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ANNUAL REPORT 2015

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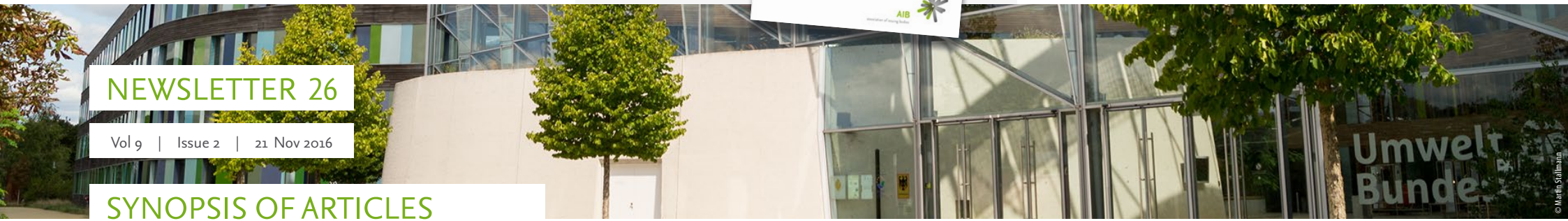

NEWSLETTER 26

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SYNOPSIS OF ARTICLES

Residual Mix/European Attribute Mix

The AIB has agreed to take over the responsibility of the Residual Mix calculation for the years 2015 and 2016. The Residual Mix simply means the corrected generation mix of a country after explicit tracking of electricity (mostly with Guarantees of Origin (GOs)) has been taken into account.

Open Markets Committee

The Open Markets Committee (OMC) is the annual meeting between the AIB and the guarantee of origin (GO) market parties, and their representative association, RECS International. Lars Olav Fosse (AIB) and Tom Lindberg (ECOHZ) talk about the topics like status of the GO market, the next RES Directive, boundaries of EECS, and the relationship between all stakeholders.

Scope 2 Accounting in Practice

This article introduces the key changes to the reporting structure for Scope 2 emissions of the new Guidance (GHG Protocol). These changes aim to heighten transparency in corporate energy procurement practices and to enable proper recognition for companies that make better energy choices.

Germany: GOs, Renewables and UBA

The UBA hosted AIB's third General Meeting of 2016 and all members got together in a fascinating, energy-efficient and beautiful building in Dessau. Read more about the German electricity production, particularities of the GO system in Germany and the latest news about regional GOs.

AIB Internals – Workgroup news

Jennifer Holgate and Laura Plunkett introduce themselves as the new co-chair of WGS and chair of WGIA and report about achievements of both Working Groups.

Event on 1 Nov. in London

At the Energy Strategy seminar organized by EY, RE100 and RECS International, Dirk van Evercooren presented AIB's standardization work and in this article he shares his view on this successful event.

CEPS and EUSEW events

Read the recap of both events which took place in Brussels in May/June this year. Interesting to see in which way attendees supported AIB's views, from moderately to very passionately.

Statistics

The latest activity statistics, showing continued growth in the market and the effect of the introduction of new members. Again with the new method: the statistics will show a monthly summary by technology group per country.

Follow

Residual Mix Calculation 2015

Imagine a buffet with all sorts of delicacies. There's Norwegian salmon, German sausage and Belgian sprouts. You've made your reservation early and when the day finally arrives you're licking your lips impatiently. Now picture that people who haven't paid for the buffet come and fill their stomachs and all you're left with is leftovers. No way José! Residual mix is basically the same idea: we protect the rights of those buying certified renewable power by not letting the energy attributes bought by them be disclosed to (or "eaten by") those buying "regular" power.

As most of the readers are likely to be aware, the AIB has agreed to take over the responsibility for calculating the Residual Mix for the years 2015 and 2016 from the EU Intelligent Energy Europe funded RE-DISS project. In May 2016, the AIB put words into action as it published the European Residual Mixes and the European Attribute Mix. The calculations were performed by Grexel Systems Ltd.

The Residual Mix simply means the corrected generation mix of a country after explicit tracking of electricity (mostly with Guarantees of Origin (GOs)) has been taken into account (Figure 1). As the trading of GOs and electricity is international, also the calculation needs to be coordinated at a European level, which is achieved through a common attribute pool, the European Attribute Mix (EAM). For more information on the Residual Mix and the European Attribute Mix calculation, please see AIB Press Releases on the subject as well as RE-DISS publications.

Only 4 % of renewable attributes (mostly wind and hydro) resided in the EAM of 2015. Fossil fuels dominated with a share of 61 %. This means that the origin of energy replaced net exported GOs, in a given country, is rather "dirty". CO_2 content of the EAM was 548 g/kWh (only direct emissions). The renewable content of the EAM has been on a steady course of decline since 2012 as a result of increased electricity tracking and further internationalisation of markets.

At an individual country level, Germany, France, the Netherlands, Czech Republic and Sweden were the largest surplus countries, therefore giving excess attributes to the EAM. Surplus is caused by the net effect of net imported GOs and net exported electricity, which >>

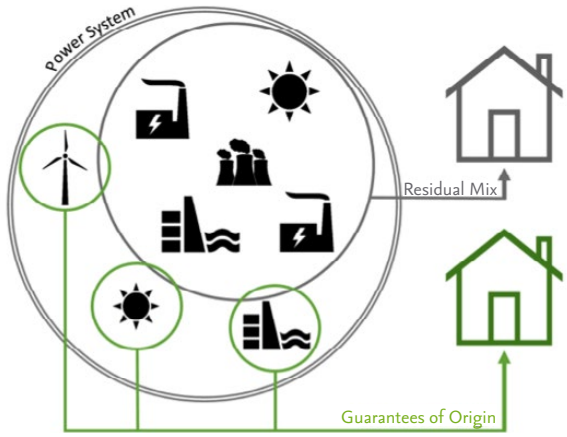


Figure 1: Idea of Residual Mix Calculation

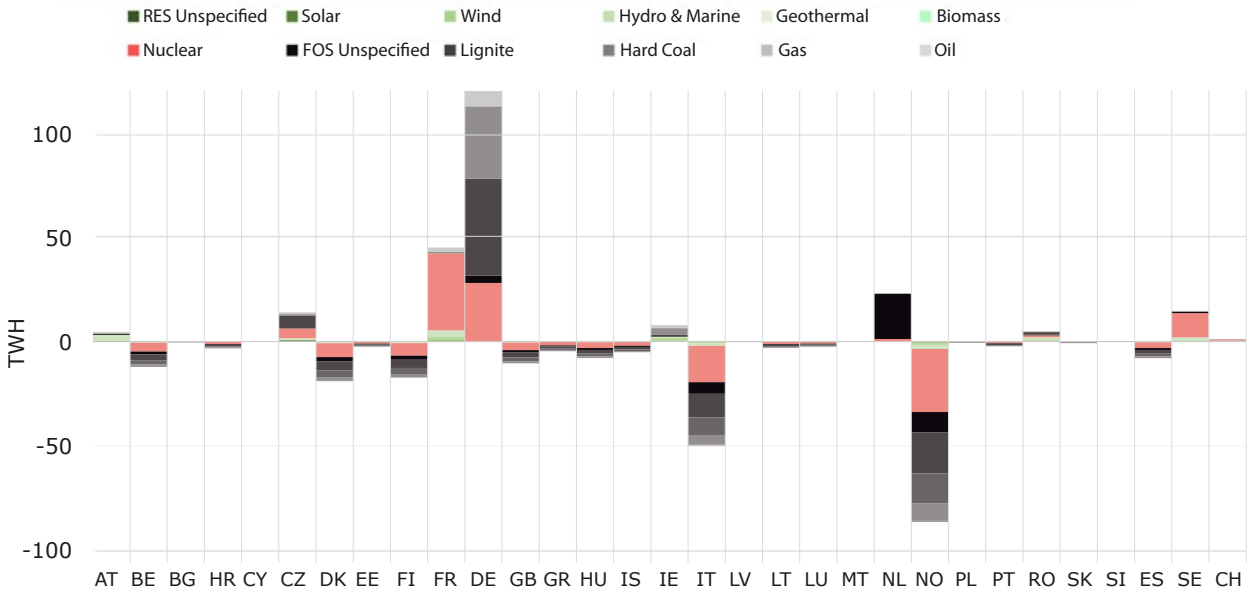


Figure 2: Interaction of countries with the European Attribute Mix (in TWh)

>> explains why the Czech Republic (a country with a very small volume of GO trading) has a considerable attribute surplus. The same reason applies for France. The largest deficit countries on the other hand were Norway, Italy, Denmark, Finland and Belgium. Again, the deficit is caused by the net effect of net exported GOs and net imported electricity. For example, Belgium, a country with a clear net import of GOs, is a deficit country due to an even greater net import of electricity.

Figure 3 portrays a comparison between the production and residual mixes of selected countries, which clearly demonstrates the need of using the residual mix instead of the production mix for disclosure of so-called untracked electricity. Differences are most notable in all Nordic countries as well as Belgium, Germany, Great Britain, Luxembourg, the Netherlands, Spain and Switzerland. Some countries included in the calculation are not incorporated in this graph due to the very small difference between the production and residual mix. For more results, including more detailed energy source division, please refer to the results document published by the AIB:

On an overall level, as a result of increased tracking of renewables, the share of renewables in the residual mixes should decline. Figure 4 shows total attributes in the aggregate production mixes and residual mixes of all European countries (EEA+Switzerland). The increase of renewables in the production mix has been impressive (7.5 % yearly), whereas the share of renewables in the residual mixes has remained more or less constant. This means that the yearly increase in tracking has been very close to the growth in renewables produced.

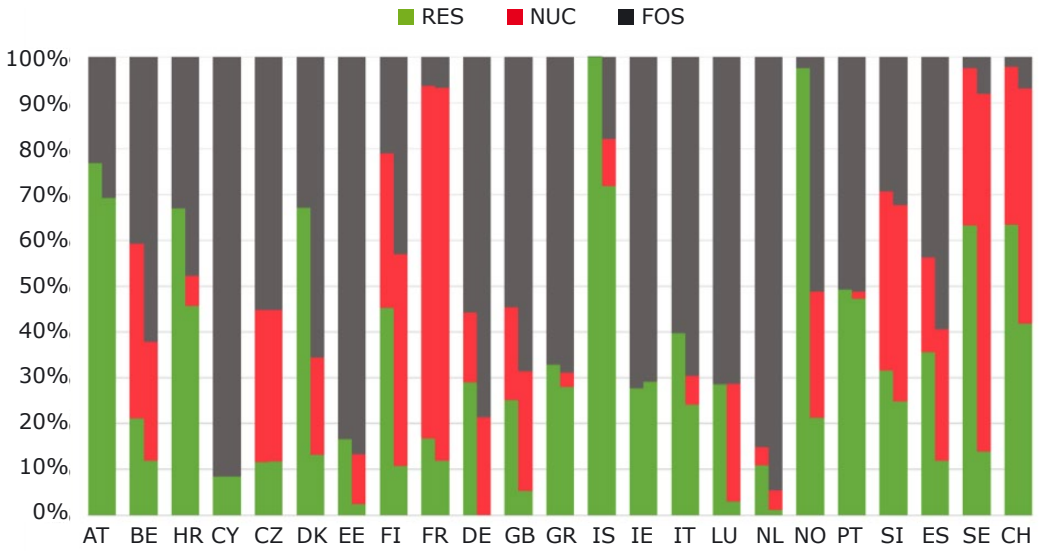


Figure 3: Production Mixes (left) vs. Residual Mixes (right) of selected countries

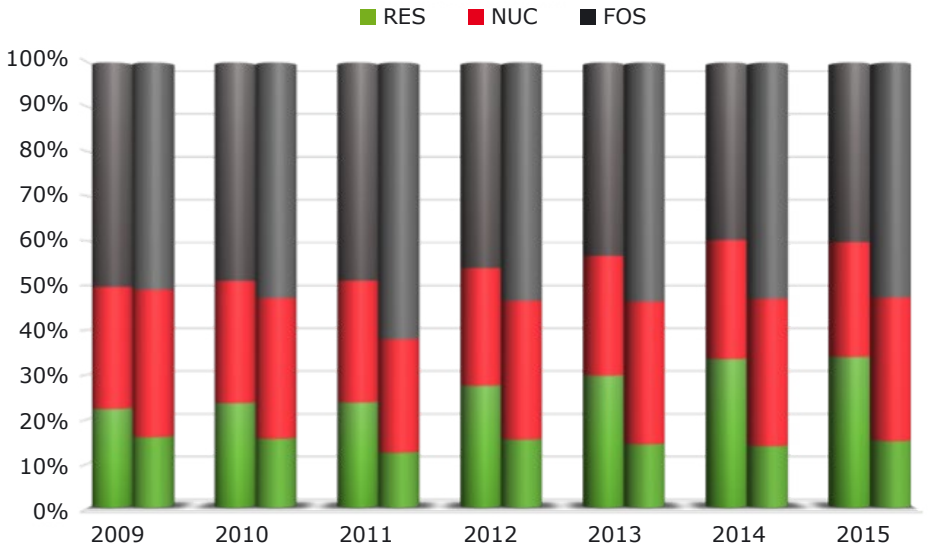


Figure 4: European Production Mix (left) vs. total attributes (right) in all Residual Mixes

Revitalizing the Open Markets Committee

The Open Markets Committee (OMC) is the annual meeting between the AIB and the guarantee of origin (GO) market parties, and their representative association, RECS International. This year's agenda is full of interesting topics. In Baden we are really revitalizing this important meeting point.

By Lars Olav Fosse, Statnett and the AIB Board

I have always regarded it as essential that the AIB registries talk to and have a good understanding of the market participants. Although we have different roles, we share the same vision, as Tom Lindberg so precisely pointed out when we met at the ECOHZ offices to talk about some of the issues on the agenda for the meeting of the OMC to be held on 1 December this year.

First of all, thank you for taking the time for an interview for our next Newsletter, Tom. The subject for today is the forthcoming OMC meeting between AIB and the market parties. Before we go to some of the topics on the agenda, what is your view on the status of the GO market?

I'm normally quite positive and optimistic. I think I have always been, especially on the long term developments. Although there have been periods in recent years where I've been less optimistic, at least in the short term, I'm currently optimistic in both the short and the long term. The major difference now is that the volumes are larger and the market is more robust, so you do not see sudden changes in prices. There is a better demand and supply balance, and the entrance or exit of one or two countries doesn't have the same impact on the market as it did before. The market has reached a first level of maturity. Prices have been more stable and at a higher level, and that adds credibility to the market. Going forward, I expect to see a rising trend in prices. Spain could have been a wild card if it had come full-blown into the market, but restrictions on trade have limited the impact.

That brings me over to one of the topics of the OMC, different national implementations. I know that concerns you, and Spain is the most recent example. How do you achieve more standardisation and less differentiation between the national GO systems?

On the product side, we need diversity. People must be able to choose different products. The problem is that there is no level playing field due to national differences. However, the losers with a conservative national implementation are, in the case of Spain, the Spanish themselves. You are building a wall against the market, and that is unfortunate, I think.

Will the next RES Directive, also on the OMC agenda, address this issue?

Well, some of these limitations might even be in breach of the Lisbon treaty and the four freedoms. Had some of these filters been implemented in any other industry, they wouldn't have been allowed.

This is maybe an illustration of the conflict between regulators' need for control and facilitating efficient markets, but are these restrictions actually needed?

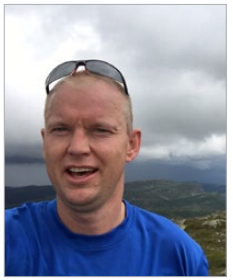
No, I don't think they really need them, and some sort of best practice for national implementation should be developed. That is the reason why we have Concerted Actions on specific directives, but the market does not know what is being discussed, or what the results of these discussions are.

And while registries maybe keep the market parties at arm's length, the regulators sometimes keep miles distant.

Yes, but if you look at Norway and Sweden, there is a dialogue between the market players and both the registries and the regulators. This dialogue is about control, but it is also to enable trade. There are reasons why market players choose NECS - for instance, it is accessible and open - but there is still control.

Let's go back to the relationship between RECS International and the AIB. It has always been close, but not without occasional friction. How do you regard the cooperation between the two organisations?

We have to be clear that we have completely different roles to play, but at the same time we share almost the same vision in terms of shaping a renewables market place. I think a bad working relationship between RECS International and AIB would be very detrimental. At the moment, though, it is quite good and we have seen a number of joint approaches during the last year towards the Commission and publishing joint statements, and such cooperation is important. Sending different messages to the Commission on the new RES Directive would not gain us any respect. Sending the Commission key messages massaged down to a few pillars, which we agree on, is very important.



Lars Olav Fosse

Tom Lindberg

Are there arguments for keeping some distance as well?

We are different organisations. However, RECS International has been reshaping its vision and role over the last couple of years. The focus is not only European, but on which needs it can serve on behalf of a more global renewables market need. However, RECS International is very clear that it will not stick its hands into any system market-enabling functions whatsoever.

Well, then we have to talk about I-REC, another topic of the OMC. Within the AIB, we have an ongoing discussion about the boundaries of EECS; Should it be limited to Europe? However, if EECS GOs are cancelled ex-domain and converted to I-RECS, then we will have a leakage of attributes from Europe.

Ex-domain cancellations exist today because there is no available system elsewhere that you can use, and the main part goes to the UK. In my mind, ex-domain cancellations should still be there, but only to countries in Europe that are not AIB-members and countries outside Europe that are not yet approved for I-REC, and I expect the number of these to become quite small. I-REC will not be operational in all countries, but in most regions across the globe. In my mind, ex-domain cancellations should not be allowed if I-REC is possible, and I-REC should never be a competitor to the AIB.

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>> *So, your answer to the issue of backwashing – what does Europe get back if attributes are exported – is that I-REC should be established outside Europe and the US, and that ex-domain cancellations should not be allowed in those countries, leaving the volume of ex-domain cancellations negligible.*

Well, we are discussing a lot with corporates what is best practice, but there is no clear answer. So, what we try to do is to establish a sort of sensible best practice. We advise our customers to take a conservative approach where they purchase as close to operations as possible. If they can do it nationally, then they should do it. If not, they should purchase I-RECS from countries that are connected with both export and import within that region.

Are there any initiatives to establish such a best practice?

The question is who does it? Ideally, we should have a global best practice established among organisations like AIB, I-REC etc. Maybe a joint working group could be an idea. One of my biggest worries is that we might have other systems coming in with much lower standards. Then we could get double counting.

We have to talk more about the new RES Directive. What are your expectations to the proposal from the Commission?

To be honest, I am not sure I'm expecting that much. I'm expecting them at least to continue with GOs, but hopefully to reinforce the GO. The Commission has also given signals that it makes sense to move GOs and disclosure into the same Directive. It would be great if the Directive has stronger wordings on national implementation that enable a tougher regime. Regarding full disclosure, that is already possible within the current Directive. There are three countries doing it, but to make that into the general rule, you need some legislation on the disclosure side. I assume full disclosure will not be in the Directive. However, one of the main weaknesses in the legislation today is the dislocation between consumer targets and production targets. If there continues to be no link between targets and consumer-based tracking, we will still have a lack of customers and a lack of credibility. Having dual reporting would increase transparency and build credibility around the system. It would enable a country like Germany that is very good on consumption to show what it is doing. Dual reporting would be a first step towards a more consumer-based market.

Another OMC issue related to the new RES Directive is carbon. There is undoubtedly a market demand for carbon on the GO. What will the market do if there are no regulations or guidance on carbon in the new RES Directive?

Nobody asks me about carbon on the GO. They want renewable energy, and that is by definition without carbon. The biggest challenge is to agree on a source of the carbon emission figures, and I know from experience that this is extremely difficult. Without full disclosure, carbon does not make much difference to me.

There are voices out there calling for additionality. Could auditing standards, for instance through RECS best practice, and more detailed customer information improve credibility without regulating the income from GOs?

There is a need for consistency in the market. RECS best practice has been there for a long time, and being clear on a minimum standard is important. More transparency about the actual source is key, and the marketing laws should be more conservative. It is hard to tell if something is good or bad, but you can clearly say if it is renewable. If you call it green or sustainable, then you will end up in an NGO discussion, a discussion about taste and flavours. It makes sense to give the customers the detailed information on the GO.

People want to know which farm their food is coming from, so why not which wind farm?

Exactly.

GO as a tool for financing new renewables is developing, ECOHZ GO2 product is one example, but those critical of GOs have a point when they say that new renewables are mainly financed by the power price and subsidies.

At the moment, it is not THE vehicle for investments, but that was not the intention either, unfortunately. However, targets could have been measured by the consumer mix, making the GO the main policy tool. Then you would not have needed national subsidy schemes.

Like the elcert system we have in Norway and Sweden.

If that were the system, those countries without great renewable resources would have to reach their targets through consumer behaviour. They would have to buy it. There are numerous reasons why it did not end up that way. However, we now see that, both due to the low power price and elcert price, the long-term marginal financing comes from GOs in some new wind projects in Norway through long-term contracts.

Which was quite a paradox after the discussion we had in Norway this spring about leaving the GO system. What was the effect of that debate?

One effect was that we finally got the chance to explain the system, as people had to figure out what this was all about. That turned the Energy Committee and Parliament around. Before it had been seen as a niche market instrument, but I'm happy we managed to pull resources out of the energy industry to convince the politicians. The important thing is that the Parliament said that Norway should become an active partner in the discussions with the Commission to shape the future use of the GO, but it remains to be seen how that will materialize.

You said in the beginning that you were an optimist. Where do you think the GO system will be in 10 years' time, maybe looking at it from an optimistic and a pessimistic angle?

The pessimistic scenario is only there if the Commission discontinues this type of voluntary tracking. It would probably destroy much of the market, although it might continue, as the market needs a system. If they reinforce and strengthen the legislation, then I see no reason why the market should not continue to grow. The volume of EECS GOs is 350 TWh, and non-traded national GOs is an additional 200 TWh. That is 50 % of all European renewable power. You could add another 200 TWh that is available, but not released to the market - for instance, German feed-in. Hence, there is a huge potential, but we do need the UK in there. For me, one wish for the future is a "Brexin", at least for GOs.

Fortunately I do not have any more questions, otherwise we would have needed to continue this interview at a restaurant. Thank you so much for taking the time to talk to the AIB about some of the topics at this year's Open Markets Committee, Tom Lindberg.

Scope 2 Accounting in Practice

In January 2015, the GHG protocol launched its new Scope 2 Guidance to provide clarity and consistency in reporting emissions from energy use in the light of different consumer choices and market instruments. The new Guidance introduced several key changes to the reporting structure for Scope 2 emissions with a view to heightening transparency in corporate energy procurement practices and to enable proper recognition for companies that make better energy choices.

The effect on the market has been very positive in shifting corporate preferences towards low-carbon energy generation procurement. To date, 81 global corporations joined the RE100 by making a public commitment to become 100% renewable. Consumption of renewable energy in Europe via the Guarantee of Origin (GO) system has also seen unprecedented increase in demand - 324,5 TWh of GOs were cancelled in the third quarter of 2016 alone, compared to a total of 357,2 TWh in all of 2015 (see fig. on the far right).

While the new Guidance provides much needed clarity in presenting an accurate picture of companies' Scope 2 emissions, incorporating the new methods can present some challenges. For example, the biggest change that these guidelines bring about is that for companies operating in areas with contractual information about electricity (including the US, Europe, Australia, Japan, and many others), total Scope 2 emissions becomes two numbers - one reflecting the 'location-based' method, and the other reflecting the 'market-based' method.

However, most companies publish a single total for their overall organisational footprint as well as for target-setting. Here, companies can calculate the total footprint based on the method that is consistent and relevant with their business goals, and clearly specify which method is used. For companies operating in liberalised markets, the Guidance recommends that such companies should use the market-based method for setting goals.

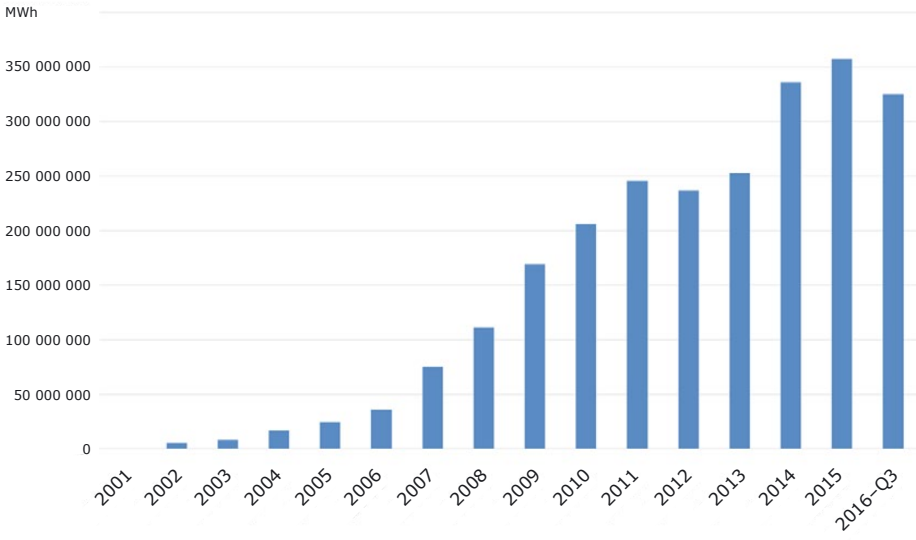
Additionally, the Guidance also clarifies that the Scope 2 figure refers to emissions that have resulted from generation-specific emissions only. This figure should not include grid losses or upstream lifecycle emissions associated with the technology or fuel. Instead, these emissions should be quantified and reported in scope 3 under the "Upstream energy emissions" category. So, for example, if you purchase GOs from a hydro or wind plant equivalent to 100% of your energy consumption, you will report zero emissions in Scope 2, and all relevant upstream LCA emissions from the hydro plant would be reported under Scope 3.

Another important distinction in the new guidance surrounds carbon offsets. The guidance makes clear that the contractual instruments used to determine the market-based emissions in an inventory do not include carbon offsets. Offsets are used to counterbalance emissions generated from one source with emissions reduction or avoidance from other sources, and are appropriate to address both scope 1 and scope 3 emissions. Scope 2 emissions, on the other hand, are to be derived from an emissions rate associated with a generating facility's energy output (i.e. emissions per megawatt hour or MWh).

Finally, the Guidance encourages companies to go one step further and make procurement choices to directly spur an increase in new, renewable capacity. This can be done through some specialised green energy products that guarantee additionality by dedicating a portion of the revenue for projects that add new renewable production capacity, by investing in new renewable capacity. 'TrackmyElectricity' and eco-labels such as Ekoenergy are some of the best practice examples of green energy products that exemplify this concept.

Janu Ramchandani

Janu Ramchandani's role in the Sustainability team at Bergen Energi focuses on helping businesses respond to climate change challenges through effective measurement and management of their carbon footprint. She also helps them communicate their sustainability efforts in a transparent and effective manner.



Consumption of renewable energy (cancelled GOs) in Europe (MWh); Data Source: Bergen Energi

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Germany: GOs, Renewables and UBA

General Meeting in Dessau-Rosslau hosted by UBA

In September 2016, AIB's General Meeting was held in Dessau-Rosslau, a town with a population of around 83,000 residents located in the Federal State of Saxony-Anhalt. Dessau-Rosslau is known for various famous UNESCO world heritage sites: The Bauhaus with its Masters' Houses, the Garden Realm Dessau-Wörlitz and an outstanding landscape dominated by meadows and forests on the Rivers Elbe and Mulde which was put under protection as the UNESCO Biosphere Reserve "Mittelelbe".

The meeting was hosted by UBA, Germany's central environment protection agency, which is also the Issuing Body for the German Domain. The UBA was established in Berlin in 1974 and has its headquarters in Dessau-Rosslau since May 2005. The UBA embraces an extremely broad spectrum of environmental issues. UBA's overarching mission is early detection of environmental risks and threats so that these can be assessed and viable solutions found in a timely manner. This is done by gathering data and conducting research ourselves, and by outsourcing research to scientific institutions in Germany and abroad. Based on this work UBA provides federal bodies such as the Ministry for the Environment with policy advice. The UBA also provides information to the general public and gives advice on environmental issues. Further, the UBA implements and enforces environmental law in areas such as CO_2 emissions trading, activities in the Antarctica, approval processes for chemicals, pharmaceutical drugs and pesticides, and GOs.

The UBA has been appointed Germany's competent authority and issuing body for GOs in 2011. The GO register with UBA went live 1 January 2013. In June 2013 we were able to connect to the AIB Hub as a Non-member Hub user, a status which the AIB thankfully invented to allow the German market to connect to the rest of Europe. Since then UBA has taken an active role in AIB's Working Group Internal Affairs and later also started engaging very much in the Working Group Systems. Eventually, as of April this year UBA has become a regular Member of the AIB.

German electricity production

Traditionally, Germany could hardly be called renewable. The electricity production used to be dominated by fossil fuels (lignite and black coal) and nuclear energy. In 1990 renewables only contributed for 3.4 % of the gross electricity consumption. Back then more than 92 % of the renewable electricity was produced in hydro power plants. Due to the renewable energy support scheme based on feed-in tariffs and since 2012 market premiums, today 31.5 % of the gross electricity consumption is covered by renewables. The total electricity production from renewable sources has increased nearly tenfold over the last 25 years. The most important renewable electricity sources are onshore wind accounting for 37 % of the total electricity production from renewables, solar (21 %) and biogas/bio methane (17 %). Now, water power is only the fourth important renewable source (10 %) and electricity production from water has almost remained the same since 1990. Germany aims to increase the share of renewables in the gross electricity consumption to at least 80 % in 2050. A study performed by UBA has even demonstrated that for Germany an electricity supply system based completely on renewable energies by 2050 is technically as well as ecologically feasible[1].

1: UBA (2010), Energieziel 2050. 100% Strom aus erneuerbaren Quellen. Short version in English.

Particularities of the GO system in Germany

Only renewable electricity that has not been supported under the support scheme is eligible to GOs. In 2015, 163 TWh or 86 % of the total German renewable electricity production was supported; only 25 TWh (14 %) was not supported and was thus eligible to GOs.

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>> To respond to the large consumer demand for green electricity in Germany and to provide relevant data for green electricity labels it is possible to include in the GO additional information on the manner in which the electricity was generated. This is aimed at providing information about a specific environmentally friendly construction and/or operation of the power plant. At the moment such additional information can be chosen for hydro power plants only. The system offers four choices: **1.** protection of organisms typical for flowing waters, **2.** discharges to water hydro-peaking, **3.** solids management and **4.** minimum water flow.
If the plant operator chooses one or more of these options, GOs from this plant will carry the respective additional information. To verify the correctness of the plant operator's statement, an environmental verifier needs to inspect the plant and hand in a confirming inspection report.

Another special feature in the German system is the optional linkage between a GO and the electricity for which it has been issued. When linked, GO and electricity cannot go separate ways, meaning the GO cannot be sold separately from the electricity but electricity and GO follow the electricity chain together. By doing so we aim at meeting the expectation of many consumers: that if they buy a green electricity product their supplier has at least purchased and supplied renewable electricity. Linked GOs require that there is a direct flow from the plant to the accounting grid from which the suppliers withdraw the electricity. In practice the hurdle to meet the requirements of the interconnection is rather high and only very few plants do therefore receive linked GOs.

Disclosure Rules in Germany

Only suppliers are allowed and obliged to cancel GOs to cover their renewable electricity supply. The year in which the electricity for the GO was produced must correspond to the year for which it was used. E.g. a GO for electricity produced in 2016 must be used for electricity disclosure of the year 2016. The deadline for publishing the updated disclosure statement is 1 November of the following year. The UBA is not the competent body for disclosure in Germany; this competence lies with the Bundesnetzagentur (BNetzA). The UBA is, however, the supervisory authority for electricity disclosure with regard to the part of the disclosure that is performed with GOs.

New: Regional GOs

An amendment of the Renewable Energy Act which will come into force in the beginning of 2017 introduces a new kind of GOs, the regional GO. The regional GO accounts for the region where the electricity has been produced, not for the energy source. The regional GO scheme only applies for electricity which is supported by a market premium and therefore does not interact with the European GOs. These regional GOs will be used to disclose to the final customer that the supported part of the energy consumed is produced in the region around the consumer. The UBA has been assigned to implement the system of regional GOs and to operate the regional GO register.

AIB Internals – Workgroup Systems and Workgroup Internal Affairs

Jennifer and Laura, could you tell me more about yourselves and your positions as chairs and your workgroups, Workgroup Systems (WGS) and Workgroup Internal Affairs (WGIA)?

JENNIFER: At Statnett, I work with both Guarantees of Origin and Elcertificates (a Swedish-Norwegian certificate system). My work consists of replying inquiries from our account holders, monitoring our registry NECS, developing, planning and testing new releases to the registry.

When I took over from Katrien Verwimp as co-chair of the WGS, I felt confident that I had the necessary expertise at hand - I only have a limited technical background myself. Therefore, I am especially happy to have Annie Desaulniers as my co-chair with all her technical expertise. Working with such a proactive group is very inspiring and we hope more members will find the way and join our Working Group.

The WGS consists of highly qualified people who work every day to make the EECS certificate exchange possible in Europe. The efficiency of the AIB Hub is their priority.

LAURA: At SEMO, I am involved in both issuing GOs in Ireland and the calculation of Fuel Mix Disclosure (FMD) for Ireland and Northern Ireland. My work ranges from addressing enquiries to ensuring GO processes and timelines are adhered to and delivering the annual FMD calculation on time. This is in parallel to being responsible for registration in the wholesale Single Electricity Market for Ireland and Northern Ireland.

I know everyone in WGIA would agree that it was difficult to say goodbye to Markus Klimscheffskij as chair earlier this year. However, we were delighted when Angela Tschernutter offered her knowledge and experience to act as interim chair. When I took over in September this year, I brought a new skillset and expertise to the group. I am delighted to be working with my co-chair Katrien Verwimp, who brings both operational and technical expertise to WGIA. I really hope that the collaborative working style of WGIA will continue.

WGIA members are competent bodies for GOs, including System Operators, Electricity Regulators and Market Operators. WGIA help to develop, maintain and enforce the operational rules, the EECS rules for a harmonised, efficient and reliable energy certificate system.

What are the highlights of 2016 and how do AIB members benefit from this work?

JENNIFER: The new AIB Hub was the highlight of this year. After much work by both the AIB, especially the user acceptance team, and Unicorn Systems, we finally managed to go live in the beginning of March. The transition was a success! We were very proud to see the outcome of all the testing done and we had a full operational hub with only minor errors, which were handled quickly. The members could also benefit from the user interface which had been "refreshed" offering necessary information about transfers related to their registry.

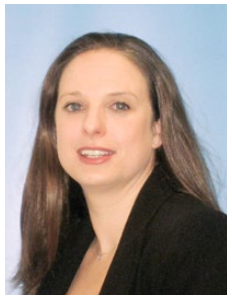
After the go live, Unicorn Systems continued to develop functionalities and fixed some bugs that had been postponed and the WGS has been testing these. Most of these issues are now completed and functional in the production environment.

We have also developed a technical audit for registries, approved by the GM, and this will now be part of the general audit of registries. We assume that this will result in more robust transfers between the registries and the hub and will eliminate unnecessary errors.

LAURA: Following many collaborative sessions within AIB, one highlight earlier this year was the publication of the Reflection Paper. This paper details suggestions from AIB for provisions regarding GOs and energy source disclosure in the future Renewables Directive. AIB proposed disclosing the source of all consumed electricity by GOs, using GOs as a way of providing evidence of the carbon emissions associated with electricity consumed to consumers and setting out GOs and Electricity Disclosure in a single Directive. The intention of the proposals was to create a level playing field for renewable, nuclear and fossil power and empower consumers to affect the carbon content of their electricity consumption. AIB members would benefit from this as national rules would be harmonised and the GO market would develop.

Throughout the year WGIA continued our work on a number of topics, which resulted in updates to the EECS rules and Fact Sheets e.g. the framework

Jennifer Holgate, Statnett, Norway



Laura Plunkett, SEM-O, Ireland

for handling pumped hydro Production Devices and the approval of EECS Rules v7.8.

What are the most important tasks to be done in the near future?

JENNIFER: By the end of the year, the fraud detection functionality should be in place. We are also working on the central account holder database. The database offers registries the opportunity to keep the account holders' lists updated automatically, and thereby eliminating waiting time for the market parties involved. In addition, we are preparing the transition to the new schema called v71, which will include more compulsory fields for cogeneration certificates.

LAURA: WGIA will discuss a number of topics e.g. GO calculation formula and PD inspections, cancellation for future use, as well as ex-domain cancellations and identify if any changes to the EECS rules or Best Practice Recommendations are required.

Corporates show leadership in sourcing renewables

Dirk van Evercooren, AIB President, shares his view on this successful event

At the Strategic seminar organized by EY, RE100 and RECS International on 1 November in London, I had the pleasure of presenting AIB's standardization work.

The seminar was held under Chatham House rules, so I cannot reveal who said what, but some clear messages came out as being supported and shared by all.

The first thing that stood out, was the commitment to the energy transition, towards renewables as the basis of our energy system. Whatever the driver, whether it is corporate social responsibility, carbon reporting or the belief that stakeholder and shareholder value can only be created in the long run by strategies that are based on sustainable energy use, this was clearly a common focus of the many multinational companies that spoke at the event.

While many testimonies highlighted the difficulties of rolling out a sustainable energy strategy globally, the efforts to standardise the instruments that allow to put into practice such strategies were highly appreciated. Clearly, the Guarantee of Origin, along with the equivalent instruments outside of Europe, the Power Purchasing Agreements, and other instruments are crucial in the ability of corporate electricity buyers to pursue sustainable energy strategies.

Thanks to these instruments, consumers (both corporate and household/SME) do not need to passively undergo the fuel mix that is served up by the grid or by the national policy regarding renewables. Guarantees of Origin (GOs from now on) provide consumers with choice, and therefore with a voice about what they prefer.

The companies that spoke at the event are committed to the energy transition and are looking for 'additionality', meaning that they want to contribute to new investment in renewable production. Yet, no one took the position that additionality should be built into the GO, as sometimes consumer organisations or NGOs still do. The participants at the event were pretty comfortable with the tiered options that are currently already available. Consumers that are happy buying electricity that is guaranteed from renewable origin can get a contract that is backed with GOs, but those who want to do more and directly contribute to new investment can get a contract that is not only based on GOs, but that also includes a label that directly channels a part of the money into new investments. Or they can go the full distance and strike a deal with a supplier/producer that is willing to build the new plant(s) to produce the electricity the consumer wants to use… Consumers have many choices!

The event clearly showcased the power of consumers, especially if they unite and bring a coherent message to the energy sector. Corporate consumers now buy half of the renewable generated electricity in Europe already. Make no mistake about it, once the demand for electricity from renewable origins (as documented with GOs) is higher than the current supply, the GO-system will have additionality incorporated within, thanks to the logic of market functioning: whenever demand is higher than supply, investments go up!

The call for consistency in how GOs are being created has been answered by the AIB, with the EECS standard. The call for consistency in how GOs are being used should be answered by the legislators (both European and national) and by the market players: why there still is so little use being made of the extensive information that is available on the GO to inform consumers and to develop specific product that clearly would be meeting demand, is beyond me.

'Corporates are taking the lead, not waiting for legislators, but pushing for initiatives' someone said. Let's hope their efforts are not in vain!

The CEPS and EUSEW events on Guarantees of Origin and (Full) Disclosure

On 31 May 2016, the Centre for European Policy Studies organised a Conference entitled "Guarantees of Origin: What EU energy market implications of full disclosure?" in Brussels.
On 16 June, AIB – together with Concerted Action - Renewables Core Team 5 – organised an EU Sustainable Energy Week event (EUSEW).
Here you can find a recap of both events.

CEPS' conference

At the CEPS event, DG Ener presented the consultation on the revision of the RES Directive. The results clearly showed large support for the use of GOs to track fossil and nuclear electricity. This would benefit the integrity of the supply mix and disclosure information, and enable improved consumer choice. However, a minority of the over 600 responses to the consultation indicated they do not see this topic as a priority focus.

A Stattkraft market expert pointed out that the situation of oversupply leading to the low price levels, witnessed in the past years, turned around at the beginning of 2016, when a general shortage of GOs led to significant price level rises. The case of Austria clearly shows the impact of moving to full disclosure (generalised use of GOs for tracking all electricity regardless of the source of the energy). This has significantly raised awareness of Austrian electricity consumers of the source of their electricity and has led to increased engagement.

In Sweden, all disclosure is based on GOs or the residual mix and all generators can claim GOs for their production, which is almost universally the case. Consumers in Sweden clearly have a preference for contracts that guarantee the electricity is from renewables and nuclear sources; while there was very little success for contracts based on fossil electricity. Since the introduction of full disclosure in 2015, the demand for renewable electricity contracts has increased significantly.

The eleven recommendations for improving the Guarantees of Origin system under REDII published by Europex follow many of the AIB's viewpoints and proposals, such as strengthening the role of the GO in the Directives and harmonising disclosure practices, moving to full disclosure (generalised use of GOs for tracking all electricity),...

The European consumer umbrella BEUC stated that according to their findings, consumers still cannot be sure that they are getting what they expect: that signing a green electricity contract indeed contributes to the energy transition. BEUC sees a need to provide proof of additionality, e.g. by third party certification. BEUC does not have problems with the GO as an instrument, but pointed to problems in the way that consumers are sometimes (mis)informed by their electricity supplier. They call for additionality to be proven, making sure that green contracts actually contribute to new investment in RES-capacity. Greenpeace Europe supported this. They also underlined the need to 'energise' consumers to participate in the energy transition. GOs are very good for informing consumers, but GO systems need to be further harmonised and improved. Greenpeace supports full disclosure, and the inclusion of CO_2 and nuclear waste information on GOs.

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>> The discussion raised the point that GOs were never about additionality, and that for other products (e.g. Fairtrade coffee) there is no direct link with investment in new production capacity either. When something (electricity from renewable sources) is in high demand, this will drive new investments without the need to legislate or enforce additionality. Historic lack of additionality cannot be used as an argument against GOs, as it is related to oversupply of GOs in the past. If GO demand keeps on rising, additionality will be the logical outcome because the market will respond by increasing supply. Meanwhile, electricity contracts that guarantee direct additionality are offered. The purpose of the GO is to provide trust and transparency.

A representative of the Norwegian Industry association expressed his lack of enthusiasm for GOs. They do not want to pay for GOs which they see as a tax, as GOs support production of electricity from renewable sources. Norwegians are getting electricity from renewable sources anyway, as proven by the Norwegian production mix, so why pay for GOs? He was very clearly countered by almost all other speakers. At the end of the conference, there was little weight given to his arguments and views.

The restriction of GO trade according to the capacity to physically export electricity was suggested as an improvement. However, an EC representative raised the point that the current 'book and claim' principle of the GO system delivers the policy goals in a cost-efficient way, which is very doubtful if physical constraints were to be added, as the tracking of physical flows would require the processing of colossal amounts of data.

From Eurelectric we heard that all disclosure information should be based on GOs and/or the residual mix, which should be further harmonised. Eurelectric supports the ambition to move to full disclosure, but for now prefers to do so on a voluntary basis. GOs should be for disclosure only, not support, so no additionality should be built into the GO-system.

In the debate, AIB pointed out that without the GO-system, a market for electricity from renewables would be - if not impossible - then at least much less trustworthy and much more expensive to set up. The GO and disclosure are about transparency, consumer empowerment and making electricity users accountable for their choices. The GO system empowers consumers; getting rid of it would disenfranchise them.

Theresa Griffin, UK MEP and member of ITRE, pointed to the recent EP report on the Energy New Deal she authored to put the debate in a wider perspective. There is a need to empower energy customers to drive the energy transition. GOs are part of the package of instruments that could do so. She supported the idea of extending the use of GOs to all sources of electricity, but also underlined the need to ensure that consumers are correctly informed.

The conference made clear that there is a need to better link the political and the technical debate: how can GOs serve to achieve Europe's energy policy goals?

The AIB – CA-RES EUSEW event

On 16 June, AIB and the Concerted Action – Renewables Core Team 5 organised an EUSEW event. The European Commission accepted our proposal for organising an EU Sustainable Energy Week (EUSEW) event, but asked to do so in a co-organisation with CA-RES Core Team 5.

The main differences in the contributions were that the tone of BEUC is getting more and more critical (again). In the CEPS event, the consumers' organisations umbrella still supported Full Disclosure, in the EUSEW event we heard that 'it would not really contribute to fix the consumers' problems'. While the contributions by the speakers from the European Commission were very positive in the CEPS event, the EC now again stressed the need for a positive cost-benefit analysis of Full Disclosure. The others, Eurelectric, RECS International on behalf of RE100 and Europex, supported AIB's views, from moderately to very passionately...

The event's video is available on the AIB's YouTube Publications channel. You are invited to check it out to learn the detailed contributions to the EUSEW event.

Dirk Van Evercooren, AIB President

Statistics

Methodology

Frequency of reporting

Statistical data is collected and reported quarterly. Where available, data has been collected for all months since 2000, as this permits a high level of reconciliation between individual and total figures.

Data items recorded

Data is collected for each domain and month, and relates to single energy sources or groups of energy sources. For each domain / month / source the following is recorded:

a. **By production date:** issued, expired and cancelled - this lets the market know how many certificates of each vintage are available for trade, so informing price setting.
b. **By transaction date:** transferred within domain, imported, exported, expired and cancelled - this helps in judging the level of market activity, and making certificate expiry dates visible further informs pricing and trading strategy; and also enables AIB to calculate it membership fees.

Energy source codes

The list of codes has been prepared by reference to the codes used by all registries, and member preferences. EECS Rules Fact Sheet 5 provides the definitive list of energy source codes, aggregating reported codes into higher-level codes where codes: are **inactive** (e.g. hydro and wave power will be aggregated until such time as wave power becomes more widely used); are **unknown** (e.g. sold renewable fuel may be used where conversion between codes has resulted in the original code becoming unknown); are **not demanded** by the market (e.g. Orimulsion is simply reported as "Fossil").

Analysis

Where possible, the statistical reports will provide a disclaimer explaining shortcomings in the data. This might include domains that do not provide certain items of data, and those that have not contributed to the latest report. The value of publishing data which contains such shortcomings is felt to outweigh the absence of such data.

Some items may solely be useful at a pan-European level (e.g. domains will not know if certificates they issued and exported have been cancelled). Hence it will be possible to know the length of the market across Europe, but not necessarily for certificates issued in a specific country).

Certificates withdrawn by the issuer (perhaps those issued in the wrong quantities or for the wrong technology) are statistically insignificant, and have therefore been ignored.

Further data is available on our website.

General

All certificates are 1MWh. As metering data is the basis for issuing certificates, there is always some delay in gaining accurate statistics for the corresponding data for a specific month, so the most recent quarter's issuing activity will always be understated and consequently this information should be treated with caution.

Statistics for certificates issued in a specific month are not presented, as the value of this data is not clear. In general, "issued by transaction date" will be similar to, but slightly later than, "issued by production date", due to the inevitable delays in processing meter data. Currently, close to 100% of the certificates for energy produced in a month will be issued within the following 6 months.

Explanatory notes to statistics

Date of collection of data

These statistics were completed on 2nd November 2016 and based on statistics gathered either from statistics published AIB member websites, or where such data is not available, from data provided to the AIB by individual members. The data itself was provided on the following days:

Aggregation of data

In some cases detailed data has been aggregated. For instance "manure" also refers to "pig manure", and "fossil" also contains "unknown source". Further, unspecified renewable energy contains that which originates from technology codes T05000000 (combustion) and T07000000 (known).

Completeness of data

The Grexel registries (DK, HR, IE, IS, LU, NO and SE) provide all required information. However, information from these domains relating to periods prior to the adoption of this version of the registry is not always available. For instance, the previous registries did not record the quantity of cancellations by production date that had taken place during the life of these registries. The Austrian registry does not currently provide expiry data.

The difference between total exports and imports is the result of absences in the information gathered, and due to exports to Belgium needing to be accepted by the importer, introducing delay registering the transaction (and which is potentially treated differently by different registries).

Country	Collected	Source
Austria	24 October 2016	website (password protected)
Belgium - Federal	21 October 2016	spreadsheet provided by CREG
Belgium - Brussels	25 October 2016	spreadsheet provided by Brugel
Belgium - Flanders	11 October 2016	spreadsheet provided by VREG
Belgium - Wallonia	13 October 2016	spreadsheet provided by CWaPE
Croatia	10 October 2016	website
Cyprus		Not yet available
Czech Republic	11 October 2016	spreadsheet provided by OTE
Denmark	13 October 2016	website
Estonia	07 October 2016	spreadsheet provided by Elering
Finland	07 October 2016	spreadsheet provided by FinExtra
France	25 October 2016	spreadsheet provided by Powernext
Germany	21 October 2016	website
Greece		Not yet available
Iceland	11 October 2016	website
Ireland	10 October 2016	website
Italy	24 October 2016	spreadsheet provided by GSE
Luxembourg	10 October 2016	website
Netherlands	11 October 2016	spreadsheet provided by CertiQ
Norway	18 October 2016	website
Portugal		Not yet available
Slovenia	10 January 2012	Only one market party currently, so publication of data would expose their trading position. Data will be published when other market parties commence trading.
Spain		Not yet available
Sweden	12 October 2016	website
Switzerland	01 November 2016	website (password protected)

Please note

New data

The latest version of the statistics now provides:

- Relating to electricity produced during a specific year: the number of certificates issued, expired and cancelled
- Relating to the date when transactions actually took place: the number of certificates transferred, exported, imported, expired and cancelled.

The number of domestic and international certificate transfers have not been reported by production year, as this information does not seem to have a use. For the same reason, the number of certificates actually issued during each month is not reported.

Fuels

The fuels displayed reflect those used by member registries, normally at the most detailed level. Due to the more detailed information now being kept, some information is at a high level. For instance, "Solid - unspecified wood" might contain forestry products, energy crops and so on. Similarly, "liquid - renewable fuels" may contain black liquor. However, when this has been recorded, then it is displayed as such. Hopefully, over time, all registries will provide information at the more detailed level, enabling more accurate analysis.

As other certificates are issued for fuels not on the current list, so these categories will be added and reported against.

Missing and seemingly contradictory data

A further point for consideration is that the new data has only been collected by registries since last year, so it will be absent in earlier data; and for those countries where the registries have yet to capture and report this information. However, given the recent restriction on the lifetime of certificates, this matter should be corrected in the next year or two.

This explains a number of anomalies - for instance, the difference between the total number of certificates cancelled for all production years, and the total number of certificates cancelled by year of transaction: while all registries report when certificates are cancelled; not all registries report the production year to which they relate.

Production and Transaction statistics

Production statistics refer to the month and year when the electricity was produced, whereas Transaction statistics refer to the month and year when the transaction took place.

Thus Production → issue is the number of GOs issued for electricity produced in a specific month, while Transaction → issue is the number of GOs issued during a specific month, regardless of when the associated electricity was produced (note that GOs are issued one or more months after the electricity is produced).

Similarly, Production → cancelled is the number of GOs cancelled which relate to electricity produced in a specific month, while Transaction → cancelled is the number of GOs cancelled during a specific month, regardless of when the electricity was issued.

For each of the above (Production and Transaction):

Issue	=	GOs created in a month for electricity produced in an earlier month
Transfer	=	GOs transferred within a country or region
Export	=	GOs transferred to another country
Import	=	GOs transferred from another country
Cancel	=	GOs which have been made non-transferrable by the holder of the account in which they reside (or its agent)
Expire	=	GOs which relate to electricity produced more than a year ago, and which have consequently been cancelled.

Statistical report

During the third quarter of 2016, market activity continued to increase, as has the use of guarantees of origin (GOs) for disclosure purposes – which is now appreciably higher than it was at this time of the year in any preceding year. Note that RECS certificates ceased to be issued and supported by the AIB and its members at the end of 2015, and are no longer included in these statistics.

These graphs illustrate activity in two ways:

1. **Activity by production date** – this shows the quantity of GOs issued, expired and cancelled which relate to **electricity produced in a given year**; and indicates those which either remain on the market or are otherwise unaccounted for.
2. **Activity by transaction date** – this shows the quantity of certificates **actually** issued, transferred within that country or region, transferred internationally, expired and cancelled in a given year.

Issue, transfer and cancellation continue to increase over preceding years.

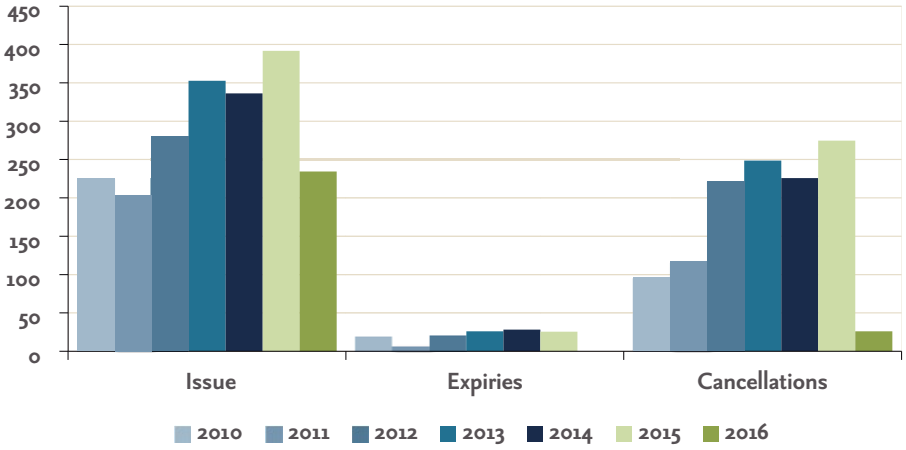
Further growth is expected as new countries are connected to the Hub, and as activity increases within existing members.

Spain (CNMC) became a member of the AIB in March 2016, and has now commenced issuing GOs; however, Cyprus continues to test its registry against the AIB Hub and has yet to commence issuing.

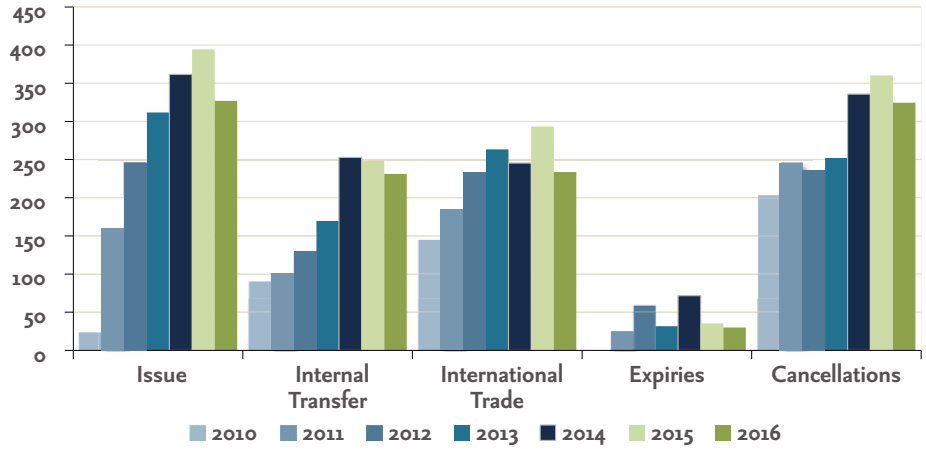
Energimyndigheten of Sweden has applied for membership, but the date on which it expects to replace Grexel and become active has slipped to mid-2017. LAGIE of Greece and Litgrid of Lithuania have applied for membership, and will probably become active next year.

Ofgem of the United Kingdom, RES Operator of Bosnia and Herzegovina, Elektromreža Srbije of Serbia, AST of Latvia and DGEG of Portugal are official observers; and contact continues with interested parties in Poland, Hungary, Slovakia and Montenegro.

Annual EECS transactions by production date (TWh)



Annual EECS transactions by transaction date (TWh)



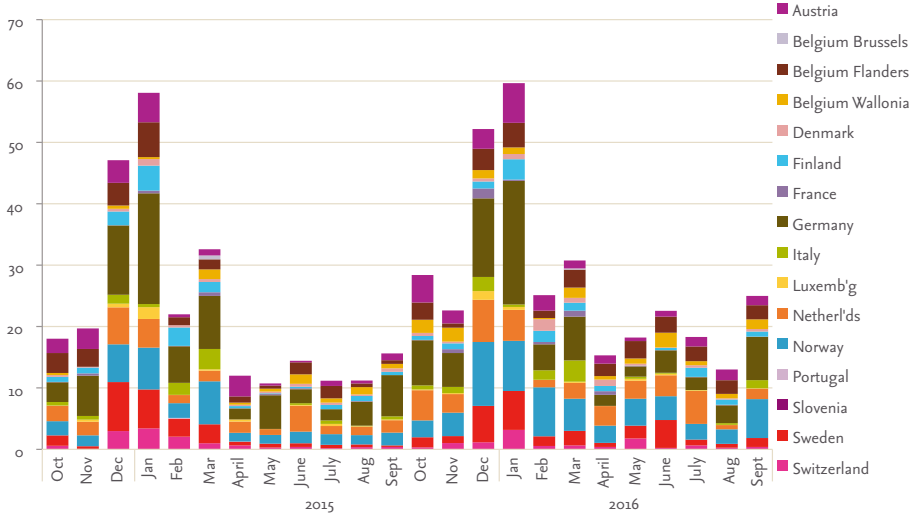
The number of cancellations continue to grow, and 2016 looks like exceeding previous years' record levels, demonstrating the increased use of GOs for purposes of selling products for differentiated energy sources. Note that issuing tends to be 20% understated over the past quarter, due to delays in capturing metering data.

The monthly discrepancy between exports and imports is due to not all transfers being instantaneous, so hence trades which commence in one month can complete the following month; however, the general shape of the import and export graphs is similar.

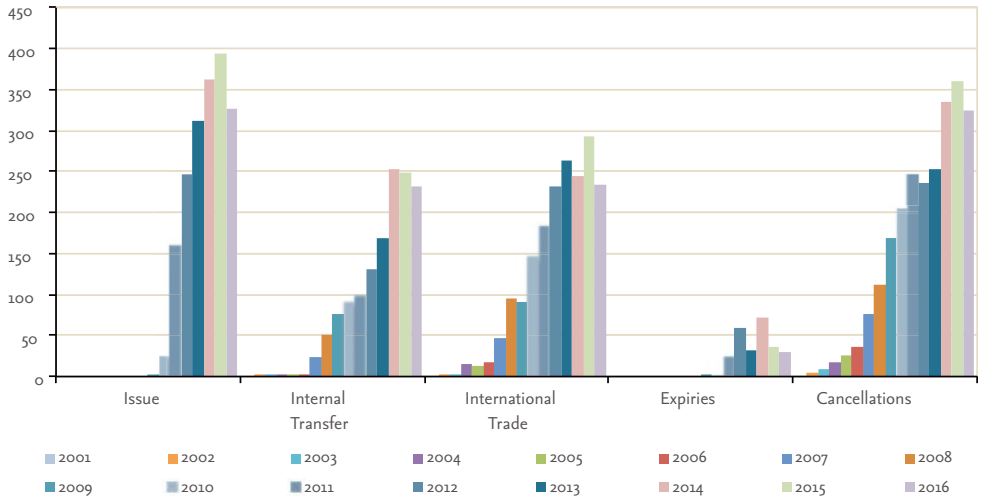
In 2015, Norway, Sweden, Belgium and France were the major exporters; while Germany, Norway, Netherlands and Belgium remained the main importers. So far in 2016, the major exporters have been Norway, Sweden, France and Italy; while Germany, Norway, Belgium and Netherlands have been the main importers. During both years, some countries figure in both exports and imports, suggesting trading activity.

These charts show the large role that the Nordic region has in this market, and the interest in renewable products elsewhere in Europe, particularly Germany and Benelux.

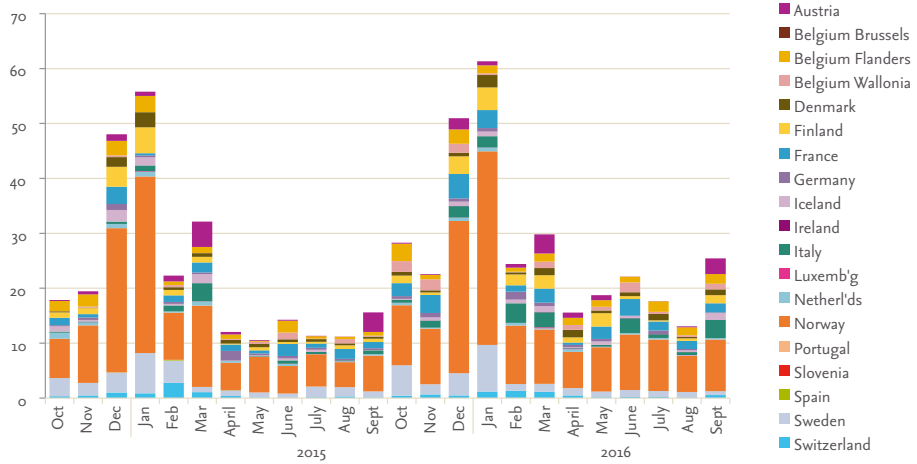
Monthly imports per country (TWh)



Annual EECS transactions by transaction date (TWh)



Monthly exports per country (TWh)



1 Note that the issuing statistics are now based on transaction dates, whereas previous newsletters used the production dates for these.

There are still trades where certificates are cancelled in one country for use in another: these are known as "ex-domain cancellations (EDCs)". The EECS Rules only permit this where transfer is technically impossible, so this does not occur between member countries - less than one percent of all EDCs are between member countries. EDCs may also occur where the account holder either does not reveal (or perhaps conceals) the country for which GOs are being cancelled: this is a matter for individual competent bodies.

EDCs can and do occur between member countries and non-member countries, to the extent that 73 percent of all EDCs go to non-member countries in Europe, while a further 26 percent go to an unknown destination (this is believed to be the UK, meaning that 99% of all EDCs are for use in Europe).
Finally, less than half a percent of EDCs are used outside of Europe.

The following table gives an indication of the countries for which ex-domain cancellations are executed.
Note that in some instances, EDCs have taken place between member countries where technical issues have prevented transfer of GOs.

Ex-Domain Cancellations by country : Quarter 2016Q3

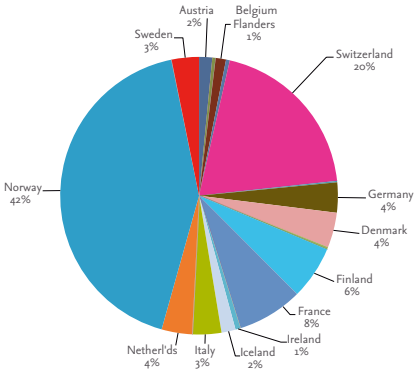
	Source																						
DESTINATION	AT	BE	BEB	BEF	BEW	CH	CY	CZ	DE	DK	EE	ES	FI	FR	HR	IE	IS	IT	LU	NL	NO	SE	SI	TOTAL
Albania	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	445	–	–	445
Australia	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.360	–	–	1.360
Bosnia	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	5	–	–	5
Brazil	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	37	6.670	–	6.707
Bulgaria	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	28.976	–	–	28.976
Chile	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	183	–	–	183
China	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	332	–	–	332
Cyprus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	325	–	–	325
Czech Republic	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	11.222	6.125	–	17.347
Greece	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	33.095	–	–	33.095
Hungary	–	–	–	–	–	–	–	–	–	–	–	–	16	–	–	–	–	–	–	–	84.211	–	–	84.227
India	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	18	–	18
Latvia	–	–	–	–	–	–	–	–	–	–	812.396	–	150	–	–	–	–	–	–	–	6.773	304.404	–	1.123.723
Lithuania	–	–	–	–	–	–	–	–	–	–	851.397	–	–	–	–	–	–	–	–	–	40.723	–	–	892.120
Malta	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	100	–	–	100
Poland	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	449.553	18.027	–	467.580
Portugal	–	–	–	–	–	–	–	–	–	–	–	–	–	100	–	–	–	–	–	–	115.345	–	–	115.445
Romania	–	–	–	–	–	–	–	–	–	–	–	–	10	–	–	–	–	–	–	–	20.493	–	–	20.503
Russia	–	–	–	–	–	–	–	–	–	–	–	–	641	–	–	–	–	–	–	–	27.917	–	–	28.558
Saudi Arabia	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	748	–	–	748
Serbia	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	13.661	–	–	13.661
Singapore	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	249	–	–	249
Slovakia	–	–	–	–	–	–	–	–	–	700.521	–	–	7.500	198.888	–	–	–	–	–	–	626.390	388.896	–	1.922.195
Spain	–	–	–	–	–	–	–	–	–	45.500	–	–	–	4.500	–	–	–	–	–	–	40.580	712	–	91.292
Sweden	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	220.000	–	–	220.000
Turkey	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	5.170	–	5.170
UK	–	–	–	–	–	–	–	–	–	4.894.590	85.390	–	151.274	4.221.811	–	961.872	–	–	–	–	6.680.363	8.324.135	122.516	25.441.951
United Arab Emirates	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.111	–	–	1.111
United States	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	108.024	–	–	108.024
Unknown	–	–	–	–	–	10.907.028	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	10.907.028
Total	–	–	–	–	–	10.907.028	–	–	–	5.640.611	1.749.183	–	159.591	4.425.299	–	961.872	–	–	–	–	8.512.221	9.054.157	122.516	41.532.478

The following graphs are based on specific "vintages" of certificate (i.e. associated with electricity produced in a particular year), and show the final destination of GOs associated with electricity produced by each member country in a year.

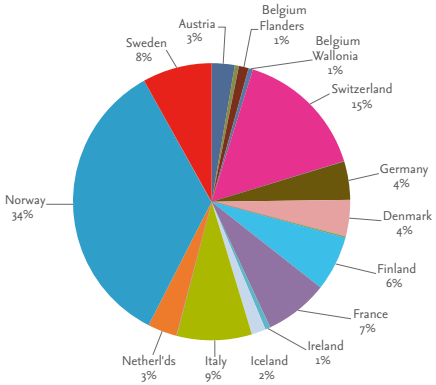
Broadly, there have been some substantial changes in national contributions, although this may change when GOs have been issued and cancelled for all 2016 production.

So far, the use of GOs for the various fuel sources remains broadly similar to last year: for renewables, hydropower remains by far the prevalent renewable energy source, followed by wind and then biomass, although there do seem to have been a disproportionately large number of wind GOs cancelled so far this year.

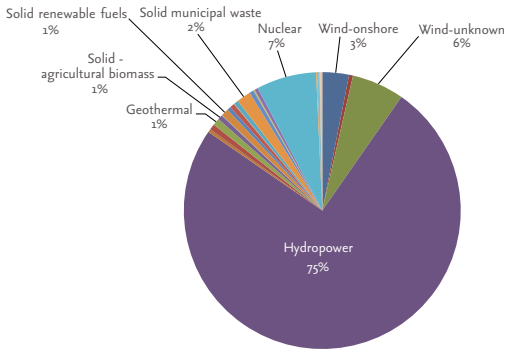
2016 Issue



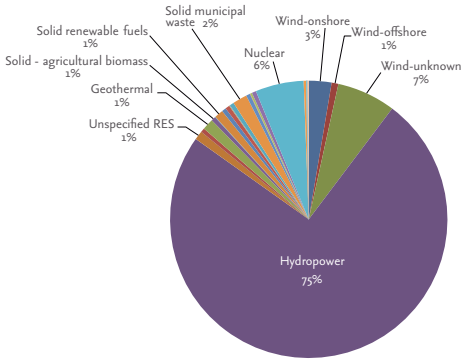
2015 Issue



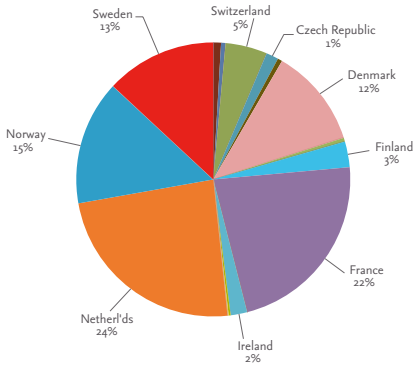
2016 Issue



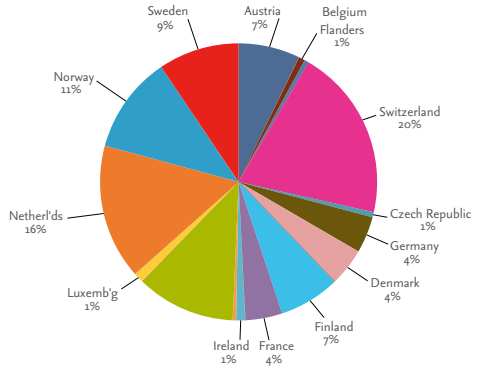
2015 Issue



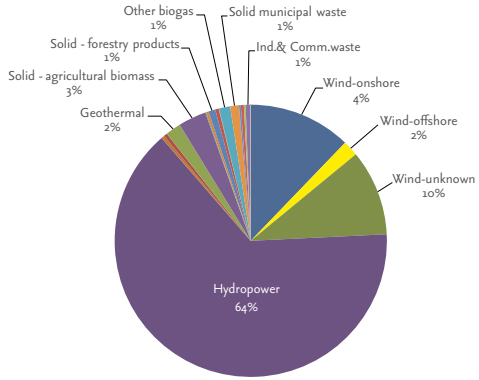
2016 Cancel



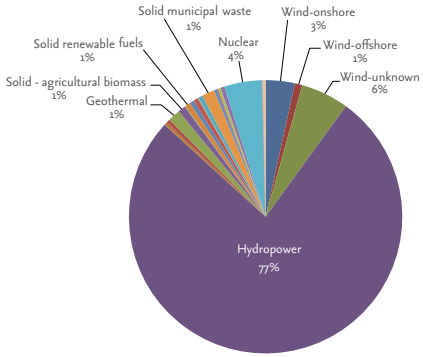
2015 Cancel



2016 Cancel



2015 Cancel



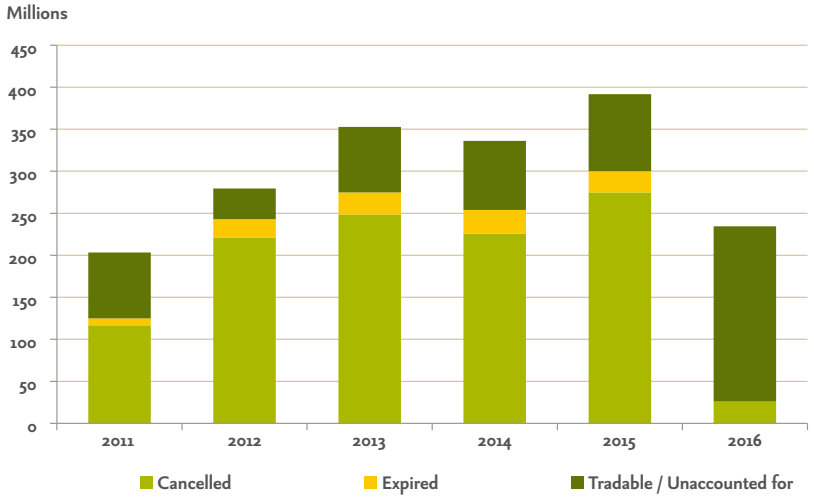
Comparing the status of different vintages of EECS certificate, we can see what has happened to the certificates that were issued for energy produced in the last four years - that is, whether the certificates have:

- been cancelled as evidence of supply;
- expired due to it being more than one year since the associated energy was produced (as required by Directive 2009/28/EC); or
- whether their whereabouts is unknown. This may mean that they remain available for trade, but it could also be that they have been transferred to a registry that does not currently report expiry and cancellation by the date of production.

Two graphs are shown. In the first, actual numbers of certificates are given; while the second illustrates the proportion of certificates in each category.

The picture is becoming clearer as more and more registries support expiry.

Usage of EECS Certificates



Proportion of EECS Certificates available

The following tables display the raw data by domain at a yearly level. Aggregated totals are given for the period since records began (2000); and for the period from January 2016 until the date of collection of the data (during October 2016 – although note that not all registries can provide the required information upon request – see also "Explanatory notes to statistics" in this statistical report).

Issuing, Trade & Redemption for all Fuels

	Total : 2001 to 2016									2014 to 2016								
	Production			Transaction						Production			Transaction					
	Issue	Expire	Cancel	Issue	Transfer	Export	Import	Expire	Cancel	Issue	Expire	Cancel	Issue	Transfer	Export	Import	Expire	Cancel
Austria	59.998.898		86.374.801	62.937.120	113.397.412	78.774.460	147.687.227		118.835.041	24.056.343		39.083.263	32.087.227	52.836.034	38.795.274	59.950.544		52.918.836
Belgium (Federal)	2.718.730			3.057.991		2.576.196				2.718.730			3.057.991		2.576.196			
Belgium Brussels	217.339		102.041	77.388	7.920.345	14.800	11.733.397	5.390	20.205.408	206.545		102.041	77.388	7.912.981		843.411	5.390	8.201.342
Belgium Flanders	30.045.072	4.691.772	16.713.659	25.848.840	119.112.059	58.773.919	227.355.246	6.891.604	145.776.181	10.781.509	1.818.331	4.373.505	12.072.061	65.502.078	43.526.074	69.577.309	3.320.332	25.587.530
Belg & Lux RECS	113.390						2.031.496		2.048.355									
Belgium Wallonia	10.829.448	29.136	4.016.345	20.664.031	39.359.262	25.697.865	83.342.170	1.291.091	51.983.683	4.334.260	29.136	1.748.414	20.664.031	23.749.799	16.350.141	26.228.256	920.267	11.251.070
Belgium	43.923.979	4.720.908	20.832.045	49.648.250	166.391.666	87.062.780	324.462.309	8.188.085	220.013.627	18.041.044	1.847.467	6.223.960	35.871.471	97.164.858	62.452.411	96.648.976	4.245.989	45.039.942
Switzerland	269.458.155	41.029.450	195.397.609	270.934.286	102.015	32.121.291	53.166.625	88.955.114	219.041.819	170.844.216	27.744.525	110.401.496	177.067.223		20.385.420	31.256.617	79.292.030	163.808.946
Cyprus																		
Czech Republic	1.671.900	243.906	3.175.301	1.671.900	2.245.749		1.789.567	243.906	3.175.301	795.386	86.465	2.455.164	1.427.027	2.024.267		1.789.567	243.906	3.171.394
Germany	68.966.565	4.790.862	174.931.792	66.545.419	238.284.038	31.522.825	424.107.319	10.674.686	418.115.723	41.283.287	1.259.604	22.930.165	48.031.066	139.464.758	15.831.780	198.354.522	10.674.686	242.700.817
Denmark	86.927.305	8.143.944	39.105.148	77.132.615	34.575.072	52.959.435	22.280.756	8.143.944	40.931.593	43.967.983	3.301.613	25.977.660	46.038.039	24.496.276	25.105.386	13.844.625	4.436.784	30.274.821
Estonia	1.556.537		231.353	3.135.892	3.768.160	1.238.673	1.848.648	679.384	1.218.863	1.556.537		231.353	3.135.892	3.768.160	1.238.673	1.848.648	679.384	1.218.863
Spain	14.686.142			3.435.153		5.565.173	58.380		6.543.588	529.595			849.587		384.509	38.377		
Finland	181.600.208	8.052.612	108.526.318	120.065.948	54.267.863	206.344.584	181.631.508	8.052.612	123.983.028	60.115.414	269.351	42.503.816	65.677.288	15.330.358	46.183.083	41.532.510	8.052.612	60.876.001
France	138.292.950	14.115.906	46.960.435	115.584.227	18.257.019	63.491.486	28.393.293	18.023.348	94.099.783	68.757.133	1.243.868	26.447.613	76.109.476	7.909.005	53.577.496	9.128.427	2.176.870	30.622.198
Croatia	143.017	7.883	117.188	143.017		136.287	121.513	7.883	117.188	143.017	7.883	117.188	143.017		136.287	121.513	7.883	117.188
Ireland	3.865.577	10	3.368.263	3.703.163	1.497.388	89.823	849.268	10	3.368.263	3.703.163	10	3.368.263	3.703.163	1.497.388	79.822	849.268	10	3.368.263
Iceland	41.588.512	987.478	1.430.980	41.588.512	4.511.172	39.512.872	1.018.443	987.478	1.430.980	20.504.747	23.343	1.108.967	23.165.425	3.530.332	21.685.142	68.000	48.658	1.178.215
Italy	130.167.230	12.472.534	60.743.304	103.464.558	194.413.323	40.400.351	35.887.950	16.060.204	157.521.249	43.750.084	11.038.256	31.901.828	89.528.540	167.182.118	29.521.112	25.219.112	16.060.204	103.972.329
Luxembourg	321.586	421.094	14.548.268	321.586	5.917.937	1.209.313	16.667.336	421.094	14.548.268	299.334	123.466	6.792.059	308.475	3.704.919	610.089	9.975.592	421.094	10.090.639
Netherlands	120.861.302	4.631.329	174.419.564	35.325.466	81.853.967	31.175.494	282.623.562	4.631.334	348.957.838	33.453.782	1.212.978	86.151.928	35.325.466	21.549.191	15.060.337	92.926.418	2.777.934	113.089.202
Norway	1.200.759.221	62.147.261	140.353.922	724.710.550	438.832.544	950.303.773	177.509.025	62.147.261	277.663.366	366.481.188	4.108.038	68.213.437	372.243.496	184.221.432	365.216.153	116.874.202	6.087.231	89.065.726
Portugal	1.455.576		422.472	477.440		1.064.056	371.468		487.048	173.524		225.236	186.341		11.800	311.409		386.946
Sweden	412.442.003	28.077.178	175.179.307	148.408.461	24.145.846	202.321.442	180.393.791	28.077.178	352.028.189	63.896.808	1.305.599	52.442.247	71.893.338	7.806.027	75.803.998	71.806.489	1.749.140	68.767.567
Slovenia	4.002.666					668.004	117.018		1.927.200									
UK	90.158																	
Total	2.782.779.487	189.842.355	1.246.118.070	1.829.233.563	1.382.461.171	1.825.962.122	1.880.985.006	255.293.521	2.404.007.955	962.352.585	53.572.466	526.575.643	1.082.791.557	732.485.123	772.078.772	772.544.816	136.954.415	1.020.667.893

Issuing, Trade & Redemption for all Fuels

	2016									2015								
	Production			Transaction						Production			Transaction					
	Issue	Expire	Cancel	Issue	Transfer	Export	Import	Expire	Cancel	Issue	Expire	Cancel	Issue	Transfer	Export	Import	Expire	Cancel
Austria	3.578.143		17.209	8.417.598	15.732.973	10.875.454	18.526.710		18.681.931	10.483.090		19.723.965	11.736.102	16.300.627	13.276.890	22.497.686		18.497.232
Belgium (Federal)	868.939			1.578.253		1.854.772				1.849.791			1.479.738		721.424			
Belgium Brussels	56.465				3.145.312		219.576	5.390	3.026.305	74.681		50.295	77.388	1.690.285		623.835		2.392.283
Belgium Flanders	2.813.826		219.854	3.661.102	19.548.570	12.415.060	22.684.460	522.151	4.914.469	4.477.150	401.924	2.047.682	4.857.457	23.023.871	16.051.568	22.231.010	927.556	8.598.099
Belg & Lux RECS																		
Belgium Wallonia	1.028.304		137.231	16.266.034	8.694.399	6.614.166	9.754.582	187.651	3.537.145	2.002.308	29.136	1.330.876	2.152.556	6.300.795	8.835.267	12.664.189	547.741	3.538.718
Belgium	4.767.534		357.085	21.505.389	31.388.281	20.883.998	32.658.618	715.192	11.477.919	8.403.930	431.060	3.428.853	8.567.139	31.014.951	25.608.259	35.519.034	1.475.297	14.529.100
Switzerland	46.278.465		1.284.588	51.362.778		5.693.496	8.167.385	11.474.663	53.471.883	60.503.048	9.510.022	55.177.516	62.333.063		7.542.293	11.346.678	17.475.927	56.199.611
Cyprus																		
Czech Republic	385.775		376.829	436.403	126.247		127.470	43.915	1.296.425	121.663	30.010	1.649.144	180.268	1.077.902		1.655.760	42.581	1.096.864
Germany	8.229.330		140.259	10.006.797	35.430.396	4.637.863	50.609.793	2.267.638	74.675.311	17.533.969	559.504	11.707.643	19.621.332	50.195.705	6.369.903	80.314.238	4.286.537	87.586.229
Denmark	9.575.037		3.047.471	11.709.705	6.693.864	9.286.549	6.064.122	679.883	7.715.391	16.541.726	591.344	12.184.326	17.794.672	9.194.494	8.642.034	5.417.044	2.769.201	14.228.931
Estonia	653.945		120.639	1.332.179	2.415.919	494.171	1.577.729	155.038	871.846	716.108		53.724	1.595.217	1.352.241	744.502	270.919	476.582	246.884
Spain															155.963			
Finland	14.533.120		784.949	19.875.907		14.591.631	10.746.957	77.855	14.618.056	25.162.637	54.532	19.453.821	24.927.279		14.413.516	14.202.631	255.467	20.828.643
France	17.872.762		5.838.461	29.591.182	2.307.381	17.490.606	2.527.242	428.914	13.170.910	29.065.668	428.914	11.809.285	26.339.645	3.323.110	21.134.826	3.891.154	814.954	9.523.599
Croatia	70.932			74.639		136.287	98.500	7.444	94.614	72.085	7.444	94.614	68.378			23.013	439	22.574
Ireland	1.381.637		508.321	1.727.763	1.302.583	65.784	537.268	10	2.976.838	2.321.526	10	2.859.038	1.975.400	194.805	14.038	312.000		391.425
Iceland	3.853.759			6.675.406	1.571.095	5.787.139		372	1.100.026	6.508.643	372	1.102.286	6.448.067	1.933.490	5.825.841		22.971	7.961
Italy	7.852.647		58.494	26.383.690	69.671.305	16.052.889	7.574.877	11.038.256	37.643.328	34.307.475	11.038.256	31.843.073	35.709.634	51.899.483	11.363.977	11.213.958	3.440.938	34.714.944
Luxembourg	101.744		37.000	127.002	336.881	214.988	1.581.524	12.060	2.750.391	132.497	12.019	3.210.140	134.463	1.720.827	229.120	4.879.844	112.713	4.022.668
Netherlands	8.323.713		6.203.399	10.252.314	4.739.026	2.861.732	26.104.044	455.248	32.445.668	13.368.815	280.591	43.337.792	13.456.792	7.851.045	4.253.635	34.326.537	1.307.521	42.702.110
Norway	99.606.106		3.830.926	107.045.108	56.492.651	110.409.623	45.997.156	2.098.045	26.713.271	134.679.016	2.071.916	31.185.560	134.685.137	69.591.078	137.870.534	43.206.206	2.116.924	32.435.315
Portugal															11.800	155.963		205.659
Sweden	7.451.995		3.396.689	20.357.821	3.079.988	17.732.165	20.790.134	499.957	24.804.905	31.699.685	421.239	25.905.507	28.901.715	2.791.428	31.168.276	24.103.558	829.811	23.077.154
Slovenia																		
UK																		
Total	234.516.644	0	26.002.319	326.881.681	231.288.590	237.214.375	233.689.529	29.954.490	324.508.713	391.621.581	25.437.233	274.726.287	394.474.303	248.441.186	288.625.407	293.336.223	35.427.863	360.316.903

Similar to the "by country" data above, the following tables display the raw data "by technology" at a yearly level.

See also the AIB website at Statistics for Excel spreadsheets in Excel 2010 format, containing the detailed data since records began, summarised by year and by month; and also analysing certificate activity by fuel source grouping per country, and giving details of the number of GOs that have been cancelled for use in other countries ("Ex-Domain Cancellations"), along with their source and destination.

Issuing, Trade & redemption for all countries

	Total : 2001 to 2016									Total : 2014 to 2016								
	Production			Transaction						Production			Transaction					
	Issue	Expire	Cancel	Issue	Transfer	Export	Import	Expire	Cancel	Issue	Expire	Cancel	Issue	Transfer	Export	Import	Expire	Cancel
Wind - onshore	89.307.022	1.539.293	45.440.052	34.244.358	56.054.129	31.185.713	51.347.502	2.629.153	91.506.223	24.996.934	378.843	25.234.397	30.838.451	25.142.784	10.046.374	17.210.880	1.720.536	36.707.503
Wind - offshore	9.883.634	583.290	9.805.387	4.666.912	8.369.302	4.544.030	15.182.916	654.614	14.820.378	4.954.840	69.914	6.618.770	4.666.912	5.374.061	3.531.776	11.815.274	283.636	9.869.100
Wind - unknown	94.010.506	12.610.144	52.391.573	97.310.964	61.519.215	84.988.699	56.204.523	14.376.356	56.396.017	59.754.390	6.996.922	36.527.533	65.712.247	49.714.837	55.816.986	40.077.226	10.292.264	46.413.909
Wind	193.201.162	14.732.727	107.637.012	136.222.234	125.942.646	120.718.442	122.734.941	17.660.123	162.722.618	89.706.164	7.445.679	68.380.700	101.217.610	80.231.682	69.395.136	69.103.380	12.296.436	92.990.512
Hydro/marine	2.180.508.694	120.901.647	961.632.942	1.430.024.615	1.103.053.057	1.610.009.398	1.648.644.470	180.464.733	1.922.921.333	719.291.544	21.830.725	371.231.652	812.776.065	574.804.040	651.088.799	653.281.464	87.117.497	788.370.487
Unspecified mechanical/other	23.126	41.731	186.975	69.580	30.431	21.414	5.897.366	726	5.847.682	16.832		11.911	63.921	22.992	19.642	2.970	726	33.349
Unspecified renewable energy	7.019.272	1.415.843	3.075.569	5.602.882	2.379.882	2.638.703	10.228.909	1.883.101	3.258.169	5.909.818	652.285	2.372.586	5.026.562	1.953.408	2.513.894	2.124.832	1.883.090	3.034.208
Unspecified heat				1.167		1.167							1.167		1.167			
Solar	7.268.667	6.198.597	5.500.609	6.867.435	19.466.984	9.664.521	10.260.480	5.835.702	6.477.200	4.610.060	3.751.999	4.170.553	4.780.019	19.076.693	9.179.357	9.570.547	4.631.936	5.603.726
Geothermal	25.339.007	307.788	6.885.661	19.989.010	13.979.490	18.903.363	18.798.645	353.677	22.705.004	11.448.465	104.567	2.918.435	15.313.842	12.216.120	14.542.436	14.065.002	334.473	14.164.143
Other	39.650.072	7.963.959	15.648.814	32.530.074	35.856.787	31.229.168	45.185.400	8.073.206	38.288.055	21.985.175	4.508.851	9.473.485	25.185.511	33.269.213	26.256.496	25.763.351	6.850.225	22.835.426
Solid - agricultural biomass (inc. energy crops)	10.433.294	315.865	8.062.932	8.129.003	2.073.960	5.376.116	6.531.272	344.862	9.867.151	5.341.300	52.566	5.911.713	5.590.314	800.034	2.123.572	3.050.344	101.292	7.366.924
Solid - agricultural products	1.033.854	83.585	661.291	784.118	192.561	365.362	379.426	90.188	624.325	631.410	46.790	426.230	655.817	121.602	201.147	194.020	65.278	514.947
Solid - renewable fuels (inc. For&Ag bp & w)	61.754.170	3.104.012	11.396.638	17.655.080	36.461.452	21.332.692	19.705.957	3.235.461	53.135.715	8.410.961	762.462	3.974.244	11.096.905	11.498.437	3.767.583	2.162.015	2.908.693	6.712.439
Solid - forestry products	9.569.017	361.242	7.257.640	8.008.559	6.329.496	4.194.557	3.580.484	640.220	8.691.905	5.032.025	159.733	3.557.013	6.220.786	2.783.738	1.957.879	1.584.235	482.383	4.889.182
Solid - forestry by-products & waste	12.923.560	614.544	5.349.771	8.137.322	5.722.080	3.607.767	3.388.036	868.194	8.446.708	5.214.440	111.507	3.390.630	6.244.347	2.785.195	1.406.182	1.576.015	655.165	5.505.456
Gas - landfill	4.449.111	111.756	1.090.024	1.183.485	3.096.068	263.983	285.484	149.684	3.290.948	627.535	35.974	398.337	818.703	738.921	54.849	55.263	95.260	734.208
Gas - sewage	596.876	50.047	242.522	546.346	258.719	1.026.666	1.189.208	262.475	301.242	403.462	9.221	162.183	428.630	9.931	8.940	50.045	209.477	200.366
Gas - other biogas	11.056.502	855.642	6.401.314	7.363.511	7.371.456	1.536.329	1.506.199	1.316.671	8.536.269	5.044.124	246.502	3.523.980	5.397.749	4.745.359	883.372	804.000	865.172	4.648.140
Solid - municipal biogenic waste	38.881.630	1.728.635	18.820.354	23.484.886	14.074.775	9.562.738	6.723.765	1.917.354	28.563.316	16.709.078	444.350	10.553.349	19.294.271	6.913.867	5.711.587	3.492.487	1.197.692	15.256.370
Liquid - renewable fuels (inc. Mun.waste)	5.822.987	201.268	3.671.782	6.011.631	4.270.582	2.980.853	2.595.609	679.042	4.675.645	4.047.695	108.143	2.323.505	4.709.997	3.373.164	2.488.810	1.605.034	345.282	3.720.682
Liquid - black liquor	1.629.922	27.146	1.785.229	1.674.786	1.697.002	2.021.954	3.011.864	28.274	2.290.495	856.942	15.265	1.233.702	1.099.709	1.107.760	1.031.023	2.225.390	28.274	2.086.231
Solid - unspecified wood	2.198.745	311.864	2.560.059	2.263.743	938.961	1.632.665	2.942.898	362.997	2.927.926	1.706.146	251.319	1.987.897	1.836.189	747.862	1.343.990	2.433.106	313.470	2.621.382
Solid - industrial & commercial waste	19.669.530	771.466	7.262.758	9.128.029	14.399.789	2.028.618	3.258.144	1.366.998	16.594.722	4.425.827	375.552	2.843.716	4.621.456	4.738.910	741.778	1.433.746	1.047.133	4.113.312
Biomass	180.019.198	8.537.072	74.562.314	94.370.499	96.886.901	55.930.301	55.098.346	11.262.420	147.946.367	58.450.945	2.619.384	40.286.499	68.014.873	40.364.780	21.720.712	20.665.700	8.314.571	58.369.639
RENEWABLE	2.593.379.126	152.135.405	1.159.481.082	1.693.147.422	1.361.739.391	1.817.887.308	1.871.663.157	217.460.482	2.271.878.373	889.433.828	36.404.639	489.372.336	1.007.194.059	728.669.715	768.461.143	768.813.895	114.578.729	962.566.064
NUCLEAR	171.000.050	34.425.691	77.146.750	115.810.416		274.670	274.670	34.434.259	120.708.930	64.850.747	14.305.859	34.161.935	67.335.372		274.668	274.668	19.037.592	54.321.628
Unknown	2.697.571	107.638	87.842	2.469.343	497.631	2.565.126	73.434	107.638	81.482	2.460.137	106.918		2.460.137	440.716	2.377.028	40.004	107.637	55.994
Solid - Unknown				3.447									3.447					
Solid - Hard coal	2.238.884	1.989.226	689.582	2.238.884	689.582	249.582	1.339.582	1.989.226	689.582	2.238.808	1.989.226	689.582	2.238.808	689.582	249.582	1.339.582	1.989.226	689.582
Solid - Brown coal	67			67														
Solid - Peat	25.770		12.356	48.118	18.948	17.844	12.697	5.355	24.857	25.770		12.356	48.118	18.948	17.844	12.697	5.355	24.857
Solid - Municipal solid waste	2.166.866	725.088	766.725	2.221.961		9.875	129.231	799.138	792.559	1.748.994	488.581	629.565	1.853.077		9.875	129.231	775.865	792.559
Solid - Industrial and commercial waste	189.827	25.421	124.507	212.913		6.369	6.360	29.879	124.507	114.173	4.261	72.063	118.415		9		14.798	120.333
Liquid - Unknown	6.913		6.913	6.913					6.913	5.060		5.060	5.060					6.913
Liquid - Crude oil	11.074	10.656	418	11.074	418	418	418	10.656	418	11.074	10.656	418	11.074	418	418	418	10.656	418
Liquid - Natural gas	256.710									256.710								
Liquid - Petroleum products	123.430	67.801	6.818	123.430				89.415	6.818	78.404	45.412	5.931	80.740				69.374	6.818
Gaseous - Unknown	2			18.076		2		2.270	167				2		2			
Gaseous - Natural gas	10.683.197	355.429	7.795.077	12.921.499	19.515.201	4.950.928	7.485.457	365.203	9.693.349	1.128.880	216.914	1.626.397	1.443.248	2.665.744	688.203	1.934.321	365.183	2.082.727
Gaseous - Coal-derived gas																		
Gaseous - Petroleum products																		
Gaseous - Municipal gas plant																		
Gaseous - Process gas																		
Heat - unknown																		
Heat - Process heat																		
FOSSIL	18.400.311	3.281.259	9.490.238	20.275.725	20.721.780	7.800.144	9.047.179	3.398.780	11.420.652	8.068.010	2.861.968	3.041.372	8.262.126	3.815.408	3.342.961	3.456.253	3.338.094	3.780.201
Total	2.782.779.487	189.842.355	1.246.118.070	1.829.233.563	1.382.461.171	1.825.962.122	1.880.985.006	255.293.521	2.404.007.955	962.352.585	53.572.466	526.575.643	1.082.791.557	732.485.123	772.078.772	772.544.816	136.954.415	1.020.667.893

Issuing, Trade & redemption for all countries

	2016									2015								
	Production			Transaction						Production			Transaction					
	Issue	Expire	Cancel	Issue	Transfer	Export	Import	Expire	Cancel	Issue	Expire	Cancel	Issue	Transfer	Export	Import	Expire	Cancel
Wind - onshore	7.284.969		3.169.959	10.199.617	5.642.818	4.397.495	6.797.913	183.886	11.003.950	10.370.936	107.661	12.868.757	10.373.918	7.102.537	2.888.918	5.395.304	640.511	12.441.604
Wind - offshore	1.082.861		480.185	1.310.285	2.925.660	1.548.709	5.682.307	54.423	3.799.751	3.083.391	50.366	3.964.934	2.636.203	1.100.924	1.728.993	3.592.488	20.812	3.139.177
Wind - unknown	14.346.939		2.651.681	20.007.254	18.857.777	21.116.446	14.495.669	6.477.577	14.787.445	26.779.969	6.282.566	20.238.466	26.188.776	18.270.315	22.008.670	17.820.893	2.213.038	20.433.769
Wind	22.714.769		6.301.825	31.517.156	27.426.255	27.062.650	26.975.889	6.715.886	29.591.146	40.234.296	6.440.593	37.072.157	39.198.897	26.473.776	26.626.581	26.808.685	2.874.361	36.014.550
Hydro/marine	175.740.425		16.749.436	248.969.944	171.042.824	189.828.324	186.899.687	14.694.029	251.989.250	292.013.675	11.886.849	192.095.443	293.240.137	199.174.044	243.856.075	248.594.871	15.004.883	276.643.186
Unspecified mechanical/other	1.410			2.086	6.068	3.933	323		570	9.884		9.926	55.882	10.284	9.281	2.647		30.679
Unspecified renewable energy	883.138		94.767	1.026.173	585.893	605.934	593.322	187.796	981.033	4.080.465	294.890	1.340.543	2.071.351	791.969	1.035.759	1.119.004	955.458	1.337.760
Unspecified heat				1.167		1.167												
Solar	1.545.317		104.196	1.799.829	15.920.691	7.362.816	7.594.837	2.381.864	3.264.544	1.852.430	2.348.996	3.286.648	1.726.680	2.315.470	1.564.895	1.638.253	770.745	1.539.084
Geothermal	1.958.548		477.016	3.583.778	3.437.460	3.649.454	3.436.949	81.121	4.365.654	5.137.888	81.062	1.618.213	6.258.614	3.729.305	6.411.398	6.232.398	210.714	5.254.553
Other	4.388.413		675.979	6.413.033	19.950.112	11.623.304	11.625.431	2.650.781	8.611.801	11.080.667	2.724.948	6.255.330	10.112.527	6.847.028	9.021.333	8.992.302	1.936.917	8.162.076
Solid - agricultural biomass (inc. energy crops)	1.283.706		865.097	1.538.140	576.959	1.078.814	1.293.511	22.185	1.478.897	2.009.037	21.626	2.572.578	2.077.066	170.703	419.366	1.031.432	37.860	3.109.069
Solid - agricultural products	164.613		22.595	187.753	3.357	81.612	74.713	5.124	122.823	229.432	3.126	213.542	254.072	48.170	116.587	116.587	37.890	258.217
Solid - renewable fuels (inc. For&Ag bp & w)	2.059.616		82.405	3.287.509	3.820.058	1.166.399	710.243	384.215	2.179.196	4.006.419	479.608	2.178.539	4.492.682	4.292.735	1.614.541	818.997	582.610	2.496.705
Solid - forestry products	1.034.862		209.811	1.772.177	150.940	482.993	255.831	135.597	1.089.276	1.976.015	79.695	1.401.491	2.408.507	940.011	825.788	679.312	263.098	1.804.706
Solid - forestry by-products & waste	1.274.337		108.087	1.784.681	1.016.631	567.144	622.910	70.933	1.297.889	1.979.971	29.875	1.577.989	2.004.202	496.395	401.697	397.004	174.689	2.006.452
Gas - landfill	100.102		10.127	183.756	159.837	22.339	22.753	20.239	187.704	248.124	16.070	194.613	246.230	187.487	13.970	13.970	31.549	239.091
Gas - sewage	91.956		2.821	144.003	511	2.292	47.288	3.666	78.009	155.230	2.935	73.695	163.157	5.102	1	1	6.225	82.301
Gas - other biogas	1.173.773		343.387	1.444.935	1.766.566	216.791	165.368	115.853	1.205.395	1.928.221	96.864	1.613.487	2.076.292	1.769.201	277.418	270.176	167.520	1.929.582
Solid - municipal biogenic waste	3.864.485		271.780	5.088.000	1.419.292	1.726.868	607.509	197.410	3.166.170	6.606.567	143.360	4.815.082	7.145.297	2.995.921	1.845.071	1.383.995	557.741	5.393.756
Liquid - renewable fuels (inc. Mun.waste)	1.155.123		53.502	1.663.585	1.023.268	958.759	633.859	101.644	1.086.988	1.767.015	95.456	1.287.662	1.707.950	1.333.705	1.017.980	740.156	153.614	1.232.410
Liquid - black liquor	95.033		94.186	190.005	317.488	281.131	1.129.048	2.444	885.923	201.935	2.444	547.810	203.631	204.730	408.704	549.983	12.888	557.803
Solid - unspecified wood	306.011		53.941	674.526	294.264	637.318	1.033.744	211.829	917.347	871.585	199.331	1.127.151	739.552	324.330	507.208	933.273	89.988	1.120.360
Solid - industrial & commercial waste	983.401		141.953	1.567.234	1.479.645	348.939	474.363	180.780	1.391.732	1.951.432	151.894	1.507.576	1.892.559	1.943.642	298.561	505.428	221.589	1.644.164
Biomass	13.587.018		2.259.692	19.526.304	12.028.816	7.571.399	7.071.140	1.451.919	15.087.349	23.930.983	1.322.284	19.111.215	25.411.197	14.712.132	7.746.892	7.440.314	2.337.261	21.874.616
RENEWABLE	216.430.625		25.986.932	306.426.437	230.448.007	236.085.677	232.572.147	25.512.615	305.279.546	367.259.621	22.374.674	254.534.145	367.962.758	247.206.980	287.250.881	291.836.172	22.153.422	342.694.428
NUCLEAR	16.406.846			18.393.285		85.904	85.904	3.844.804	18.200.799	22.065.516	2.641.814	18.872.798	22.826.496		106.279	106.279	10.930.536	15.961.136
Unknown	261.759			269.806		668.141	4	53.677		1.097.404	945		1.192.089		762.979	40.000	53.241	
Solid - Unknown				3.447														
Solid - Hard coal							650.000	47.714					1.397.144	249.582	249.582	249.582	1.941.512	249.582
Solid - Brown coal																		
Solid - Peat	20.652		7.238	32.793	12.641	14.181	9.034	5.355	18.550	5.118		5.118	15.325	6.307	3.663	3.663		6.307
Solid - Municipal solid waste	643.174			817.058		6.169		311.193	253.342	587.264	267.269	332.322	551.797		3.706	129.231	233.236	402.057
Solid - Industrial and commercial waste	38.802			48.300				2.555	28.728	29.662	1.888	28.728	23.345				2.854	43.335
Liquid - Unknown													5.060					5.060
Liquid - Crude oil													5.541	418	418	418	10.656	418
Liquid - Natural gas	154.855									84.952								
Liquid - Petroleum products	22.945			25.842				22.724	4.021	28.343	20.299	4.021	28.120				24.575	1.910
Gaseous - Unknown																		
Gaseous - Natural gas	536.986		8.149	864.713	827.942	354.303	372.440	153.853	723.727	463.701	130.344	949.155	466.628	977.899	247.899	970.878	77.831	952.670
Gaseous - Coal-derived gas																		
Gaseous - Petroleum products																		
Gaseous - Municipal gas plant																		
Gaseous - Process gas																		
Heat - unknown																		
Heat - Process heat																		
FOSSIL	1.679.173		15.387	2.061.959	840.583	1.042.794	1.031.478	597.071	1.028.368	2.296.444	420.745	1.319.344	3.685.049	1.234.206	1.268.247	1.393.772	2.343.905	1.661.339
Total	234.516.644	0	26.002.319	326.881.681	231.288.590	237.214.375	233.689.529	29.954.490	324.508.713	391.621.581	25.437.233	274.726.287	394.474.303	248.441.186	288.625.407	293.336.223	35.427.863	360.316.903

Forthcoming events

1 Dec 2016	Baden, Switzerland	Open Markets Committee
2 Dec 2016	Baden, Switzerland	AIB General Meeting
21-22 Mar 2017	Amsterdam, Netherlands	RECs Market Meeting
30-31 Mar 2017	Athens, Greece	AIB General Meeting
8-9 June 2017	Helsinki, Finland	AIB General Meeting