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NEWSLETTER 25

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SYNOPSIS OF ARTICLES

AIB responds to Commission Consultation on new RED

The response was part of the outcome of the AlB's project to provide the Commission with input for the revision of the Directive. Part of this process is also a dialogue with relevant stakeholders, and an article in the ICER Chronicle. Read the main points of the response to the consultation in this newsletter.

AIB and BEUC in discussion

BEUC launched a 2-year project on green electricity, and prosumers as well as the AIB appreciate the constructive discussions. In an interview you can read more about BEUC's views on GOs as a trustworthy instrument for disclosing electricity from renewable sources to the consumer, additionality and AIB's call for 'full disclosure'.

Recruitment of new EECS members

AIB members provide the services of helping newcomers and observers, and to guiding them through the process of joining the organisation. In April 2016, the AIB is an active group of 23 members from 20 countries.

Norway – Oslo - Statnett

Statnett issues one third of all European GOs and is a very supportive member of the AIB since the beginning in 2001. Find some information about NECS, disclosure in Norway and read about Statnett's welcoming of all AIB members and observers for the General Meeting in Oslo on 10 June!

RECS Market Meeting 2016

This article is based on the presentation given by Dirk van Evercooren, President of the AIB. He assembles what is working well and things that do not work (well) yet. And he discusses a real quantum leap for the future – full disclosure.

Latest News

- RECS International appoints new Secretary-General.
- Unicorn Systems successfully launches the new AIB central processing HUB.

Statistics

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



AIB Responds to Commission Consultation on new RED

On 11th February 2016, the Association of Issuing Bodies submitted its views on Guarantees of Origin and Electricity Disclosure in Europe for the EU Commission's consultation on the new Renewable Energy Directive. The response was one of the outcomes of the AIB's project to provide the Commission with input for the revision of the Directive, which started with publication of the AIB's <u>Reflection Paper</u> on 20th June 2015. Since then, the AIB has been heavily engaged in dialogue with the relevant stakeholders, provided more input to the Commission and published an <u>article</u> in the ICER Chronicle. The issue was also reflected in the previous <u>AIB Newsletter</u>. In the following article, we assemble the main points of the response to the consultation.

On the technical side, EECS has already harmonized the GO system in most European countries and the AIB HUB provides a reliable interconnector between national GO registries. The volume of renewable energy certified through EECS is currently around 360 TWh, representing more than one third of renewable electricity generation in Europe. This is impressive, considering that a large part of renewable electricity generation is ineligible for GOs due to how national support schemes are set up in some countries, and acknowledging that not all European countries are members of the AIB. A notable downside of the current GO system is its limitation to include renewable energy only, which makes distinguishing the various 'shades of gray', meaning fossil and nuclear energy, difficult. Indeed, electricity consumption which is not tracked through GOs is often rather homogeneous in terms of the energy origin, and therefore doesn't properly incentivize consumers to change supply. The EECS Framework has been built to accommodate all energy sources, and so the topic of 'Full-Disclosure' is especially worth investigating thoroughly, given that no technical changes to EECS are necessary. Tracking all energy through GOs could help the systemisation and automation of electricity disclosure, and make the entire system more reliable and meaningful for end-customers.

Article 3, Paragraph 9b of the Internal Energy Market Directive (2009/72/EC) requires electricity suppliers to disclose to endcustomers the CO2 emissions and radioactive waste resulting from the generation of the supplied electricity. Since suppliers use GOs to obtain reliable energy source information for electricity disclosure, it would be logical for them to use GOs to disclose the environmental impacts as well. Solving the remaining issues regarding availability of data will determine how this data can be associated with a GO. Even though, on the technical side, EECS manages the reliability and robustness of GOs, remaining challenges persist on the harmonisation and enforcement of a reliable electricity disclosure regime. Sub-optimal rules for electricity disclosure are currently the leading cause of the same unit of renewable energy being improperly 'owned' by two different consumers. This can happen either because the tracking scheme is poorly communicated to the public, or because rules for disclosure allow it to happen directly. Setting the legal basis of GOs and electricity disclosure in a single directive would go some way to help resolving the indirect relationship between the two, by making GOs **the** mechanism for electricity disclosure. Another important element is that suppliers should not be permitted to disclose electricity sold through electricity products to customers for 'regular' (non-energy specific) products. This is currently allowed in some countries, and leads to double counting.

The AIB believes that with these and other improvements set forth in the Reflection Paper, the European GO and Electricity Disclosure system will get a significant boost in its mission of providing a consumer-driven mechanism for a greener future.

Read the response <u>here</u>.

Green electricity and Guarantees of Origin – AIB and BEUC in discussion

AIB: Why did BEUC decide to launch a 2-year project on green electricity and prosumers? What are the goals of your project?

Over the past years, consumers have faced issues related to green electricity that remain unsolved. Among these issues is insufficient transparency in connection with the 'green' tariffs that electricity suppliers offer consumers. We have also observed that, though consumers can now take part in small scale and decentralised energy generation, there are still several barriers for them to benefit from this opportunity.

Our project aims to improve market transparency, meaning that we want to make sure consumers who want to 'go green' get exactly that. Many consumer organisations in the BEUC network have identified misleading 'green electricity' offers in their countries. However, there are also a few good practices on the national level that help consumers to find trustworthy 'green' tariffs. These solutions should be part of the current debate about a consumer-centric Energy Union. 2. AIB: BEUC now supports the Guarantee of Origin as the only trustworthy instrument for disclosing electricity from renewable sources to the consumer, but some five years ago, many consumer organisations were still sceptical. Why this change?

BEUC's views have not changed. We see Guarantees of Origin (GOs) as a statistical tracking tool to be used by the Member States. Consumer organisations are not against GOs or other tracking schemes at all, but we are against the way a number of suppliers use them, particularly when they are used as a 'green façade' for marketing. Since GOs can be traded separately from the renewable megawatt-hours they were originally issued for, they can be used by electricity suppliers to cover up non-renewable electricity. GOs alone fail to substantiate the environmental benefits that are hinted at in advertising. That's why we're still sceptical about 'green electricity' tariffs.

3. AIB: You insist on the fact that consumers expect additionality, but how exactly would you define that concept?



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- In practice, offering 'additionality' of an offer ' could >> mean adding a surcharge per kilowatt-hour to 'green' tariffs which gets channelled to a third-party supervised fund. The capital would then be directed from this fund into new, additional generation capacities, going beyond 'business as usual' investment. Suppliers should have to say what the revenue from 'green' tariffs' was spent on, and how they contributed to generating new capacity which would not have been launched otherwise. If the investment in an old renewable power plant is already paid off, then buying its electricity does not provide any additional benefit for the environment. Large companies like Google ask for "new, additional renewables capacity, not the old stuff which is already in the grid."
 - 4. AIB: Does the concept of additionality mean that GOs cannot be traded between a producer and a supplier? That only producers with capacity to produce electricity from renewable sources can sell green electricity?

No, additionality can be substantiated by all retailers, not just producer-suppliers. This question leads us away from our main concern, which is the quality of the offer: can consumers be sure that the money spent on a 'green' tariff truly contributes to an energy transition? Has their 'green' choice had any measurable impact on the environment? Trade in GOs alone won't solve this. The trade of GOs should be supplemented by proof about how the supplier has used the money to invest in additional renewable energy generation. Otherwise, despite making a seemingly 'green' choice, consumers could actually be supporting fossil fuels or nuclear unknowingly.

5. AIB: Do you feel that all green electricity contracts need to ensure additionality? How does BEUC want to ensure this, through consumer pressure, legislation, self-regulation, private green electricity labels...?

Legislation on this issue is necessary. Our mapping report revealed that the rules for defining what is 'green' in a 'green' tariff are deficient and need changing. According to surveys and studies from several Member States, suppliers' practices in 'green electricity' marketing are very confusing for consumers. Frequently, offers and what consumers understand or expect from them don't match.

But some positive examples from Member States do exist. For instance, the UK regulator, Ofgem, requires all suppliers to explain what the additional environmental benefit marketed in a 'green' tariff is. In Denmark, the Ombudsman, together with the industry, consumer organisations and environmentalists, developed minimum criteria for delivering environmental benefits that are accepted by all market participants. If regulators don't act, consumer organisations and environmental NGOs fill the gap in some Member States: they offer independent quality labels or rankings to guide consumers.

- 6. AIB: In a recent debate in the EP, Monique Goyens, Director General of BEUC, said that she would support the electricity industry if it would clearly distinguish between 'renewable contracts' without additionality and 'green contracts' with additionality, next to the other contracts, of course.
- How about setting up a dialogue with the industry on this, like BEUC did on transparent billing?

Setting up a dialogue would help but it is a means, not an end. Consumers need answers now. It would be interesting to know how the industry and the issuing bodies would address consumers' misperception caused by unbundled purchase of GOs.

7. AIB: BEUC also supports the call of the AIB for 'full disclosure', the use of GOs for tracking all sources of electricity, not just from renewable sources and high-efficiency cogeneration. How do you see this changing the electricity market and how will it impact the consumer? From a consumer point of view, we support full disclosure because it is against the idea of a levelplaying field to make GOs binding for renewable power plant operators only. Suppliers with a fuel mix which is dirtier than the national average would be unable to hide behind the disclosure of the 'anonymous' national average mix anymore. On the statistical level, it could make fuel mix disclosure more accurate. However, full disclosure is not a silver bullet. With regard to our main concern on

misleading offers and missing environmental benefits, it does not necessarily help. And the impact on markets and consumers remains unclear. For most Member States' practices, full disclosure would mean an important change. So the ball is on the side of the issuing bodies and regulators to assess distributional costs in a transparent way.

AIB thanks Jörg Mühlenhoff from BEUC for this interview!



Jörg Mühlenhoff is the Project Coordinator on Renewable Energy at BEUC, the European Consumer Organisation. BEUC is the umbrella group for 42 inde-

pendent national consumer organisations from 31 European countries. It represents them at European level and defends the interests of all Europe's consumers. <u>http://www.beuc.eu/energy</u>

Recruitment of new EECS members

By April 2016, the members of the AIB numbered 23 Issuing Bodies from 20 Member States of the EU. These competent bodies are – in terms of implementation of the system of Guarantees of Origin, Directive 2009/28/EC - mainly transmission system operators and regulators; however, several of them are market operators and energy agencies.

Current status as of April 2016 includes the following 23 members:

| | Country | AIB Member |
|-----|----------------|-------------------|
| 1. | Austria | E-Control |
| 2. | Belgium | Federal - CREG |
| 3. | Belgium | Brussels - Brugel |
| 4. | Belgium | Flanders - VREG |
| 5. | Belgium | Wallonia - CWaPE |
| 6. | Croatia | HROTE |
| 7. | Cyprus | TSO-CY |
| 8. | Czech Republic | OTE |
| 9. | Denmark | Energinet.dk |
| 10. | Estonia | Elering |
| 11. | Finland | Finextra |
| 12. | France | Powernext |
| 13. | Germany | UBA |
| 14. | Iceland | Landsnet |
| 15. | Ireland | SEM-O |
| 16. | Italy | GSE |
| 17. | Luxembourg | ILR |
| 18. | Netherlands | TenneT - CertiQ |
| 19. | Norway | Statnett |
| 20. | Slovenia | AGEN-RS |
| 21. | Spain | CNMC |
| 22. | Sweden | Grexel |
| 23. | Switzerland | Swissgrid |

Table 1. The list of AIB members in April 2016

The current status of some AIB members was changed during 2015: (i) Finextra (TSO from Finland) replaced the previous member for Finland, Grexel and (ii) CNMC (Spanish regulator) replaced the previous member for Spain, GCC.

OTE has open issues with implementation of the disclosure rule in Czech Republic. Therefore its electronic system was disconnected from the international HUB, but OTE stays an AIB member (EECS member scheme).

The German issuing body (UBA) had been the only participant with the status of HUB user until March 2016, when UBA became an AIB member.

There are a few countries with "old" and "new" observer status that are considering membership or have started the process of joining the AIB:

- EMS (TSO) from Serbia, (ii) Ofgem (Regulator) from the UK,
 (iii) the Operator for Renewable Energy Sources and Efficient
 Cogeneration (Market Operator) from Bosnia and Herzegovina,
 Federation of Bosnia and Herzegovina and (iv) the Turkish Ministry
 of Energy and Natural Resources are observers;
- Litgrid AB (TSO) from Lithuania is also close to applying for membership of the AIB.

The map of Europe, showing AIB activities, demonstrates that the countries have different status - whether it is a member, a formal applicant for membership or a country which has shown an interest in the AIB work, or a country to which the AIB has made a first step of approach. However, there are a few countries with no activity as the AIB has had no formal contact with them so far.



Figure 1. Map of Europe with AIB activities

AIB members provide the service of helping newcomers and observers, and guiding them through the process of joining the organisation. This includes teleconferences, emails, or other communications, and also physical meetings where distance and budgets enable this. For example, in this way, the observers from Serbia and Bosnia and Herzegovina became more involved into the organisation and have become active observers.



Norway – Oslo – Statnett

Statnett – building the next generation power system

The premises of Statnett are located in an old industrial area, to the north of Oslo. Over the past 20 years, the area has been transformed into a vibrant business and housing area with a new modern metro station. You could also say that Statnett itself has been transformed during the past 10 years. The deregulation of the power market in 1991 led to efficiency gains. This reduced the need for investment in both power plants and the grid network. Investments were low until 2005, when it became evident that renovation and strengthening of the grid was urgently needed. Statnett had to be scaled up significantly in order to complete the investment projects needed by 2020. This year, investment in new and existing grids will exceed 6 billion NOKs. The estimated cost of projects being planned and completed over the period 2016-20 is between 40-55 billion NOKs.

The Norwegian Energy Certificate System

The Norwegian Energy Certificate System (NECS) is the name of the Norwegian registry, and it is not only used for GOs, but also for elcertificates. Elcertificates are part of a financial support scheme to stimulate the development of new electricity production from renewable sources in Norway and Sweden. There are 52 account holders of GOs in NECS, of which 14 are foreign, and there are 1 079 plants registered in NECS with an installed capacity of 32 775 MW, of which 97 % is hydropower. 8 447 transactions were completed in the registry in 2015, involving 283 million GOs. The number of transactions has increased eightfold over the past 5 years.

NECS is developed and maintained by Grexel Systems Oy in Finland, and Statnett and Grexel have cooperated for 15 years.



Statnett's grid investments (2015 prices)

>> Statnett in AIB

Statnett has been member of the AIB since it was founded in 2001, and has always given priority to the work in the AIB. The reason is simple: as it issues one third of all European GOs, the development of the system is key for Norwegian producers. In addition, it is both fun and developing. Currently Lars Olav Fosse is a member of the AIB Board, and Jennifer Holgate is one of two co-chairs of the Working Group Systems.

Disclosure for Norway

Although Norway is a major exporter of GOs, the number of cancelled GOs for Norway is slowly increasing. In 2014, 19 TWh (15 % of Norwegian consumption ¹) was covered by GOs. The volume for 2015 is 20 TWh. Still, 85 % of the consumption is covered by the Norwegian residual mix. Since Norway issues GOs for nearly all production, that means that most of the Norwegian residual mix is based on the European attribute mix. The consumption of those consumers that do not chose a power supply which is contracted and backed by GOs will be 54 % fossil fuel and 37 % nuclear power. Recently the price comparison service <u>www.strompris.no</u> was launched by the Norwegian Consumer Council. This service makes it possible to search only for offers backed by guarantees of origin.

Welcome to Oslo

Did you know that there are more than 5 000 concerts in Oslo each year, much more than offered by neighbouring Stockholm and Copenhagen? In Oslo, you can go by metro to go downhill skiing, or you can jump on one of the ferries taking you to one of the islands just outside the city centre, where you can go swimming in the summer. Oslo is actually the fastest growing capital in Europe, attracting people from all over the world. Within the last 30 years, Oslo has gone from being a sleepy, little town in the periphery of Europe, to becoming a vibrant small metropolis.

We hope our guests from the AIB will have a nice visit to Oslo in June.

¹ For further details and evidence please go to <u>http://necs.statnett.no/Lists/</u><u>PublicPages/Statistics.aspx</u> and choose Cancellation, put 2014-04 as start date and 2015-03 as end date (to cover 2014 cancellations). This way you get the figure 19 016 828 for Norway only





Active customers take responsibility for their choices

Rec: Market Meeting 2016 The power of transportery The power of transportery

8-9 MARCH AMSTERDAM, NETHERLANDS

This article is based on the presentation by Dirk van Evercooren, AIB President, given at the RECS Market Meeting 2016 in Amsterdam on 8 March.

With regard to disclosure of information to electricity consumers we cannot say that things are perfect yet; but if we look at the progress made over the past 10 years we are definitely going in the right direction!

Let's first take a look at what already works:

- The GO was created in European legislation and was given a specific purpose: to disclose the origin of electricity from renewable sources to end consumers.
- This has been done, starting with European legislation - first implemented at national level and then coordinated and harmonized in more and more countries thanks to AIB's EECS standard. This harmonisation was, among other things, instrumental in making disclosure much more reliable and therefore relevant for consumers.

But the GO only makes sense in a **broader** perspective: to disclose the origin of all electricity to all electricity customers in Europe, whether they are big corporate clients, SMEs or households. After all, why would we even bother to inform electricity customers about the origin of the electricity they consume? Because origin matters! (paraphrasing the slogan of another panellist's company).

But some problems have come to the surface recently! First, we see the debate re-rising regarding national solutions, like in the Netherlands, where some consumers see local GOs as 'good', while GOs imported from countries such as Norway and Iceland are seen by many as 'bad'. This return to the national level is the first dark cloud looming over the future of disclosure, because often, this debate sheds a dark shadow over (the use of) Guarantees of Origin.

We must remember that not all electricity is generated in the same way, but all electricity that comes out of the wall socket is exactly the same. So we need GOs to differentiate between electricity that was produced from zero carbon emitting sources and electricity from sources that leave a significant greenhouse gas footprint.

In a way, it's too easy to be a 'dirty' electricity consumer: if a consumer does not actively and explicitly buy electricity from renewable sources the electricity supply is just a mix. This is the second dark cloud! A mix which may consist of hard coal, lignite, gas, nuclear and supported renewables from countries where these are not entitled to GOs If you're not a green electricity consumer, you get stuck with the leftovers - the bad candy! And this environmental impact should be made clear to the consumer.



Dark clouds shed dark shadows over (the use of) Guarantees of Origin.

Now let's take a look at some of the things which do not work (well) yet:

- Disclosure of information on electricity from non-renewable sources is much less reliable and the mix of different disclosure systems makes the process less cost-efficient.
- Unfortunately, in many countries electricity suppliers are not legally bound to use GOs to disclose the origin of electricity in order to claim that the electricity they supply is green. Also consumers can still get away with claiming to be sustainable without proving the origin of their consumption with GOs. This still leaves possibilities for 'double perception': while the green attributes have been exported, some suppliers

and consumers keep claiming the greenness based on the production mix, ignoring the impact of the exported GOs and the imported fossil attributes on the consumption mixes. But make no mistake about it, it's the supplier mixes that count, not the production mix!

• Europe should simply take the next step and make legislation stating that disclosure systems can only be based on GOs. That way, the industry in Iceland can no longer claim to be green, sustainable and zero carbon, unless they prove their claim with GOs! (I am sorry if this sounds aggressive, but this is truly a great danger to the trust that consumers put in to the disclosure system!)

- Will we ever be able to a) explain to Icelandic and Norwegian households and SMEs that their electricity is not 'automatically' green? And b) convince them that they therefore need to buy GOs or sign an electricity contract that is covered by GOs? I think this will be very hard to do, so – let me try to provoke your mind here - why not give them the GOs for free, so that their perception is indeed matched by reality? After all, if public value does not exist in countries exporting GOs a stable market will not be feasible and the long term perspective for producers and traders will remain uncertain. So if all Icelandic and Norwegian suppliers offered green contracts only (backed by GOs off course!) to households and SME consumers, would that be a solution to the double perception problem?
- Just to be perfectly clear, some people asked me after the presentation whether the AIB shares the view of some Dutch consumers that value Nordic GOs less than others. We don't see things that way! But it is indisputable that such views do exist within the Netherlands and indeed elsewhere. However, we would like to make clear that the AIB does not support such views, but merely acknowledges their existence.

So, will we see focus turn to the European or to the national level when future developments in the connection with disclosure information are on the table? Does it make sense - when integrating the European internal energy market - to focus on national level when renewables are concerned? Imagine that we deal with all the complexities introduced by market coupling between the European member states, only to fall back on a national focus when RES-GOs come into play...

Yes, 'local' is an important marketing argument. It has many merits, including the combat of the NIMBY reflex where new investments in renewable production are at stake, but at system level it does not make sense to lose the European dimension! So we need a European harmonisation of disclosure information, a European ban on claims of using electricity from renewable sources that are not substantiated by GOs and we need a disclosure system that delivers the fine details to those customers who require them!

Is the current disclosure information sufficient? Clearly not! Some consumers want to go much further into detail: for electricity from renewable sources, this is perfectly possible, given the detailed level of information on the GO. It is possible to reliably sell a product of the type 'German offshore wind' of 'Portuguese small-scale solar'. I am pretty sure that there is a market for such products, even if it most likely starts with the local rather than the multinational suppliers. Just look at a supplier like Vandebron (literally: FromtheSource) in the Netherlands! This will also help to support the GO as cornerstone of the disclosure system: the critical voices are precisely among those small-scale electricity companies, who feel that, the current "GO = renewable sources, period"-information is more harmful than beneficial...

But the real quantum leap ahead will be when the principle of Full Disclosure can be entered into the European Directives: the use of the GO as the unique instrument for disclosing all electricity, regardless of the source. This is often met by concerns of cost and administrative burden. I feel this is not a real concern. Firstly, several countries already have FD: Austria and Switzerland have it on a mandatory basis, Sweden on a voluntary basis. Secondly, the number of production facilities to enter into the system to issue GOs for fossil and nuclear is very limited, compared to the number



The European market and disclosure system, with the GO as its cornerstone, has the potential for a real green energy market.

of renewable and CoGen facilities. Thirdly, the information that fossil and nuclear facilities need to report to allow issuing is already reported to others, such as TSOs, regulators or ministries. On the other hand, full disclosure will standardise the Disclosure system, therefore making it more cost-efficient than the current hybrid system. It will also be more reliable and will make consumers accountable for their choices. Finally, full disclosure will create a level playing field for all electricity producers, whereas now, the cost of the system is only supported by the renewable producers...

Some consumers are only interested in production from recently build plants, or even in signing contracts that include a commitment from the supplier to invest in new renewable capacity, like the Dutch railways did. That's additionality for you! So while the GO system does not embody additionality, it is fully capable of facilitating it!

Let's be optimistic! We have come a long way: 10 years ago, a green electricity contract was a leap of faith for consumers at best, and something very fishy at worst; it is now a viable and relevant option for electricity consumers - large and small.

Can we sit back and rest satisfied? Absolutely not! Consumers are not confronted with the environmental consequences of their choice of electricity contract and are therefore not yet driving the market towards more clean electricity production. The European market and disclosure system, with the GO as its cornerstone, has the potential to do so. Let's develop this potential and reinforce the directives to the benefit of the European consumers!

Latest News

RECS International appoints new Secretary-General

On March 7, 2016 Peter Niermeijer resigned as Secretary-General of RECS International. The former Deputy Secretary-General, Jared Braslawsky, was appointed to replace him in the position. Peter was thanked during the RECS International General Meeting for his years of dedication to the organization. Since the inception of RECS International on December 23, 2002 Peter has held the position of its Secretary-General. The success of the guarantee of origin system in Europe was in part due to Peter's constant drive for improving the tracking system and the information consumers received about their electricity. Peter will remain active as an advisor to RECS International, and as a board member of the International REC Standard.



Gift from RECS International board to Peter

Unicorn Systems successfully launches the new AIB central processing HUB

After hard work from both the Association of Issuing Bodies (AIB) and Unicorn Systems teams, Unicorn Systems successfully launched the renewed central inter-registry HUB application for the AIB on 8 March 2016. AIB promotes the use of a standardised system, based on harmonised environment, structures and procedures in order to ensure the reliable operation of international energy certificate systems. This standardised system is known as EECS[©] – the European Energy Certificate System. In doing so it ensures reliable and efficient cross-border exchange of guarantees of origin (GOs), thereby strengthening and enlarging the market.

In order to further facilitate the international exchange of energy certificates, and due to the enormous growth of the GOs traded, the previous system was no longer sufficient. Unicorn Systems has completely redesigned and rebuilt the application and made it futureproof. To be able to achieve the given goals, Unicorn Systems built the solution upon its own Unicorn Open Energy Platform, which is also being used by other European ICT Integration Solutions in the Energy Domain. The new solution will be hosted, operated and maintained in the Unicorn Energy Cloud. The AIB HUB will in the future include more functionality, e.g. an accountholders database, which will facilitate the transfers of GOs, and monitoring.

UNICORN Systems



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, at: Statistics. This is based on the most up-to-date information, including corrected errors discovered in base data.

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

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These statistics were completed on 28th April 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:

| Country | Collected | Source |
|--------------------|--------------------|--|
| Austria | 27 April 2016 | website (password protected) |
| Belgium - Federal | 21 April 2016 | spreadsheet provided by CREG |
| Belgium - Brussels | 15 April 2016 | spreadsheet provided by Brugel |
| Belgium - Flanders | 14 April 2016 | spreadsheet provided by VREG |
| Belgium - Wallonia | 05 April 2016 | spreadsheet provided by CWaPE |
| Croatia | 26 April 2016 | website |
| Cyprus | | Not yet available |
| Czech Republic | 18 April 2016 | spreadsheet provided by OTE |
| Denmark | 28 April 2016 | website cmo.grexel.com |
| Estonia | 20 April 2016 | spreadsheet provided by Elering |
| Finland | 01 April 2016 | spreadsheet provided by FinExtra |
| France | 21 April 2016 | spreadsheet provided by Powernext |
| Germany | 20 April 2016 | <u>website</u> |
| Greece | | Not yet available |
| Iceland | 27 April 2016 | website |
| Ireland | 27 April 2016 | website |
| Italy | 18 April 2016 | spreadsheet provided by GSE |
| Luxembourg | 27 April 2016 | website |
| Netherlands | 05 April 2016 | spreadsheet provided by CertiQ |
| Norway | 29 April 2016 | website |
| Portugal | | Not yet available |
| Slovenia | 10 January 2012 | Only one market party currently, so publica- tion of data would expose their trading position. Data will be published when other market parties commence trading. |
| Spain | - | Not yet available |
| Sweden | 28 April 2016 | website |
| Switzerland | 26 April 2016 | website (password protected) |

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 To500000 (combustion) and To7000000 (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).

Statistical report

During the first 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:

- 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.
- 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 member countries replace RECS certificates with GOs – the last issuers of RECS certificates (at the end of 2014) were Spain and Portugal: GCC of Spain ceased transferring RECS certificates at this point and left the AIB; while REN of Portugal ceased to transfer RECS certificates at the end of 2015 and left the AIB.

Spain (CNMC) became a member of the AIB in March 2016, and after the conclusion of various technicalities will commence activity, issuing GOs. UBA of Germany changed status at the same time, becoming a full member of the AIB rather than simply a user of the AIB Hub.

Energimyndigheten of Sweden has applied for membership, and expects to replace Grexel and become active in mid-2016. Also, LAGIE of Greece and Litgrid of Lithuania have applied for membership, and will probably also become active later in 2016.

Cyprus continues to test its registry against the new AIB Hub, and will soon connect to the new Hub.

Ofgem of the United Kingdom, RES Operator of Bosnia and Herzegovina, Elektromreža Srbije of Serbia 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)



^{■2010 ■2011 ■2012 ■2013 ■2014 ■2015 ■2016}

It is interesting to see how the market has developed since its inception in 2001. Note that the issuing statistics are now based on transaction dates, whereas past newsletters used the production dates for these.

Cancellation continues to grow, and 2015 again exceeded 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, Italy and Finland; while Germany, Norway, Sweden and Belgium 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 the Benelux countries.

Annual EECS transactions by transaction date (TWh)





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



Monthly exports per country (TWh)



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. 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; and 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-D | omain C | ANCELL | ATIONS BY | COUNTR | Y : QUART | ER ZUIOG | 51 1 | | | | | | | | | |
|----------------------|--------|----|-----|-----|-----|---------|----|------|---------|--------|-----------|--------|-----------|----------|---------|----|----|---|----|----|-----------|-----------|----|-----------|
| | Source | | | | | | | | | | | | | | | | | | | | | | | |
| Destination | AT | BE | BEB | BEF | BEW | СН | СҮ | cz | DE | DK | EE | ES | FL | FR | HR | IE | IS | п | LU | NL | NO | SE | SI | Total |
| Australia | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.360 | 0 | 0 | 1.360 |
| Brazil | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 37 | 6.670 | 0 | 6.707 |
| Bulgaria | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 27.738 | 0 | 0 | 27.738 |
| Chile | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 183 | 0 | 0 | 183 |
| China | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 332 | 0 | 0 | 332 |
| Cyprus | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 120 | 0 | 0 | 120 |
| Czech Republic | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9.397 | 6.125 | 0 | 15.522 |
| Greece | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 24.167 | 0 | 0 | 24.167 |
| Hungary | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 57.581 | 0 | 0 | 57.581 |
| India | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18 | 0 | 18 |
| Latvia | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 99.657 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6.673 | 304.404 | 0 | 410.734 |
| Lithuania | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 216.846 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 36.959 | 0 | 0 | 253.805 |
| Poland | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 233.478 | 18.027 | 0 | 251.505 |
| Portugal | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 49.728 | 0 | 0 | 49.728 |
| Romania | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13.153 | 0 | 0 | 13.153 |
| Russia | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 641 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 26.670 | 0 | 0 | 27.311 |
| Saudi Arabia | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 748 | 0 | 0 | 748 |
| Serbia | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13.387 | 0 | 0 | 13.387 |
| Singapore | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 249 | 0 | 0 | 249 |
| Slovakia | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7.500 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 209.445 | 169.632 | 0 | 386.577 |
| Spain | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 39.274 | 712 | 0 | 39.986 |
| Sweden | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 220.000 | 0 | 0 | 220.000 |
| Turkey | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5.170 | 0 | 5.170 |
| UK | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 85.390 | 0 | 151.274 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.005.833 | 1.690.653 | 0 | 4.933.150 |
| United Arab Emirates | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.111 | 0 | 0 | 1.111 |
| United States | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13.574 | 0 | 0 | 13.574 |
| Unknown | 0 | 0 | 0 | 0 | 0 | 594.110 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 594.110 |
| Total | 0 | 0 | 0 | 0 | 0 | 594.110 | 0 | 0 | 0 | 0 | 401.893 | 0 | 159.415 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.991.197 | 2.201.411 | 0 | 7.348.026 |

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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, the picture in 2016 is similar to 2015.

So far, the contribution of 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.





2015 Cancel

Wind-onshore

3%

_Wind-offshore

1%

Wind-unknown

6%

Nuclear

4%

2015 Issue

_Wind-onshore 3%

Wind-offshore 1%

Wind-unknown 7%

Nuclear





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.







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 2015 until the date of collection of the data (during April 2016 – although note that not all registries can provide the required information upon request – see also "Explanatory notes to statistics" in this statistical report).

| | | | | | | l: | ssuing, Ti | RADE & RE | DEMPTION | I FOR ALL F | UELS | | | | | | | |
|-------------------|---------------|-------------|---------------|---------------|-----------------|---------------|---------------|-------------|---------------|-------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | | | | Тот/ | аl : 2001 то 20 |)16 | | | | | | | 20 |)14 то 2016 | | | | |
| | PRODUCTION | | | TRANSACTION | | | | | | PRODUCTION | | | TRANSACTION | | | | | |
| | Issue | Expire | CANCEL | ISSUE | Transfer | Export | Import | Expire | CANCEL | Issue | Expire | Cancel | Issue | Transfer | Export | Import | Expire | CANCEL |
| Austria | 55.774.065 | | 82.203.641 | 58.712.287 | 109.108.314 | 73.577.035 | 140.607.813 | | 114.663.881 | 19.831.510 | | 34.912.103 | 27.862.394 | 48.546.936 | 33.597.849 | 52.871.130 | | 48.747.676 |
| Belgium (Federal) | 2.193.114 | | | 2.406.637 | | 1.894.797 | | | | 2.193.114 | | | 2.406.637 | | 1.894.797 | | | |
| Belgium Brussels | 190.304 | | 102.041 | 77.388 | 6.485.268 | 14.800 | 11.722.390 | 5.390 | 19.141.592 | 179.510 | | 102.041 | 77.388 | 6.477.904 | | 832.404 | 5.390 | 7.137.526 |
| Belgium Flanders | 27.657.103 | 4.348.776 | 15.437.156 | 23.460.871 | 109.594.347 | 50.201.995 | 213.257.304 | 6.499.382 | 140.448.347 | 8.393.540 | 1.475.335 | 3.097.002 | 9.684.092 | 55.984.366 | 34.954.150 | 55.479.367 | 2.928.110 | 20.259.696 |
| Belg & Lux RECS | 113.390 | | | | | | 2.031.496 | | 2.048.355 | | | | | | | | | |
| Belgium Wallonia | 9.806.585 | 29.136 | 3.881.343 | 4.937.405 | 35.006.343 | 20.634.375 | 76.519.176 | 1.147.437 | 49.869.839 | 3.311.397 | 29.136 | 1.613.412 | 4.937.405 | 19.396.880 | 11.286.651 | 19.405.262 | 776.613 | 9.137.226 |
| Belgium | 39.960.496 | 4.377.912 | 19.420.540 | 30.882.301 | 151.085.958 | 72.745.967 | 303.530.366 | 7.652.209 | 211.508.133 | 14.077.561 | 1.504.471 | 4.812.455 | 17.105.522 | 81.859.150 | 48.135.598 | 75.717.033 | 3.710.113 | 36.534.448 |
| Switzerland | 234.985.794 | 31.544.793 | 156.021.898 | 236.405.837 | 102.015 | 30.517.271 | 49.737.489 | 79.470.454 | 178.038.394 | 136.371.885 | 18.234.051 | 71.025.785 | 142.538.774 | | 18.781.400 | 27.827.481 | 69.807.370 | 122.805.521 |
| Cyprus | | | | | | | | | | | | | | | | | | |
| Czech Republic | 1.278.049 | 221.322 | 2.474.349 | 1.260.526 | 2.193.392 | | 1.789.567 | 218.552 | 2.381.754 | 401.535 | 63.881 | 1.754.212 | 1.015.653 | 1.971.910 | | 1.789.567 | 218.552 | 2.377.847 |
| Germany | 57.411.206 | 8.517.895 | 169.212.924 | 59.953.332 | 223.655.896 | 29.565.686 | 404.950.828 | 9.302.426 | 387.564.369 | 29.727.928 | 4.986.637 | 17.211.297 | 41.438.979 | 124.836.616 | 13.874.641 | 179.198.031 | 9.302.426 | 212.149.463 |
| Denmark | 81.746.251 | 7.825.199 | 37.236.111 | 71.951.561 | 33.506.889 | 48.898.739 | 20.711.216 | 7.825.199 | 39.062.556 | 38.786.929 | 2.982.868 | 24.108.623 | 40.856.985 | 23.428.093 | 21.044.690 | 12.275.085 | 4.118.039 | 28.405.784 |
| Estonia | 1.085.951 | | 110.714 | 2.378.026 | 1.769.134 | 1.041.347 | 486.686 | 617.988 | 373.373 | 1.085.951 | | 110.714 | 2.378.026 | 1.769.134 | 1.041.347 | 486.686 | 617.988 | 373.373 |
| Spain | 14.686.142 | | | 3.435.153 | | 5.565.173 | 58.380 | | 6.543.588 | 529.595 | | | 849.587 | | 384.509 | 38.377 | | |
| Finland | 168.797.707 | 8.016.095 | 106.301.554 | 107.263.447 | 54.267.863 | 200.275.199 | 177.261.551 | 8.016.095 | 121.758.264 | 47.312.913 | 232.834 | 40.279.052 | 52.874.787 | 15.330.358 | 40.113.698 | 37.162.553 | 8.016.095 | 58.651.237 |
| France | 117.425.464 | 13.858.364 | 36.723.369 | 94.737.910 | 16.604.648 | 52.993.748 | 27.465.083 | 17.765.806 | 83.862.717 | 47.889.647 | 986.326 | 16.210.547 | 55.263.159 | 6.256.634 | 43.079.758 | 8.200.217 | 1.919.328 | 20.385.132 |
| Croatia | 116.284 | 7.883 | 117.188 | 116.284 | | 68.027 | 121.013 | 7.883 | 117.188 | 116.284 | 7.883 | 117.188 | 116.284 | | 68.027 | 121.013 | 7.883 | 117.188 |
| Ireland | 3.051.498 | 10 | 2.703.042 | 2.889.084 | 1.349.415 | 31.259 | 599.267 | 10 | 2.703.042 | 2.889.084 | 10 | 2.703.042 | 2.889.084 | 1.349.415 | 21.258 | 599.267 | 10 | 2.703.042 |
| Iceland | 38.338.279 | 987.478 | 1.430.980 | 38.338.279 | 4.438.172 | 36.543.222 | 1.018.443 | 987.478 | 1.430.980 | 17.254.514 | 23.343 | 1.108.967 | 19.915.192 | 3.457.332 | 18.715.492 | 68.000 | 48.658 | 1.178.215 |
| Italy | 93.359.091 | 1.434.278 | 28.987.906 | 95.611.911 | 173.065.082 | 32.710.311 | 33.756.213 | 8.262.123 | 157.311.992 | 6.941.945 | | 146.430 | 81.675.893 | 145.833.877 | 21.831.072 | 23.087.375 | 8.262.123 | 103.763.072 |
| Luxembourg | 259.709 | 420.176 | 13.161.337 | 259.709 | 5.840.526 | 1.191.445 | 15.806.945 | 420.176 | 13.161.337 | 237.457 | 122.548 | 5.405.128 | 246.598 | 3.627.508 | 592.221 | 9.115.201 | 420.176 | 8.703.708 |
| Netherlands | 115.308.335 | 4.498.800 | 154.553.415 | 29.772.499 | 78.663.844 | 29.699.076 | 265.344.061 | 4.498.805 | 329.091.689 | 27.901.247 | 1.093.605 | 66.285.779 | 29.772.499 | 18.359.068 | 13.583.919 | 75.646.917 | 2.645.405 | 93.223.053 |
| Norway | 1.148.208.829 | 61.429.039 | 134.274.039 | 672.160.158 | 415.244.442 | 902.146.140 | 155.611.719 | 61.429.039 | 271.583.483 | 313.930.796 | 3.389.816 | 62.133.554 | 319.693.104 | 160.633.330 | 317.058.520 | 94.976.896 | 5.369.009 | 82.985.843 |
| 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 | 406.755.305 | 28.002.091 | 165.933.905 | 142.721.763 | 22.341.504 | 196.911.403 | 170.523.035 | 28.002.091 | 342.782.787 | 58.210.110 | 1.230.512 | 43.196.845 | 66.206.640 | 6.001.685 | 70.393.959 | 61.935.733 | 1.674.053 | 59.522.165 |
| Slovenia | 4.002.666 | | | | | 668.004 | 117.018 | | 1.927.200 | | | | | | | | | |
| UK | 90.158 | | | | | | | | | | | | | | | | | |
| Τοτάι | 2.584.096.855 | 171.141.335 | 1.111.289.384 | 1.649.327.507 | 1.293.237.094 | 1.716.213.108 | 1.769.868.161 | 234.476.334 | 2.266.353.775 | 763.670.415 | 34.858.785 | 391.746.957 | 902.885.501 | 643.261.046 | 662.329.758 | 661.427.971 | 116.137.228 | 883.013.713 |

| | | | | | | ls | suing, Tr <i>i</i> | ADE & REI | DEMPTION | N FOR ALL F | UELS | | | | | | | |
|-------------------|------------|--------|-----------|-------------|-------------|-------------|--------------------|-----------|-------------|-------------|-----------|-------------|-------------|-------------|-------------|-------------|------------|-------------|
| | 2016 | | | | | | | | | 2015 | | | | | | | | |
| | PRODUCTION | | | TRANSACTION | I | | | | | PRODUCTION | | | TRANSACTION | | | | | |
| | Issue | Expire | CANCEL | Issue | Transfer | Export | Import | Expire | CANCEL | Issue | Expire | CANCEL | Issue | Transfer | Export | Import | Expire | CANCEL |
| Austria | 763 | | 6.849 | 4.192.765 | 11.443.875 | 5.678.029 | 11.447.296 | | 14.510.771 | 9.835.637 | | 15.563.165 | 11.736.102 | 16.300.627 | 13.276.890 | 22.497.686 | | 18.497.232 |
| Belgium (Federal) | 343.323 | | | 926.899 | | 1.173.373 | | | | 1.849.791 | | | 1.479.738 | | 721.424 | | | |
| Belgium Brussels | 29.430 | | | | 1.710.235 | | 208.569 | 5.390 | 1.962.489 | 74.681 | | 50.295 | 77.388 | 1.690.285 | | 623.835 | | 2.392.283 |
| Belgium Flanders | 486.815 | | 4.799 | 1.273.136 | 10.030.858 | 3.843.136 | 8.586.518 | 129.929 | | 4.416.479 | 58.928 | 986.234 | 4.857.454 | 23.023.871 | 16.051.568 | 22.231.010 | 927.556 | 8.184.734 |
| Belg & Lux RECS | | | | | | | | | | | | | | | | | | |
| Belgium Wallonia | 5.441 | | 2.229 | 539.408 | 4.341.480 | 1.550.676 | 2.931.588 | 43.997 | 1.423.301 | 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 | 865.009 | | 7.028 | 2.739.443 | 16.082.573 | 6.567.185 | 11.726.675 | 179.316 | 3.385.790 | 8.343.259 | 88.064 | 2.367.405 | 8.567.136 | 31.014.951 | 25.608.259 | 35.519.034 | 1.475.297 | 14.115.735 |
| Switzerland | 11.873.925 | | 213.472 | 16.798.432 | | 4.059.076 | 4.706.405 | 1.964.056 | 11.699.443 | 60.435.920 | | 16.107.569 | 62.368.960 | | 7.572.693 | 11.346.678 | 17.476.027 | 56.962.729 |
| Cyprus | | | | | | | | | | | | | | | | | | |
| Czech Republic | | | | 25.029 | 73.890 | | 127.470 | 18.561 | 502.878 | 113.587 | 7.426 | 1.325.021 | 180.268 | 1.077.902 | | 1.655.760 | 42.581 | 1.096.864 |
| Germany | 469.092 | | 1.901 | 3.414.710 | 20.802.254 | 2.680.724 | 31.453.302 | 895.378 | 44.123.957 | 13.738.848 | 4.286.537 | 6.127.133 | 19.621.332 | 50.195.705 | 6.369.903 | 80.314.238 | 4.286.537 | 87.586.229 |
| Denmark | 4.420.728 | | 1.846.193 | 6.528.651 | 5.625.681 | 5.225.853 | 4.494.582 | 361.138 | 5.846.354 | 16.514.981 | 272.599 | 11.516.567 | 17.794.672 | 9.194.494 | 8.642.034 | 5.417.044 | 2.769.201 | 14.228.931 |
| Estonia | 183.359 | | | 574.313 | 416.893 | 296.845 | 215.767 | 93.642 | 26.356 | 716.108 | | 53.724 | 1.595.217 | 1.352.241 | 744.502 | 270.919 | 476.582 | 246.884 |
| Spain | | | | | | | | | | | | | | | 155.963 | | | |
| Finland | 1.730.619 | | 14.105 | 7.073.406 | | 8.522.246 | 6.377.000 | 41.338 | 12.393.292 | 25.162.637 | 18.015 | 17.999.901 | 24.927.279 | | 14.413.516 | 14.202.631 | 255.467 | 20.828.643 |
| France | 1.184.193 | | 140.629 | 8.744.865 | 655.010 | 6.992.868 | 1.599.032 | 171.372 | 2.933.844 | 24.886.751 | 171.372 | 7.270.051 | 26.339.645 | 3.323.110 | 21.134.826 | 3.891.154 | 814.954 | 9.523.599 |
| Croatia | 44.199 | | | 47.906 | | 68.027 | 98.000 | 7.444 | 94.614 | 72.085 | 7.444 | 94.614 | 68.378 | | | 23.013 | 439 | 22.574 |
| Ireland | 567.558 | | | 913.684 | 1.154.610 | 7.220 | 287.267 | 10 | 2.311.617 | 2.321.526 | 10 | 2.702.138 | 1.975.400 | 194.805 | 14.038 | 312.000 | | 391.425 |
| Iceland | 603.526 | | | 3.425.173 | 1.498.095 | 2.817.489 | | 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 | 471.323 | | | 18.531.043 | 50.268.635 | 8.362.849 | 5.443.340 | 3.240.175 | 37.434.071 | 4.880.660 | | 146.169 | 35.709.634 | 49.953.912 | 11.363.977 | 11.213.758 | 3.440.938 | 34.714.944 |
| Luxembourg | 39.867 | | | 65.125 | 259.470 | 197.120 | 721.133 | 11.142 | 1.363.460 | 132.497 | 11.101 | 1.860.209 | 134.463 | 1.720.827 | 229.120 | 4.879.844 | 112.713 | 4.022.668 |
| Netherlands | 2.552.779 | | 283.479 | 4.374.758 | 1.548.903 | 1.385.314 | 8.824.543 | 322.719 | 12.579.519 | 13.612.751 | 186.757 | 29.391.563 | 13.781.381 | 7.851.045 | 4.253.635 | 34.326.537 | 1.307.521 | 42.702.110 |
| Norway | 47.055.714 | | 718.627 | 54.494.716 | 32.904.549 | 62.251.990 | 24.099.850 | 1.379.823 | 20.633.388 | 134.679.016 | 1.353.694 | 28.217.976 | 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 | 2.303.513 | | 894.627 | 14.671.123 | 1.275.646 | 12.322.126 | 10.919.378 | 424.870 | 15.559.503 | 31.161.469 | 346.152 | 19.162.167 | 28.901.715 | 2.791.428 | 31.168.276 | 24.103.558 | 829.811 | 23.077.154 |
| Slovenia | | | | | | | | | | | | | | | | | | |
| UK | | | | | | | | | | | | | | | | | | _ |
| Τοται | 74.366.167 | 0 | 4.126.910 | 146.615.142 | 144.010.084 | 127.434.961 | 122.541.040 | 9.111.356 | 186.498.883 | 353.116.375 | 6.749.543 | 161.007.658 | 394.834.786 | 246.495.615 | 288.655.807 | 293.336.023 | 35.427.963 | 360.666.656 |

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 <u>Statistics</u> 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 COUNTRIE |
|----------|---------|-----------------------------|
|----------|---------|-----------------------------|

| | | | | То | tal : 2001 to 20 | 16 | | | | | | | Тот | га <mark>l : 2014 то</mark> 2 | 016 | | | |
|---|---------------|---------------|---------------|---------------|------------------|---------------|---------------|-------------|---------------|---------------|------------|-------------|-------------|-------------------------------|-------------|--------------|-------------|-------------|
| | PRODUCTION | | | Transaction | | | | | | PRODUCTION | | | TRANSACTION | | | | | |
| | Issue | Expire | CANCEL | Issue | Transfer | Export | Import | Expire | CANCEL | Issue | Expire | CANCEL | Issue | Transfer | Export | Import | Expire | CANCEL |
| Wind - onshore | 84.185.164 | 1.493.309 | 38.628.821 | 29.047.963 | 52.609.904 | 28.899.984 | 46.363.454 | 2,558,870 | 84.290.352 | 19.875.346 | 342.940 | 18.423.166 | 25.642.056 | 21.698.559 | 7.760.645 | 12.226.832 | 1.650.253 | 29.491.632 |
| Wind - offshore | 9 087 160 | 530 277 | 7 699 952 | 3 870 438 | 6 105 371 | 3 259 800 | 11 808 448 | 601 601 | 12 186 452 | 4 158 366 | 19 814 | 4 513 335 | 3 870 438 | 3 110 130 | 2 247 546 | 8 440 806 | 230 623 | 7 235 174 |
| Wind - unknown | 81 886 912 | 6 770 556 | 46 710 342 | 87 451 531 | 51 231 537 | 76 389 910 | 50 744 501 | 9 843 969 | 51 016 514 | 47 630 796 | 1 157 334 | 30 846 302 | 55 852 814 | 39 427 159 | 47 218 197 | 34 617 204 | 5 759 877 | 41 034 406 |
| Wind | 175 159 236 | 8 794 142 | 93 039 115 | 120 369 932 | 109 946 812 | 108 549 694 | 108 916 403 | 13 004 440 | 147 493 318 | 71 664 508 | 1 520 088 | 53 782 803 | 85 365 308 | 64 235 848 | 57 226 388 | 55 284 842 | 7 640 753 | 77 761 212 |
| | 1/5/12/12/0 | 007711212 | /5105/1115 | 12013071732 | 10717 101012 | 10015171071 | 1000/101105 | 15100 11110 | 100000 | 7 1100 115 00 | 1.5201000 | 5511 021005 | 0515051500 | 0112001010 | 5712201500 | 55120 110 12 | 710101755 | 7717011212 |
| Hydro/marine | 2.030.650.505 | 113.668.267 | 866.709.625 | 1.291.875.421 | 1.049.584.373 | 1.525.221.665 | 1.563.345.406 | 170.026.178 | 1.825.687.538 | 569.433.355 | 14.597.345 | 276.308.335 | 674.626.871 | 521.335.356 | 566.301.066 | 567.982.400 | 76.678.942 | 691.136.692 |
| Unspecified mechanical/other | 23.126 | 41.731 | 186.405 | 69.580 | 29.715 | 17.735 | 5.897.043 | 726 | 5.847.112 | 16.832 | | 11.341 | 63.921 | 22.276 | 15.963 | 2.647 | 726 | 32.779 |
| Unspecified renewable energy | 3.687.507 | 2.000.306 | 2.706.985 | 5.005.612 | 2.008.959 | 2.237.597 | 9.856.248 | 1.795.301 | 2.839.159 | 2.578.053 | 1.236.748 | 2.004.002 | 4.429.292 | 1.582.485 | 2.112.788 | 1.752.171 | 1.795.290 | 2.615.198 |
| Unspecified heat | | 100 | | | | | | 100 | | | 100 | | | | | | 100 | |
| Solar | 5.963.325 | 3.893.982 | 3.495.805 | 5.787.398 | 6.310.821 | 4.129.615 | 4.507.996 | 4.052.095 | 5.728.478 | 3.304.910 | 1.447.576 | 2.165.749 | 3.699.982 | 5.920.530 | 3.644.451 | 3.818.063 | 2.848.329 | 4.855.004 |
| Geothermal | 23.271.901 | 229.549 | 5.851.788 | 18.406.400 | 13.711.612 | 17.480.048 | 17.332.192 | 353.666 | 21.811.732 | 9.381.359 | 26.328 | 1.884.562 | 13.731.232 | 11.948.242 | 13.119.121 | 12.598.549 | 334.462 | 13.270.871 |
| Other | 32.945.859 | 6.165.668 | 12.240.983 | 29.268.990 | 22.061.107 | 23.864.995 | 37.593.479 | 6.201.888 | 36.226.481 | 15.281.154 | 2.710.752 | 6.065.654 | 21.924.427 | 19.473.533 | 18.892.323 | 18.171.430 | 4.978.907 | 20.773.852 |
| | | | | | | | | | | | | | | | | | | |
| Solid - agricultural biomass (inc. energy | 9.877.765 | 307.103 | 7.719.894 | 7.573.474 | 2.020.074 | 4.483.065 | 5.642.947 | 336.100 | 9.453.058 | 4.785.771 | 43.804 | 5.568.675 | 5.034.785 | 746.148 | 1.230.521 | 2.162.019 | 92.530 | 6.952.831 |
| crops) Solid - agricultural products | 056 705 | 91 172 | 648 457 | 707.059 | 101 200 | 22/ 000 | 255 067 | 87 776 | 604 592 | 554 251 | 44 278 | 412 206 | 578 758 | 120.240 | 170 784 | 170 556 | 67.866 | 105 211 |
| Solid - renewable fuels (inc. For&Ag | 750.775 | 01.175 | 040.437 | 707.037 | 171.277 | 334.777 | 333.702 | 87.770 | 004.372 | 554.551 | 44.376 | 413.370 | 578.758 | 120.340 | 170.704 | 170.330 | 02.000 | 475.214 |
| bp & w) | 58.739.003 | 2.978.513 | 10.188.704 | 15.736.807 | 35.370.378 | 20.830.537 | 19.501.471 | 2.968.252 | 51.826.126 | 5.395.794 | 636.963 | 2.766.310 | 9.178.632 | 10.407.363 | 3.265.428 | 1.957.529 | 2.641.484 | 5.402.850 |
| Solid - forestry products | 8.700.236 | 331.923 | 7.052.763 | 7.038.356 | 6.260.107 | 4.055.244 | 3.512.292 | 610.901 | 8.461.382 | 4.163.244 | 130.414 | 3.352.136 | 5.250.583 | 2.714.349 | 1.818.566 | 1.516.043 | 453.064 | 4.658.659 |
| Solid - forestry by-products & waste | 11.905.386 | 612.093 | 4.982.720 | 7.069.543 | 5.189.191 | 3.303.021 | 3.077.977 | 846.018 | 7.920.943 | 4.196.266 | 109.056 | 3.023.579 | 5.176.568 | 2.252.306 | 1.101.436 | 1.265.956 | 632.989 | 4.979.691 |
| Gas - landfill | 4.361.879 | 101.964 | 1.065.658 | 1.088.948 | 3.046.817 | 247.133 | 268.276 | 136.894 | 3.244.568 | 540.303 | 26.182 | 373.971 | 724.166 | 689.670 | 37.999 | 38.055 | 82.470 | 687.828 |
| Gas - sewage | 511.648 | 47.154 | 235.652 | 460.758 | 258.427 | 1.025.381 | 1.142.927 | 259.490 | 263.885 | 318.234 | 6.328 | 155.313 | 343.042 | 9.639 | 7.655 | 3.764 | 206.492 | 163.009 |
| Gas - other biogas | 10.123.503 | 771.210 | 5.685.487 | 6.421.787 | 6.563.389 | 1.422.750 | 1.440.770 | 1.239.781 | 7.978.123 | 4.111.125 | 162.070 | 2.808.153 | 4.456.025 | 3.937.292 | 769.793 | 738.571 | 788.282 | 4.089.994 |
| Solid - municipal biogenic waste | 35.377.241 | 1.588.074 | 17.969.314 | 20.250.018 | 13.175.964 | 8.361.735 | 6.290.749 | 1.801.905 | 27.893.886 | 13.204.689 | 303.789 | 9.702.309 | 16.059.403 | 6.015.056 | 4.510.584 | 3.059.471 | 1.082.243 | 14.586.940 |
| Liquid - renewable fuels (inc. Mun.waste) | 4.554.281 | 99.709 | 3.009.358 | 4.979.033 | 3.727.982 | 2.224.277 | 2.045.771 | 578.232 | 4.506.278 | 2.778.989 | 6.584 | 1.661.081 | 3.677.399 | 2.830.564 | 1.732.234 | 1.055.196 | 244.472 | 3.551.315 |
| Liquid - black liquor | 1.545.330 | 26.261 | 1.485.487 | 1.536.330 | 1.540.860 | 1.773.850 | 2.308.721 | 27.389 | 1.892.308 | 772.350 | 14.380 | 933.960 | 961.253 | 951.618 | 782.919 | 1.522.247 | 27.389 | 1.688.044 |
| Solid - unspecified wood | 1.858.201 | 213.004 | 2.267.198 | 2.092.540 | 866.992 | 1.263.992 | 2.537.773 | 293.470 | 2.568.707 | 1.365.602 | 126.612 | 1.695.036 | 1.664.986 | 675.893 | 975.317 | 2.027.981 | 243.943 | 2.262.163 |
| Solid - industrial & commercial waste | 18.963.339 | 685.900 | 6.664.326 | 8.421.838 | 13.450.071 | 1.780.921 | 2.915.492 | 1.289.623 | 16.001.450 | 3.719.636 | 289.986 | 2.245.284 | 3.915.265 | 3.789.192 | 494.081 | 1.091.094 | 969.758 | 3.520.040 |
| Biomass | 167.474.607 | 7.844.081 | 68.975.018 | 83.376.491 | 91.661.551 | 51.106.906 | 51.041.128 | 10.475.831 | 142.615.306 | 45.906.354 | 1.900.546 | 34.699.203 | 57.020.865 | 35.139.430 | 16.897.317 | 16.608.482 | 7.527.982 | 53.038.578 |
| | | | | | | | | | | | | | | | | | | |
| RENEWABLE | 2.406.230.207 | 136.472.158 | 1.040.964.741 | 1.524.890.834 | 1.273.253.843 | 1.708.743.259 | 1.760.896.416 | 199.708.337 | 2.152.022.643 | 702.285.371 | 20.728.731 | 370.855.995 | 838.937.471 | 640.184.167 | 659.317.094 | 658.047.154 | 96.826.584 | 842.710.334 |
| | 1/0 200 005 | 21 000 502 | (1,200,02) | 105 100 4/1 | | 274 (70 | 274 (70 | 21 010 100 | 102 402 242 | 54 140 702 | 11 (00 750 | 10 215 011 | 54 424 417 | | 274770 | 274 ((0 | 17 421 402 | 27.014.041 |
| NUCLEAR | 160.299.095 | 31.809.382 | 01.299.820 | 105.109.461 | | 2/4.6/0 | 2/4.0/0 | 51.616.150 | 105.402.245 | 54.149.792 | 11.069./50 | 18.515.011 | 50.034.417 | | 2/4.000 | 2/4.008 | 10.421.465 | 57.014.941 |
| Heleneur | 2 081 158 | 105 774 | 87 842 | 2 752 920 | 407 621 | 2 215 125 | 72 /22 | 105 774 | 91 492 | 2 742 724 | 105 054 | | 2 7/2 72/ | 440 716 | 2 1 27 0 27 | 40.002 | 105 772 | 55 004 |
| Solid - Unknown | 2.701.130 | 105.774 | 07.042 | 2.7 32.730 | 477.031 | 2.313.125 | 75.452 | 105.//4 | 01.402 | 2.743.724 | 105.054 | | 2.743.724 | 440.710 | 2.127.027 | 40.002 | 105.775 | JJ.774 |
| Solid - Hard coal | 2 238 884 | 1 989 226 | 689 582 | 2 238 884 | 689 582 | 249 582 | 1 339 587 | 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 | 1.707.220 | 007.502 | 67 | 007.502 | 217.502 | 1.557.502 | 1.707.220 | 007.502 | 2.250.000 | 1.707.220 | 007.502 | 2.250.000 | 007.502 | 217.502 | 1.557.502 | 1.707.220 | 007.502 |
| Solid - Peat | 13 635 | | 12 356 | 30 156 | 6 307 | 17 215 | 10 901 | | 17 208 | 13 635 | | 12 356 | 30 156 | 6 307 | 17 215 | 10 901 | | 17 208 |
| Solid - Municipal solid waste | 1.637.729 | 457.819 | 560.330 | 1.624.869 | 0.507 | 9,843 | 135.128 | 519.626 | 567.471 | 1.219.857 | 221.312 | 423,170 | 1.255.985 | 0.507 | 9.843 | 135.128 | 496.353 | 567,471 |
| Solid - Industrial and commercial waste | 156.078 | 23.533 | 108.222 | 179.164 | | 6.369 | 6.360 | 27.991 | 108.222 | 80.424 | 2.373 | 55.778 | 84.666 | | 9 | | 12.910 | 104.048 |
| 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 | 101.855 | | | | | | | | 80.914 | 101.855 | | | | | | | | 80.914 |
| Liquid - Petroleum products | 108.343 | 47.502 | 4.767 | 108.343 | | | | 69.116 | 4.767 | 63.317 | 25.113 | 3.880 | 65.653 | | | | 49.075 | 4.767 |
| Gaseous - Unknown | 2 | | | 18.076 | | 2 | | 2.270 | 167 | | | | 2 | | 2 | | | |
| Gaseous - Natural gas | 10.311.815 | 225.085 | 7.554.387 | 12.356.736 | 18.789.313 | 4.596.625 | 7.131.154 | 225.188 | 9.371.745 | 757.498 | 86.570 | 1.385.707 | 878.485 | 1.939.856 | 333.900 | 1.580.018 | 225.168 | 1.761.123 |
| Gaseous - Coal-derived gas | | | | | | | | | | | | | | | | | | |
| Gaseous - Petroleum products | | | | | | | | | | | | | | | | | | |
| Gaseous - Municipal gas plant | | | | | | | | | | | | | | | | | | |
| Gaseous - Process gas | | | | | | | | | | | | | | | | | | |
| Heat - unknown | | | | | | | 100 | | | | | | | | | 100 | | |
| Heat - Process heat | | | | | | | | | | | | | | | | | | |
| FOSSIL | 17.567.553 | 2.859.595 | 9.024.817 | 19.327.212 | 19.983.251 | 7.195.179 | 8.697.075 | 2.949.847 | 10.928.889 | 7.235.252 | 2.440.304 | 2.575.951 | 7.313.613 | 3.076.879 | 2.737.996 | 3.106.149 | 2.889.161 | 3.288.438 |
| Total | 2 584 096 855 | 171 141 335 1 | 111 289 384 | 1 649 327 507 | 1 203 237 004 | 1 716 213 108 | 1 769 868 161 | 234 476 334 | 2 266 353 775 | 763 670 415 | 34 858 785 | 301 746 957 | 902 885 501 | 643 261 046 | 662 329 758 | 661 427 971 | 116 137 228 | 883 013 713 |

Issuing, Trade & redemption for all countries

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| Nat one 244.00 5000 50.00 < | | Issue | Expire Cancel | Issue | TRANSFER | Export | IMPORT | Expire | CANCEL | Issue | Expire | CANCEL | Issue | TRANSFER | Export | IMPORT | Expire | CANCEL |
| and solution | Wind - onshore | 2 341 962 | 204.007 | 5 003 120 | 2 198 593 | 2 111 766 | 1 813 865 | 113 603 | 3 790 848 | 10 193 132 | 72 248 | 9 023 478 | 10 374 020 | 7 102 537 | 2 888 918 | 5 395 304 | 640 511 | 12 438 835 |
| Name Open Part of the Part | | 2.541.702 | 5.052 | 512.011 | 2.170.373 | 2.111.700 | 2.207.020 | 115.005 | 1,215,425 | 2,002,202 | 72.240 | 2 222 022 | 2 (2(202 | 1 100 004 | 1 720 002 | 2.502.400 | 20.012 | 2,000,277 |
| Name Number Number <th>Wind - offshore</th> <th>286.385</th> <th>1.052</th> <th>513.811</th> <th>10 007 984</th> <th>264.479</th> <th>2.307.839</th> <th>1.410</th> <th>1.215.625</th> <th>3.083.393</th> <th>200</th> <th>2.333.832</th> <th>2.636.203</th> <th>16 832 420</th> <th>1./28.993</th> <th>3.592.488</th> <th>20.812</th> <th>3.089.377</th> | Wind - offshore | 286.385 | 1.052 | 513.811 | 10 007 984 | 264.479 | 2.307.839 | 1.410 | 1.215.625 | 3.083.393 | 200 | 2.333.832 | 2.636.203 | 16 832 420 | 1./28.993 | 3.592.488 | 20.812 | 3.089.377 |
| ALT ALT <th>Wind</th> <th>7 603 448</th> <th>1.058.058</th> <th>15 664 736</th> <th>12 868 306</th> <th>14 893 893</th> <th>13 157 351</th> <th>2 060 203</th> <th>14 414 415</th> <th>37 304 738</th> <th>515 492</th> <th>27 508 188</th> <th>39 199 015</th> <th>25 035 891</th> <th>26 626 590</th> <th>26 808 685</th> <th>2.213.038</th> <th>35 961 981</th> | Wind | 7 603 448 | 1.058.058 | 15 664 736 | 12 868 306 | 14 893 893 | 13 157 351 | 2 060 203 | 14 414 415 | 37 304 738 | 515 492 | 27 508 188 | 39 199 015 | 25 035 891 | 26 626 590 | 26 808 685 | 2.213.038 | 35 961 981 |
| bit bit <th></th> <th>710051110</th> <th>1120/10//</th> <th>15100 11750</th> <th>1210001300</th> <th>110/510/5</th> <th>1912971991</th> <th>210001203</th> <th>11111111</th> <th>5715011750</th> <th>5151172</th> <th>2/15/01/00</th> <th>5711771015</th> <th>2510551071</th> <th>2010201370</th> <th>2010001005</th> <th>2107 11501</th> <th>5517011701</th> | | 710051110 | 1120/10// | 15100 11750 | 1210001300 | 110/510/5 | 1912971991 | 210001203 | 11111111 | 5715011750 | 5151172 | 2/15/01/00 | 5711771015 | 2510551071 | 2010201370 | 2010001005 | 2107 11501 | 5517011701 |
| Number Number< | Hydro/marine | 56.694.766 | 1.778.421 | 110.820.568 | 117.574.108 | 105.010.189 | 101.600.821 | 4.255.474 | 154.306.581 | 261.201.574 | 4.653.898 | 111.383.434 | 293.240.174 | 199.174.076 | 243.886.477 | 248.594.673 | 15.004.883 | 277.092.060 |
| Height in the second s | | | | | | | | | | | | | | | | | | |
| Dubb Dubb <thdubb< th=""> Dubb Dubb <thd< th=""><th>Unspecified mechanical/other</th><th>1.410</th><th></th><th>2.086</th><th>5.352</th><th>254</th><th></th><th></th><th></th><th>9.884</th><th></th><th>9.356</th><th>55.882</th><th>10.284</th><th>9.281</th><th>2.647</th><th></th><th>30.679</th></thd<></thdubb<> | Unspecified mechanical/other | 1.410 | | 2.086 | 5.352 | 254 | | | | 9.884 | | 9.356 | 55.882 | 10.284 | 9.281 | 2.647 | | 30.679 |
| Unput bin Upp is the set of the set o | Unspecified renewable energy | 94.575 | 48.224 | 428.903 | 214.970 | 204.828 | 220.661 | 99.996 | 562.023 | 1.537.263 | 879.353 | 1.018.502 | 2.071.351 | 791.969 | 1.035.759 | 1.119.004 | 955.458 | 1.337.760 |
| matrix matrix< | Unspecified heat | 402.024 | 5124 | 710 (70 | 2 220 022 | 1 027 010 | 1 0 42 252 | 500 257 | 2 515 072 | 1 500 221 | 45.014 | 1 200 005 | 1 724 020 | 1 040 175 | 1 5 (4 005 | 1 (20 202 | 100 | 1 520 022 |
| Online Dirac Line Line <thline< th=""> Line Line <</thline<> | Solar | 493.834 | 21.250 | 719.678 | 3.239.833 | 1.827.910 | 1.842.353 | 598.257 | 2.515.8/3 | 1.599.221 | 45.014 | 1.380.905 | 1./26.939 | 2 720 205 | 1.564.895 | 1.038.255 | 7/0.745 | 1.539.033 |
| NOME NOME <th< th=""><th>Other</th><th>965 757</th><th>84 610</th><th>3 151 835</th><th>6 6 79 7 37</th><th>4 259 131</th><th>4 033 510</th><th>779 363</th><th>6 555 925</th><th>7 799 760</th><th>927 190</th><th>3 438 869</th><th>10 112 786</th><th>6 371 723</th><th>9.021.333</th><th>8 992 302</th><th>1 937 017</th><th>8 156 378</th></th<> | Other | 965 757 | 84 610 | 3 151 835 | 6 6 79 7 37 | 4 259 131 | 4 033 510 | 779 363 | 6 555 925 | 7 799 760 | 927 190 | 3 438 869 | 10 112 786 | 6 371 723 | 9.021.333 | 8 992 302 | 1 937 017 | 8 156 378 |
| sele sele <th< th=""><th></th><th>705.757</th><th>01.010</th><th>5.151.055</th><th>0.027.757</th><th>1.257.151</th><th>1.055.510</th><th>777.505</th><th>0.555.725</th><th>/</th><th>727.170</th><th>5.150.007</th><th>10.112.700</th><th>0.57 1.725</th><th>7.021.555</th><th>0.772.502</th><th>1.757.017</th><th>0.150.570</th></th<> | | 705.757 | 01.010 | 5.151.055 | 0.027.757 | 1.257.151 | 1.055.510 | 777.505 | 0.555.725 | / | 727.170 | 5.150.007 | 10.112.700 | 0.57 1.725 | 7.021.555 | 0.772.502 | 1.757.017 | 0.150.570 |
| Shid spechal prob 0.000 | Solid - agricultural biomass (inc. energy crops) | 728.179 | 543.914 | 982.611 | 523.073 | 185.763 | 405.186 | 13.423 | 1.064.804 | 2.009.035 | 12.864 | 2.550.723 | 2.077.066 | 170.703 | 419.366 | 1.031.432 | 37.860 | 3.109.069 |
| shot | Solid - agricultural products | 87.554 | 22.595 | 110.694 | 2.095 | 51.249 | 51.249 | 2.712 | 103.090 | 229.432 | 714 | 200.708 | 254.072 | 48.170 | 116.587 | 116.587 | 37.890 | 258.217 |
| Side | Solid - renewable fuels (inc. For&Ag bp & w) | 79.272 | 23 | 1.369.238 | 2.728.984 | 664.247 | 505.758 | 117.006 | 891.216 | 2.971.596 | 354.109 | 1.052.987 | 4.492.680 | 4.292.735 | 1.614.538 | 818.996 | 582.610 | 2.475.096 |
| Soli-Georgy by-genetation 22549 775 MP 1979 38 2748 12227 2004.20 49.89 41.69 397.08 11.69 1370 13.69 < | Solid - forestry products | 183.522 | 116.050 | 801.974 | 81.551 | 343.680 | 187.639 | 106.278 | 859.165 | 1.976.015 | 67.817 | 1.290.375 | 2.408.507 | 940.011 | 825.788 | 679.312 | 263.098 | 1.804.294 |
| Gas starting 11:00 501 168:01 970 88:01 10:00 68:02 16:88 22.00 10:00 11:00 < | Solid - forestry by-products & waste | 256.149 | 36.748 | 716.902 | 483.742 | 262.398 | 312.851 | 48.757 | 775.876 | 1.979.985 | 27.424 | 1.282.277 | 2.004.202 | 496.395 | 401.697 | 397.004 | 174.689 | 2.002.700 |
| Gin - More Fage Ali0 500 Galo 100 <th>Gas - landfill</th> <th>15.703</th> <th>371</th> <th>89.219</th> <th>110.586</th> <th>5.489</th> <th>5.545</th> <th>7.449</th> <th>141.441</th> <th>245.291</th> <th>6.278</th> <th>180.003</th> <th>246.230</th> <th>187.487</th> <th>13.970</th> <th>13.970</th> <th>31.549</th> <th>238.974</th> | Gas - landfill | 15.703 | 371 | 89.219 | 110.586 | 5.489 | 5.545 | 7.449 | 141.441 | 245.291 | 6.278 | 180.003 | 246.230 | 187.487 | 13.970 | 13.970 | 31.549 | 238.974 |
| U2 - 90.2 kg/s 0.11 0.10< | Gas - sewage | 6.110 | 570 | 56.617 | 219 | 1.007 | 1.007 | 681 | 40.652 | 155.848 | 42 | 69.076 | 164.955 | 5.102 | 277.417 | 270.17(| 6.225 | 82.301 |
| Dub Dub <thdub< th=""> <thdub< th=""> <thdub< th=""></thdub<></thdub<></thdub<> | Gas - other biogas | 262.118 | 47.655 | 1 814 050 | 520.491 | 103.213 EDE 94E | 174 404 | 38.963 | 003.835 | 4 270 445 | 12.664 | 4 105 280 | 2.076.292 | 2.005.021 | 2/7.417 | 1 292 004 | 167.520 | 1.922.996 5 201 209 |
| Lugad backlope fund 27200 5159 1539 | Liquid - renewable fuels (inc. Mun.waste) | 184 057 | 40.453 | 630 987 | 480 668 | 202 180 | 84 021 | 834 | 917 621 | 1 475 513 | 2./ 77 | 4.175.567 | 1 707 950 | 1 333 705 | 1.043.071 | 740 156 | 153 614 | 1 232 410 |
| Shid Shid Size Shid Size Size <t< th=""><th>Liquid - black liquor</th><th>10.441</th><th>22,500</th><th>51,549</th><th>161.346</th><th>33.027</th><th>425.905</th><th>1.559</th><th>487.736</th><th>201.935</th><th>1.559</th><th>319,754</th><th>203.631</th><th>204.730</th><th>408.704</th><th>549,983</th><th>12.888</th><th>557.803</th></t<> | Liquid - black liquor | 10.441 | 22,500 | 51,549 | 161.346 | 33.027 | 425.905 | 1.559 | 487.736 | 201.935 | 1.559 | 319,754 | 203.631 | 204.730 | 408.704 | 549,983 | 12.888 | 557.803 |
| Solid-addet def add solid | Solid - unspecified wood | 113.882 | 32.251 | 503.323 | 222.295 | 268.645 | 602.772 | 116.455 | 558.128 | 723.170 | 74.624 | 855.980 | 739.552 | 324.330 | 507.208 | 933.273 | 89.988 | 1.120.360 |
| Image Matrix | Solid - industrial & commercial waste | 277.970 | 117.241 | 826.019 | 529.963 | 101.252 | 131.711 | 103.405 | 804.390 | 1.950.672 | 66.328 | 933.856 | 1.927.583 | 1.943.606 | 298.551 | 505.428 | 221.589 | 1.638.234 |
| NEWNE Sabes Sabes <th< th=""><th>Biomass</th><th>2.791.975</th><th>981.191</th><th>8.457.294</th><th>6.835.879</th><th>2.748.015</th><th>2.988.077</th><th>639.483</th><th>9.797.142</th><th>22.205.338</th><th>627.257</th><th>14.802.512</th><th>25.486.199</th><th>14.679.719</th><th>7.746.881</th><th>7.440.312</th><th>2.337.261</th><th>21.833.762</th></th<> | Biomass | 2.791.975 | 981.191 | 8.457.294 | 6.835.879 | 2.748.015 | 2.988.077 | 639.483 | 9.797.142 | 22.205.338 | 627.257 | 14.802.512 | 25.486.199 | 14.679.719 | 7.746.881 | 7.440.312 | 2.337.261 | 21.833.762 |
| Exervalit 68,055,94 4,112.19 133,094.43 143,086.30 122,012.28 127,779.79 7734.23 185,074.03 325,11.40 67,23.37 157,13.00 3660.81.74 245,261.40 221,281.8 22,155.22 441,041.81 UNCLER 5,705.871 2 268,320 85,904 85,904 85,904 82,905 89,4112 22,055.51 23,025.874 22,282.649 22,282.49 106,279 100,079 10,030,05 15,91,130 UNCLER 261,199 - 268,327 41,814 12,85.97 41,286.95 89,4112 22,055.51 23,025.874 22,825.49 - 106,279 40,000 53,14 Sold - Hand cell - <t< th=""><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></t<> | | | | | | | | | | | | | | | | | | |
| NUCLAR Sp659 Sp659 Sp639 Sp639 <t< th=""><th>RENEWABLE</th><th>68.055.946</th><th>4.112.119</th><th>138.094.433</th><th>143.908.030</th><th>126.911.228</th><th>121.779.759</th><th>7.734.523</th><th>185.074.063</th><th>328.511.410</th><th>6.723.837</th><th>157.133.003</th><th>368.038.174</th><th>245.261.409</th><th>287.281.281</th><th>291.835.972</th><th>22.153.522</th><th>343.044.181</th></t<> | RENEWABLE | 68.055.946 | 4.112.119 | 138.094.433 | 143.908.030 | 126.911.228 | 121.779.759 | 7.734.523 | 185.074.063 | 328.511.410 | 6.723.837 | 157.133.003 | 368.038.174 | 245.261.409 | 287.281.281 | 291.835.972 | 22.153.522 | 343.044.181 |
| Markanow Same | | 5 705 001 | | 7 (02 220 | | 05.004 | 05.004 | 1 220 (05 | 004 112 | 22.045.514 | 25 705 | 2 025 074 | 22.027.407 | | 107 270 | 107 270 | 10.020.527 | 15 0(1 12(|
| bill bill bill bill bill bill bill bill | NUCLEAR | 5.705.891 | | 7.692.330 | | 85.904 | 85.904 | 1.228.695 | 894.112 | 22.065.516 | 25./05 | 3.025.874 | 22.826.496 | | 106.279 | 106.279 | 10.930.536 | 15.961.136 |
| Solid - Uthnom International Solid - Barban Solid | Unknown | 261,199 | | 268.326 | | 418,140 | 2 | 51,813 | | 1,382,471 | 1 | | 1.477.156 | | 762,979 | 40.000 | 53,241 | |
| Solid - Hand columner 1 | Solid - Unknown | | | | | | - | | | | | | | | | | | |
| Solid- Berone Mathematical Solid Processing Solid Processing Solid Processing Solid Processing Processing Solid Processing Processing Processing Solid Processing Pro | Solid - Hard coal | | | | | | 650.000 | 47.714 | | | | | 1.397.144 | 249.582 | 249.582 | 249.582 | 1.941.512 | 249.582 |
| Solid - Neal 8.517 7.28 14.831 13.552 7.238 10.00 51.18 51.18 51.355 6.07 3.663 3.663 4.637 Solid - Industrial and command wat 5.057 5.057 10.019 551.07 0.306 3.706 129.28 232.36 40.3037 Solid - Industrial and command wat 5.057 14.55 14.55 14.55 14.55 232.36 40.337 Solid - Industrial and command wat 5.057 14.55 14.55 14.55 232.36 40.337 Solid - Industrial and command wat 5.057 14.55 14.55 14.55 232.36 40.337 Solid - Industrial and command wat 5.057 14.55 14.55 24.55 10.55 | Solid - Brown coal | | | | | | | | | | | | | | | | | |
| Solid - Municipal solid wate 93.25 219.966 6.137 31.681 22.37 607.976 120.189 55.979 3.706 12.92.31 23.23.6 400.077 Solid - Industrial and commercial wate 95.053 14.551 14.551 14.551 14.551 14.551 23.23.6 400.077 3.706 12.92.31 23.23.6 400.077 Solid - Industrial and commercial wate 50.531 14.551 | Solid - Peat | 8.517 | 7.238 | 14.831 | | 13.552 | 7.238 | | 10.901 | 5.118 | | 5.118 | 15.325 | 6.307 | 3.663 | 3.663 | | 6.307 |
| Solid - Industrial and commercial wate 5.053 | Solid - Municipal solid waste | 93.325 | | 219.966 | | 6.137 | | 31.681 | 22.357 | 607.976 | | 120.189 | 551.797 | | 3.706 | 129.231 | 233.236 | 402.057 |
| Liquid Jukinova 6478 5.541 5.541 448 418 | Solid - Industrial and commercial waste | 5.053 | | 14.551 | | | | 667 | 12.443 | 29.662 | | 12.443 | 23.345 | | | | 2.854 | 43.335 |
| Liquid Valural ges | Liquid - Unknown | | | | | | | | | | | | 5.060 | 419 | 410 | 419 | 10 454 | 5.060 |
| Liquid Protoleum poducts 7.858 10.755 2.99.50 10.755 2.425 1.970 28.343 1.970 28.120 1.970 28.120 1.970 28.120 1.970 28.120 1.970 28.120 1.970 28.120 1.970 28.120 1.970 28.120 1.970 28.120 1.970 28.120 1.970 247.899 970.878 77.81 952.670 Gaseous - Natural gas 228.378 7.553 2.99.950 102.054 18.137 13.838 400.927 709.061 4466.628 977.899 247.899 970.878 77.831 952.670 Gaseous - Natural gas Caseous - Natural gas Caseous - Natural gas Caseous - Natural gas 977.899 247.899 970.878 77.831 952.670 Gaseous - Natural gas Caseous - Natural gas Caseous - Natural gas Caseous - Natural gas Feither Heighter H | Liquid - Crude on | | | | | | | | 80 914 | 84 952 | | | 5.541 | 410 | 410 | 410 | 10.030 | 410 |
| Gaseous - Unknown Office | Liquid - Petroleum products | 7.858 | | 10.755 | | | | 2,425 | 1.970 | 28.343 | | 1,970 | 28.120 | | | | 24,575 | 1.910 |
| Gaseous - Natural ga 228.378 228.378 7.553 229.990 10.054 18.137 18.137 18.137 40.007 70.001 466.628 977.899 247.89 970.878 77.831 952.670 Gaseous - Code of the code of | Gaseous - Unknown | | | | | | | | | | | | | | | | | |
| Gaseous - Cool-derived ga Gaseou | Gaseous - Natural gas | 228.378 | 7.553 | 299.950 | 102.054 | | 18.137 | 13.838 | 402.123 | 400.927 | | 709.061 | 466.628 | 977.899 | 247.899 | 970.878 | 77.831 | 952.670 |
| Gaseous - Petroleum products Gaseous - Annole Process gas Gaseous - Annole Process Gaseous | Gaseous - Coal-derived gas | | | | | | | | | | | | | | | | | |
| Gaseous - Municipal gas plant Gaseous - Process gas Gaseous - Process Gaseous - | Gaseous - Petroleum products | | | | | | | | | | | | | | | | | |
| Gaseous - Process gas Gaseous - Process gas Gaseous - Process gas Heat - unknown Heat - Process heat Gossile | Gaseous - Municipal gas plant | | | | | | | | | | | | | | | | | |
| Heat - Unknown Heat - Process heat Heat - Process heat 14.91 828.379 102.054 437.829 675.377 148.138 530.708 2.539.449 1 848.781 3.970.116 1.234.206 1.268.247 1.393.772 2.343.905 1.661.339 OSSIL Total 74.366.167 0 4.126.910 146.615.142 144.010.084 127.434.961 122.541.040 9.111.356 186.498.883 353.116.375 6.749.543 161.007.658 394.834.786 246.495.615 288.655.807 293.336.023 35.427.963 360.666.656 | Gaseous - Process gas | | | | | | | | | | | | | | | | | |
| Description Description <thdescription< th=""> <thdescription< th=""></thdescription<></thdescription<> | Heat - unknown | | | | | | | | | | | | | | | | | |
| TOTAL 74.366.167 0 4.126.910 146.615.142 144.010.084 127.434.961 122.541.040 9.111.356 186.498.883 353.116.375 6.749.543 161.007.658 394.834.786 246.495.615 288.655.807 293.336.023 35.427.963 360.666.656 | Heat - Process heat | 604 330 | 14 701 | 828 220 | 102.054 | 437 820 | 675 377 | 148 138 | 530 709 | 2 530 440 | 1 | 848 781 | 3 970 116 | 1 234 206 | 1 268 247 | 1 393 772 | 2 343 905 | 1 661 320 |
| | Τοται | 74.366.167 | 0 4.126.910 | 146.615.142 | 144.010.084 | 127.434.961 | 122.54 <u>1.040</u> | 9.11 <u>1.356</u> | 186.498.883 | 353.116.375 | 6.749.543 | 161.007.658 | 394.83 <u>4.786</u> | 246.49 <u>5.615</u> | 288.655.807 | 293.336.023 | 35.427.963 | 360.666.656 |

Forthcoming events

| 8 June | Oslo, Norway | AIB Workshop on Residual Mix / European Attribute Mix calculation for 2019 |
|-----------------|-------------------|--|
| 9-10 June | Oslo, Norway | AIB General Meeting |
| 15 June | Brussels, Belgium | <u>Sustainable Energy Week</u> - Session: Electricity origins and consumers |
| 29-30 September | Dessau, Germany | AIB General Meeting |
| 1 Dec | Switzerland | Open Markets Committee |
| 1-2 Dec | Switzerland | AIB General Meeting |