

**DEVELOPMENT OF  
THE GUARANTEES  
OF ORIGIN MARKET  
2009-2018**

August 2019  
**REPORT**

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## LIST OF ABBREVIATIONS

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AIB	Association of Issuing Bodies
CAGR	Compound Average Growth Rate
DGEC	Direction Générale de l’Energie et du Climat/ Directorate General for Energy and Climate (France)
DGEG	Direção-Geral de Energia e Geologia/ Directorate General for Energy and Geology (Portugal)
DSR	Demand Side Response
EC	European Commission
EECS	European Energy Certificate System
ENTSO-E	European Network of Transmission System Operators for Electricity
EUROSTAT	European Statistical Office
FiT	Feed-in Tariffs
FiP	Feed-in Premium
GME	Gestore del Mercato Elettrico/ Electricity Market Manager
GO	Guarantee of Origin
IRENA	International Renewable Energy Agency
KYC form	Know your customer form
MS	Member State
MWh	Megawatt hour
PPA	Power Purchase Agreement
PV	Photovoltaic
RED II	Revised Renewable Energy Directive
REGO	Renewable Energy Guarantees of Origin – UK scheme for GOs
RES-E	Renewable energy sources for electricity
SDE++	<i>Stimuleringsregeling Duurzame Energietransitie</i> , Dutch support system
TWh	Terawatt hour

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## EXECUTIVE SUMMARY

This report was first launched in 2014 by RECS International. It aims to provide an annual survey of the Guarantees of Origin (GOs) market in Europe. A GO is an electronic document that enables tracking of electricity from production to consumption and verifying that a quantity of power sold to end consumers has been produced from a specified source. This is the sixth report in the series, and it examines the GO market between 2009 and 2018.

2018 was again a remarkable year for renewable electricity. After slower progress between 2016-17, renewable power generation in Europe sped up again reaching 1244 TWh in 2018, a 6% growth rate between 2017-18 [1]. Last year we also saw record-low bid prices in tenders for renewable power in many countries - some without government subsidies [2], [3], [4] - and we saw the procurement of renewable energy reach new heights, particularly from corporate customers with Power Purchase Agreements (PPAs) [5].

In the political arena, the Clean Energy Package for all Europeans was finalized and formally adopted in December 2018. First published by the Commission in November 2016, this package will play a key role in driving the energy transition in Europe in the next decade.

In line with Article 19 of the new Renewable Energy Directive (RED II), in 2018 we also saw the first auction system for GOs of supported generation take shape in Luxembourg. The auction doubled the EECS-GOs issuing volumes in the small country. As other Member States (MSs) start translating the new directive into national legislation other auction systems are likely to be created.

Policy developments, the growing private sector's appetite for certified renewable power

and the advent of localised GO auction structures make the market more volatile, and thus following and reporting on the development of the GO market in Europe is more vital than ever. This report will present how supply and demand of renewable electricity GOs in Europe have evolved so far, highlighting key trends in this development. Besides that, MSs are in the midst of implementing RED II provisions and analysing the dependence of the GO market on supported generation is thus very timely. This is done in Section 2 of this report.

Finally, this report also aims to raise awareness of the importance of dual reporting when tracking MSs' progress towards renewable electricity targets. Like previous reports, we selected a set of countries for a case study to demonstrate that target attainment depends greatly on whether we focus only on renewable generation or if we also take into account renewable consumption by means of GOs.

In summary, the report aims to answer four key questions:

- 1. How has the GO market evolved so far?*
- 2. What trends can we recognise in the European market and what can we expect for the market in the short and medium terms?*
- 3. In face of Article 19 of RED II and in particular the provisions on GOs for supported generation, how dependable is the GO market on supported generation and how could it be affected by the new legislation?*
- 4. What conclusions can we draw from analysing country specific data in terms of renewable generation, consumption of renewable electricity and target attainment?*

## Geographical focus and data

The report studies 31 European countries, not only where the European Energy Certificate System (EECS) scheme is in place, but also where there are national GO systems in operation. The countries considered in the analysis were: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.



Figure 1. Markets analysed

This study considers renewable electricity production volumes from ENTSO-E [1] and national sources; issuing and cancellation volumes of national GOs (from country reports) and of EECS-GOs from the Association of Issuing Bodies (AIB)'s statistics [6]; and data on electricity production that is not-eligible for certification due to support schemes (e.g. Feed-in tariffs) from several reports.

## Report structure

**1. Guarantees of Origin Market Development 2009-2018:** This section analyses how issuing, cancellation, not certified production and available for certification volumes have evolved between 2009 and 2018. It focusses on the overall picture but also pays attention to country

level development and briefly discusses the market per technology.

**2. Market Trends:** This part performs a simple forecast for the market up to 2025 and discusses market trends and the potential regulatory changes that will likely affect the market in the coming years. Besides that, this section analyses how much of the market is dependable on supported RES generation and discusses potential effects of the new RED II provisions on GOs for supported generation.

**3. Renewable Generation vs Consumption and 2020's RES-E Targets:** Here, the report focuses on comparing renewable generation and certified consumption in selected countries and discusses how this relates to 2020 Renewable Electricity (RES-E) targets. The goal of this section is to raise awareness of the importance of dual reporting.

## Key findings

1. After limited growth in the previous year (1.8% between 2016-17), renewable generation sped up again reaching 1244 TWh in 2018, a 6.11% increase between 2017-18. Accompanying this growth, generation that received a GO reached 791 TWh in 2018, a remarkable 10.1% jump from 2017 when compared to the 3.3% increase between 2016-2017. Norway is known for its high share of renewable and certified production (137 TWh in 2018, 17% of total issuing in Europe). Spain and Italy, too, each showed an impressive 20% growth in issued GOs and together they issued 183 TWh of EECS-GOs. Austria, Finland, France, Sweden and Switzerland are also large EECS-GO issuers.

2. On the other hand, the generation eligible for certification but not currently receiving it (176 TWh in 2018), which has been consistently decreasing, slowed down its declining rate (-10% between 2017-18 compared to an average of -15% in previous years). Apart from countries

where there is not yet issuing in place (so available capacity is 100%), Czech Republic, Greece, Lithuania and Hungary still had over 50% of uncertified capacity.

3. Cancellations once again reached a new record, 702 TWh in 2018. Austria, Germany, Netherlands, Norway, Switzerland, Sweden and the UK lead the demand for certified renewable power. Spain is also performing extremely well, especially after more than 700 local municipalities decided to procure 100% renewable electricity for their public lighting and buildings. In 2018, cancellations surpassed local issuing in Austria, Belgium, Germany, Ireland, Luxembourg, the Netherlands, Sweden and Switzerland.

4. Besides that, issuing volumes grew more than the volume of capacity that received public support and was not eligible for certification (supported - not certified), which increased 7.57% in 2017-18. In 2018, France's and Germany's legislation prohibited GOs for supported generation and 250 TWh of production was left out of the market.

5. Luxembourg started to issue and auction GOs for supported generation in 2018 and thus its supported-not certified volumes disappeared while issuing amount doubled. Croatia and Ireland still have renewable support schemes that do not issue GOs for supported generation. Together they held 9.9 TWh of uncertifiable production.

6. It is well known that hydro GOs constitute most of the GO market (over 57% of the volumes issued in 2018) and that Norway supplies most of these. Sweden, France, Switzerland, Austria and, since 2018, Italy were also big contributors to the supply of hydro GOs. As for the cancellations, Germany, Sweden and the Netherlands lead the demand side.

7. Wind is the second largest technology and accounted for 23% of the total GO issuing in 2018 (about 180 TWh). UK, Spain, the Netherlands, Italy, Sweden and Denmark are the largest wind GO issuers and, apart from Italy, also the largest cancellers. Netherlands' wind GO demand stands out for largely surpassing the local issuing. This is in part explained by the fact that Dutch electric trains became 100% wind powered in 2018.

8. The UK, the second largest biomass-fired electricity producer in Europe, is the largest biomass GO issuer under its national GO scheme, REGO. Italy, Finland and Sweden supplied most of the biomass EECs-GOs in 2018. The demand for biomass GOs is not hindered by controversies surrounding the environmental impact of biomass. In the past three years, the cancellation volume of biomass GO increased rapidly from 55% to 90%.

9. Compared to other renewable GOs, solar generation has the lowest certification rate (only 28.9% of production is certified). Italy and Spain are together the largest solar GO issuers with 65% of the market but show very contrary solar demand behaviour. While Spain's demand is remarkably high, Italy cancelled only 0.8 TWh (6.7% of its issuing) in 2018 and cancellations have been slightly decreasing in the country. Norway's behaviour towards solar GOs is impressive: while no solar GO has been issued in the country in the last 3 years, it cancelled over 4 TWh of solar GOs in 2018.

10. If we consider the Compound Average Growth Rate (CAGR) we can expect cancellation volumes to grow at a higher pace than issuing in the next years. Available volumes would disappear by 2023. This of course presumes that the available potential can be easily included into the GO system, which is not always the case.

11. At the same time, the European market is going through a fast-moving shift in paradigm. Many MSs have stated a complete change in their power generation fleet with coal and nuclear decommissioning and bolder renewable energy targets. The translation of the Clean Energy Package into national legislation will certainly impact the GO market to a degree beyond the one forecasted in our basic CAGR projections.

12. In particular, Article 19 means that MSs need to start taking into account the GO value into their supported generation. Supported generation has been increasing since 2013 and it reached 657 TWh in 2018, of which about 42% was not entitled to receive a GO and 58% is either already certified or available. RED II could mean that the supply of EECS-GO increases if countries that currently do not allow the issuance of a GO for supported generation follow the example of Luxembourg and France and set up a system for auctioning certificates for their supported generation; potentially about 55 TWh of new EECS-GOs could be issued if we look at 2018's volumes. Another less desirable scenario could be that these countries just continue to not allow GOs for supported plants.

13. In markets that currently already issue GOs for their supported generation, again two outcomes are possible. A less desirable scenario would be if these markets decide to stop issuing GOs for supported generation, this could mean a sharp drop in EECS-GO volumes. Another possible scenario would be that countries continue to issue certificates for supported generation and take the market value of the GO into consideration within the support mechanism.

14. In less than a year the deadline for the 2020 targets of the 2009 Renewable Energy Directive will pass. Not all countries have been able to reach these renewable energy production

targets. Among the eight countries analysed in this target case study, Austria, Norway, the Netherlands, Spain, Luxembourg and Belgium fall short of their 2020 RES-E targets with the Netherlands being furthest away from its RES-E goal. Only UK and Germany have already reached their 2020 RES-E targets, both in 2017.

15. Had consumption be used as the measure for reaching the 2020 targets, rather than production, the picture changes drastically. Austria, Germany and Luxembourg would have reached their targets already in 2014 and the Netherlands in 2015. Belgium would have been able to reach their targets already in 2009, with a small setback in 2015. Consumption figures for the UK would not have been sufficient to reach their targets, despite the fact that their production targets were able to reach the 2020 targets. Spain, too, would not have been able to reach the 2020 targets, if it were based on the cancellation figures.



## CHAPTER 1: GUARANTEES OF ORIGIN MARKET DEVELOPMENT 2009-2018

After a slower progress between 2016-17, renewable production's growth sped up again reaching 1244 TWh in 2018, a 6.1% increase from 2017.

When breaking down this generation into production volumes that receive a GO (EECS or national), volumes that can't be certified and the remaining volume available for certification, we see that the share of certified renewable generation continues to rise.



Figure 2. Market Development 2009-2018, [1], [6]

**Issuing:** GOs are issued electronically for each MWh of electricity produced from renewable sources. Issuing volumes in this report contain both EECS-GOs and national GOs.

**Supported - not certified:** In some MSs, the electricity disclosure system to consumers already takes into account production that receives some form of support from the local government (e.g. Feed-in Tariffs, FiT). As a result, this volume is not entitled to a GO. Such practice takes place in Croatia, France, Germany, Ireland and Portugal.

**Available for certification:** This is the residual electricity that is not yet certified or under a support system that prevents certification.

**Cancellation:** This refers to the process of allocating the electricity attributes carried by a GO to a consumer by removing the GO from the market to avoid use by another end user. Cancellation volumes are an indication of the market's appetite for renewable electricity.

In 2018, issuing reached 791 TWh. This is a remarkable 10.1% jump from 2017 if compared to the 3.3% increase between 2016-17. Besides that, issuing volumes grew more than supported-not certified which increased 7.6% in

2017-18. On the other hand, the generation available for certification (181 TWh in 2018) slowed down its decreasing rate to -10.4%, after a continuous rapid reduce averaging of -15%.

Cancellations once again reached new records, 702 TWh in 2018. The growth during 2018 has, however, been much slower than preceding years: only 9.6%, compared to over 22% in 2016-17.

## Country clusters

Looking at the data at country level allows us to better understand what is happening at the market. This section divides countries into subgroups according to their EECS membership status and volume of renewable production, using a threshold value of 20 TWh. This assembly is similar to previous reports.

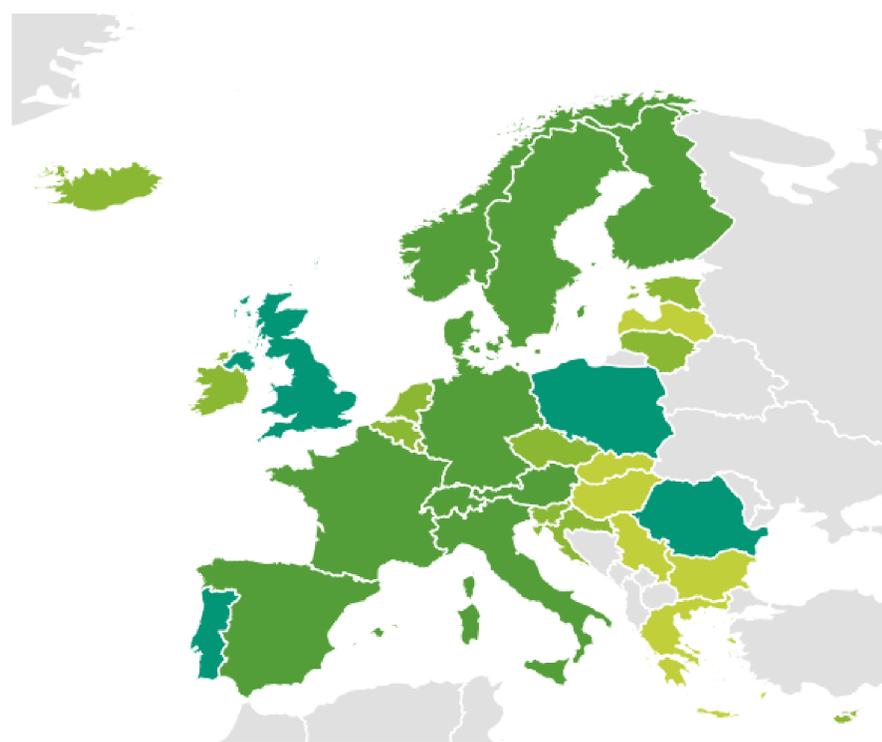


Figure 3. Country Groups [8]

Group 1	EECS countries with large renewable production (>20 TWh) <i>Austria, Denmark, Finland, France, Germany, Italy, Norway, Spain, Sweden, Switzerland</i>
Group 2	EECS countries with small renewable production (<20 TWh) <i>Belgium, Croatia, Czech Republic, Cyprus, Estonia, Iceland, Ireland, Lithuania, Luxembourg, the Netherlands, Slovenia</i>
Group 3	Non-EECS countries with large renewable production (>20 TWh) <i>Poland, Portugal, Romania, the UK</i>
Group 4	Non-EECS countries with small renewable production (<20 TWh) <i>Bulgaria, Greece, Hungary, Latvia, Serbia, Slovakia</i>

In 2018, there were 21 countries part of EECS provided by the AIB [7]. In this report, Denmark was moved from Group 2 to Group 1, since its renewable generation passed the threshold of 20 TWh. Lithuania and Cyprus, which were in group 4, joined Group 2 countries in this report as Cyprus' EECS membership was activated, and Lithuania became a member in 2018. Group 3 countries remained as the same as previous reports. According to the AIB, Greece has applied for membership; Serbia, Poland and the UK have showed interest in joining the AIB as well. Also, the new Portuguese competent body, DGEG, appointed a team for the setting up of the GO issuing Body [8].

**The European Energy Certificate System (EECS)** developed by the AIB offers a harmonized framework to manage energy attribute certificates like GOs. The EECS rules ensure that the certificates are reliable and tradable between EECS members.

## Group 1

Countries in Group 1 are part of EECS and have large renewable generation. Besides that, these countries certify large shares of their production, with the exception of Germany and France due to their support schemes not allowing supported generation the issuance of a GO in 2018. As mentioned before, Denmark is a new addition to Group 1 as its renewable generation increased above 20TWh in 2017 and stayed above it since then.

The markets with the largest issuing to production shares are **Austria, Switzerland, Sweden** and **Norway** with 100%, 100%, 99% and 96.5% shares respectively, followed by **Denmark, Spain and Finland**, all above 86%. These 7 countries together brought about 448 TWh of certificates into the market in 2018, 57% of the total issuing in 2018.

It is worth noting that since 2013, GOs are issued for all produced electricity in **Switzerland**

(including nuclear and fossil). The use of cancelled GOs for electricity disclosure by suppliers was required in case those suppliers have GOs available in their account. If no certificates were available in the suppliers account, they were able to label it as "*not verifiable energy sources*". With the new Federal Energy Act that took effect in January 2018 this is no longer allowed, and retailers are required to solely use GOs in disclosure [9], [10].

**Spain's** available generation continued the decreasing trend and went down to 8% of its production in 2018. A significant drop, from 32.4% in 2017 to 19.6% in 2018, of available renewable power for certification was also seen in **Italy**.

Cancellation volumes in countries of Group 1 are high compared to their issued generation, with exception of **Denmark, France, Norway** and **Italy**. Even though Denmark and Norway's cancellation volumes increased in 2018, the volumes only accounted for 49.5% and 35% respectively of their issuing. Italy's performance was also relatively poor, its cancellation volume was only half of its local issuing during last year. On the other hand, in 2018, cancellations surpassed local issuing once again in **Austria, Germany** and **Switzerland**.

**Sweden's** total cancellation amount, the sum of national GO cancellation and EECS GO cancellation, decreased sharply in 2018 to 92.2 TWh, barely surpassing the country's issuing volume. The decrease in total cancellation was caused by the drop in the Sweden's national

GO cancellation. Finally, attention should also be given to Spain's cancellation volumes in 2017 and 2018. The Spanish interest in renewable certified power has boomed in the last 2 years after it joined the AIB and after more than 700 municipalities in Spain<sup>1</sup> have decided to procure 100% renewable electricity for their public lighting and buildings in 2017 [11].

In Group 1, **Germany's** and **France's** renewable policy prevented supported production from receiving a GO still in 2018. Both Germany's and France's supported generation has increased, and in total held 90% of the supported not certified capacity of the market in 2018. In 2018, Germany only certified 7.1% of its renewable production, the lowest rate since 2013. After Germany, France has the lowest share of issued generation, 45.7%. However, France decided to auction GOs for supported generation starting from September 2019. This means that there will be a lot of new certificates potentially entering the market in 2019, although due to their special characteristics it doesn't mean that the market will be more liquid. They might make disclosure less effective as it will be discussed later.

In 2019, **Germany** will also start issuing a certificate for locally generated renewable electricity. However, these certificates should not be confused with a GO. In contrast to GO certificates, the local production certificates cannot be used for Scope 2 emission reporting, represent a kWh instead of a MWh and cannot be traded internationally but should be used within a 50 km radius of production.

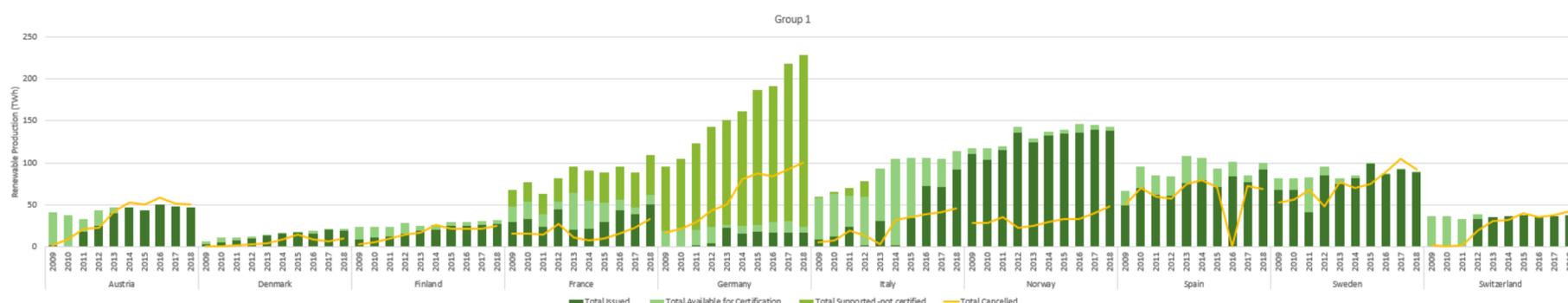


Figure 4. Group 1 Market Development 2009-2018, TWh [1], [6]

1. Spain joined the AIB in 2016, and its cancellation volumes for that year are not available.

The only attribute of the local production certificate is its location. It has no connection to the GO system that is still needed in Germany to prove the use of electricity that was generated with a renewable source.

## Group 2

Countries in Group 2 are part of EECS and have a renewable production of maximum 20 TWh. **Lithuania**, which newly became an EECS member in 2018, certified 18% of its generation. **Cyprus**, which has been an EECS member since 2014 but was inactive until 2018, is also a new addition to Group 2 and had 100% issuing rate for renewable power in 2018.

**Iceland** and **the Netherlands** were largest issuers in Group 2 and issued 33.7 TWh GOs, with certification rates of 98.1% and 82.6% respectively. In **Croatia**, the certification rate of renewable generation rose significantly from 19.5% in 2017 to 31.7% in 2018. On the other hand, issuing only represented 21.9% of the generation in **Ireland** in 2018, nevertheless an improvement from the 17.8% in 2017.

In this group, **Luxembourg** started to issue and auction GOs for supported generation in 2018 and thus its supported-not certified volumes disappeared while issuing amount doubled. **Croatia** and **Ireland** still have renewable issuing only represented 21.9% of support schemes that do not issue GOs for supported generation. Ireland's supported-not certified volume dropped 18% in 2018 after a rapid growth (7.6 TWh in 2016 to 11.6 in 2017 and



down to 7.4 TWh in 2018), while Croatia's volume increased from 2.3 to 2.5 TWh.

While EECS membership and a small production keeps the countries in this group together, there are extreme differences within the group regarding cancellation volumes. **The Netherlands** continues to surpass its previous cancellation records, showing that demand for renewable power is stronger than ever in the country. **Belgium's** cancellations, where volumes were in free fall between 2011 and 2015, have been keeping an upward trend since. **Iceland's** renewable consumption increased during 2018 but is still negligible compared to the country's issuing. On the other hand, **Luxembourg's** cancellation volume continued the decreasing trend but was still exceptionally large compared to the volume of its local issuing.

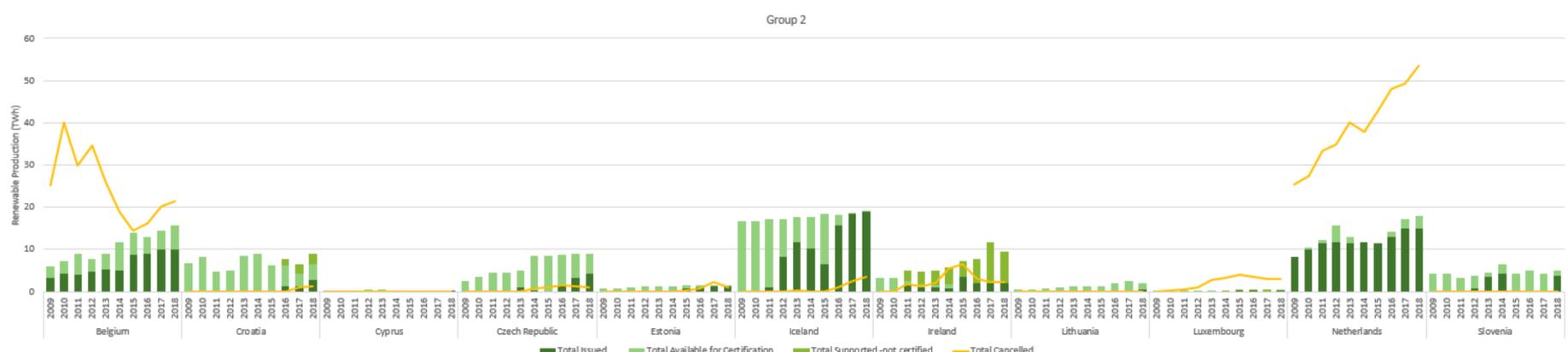


Figure 5. Group 2 Market Development 2009-2018, TWh [1], [6]

## Group 3

**Poland, Portugal, Romania** and the **UK** are non-EECS members with a renewable production over 20 TWh. Together, Group 3 countries generated more than 187.4 TWh of renewable power in 2018.

Attention should be paid to the **UK**, where renewable production has been growing fast and most of it was certified by national GOs (called Renewable Energy Guarantees of Origin, REGO [12]). In 2018, renewable generation grew by 11%, issuance by 8% and cancellations by a remarkable 17%. In previous reports, we expected that the UK, with large national GO issuing, would significantly influence the EECS GO market if it would join the EECS in the future. However, based on the recent observation of Brexit processes, joining EECS might not be among the top priorities for the UK at the moment. National REGO issuer, Ofgem, says that REGO administration and local disclosure will not be influenced by Brexit. However, leaving the EU without a deal will cause REGO to no longer be recognized by EU member states and will negatively impact the UK national GO market [12].

It is also worth noting that Poland's national GOs have had an incredible development last year. The Polish national GO issuing surged significantly from 2.55 TWh to 16.85 TWh in 2018, even though the renewable production



dropped by 4.16 TWh. According to the AIB, talks with responsible bodies in **Poland** about becoming an AIB member also continue.

**Portugal** which has a support scheme that prevents the production from getting a GO used to be part of EECS in the past, but after REN (the Issuing Body in Portugal) resigned in 2015 issuing and cancellations ceased. The new Portuguese competent body, DGEG, appointed a team to set up an issuing entity for GOs [8] and in the near future issuing should restart. Finally, **Romania** has legislation in place for electricity disclosure since the President Order (41/2004) of December 2004 and a national GO system since a law from 2010 linking GOs with disclosure [13]. However, there is no data showing that GOs were issued in Romania since then.

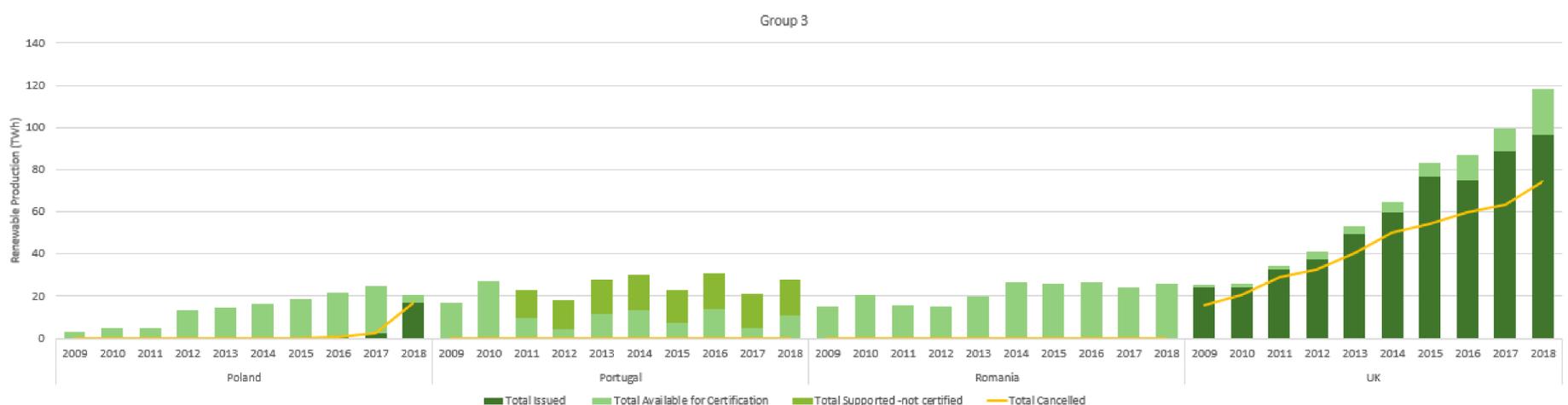


Figure 6. Group 3 Market Development 2009-2018, TWh [1], [6]

## Group 4

Group 4 contains the remaining countries in this study. They are characterised by lower levels of renewable generation (below 20 TWh on an annual basis) and in 2018 they were not part of EECS.

Although their renewable generation is small, there has been a lot of movement concerning EECS membership in these markets in the past years. **Greece** and **Serbia** will likely become members in 2019-2020 [14]. According to the AIB, **Hungary**, **Latvia** and **Slovakia** are also engaged in negotiations to join EECS. Together, they could bring about 12.4 TWh of certificates to the market based on the amounts of national GOs they issued in 2018.

**Bulgaria**, with about 8 TWh GOs in 2018, remained the largest GO issuer and canceller in this group, but there is no ongoing discussion about the country joining EECS. However, the lack of better data and disclosure information raises questions about the volume of GOs cancelled in that country. In general, these markets' electricity disclosure legislation is very recent or not yet in place.

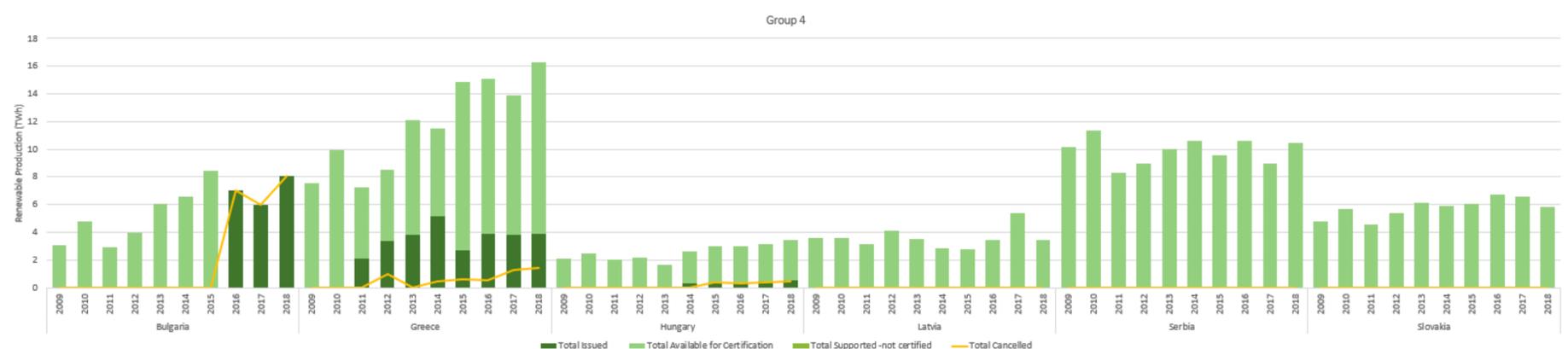


Figure 7. Group 4 Market Development 2009-2018, TWh [1], [6]

## Markets' preferences for Hydro, Solar, Wind and Biomass GOs

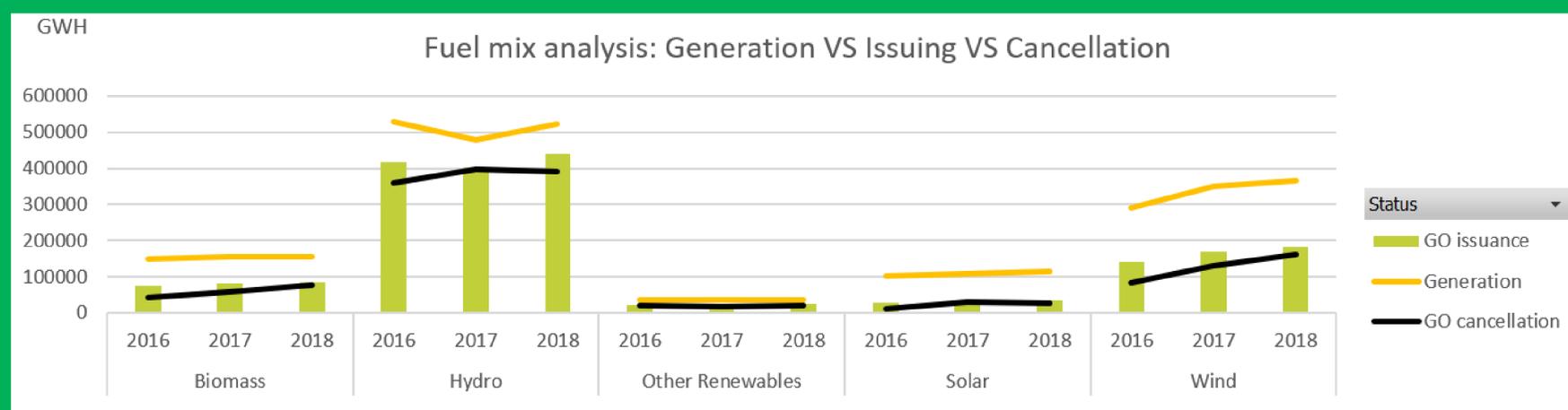


Figure 8. Fuel mix analysis 2016-2018, GWh [1], [6]

Hydro plants are responsible for most of the renewable GOs available today. In fact, hydro GOs represented 57.5% of the volumes issued in 2018. That is not only because hydro generation is a familiar and well established source in Europe and hydro generators were the early adopters of GO certificates, but also because hydro plants, usually relatively old installations compared to other sources, are less likely to receive financial support and consequently be denied a GO in some countries.

Norway supplies most of the hydro GOs in the market; in 2018 the country alone issued 30.6% of total hydro GOs. Sweden, France, Switzerland, Austria and, since 2018, Italy were also big contributors to the supply of hydro GOs. As for cancellations, Germany, Sweden and the Netherlands lead the demand side. In fact, hydro GOs cancellation volumes in Germany, Sweden and the Netherlands are on average 78 TWh, 9.2 TWh and 12 TWh respectively higher than their issued hydro GO amounts in the past three years, meaning that Germany, Sweden and the Netherlands imported large amounts of hydro GO from other EEC countries.

Although wind, solar and biomass generation still lags in volumes compared to hydro production, partly because much of it is supported and not entitled to a certificate, we can identify some interesting trends when analysing the market for each technology.

### Wind GOs

Wind generation and wind GO issuing and cancellation volumes have grown considerably in the past three years. And even though there is a large volume of uncertifiable wind generation, wind GOs accounted for 23% of the total GO issuing amount in 2018 (total volume of issued wind GOs was 180 TWh). UK, Spain, the Netherlands, Italy, Sweden and Denmark are the largest wind GO issuers and together supplied 86.1% of wind GOs in 2018. However, we can still see some production available for certification in Italy, the UK and Spain and this may be caused by the existence of some smaller plants, for which the operation cost or administrative burden is a big barrier to enter the GO market [37] or because smaller facilities are still not entitled to a GO.

The largest wind GO issuing countries are also the largest wind GO cancellers, apart from Italy. In 2018 wind cancellations reached 160 TWh. It is worth mentioning that among these countries, wind GO cancellation volumes in the Netherlands (33 TWh in 2018) largely surpassed the local issuing volume (10 TWh). This is expected given the exceptionally high Dutch demand for local wind GOs, known for its relatively high prices. But the local supply is not able to match the high demand and the country must import large volumes from abroad to meet the local demand. In 2017, for example, the Dutch national railway company, NS, signed a 10-year deal setting January 2018 as the date by which all NS trains should run on wind energy and claimed that all Dutch electric trains are now 100% powered by wind energy [38].

### Solar GOs

In 2018, 33 TWh of solar GOs were issued and 26 TWh were cancelled. The Netherlands also demonstrates an above average demand for solar GOs, but more surprising than that are the cancelled volumes in Norway and in Spain. Spain is the largest solar 'canceller' with 11 TWh in 2018 and cancellations have a steep growing trend in the Iberian country. As for Norway, while no solar GO has been issued in the country in the last 3 years, it cancelled over 4 TWh of solar GOs in 2018.

Italy and Spain are together the largest solar GO issuers with 65.1% of the market (9.5 TWh and 12.1 TWh of solar GOs issued in Spain and Italy, respectively), but they show very contrary behaviour in solar GO cancellation. While Spain's demand is remarkably high, Italy cancelled only 0.8 TWh (6.7% of its issuing) in 2018 and cancellations have been slightly decreasing in the country. This Italian "disinterest" towards local solar GOs (and wind GOs, as mentioned above) is not seen with hydro or biomass sources and can be partially explained by the fact that hydro GOs usually have lower prices [39] being the first choice of Italian consumers that do not require more strict attributes besides the generic "green" electricity.

Finally, it is worth noting that compared to other renewable GOs, solar generation has the lowest certification rate (only 28.9% of production was certified on average). The low rate is explained by national support schemes that forbid issuing GOs for supported energy, but also by the fact that high proportion of solar energy production comes from small production units. Since the administrative burden and operating costs are big barriers for rooftop solar panels or small solar production units, the renewable energy generated by small production units is not likely to be certified with GOs [37]. For example, even though Italy has on average 80% certification rate and is one of the largest solar issuers, the certification rate of solar GOs was only around 50%, because 40% Italian PV capacity refers to plants with size below 200KW [40].

### **Biomass GOs**

The demand for biomass GOs has grown much quicker than its supply in the past three years. In 2016, the volume of cancelled biomass GOs accounted for only 55% of issued biomass GOs and that rate surged to 70.6% in 2017 and to 90.1% in 2018. Controversies surrounding the environmental impact of biomass can partly explain the low demand of biomass GOs in the past. Classifying some types of biomass as "carbon neutral" has always been contentious and some observers even suggested that financial and regulatory support should not be given to woody feedstocks because they won't cut carbon emissions in the short term and also woody biomass contains more moisture than fossil fuels, burning wood for energy usually emits more greenhouse gases per unit of energy produced than fossil fuels [45]. However, government support schemes are not hampered by the debates: encouraging regulatory frameworks and government grants and incentive programs are continuously released and bolster adoption of biomass in Europe [43].

The UK was the largest biomass GO issuer (under their national system, 'REGO') and second largest biomass-fired electricity producer in Europe in 2018. As the emission costs rise, fuel switching from coal to biomass or natural gas is enabling power plants in the UK and elsewhere to stay open. Drax, the large biomass- and coal-fired power station in the UK, for example, generated more than 65% of its power from only biomass and converted a fourth unit from coal to biomass in 2018 [44]. Although the biomass energy production was increasing in the UK, the biomass GO issuing volume stayed stable, while UK's biomass REGO cancellation reduced largely from 2017 to 2018 and only accounted for 78% of the REGO issuing amount in 2018.

Among EECS members, Italy was the largest biomass GO issuer in 2018 followed by Sweden and Finland. Compared to the UK, we see an extremely different development in biomass generation, issuing and cancellation in Italy. In 2017-2018, biomass GO issuing volume stayed stable in Italy, while the cancellations tripled and accounted for 56% of the issuing amount in 2018. Italy had the largest biomass GO net export volume (accounting for 40% of its issuing in 2018), and Belgium, the Netherlands and Norway were main importers of biomass GOs.

### **Notes:**

- I. Graphs per technology and country are available in the Annex (Figures 15-24).
- II. The GO market is characterised by its heterogeneity mirroring the wide range of end-user preferences. This analysis reflects general findings for wind, solar and biomass GOs, and as such it should be kept in mind that the same results might not apply for a very specific GO product, for example quality labelled Italian solar GOs.
- III. Volumes per fuel were not available for national GOs of Bulgaria, Greece, Poland or Hungary.



## CHAPTER 2: MARKET TRENDS

This section performs a simple forecast exercise using the Compound Annual Growth Rate (CAGR) to illustrate a possible market scenario up to 2025. Besides that, the report briefly discusses recent developments and regulatory changes that are likely to affect markets in the next years.

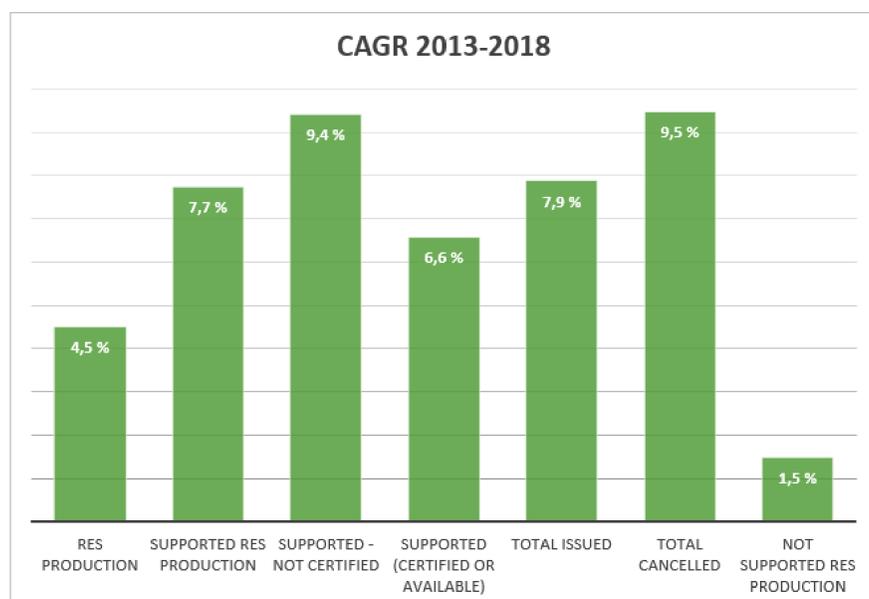


Figure 9. Compound Annual Growth Rate, % [1], [6]

CAGR is a useful method to measure growth over several periods of time allowing to take into account the compound effect between the years. For example, issuing volumes increased 10.1% between 2017 and 2018, while cancellations increased by 9.6% and supported - not certified by 7.6%. However, if we take the CAGR for period between 2013-2018, issuing increased 7.9%, cancellations by 9.5% and supported - not certified generation by 9.4%. Thus, in a longer

time interval the market is becoming short.

The time frame of when the market will become short has, however, changed from the previous reports. The 2018's report predicted that cancellations would overcome issuing around 2024. In this new report, cancellation volumes still grow at a higher pace than issuing and renewable production from a CAGR perspective, but the increase seen in issuing volumes between 2017-2018 has impacted the CAGR rate and consequently the forecasted volumes.

Available volumes would disappear by 2023 similar to what was predicted in the previous report. This of course presumes that the available volumes can easily enter the market, which may not always be the case for supported GOs. Also, these values are not considering the renewable production volume that is currently supported-not certified but are due to see their support end in couple of years.

Besides that, this projection does not take into account recent policy developments and the fact that the transposition of the Clean Energy Package's directives into national regulation will greatly impact the certificate market. These factors together are and will continue to transform the European energy panorama and

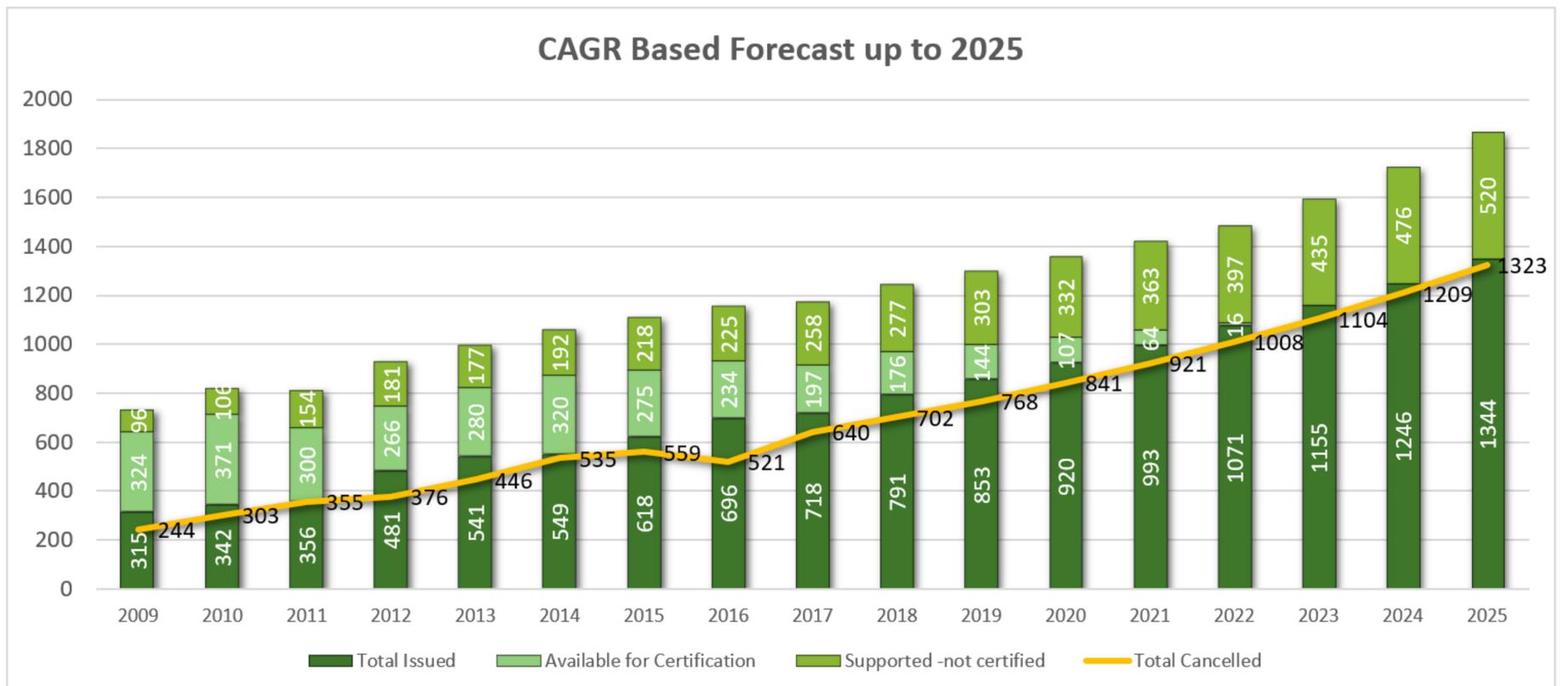


Figure 10. CAGR Based forecast up to 2025, TWh [1], [6]

consequently the future supply and demand for certified electricity is likely to change to a degree beyond the one forecasted in our simple CAGR projections.

**France, Sweden, Austria, Ireland, Italy, United Kingdom, Finland, Denmark, the Netherlands, Portugal and Spain** have already announced plans to decommission coal-fired generation, the earliest ones already in 2021 [15], [16]. **Spain**, which was reluctant to close its coal-fired power plants, published a new climate law in 2018 that aims to make Spain's electricity system 100% renewable by 2050 and will close the last of its nuclear reactors and coal power plants before 2030 [17]. After months of wrangling, **Germany's** "Special Commission on Growth, Structural Economic Change and Employment", better known as "the Coal Commission", also agreed on an exit timetable for its coal-fired fleet that would culminate in phasing out the fuel by 2038 [18]. We should expect that the coal fleet retirement will be replaced with renewables and gas-fired generation.

As the new Clean Energy Package is translated into national law, MSs will be setting up their 2030 targets for renewable electricity

consumption. Austria, Sweden, Denmark, Germany and Spain already vowed to reach 80% to 100% of renewable electricity consumption in the next decades [19], [20], [21], [17]. MSs must transpose the RED II provisions into their national legislation by 30 June 2021.

When it comes to renewable support, Feed-in Tariffs (FiT) and Feed-in Premiums (FiP) continue to be the main systems used in Europe to incentivise investments in renewable power, but a switch to auction-based systems has led to a decrease in the premiums paid. In 2018, we saw an introduction of technology neutral schemes in **Denmark** [22] and creation of a new support scheme, SDE++ in **the Netherlands**, in which producers will no longer compete for compensation on the basis of amounts of renewable energy produced, but rather on the amounts of carbon dioxide (CO<sub>2</sub>) and other greenhouse gases that have been avoided starting from 2020. With RED II, we should see competitive, non-discriminatory and cost-effective support systems becoming the standard across Europe. Finally, the fact that certain renewable projects are ready to become "subsidy-free" indicates that renewable plants are ready to face the market on their own and the era of unsupported renewables might start

sooner than later.



Figure 11. CEER's Overview of implementation status of RES tendering procedures in Member States [23]

Due to the restriction of national support schemes, **Germany** and **France** have the largest volumes of supported renewable production not entitled to a GO. However, France's decision to auction GOs starting from September 2019 [24], will certainly affect the market. **Luxembourg** also decided in 2018 to start auctioning GOs for supported production devices and has since then organized 3 auction rounds for supported wind production [25], [26]. GME<sup>2</sup> also holds GO auctions in Italy.

These changes go in accordance with the new Package's position regarding renewable support and GO issuance that says that "*Member States shall ensure that when a producer receives financial support from a support scheme for the production of energy from renewable sources, the market value of the guarantee of origin for the same production is appropriately taken into account in the relevant support scheme.*" [27].

Although auctioning of GOs is not mandatory (such an idea was even removed from the final REDII text), other MSs might follow the example of **France** and **Luxembourg** and set up auctions systems of their own or something of the like. The method other MSs will choose to comply with the new Article 19 of RED II is still unknown but now more than ever it is important to

understand how the GO market is dependent on supported generation.

### Focus: supported vs not supported RES production and market impact

As was done in previous reports, Figure 12 looks at volume of renewable generation that is *Supported* and *Not Supported*. Supported production refers to renewable generation that receives some kind of government aid, usually by means of FiT, FiP or green certificates and it can either be certified or not.

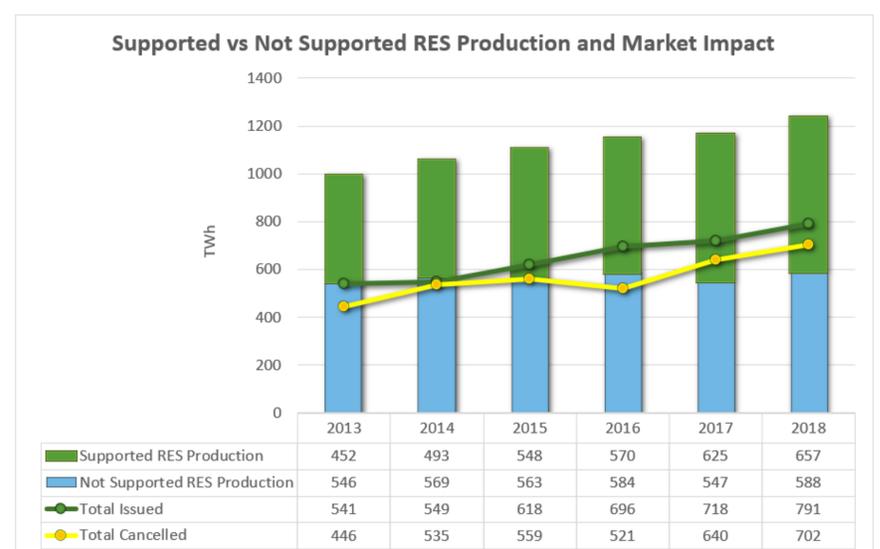


Figure 12. Supported vs Not Supported RES Production and Market Impact 2013-2018, TWh [6], [28]

Not Supported production has remained rather stable through the years. Supported generation, on the other hand, as expected, has been increasing since 2013. In 2018, it reached 657 TWh, 5% higher than 2017. The figure also shows that issued volumes are well above Not Supported RES production values and have been like this since 2015. The gap comes from production that is supported, certified and issued. Cancellation levels have been, since 2015, as high as supported generation, if not above it.

Besides that, the split between the supported production that is not certifiable versus the remaining supported production (available or certified) has been very stable through the years, 40%/60% respectively. In 2018, five countries didn't allow GOs for supported generation: Croatia, France, Germany, Ireland and Portugal. From these, France and Germany

2. As part of the process of liberalisation of the electricity sector, GME-Gestore dei Mercati Energetici S.p.A (manager of the electricity market) operates power, gas and environmental markets.

hold about 90% of supported not certified volumes.

We can expect a set of different possible outcomes in the GO market as the RED II text gets translated into national legislation and countries need to account for the GOs' prices in their support systems:

In countries where the supported generation is not entitled to a GO, RED II implementation could mean that either these countries continue with the existing state of affairs and do not issue GOs for supported generation, or that they follow the example of Luxembourg and France and decide to set up a system to auction certificates for the supported generation. The latter case means that a lot of new GOs could be entering the market in the next few years. Auctions in **Luxembourg** doubled the volumes of the country's EECS-GOs in 2018 to about 0.3 TWh, a small volume for the size of the EECS market, but a volume that is now available to buyers in other EECS domains, nonetheless. **France** held 46.5 TWh of supported generation that did not receive a GO in 2018. If this volume enters the market via auctions once Powernext starts the system in September 2019 (see focus box below), that is a potential 6% increase in issuing volumes. If **Ireland** and **Croatia** follow suit, that is another 10 TWh of renewable generation that could be certified<sup>3</sup>.

It is also worth highlighting that auctions might have a floor price, as is the case in **Luxembourg** and **France**. According to a RECS International article, the French auction floor price could be higher than 0.05 €/MWh [29], which is above the average low hydro GO prices seen in past, but below the high GO prices we experienced at the end of 2018 [30], [31].

Regarding the markets that currently already issue GOs for their supported generation, again two outcomes are possible. A less desirable

scenario would be if these markets decide to stop issuing GOs for supported generation if, for example, they find it too burdensome to start considering the value of GOs into the existing support systems. This would mean a sharp drop in EECS-GO volumes. Another possible scenario is that these countries continue to issue certificates for supported generation and set up an appropriate system to account for the market value of the GOs.



3. If Portugal would resume issuing of GOs and would also decide to issue GOs for its supported production, another 16 TWh could be entering the market.

In 2018, markets that currently already issue GOs for their supported generation produced together 860 TWh of renewable power of which about 380 TWh received some kind of support (through FiT, FiP or green certificates). These countries issued 523TWh of EECS- GOs in 2018, part of it, and we can't know exactly how much, received support<sup>4</sup>.

It is too soon to speculate how and if other MSs will choose to take account of the GO value into their support systems. But, regardless of the type of arrangements chosen, the systems built should be well planned, robust and efficient to ensure certain levels of market liquidity and

that the connection between buyers and generators is maintained, otherwise they might create an unwelcome barrier to the commercialization of green electricity products hampering consumers' choice. In the case of **Luxembourg**, which pioneered the auctioning of GOs, it is reassuring to see that their system is somewhat connected to their EECS registry promising the synchronization of auctions and GO management in an efficient way. Also, we should hope that practices across MSs follow a similar set of principles and rules to ensure the reliable operation of international certificate schemes and best options to European consumers.

### France's GO auction system for supported generation

Powernext, the registry operator for French GOs and appointed Issuing Body, has developed a system to auction GOs for generation currently benefiting from FiT and FiP. It plans to launch the new platform in September 2019.

These auctions are intended to be held every month and refer to the preceding seventh- and sixth-month's production, e.g. September's auction will refer to April and May generation. The quantity of GOs to be auctioned as well as a price floor will be determined by the Direction Générale de l'Énergie et du Climat (DGEC) of the Ministry for an Ecological and Solidary Transition [35]. Bids will be taken in advance and buyers can indicate a preference for a specific technology (at the moment four categories are present - solar, thermal, hydro and onshore wind - but consultation is currently ongoing); for a particular geographical region or even for one or multiple specific production devices [36].

The GOs sold to market players on this auction will have a label/earmark saying the MWh was produced by a production device benefitting from a FiT. Within 2-business days after the auction, GOs will be transferred from the DGEC's account to the buyers' accounts [36].

According to Powernext, anyone can participate in the auctions provided that they have a membership in the Powernext's auction registry; they comply with auctions rules; they have agreed a clearing agreement with their Clearing House; they have responded to the KYC form and they paid a 2,000€ annual participant fee (on top of the current registry annual fee) and the necessary transaction fees [36], [41].

Powernext is currently working on updating its EECS-GO registry to give space for the auction mechanism, to make it easier to validate metering data and to simplify transactions and cancellations requests [36]. The issued GOs will be EECS-GOs and as such can be transferred to other EECS domains.

Regarding disclosure, French suppliers need to indicate the share of renewable energy that has been disclosed through GOs which are coming from plants receiving support and that have been bought through the auction system [41].

The final details of the auction mechanism are still being agreed among Powernext, the government and market stakeholders.

4. EECS-GOs are earmarked to record whether the generating plant received support or not and what type of support it received. Statistics per earmark type are not available.



## CHAPTER 3. RENEWABLE GENERATION VS CONSUMPTION AND 2020 RES-E TARGETS

The 2009 Renewable Energy Directive (2009/28/EC) set targets for the production of renewables for the Member States in 2020, and in previous chapters we briefly discussed that these targets have not been reached by all Member States. In this chapter, we compare renewable generation and consumption in selected countries and discuss how each country is performing to achieve its 2020 targets from a production perspective and from a certified consumption point of view. This section also aims to raise awareness of the importance of dual reporting, which means that both production and consumption of renewables are being used in analysing renewable markets.

Reports on trends in renewables tend to focus on production. The 2009 Renewable Directive (2009/28/EC) seems an exception, but under closer examination Article 5.3 states that “(...) gross final consumption of electricity from renewable energy sources shall be calculated as the quantity of electricity *produced* in a MS from renewable energy sources (...)”. As such, the 2020 RES-E targets are technically also production targets. The consumption of renewables, based on GO trends, is often left out of these reports and guidelines.



Figure 13 below compares production and consumption. On the left bar renewable production is broken down into the same 3 categories we used in chapter 1: volume issued, volume available for certification and volumes that are not entitled to a GO; the remaining in grey bar represents fossil and nuclear generation according to ENTSO-E’s figures. On the right bar, the graph shows consumption volumes also according to ENTSO-E data but it distinguishes between the consumption that is certified (cancelled) and the remaining that is uncertified. The certified consumption volumes take into account only renewable sources, but it is important to remember that many domains issue GOs also for fossil and nuclear production. It is easy to see that renewable generation levels are much higher than renewable consumption by means of certificates.



Figure 13. Renewable Production vs Consumption by means of certificates 2009 -2018, [1], [6]

## Case studies

The differences are even more apparent if we look at some specific countries.

We selected countries from different groups that have different renewable production levels and consumption patterns: **Austria** has implemented “full disclosure”, i.e. local suppliers are obliged to cancel GOs for the entire volume of their electricity sales, regardless of technology; **Germany**, as discussed, has a large share of supported-not certified production and also high shares of GO cancellations compared to national issuing; **Norway** is the largest issuer of EECS-GOs in volume; **The Netherlands** and **Belgium**, from Country Group 2, demand a lot of GOs from abroad and have distinct consumption trends - Belgium’s renewable consumption was decreasing rapidly before 2015 and started to grow steadily after that, while Dutch demand for renewable power grows continuously; the **United Kingdom**, from Group 3, has a growing renewable generation certified with local REGOs. In this report, **Spain** and **Luxembourg** are newly added in case studies. **Spain**, from country Group 1, has a large amount of

renewable production and switched from National GOs to EECS GOs in 2016. **Luxembourg**, from Group 2, despite having the lowest share of renewable sources among EU countries, has considerable amount of RES consumption which was 46.9% of its total consumption in 2018. As mentioned in previous chapters, Luxembourg started to issue and auction GOs for supported renewable energy in 2018.

Figure 14 compares renewable generation divided into the usual categories (issued, available for certificate and when applicable supported – not certified) with consumption values (yellow background) and with the 2020 renewable electricity consumption targets as reported in the National Action Plans [33]. Consumption is divided into 2 categories as well: renewable consumption by means of GO cancellations or by means of tracking via support (Germany’s case) and other consumption. It is important to remember that RES attributes may also reside on the grey area (through uncertified production, i.e. residual mix), but they are not explicitly tracked as renewable consumption and only implicitly allocated to consumers.

We can see that if we consider only the generation side, only the **UK** and **Germany** have already reached their 2020 RES-E targets, both in 2017. **Germany** had 42.4% of renewable production in national electricity consumption compared with a 38.7% RES-E target and the **UK** had 37.1% of renewable generation in its total consumption compared with a 31% target. The other 6 markets are still falling behind, and **the Netherlands** is the furthest away from its 37% RES-E goal with only 15.4% of renewable generation in 2018. **Spain** reached its 40% RES-E target in 2013 and 2014 but could not keep up the generation volume and fell short after 2015 not recuperating ever since.

Even though **Norway's** renewable GO issuing exceeded the local consumption, it still has not reached its ambitious 114% RES-E target. Due to unfavorable weather conditions in 2018, Norway, known for large hydro production, had a reduction in the supply of hydro GOs, which enlarged the gap between the country's 2020 RES-E target and the renewable generation.

On the other hand, if we take into consideration electricity consumption that is explicitly tracked by GOs or disclosed via support – **Germany's** case – and the flow of attributes between countries, the overall picture changes drastically. In this case, **Luxembourg** has reached its RES-E target in 2012 and its certified RES consumption peaked in 2015. Despite the small local renewable capacity, Luxembourg's local market consumed large amount of renewable energy imported from abroad and today local RES consumption still significantly surpasses the renewable target by 35.1%. Both **Austria** and **Germany** already surpassed their 2020 targets in 2014. Austria's renewable consumption dropped in 2017 and stayed around its 2020 RES target level in 2018, while Germany's renewable consumption kept the increasing trend and reached 56.6% of its total consumption. We also see that Germany almost reached the 2020

targets (38.6%) in 2018 with renewable consumption tracked via support values alone, which were responsible for 37.9% of the renewable consumption. Should Austria and Germany aim at reaching their 2030 targets (100% and 80%, respectively), cancellations should continue to grow.

The **Dutch**, who were furthest away from their RES-E target from a generation perspective, achieved their target already in 2015 with GO cancellations and its renewable consumption continued the upward trend in 2018. **Belgium's** high cancellation volumes have enabled the country to stay above the country's 20.9% target since 2009 with a small setback in 2015 and surpassed its target again in 2017. Even though the renewable consumption in Belgium continued increasing in 2018, the percentage was only half of the peak seen in 2010.

The **UK**, that had achieved its targets when we looked at renewable production in national electricity consumption, is still short of its goal if we observe the certified consumption. Given the high volumes of REGOs issued, the UK could easily reach the 2020 targets in this case as well, but REGO cancellation volume increase is not as rapid as that for issuance and accounted for only 24.5% of the country's consumption in 2018. Despite an increase in GO issuing volume, **Spain's** GO cancellation volume decreased to 25.4% of its consumption in 2018 and the reduction pushed Spain further away from its 2020 RES-E target (40%).

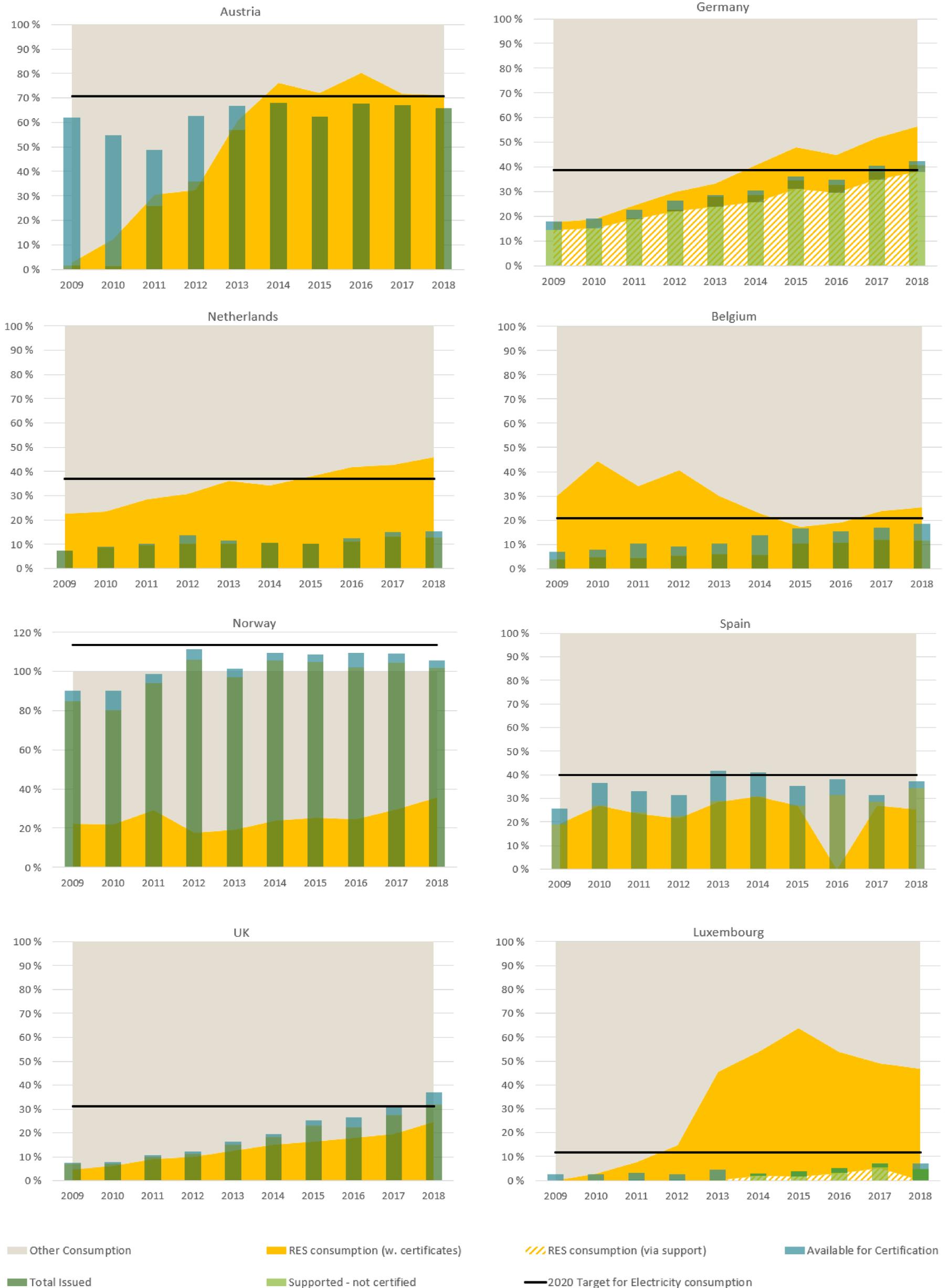


Figure 14. Renewable Production vs Consumption by means of certificates 2009 -2018, [1], [6]

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# ANNEX

Total issued GOs by fuel mix in 2018

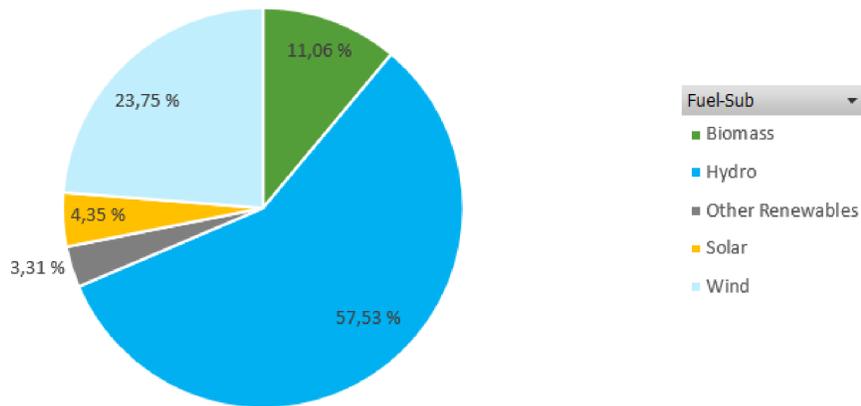


Figure 15. 2018 Total issued GOs by fuel mixes

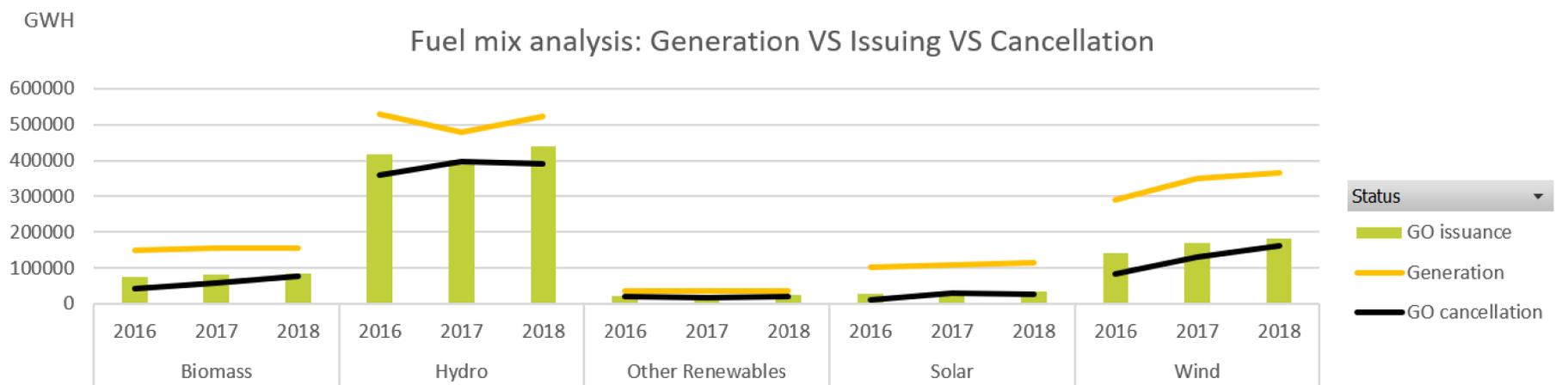


Figure 16. Fuel mix analysis: Generation VS Issuing VS Cancellation 2016-2018, GWh

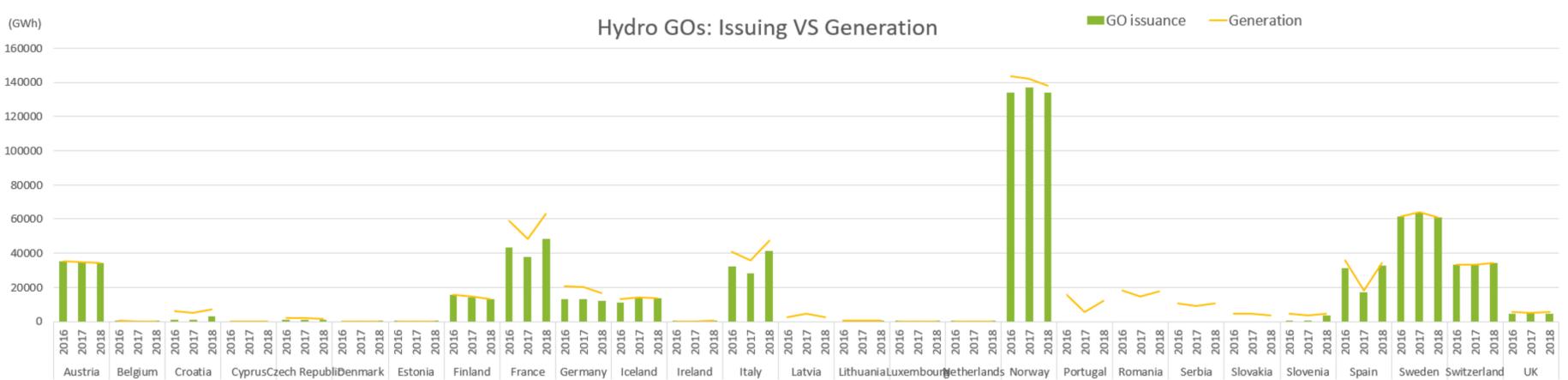


Figure 17. Hydro GOs: Issuing VS Generation

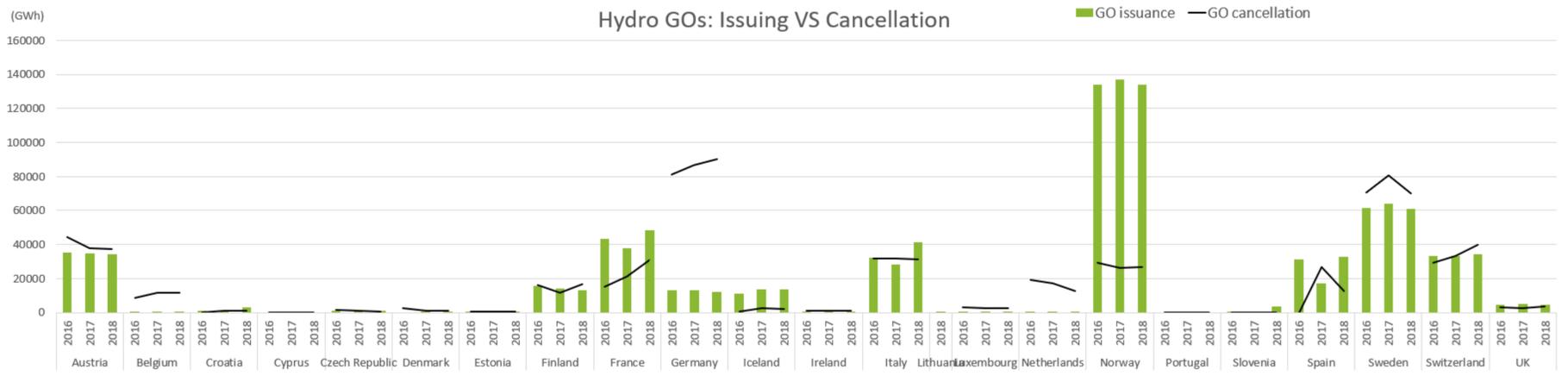


Figure 18. Hydro GO: Issuing VS Cancellation

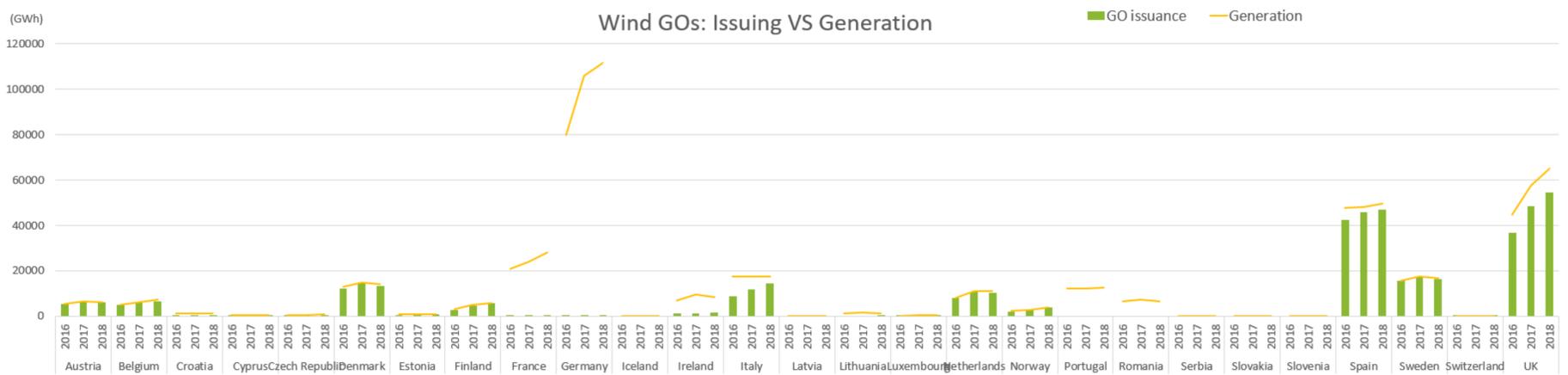


Figure 19. Wind GOs: Issuing VS Generation

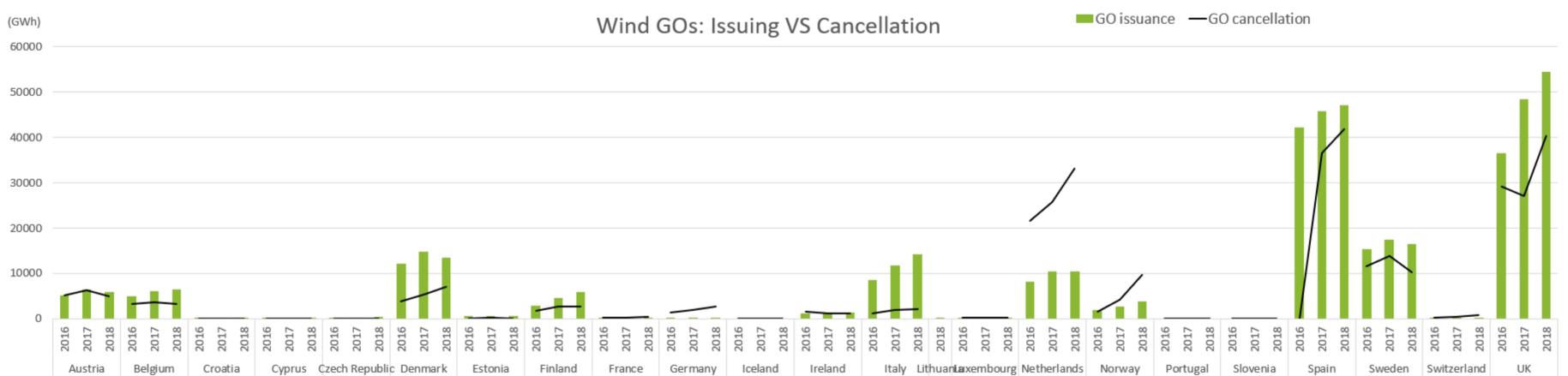


Figure 20. Wind GOs: Issuing VS Cancellation

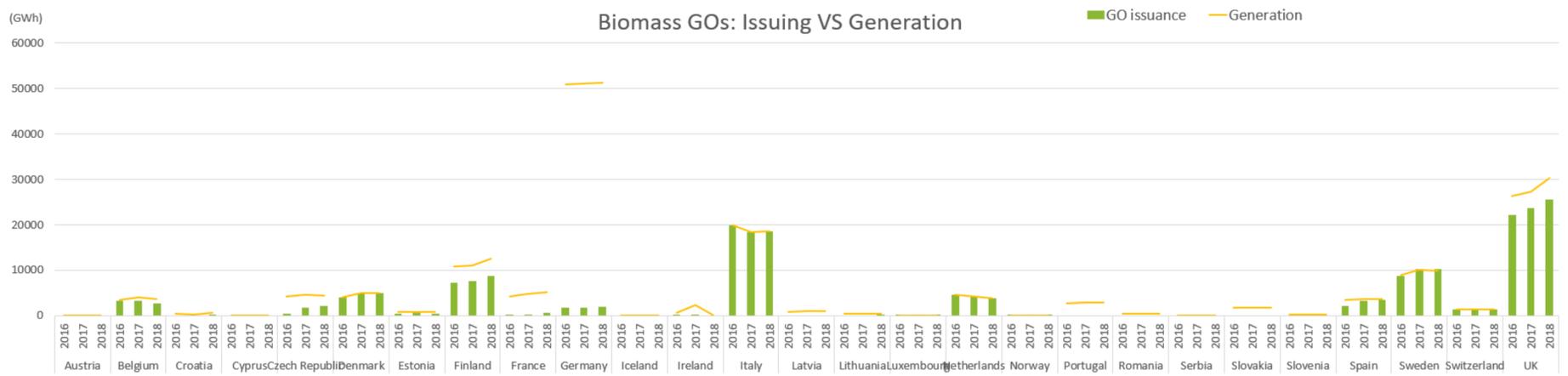


Figure 21. Biomass GOs: Issuing VS Generation

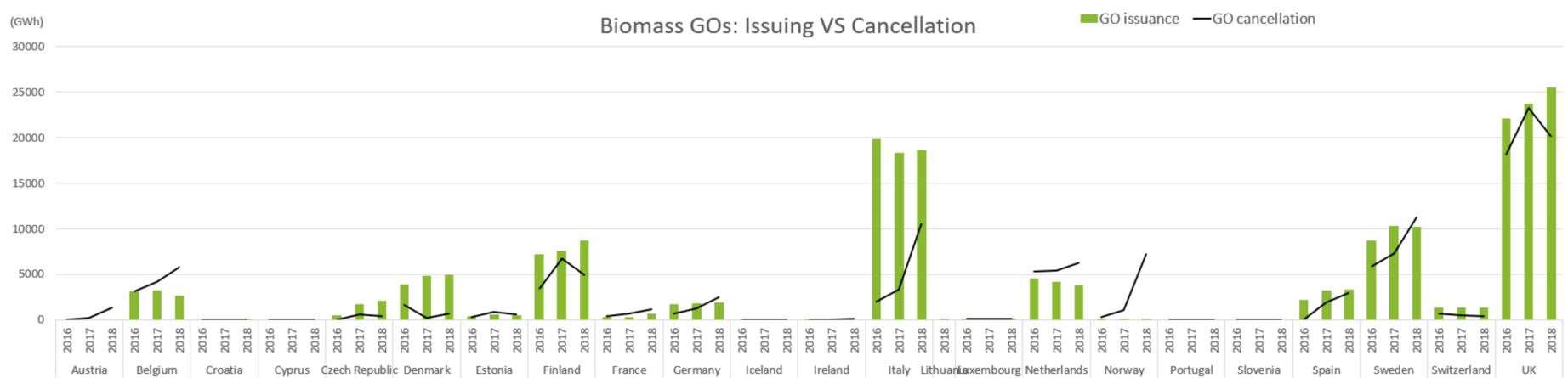


Figure 22. Biomass GOs: Issuing VS Cancellation

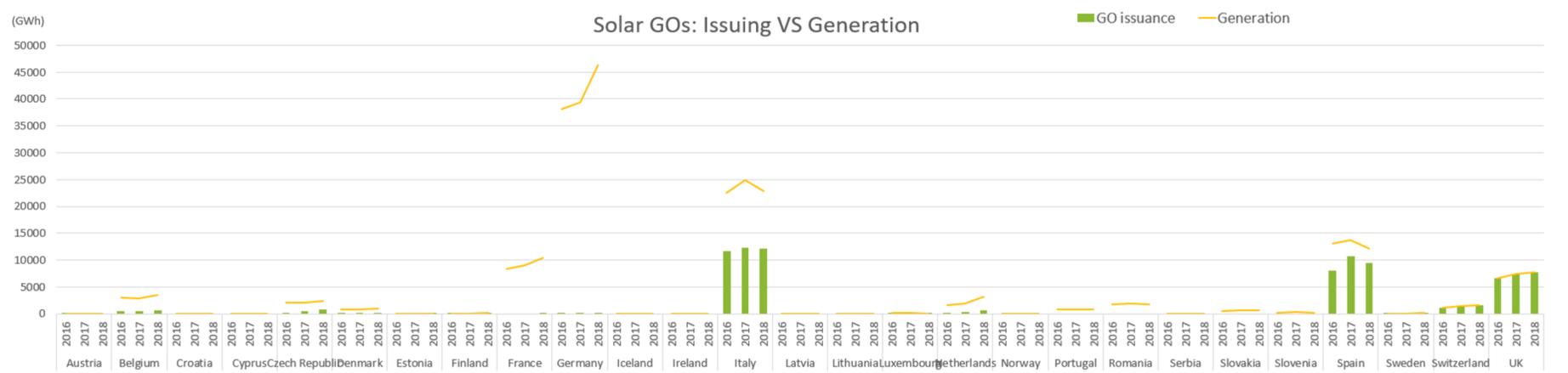


Figure 23. Solar GOs: Issuing VS Generation

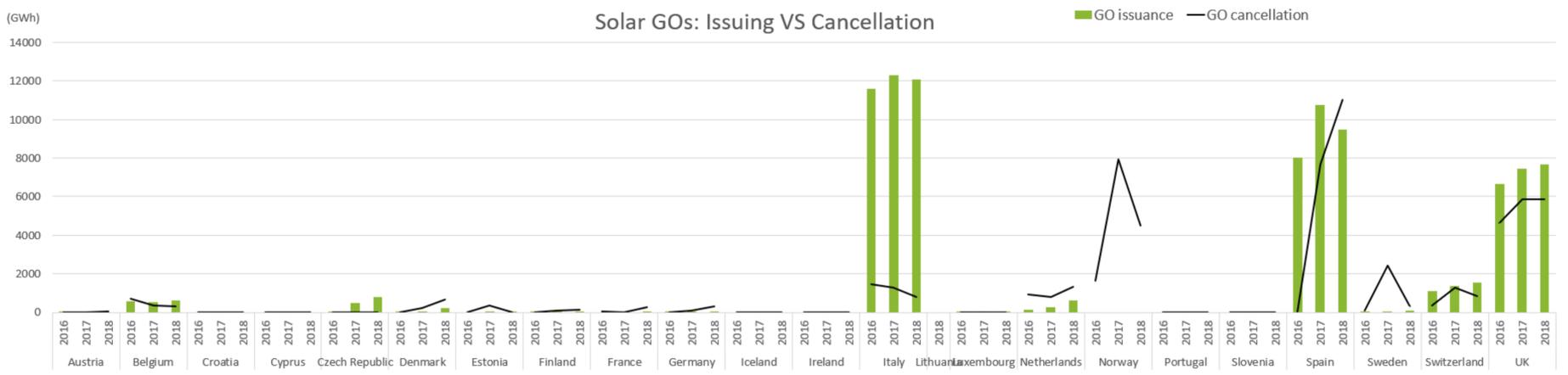


Figure 24. Solar GOs: Issuing VS Cancellation

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## ABOUT

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### **Design and communication**

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### **About VaasaETT**

VaasaETT is a research and advisory consultancy dedicated to customer behaviour and competitive market dynamics in the energy industry. Founded in 2007, we advise our clients based on in-depth market monitoring and extensive research in the fields of consumer choice, engagement, satisfaction, innovativeness, image and brand, price elasticity, demand response and smart grids in liberalised and close-to-liberalization markets. Our in-depth knowledge and understanding of consumer related issues is built on accumulated 20 years of experience with energy consumer behaviour and psychology. Our research is heavily used by utilities, vendors, national regulators and renowned international institutions such as the European Commission and IEA. In addition, VaasaETT is a joint-founder of the Smart Energy Demand Coalition, a non-profit membership-controlled organization of approximately 60 of the world's leading players in this field. The SEDC is headquartered in Brussels and works with both the EU institutions as well as industry representatives to promote and enhance demand respond across the EU.

### **About RECS International**

RECS International is a non-profit organization striving for an open pan-European renewable energy market, facilitated by commonly accepted and harmonized tracking systems. RECS International represent the market players, from generators, traders, wholesalers, suppliers and consumers, in a constant dialogue with national legislative bodies and European policy makers to further develop a standardized pan-European electricity tracking system. RECS International has worked since 2001 to improve and simplify the system of tracked electricity, the certificates used in that system and the claims consumers can make after their certificate purchases.

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