EurObserv'ER: Photovoltaic Barometer 2014, May 2015, p. 10.
[531] EurObserv'ER: Photovoltaic Barometer 2014, May 2015, p. 7-9.
[532] Agencija za energijo: Guarantee of Origin (GO), http://www.agen-rs.si/web/en/esp_go, 10 July 2015.
[533] RE-DISS II project: Country profiles: Slovenia, http://www.reliable-disclosure.org/upload/171-RE-DISSII_Country_Profile_Slovenia_2015V03.pdf, 27 April 2015.
[534] RE-DISS II project: Country profiles: Slovenia, http://www.reliable-disclosure.org/upload/171-RE-DISSII_Country_Profile_Slovenia_2015V03.pdf, 27 April 2015.
[535] Holding Slovenske Elektrame (HSE): Annual report 2013, June 2014, p. 98; evidence from national BEUC member organisation.

renewable (hydropower) electricity which is produced or purchased by him with the renewable GOs for disclosure purposes.

How 'green' tariffs are offered to consumers

Suppliers' information duties: Since the revision of the Energy Act in February 2015, suppliers have to publish links to webpages with information on the tariff's additionality on the bill.[536] No further binding regulatory framework addresses suppliers' communication about 'green' tariffs. In practice, tariffs backed by 100% renewable GOs are offered as 'Blue Energy' or 'Green Energy'.

Online price comparison tools (PCTs): The official online price comparison tool, run by the regulator Agencija za energija, displays the product mix by default. The legal fuel mix disclosure of every tariff is shown, differentiating the share of renewable energy sources, of fossil fuels and of nuclear power.[537]

Disclosure report: No official listing or comparison of fuel mixes exist.

How 'green' tariffs and the fuel mix are disclosed on the bill

Functioning of legal fuel mix disclosure: Fuel mix disclosure is mandatory since 2006. Renewable Guarantees of Origin (GOs) have to be used as the only tool to back renewable electricity tariffs in the fuel mix disclosure. The GO tracking system is fully operational and harmonised with other Member States' bodies. The national average residual mix applies for the remaining shares.

Advancement of fuel mix disclosure: The product mix of the specific tariff chosen by a customer must be published together with the supplier mix representing the company's total fuel mix. The rules for fuel mix disclosure require a detailed presentation of different fossil and renewable sources instead of summing them up. Suppliers also are obliged to publish the CO_2 emissions and the radioactive waste in relation with fuel mix disclosure on the bill. Since 2013, a list of relevant websites and other sources of information must be published in order to offer consumers more exhaustive background information on the environmental impacts of the fuel mix used for electricity generation.[538]

Informative value: The rules for fuel mix disclosure in Slovenia slightly go beyond the minimum criteria of the Directive. Fuel mix disclosure is coherent and understandable.

How environmental benefits of 'green' tariffs are proven to consumers

Legal provisions: Suppliers need to explain additionality of the tariff on a website, see "How 'green' tariffs are offered to consumers - Suppliers' information duties".

Additionality: It remains unclear how the provision of additionality information is handled by suppliers in practice. As the new rule imposing an information duty concerning additionality of a tariff was introduced in February 2015, there aren't yet any experiences about the rule's implementation. Funds raised by suppliers from 'green' tariffs' revenues are intended for

[536] RE-DISS II project: Country profiles: Slovenia, http://www.reliable-disclosure.org/upload/171-RE-DISSII_Country_Profile_Slovenia_2015V03.pdf, 27 April 2015.
[537] Agencija za energijo: Primerjava stroškov oskrbe z električno energijo, http://primerjalnik.agen-rs.si/index.php?/kalkulatorelektrika/kalkulator/action/PredstavitevRezultatov/, 3 August 2015.
[538] For an example of a fuel mix disclosure see: Elektro Celje Energija (ECE): Električna energija, https://www.ece.si/dom/elektrika/, 26 October 2015.

maintenance of existing and construction of new production capacities of environmentally friendly electricity production.[539]

How 'green electricity' quality labels guide consumers

Relevance of labels: No national 'green electricity' quality labels exist. HSE as one of the suppliers that offer a 'green' tariff is listed as a licensee of the Helsinki-based international EKOenergy label.[540]

Functioning of labels: The EKOenergy label applies certain environmental minimum criteria.

4.11.3 Evaluation of consumers' access to self-generation

How grid access and use are guaranteed to self-generating consumers

Procedure: Self-generation units below 1 MW are exempted from the energy permit and licensing procedure for renewable energy plant operators. Consumers just have to declare the specificities of their planned installation and receive a connection consent from the distribution system operator.

Legal status: Grid operators have to grant priority grid access to renewable power plants. After concluding a connection agreement, the plant owner has the right to be connected to the grid within 8 days.[541]

Commensurability of costs: For self-generators, there are no specific charges related to grid connection, reinforcement or use of the grid. Access is fair and easy for consumers willing to launch their own small self-generation project.

How consumers' excess electricity production is treated

Rationale of the support scheme: At the moment, no dedicated support scheme for small solar PV self-generation projects is offered. Within the FiT/premium tariff scheme which was phased out in 2014, such projects had a specific remuneration category and were nudged to increase self-consumption instead of incentivising feed-in to the grid.

Remuneration: Units below 1 MW of installed capacity received the fixed FiT from the market operator BORZEN for a period of 15 years. Solar PV installations below 50 kW were entitled to 9.8 ct/kWh in September 2014.[542] Power plants with more than 1 MW were not entitled to the fixed FiT but automatically received a premium tariff on top of the wholesale market price. Units below 1 MW were allowed to opt for this premium tariff. The premium tariff covers the difference between the theoretical reference costs of renewable electricity generation set by the government (equivalent to the FiT of 9.8 ct in the case of solar PV below 50 kW) and the average wholesale market price (ca. 5 ct/kWh) which is multiplied with a factor. A favourable factor widens the gap between the arithmetically lowered market price and the theoretical reference costs so that the premium tariff increases. Self-generators were allowed to receive the premium for self-consumed electricity. In this case, substituting the import of electricity from the grid and getting the premium on top created an indirect incentive to increase self-consumption. Small-scale solar PV installations run by households

[539] Evidence from national BEUC member organisation.
[540] EKOenergy: Buy EKOenergy, http://www.ekoenergy.org/how-to-buy-ekoenergy/households/, 10 July 2015.
[541] BORZEN: Useful tips for small power plant construction. For the production of electricity from renewable energy sources and the cogeneration of heat and power, July 2013; RES-LEGAL project: Slovenia – Connection to the grid, http://www.res-legal.eu/search-by-country/slovenia/single/s/res-e/t/gridaccess/aid/connection-to-the-grid-34/lastp/191/, 10 December 2014.
[542] RES-LEGAL project: Slovenia - Feed-in tariff (guaranteed price), http://www.res-legal.eu/search-by-country/slovenia/single/s/res-e/t/promotion/aid/feed-in-tariff-guaranteed-price/lastp/191/, 10 December 2014.

on their rooftop further benefitted from a 5% addition to the reference costs if the unit was connected behind the end user's meter.[543]

Investment security: After cancellation of the first tender in October 2014, new projects cannot rely on any support scheme. For private households, investments in solar PV self-generation projects are not viable under these conditions. Already under the late FiT scheme, investment in solar PV self-generation was a serious financial risk for private households. Most projects did not pay off since a 2% monthly regression of the tariffs for newly installed projects was introduced in 2012. This rapid cut previously lead to a sharp decrease of newly installed small solar PV capacity.[544] The FiT/premium tariff scheme was mainly used by commercial projects for huge rooftops since remuneration appeared to be too low to offset higher costs of electricity generation entailed by smaller units.[545]

Which typical risks consumers face when starting a self-generation project

Financial risks: While the Energy Act amendment 2014 already complicated private household's access to payment schemes for self-generation through a thwarting tender system (high incertitude and administrative outlay), the suspension of the first tender in October 2014 leaves Slovenia without of any public support scheme for consumers' new self-generation projects. The following call in 2015 again was not carried out despite funding provided since the approval by the European Commission was still pending. With an eventual net metering scheme also pending, there are no adequate support schemes that could apply to households' solar PV self-generation projects at the moment of the editorial deadline of this report in autumn 2015.

Administrative barriers: Compared to the previous FiT scheme, the tender system could disadvantage consumers who would face higher transaction costs for applying concurrently with higher incertitude regarding their project's approval.

Legal framework: Concerning a future implementation of the tender system, it remains unclear if consumers will be granted a dedicated status or if they will have to compete with commercial stakeholders.

Quality of offers and services: No major problems or complaints known referring to the range of choice and commercial practices.

Information on self-generation options: Building on their experiences collected during the previous FiT scheme, the national regulator respectively its market actor BORZEN could evolve towards a one-stop shop.

[543] RES-LEGAL project: Slovenia – Premium tariff, http://www.res-legal.eu/search-by-country/slovenia/single/s/res-e/t/promotion/aid/premium-tariff/lastp/191/, 10 December 2014.
[544] 2020 Keep on track project: Analysis of deviations and barriers 2014/2015, June 2015, p. 404.
[545] Germany Trade and Invest (GTAI): Slowenien baut Photovoltaik-Förderung stark ab, http://www.gtai.de/GTAI/Navigation/DE/Trade/Maerkte/suche,t=slowenien-baut-photovoltaikfoerderung-stark-ab,did=640528.html, 10 September 2012.

4.11.4 Summary of 'green electricity' markets and self-generation in Slovenia

Conditions for consumers' 'green' choice		Remarks
Stage of market liberalisation		Fully liberalised, small market with relevant competition.
Renewable energy policy		FiT and premium tariff with dedicated but phased-out support for small self-generation, new tender system not operational.
'Green electricity' market size and choice		Small, but relevant offer.
Relevance of renewable self-generation		Solar PV grid parity just reached.

Transparency of 'green' tariffs		
Definition of 'green electricity' offers		No clear definition, but reference to additionality of environmental effects.
How 'green' tariffs are offered to consumers		Relatively transparent offers and unambiguous PCT.
How 'green' tariffs and the fuel mix are disclosed on the bill		Information slightly beyond the Directive's minimum requirements.
How environmental benefits of 'green' tariffs are proven to consumers		Mandatory information on additionality on supplier's website just introduced.
How 'green electricity' quality labels guide consumers		Little activities and relevance of labels.

Consumers' access to self-generation		
How grid access and use are guaranteed to self-generating consumers		Priority grid access without restrictions.
How consumers' excess electricity production is treated		FiT/premium tariff is insufficient because of too sharp cuts, replaced by a not operational tender system.
Which typical risks consumers face when starting a self-generation project		Lack of financial viability due to absence of any remuneration scheme for newly installed renewable self-generation.

Evaluation scale for transparency and market access

Good practice; issue showing good solutions related to transparency and/or market access from the point of view of consumers' rights	
Average performance; issue with some problems and some solutions related to transparency and/or market access from the point of view of consumers' rights	
Bad practice; issue with relevant problems related to transparency and/or market access from the point of view of consumers' rights	

4.12 Spain

National key indicators

Electricity consumption of households (residential) 2013: 72.513 TWh[546]
Renewable electricity generation 2013: 99.168 TWh (36.4% of total gross electricity consumption, EU28 average: 25.4%)[547]
Average electricity price 2014 (medium size households, incl. taxes and levies): 21.7 ct/kWh (EU28 average: 20.3 ct/kWh) [548]
Annual electricity bill of an average household in the capital Madrid: 876 euro[549]

4.12.1 Conditions for consumers' 'green' choice

Stage of market liberalisation

Overview: Spain recently started to implement the Third Energy Package. Wholesale markets are closely integrated with Portugal while interconnectors with France are to be extended. As a consequence of the recession between 2009 and 2013, the electricity market accumulated important overcapacities. Decreasing wholesale market prices and high public burdens resulting from regulated prices for vulnerable households and from renewable electricity support schemes caused a tariff deficit peaking at 29 billion Euro at the end of 2013 for the public purse. The Parliament tried to tackle the deficit with the fundamental changes endorsed within the new electricity law in December 2013.[550]

Market concentration: Thanks to the increase of small renewable electricity producers, concentration of the wholesale markets has been reduced but is stagnating now. The retail electricity markets tends to become less concentrated but remains on a high level with the most important single supplier covering 37% of the liberalised market in 2012.[551] Household electricity suppliers' mark-ups still were amongst at around 1.2 ct/kWh in 2013.[552]

Choice: 32 different tariff offers from 19 electricity suppliers available to household consumers in the capital Madrid in 2013[553]

Switching activity: Annual switching rate 2013: 12.8% (EU28 average: 5.6%)[554], average 2008-2012: ca. 8% (EU28 average: 4%).[555] Overall consumer satisfaction with the electricity market is the third lowest in the EU.[556] Annual savings to be encashed by consumers in the capital through switching are

[546] Eurostat: Supply, transformation and consumption of electricity - annual data, Electrical energy – residential http://ec.europa.eu/eurostat/tgm/table.do?tab=table&plugin=1&language=en&pcode=tsdpc310, 27 April 2015.
[547] Eurostat: Energy from renewable sources, http://ec.europa.eu/eurostat/web/energy/data/shares, 28 April 2015.
[548] Eurostat: Electricity prices per type of user, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_pc_204&lang=en, 28 April 2015.
[549] Incumbents' standard offers, 4,000 kWh consumption, see ACER/CEER annual report, p. 33.
[550] European Commission: EU Energy markets in 2014, October 2014, p. 70-75; International Energy Agency (IEA): Energy policies of IEA countries – Spain. Executive summary and key recommendations, July 2015.
[551] European Commission: EU Energy markets in 2014, October 2014, p. 72.
[552] ACER/CEER annual report, p. 57-58.
[553] ACER/CEER annual report, p. 42.
[554] ACER/CEER: Annual report, p. 79.
[555] ACER/CEER: Annual report, p. 69.
[556] European Commission: EU Energy markets in 2014, October 2014, p. 73.

on average around 50 euro.[557] The majority of consumers remain under the Voluntary Prices for Small Consumer scheme which combines the former regulated prices and to some extend a coupling with hourly wholesale market prices.[558]

Renewable energy policy

Target compliance: 2020 target for the share of renewable electricity in final consumption: 39.0% (2013: 36.4%). Provided that the growth rates in the electricity sector continue, the 2020 electricity target probably will be reached easily.[559] However, since growth in renewable heating and the renewables' share in transport is lagging behind, Spain will clearly fail to fulfil its overall 2020 target according to the European Commission's progress report.[560]

Main electricity support scheme: Based on a combination of feed-in tariffs (FiT) and a market premium scheme, Spain succeeded in building one of the most important renewable power generation portfolios until the beginning of the financial crisis. At the beginning of 2012, a moratorium was put on any support for new installations. Existing power plants were charged with a 7% tax on every kilowatt-hour generated to recover partially the tariff deficit. Another retroactive change affected renewable power plants under the FiT scheme who saw the number of remunerated production hours reduced. In March 2013, the FiT for existing installations was further reduced by skipping the tariffs' annual adaptation to the inflation rate so that the value of the paid FiT diminished with rising operational costs and taxes. The market premium also phased out in 2013 without any substitution.

Recent changes and trends: In June 2014, the remaining reduced FiTs for existing renewable power plants finally were all stopped. From now on, besides revenues from electricity sale at wholesale markets, both old and newly added installations can only rely on a capacity-based retribution which is paid to all power plants, regardless if renewable or not. The retribution scheme declares to provide a reasonable return on investment of about 7.5%. In practice, the scheme uses a calculation methodology which states how much each power plant should have earned in each year of its lifespan. It has to be noted that the amount is not determined on the basis of a project's real investment costs and maintenance costs but only on parameters for theoretical model projects. For existing installations, this change can imply a massive cut of revenues and consequently indebtedness of the owner. Solar PV self-generation saw a new regulation since 2013 with high network fees ('back-up toll') for self-consumed electricity. The government's June 2015 proposal for a new decree on self-consumption continues the prohibitive approach against grid-connected small-scale solar PV units. Against this backdrop, virtually no new solar PV units were installed in Spain in 2014.[561]

[557] ACER/CEER: Annual report, p. 72.
[558] Hispacoop: Spanish situation of the energy markets (electricity and gas markets) 2014-2015, ECCG sub-group on Energy meeting, 12/13 March 2015.
[559] 2020 Keep on track project: EU Tracking Roadmap 2015. Keeping track of renewable energy targets towards 2020, June 2015, p. 49-51.
[560] European Commission: Renewable energy progress report, June 2015, p. 5.
[561] With an added 21 MW, less solar PV capacity was installed in 2014 than on the small island of Malta, EU's smallest Member State (26 MW), see EurObserv'ER: Photovoltaic Barometer 2014, May 2015, p. 8.

'Green electricity' market size and choice

Choice: 15 different 'green' tariff offers from 7 electricity suppliers available to household consumers in the capital Madrid in 2013. [562]

Market size and development: Consumers can switch suppliers since 2003. Since then, first 'green' tariffs appeared on the market. Both, specialised suppliers selling uniquely 'green' tariffs as well as incumbent suppliers offering only one 'green' tariff amongst others, hold market shares. In 2013, GOs were issued for 79.995 TWh of renewable electricity (80.7% of total renewable electricity generation), whereof mainly wind power and to a minor extent large hydropower plants. But only 20.579 TWh were cancelled in Spain for disclosure purposes. Virtually no imports or exports of GOs are taking place.[563]

Relevance of renewable self-generation

Grid parity: With levelised electricity generation costs of solar PV of around ca. 9 to 15 ct/kWh, grid parity was reached in all parts of the country in 2014. The average retail electricity price exceeded costs of solar PV by 7 to 13 ct/kWh, providing very attractive savings from self-consumption.[564]

Generation capacity: In 2014, the installed capacity of solar PV units reached 4,787 MW, [565] of which ca. 2% were installed in the residential sector[566] (2013: 4,766 MW), producing 8.211 TWh of solar electricity equal to 3.1%[567] of gross electricity consumption (EU28 average: 3.5%; 2013: 8.297 TWh, 3%).[568] In contrast to most other Member States, commercial solar PV installations at utility scale dominate the generation capacity. Still, solar PV self-generation on private households' rooftops does merely play any significant role.

Capacity per inhabitant: With 102.9 W, the installed capacity per inhabitant is below the EU average (171.5 W).[569]

4.12.2 Evaluation of 'green' tariffs' transparency

Definition of 'green electricity' offers

Disambiguation: An official definition of 'green' offers and related environmental benefits is missing. De facto, only suppliers with a supplier mix backed by 100% renewable GOs are presented as 'green energy suppliers'. Renewable GOs are not automatically assigned to renewable power plants, but all are entitled to, regardless if power plants have received public support or not. Operators have to request the national regulator at latest by the end of January of the relevant year.[570]

[562] ACER/CEER annual report, p. 42.
[563] RE-DISS II project: Country profiles: Spain, http://www.reliable-disclosure.org/upload/143-V03_template_RE-DISSII_Country_Profile_Spain_2014.pdf, 12 August 2014.
[564] Joint Research Centre (JRC): Cost Maps for Unsubsidised Photovoltaic Electricity 2014, September 2014. The actual spread between the retail price on the one hand and the levelised generation cost of solar PV electricity may differ because the JRC model applied EU average data and did not take into account any eventual public support granted (e.g. tax exemptions) that could increase or decrease retail prices respectively generation cost.
[565] EurObserv'ER: Photovoltaic Barometer 2014, May 2015, p. 10.
[566] Solar Power Europe (SPE): Global market outlook for solar power 2015 – 2019, June 2015, p. 22.
[567] Solar Power Europe (SPE): Global market outlook for solar power 2015 – 2019, June 2015, p. 26.
[568] EurObserv'ER: Photovoltaic Barometer 2014, May 2015, p. 10.
[569] EurObserv'ER: Photovoltaic Barometer 2014, May 2015, p. 7-9.
[570] RE-DISS II project: Country profiles: Spain, http://www.reliable-disclosure.org/upload/143-V03_template_RE-DISSII_Country_Profile_Spain_2014.pdf, 12 August 2014.

Qualitative minimum criteria: Renewable power plant operators that get an additional benefit from the sales of supported GO have an obligation to invest part of the benefits into environmental actions in case the price of the 'green' tariff exceeds the regulated retail price.[571] However, according to BEUC's national member organisation OCU, the rule has not been implemented consistently. It remains unclear how operators' duties are implemented or monitored, given that the initial support schemes (FiT/market premium) were phased out.

Matching: Consumers cannot rely on any binding information when they want to know whether a GO-based 'green' offer is backed with power purchase contracts from renewable power plants or not. Consequently, it is left to the willingness of the supplier to make clear if they pay for kilowatt-hours generated or purchased from renewable power plants. However, given the limited exchange of the Spanish GO tracking scheme with other countries, consumers reasonably can suppose that the disclosed share of renewables is backed with domestic renewable GOs.

How 'green' tariffs are offered to consumers

Suppliers' information duties: No binding regulatory framework addresses suppliers' communication about 'green' tariffs. No legal provisions apply to the marketing of 'green' tariffs.

Online price comparison tools (PCTs): The listing of the official PCT run by the national regulator Comisión nacional de los mercados y la competencia (CNMC) differentiates 'green energy' in one column with a 'yes' or 'no' indicator.[572] Only if consumers click on the detailed product information related to a 'green energy' tariff, they can find a text explaining that the supplier mix consists of 100% renewable electricity and that it is certified as a 'class A' supplier. There is no further guidance on the function of GOs or the 'class A' certification. No product mix is published. In the case of tariffs that are indicated as 'no green energy', the detailed product information provides neither the supplier mix nor the product mix. The PCT offered by BEUC's national member Organización de consumidores y usuarios (OCU) provides also a 'yes/no' differentiation concerning the 'green energy' character of a tariff, but detailed information are more meaningful and understandable than in the regulator's PCT. OCU's PCT explains that the 'green' tariff has to be covered exclusively by certain renewable energy sources. Additionally, the PCT shows the environmental indicators (CO_2 emissions and radioactive waste related to the supplier mix) via the A to F labelling scheme. This labelling is prescribed in legal fuel mix disclosure on consumers' bills. OCU's PCT also provides users with an explanatory text on the calculation of these indicators.[573]

Disclosure report: CNMC publishes an annual list of all supplier mixes, including data on CO_2 emissions and radioactive waste, plus the environmental labelling A-F class.[574] However, the report is just a sober technical document without further explanatory texts or guidance for consumers to make a choice.

[571] RE-DISS II project: Country profiles: Spain, http://www.reliable-disclosure.org/upload/143-V03_template_RE-DISSII_Country_Profile_Spain_2014.pdf, 12 August 2014.
[572] CNMC: Comparador de ofertas de energía, http://comparadorofertasenergia.cnmc.es, 14 August 2015.
[573] Organización de consumidores y usuarios (OCU): Gas y electricidad: tu tarifa más barata, http://www.ocu.org/vivienda-y-energia/gas-luz/calculadora/gas-electricidad, 14 August 2015.
[574] Comisión nacional de los mercados y la competencia (CNMC): Mezcla de comercialización año 2014, https://gdo.cnmc.es/CNE/resumenGdo.do?action=download&informe=etiquetado_electricidad&anio=2014&file=MixComerc+y+factores+impactoMA.pdf, 14 August 2015.

How 'green' tariffs and the fuel mix are disclosed on the bill

Functioning of legal fuel mix disclosure: Suppliers are obliged to fuel mix disclosure since 2006. The calculation of the supplier mix which is disclosed on the bill is done by the national regulator CNMC. After receiving data on the national production mix from the national transmission system operator, CNMC deducts the cancelled GOs of suppliers, based on their declarations. CNMC then assigns the specific supplier mix. If a supplier does not use any GOs, the national average default mix applies. The lack of full harmonisation of the Spanish GO tracking scheme with the European EESC scheme can cause deficiencies in terms of accuracy and double-counting.[575]

Advancement of fuel mix disclosure: The legal fuel mix disclosure is in the main in line with the minimum requirements of the Directive. Suppliers have to disclose the share of renewables without differentiating sources like wind energy, hydropower, solar PV etc. On the other side, high efficient cogeneration, cogeneration, natural gas, coal, fuel/gas and nuclear power have to be mentioned separately. A standardised consumer-friendly graphical format to display the fuel mix on the bill is mandatory.[576] It includes the national production mix to provide consumers a benchmark for comparison. The country of origin is not disclosed, but at the moment, all GOs virtually come from domestic power plants (see "'Green electricity' market size and choice"). The environmental indicators (CO_2 emissions and radioactive waste related to the supplier mix) have to be published joint with the supplier mix on the bill. Both indicators are ranked on an A to F range which recalls the established EU energy labelling template. The national average indicator is provided. In the end, it may cause confusion to consumers that in pre-contractual information and on the bills only the supplier mix is disclosed while a number of suppliers offers as well 'green' tariffs backed by 100% renewable GOs, as they offer other non-renewable default tariffs. In order to be coherent and accomplish the minimum requirements of the Directive, the product mix should also be calculated.

Informative value: In designing the standardised fuel mix disclosure, a high informative value is achieved. The fuel mix disclosure includes a meaningful guidance on the function of the GO tracking tool and its difference to physical delivery on the bill. The presentation of the environmental indicators allows a consumer-friendly comparison at a glance related to CO_2 emissions and radioactive waste associated with the supplier's fuel mix in relation to the national average as a benchmark. However, the absence of the product mix generally could cause confusion. In addition, BEUC's national member OCU criticised that suppliers published the fuel mix disclosure only on their websites but did not send out this information to the consumer with the bill.[577]

How environmental benefits of 'green' tariffs are proven to consumers

Legal provisions: No regulatory provisions apply for proving qualitative environmental aspects related to the impacts of purchasing a 'green' tariff.

Additionality: Suppliers of 'green electricity' tariffs are not obliged to communicate about additionality of their offers to consumers.

[575] RE-DISS II project: Country profiles: Spain, http://www.reliable-disclosure.org/upload/143-V03_template_RE-DISSII_Country_Profile_Spain_2014.pdf, 12 August 2014.
[576] RE-DISS II project: Selected options for implementation of "front side" disclosure aspects. Background information and consultation, April 2014.
[577] OCU: Energía verde. Mucho por hacer. OCU-Compra Maestra no. 350, July/August 2010, p. 34-36.

How 'green electricity' quality labels guide consumers

Relevance of labels: No national 'green electricity' quality labels exist. One supplier is listed as a licensee of the Helsinki-based international EKOenergy label.[578]

Functioning of labels: The EKOenergy label applies certain environmental minimum criteria.

4.12.3 Evaluation of consumers' access to self-generation

How grid access and use are guaranteed to self-generating consumers

Procedure: For small-scale solar PV units with up to 10 kW, a simplified grid connection permit procedure applies. Self-generators have to request authorisation for connection to the distribution grid at the existing point of supply which does not cause any problems according to experts' evaluations. However, the waiting period related to receiving a reply from all administrations involved in the permitting procedures for solar PV projects is amongst the longest in the EU with 129 weeks on average.[579] Obtaining works and/or urban licences at the municipal level eventually can also be cumbersome.[580]

Legal status: Formally, priority grid access is granted.[581] However, the new electricity law voted in December 2013 limits priority access and dispatch of renewable energy installations which is contingent upon undercutting of prices of the other players. This is regarded as a breach of the Renewable Energy Directive which stipulates grid access for renewables independently of the wholesale market prices.[582]

Commensurability of costs: Solar PV self-generation units that connect to the grid have to pay a charge on the electricity which they generate ('back-up toll'), as well as a charge defined by the size of installed capacity. Installations below 10 kW are exempted from the charge on the electricity generated. In case the installed capacity of the solar PV unit is below the size of the household's grid connection, self-generators also can be exempted. A household having installed a self-generation unit might end up paying higher network fees than an average household without it. The new government proposal for a self-consumption decree continues this prohibitive approach by installing a 'system charge' calculated as a combination of variable and fixed fees for grid access and grid use, varying on contracted power capacity. It would be imposed retroactively on all existing installations. Self-generators who fail to register (see: "How consumers' excess electricity production is treated – Remuneration") are menaced by fines. BEUC's national member OCU, together with environmental organisations and the renewable energy industry, denounce the charges on self-consumption as "taxing the sun".[583]

How consumers' excess electricity production is treated

Rationale of the support scheme: Currently, no dedicated support scheme for consumers' self-generation projects exists. Consumers may install solar PV panels on their rooftops and can self-consume a part of the generated electricity on the premises, but no special framework for feeding

[578] EKOenergy: Buy EKOenergy, http://www.ekoenergy.org/how-to-buy-ekoenergy/households/, 10 July 2015.
[579] 2020 Keep on track project: Analysis of deviations and barriers 2014/2015, June 2015, p. 197-206.
[580] PV GRID project: Spain – Residential Systems, http://www.pvgrid.eu/database/pvgrid/spain/national-profile-3/residential-systems/2305/systems-less-than-or-equal-to-10-kw-1.html, 14 August 2015.
[581] RES-LEGAL project: Grid issues in Spain, http://www.res-legal.eu/search-by-country/spain/tools-list/c/spain/s/res-e/t/gridaccess/sum/196/lpid/195/, 10 December 2014.
[582] 2020 Keep on track project: Analysis of deviations and barriers 2014/2015, June 2015, p. 197-206.
[583] OCU: En OCU queremos autoconsumo, http://www.ocu.org/vivienda-y-energia/gas-luz/noticias/queremos-autoconsumo, 27 July 2015.

excess electricity into the grid exists. Self-generators would have to negotiate sale of excess electricity to the wholesale market, presupposing that they comply with formal market access rules that are in place for large power plants and utilities.[584] The new government proposal for a self-consumption decree, published in June 2015, defines rules for three categories of self-consumption: solar PV units up to 100 kW may self-consume electricity if the producer and the consumer are the same. The installed capacity is limited to the contracted power capacity. The second category addresses solar PV units up to 100 kW without power capacity-related limits. The installation has to be run by one juristic person who is obliged to declare self-generation as a commercial activity, liable to taxation in the trade register. A third category includes off-grid solar PV units without any limit of installed capacity that supply electricity through a direct line to a self-consumer who is identic with the owner or, in case of a corporate body, owns at least 25% of the company. In general, no storage devices are allowed for solar PV units connected to the grid.[585]

Remuneration: No dedicated regulation for the remuneration of consumers' excess electricity injection into the grid exists. The June 2015 proposal for a new decree does not grant any rights for consumers to sell excess electricity of their solar PV installation, except if they succeed to negotiate a purchase contract with a supplier which is willing to buy the surplus. Self-generation units under the second category of the proposal, run by juristic persons after entering the trade register, can sell excess electricity at the wholesale market. Any other self-consumption or sale of excess electricity beyond the three categories would be forbidden and subject to important fines.

Investment security: The numerous retroactive changes for renewable power plants in Spain after 2011 lead to a severe deterioration of the economic viability, of both of newly installed capacity and existing installations that were planned under previous support schemes. According to estimations from industry experts, for solar PV systems (commercial and private households' installations), the amortisation period on average was prolonged from 14 to around 35 years.[586] Given the disadvantageous options for selling excess electricity and the high system charge on self-consumption under the June 2015 proposal for a decree, the return on investment of small-scale consumers' projects is estimated at around 30 years.[587] Under the prohibitive conditions of the current and planned policy framework, no meaningful incentive for consumers' investments in self-generation is provided. In fact, self-generation must be regarded as highly risky for consumers in Spain.

Which typical risks consumers face when starting a self-generation project

Financial risks: First of all, access to capital is seen as a major hurdle for consumers willing to launch their self-generation project since banks normally only grant credits if guaranteed with personal belongings.[588] The abolition of the FiT scheme without adequate substitution menaces previously made investments of household consumers in solar PV systems. In case consumers default the loan repayment as a consequence of reduced revenue from electricity production, banks can seize not only the PV panels but eventually even the consumer's house if it was given as a guarantee for the

[584] 2020 Keep on track project: Analysis of deviations and barriers 2014/2015, June 2015, p. 197-206.
[585] Union Española Fotovoltaica (UNEF): Proyecto RD de autoconsumo. Una apuesta por el pasado. Presentation, July 2015.
[586] Wandler, Rainer: Süden ohne Sonne. In: Neue Energie, 12/2013, p. 75-79.
[587] Union Española Fotovoltaica (UNEF): Proyecto RD de autoconsumo. Una apuesta por el pasado. Presentation, July 2015;
[588] PV GRID project: Final project report, August 2014, p. 44.

bank loan.[589] Amortisation periods are significantly lengthened and economic viability often is not given for self-generation projects, especially if inappropriate charging will continue.

Administrative barriers: The waiting periods for permits are very long and priority grid access and use is not clear. Forcing households under the proposal for the new decree to register a business activity in the trade register increases administrative barriers.

Legal framework: Spain is the rare example of a Member State that allows neither net metering nor FiT nor a market premium, but applies a prohibitive regulation against self-consumption. The frequent changes in the policy framework did not allow for any grandfathering clause that would have protected consumers' investments in an adequate way. BEUC's national member OCU harshly criticises the winding-up of the formerly flourishing Spanish solar energy industry at the expense of security of supply and consumers' civic right to self-consume.[590]

Quality of offers and services: As a consequence of the retroactive changes and the recession, many installers went bankrupt. Spain can rely on the expertise of a previously leading solar PV industry but OCU deplores the low efficiency assessed amongst domestic manufacturers in an audit.

Information on self-generation options: No one-stop shop for consumers' self-generation projects exists. The frequent changes in the regulatory framework caused high uncertainty. A survey under the CLEAR project showed that Spanish consumers know well what solar PV panels are (55% of people surveyed say so). The most important information sources about renewable energy technologies that consumers opt for are manufacturers, the consumer organisation and friends. Consumers mostly search for how much money they would save compared to fossil energy sources. 25% of Spanish consumers say that they would not consider buying solar PV panels at all.[591] BEUC's national member organisation OCU provides a very exhaustive online information tool[592] to guide consumers who are interested in investing in renewable self-generation, raise awareness for potentials.

[589] 2020 Keep on track project: Analysis of deviations and barriers 2014/2015, June 2015, p. 197-206.
[590] OCU: En OCU queremos autoconsumo, http://www.ocu.org/vivienda-y-energia/gas-luz/noticias/queremos-autoconsumo, 27 July 2015.
[591] GfK: CLEAR – WP2.1. Consumer survey 1 – Attitudes, opinion, drivers and barriers and satisfaction with regard to Renewable Energy Systems, October 2014.
[592] https://renovamos.org.

4.12.4 Summary of 'green electricity' markets and self-generation in Spain

Conditions for consumers' 'green' choice		Remarks
Stage of market liberalisation		Liberalisation is not fully accomplished, high switching activity.
Renewable energy policy		Many retroactive changes, all support schemes phased-out.
'Green electricity' market size and choice		Broad choice.
Relevance of renewable self-generation		Clear grid parity, but lack of policy, instability and recession hinder potential to be tapped.

Transparency of 'green' tariffs		
Definition of 'green electricity' offers		No binding definition, but de facto only 100% renewable GOs tariffs are marketed as 'green'.
How 'green' tariffs are offered to consumers		No binding provisions, thin information from the regulator.
How 'green' tariffs and the fuel mix are disclosed on the bill		Meaningful and understandable template, but no product mix developed.
How environmental benefits of 'green' tariffs are proven to consumers		No provisions or obligations existing.
How 'green electricity' quality labels guide consumers		Little activities and relevance of labels.

Consumers' access to self-generation		
How grid access and use are guaranteed to self-generating consumers		Prohibitive network fee on self-consumption and long waiting periods for permits.
How consumers' excess electricity production is treated		No support, consumers must negotiate electricity sale at the wholesale market.
Which typical risks consumers face when starting a self-generation project		Lack of access to capital, prohibitive approach of policy framework, long amortisation period.

Evaluation scale for transparency and market access

Good practice; issue showing good solutions related to transparency and/or market access from the point of view of consumers' rights	
Average performance; issue with some problems and some solutions related to transparency and/or market access from the point of view of consumers' rights	
Bad practice; issue with relevant problems related to transparency and/or market access from the point of view of consumers' rights	

4.13 United Kingdom

National key indicators

Electricity consumption of households (residential) 2013: 113.453 TWh[593]
Renewable electricity generation 2013: 51.348 TWh (13.9% of total gross electricity consumption, EU28 average: 25.4%)[594]
Average electricity price 2014 (medium size households, incl. taxes and levies): 19.2 ct/kWh (EU28 average: 20.3 ct/kWh) [595]
Annual electricity bill of an average household in the capital London: 738 euro[596]

4.13.1 Conditions for consumers' 'green' choice

Stage of market liberalisation

Overview: The UK is a frontrunner in electricity market liberalisation since the beginning of 1990s. The Third Energy Package has been entirely transposed into national law. The national regulator Ofgem referred the energy market to the Competition and Markets Authority (CMA) for an investigation by April 2016. The investigation could result in remedies which could significantly change the energy market in the UK. For example, one proposed remedy is the introduction of a 'safeguard tariff' for disengaged customers.

Market concentration: Market concentration at domestic retail level remained high with six large suppliers accounting for 95% of the electricity retail market in 2013.[597] The UK has the highest household electricity suppliers' margins in the EU with more than 3 ct/kWh in 2013.[598]

Choice: 59 different tariff offers from 22 electricity suppliers available to household consumers in the capital London in 2013[599]

Switching activity: Annual switching rate 2013: 12.3% (EU28 average: 5.6%)[600], average 2008-2012: ca. 16% (EU28 average: 4%).[601] The UK traditionally has by far the highest switching rates for electricity household consumers amongst all EU Member States though switching activity is declining slightly. Annual savings to be encashed by consumers in the capital London through switching are estimated between 100 and 150 euro.[602]

Renewable energy policy

Target compliance: 2020 target for the share of renewable electricity in final consumption: 31% (2013: 13.9%). The UK is just reaching its interim targets within the National Renewable Energy

[593] Eurostat: Supply, transformation and consumption of electricity - annual data, Electrical energy – residential http://ec.europa.eu/eurostat/tgm/table.do?tab=table&plugin=1&language=en&pcode=tsdpc310, 27 April 2015.
[594] Eurostat: Energy from renewable sources, http://ec.europa.eu/eurostat/web/energy/data/shares, 28 April 2015.
[595] Eurostat: Electricity prices per type of user, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_pc_204&lang=en, 28 April 2015.
[596] Incumbents' standard offers, 4,000 kWh consumption, see ACER/CEER annual report, p. 33.
[597] European Commission: EU Energy markets in 2014, October 2014.
[598] ACER/CEER annual report, p. 57-58.
[599] ACER/CEER annual report, p. 42. 66 different offers from 28 suppliers were available in September 2015, see http://www.energylinx.co.uk, 22 September 2015.
[600] ACER/CEER: Annual report, p. 79.
[601] ACER/CEER: Annual report, p. 69.
[602] ACER/CEER: Annual report, p. 72.

Action Plan submitted within the EU 2020 targets. However, the European Commission's progress report 2015 expects that the UK will largely fail to accomplish the 2020 overall target for the renewable share in final energy consumption (electricity, heating & cooling, transport). Consequently, the progress report urges the UK to assess its renewable energy policies.[603] Growth in renewable electricity production has to increase in order to double the share of renewables in electricity consumption until 2020.[604]

Main electricity support scheme: The Renewables Obligation Orders, a quota scheme, has been the main driver for renewable electricity generation in the UK. For renewable energy plants including small scale self-generation projects up to 5 MW of installed capacity, a feed-in tariff (FiT) applies since 2010. The FiT has been quite successful in the UK, especially for solar PV, with over 600,000 domestic installations of solar PV systems reported in 2015. Self-consumed electricity is exempted from taxes and levies.[605]

Recent changes and trends: In June and July 2015, the government announced plans to advance the closure of the Renewables Obligation scheme for onshore wind and solar PV, to end the accreditation rules for projects beyond 50 kW under the FiT scheme and to remove the guaranteed level of subsidy for biomass projects.[606] A consultation has also been published in August 2015 proposing to cut the rate of the generation tariff of the FiT by 87% from 12.92 p/kWh (=17.92 ct/kWh) down to 1.63 p/kWh (=2.26 ct/kWh) from January 2016.[607]

'Green electricity' market size and choice

Choice: 8 different 'green' tariff offers from 6 electricity suppliers available to household consumers in the capital London in 2013.[608] 'Green' tariffs are a small niche market in the UK. Until 2014, suppliers were allowed to offer any variety of different tariffs. Amongst a high number of different tariff offers, some suppliers also marketed 'green' tariffs. The Retail Market Review in January 2014 limited the number of tariffs that suppliers can offer to four core tariffs. As a result, most of the main suppliers have withdrawn 'green' tariffs as there were not enough customers on most of these 'green' tariffs to justify their being "core". 'Green' tariffs are now mainly offered by providers whose business model is based on offering green energy only.

Market size and development: Domestic consumers can choose their supplier and their tariff since 1999. Around the turn of the millennium, the first specialised suppliers offered 'green' tariffs.[609] According to suppliers' estimations, in 2015 around 225,000 electricity customers had a 100%

[603] European Commission: Renewable energy progress report, June 2015, p. 5.
[604] 2020 Keep on track project: EU Tracking Roadmap 2015. Keeping track of renewable energy targets towards 2020, June 2015, p. 100-102.
[605] RES-LEGAL project: United Kingdom: Summary – Support schemes, http://www.res-legal.eu/search-by-country/united-kingdom/summary/c/united-kingdom/s/res-e/sum/204/lpid/203/, 10 December 2014.
[606] Department of Energy & Climate Change (DECC): Controlling the cost of renewable energy. Press release, 22 July 2015; DECC: Changes to onshore wind subsidies protect investment and get the best deal for bill payers. Press release, 18 June 2015.
[607] DECC: Consultation on a review of the Feed-in Tariff scheme, https://www.gov.uk/government/consultations/consultation-on-a-review-of-the-feed-in-tariff-scheme, 27 October 2015.
[608] ACER/CEER annual report, p. 42. 15 different 'green' tariff offers from 8 suppliers were available in September 2015, see http://www.energylinx.co.uk, 22 September 2015.
[609] Good Energy: Our history, http://www.goodenergy.co.uk/about/company-history, 4 August 2015; Ecotricity: Our history, http://www.ecotricity.co.uk/about-ecotricity/our-history, 4 August 2015.

renewable energy tariff in the UK.[610] 'Green' tariffs were covering approximately 0.5% of the retail market.[611]

Relevance of renewable self-generation

Grid parity: With levelised electricity generation costs of solar PV of around ca. 14 to 20 ct/kWh, grid parity was not yet reached in all parts of the country in 2014. The average retail electricity price exceeded costs of solar PV by a maximum of 4 ct/kWh, while in some parts of the UK with less solar irradiation, purchase of electricity from the grid was 1 ct/kWh cheaper than self-generation of solar PV electricity.[612]

Generation capacity: In 2014, the installed capacity reached 5,230 MW[613], of which ca. 25% were installed in the residential sector[614] (2013: 2,782 MW), producing 3.931 TWh of solar electricity equal to 1.4%[615] of gross electricity consumption (EU28 average: 3.5%; 2013: 2.036 TWh, 0.6%).[616] For the first time, the newly installed capacity added in the UK during the year 2014 was the most important one in Europe, almost doubling the cumulated installed capacity. By December 2014, 561,185 solar PV installations were installed under the FiT scheme[617], being at the origin of 55% of the cumulated solar PV capacity.[618]

Capacity per inhabitant: With 81.3 W, the installed capacity per inhabitant is slightly above half of the EU average (171.5 W).[619]

4.13.2 Evaluation of 'green' tariffs' transparency

Definition of 'green electricity' offers

Disambiguation: A certification scheme, the Green Energy Certified scheme,[620] was first introduced in the UK to label and to differentiate 'green' tariffs which passed certain criteria. But after a subsequent multi-tiered consultation process on 'green electricity' offers, Ofgem introduced new licence conditions[621] that entered into force on 1 April 2015. The new licence conditions define minimum requirements for every licensed electricity supplier. If the supplier attaches environmental claims to a tariff (e.g.: 'green'), Guarantees of Origin (GOs) need to be used to track the origin. No further provisions on the product design itself apply. Although there is no clear legal definition of a 'green' tariff, the supplier additionally is legally obliged to report annually about environmentally beneficial effects of such a tariff (see "How environmental benefits of 'green' tariffs are proven to

[610] Good Energy: Energy regulator bans greenwashing. Press release, 31 March 2015.
[611] CEER: Advice on customer information on sources of electricity, March 2015, p. 9.
[612] Joint Research Centre (JRC): Cost Maps for Unsubsidised Photovoltaic Electricity 2014, September 2014. The actual spread between the retail price on the one hand and the levelised generation cost of solar PV electricity may differ because the JRC model applied EU average data and did not take into account any eventual public support granted (e.g. tax exemptions) that could increase or decrease retail prices respectively generation cost.
[613] EurObserv'ER: Photovoltaic Barometer 2014, May 2015, p. 9.
[614] Solar Power Europe (SPE): Global market outlook for solar power 2015 – 2019, June 2015, p. 22.
[615] Solar Power Europe (SPE): Global market outlook for solar power 2015 – 2019, June 2015, p. 26.
[616] EurObserv'ER: Photovoltaic Barometer 2014, May 2015, p. 10.
[617] Ofgem: Feed-in Tariffs scheme: 3GW renewable capacity reached, January 2015; Department of Energy and Climate Change: Energy Trends, December 2014.
[618] EurObserv'ER: Photovoltaic Barometer 2013, May 2014, p. 6.
[619] EurObserv'ER: Photovoltaic Barometer 2014, May 2015, p. 7-9.
[620] Green Energy Supply Certification Scheme, http://www.greenenergyscheme.org, 22 September 2015.
[621] Ofgem: Standard licence conditions (SLC) 21D.2 to 21D.13, https://www.ofgem.gov.uk/publications-and-updates/decision-modify-standard-licence-conditions-slcs-electricity-supply-licence-inserting-new-condition-slc-21d, 30 April 2015.

consumers"). If the supplier does not provide such information, a disclaimer explaining that the purchase of the tariff will not produce any environmental benefit, must be published in every publication in close proximity to the claim.

Qualitative minimum criteria: The supplier indirectly is nudged to prove additionality of the tariff in order to avoid publication of the disclaimer. The licence condition provides a definition of additionality to that extent requiring that the environmental benefits should not be "brought about as a result of subsidies, obligations or other mandatory mechanisms". These new binding minimum requirements referring to environmental claims are the first ones for 'green' tariffs which have been initiated by a national regulator in the EU. Furthermore, the provisions on 'green' tariffs have even been anchored at the high level of the supplier's licence itself. Therefore, it is directly linked to the juridical key prerequisite of market access.

Matching: Consumers do not necessarily know which kilowatt-hours they pay for. The licence conditions do not secure that the supplier matches renewable GOs for disclosure purposes with renewable electricity which is produced or purchased by the supplier. As a consequence, there is still a loophole for suppliers to produce or sell "grey" electricity as a 'green' tariff.

How 'green' tariffs are offered to consumers

Suppliers' information duties: The new licence conditions provide a binding regulatory framework on how to communicate about 'green' tariffs. This already is a clear progress compared to the previous disjointed market situation which confused consumers. While the voluntary Green Energy Supply Certification Scheme (GESCS) defined clear criteria for additionality of 'green' offers, only a few suppliers adopted it, sometimes offering 'green' tariffs with a 15% renewable energy share only. On the other side, small suppliers specialised in exclusively 100% renewable energy tariffs. They partly refused the certification under the GESCS. Confusion could nevertheless continue as tariffs might be advertised as 'green' although accompanied by a disclaimer that contradicts the tariff's image which was conveyed to consumers.

Online price comparison tools (PCTs): Ofgem does not offer an own PCT as yet[622] but established a confidence code which is respected by a dozen of private PCT websites. While the confidence code initially required a prominent disclosure of 'green' tariffs that were certified by the GESCS,[623] the private PCT websites treat fuel mix disclosure differently after the end of the GESCS. There are accredited PCTs[624] that totally ignore the fuel mix of the compared tariffs or only show supplier's environmental claims, while others provide the fuel mix with the detailed tariff information or even enable users to rank tariffs according to the share of renewables in their fuel mix. Fuel mix disclosure and environmental claims should be tackled in a more coherent and meaningful way, staying in line with the new licence conditions.

Disclosure report: No official listing or comparison of fuel mixes exists.[625]

[622] One of the proposed remedies from the CMA market investigation is that Ofgem offers an own PCT.
[623] CEER: Price Comparison Tools: case studies. Annex 1 to CEER Draft advice on Price Comparison Tools, October 2011, p. 76.
[624] Ofgem: Ofgem accredited price comparison sites, http://www.goenergyshopping.co.uk/en-gb/help/comparison-sites, 5 August 2015.
[625] Several specialised private websites offer a comparison of 'green' tariffs and suppliers' fuel mixes, e.g. http://www.electricityinfo.org/suppliers.php, http://www.greenelectricity.org, 27 October 2015.

How 'green' tariffs and the fuel mix are disclosed on the bill

Functioning of legal fuel mix disclosure: Guarantees of Origin (GOs) apply to disclose the share of renewable energy sources. Non-renewable sources are not tracked with the help of this instrument, but with the help of an average national default fuel mix, so that a certain level of incoherence continues in this regard.

Advancement of fuel mix disclosure: In the UK, provisions on the disclosure of the fuel mix on the consumer's electricity bill do not go beyond the basic requirements stipulated by the Internal Electricity Market Directive. Information on greenhouse gas emissions and radioactive waste production associated with the supplier's fuel mix have to be published at least once a year on a bill or on a statement, but only by means of a mere reference to a web page.[626] Thus, suppliers with a 'dirty' fuel mix can hide this fact easily. The country of origin of the GOs or the share of supported renewables are not disclosed. Through the Renewables Obligation, a minimum share of renewable electricity has to be sold by all suppliers. Although consumers indirectly refinance this support scheme, no differentiated presentation of the supported renewable electricity production is included in the bill respectively in the fuel mix disclosure.

Informative value: Knowledge about costs of public support schemes for renewables could help increasing consumers understanding of the cost allocation mechanism. Regardless of opting for a 'green' tariff or not, this information also could express appreciation of consumers' monetary contribution to renewable energy support in form of levies. Key information such as greenhouse gas emissions and radioactive waste should not be hidden on websites.

How environmental benefits of 'green' tariffs are proven to consumers

Legal provisions: The new licence conditions forces the supplier to prove additionality unless the supplier accepts to publish the disclaimer in the communication to consumers. From the point of consumer protection, the focus on additionality is welcomed and the new UK regulation can be regarded as a step into the right direction. But as strong this provision appears to be, the weaker is the implementation: as the licence conditions do not precisely define how suppliers have to report in order to prove additionality of their 'green' tariff, accomplishment of the targeted effects is not guaranteed (see "Definition of 'green electricity' offers"). While some suppliers might be innovative, others could fulfil the reporting obligation on additionality in a less ambitious way. It could become quite difficult to compare suppliers' different efforts as well as to verify the outcomes. In pre-contractual information, suppliers have to explain the nature of additional environmental benefit. Suppliers are obliged to disclose the fuel mix with a chart, a link or other information on where consumers can obtain contextual information on additionality, government support for renewable energy and how electricity is physically distributed. Besides these requirements settled in the licence conditions, rules and regulations are already in place which could help to clarify what kind of claims suppliers can make and which should discourage suppliers from using vague terms. In the UK, these general aspects are monitored by the Advertising Standards Authority.

Additionality: As the new licence conditions entered into force in April 2015, it is too early to assess suppliers' approaches to proof a positive environmental impact of their tariffs. In the licence conditions, the only specifications referring to the reporting obligation on additionality postulate that the supplier should include in every report how it has met the additionality obligation, "why the environmental benefit would not have occurred in the absence of customers choosing the relevant

[626] RE-DISS II project: Country profiles: Great Britain, http://www.reliable-disclosure.org/upload/92-RE-DISSII_Country_Profile_GB_2014V2.pdf, May 2015.

tariff" and "the scale of the environmental benefit on a per customer basis, for example in terms of costs as well as avoided Carbon Dioxide equivalent (CO_2e) emissions".[627]

How 'green electricity' quality labels guide consumers

Relevance of labels: The only voluntary 'green electricity' quality label was the GESCS which ceased operability when the new binding licence conditions came into effect in April 2015 (see "How 'green' tariffs are offered to consumers"). Since the new licence condition provide a set of minimum requirements, no further 'green electricity' quality labels are active in the UK.

Functioning of labels: No 'green electricity' quality labels are active in the UK.

4.13.3 Evaluation of consumers' access to self-generation

How grid access and use are guaranteed to self-generating consumers

Procedure: Grid operators have to conclude a connection agreement with plant operators. Solar PV self-generators are subject to a standardised procedure, normally lasting not more than two to four weeks. In general, permission procedures in the UK do not cause major problems to consumers who want to start a renewable self-generation project. Solar PV installations in the residential sector normally can count on a relatively swift and hassle-free approval compared to other renewable energy plants in the UK as well as in other Member States.[628] Until now, the legislative and regulatory framework is clear and reliable.

Legal status: Renewable power plants cannot rely on priority access to the grid. Households that produce renewable electricity and want to feed it into the grid conclude a contract with the grid operator to enter a bilateral connection agreement.[629] In the case of small self-generation units, a FiT licensee, for instance the electricity supplier of the consumer, takes over this procedure.

Commensurability of costs: For larger projects above 4 kW of installed capacity, additional costs can apply for grid reinforcement which consumers might not know about until they apply for access. This adds further financial risk to projects. The network fees for operating, maintaining and enlarging the grid are shared by plant operators (in charge of 27% of the Transmission Network Use of System Charge) and energy suppliers (73%).[630]

How consumers' excess electricity production is treated

Rationale of the support scheme: Under the FiT scheme, solar PV electricity generation is supported both in the case of self-consumption as well as in the case of export to the grid. The incentive is to self-consume and not to feed into the grid as the FiT export tariff is less than the unit rate of imported electricity.

Remuneration: Solar PV systems and installers of less than 50 kW have to be certified within the Microgeneration Certification Scheme. After being accredited, plants are entitled to receive a fixed amount from a licensed supplier for (i) every kilowatt-hour generated by the system (independently of whether this kilowatt-hour is consumed on site or exported) called the generation tariff and (ii) every kilowatt-hour fed into the grid, called the export tariff. Tariffs under the FiT scheme differ according to the installation's capacity. Generation tariffs range from 12.47 p/kWh (= approx. 17.9

[627] SLC 21D.12.
[628] PV GRID project: Final project report, August 2014, p. 46.
[629] RES-LEGAL project: Grid issues in United Kingdom, http://www.res-legal.eu/search-by-country/united-kingdom/tools-list/c/united-kingdom/s/res-e/t/gridaccess/sum/204/lpid/203/, 30 April 2015.
[630] Ibid.

ct/kWh,[631] valid from October until December 2015) for the smallest plants in the highest rate class with up to 4 kW, falling down to 5.94 p/kWh (approx. 8.52 ct/kWh) for units in the lowest rate class respectively for huger installations with up to 250 kW. The government is however proposing to drop the generation tariff to 1.63 p/kWh (=2.26 ct/kWh)[632]. The export tariff is 4.85 p/kWh (=6.96 ct/kWh) for all classes.[633] Based on the Feed-in Tariffs Order 2012, Ofgem corrects the fixed rates every year.[634] The FiT scheme is easily accessible through the licensed electricity supplier chosen by the consumer.

Investment security: The UK Feed-in Tariffs scheme proved to be a simple and effective instrument to enable consumers who are willing to invest in self-generation. It provides a fair and adequate compensation for consumers' self-consumed and exported electricity. Although low retail prices in the UK hinder grid parity of solar PV, the support scheme sets appropriate incentives for self-consumption without imposing a cap on the installation's size or on the amount of electricity fed into the grid. For PV systems under 4 kWp, the export tariff is normally deemed at 50% of the total generated electricity. So there is a sort of cap for small installations. Larger systems are metered for export.

Which typical risks consumers face when starting a self-generation project

Financial risks: High upfront costs are a major barrier to consumers' involvement in renewable self-generation. As access to capital often proves to be difficult, consumers on their way to become 'prosumer's are dependent upon financial support from different mechanisms that can be subject to change. "Free solar" schemes are one way to provide a solution to the high upfront cost as a company would purchase the PV system and sort of "rent" the householder's roof to pocket all or part of the FiT.[635]

Administrative barriers: For small self-generation units, grid connection issues and access to the support scheme is relatively hassle-free. However, compared with other Member States, the UK scores very high in complaints about barriers to renewable electricity projects related to national regulation.[636]

Legal framework: Given the announced review of the FiT scheme, it is unclear if future support for small self-generation units will continue.

Quality of offers and services: The UK consumer organisation Citizens Advice published a detailed research on consumers' experiences on the sales, installation and after care of solar PV panels under the FiT scheme. It concluded that it generally was a good news story with most people satisfied with the different aspects of their systems but the survey revealed that there is also an increase in speculative (doorstep & telephone) selling and new ways to engage such as 'rent a roof' and third party financing. In these cases, consumers who are willing to invest in solar PV installations do not

[631] Exchange rate as of 5 August 2015, http://www.finanzen.net/waehrungsrechner/britische-pfund_euro.
[632] DECC: Consultation on a review of the Feed-in Tariff scheme, https://www.gov.uk/government/consultations/consultation-on-a-review-of-the-feed-in-tariff-scheme, 27 October 2015.
[633] Ofgem: Feed-in Tariff (FiT) Payment Rate Table for Photovoltaic Eligible Installations (1 October 2015 – 31 December 2015), July 2015.
[634] RES-LEGAL project: United Kingdom Feed-in tariff, http://www.res-legal.eu/search-by-country/united-kingdom/single/s/res-e/t/promotion/aid/feed-in-tariff-5/lastp/203/, 30 April 2015.
[635] Which?: How to buy solar panels, http://www.which.co.uk/energy/creating-an-energy-saving-home/guides/how-to-buy-solar-panels/free-solar-panels, 27 October 2015.
[636] RE-FRAME project: Results from 2013/2014, http://re-frame.eu/index.php?id=16, 4 August 2015.

necessarily get the best deal.[637] BEUC's national member organisation Which? also surveyed 1,530 Which? members who already had installed their own solar PV system. The Which? survey confirms the high satisfaction of consumers with their solar PV installation. 90% would recommend solar PV systems to a friend or family member and 97% said that their solar PV system met their expectation in terms of how much electricity they believed it would generate.

Information on self-generation options: Consumers' interest in self-generation technologies and their knowledge about potentials and risks was identified by the International Energy Agency (IEA) Renewable Energy Technology Deployment (RETD) as being one of the decisive factors impacting 'prosumer' development.[638] Offers and availability of support or simplicity of access to the grid can vary from place to place in the UK. Since a simple one-stop shop is missing, getting the right information can be difficult as it tends to be quite fragmented. In addition, there are different consumer codes and installer codes that consumers should check.

[637] Future Climate/Purple Market Research: Final Report to Citizens Advice: A review of consumer experience of solar PV systems, June 2015; Citizens Advice: Staying FiT. Learning from consumer experience of solar PV systems to inform the development of low-carbon policies, June 2015.
[638] IEA RETD: Residential prosumers – Drivers and policy options (RE-Prosumers), September 2014, p. 84.

4.13.4 Summary of 'green electricity' markets and self-generation in the UK

Conditions for consumers' 'green' choice		Remarks
Stage of market liberalisation		Relatively high switching level and accomplished Third Energy Package but still high concentration.
Renewable energy policy		Clear framework for solar PV self-generation under review, generally lagging behind targets.
'Green electricity' market size and choice		Relatively small number of 'green electricity' offers.
Relevance of renewable self-generation		High interest and good progress despite lack of clear grid parity.

Transparency of 'green' tariffs		
Definition of 'green electricity' offers		No clear definition but binding minimum requirements targeting environmental claims.
How 'green' tariffs are offered to consumers		Suppliers are obliged to communicate on environmental benefits but renewable GOs do not necessarily match electricity.
How 'green' tariffs and the fuel mix are disclosed on the bill		No provisions that go beyond minimum criteria, environmental indicators on website only.
How environmental benefits of 'green' tariffs are proven to consumers		Binding report on additionality of the tariff but unclear criteria question comparability.
How 'green electricity' quality labels guide consumers		Mandatory reporting on additionality replaces voluntary quality label.

Consumers' access to self-generation		
How grid access and use are guaranteed to self-generating consumers		No relevant restrictions for small projects, although no priority grid access is granted.
How consumers' excess electricity production is treated		Relatively simple and effective feed-in tariff system guaranteed appropriate remuneration until 2015.
Which typical risks consumers face when starting a self-generation project		Difficult access to capital for self-generators, some speculative selling practices.

Evaluation scale for transparency and market access

Good practice; issue showing good solutions related to transparency and/or market access from the point of view of consumers' rights	
Average performance; issue with some problems and some solutions related to transparency and/or market access from the point of view of consumers' rights	
Bad practice; issue with relevant problems related to transparency and/or market access from the point of view of consumers' rights	

5. Summary assessment of Member States' best practices

As shown in the previous country case studies, Member States operate a broad range of policies to regulate 'green electricity' markets and renewable self-generation. After having assessed these diverse approaches, we will now try to sum up the good and bad practices. These findings led to BEUC's key recommendations in the executive summary of this report. They also back BEUC's policy papers "A welcome culture for consumers' solar self-generation" and "Trustworthy 'green electricity' tariffs".[639]

5.1 Conditions for consumers' 'green' choice

Stage of market liberalisation

Early liberalisation of electricity markets does not automatically lead to higher competition or better choices for consumers. However, there is evidence that amongst the Member States analysed in this report, those with a longer experience in switching suppliers also possess more advanced 'green electricity' markets. In Italy, Germany and Spain, rising renewable self-generation decisively contributed to lowering wholesale market prices and to undermine market dominance of incumbent suppliers.

Renewable energy policy

Almost all Member States assessed have developed dedicated categories for small-scale self-generation in their support schemes, at least formally. This does, however, not protect consumers against severe retroactive changes that endanger their investments in solar PV rooftop systems like in Greece, Italy and Spain.

'Green electricity' market size and choice

Amongst the 15 Member States in which consumers can opt for at least one 'green' tariff, ten are analysed in this report. Some of them still are very small niche segments (Portugal, Slovenia, UK). But others have evolved to advanced markets with a relevant number of consumers supplied (Austria, Belgium, Denmark, Germany, Netherlands). In those Member States, a lively public debate on the environmental benefits of consumers' choices accompanies the market development. While most of 'green electricity' markets are in progress, only in Belgium saw a recent decrease in the amount of electricity supplied under 'green' tariffs, due to a skipped tax exemption.

Relevance of renewable self-generation

In most Member States observed, there is a clear case for grid parity, except Slovenia and the UK. The higher the retail electricity prices, and the lower the solar PV electricity generation cost, and the wider the spread – see the cases of Cyprus, Germany and Denmark which make clear that solar PV for consumers does not only pay off in regions with high solar irradiation. In terms of market penetration of solar PV, Germany, Italy and Belgium lead.

[639] BEUC: A welcome culture for consumers' solar self-generation. Policy recommendations, BEUC-X-2016-001, 6 January 2016 and BEUC: Trustworthy 'green electricity' tariffs. Policy recommendations for more transparency, better choice and environmental benefits, BEUC-X-2016-002, 6 January 2016.

5.2 Transparency of 'green' tariffs

Definition of 'green electricity' offers

There is a lot of confusion and uncertainty because of the lack of a clear definition regarding what is allowed to be offered as a 'green' tariff. Most Member States analysed in this report do not provide any dedicated rules and leave the doors wide open for suggestive wording. The use of renewable GOs is a prerequisite to provide the correct renewable share in the fuel mix. On top of that, binding provisions should make the supplier responsible for proving the extra environmental bonus which legitimates the tariff to be marketed with a 'green' claim. Such legally binding minimum standards only partially are fixed in Austria and in the UK. A series of minimum compliance criteria is set in Denmark, linked to the definition of tariffs with beneficial impacts for the environment. This promising approach is formally not anchored in legislation but is the result of a voluntary agreement of relevant stakeholders.

The fact that renewable GOs can be used to cover a non-renewable electricity generation without literally any environmental benefit constitutes one of the most problematic aspects of the fuel mix disclosure issue. Only in Austria, it is mandatory that the quantity of domestic renewable electricity sold within a 'green' tariff automatically matches with renewable GOs from the identic domestic renewable power plants that produced the kilowatt-hours sold to final customers.

Beyond consumers' involvement with the electricity market, the issue of reliable 'green' offers also relates to the broader fields of product policy and unfair commercial practices: consumers may be exposed to product-related environmental claims of companies that indicate a low carbon footprint due to the use of flawed 'green electricity' offers. This shows that a legally binding definition for 'green' offers and the environmental claims related to them is not just needed for the sake of it. A lack of rules for 'green' offers might impact also other areas and entail misleading communication to consumers.

How 'green' tariffs are offered to consumers

Consumers should be able to identify at least both the supplier mix and the environmental indicators in any advertisement for all electricity tariffs. Only some Member States force suppliers to communicate to their consumers about the fuel mix at an early stage. And only some oblige them to communicate what activities they launch with the help of consumers' money in order to generate environmental benefits. Consumers naturally should have the right to know what extra activities are undertaken thanks to their 'green' choice. But since legally binding provisions are lacking in most Member States analysed in this report, the picture is rather deceiving, again with the exception of Austria and Denmark. Slovenia and the UK recently have pushed their suppliers to explain additionality of 'green' tariffs but it is still too early to evaluate the results.

Since European consumers increasingly tend to search online for their electricity tariff, online price comparison tools (PCTs) are key to guide consumers to reliable 'green' tariffs. Again, in many Member States these websites fail to explain in a meaningful way what actually is the 'green' in a 'green' tariff, mainly with the exception of Austria and Denmark. PCTs run by consumer organisations often fill the gap. A minority of regulators identified the importance of setting clear rules for privately run PCTs. A limited number of regulators also provides annual disclosure reports that compile the fuel mixes of all suppliers, jointly with consumer-friendly background information on the functioning of 'green electricity' markets, e.g. in Austria and Belgium (Flanders).

How 'green' tariffs and the fuel mix are disclosed on the bill

Member States with liberalised markets implemented the Directive's minimum requirements in a highly diverse manner. First of all, disclosure of information should be presented in an easy understandable and comparable way. On the bill, a standardised template including a chart and average values for benchmarking the specific offer effectively facilitates consumers' orientation. With this regard, implementation in Austria, Germany and Spain were identified as good practices. Consumers should not just be confronted with a tripartite bloc presenting the share of renewables, fossils and nuclear. A sound layout can also integrate the different renewable sources as well as the country of origin of the (renewable) GOs used for disclosure like in Austria. Although disclosure of the environmental indicators (CO_2 emissions and radioactive waste) is mandatory, many Member States have not implemented appropriate rules. Suppliers should not be allowed to hide these information on their websites.

Additionally, transparency would be improved through reporting the share of supported renewable electricity separately like in Germany. Consumers in most Member States are forced to refinance the public support schemes for renewable electricity through levies on the electricity price respectively as a taxpayer. Providing this information can help consumers to understand how they contribute to the expansion of renewable generation capacities.

Along with the supplier mix, it is also necessary to publish the product mix once a supplier offers different tariffs. By doing so, double-counting and incoherence can be avoided, but only a minority of analysed Member States does so, e.g. Germany.

Behind the disclosure, the calculation of the fuel mix data are not always coherent.[640] While some Member States leave it to the suppliers to provide unchecked data, others calculate the suppliers' fuel mixes in a more accurate way by tracking suppliers' specific electricity production and/or trade. Some just apply a default mix. In the latter case, consumers lack in meaningful information to differentiate suppliers' environmental performance.

Against this backdrop, BEUC sees several reasons to implement 'full disclosure' (see **chapter 2.3.1 Minimum requirements for fuel mix disclosure**). Amongst the analysed Member States, only in Austria GOs are the unique tracking tool allowed. Sweden operates 'full disclosure' on a voluntary base.

Info box: 'Full disclosure' as good practice for more coherent fuel mix disclosure

From a consumer point of view, 'full disclosure' can be regarded as good practice for several reasons:

> The calculation of the fuel mixes becomes more coherent, accurate and reliable. The risk of double-disclosure of electricity's attributes could be reduced.
> Comparability of suppliers and offers is improved. The 'anonymous' residual mix can be phased out. If all suppliers would continue to disclose the same national fuel mix, the informative value with regard to comparison of their environmental footprint would be limited. Suppliers below the average could not hide behind the 'anonymous' residual mix. Suppliers that perform better than the average would be able to disclose this information.

[640] The RE-DISS projects have identified deficiencies of the calculation methodologies and initiated improvement of national practices with regard to coherence and accuracy, see RE-DISS II project: RE-DISS Guidelines for the Regulation of the Front-Side Disclosure of Electricity, http://www.reliable-disclosure.org/upload/175-RE-DISSII_Disclosure-Guidelines_Regulation_Competent-Bodies_v1.pdf, 22 July 2015; RE-DISS II project: RE-DISS Disclosure Guidelines for Electricity Suppliers, http://www.reliable-disclosure.org/upload/174-RE-DISS_II_Disclosure-Guidelines_Suppliers_v1.pdf, 22 July 2015.

There are further advantages of 'full disclosure' from a more general point of view of competition:

> It creates a level playing-field for RES and non-renewable sources. It would not be fair to commit only renewable power plant operators to the GO tracking scheme.
> Given the uncompleted GO market, the trade in GOs could increase and eventually contribute to higher prices for renewable GOs which again could help to reach overshooting demand which would incentivise investments in new generation capacities.

On the other side, 'full disclosure' is not the silver bullet for deficiencies of fuel mix disclosure:

> If a plant operator automatically receives GOs for the kilowatt-hours produced by its power plants, this alone does not necessarily improve transparency for the customer. GOs could remain unclaimed by suppliers. If suppliers (willingly) fail to cover their electricity supplied to final customers with GOs, still a residual mix or any other methodology would have to apply in order to define the unidentified share.
> After all, GOs are not tied to the kilowatt-hour produced, traded and sold. The GO does not travel the whole value chain from the producer, passing the trader and the supplier to final fuel mix disclosure of the final customer's bill. Matching GOs with their power plant's electricity is not mandatory.
> Some Member States (e.g. Germany, Portugal) already operate a reliable calculation methodology to track which amounts of electricity have been produced by which power plants and which amounts of electricity have been traded by each supplier. Therefore, the fuel mix can show the consumer in a relatively reliable manner which electricity she/he actually paid for. The use of GOs as the only tracking tool should not dilute the reliability of these quite accurate calculations.

How environmental benefits of 'green' tariffs are proven to consumers

When opting for 'green electricity', consumers expect their supplier to shift towards renewable generation, thus to create additional benefits that would not have occurred without the consumers' choice. From the Member State's perspective, the additionality is also crucial because 'green' tariffs can contribute to the fulfilment of the national 2020 targets through additional investments in new renewable generation capacities. Consumers' spending for 'green' tariffs helps to achieve the renewable electricity targets or to go beyond these targets.

Although additionality is an abstract concept, the example of a binding reporting on the additionality of any 'green' offer shows that regulators, like in the UK, can enforce substantiation of environmental claims.[641] On a voluntary basis, Denmark also knows partly strong provisions for suppliers to offer tariffs that include additionality. Slovenia just introduced such rules. In other advanced 'green electricity' markets, where legally binding provisions are missing, environmental NGOs and consumer organisations have set up rankings with regard to suppliers' engagement on renewables to guide consumers (Belgium, Netherlands).

How 'green electricity' quality labels guide consumers

Besides national regulators, private 'green electricity' quality labels can help to establish and verify environmental minimum criteria related to additionality. BEUC welcomes joint approaches of national regulators, electricity market stakeholders, consumer organisations and environmental NGOs like in Austria, Denmark and Germany to develop specific national quality labels (or standards)

[641] See chapter 4.13.2 Evaluation of 'green' tariffs' transparency in the UK; Modification of the standard conditions of electricity supply licenses granted under section 6 of the electricity act 1989. Licence conditions 21D.6, 21D.7, December 2014.

which define minimum criteria for 'green' tariffs. These could provide an appropriate approach to tackle highly diverse stages of national 'green electricity' markets.

Nevertheless, voluntary labels alone cannot replace neither a coherent implementation of reliable tracking nor an understandable disclosure of relevant attributes of the fuel mix. In this context, we encourage stakeholders to proactively adopt ambitious transparency rules for 'green electricity' as a template to enable consumers to make well-informed choices.

5.3 Consumers' access to self-generation

How grid access and use are guaranteed to self-generating consumers

Clear and simplified rules facilitate permit procedures for consumers' small-scale solar PV systems. Some Member States prescribe quick standard processes but distribution grid operators do not necessarily incorporate a real welcome culture for renewable self-generation. Grid access and authorisation are hassle-free only in Germany, Slovenia and the UK. The fact that some Member States like Italy provide priority grid access does not entail a swift and equal treatment of consumers' right to be connected to the grid. Spain applies a clearly prohibitive regulation that discourages consumers.

Info box: Remarks on self-generation and network fees

Do consumers who self-consume undermine the solidarity of the electricity supply system?

Households that consume their own solar PV electricity will reduce their electricity consumption from the grid and will consequently contribute less to the coverage of total costs for maintenance and extension of the electricity networks since these costs are mainly paid by network fees charged on every kilowatt-hour consumed ('consumption-based fee').

Revision of consumption-based network fees towards more capacity-based fees could be designed to address this problem and to incentivise flexibility of electricity generation. But since capacity-based network fees might increase the burden for small consumers, such a revision would require additional compensating mechanisms for vulnerable households.

In general, the effect of 'prosumers'' diminishing contribution to network fees described above should not be overestimated. Even in far developed solar PV self-generation markets (e.g. Germany, Italy), 'prosumers'' self-consumption only makes up a very limited share of final electricity consumption (<0.5% in Germany). Given its limited share, self-consumption will not be able to diminish substantially grid operators' revenue from network fees. It would be neither appropriate nor fair to burden in-house electricity generation and consumption which spares the electricity networks. Nevertheless, it is worth to consider more differentiated schemes for network fees that foster flexibility options of demand and supply, involving all electricity producers and consumers.

How consumers' excess electricity production is treated

Feed-in tariffs (FiTs) and net metering are the dominating support schemes that provide a more or less reliable remuneration for consumers' self-generation projects. Generally, the analysed Member States tend to change their support schemes, especially for solar PV systems, in a more and more frequent way. After the value of renewable electricity decreased because of the wholesale market price decline, the differential costs of fixed FiTs increased in some Member States. This often led to sudden cuts and abrupt changes in the support schemes, affecting the economic viability of consumers' investments. FiTs in Germany and in the UK currently offer a consumer-friendly,

appropriate framework. The same applies to the Dutch net metering scheme which offers a fair remuneration for excess electricity as well as opportunities to involve tenants in multi-storey dwellings and local community projects. Again, the Spanish policy virtually prohibits consumers' small-scale self-generation.

Which typical risks consumers face when starting a self-generation project

First, consumers' access to capital is questioned by the financial crisis and/or by the uncertainty of public policies. Retroactive changes thwart consumers' investment in self-generation – as well as the willingness of the finance sector to get involved in such projects. Depending on the maturity of solar PV markets, the quality of offers could be improved in some Member States. Consumers generally need more independent and reliable information on the use of renewable self-generation technologies. No Member State provides a real one-stop shop responding to consumers specific needs.

Glossary

2020 targets

In 2009, the European Union fixed a threefold aim in the field of energy and climate protection under its 2020 Energy Strategy:[642] By 2020, the share of renewable energy is to be increased to 20% of consumption, the EU's greenhouse gas emissions have to be cut by 20% and the final energy consumption should decrease by 20%. Concerning the first target, touching upon the share of >renewable energy sources in final energy consumption, EU Member States agreed upon different binding targets on the national level, given the fact that some countries are already far beyond a share of 20% while others just started to introduce renewable energy in their national markets. Member States have to communicate their strategy to reach their binding national target in a National Renewable Energy Action Plan. Member States' progress in this regard is monitored by the European Commission which regularly publishes a progress report. The Member States are free to launch their specific sub-targets for renewable electricity and renewable heating, with the exception of the transport sector where a general sub-target of 10% share of renewable energy applies.

Cogeneration

Cogeneration is the combined production of electricity and heat. Power generation through burning of fossil or renewable fuels in thermal power plants always releases heat. While stand-alone thermal power plants dissipate the waste heat of the power generation process through a cooling tower, combined heat and power (CHP) units feed the heat into a dwelling's central heating, into a district heating network or provide it as process heat in the industry. By using a part of the primary energy input in a heat sink, the combustion efficiency of the whole process increases compared to the single use of a fuel for electricity production only. Typical cogeneration units currently available at the household level are mini- or micro-CHP devices fired with natural gas, biomethane, wood chips or wood pellets.

Disclosure

See >fuel mix/fuel mix disclosure.

Distribution system operator (DSO)

Distribution system operators (DSOs) are responsible for transporting and delivering electricity to final customers through the electricity grid on the local level. In contrast to the supergrid of the transmission system, the distribution grid (or: distribution network) is mostly run on low and medium-high voltage. While the transmission system can be compared with a motorway for electricity, the distribution system more resembles to the ramifications of rural roads or residential streets. DSOs have to maintain, strengthen and enlarge the distribution grid in order to guarantee security of supply and offer discrimination-free access to the grid. They are refinanced by >network fees.

European Electricity Certificate System (EECS)

The European Electricity Certificate System is a harmonised tracking scheme for >Guarantees of Origin (GOs), providing rules and technical standards to execute any exchange of GOs in Europe between >Issuing Bodies, power plant operators, traders, >suppliers and >registries.

[642] European Commission: Energy 2020: A strategy for competitive, secure, and sustainable energy, COM(2010)639, November 2010.

Feed-in tariff (FiT)

Feed-in tariffs are a support scheme for the market introduction of new renewable electricity generation technologies. Since these new technologies normally have higher levelised costs of electricity generation than the level of the wholesale market price, a fixed price is paid to renewable power plant operators during a certain period in time, e.g. 15 years. Thanks to this stable remuneration, risks related to investments in new renewable electricity generation capacities can be reduced effectively. As a consequence, access to capital becomes easier. FiTs allow for cost-efficient upscaling of generation capacities and consequently economies of scale, like observed in the EU in the field of solar PV installations or wind turbines since the beginning of the 1990es. With investment costs going down, the FiT rates were reduced regularly. The differential costs, i.e. the spread between the low wholesale market price and the high FiT rate, are passed on to all consumers as a levy on the retail electricity price or are covered by the public purse.

Fuel mix/fuel mix disclosure

The fuel mix indicates the share of the different energy sources used to generate the electricity provided to final customers. The Internal Electricity Market Directive confirms that European Consumers have the right to know where their electricity comes from. For this reason, EU Member States developed national frameworks that define how electricity >suppliers have to implement legal fuel mix disclosure to their final customers. At least, the percentage of fossil fuels, nuclear power and >renewable energy sources have to be disclosed once a year with the bill sent to consumers. A more detailed disclosure is offered in some Member States, by differentiating the share of fossil fuels (e.g. hard coal, lignite, natural gas…) as well as the >renewable energy sources used (e.g. wind power, solar power, hydropower). In most Member States, >Guarantees of Origin (GOs) are used to track and disclose the share of >renewable energy sources. The fuel mix can refer to the specific fuel mix of the electricity tariff product which the consumer subscribed to (so-called >product mix) or to the overall fuel mix of the electricity supplier (>supplier mix) in case the >supplier offers more than one tariff product. In liberalised electricity markets, the fuel mix should serve as an indicator of the environmental performance of a >supplier or of a tariff. When searching for a good deal, consumers should be enabled to identify not only the price, but also the fuel mix to make a well-informed choice.

Full disclosure

In the context of >fuel mix disclosure, this term means that only >Guarantees of Origin are used for calculating the renewable *and* the non-renewable shares in the fuel mix, like in Austria, Switzerland and (voluntarily) in Sweden.

‘Green’ tariff/offer/electricity

There is no commonly agreed definition of a ‘green’ tariff or ‘green electricity’. In this publication, we understand it as a 100% renewable electricity tariff in terms of >fuel mix disclosure. ‘green’ tariffs mostly are marketed with certain environmental claims by electricity >suppliers on liberalised markets, based on a reference to the renewable share of the >fuel mix. Normally, consumers voluntarily choose such a tariff product whose presentations suggests an environmentally positive effect. The environmental benefits of ‘green’ tariffs can be certified by >quality labels.

‘Green electricity’ quality label

See >quality label.

Grid operator

The electricity grid (or: network) is the backbone of every modern electricity supply system, connecting power plants and electricity consumers. It is run by grid operators, namely by >distribution system operators that secure the transport to final customers on the one hand and transmission system operators that run the supergrid. They are refinanced by >network fees.

Grid parity

Grid parity (or "socket parity") describes the point in time when self-generated solar PV electricity is cheaper than electricity bought from a supplier via the grid. This cost advantage is key for enabling consumers to cut their electricity bill with the help of solar PV self-consumption. But naturally, it only applies during some hours per day. It doesn't imply that investments will amortise automatically or that self-generators can compete on a par with other commercial generators.

Guarantee of Origin (GO)

For the purpose of >fuel mix disclosure to final customers, Guarantees of Origins (GOs) can be used as a statistical tracking tool. It serves as a proof to consumers that a given quantity or share of electricity was produced with >renewable energy sources. Renewable power plant operators can ask the national >issuing body to provide them with one GO for each renewable megawatt-hour of electricity produced by its power plant. The Renewable Energy Directive defines that GOs are tradable certificates which means that they do not necessarily accompany the cash flow related to the sold kilowatt-hours. For instance, a renewable power plant operator can sell his kilowatt-hours to another utility while he sells the GOs separately to another electricity >supplier which uses the GOs to disclose renewable energy sources in its >fuel mix.

Issuing Body

In order to track the share of >renewable energy sources in the >fuel mix disclosed to consumers, >Guarantees of Origin (GOs) are used as the information carrier. GOs indicate the source of one megawatt-hour of electricity, produced in a certain generation unit in Europe. Every EU Member State has at least one issuing body that distributes to renewable power plant operators the amount of GOs equivalent to the quantity of renewable electricity produced by them.

Label

See >quality label.

Matching

In this publication, the term is used to describe the use of >Guarantees of Origin (GOs) for >fuel mix disclosure in case of bundled purchase with the megawatt-hours produced in renewable power plants. The statistical flow of GOs is identic with the financial cash flow for electricity along the entire chain, starting from the renewable power plant operator until the disclosure of the GOs on the bill which is sent to consumers to refinance the same renewable power plant. When the disclosed GOs equal the share of electricity produced, traded, purchased and finally sold to consumers, the latter exactly pay for the renewable power plants that provide the GOs. If GOs are traded independent of the megawatt-hours, consumers might think that they spend their money exclusively for renewable electricity because the >fuel mix disclosure is done with renewable GOs only while the >supplier purchased electricity from coal-fired power plant operators to cover consumers electricity demand.

Net metering

Consumers running a solar PV unit as a >self-generator can participate in a net metering scheme in several EU Member States. Net metering allows them to reduce their electricity bill by the amount of kilowatt-hours fed into the grid, so called "netting". The self-generator's meter just runs backwards. Only the annual (or monthly or hourly) net consumption is invoiced by the >supplier and if annual (or monthly or hourly) production exceeds the self-generators' electricity import from the grid, his/her bill will be zero. The higher the retail electricity price a consumer has to pay, the higher is the indirect remuneration of self-generated electricity through exporting it to the grid at this price level.

Network fee

The tasks of >distribution grid operators and transmission grid operators like the maintenance and extension of the electricity networks are refinanced with the help of network fees. Every consumer connected to the electricity grid, has to pay a network fee which is normally collected as a surcharge included in the retail electricity price. In most of the EU Member States, network fees consist of a capacity-based part and a consumption-based part. This means that a part of the network fee is calculated according to the capacity of a consumer's grid connection while another part depends on the amount of consumed electricity.

Product mix

The product mix represents the annual >fuel mix of a specific electricity tariff product offered amongst a number of other tariffs by one electricity supplier, for instance a >'green electricity' tariff. In case supplier offers more than one single tariff, the product mix needs to be disclosed separately from the suppliers overall fuel mix, the >supplier mix.

Production mix

In contrast to the >supplier mix and to the >product mix, the production mix does not provide a >fuel mix which represents the shares of the different energy sources used for the electricity delivered to final customers under a certain tariff. The production mix only looks at the total amount of electricity generated by one supplier or by a whole country. From the point of view of consumers, the informative value of this approach tends to be lower because the production mix does not reflect the fact that suppliers or countries may produce more electricity than consumed by their final customers or that they need to import electricity from other sources of origin to entirely cover their customers' demand. For example, in case a supplier only owns renewable electricity generation capacities, the production mix would be 100% renewable but this does not yet provide a guarantee to its final customers that they exclusively purchase 100% electricity from renewable power plants. Mixing up the use of a production mix and a >supplier mix in >fuel mix disclosure can cause inaccuracy and flawed statistics.

Prosumer

'Prosumer' is another term for consumers that self-generate and self-consume electricity on the premises. In this publication, we prefer to describe the role of consumers as self-generators. Regardless of the term, the household always keeps connected to the grid.

Quality label

In order to examine the additional environmental benefits of purchasing a >'green' tariff, independent stakeholders such as environmental organisations or consumer organisations have established 'green electricity' quality labels in several countries. Suppliers can apply for being

labelled. In order to be certified by the quality label, suppliers have to comply with the quality label's own minimum requirements. These can entail payments for an independent fund that provides money for investments in new renewable generation capacities with the money consumers spent for a labelled 'green' tariff.

Regulator

In this publication, when referring to the regulator, we mean a state authority that has the task to monitor and safeguard the functioning of the electricity market with regard to competition, discrimination-free access and grid use. In many Member States, regulators care for the key rules on consumers' rights and duties when engaging in electricity markets.

Registry

As internationally tradable certificates, >Guarantees of Origin (GOs) need to be tracked in order to disclose the share of >renewable energy sources in the >fuel mix to final customers. For one megawatt-hour of renewable electricity produced, the national >issuing body provides the renewable power plant operator with one GO. The following transactions, for instance if a power plant operator sells a GO to a supplier, can be monitored by the national registry. In order to make sure that the number of GOs disclosed to final customers always equals the amount of electricity sold to them, GOs have to be cancelled in the registry. Following the Renewable Energy Directive's provisions, the national registry ensures that a GO is used only once for disclosure purposes. A European-wide coordination of registries under the >European Electricity Certificate System (EECS) works to avoid double-counting of renewable electricity.

Renewable energy sources

In this document, the definition provided by the Renewable Energy Directive applies. Renewable energy sources means all energy from renewable non-fossil sources, namely wind, solar, aerothermal, geothermal, hydrothermal and ocean energy, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases. >Guarantees of Origin (GOs) can only be issued to renewable power plants using one of these renewable energy sources.

Self-consumption

Self-consumption is the activity of using a certain share of power and/or heat generation from >self-generation on the premises of a private consumer directly to cover the consumer's energy demand. Self-consumption is a central, but not the unique activity within the concept of >self-generation. Self-generators normally also feed excess electricity into the public grid.

Self-generation

Self-generation is power and/or heat generation on the premises of a private consumer who uses self-generated heat, or electricity, to cover his/her own demand to a certain degree (>self-consumption). On top of that, it entails feeding excess electricity production into the public grid or eventually storing electricity. For self-generation, renewable and non-renewable energy sources can be used.

Supplier

In the context of this document, a supplier is a power company, licensed for the sale of electricity tariffs to its final customers.

Supplier mix

The supplier mix is used in >fuel mix disclosure to represent all energy sources used for the total amount of electricity delivered to final customers under different tariff products during one year. In case an electricity supplier only offers one single tariff product, the >product mix is identic with the supplier mix. Mixing up the use of a supplier mix and a >production mix in >fuel mix disclosure can cause inaccuracy and flawed statistics.

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Units and abbreviations

ACER	Agency for the Cooperation of Energy Regulators
AIB	Association of Issuing Bodies
CEER	Council of European Energy Regulators
DSO	Distribution system operator
EECS	European Electricity Certificate System
FiT	Feed-in tariff
GO	Guarantee of Origin
kWh	kilowatt-hour
kW	kilowatt
MWh	Megawatt-hour (=1,000 kWh)
MW	megawatt (=1,000 kW)
PCT	Price comparison tool
RES	renewable energy sources
TSO	Transmission system operator
TWh	terawatt-hour (=1 billion kWh)
VAT	Value-added tax

Annexe

Catalogue of research questions for the analysis of current practices in 'green electricity' markets and self-generation in Member States and in Norway (see chapter 4)

Category 1: Conditions for consumers' 'green' choice

Stage of market liberalisation

Overview: Is the Third Energy Package implemented completely? Is the national market framework in line with EU legislation?

Market concentration: Is the market share of the largest company dominating the retail market? Is the level of competition sufficient? Are suppliers' mark-ups in the retail electricity market high?

Choice: Can consumers switch suppliers? From how many different tariff offers from how many electricity suppliers can household consumers choose?

Switching activity: Are consumers satisfied with electricity suppliers and their offers? Are consumers active in switching their suppliers? Is the annual switching rate above or below the EU28 average? What potential savings can be encashed thanks to switching?

Renewable energy policy

Target compliance: Is the Member State on track regarding the 2020 targets?

Main electricity support scheme: How did and does the Member State support renewable electricity generation, especially in the small-scale self-consumption segment?

Recent changes and trends: How is the Member State's policy evolving? Have there been any retroactive changes or improvements, especially with regard to the small-scale self-consumption segment?

'Green electricity' market size and choice

Choice: Is there a broad choice? From how many different 'green' tariff offers from how many electricity suppliers can household consumers choose? Who offers 'green' tariffs to consumers?

Market size and development: What is the relevance of the 'green' electricity market? When was it launched and how did it evolve? Is it a niche market or is it an advanced market, regarding the ratio between the number of consumers and the number of 'green' tariffs offered?

Relevance of renewable self-generation

Grid parity: To what extent does the average retail electricity price exceeded the costs of solar PV generation? Is self-generation with solar PV systems attractive?

Generation capacity: Is there a broad experience in the Member State regarding electricity generated by solar PV systems? How many solar PV systems are installed? What is the installed capacity? How did it evolve?

Capacity per inhabitant: Is the penetration of solar PV systems in relation to the population above or below the EU28 average?

Category 2: Evaluation of 'green' tariffs' transparency

Definition of 'green electricity' offers

Disambiguation: Is there an official definition or listing of 'green' offers, avoiding misleading advertising or wording?

Qualitative minimum criteria: Do any requirements related to environmental benefits exist?

Matching: Do consumers know for what they are paying for? Can consumers rely on any binding information when they want to know whether a GO-based 'green' offer is backed with power purchase contracts from renewable power plants or not?

How 'green' tariffs are offered to consumers

Suppliers' information duties: Which rules apply for communication with consumers? Are suppliers obliged to communicate to consumers in a binding, meaningful way?

Online price comparison tools (PCTs): Which rules apply when 'green' tariffs are displayed? Are there any rules providing consumers with meaningful and understandable information on the character of 'green' tariffs? Are there any information provided about additionality of 'green' tariffs displayed in PCTs?

Disclosure report: Does any official listing or comparison of fuel mixes exist? Does the regulator publish an annual disclosure report comparing the fuel mixes of all suppliers? If yes, is this information easy accessible and understandable for consumers?

How 'green' tariffs and the fuel mix are disclosed on the bill

Functioning of legal fuel mix disclosure: Does the national implementation of legal fuel mix disclosure secure reliability, accuracy and coherence (including disclosure of electricity benefitting from public support)? Is the fuel mix published regularly? Is the information or parts of it published on websites of the suppliers only, on the bill or in other pre-contractual information?

Advancement of fuel mix disclosure: Is there any binding information going beyond basic requirements of the Directive and providing details to consumers in a transparent and understandable way, e.g.: differentiation of energy sources, disclosure of national average values as a benchmark for comparison, presentation of CO_2 emissions and radioactive waste, disclosure of the country of origin of the used GOs?

Informative value: Does the implementation of fuel mix disclosure in the Member State help consumers to understand and to compare the environmental footprint related to electricity offers? Is fuel mix disclosure complete and organised in a consumer-friendly, meaningful way? Is the overall transparency and frequency of disclosure sufficient?

How environmental benefits of 'green' tariffs are proven to consumers

Legal provisions: Are there any binding rules that apply for communicating environmental benefits of 'green' tariffs? If yes, are they efficient and useful to guide consumers?

Additionality: Are there any approaches of suppliers to proof a positive environmental impact of their 'green' tariff beyond business-as-usual practice? If yes, are these approaches transparent and meaningful, avoiding misleading environmental claims?

How 'green electricity' quality labels guide consumers

Relevance of labels: Do private 'green electricity' labels provide guidance of consumers, e.g. related to reliability and understandability?

Functioning of labels: If existing, how meaningful and ambitious are private 'green electricity' labels? Which minimum criteria apply, e.g. related to additionality?

Category 3: Evaluation of consumers' access to self-generation

How grid access and use are guaranteed to self-generating consumers

Procedure: To what extent are rules adapted to consumers' needs (simplicity, reliability and duration of grid connection)?

Legal status: Is priority grid access granted to consumers' renewable self-generation projects?

Commensurability of costs: Are charges related to grid connection, reinforcement and use established and if so, are they appropriate and fair?

How consumers' excess electricity production is treated

Rationale of the support scheme: Are there any dedicated provisions for consumers' self-generation projects?

Remuneration: Is there any support scheme for excess electricity? Is it easily accessible and adequate?

Investment security: Does the remuneration scheme incentivise self-generation and cost-effective investments? Does it enable consumers to calculate an adequate repayment period?

Which typical risks consumers face when starting a self-generation project

Financial risks: Is the financial risk related to investments in solar PV self-generation acceptable for consumers? Are there any specific risks related to amortisation, e.g. deficiencies of the remuneration scheme, taxation of self-consumed electricity?

Administrative barriers: Do administrative practices hamper accessibility of self-generation technologies to consumers? If yes, to what extend do they complicate consumers' projects?

Legal framework: Is there a dedicated and secure juridical status of consumers and small-scale self-generation? Is the framework sufficient and reliable? Do any retro-active changes menace consumers' investments or do grandfathering clauses protect them?

Quality of offers and services: From the point of view of consumers who are interested in investing in solar PV self-generation, does the market in the Member State provide a broad choice, transparent offers and fair commercial practices?

Information on self-generation options: Are there any provisions or practices that enhance accessibility and quality of information for consumers willing to invest in self-generation; e.g. a dedicated one-stop shop?

BEUC The European Consumer Organisation

The Consumer Voice in Europe