# Reliable Disclosure in Europe: Status, Improvements and Perspectives

**Final Report from the project**
**"Reliable Disclosure Systems for Europe - Phase II"**
**(RE-DISS II)**

Co-funded by the Intelligent Energy Europe Programme of the European Union

RE-DISS II
Reliable disclosure systems for Europe


Co-funded by the Intelligent Energy Europe Programme of the European Union

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# Glossary

**Association of Issuing Bodies:**

The European organisation which governs the European Energy Certificate System (EECS). See http://www.aib-net.org.

**(Electricity Generation / Disclosure) Attributes:**

Pieces of information, which are tracked in order to disclose information to consumers under electricity disclosure. Most important attributes for disclosure are the energy source and the associated $CO_2$ emissions and radioactive waste.

**Available attributes:**

Attributes that are not explicitly tracked in order to disclose certain consumption. The pool of yearly available attributes in a domain constitutes the domestic residual mix.

**Cancellation:**

The realisation of the value of a certificate. A certificate can be cancelled only once. Upon cancellation a certificate ceases to be transferable.

**Certificate:**

An evidence which represents the attributes of an instance of electricity generation for a certain tracking purpose and which can be transferred between different owners. Certificates are usually held as electronic records in a database (registry) and their typical life cycle is issuing, transfer and cancellation. It is quite common to issue certificates in units related to 1 MWh of electricity.

**Cogeneration Directive:**

EU Directive 2004/8/EC of the European Parliament and of the Council on the promotion of cogeneration based on a useful heat demand in the internal energy market.

**Cogeneration GO (CHP-GO):**

A Guarantee of Origin issued for electricity produced from high efficient cogeneration as defined by the Cogeneration Directive.

**Competent Body:**

A person or a body appointed by legislation to supervise systems of electricity disclosure or the issuance, transfer and cancellation of Guarantees of Origin. There can be only one competent body per tracking mechanism in a domain. The competent bodies for RES-GO, Cogeneration GO, and Disclosure in a domain can be identical; this supports the coordination of these instruments.

**Contract-based tracking:**

Allocation of disclosure attributes based on the contracts concluded by market participants in the electricity market.

**Directive 2003/54/EC:**

Directive 2003/54/EC of the European Parliament and of the Council concerning common rules for the internal market in electricity and repealing Directive 96/92/EC. This Directive has been replaced by Directive 2009/72/EC.

**Directive 2009/28/EC:**

Directive 2009/28/EC of the European Parliament and of the Council on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

**Directive 2009/72/EC:**

Directive 2009/72/EC of the European Parliament and of the Council concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC.

**Directive 2012/27/EC:**

Directive 2012/27/EC of the European Parliament and of the Council on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC.

**(Electricity) Disclosure:**

Based on Directive 2009/72/EC electricity suppliers are required to disclose to their customers certain av-erage attributes of the electricity which they have supplied in the previous year. This comprises all products which a supplier offers to its customers. Sometimes suppliers are also allowed to add specific information about the specific product bought by a customer.

**Disclosure period:**

The period of time which is used as the accounting period for energy consumption and the attributes which suppliers of electricity have acquired for disclosure purposes. Directive 2009/72/EC defines that the disclosure period is one year. The RE-DISS recommendation is that this should be the calendar year.

**Domain:**

A single administrative region in which the rules for a tracking system are defined consistently and are supervised by a competent body. Usually each country in Europe forms one domain. However, there may be several domains in one country, like it is the case in Belgium, and in the future it might also be that several countries jointly form a single domain.

**Double counting:**

The attributes from an instance of electricity generation should only be used once for disclosure. If for example a MWh of RES-E is allocated to two or more different consumers or their suppliers, then this denotes a case of double counting. Double counting mostly occurs due to improper design of tracking systems, but it might also be caused by errors or fraud.

**Electricity from renewable energy sources (RES-E):**

Electricity from renewable energy sources as defined in Directive 2009/28/EC.

**Environmental indicators:**

Environmental information to be displayed to consumers under electricity disclosure in addition to the energy sources used for electricity generation. Typically this is CO2 emissions and production of radioactive waste.

**European Attribute Mix (EAM):**

A calculatory pool of available attributes in residual mix calculations. It results from surpluses of available attributes compared to the volume of untracked consumption in surplus domains.

The EAM is used to cover deficits of available attributes compared to untracked consumption in deficit domains.

**European Energy Certificate System (EECS):**

A harmonised European system for the handling of Guarantees of Origin and other energy certificates, which is operated by the Association of Issuing Bodies. EECS is the only standardised system for implementing Guarantees of Origin in Europe.

**Explicit tracking:**

A mechanism which allows the bilateral allocation of electricity attributes from a generator to a final consumer or its supplier. The allocation might also involve traders as intermediaries. Explicit tracking is usually implemented based on Guarantees of Origin, but there may also be other explicit tracking mechanisms.

**External domain:**

Domains outside the area for which the calculation of residual mixes is implemented in a coordinated way.

**Guarantee of Origin (GO):**

A unique means of proving the origin of an instance of electricity for purposes of electricity disclosure. Most usual are RES-GO and cogeneration GO, but the concept has already been extended to all other types of electricity generation.

**Implicit tracking:**

A mechanism which allows allocating electricity attributes from a group of generators to usually a large group of suppliers or final consumers for purposes of electricity disclosure. Implicit tracking is typically used if the origin of electricity is not known based on explicit tracking mechanisms. For this case most domains have defined a default set of attributes which can be used by suppliers. RE-DISS recommends the use of a residual mix for this purpose, which avoids double counting.

**Registry:**

An electronic database in which certificates such as electronic GO can be issued, transferred and cancelled. Typically there is one registry per domain. In order to allow transfers of certificates between domains, the registries must be connected and the definition of the information content of the certificates needs to be harmonised.

**(Other) Reliable Tracking Systems (RTS):**

Explicit tracking systems other than Guarantees of Origin which are used for purposes of electricity disclosure and which fulfil the criteria of added value, reliability and transparency as defined in the E-TRACK recommendations. Typical examples of Reliable Tracking Systems are allocation mechanisms for electricity which has been supported under a feed-in support system.

**Residual mix:**

A pool of available generation attributes which are not explicitly tracked in order to disclose certain consumption.

**Residual mix calculation:**

An implicit tracking mechanism in which shares of energy sources and environmental indicators of un-tracked consumption are determined by the statistical mix of available attributes.

**Supplier mix:**

The total of all products sold to final consumers by an individual supplier, expressed in fuel mix and environmental indicators as required for electricity disclosure.

**Supplier's remaining mix:**

The difference between the individual supplier mix of a supplier and the attributes of all the products, which the supplier sells with claims regarding the origin of the electricity (e.g. "green" products). The volume of the remaining mix is equal to the electricity sales to final consumers under a "residual" or default product of the supplier, which is not advertised with ex-ante claims regarding the origin of the electricity.

**Total supplier mix:**

The total volume of attributes disclosed in a domain, both explicitly tracked and those disclosed through the residual mix, expressed in fuel mix and environmental indicators as required for electricity disclosure.

**Tracking:**

A methodology for the accounting of generation attributes in the electricity market and their allocation to final consumption of electricity, mostly for purposes of electricity disclosure. There are explicit and implicit tracking mechanisms.

**Untracked consumption:**

Electricity consumption that is not disclosed by using explicit tracking mechanisms such as GO. Untracked consumption should be disclosed based on the residual mix.

# List of Abbreviations

| | |
|---|---|
| AIB | Association of Issuing Bodies (see http://www.aib-net.org) |
| CHP | Combined heat and power (cogeneration) |
| CHP-GO | Guarantee(s) of Origin for high-efficient cogeneration, issued under the Cogeneration Directive 2004/8/EC or the Energy Efficiency Directive 2012/27/EC |
| EAM | European Attribute Mix (see glossary) |
| EECS | European Energy Certificate System, operated by the AIB (see http://www.aib-net.org) |
| E-TRACK | The European project "A European Tracking System for Electricity" which was carried out in two phases (I and II), see http://www.e-track-project.org |
| EU | European Union |
| EU28 | The total of current EU Member States |
| FOS | Electricity from fossil energy, as a category of energy sources under disclosure |
| GHG | Greenhouse Gas |
| GO | Guarantee(s) of Origin |
| GWP | Global Warming Potential |
| HE cogeneration | Electricity from high efficient cogeneration as defined by the Cogeneration Directive 2004/8/EC or the Energy Efficiency Directive 2012/27/EC |
| IAEA | International Atomic Energy Agency |
| IB methodology | Issuance-based methodology for residual mix calculations |
| kWh | Kilowatt-hour (unit of (electric) energy) |
| LCA | Life Cycle Assessment |
| MWh | Megawatt hour (unit of (electric) energy which equals 1.000 kWh) |
| NUC | Electricity from nuclear energy, as a category of energy sources under disclosure |
| PRIS | Power Reactor Information System of the IAEA |
| RECS | Renewable Energy Certificate System |
| RES | Renewable energy sources |
| RES Directive | Directive 2009/28/EC (see glossary) |
| RES-E | Electricity from renewable energy sources |
| RES-GO | Guarantee(s) of Origin for (electricity from) renewable energy sources |
| RM | Residual mix |
| RTS | "Reliable Tracking Systems (see glossary) |

| | |
|---|---|
| RW | (high-level) radioactive waste |
| STB methodology | Shifted transaction-based methodology for residual mix calculations |
| TWh | Terawatt-hour (unit of (electric) energy which equals 1.000.000.000 kWh) |

# 1 Introduction and Background

The opening of the electricity market in the European Union for retail competition has given the consumers a choice of supplier. This choice can be based on price, on quality and reliability of service, but can also relate to the generation characteristics of the electricity supplied.

The Internal Electricity Market Directive 2009/72/EC (in the following: IEM Directive), which replaced the former Directive 2003/54/EC, therefore contains the obligation on suppliers to specify the fuel mix and its related environmental impact of the electricity they sell to final consumers.

The objectives of this specification are fourfold:

- increase market transparency by providing open and easy access to relevant information,
- comply with the consumers right to information regarding purchased products,
- enable consumers to make informed choices about suppliers and their electricity products based on the generation characteristics of the electricity they supply,
- educate consumers and stimulate electricity generation that contributes to a secure and sustainable electricity system.

The implementation of disclosure differs strongly between EU Member States, from basic implementation by straight-forward adoption of the wording of the Directive to highly sophisticated and clearly specified approaches. There are also Member States which have not implemented disclosure (either legally or operationally) at all so far. These different stages of disclosure to some extent also reflect the different development of liberalised electricity markets in different European Member States.

While the IEM Directive focuses on the provision of information towards end consumers, Directive 2009/28/EC on the promotion of the use of energy from renewable sources (in the following: RES Directive) defines the Guarantee of Origin (GO), which can be considered the major accounting instrument in order to create a link between electricity production (more specifically: renewable electricity) towards specific end consumers. Such tracking of electricity attributes is essential in order to define the values of a specific fuel mix which can then be disclosed towards an end consumer. Article 15 of the RES Directive requires each Member State to provide a system for Guarantees of Origin for electricity produced from renewable energy sources which have to be issued, transferred and cancelled in an electronic registry under supervision of a single appointed national Competent Body. The only purpose of these GO is their use for electricity disclosure. Member States have to ensure that these GO are accurate, reliable and fraud-resistant, and that double-counting is avoided. The Cogeneration Directive 2004/8/EC has introduced also GO for high-efficient cogeneration of heat and electricity. The Cogeneration Directive has meanwhile been replaced by Directive 2012/27/EC on energy efficiency. However, it has to be stated that the use of CHP-GO for disclosure purpose has only gained very limited practical relevance since then.

19 European countries have organised their GO systems within the European Energy Certificate System (EECS) provided by the Association of Issuing Bodies (AIB). This includes not only a common technical standard, but particularly operates a central registry

communication interface for international transactions of GO between the different registries, the "AIB Hub". It is worth highlighting that EECS does not only facilitate handling of RES-GO and CHP-GO, but also generally allows for issuing, transfer and cancellation of GO for other fuel sources like fossil and nuclear. In the year 2014, EECS GO representing some 328TWh of RES production have been cancelled and therefore used as compared to an overall RES production in Europe of some 1070 TWh.

The international interactions which result from Europe-wide trading activities for electricity and GO make it necessary that rules for such an accounting approach are applied in a coordinated way, in order to avoid double counting of specific attributes or loss of other attributes. Since 2004, the EU funded projects E-TRACK (Phases I and II) and RE-DISS (Phases I and II) have worked on electricity tracking and electricity disclosure, and provided recommendations how such systems should be designed. While the E-TRACK projects have focussed on developing the systematic analysis and principles, the RE-DISS projects have been focussing on the support of the actual implementation of coordinated tracking systems in Europe. Therefore, the major target group has been the national Competent Bodies for GO and for disclosure which are in charge of the national systems. Figure 1 gives an overview of both the legal milestones in the field of tracking and disclosure policies and the key contributions of the E-TRACK and RE-DISS projects for the further development of these systems.

This report summarises the results of the last of this series of projects called "Reliable Disclosure Systems for Europe – Phase II". This project pursued the following objectives:

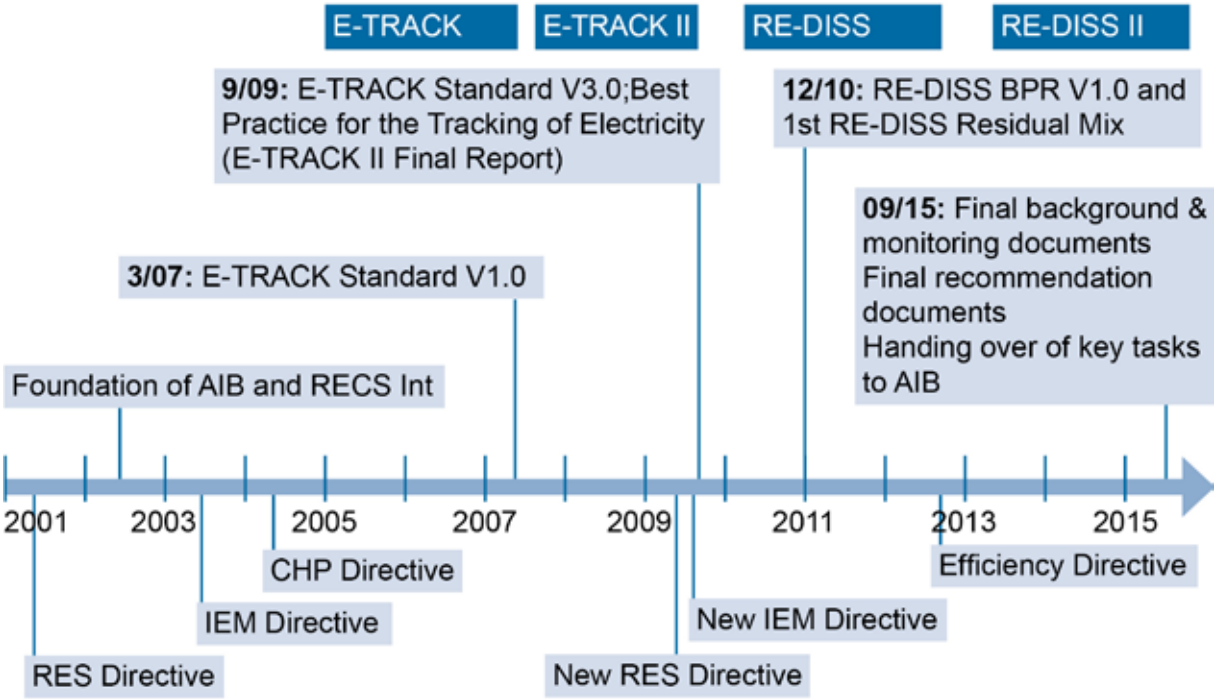
- <u>To support Competent Bodies in improving their GO and disclosure systems by providing general and specific recommendations, and by promoting exchange of expertise between them:</u>
  This has been facilitated by the development and maintenance of the RE-DISS Best Practice Recommendations (BPR) (see the annex to this report), and the so-called Starter Kit (RE-DISS II project 2014), which basically helps less advanced countries in a stepwise implementation of the BPR (see chapter 2.2). Furthermore, RE-DISS II has developed Guidelines for the Regulation of Front-Side Disclosure (RE-DISS II project 2015), see chapter 2.3). While the first documents mainly cover aspects related to tracking and the coordination of pan-European accounting systems, the latter gives advice on how to present disclosure information towards the end consumer. In order to support competent bodies in their decision about the recognition of imported GO, also a set of recognition criteria is proposed (see chapter 3).
  Besides the development of these guidelines documents, which are generally applicable by competent bodies also in the future, RE-DISS II has also supported competent bodies by giving bilateral advice and specific recommendations, and by the organisation of workshops for competent bodies for the exchange of experience and the joint development of best practice recommendations.

- <u>To allow for a coordinated operation of tracking and disclosure policies by providing centrally processed data to Competent Bodies and market actors</u>
  This objective was addressed by the annual provision of the "European Attribute Mix" (EAM) and of residual mix (RM) data on a national level. This is statistical key data in order to ensure a reliable disclosure and to avoid double counting (see chapter 4. Furthermore, country-specific environmental emission factors for different fuels have

been elaborated in order to improve also the provision of environmental indicators together with the disclosure information (see chapter 5).

- To monitor implementation of policies related to tracking of electricity as imposed by EU Directives
  RE-DISS II has provided Country profiles for the EU28+NO+CH+IS, outlining the status quo of tracking and disclosure systems in the different countries. This covers not only the straight forward implementation of the Directive, but also the implementation of the different recommendations of the BPR, which can be considered an indicator for the sound implementation of disclosure. The development of the policy implementation in Europe is assessed in chapter 6. Also the situation of individual countries in the light of the recognition criteria has been analysed (see chapter 3).
- To develop recommendations and guidelines both to Competent Bodies and to other stakeholders helping to improve the informative value of disclosure for end consumers
  This objective has not only been addressed by the Guidelines for the Regulation of Front-Side Disclosure (RE-DISS II project 2015), but also by guidelines which directly address suppliers in order to improve their disclosure over and above what is required in their respective national context (see chapter 2.3).
- To develop methods, processes and governance structures needed for the central coordination of a European Tracking System which can be applied continuously also after the end of the project phase
  This objective has been pursued by supporting the Association of Issuing Bodies (AIB) in order to take over key responsibilities which should ensure that also after the end of the RE-DISS projects a sufficient coordination of European disclosure and tracking systems takes place (see chapter 7.3).

Figure 1: History of tracking and disclosure policies on the EU level




Source: Authors' own compilation

# 2 RE-DISS Recommendations for implementing sound disclosure systems

## 2.1 Overview over scope of recommendations and guidelines

A major result of the RE-DISS II project is the provision of several documents which focus on giving specific recommendations or guidelines in the context of guarantees of origin and disclosure. This includes the following documents:

- RE-DISS Best Practice Recommendations (see the annex to this report)
- Starter Kit for Basic Implementers (BI)[1] (RE-DISS II project 2014)
- Proposal for Recognition Criteria (RE-DISS II project 2014a)
- RE-DISS Guidelines for the Regulation of the Front-Side Disclosure of Electricity (RE-DISS II project 2015)
- RE-DISS Disclosure Guidelines for Suppliers (RE-DISS II project 2015a)

The documents are intended to serve as a point of orientation for many countries, and to support a reliable and sensible implementation of GO and disclosure frameworks across Europe. They cannot be considered binding in any respect. However, the given recommendations are based on intensive discussions and input from competent bodies for GO and for disclosure and from other stakeholders including European market stakeholder associations and environmental and consumer NGOs This includes consultations in various formats, and has been substantiated by an informal approval of these documents by competent bodies and also other stakeholders. Although such approval implies in no way a commitment by the respective party to follow all given recommendations in its domain, and also does not require agreement to all individual recommendations covered by that document, it expresses that the respective document is considered helpful in general by providing a valuable point of orientation for many competent bodies (or potentially also other target groups). Still, it has to be noted that the responsibility for all published documents lies with the RE-DISS II project team.

## 2.2 RE-DISS Best Practice Recommendations and Starter Kit

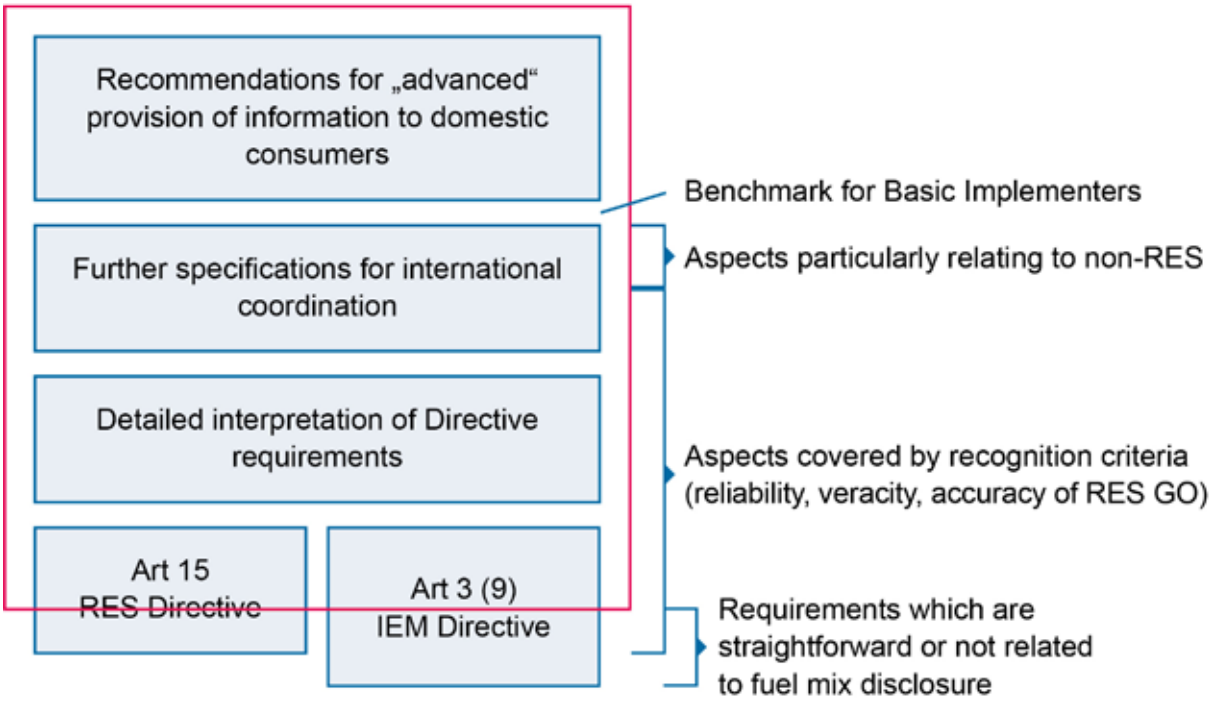
### 2.2.1 RE-DISS Best Practice Recommendations

The RE-DISS Best Practice Recommendations (BPR) are the key document with the highest relevance in terms of international coordination. The RES and IEM Directives only give general directions on some topics related to the implementation of disclosure and GO, which need to be further elaborated in order that Member States all make the same choice of implementation. Some of the BPR are necessary to agree on between different Member States in order not to hamper the consistency of other domains' disclosure system, taking international trade of electricity and GO into account. The RE-DISS BPR focus on tracking and accounting aspects of electricity disclosure attributes, which are of international relevance. However, they are not strictly limited to this and also provide recommendations on

[1] The term "Basic Implementers" is used for countries with a basic level of electricity market development and of systems for Guarantees of Origin and for electricity disclosure. For a more comprehensive definition, please see the Starter Kit document as available on the RE-DISS website www.reliable-disclosure.org.

the provision of meaningful disclosure information to domestic consumers. The RE-DISS BPR provide orientation for the improvement of existing GO and disclosure systems and for the implementation of new features or frameworks covering the whole electricity market and not only the RES part. The RE-DISS BPR therefore can be roughly described according to the following figure.

Figure 2: Scope of RE-DISS Best Practice Recommendations




Source: Authors' own compilation

It has to be noted that the RE-DISS BPR do not include all of Article 15 of the RES Directive, because some of the requirements are quite straightforward and can be implemented by Member States without further explanations (e.g. 1 MWh face value of a GO). Also some of these requirements have been included into the EECS Rules[2], the implementation of which is recommended by the RE-DISS BPR. In the same way some requirements of Article 3 (9) of the IEM Directive are not directly addressing fuel mix disclosure, so these are neglected by the BPR and recognition criteria.

The benchmark for Basic Implementers indicates the level of GO and disclosure implementation which should correspond to the first two stages described in the RE-DISS Starter Kit (see chapter 2.2.5 below).

Last, the illustration does not show that some of the IEM Directive requirements which are included in the BPR are not considered relevant for recognition criteria (e.g. provision of "supplier mix" rather than "product mix").

[2] The EECS Rules are a document issued by the Association of Issuing Bodies which encompasses the principles and rules of operation of the European Energy Certificate System.

With respect to the Directives and the EECS Rules, the RE-DISS BPR are on an intermediary level of detail. A strict distinction is not possible due to several reasons, including:

- The status quo implementation of Directives shows that it is important to stress some specific requirements of the Directives in order to support their actual implementation in domains.
- The RE-DISS BPR aim to reach all European countries, not only EECS countries.
- The RE-DISS BPR are defined in a way that their implementation (together with straightforward requirements as imposed by the relevant Directives) should ensure that respective GO can be considered reliable, veracious and accurate and therefore give no reason for non-recognition according to Art. 15 (9) of the RES Directive.

Some of the recommendations included in the Best Practice Recommendations provide general guidance in order to ensure the stringency of tracking systems also in an international context, while others provide a very specific recommendation, although also other alternative forms of implementation could be considered as well. The RE-DISS BPR in their final form are the result of a long discussion process between the project team and the Competent Bodies. They represent what both the Competent Bodies and the project team considered to be the best direction to take, both on a practical level and in a more long term perspective. The BPR at the same time include the principles of an ideal “lighthouse” implementation of relevant regulation (and thus give rather “visionary” recommendations), and a more practical guidance towards better tracking systems starting from today’s status quo (and thus give “practical” recommendations). Given the non-binding character, the inclusion of the two dimensions probably is helpful for Competent Bodies in different cases.

### 2.2.2 Purpose of the BPR

Disclosure enables consumers to make informed choices about their energy supply based on other criteria than price. Depending on the details of the national regulations, this can for example include the energy sources used for electricity production compared with a national average, information on the environmental impact of the supplied mix and the origin of the electricity supplied (domestic production or imported electricity). The consumer choice can be made in principle at two different levels: supplier mix information and specific products (optional).

For consumers to make an informed decision on their energy supplier, it is crucial that the information provided to the consumer is reliable. For that, the tracking system should avoid all forms of double counting (especially of RES) and should assure that one produced MWh of energy is assigned to consumers only once. In general, disclosure should also aim at:

- Providing meaningful information to the users of electricity, enabling consumer’s choice;
- Being robust against errors and fraud by actors involved;
- Being compatible with existing economic, socioeconomic regulatory and legislative framework;
- Being cost-efficient, by providing the services required at reasonable costs;
- Being flexible enough to adapt to changing framework conditions.

Reliable tracking can only be done by decoupling attributes from electricity produced and by creating two distinct markets: exchange of physical electricity and exchange of attributes.[3]

Guarantees of Origin (GO) for electricity from renewable energy sources (RES-E) were first created as carrier of attributes in the RES Directive 2001/77/EC. However the lack of stringent requirements resulted in different implementation in different Member States. The revised RES Directive 2009/28/EC provided clarifications in Article 15 on how the GO system should be implemented; on its function (that GO should only be used for disclosure); its form (GO should be an electronic document) and lifecycle (12 months lifetime); and that the mechanism for managing GO should be accurate, reliable and fraud resistant. On this ground, the RES Directive 2009/28 also referred that GO should be recognised by other Member States unless they are found not to be veracious, reliable or accurate.

Although the EU Directives define the fundamental principles of GO and disclosure systems, Member States need to interpret the measures necessary to make GO and disclosure reliable, accurate and fraud-resistant as well as they are required to recognise GO from other Member States (unless there are well funded doubts about the accuracy, reliability or veracity of the GO). Moreover, national energy markets are closely internationally interconnected in flows of physical energy and attributes and the reliability of disclosure information provided to consumers is usually partly dependent on information provided by actors in other countries. Thus a coordinated implementation of GO and disclosure schemes is crucial for all national Competent Bodies.

In this sense, the RE-DISS project has put forward the BPR that were extensively discussed with Competent Bodies from many European countries and in the end has been generally approved by them to provide further guidance on the establishment of reliable, accurate and fraud resistant GO and disclosure systems in Europe. The BPR aims at providing guidance for developing and revising national primary and secondary legislation and to advise Competent Bodies how further practical details of GO and disclosure systems could be implemented.

As the rules for implementing GO and disclosure schemes are governed by EU and national legislation and regulations, the actual use of the BPR is subject to national legislation and thus is not binding.

The BPRs' main purpose is a contribution to solving or minimising the problems[4] related to disclosure systems, which can be classified as follows:

1. Double counting in different explicit tracking mechanisms,
2. Double counting of attributes in implicit tracking,
3. Double counting within individual supplier's portfolio,
4. Loss of disclosure information
5. Intransparency for consumers;
6. Leakage of attributes and/or arbitrage; and
7. Unintended market barriers.

[3] For more detail on the general functioning of a tracking system, please refer to the E-TRACK Final Report (E-TRACK I project 2007).

[4] For more details on the disclosure problems, please refer to the RE-DISS I Report on Improvements Achieved by the Project based on the Best Practice Recommendation (RE-DISS I project 2012).

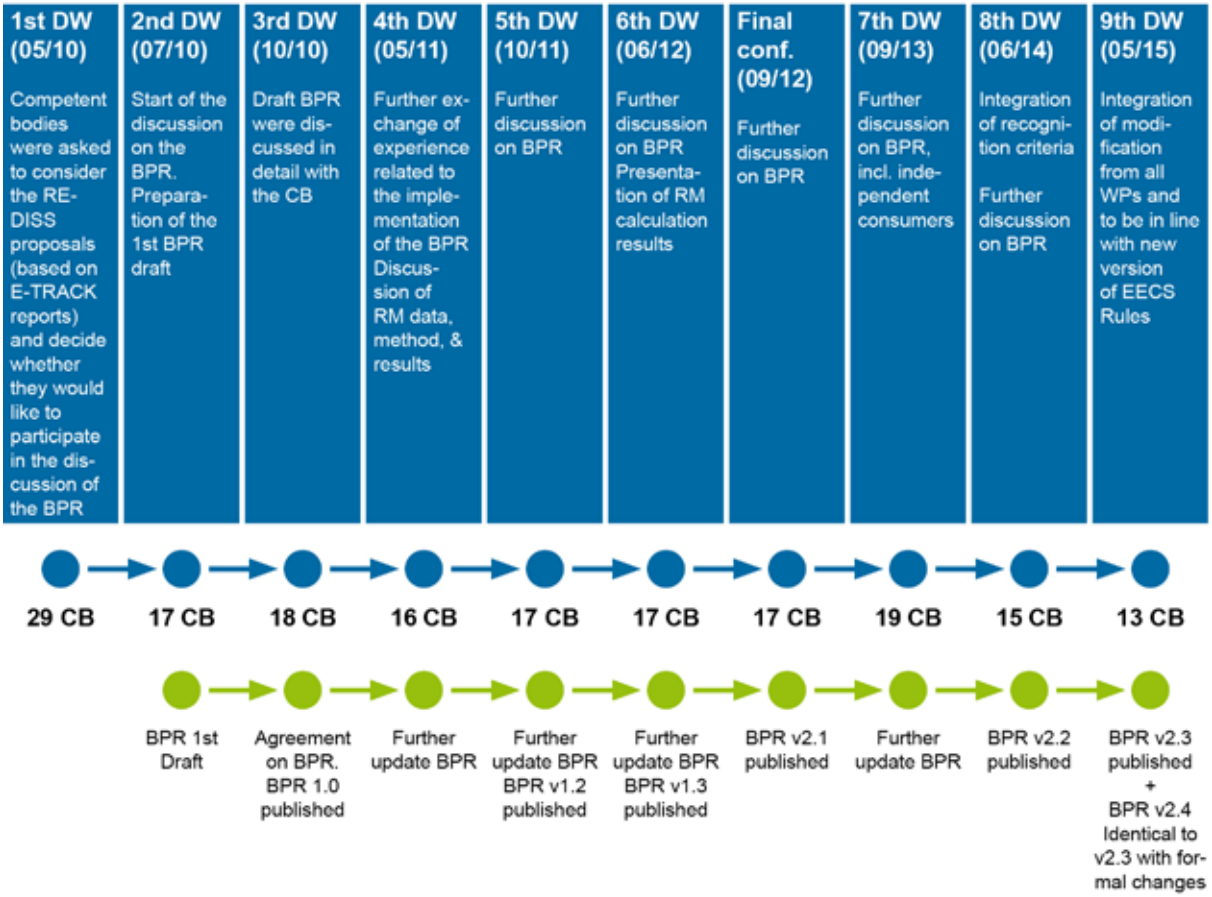
### 2.2.3 Elaboration process of the BPR

The Best Practice Recommendations builds upon the findings and recommendations of the project "A European Tracking System for Electricity (E-TRACK)".[5] These have been developed further in the first phase of the RE-DISS project[6] and were discussed in six workshops which involved representatives of Competent Bodies from 19 European countries. Comments received during and in between the workshops were taken up in version 2.1 of the BPR document, which concluded the work of phase I of the RE-DISS project. It was not intended to ask the workshop participants for a formal approval of the BPR. However a broad majority of participants supported the proposals and only very few reservations on single elements of the recommendation were made by some workshop participants. In its second phase, the RE-DISS project has developed the BPR further based on continued discussions with Competent Bodies. During RE-DISS II two versions of the BPR were adopted: BPR v2.2 and BPR v2.3 from July 2015, which is the latest version where changes were made to the content. This version takes up comments and suggestions made in the 7th and the 8th RE-DISS Domain Workshop for Competent Bodies that were held in September 2013 and June 2014 and further comments received in writing from various stakeholders until mid July 2014. Other changes to version 2.2 of the BPR were made to integrate the project's findings or new developments coming from e.g. the AIB's work, like the publication of v7.7 of the EECS Rules. The final version of the BPR, version 2.4, only incorporates formal changes, which were made necessary to acknowledge the termination of the project. This version of the BPR is contained in an annex to this report.

5 See the website of the E-TRACK project, which ran until 2009 (http://www.e-track-project.org). The E-TRACK final report contains a lot of background information which might help in understanding this document.

6 For more information on the first phase of the RE-DISS project, which ran until October 2012, please see the pages on the project website dedicated to this phase (http://phase1.reliable-disclosure.org/), which contain useful information regarding GOs and disclosure.

Figure 3: BPR Development




DW: Domain Workshop; CB: Competent Bodies (participating in workshops)

Source: Authors' own compilation

## 2.2.4 Main contents of the BPR

The elements of the BPR are numbered for easy reference and are divided in different categories, depending of what they target:

- "12 Month Lifetime Rule" for GO
- Usage of EECS
- Issuing of GO for different energy sources and generation technologies
- GO as the unique "tracking certificate"
- Recognition of GO
- Disclosure Schemes and other Reliable Tracking Systems (RTS)
- Calculation of residual mixes
- Contract Based Tracking
- Timing for Disclosure
- Further Recommendation on Disclosure

Several BPR from previous versions of the document were split up as they call for the implementation of several aspects within the same item. The following table shows how the BPR have been split up as well as their content.

Table 1: Structure and main content of the BPR (Version 2.4)

| Set of BPR | BPR ID | Main content of the BPR |
|---|---|---|
| „12 Month Lifetime Rule" for GO | 1a | The metered production periods for purposes of issuing GOs should not be longer than a calendar month and where possible should not run across the start and end dates of the disclosure periods. If metered production periods are longer, then the allocation of GOs to production periods should be done according to what the EECS Rules recommend (C3.4.1.c). |
| | 1b | Longer intervals up to one year are acceptable for very small plants, for example. |
| | 2a | If possible, the issuing of GOs should be done without delay after the end of each production period |
| | 2b | Wherever possible, the issuing of GOs for energy produced in year X should be done at the latest by 31st March X+1. |
| | 3a | The lifetime of GOs should be limited to 12 months after the end of the production period. |
| | 3b | GOs which have reached this lifetime should be considered as "expired" and be collected into the Residual Mix. |
| | 4 | An extension to this lifetime can be granted if a GO could not be issued for more than six months after the end of the production period for reasons which were not fully under the control of the plant operator. In this case, the lifetime of the GO might be extended to six months after issuing of the GO. |
| | 5a | Cancellations of GOs relating to production periods in a given year X which take place until a given deadline in year X+1 should count for disclosure in year X. Later cancellations should count for disclosure in year X+1. (In case that disclosure periods differ from the calendar year (see item [31]), the deadline should be defined accordingly.) |
| | 5b | Deadline is set on 31 March X+1 |
| | 6 | The disclosure information from expired GOs (see item [3]) can be allocated either to the production year of the corresponding energy unit or to the year when the GOs have expired, depending on the methodology used for Residual Mix calculation in the respective domain. |
| Usage of EECS | 7a | The implementation of GO in all countries in Europe should be based on the European Energy Certificate System (EECS) operated by the Association of Issuing Bodies (AIB If national GO systems are established outside of EECS, then EECS should at least be used for transfers between registries. |
| | 7b | If national GO systems are established outside of EECS, then EECS should at least be used for transfers between registries. |
| | 8 | If not all European countries are members of EECS, appropriate connections between the EECS system and non-EECS members as well as in between different non-EECS members will need to be established. These include inter alia procedures for assessing the reliability and accuracy of the GOs issued in a certain country and interfaces for the electronic transfer of GOs. |
| | 9a | Market participants of the respective domain should be provided the possibility to export their GOs and thus participate in the European internal market for electricity. |
| | 9b | So-called ex-domain cancellations of GO, where a GO is cancelled in one registry and a proof of cancellation is then transferred to another country in order to be used there for disclosure purposes, should only be used if there is no possibility for a secure electronic transfer and if there is an agreement on such ex-domain cancellations between the competent bodies involved. Statistical information on all ex-domain cancellations should be made available in order to support Residual Mix calculations. |

| Set of BPR | BPR ID | Main content of the BPR |
|---|---|---|
| Issuing of GOs for different energy sources and generation technologies | 10.1 | GOs should generally be issued only for the net generation of a power plant, i.e. gross generation minus the consumption of all auxiliaries related to the process of power production. For hydro power plants involving pumped storage this means that GOs should be issued only for the net generation which can be attributed to natural inflow into the reservoir. This should be consistent with the EECS Rules which for the time being means: net generation may include losses associated with pumping, where the efficiency of the pump is known and can be verified.<br>Issuing = Generation – AuxiliaryConsumption – Pumping*PumpingEfficiency<br>If Pumping Efficiency is unknown, 100% must be assumed. |
| | 10.2 | Verification mechanisms should be implemented for ongoing control of registered data (e.g.re-audits, random checks, etc.). |
| | 10.3 | Correct accounting of RES share of combustion plants should be assured by adequate measures such as those recommended by the EECS Rules (cf part N6.3.2 and N6.4.1). |
| | 10.4 | The competent body can correct errors in GOs it has issued before they are exported, and is the only one with this competence. |
| | 11a | The GO system should be extended beyond RES & cogeneration to all types of electricity generation. |
| | 11b | GOs should be issued for all electricity production, unless an RTS applies for that production, e.g. for the disclosure of supported electricity. |
| | 11c | Competent bodies should consider to make the use of GOs mandatory for all electricity supplied to final consumers. |
| | 12.1 | All types of GO should be handled in one comprehensive registry system per country. (For an exception from this recommendation see the coexistence of national GO systems and EECS in item [7]) |
| | 12.2 | Technical changes to plants need to be registered as soon as is reasonably practicable. |
| | 13.1 | GOs shall have no function in terms of target compliance and should not be used as support instrument. The only purpose of GOs should be disclosure. |
| | 13.2 | A GO should be considered as having been used only once it has been electronically cancelled. |
| | 13.3 | After cancellation, no further cancellation, transfer or export of the given GO should be possible. |
| | 13.4 | After expiry, no further cancellation, transfer or export of the given GO should be possible. |
| | 13.5 | An exported GO should be marked as removed from the exporting registry. |
| | 13.6 | Processes in the registry should exclude duplication of GOs. |
| | 13.7 | Registries should be audited on a regular basis. |
| | 14a | There should be no issuing of more than one GO for the same unit of electricity. |
| | 14b | If multiple certificates are to be issued, e for example, a GO for disclosure and a support certificate for management of a support system, then these should be legally separated. |
| | 15a | This also applies to cogeneration plants which are using RES as the energy source: Only one GO should be issued per unit of electricity |
| | 15b | This GO should combine the functionalities of a RES-GO and a High Efficiency cogeneration GO. |
| GO as the unique "tracking certificate" | 16 | GO should be the only "tracking certificate" used. Any other tracking systems of a similar purpose and function as GO should be converted to GO. |
| | 17 | Besides GO, only Reliable Tracking Systems (which may include contract-based tracking) and the Residual Mix should be available for usage for disclosure. No other tracking mechanisms should be accepted. |
| | 18 | Green power quality labels should use GO as the unique tracking mechanism. |
| | 19 | European countries should clarify whether and under which conditions the use of GOs by end consumers is allowed independently from the disclosure provided by their electricity suppliers. Such use of GOs should not be based on ex-domain cancellations performed in other countries. If consumers are allowed to use GOs independently, a correction should be implemented in the disclosure scheme which compensates for any "double disclosure" of energy consumed. |

| Set of BPR | BPR ID | Main content of the BPR |
|---|---|---|
| Recognition of GO imported from other countries | 20a | European countries should choose one of the two followings options and apply it consistently for all foreign GOs:<br>• Rejection of GOs only relates to the cancellation of GOs and subsequent use for disclosure purposes in the respective countries and should not restrict the transfers of GOs between the registry of the considered country and the registries of their countries. This means that the decision about the recognition of a GO by a country should not hinder its import into the considered country.<br>• Rejection of GOs implies blocking their import to the national registry. |
| | 20b | The choice of one or the other option should be transparent for all market parties and clearly communicated. |
| | 21 | Within the rules set by the respective Directives, European countries should consider their criteria for the acceptance of imported GOs for purposes of disclosure.<br>• These criteria should address imports at least from all EU member states, other members of the European Economic Area (EEA) and Switzerland. The parties to the Energy Community Treaty should be considered as well, as soon as GO imports from these countries become relevant.<br>• The criteria should specify the electronic interfaces, specifying data format and contents of GOs to be imported, which the respective country accepts for imports of GOs (such as the EECS Hub and any other interfaces accepted).<br>• Conditions for the recognition of GOs from other countries should be that they were issued based on Art. 15 of Directive 2009/28/EC or compatible national legislation, and that they meet the explicit requirements set in Art. 15, for example, regarding the information content of the GOs.<br>• The recognition of GOs from other countries should be rejected if these countries have not implemented an electricity disclosure system.<br>• The recognition of GOs from other countries should be rejected if the country which has issued the GOs or the country which is exporting the GOs have not implemented appropriate measures which effectively avoid double counting of the attributes represented by the GOs. Such appropriate measures should ensure the exclusivity of the GOs for representing the attributes of the underlying electricity generation, implement clear rules for disclosure, establish a proper Residual Mix or equivalent measures, and ensure their actual use. Furthermore, the appropriate measures should ensure that attributes of exported GOs are subtracted from the Residual Mix of the exporting country and cannot be used for disclosure at any time in the issuing or the exporting country by explicit mechanisms, unless the GOs are re-imported and cancelled there. |
| Disclosure Schemes and other Reliable Tracking Systems | 22 | Full disclosure schemes should be implemented, including the disclosure of CO2 emissions and radioactive waste. |
| | 23 | (Other) Reliable Tracking Systems (RTS) should be defined where appropriate based on criteria of added value, reliability and transparency. |
| | 24 | RTS can comprise, where applicable:<br>• Homogeneous disclosure mixes for regulated market segments where no choice of supplier or different products exists,<br>• Support systems whose interaction with disclosure requires a certain allocation of the attributes of supported generation (e.g. a pro-rata allocation to all consumers in a country where RES electricity is supported by a feed-in tariff),<br>• Contract-based tracking |
| Calculations of Residual Mixes | 25 | All countries should provide a Residual Mix as a default set of data for disclosure of energy volumes for which no attributes are available based on cancelled GO or based on other Reliable Tracking Systems. The use of uncorrected generation statistics (e.g. on national or UCTE, Nordel etc. levels) should be avoided. |
| | 26a | The calculation of the Residual Mix should follow the methodology developed in the RE-DISS project. |
| | 26b | As part of this methodology, competent bodies from all countries in Europe should cooperate in order to adjust their Residual Mixes in reflection of cross-border transfers of physical energy, GO and RTS. |
| | 27 | For purposes of this cross-border adjustment, competent bodies should use data provided by RE-DISS. They should also support the collection of input data for the related calculations by the RE-DISS project team. |

| Set of BPR | BPR ID | Main content of the BPR |
|---|---|---|
| | 28 | As a default, the Residual Mix should be calculated on a national level. However, if the electricity markets of several countries are closely integrated (for example in the Nordic region), a regional approach to the Residual Mix may be taken. This should only be done after an agreement has been concluded between all countries in this region which ensures a coordinated usage of the regional Residual Mix. |
| Contract based tracking | 29 | If contract-based tracking is allowed in a country, it should be regulated clearly. |
| | 30 | Such regulations should ensure that<br>• The rules of the tracking system are transparent and comprehensive and are clearly understood by all participants in the system.<br>• Double counting of attributes and loss of disclosure information is minimised within the contract based tracking scheme and also in the interaction of the contract based tracking scheme to GO and other RTS (if applicable). As a precondition for this, the contract based tracking scheme should be able to provide comprehensive statistics about the volumes and types of electricity attributes which are tracked through it.<br>• The relevant information for disclosure purposes should be available in time to meet the timing requirements |
| | 31 | If suppliers of electricity intend to use contract-based tracking in order to fulfil claims made towards consumers regarding the origin of a certain electricity product (for example a "green" energy product), GOs should be used in addition to the contract (see also item [38]). |
| | 32 | If a country implements a system in which generation attributes are allocated to suppliers and consumers of electricity "ex post" based on the contracts concluded in the electricity market, then such a system should fulfil the requirements mentioned above in order to qualify as a Reliable Tracking System (see item [23]). This includes the need to produce reliable statistics about the attributes allocated by this system. |
| Timing of Disclosure | 33 | Electricity disclosure should be based on calendar years. |
| | 34 | The deadline for cancelling GO for purposes of disclosure in a given year X should be 31 March of year X+1 (see BPR 5b). |
| | 35 | The timing of the calculation of the Residual Mix should be coordinated across Europe:<br>• By 30 April X+1 all countries should determine their preliminary domestic Residual Mix and whether they have a surplus or deficit of attributes.<br>• By 15 May X+1, the European Attribute Mix should be determined.<br>• By 31 May X+1, the final national Residual Mixes should be published.<br>• As of 1 July X+1 the disclosure figures relating to year X can be published by suppliers. |
| Further Recommendations on Disclosure | 36 | All countries should clarify the relation between their support schemes for RES & cogeneration on the one side and GOs and disclosure schemes on the other side. Where necessary, the support schemes should be defined as RTS (see item [23]). |
| | 37 | If support schemes in a country are using transferable certificates, then these certificates should be separated from GOs and should not be used for disclosure (see also item [14]). |
| | 38 | All electricity products offered by suppliers with claims regarding the origin of the energy (e.g. green or low-carbon power) should be based exclusively on cancelled GO. No other tracking systems should be allowed, with the exception of mechanisms defined by law, e.g. a pro-rata allocation of generation attributes to all consumers which is related to a support scheme (see item [24]) |
| | 39a | As required by Art. 3 (9) of the IEM Directive 2009/72/EC annual disclosure of the supplier mix on or with the bill should be mandatory. This should also include information on environmental impacts. |
| | 39b | Additionally, suppliers offering two or more products which are differentiated regarding the origin of the energy should be required to give product-related disclosure information, including environmental information, to all their customers including those which are buying the "default" remaining product of the supplier. |
| | 40 | There should be clear rules for the claims which suppliers of, for example, "green" power can make towards their consumers. There should be rules how the "additionality" of such products can be measured (the effect which the product has on actually reducing the environmental impact of power generation), and suppliers should be required to provide to consumers the rating of each product based on these rules. |

| Set of BPR | BPR ID | Main content of the BPR |
|---|---|---|
| | 41 | Claims made by suppliers and consumers of "green" or other low-carbon energy relating to carbon emissions or carbon reductions should also be regulated clearly. These regulations should avoid double counting of low-carbon energy in such claims. A decision needs to be taken whether such claims should adequately reflect whether the energy purchased was "additional" or not. |
| | 42 | If suppliers are serving final consumers in several countries rules must be developed and consistently implemented in the countries involved on whether the company disclosure mix of these suppliers should relate to all consumers or only to those in a single country. |
| | 43a | The following recommendations should be followed with respect to the relation of disclosure to cooperation mechanisms (Art 6 - 11 of Directive 2009/28/EC):<br>a) If EU member states or member states and other countries agree on Joint Projects, such agreements should also clarify the allocation of attributes (via GOs, RTS or Residual Mix) issued from the respective power plants. |
| | 43b | b) If EU member states agree on Joint Support Schemes, such agreements should also clarify the allocation of attributes (via GOs, RTS or Residual Mix) issued from the power plants supported under these schemes. |

Most of the Best Practice Recommendations are for immediate application. However, in some cases, when the project ambition was too far away from the current GO and Disclosure frameworks observed in most countries, the RE-DISS team felt it necessary to sketch what the long term goal was and to provide for intermediary steps that could lead to the ideal vision. Typical examples are BPR [11b] and [11c].

The status of implementation of the individual BPR will be dealt with in chapter 6 of this report.

### 2.2.5 Starter Kit

In a number of countries, particularly in the new Member States, it appears that the transposition of the disclosure obligation and the implementation of a GO system is not yet finalised, for a number of different reasons: financial and economic crisis, lack of development of the electricity market (high concentration, existence of segments which are not yet open to competition etc.).

One of the aims of phase II of the RE-DISS project was to help these Member States to become "Directive and BPR compatible" by identifying which are the basic requirements that a country can and needs to implement in order to properly transpose GO according to Directive 2009/72 and to create a framework that is compatible with the BPR.

The Starter Kit should be understood as guidelines that will give practical advice on where to start and how to prioritise among the numerous actions that have to be implemented by the Competent Authorities for GO and/or Disclosure. It gives recommendations to Basic Implementers on the implementation of a sub–set of the BPR in order to focus on the most relevant ones (which are relevant in order to assure consistency of international tracking systems and to spur the development of a differentiated market on the national level). It is taken into account that such step-wise implementation should not imply dead-end developments, but that they are logical elements when progressing to more advanced levels of electricity markets and tracking systems. This is reasonable in order to keep the pace with liberalisation of national markets and development of specific consumer interest. Although in the long-run RE-DISS sees that the implementation of the full set of BPR is the most advantageous strategy, the Starter Kit thus provides guidance on where to focus first. This takes into account limited financial and administrative capacities of responsible bodies in many Basic Implementer countries.

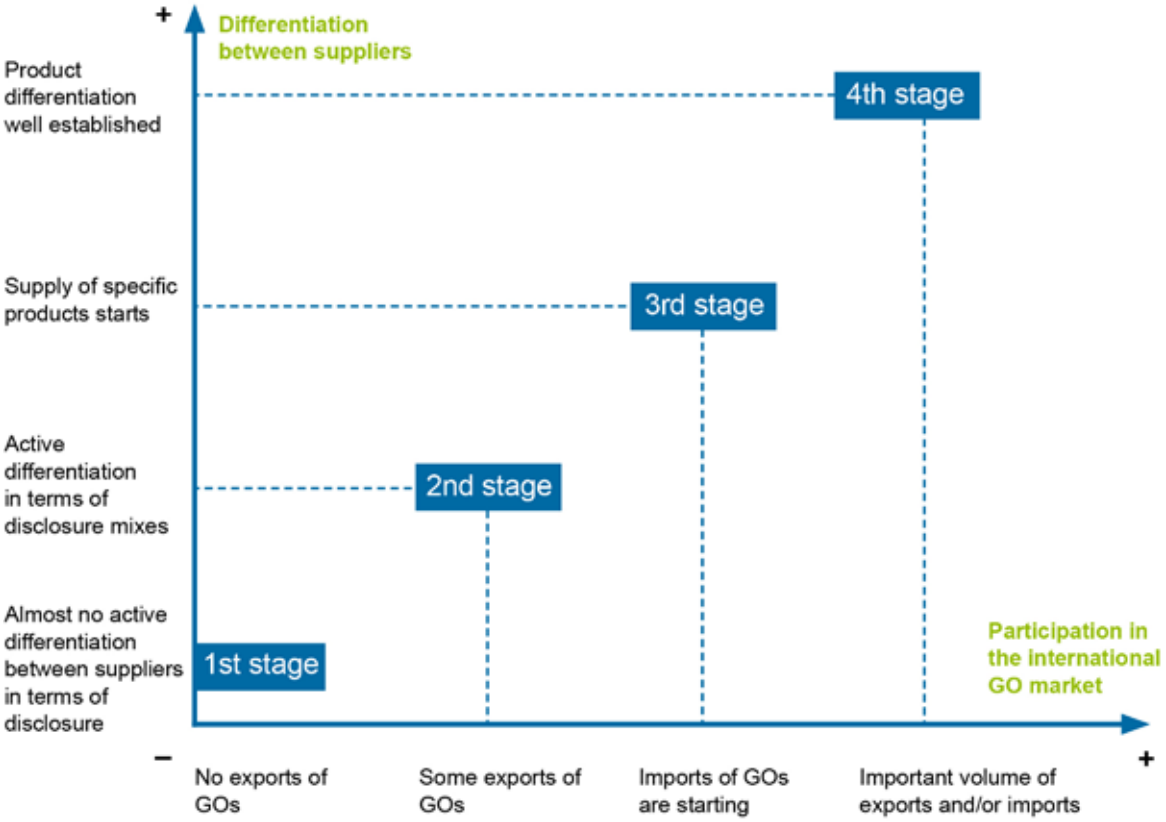
The Starter Kit should serve three main objectives:

- Enable correct implementation of EU Directives on GO and disclosure by all Member States
- Enable Member States to plug into the GO market without creation of disruptions, i.e. keeping the global qualities of the whole market: reliability, accuracy and fraud resistance.
- Ease and support this implementation in Member States whose electricity markets do not show a large degree of differentiation

The vocation of the Starter Kit is to be a general guideline that can be followed by all Competent Authorities. It is not tailor made to the individual Domains. Stemming from that, the cases that are proposed below may seem a bit theoretical and recommendations have to be adapted to the context of each Domain.

In order to determine which are the basic requirements for the implementation of proper disclosure and GO frameworks it was necessary to define a series of typical stages that can be found characteristic from less advanced countries situation and from the more advanced countries. This can be understood as a chronological framework that would follow the development of the electricity market in a given country, which would start as basic implementer and end as advanced implementer of the RE-DISS BPR.

Figure 4: Different stages of market maturity




Source: Authors' own compilation

Countries which correspond to situations as described by the first and second stages are considered as Basic Implementers, and are the target of the Starter Kit. In these countries, market liberalisation is not completed, with whole segments of consumers that cannot change suppliers or that benefit from regulated tariffs, which prevents effective competition to take place. Suppliers in these domains do not use disclosure as a means of differentiation. The integration in the GO international market is almost non existent, with countries where no issuing of GO takes place yet. Of course, definition of these stages is only indicative, as individual development of countries is more complex. For example in Portugal, no GO are issued yet, but the framework for disclosure is such that differentiation between suppliers is high. In Spain, GO are extensively used on the national level with strongly differentiated supplier mixes, but GO are not exported nor imported a lot since Spain is not yet connected to the EECS Hub, which is currently the only existing international platform for exchanging GO reliably.

Table 2: Correspondence between the 1st stage of market development and requirements in terms of GO and Disclosure

| Description of stages | Priorities for the tracking system | Requirements in terms of GO | Requirements in terms of disclosure |
|---|---|---|---|
| 1st stage | | | |
| • No or very limited market liberalisation, particularly meaning no free choice of supply by end consumers<br>• Almost no active differentiation between suppliers (in terms of disclosure information)<br>• Very low participation in the GO market (possibly some exports) | • Implement the RES and IEM Directives<br>• Establish mechanisms to avoid double counting (national level above all)<br>• Information of consumers on the existence and purpose of disclosure<br>• Make disclosure by suppliers operational, e.g. by establishing simple but stringent rules<br>• Set appropriate basis for future developments of disclosure: concept of tracking tools and basic rules that should correspond to the same framework as RE-DISS (timing, period)<br>• Limit costs | • Legislation in place<br>• Competent Authority designated and compliant with Directive requirements<br>• Electronic registry where compliant GO (all Directive information) can be issued, transferred nationally and cancelled. Could be a spreadsheet.<br><br>The following BPRs should be implemented:<br>• GO to be used for disclosure [BPR13-1]<br>• GO to be used only once [BPR13-2]<br>• No further transactions after cancellation or expiry [BPR13-3, 13-4], exported GO removed from registry [BPR13-5], no duplication of GO [BPR13-6]<br>• Uniqueness of GO [BPR14 a, b], [BPR15a, b]<br>• Cancelled attributes should be allocated according to date of cancellation [BPR5]<br>• Same for expired certificates [BPR6]<br>• Deadline for cancellation 31st March X+1 [BPR34] | • Legislation in place<br>• Competent Authority designated and compliant with Directive requirements<br>• Disclosure implemented in practice, on or with the invoices of the suppliers<br><br>The following BPRs should be implemented:<br>• Calendar years [BPR33]<br>• Full disclosure schemes [BPR22]<br>• GO only tracking certificate [BPR16]<br>• Provision of residual mix [BPR25]<br>• Clarification of link between support schemes and disclosure [BPR36], [BPR37]<br>• Deadline for cancellation 31st March X+1 [BPR34] |

The requirements in the 2nd stage are based on the assumption that requirements of the 1st stage are fulfilled.

Table 3: Correspondence between the 2nd stage of market development and requirements in terms of GO and Disclosure

| Description of stages | Priorities for the tracking system | Requirements in terms of GO | Requirements in terms of disclosure |
|---|---|---|---|
| 2nd stage | | | |
| • Active differentiation starting between suppliers (probably based mostly on own generation capacities)<br>• Individual consumers (e.g. multinational commercial consumers) start requesting specific products<br>• Exports of GO | • Ensure that there are clear rules on how to use tracking instruments, especially contract based tracking and other RTS<br>• Education of suppliers and consumers on the purpose of disclosure<br>• Ensure that national GO are accepted by other Member States<br>• Prepare for connection to the international market of GO with higher volumes<br>• Limit costs | The following BPRs should be implemented:<br>• Use of EECS [BPR7]<br>• One comprehensive registry [BPR12]<br>• Rules on ex-domain cancellations [BPR9] | The following BPRs should be implemented:<br>• No other tracking system than GO [BPR17]<br>• Rules on RTS [BPR17], [BPR23], [BPR24], and on contract based tracking [BPR25], [BPR29], [BPR30],<br>• Green offers should use GO [BPR31] |

## 2.3 Disclosure Guidelines

The RE-DISS II project has provided two different sets of guidelines with respect to disclosure, the “Guidelines for the Regulation of Front-Side Disclosure” (RE-DISS II project 2015), and the Disclosure Guidelines for Suppliers (RE-DISS II project 2015a).

The *Guidelines for the Regulation of Front-Side Disclosure* should support Competent Bodies in establishing sound disclosure systems. They focus on the “front-side aspects”, i.e. “Which sort of information is disclosed, and how is this done?”. These aspects are particularly relevant for the implementation on the national level in order to assure comparability for end-consumers which are active on the national market, but are less relevant for international coordination. In many cases, the national framework conditions will determine which information is relevant and of interest to consumers. Therefore, the Disclosure Guidelines will to some extent have the nature of a “tool box”, from which individual elements can be used or also neglected in individual countries rather than of step-by-step guidelines. Particularly with respect to the selection of different parameters to be disclosed, Competent Bodies will have to weight between provision of useful information and information overload. The requirements as defined by Article 3 (9) of Directive 2009/72/EC of course act as an obligatory baseline for all recommendations.

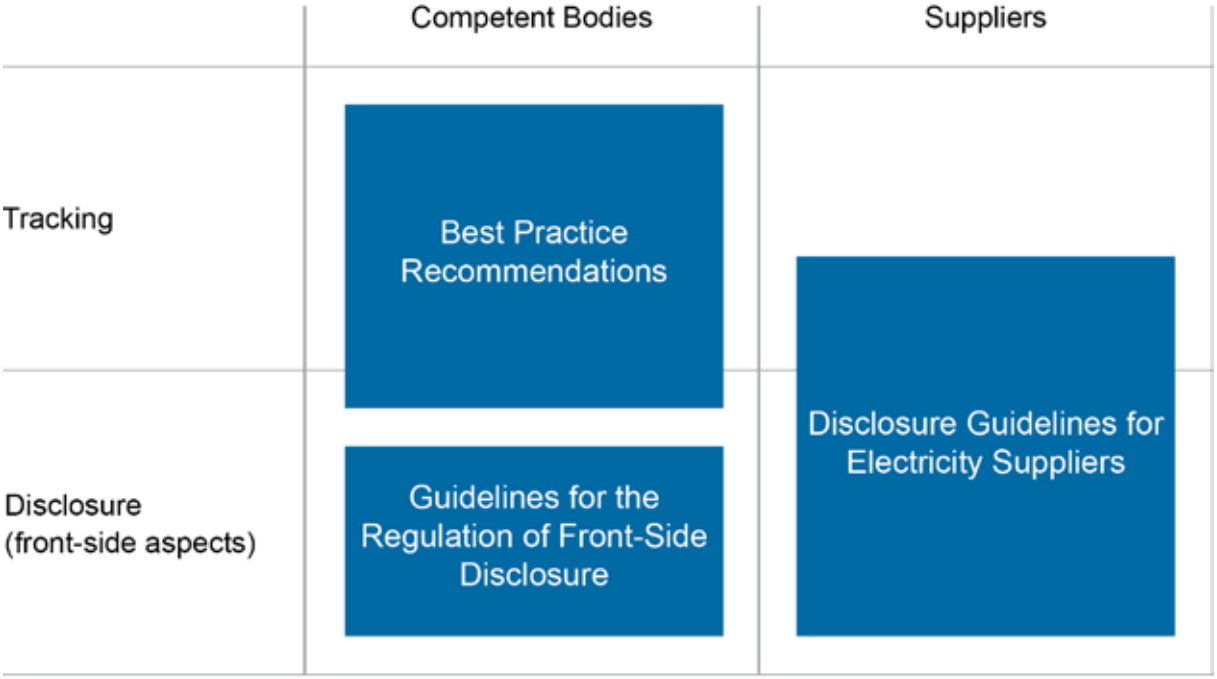
The Disclosure Guidelines for suppliers support electricity supply companies in order to optimise their own information behaviour towards their end-consumers in the context of electricity disclosure within the given national regulatory framework. It is in any case recommended that suppliers act in consistency with national legislation and official regulation. The given recommendations should be followed only in case this is allowed by the national framework. The Disclosure Guidelines cover both “back-side aspects” of disclosure (tracking of production attributes) as well as “front-side aspects” (which sort of information is disclosed, and how this is done), focussing on the elements which are of relevance for a supplying company. The elements of the Disclosure Guidelines thus are developed so that a supplier can best adapt to a given regulatory framework in his country and can optimise

information given to his customers under these preconditions. Long-term development of system principles and particularly technical infrastructure, which is beyond the powers of individual supply companies, is covered by the BPR and to minor extent also the Guidelines for the Regulation of Front-Side Disclosure which address the responsible Competent Bodies. The requirements as defined by Article 3 (9) of Directive 2009/72/EC of course act as an obligatory baseline for all recommendations. The same applies in principle also for the requirements as defined by Article 15 of the RES Directive 2009/28/EC

The scope of these documents is visualised in Figure 5.

Figure 6 gives an overview over the aspects which are covered by the Guidelines for the Regulation of Front-Side Disclosure.

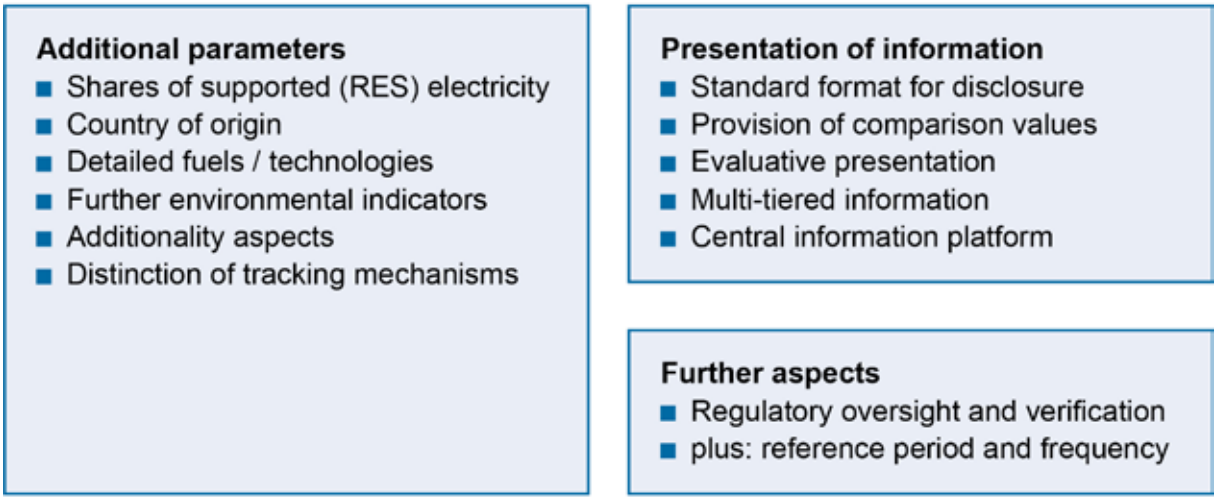
Figure 5: Scope of RE-DISS Best Practice Recommendations and Disclosure Guidelines




Source: Authors' own compilation

The core recommendations relating to these aspects are summarised below. In the Guidelines document, these recommendations are explained in more detail, and also additional recommendations are given which can be followed in order to further improve the information of electricity consumers relating to the fuel mix and environmental impacts of their electricity supply.

Figure 6: Aspects which are covered by the Guidelines for the Regulation of Front-Side Disclosure



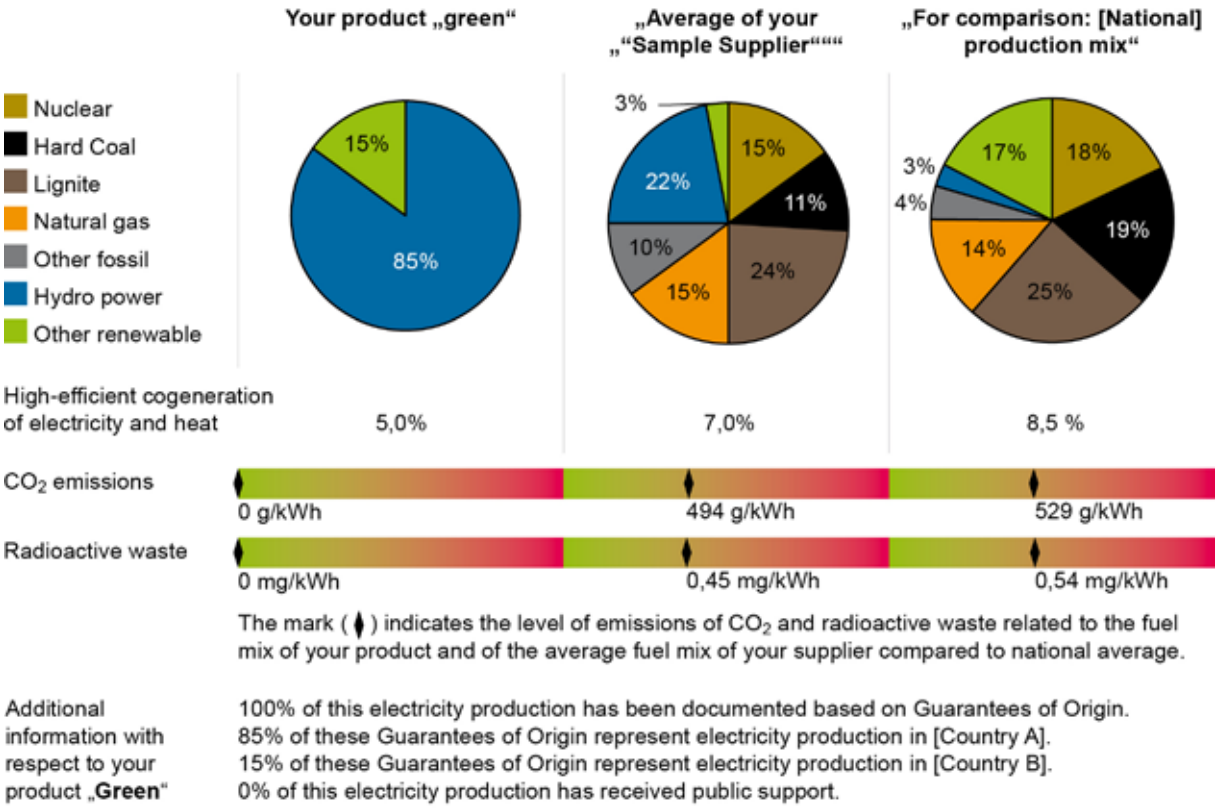

Source: Authors' own compilation

**Presentation of information:**

- The information on the fuel mix and on the environmental impact must be provided directly on or with the bill to consumers.
- Domains should ensure that disclosure information is provided to consumers in an understandable and comparable way. Therefore, they should ideally define a standard format. This display format should in any case include a graph for all key parameters, preferably a pie or a bar chart.
- The information on the fuel mix and the environmental impact should be provided with reference to the overall fuel mix of the supply company. If a supplier differentiates different products for his customers, he shall be obliged to disclose the information relating to the specific product to ALL his customers in addition to the information on the supplier's overall fuel mix.
- In order to allow consumers to better understand the provided information, the disclosure statement should allow for a comparison of the supplier and the product specific information with the national average production mix, or alternatively with the average mix of all information which is disclosed to consumers in a given country.
- Countries should require to suppliers to present information on environmental indicators ($CO_2$, radioactive waste) in a form which easily allows consumers to understand the level of environmental indicators in the relation to reference mixes. This should not only include graphical charts comparing the supplier mix, product mix and national mix, but also further instruments like intuitive colour coding.
- Countries should ensure that central information for all electricity products is available to consumers within a certain area, e.g. through a website.

For a proposal for such a way of presentation see Figure 7 and Figure 8.

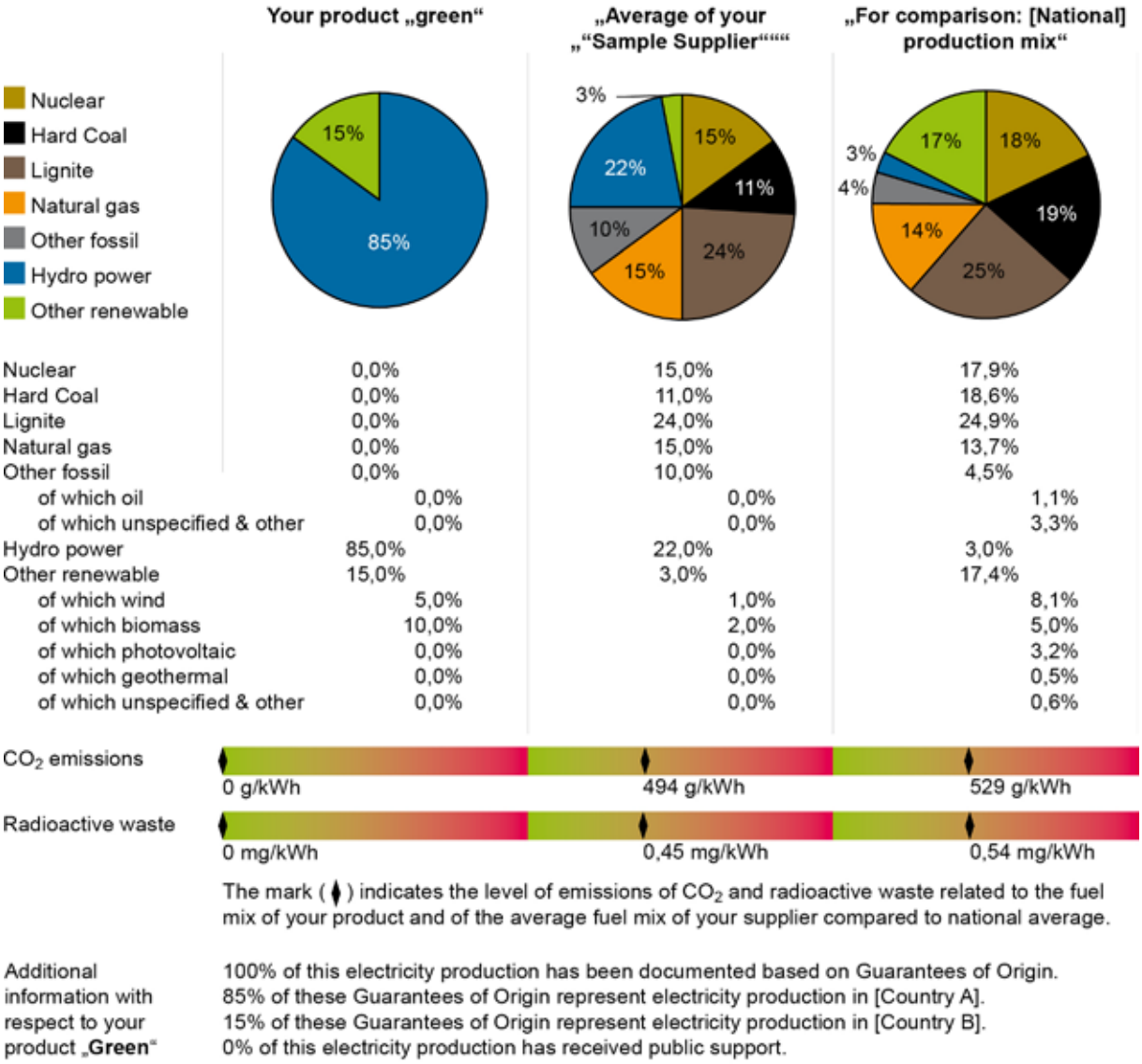
Figure 7: Example for Disclosure Statement 1




**Parameters to be disclosed:**

- The information on the fuel mix and the environmental impact (as indicated by $CO_2$ emissions and by radioactive waste) is clearly required by the European IEM Directive.
- Countries should develop a standard list of fuel categories to be used by all suppliers. This should be consistent with the fuel categories as defined for calculation of the RE-DISS residual mix in order to achieve international data consistency, particularly for application of residual mix information.
- Countries should require that suppliers indicate the country of origin of the underlying attributes as far as this information is available based on reliable tracking information. This should be the case at least for products with ex-ante claims, which should be tracked with GO.
- All countries should clarify the relation between their support schemes for RES-E & cogeneration on the one side and GO and disclosure schemes on the other side.
- Domains should decide whether suppliers of specific RES or other “green” products should be required to provide to consumers the rating of each product based on these rules.

Figure 8: Example for Disclosure Statement 2




Source for Figure 7 and Figure 8: Authors' own compilation

**Parameters to be disclosed (continued):**

- In principle, countries should weight the value of comprehensive consumer information against the reduction of complexity for consumers, particularly for those who are not highly interested anyway in the provided disclosure information. Thus, for some further detailed parameters it should be considered if such information is not to be provided directly in or with the bill in order not to reduce comprehensibility of disclosure information for the majority of consumers by information overload. In these cases, such information should be provided transparently on a website, to which the physically provided disclosure statement clearly refers. Such parameters include:
    - Additional environmental indicators besides $CO_2$ and radioactive waste, if available;
    - Possibly information on the shares of supported electricity particularly with respect to a disclosed product mix with ex-ante claims (e.g. as specifically "green" or "RES" product). Such information on support will probably be only consistently available for volumes which are tracked by means of RES-GO, as

the level of support is a mandatory information item on RES-GO according to the RES Directive;

- o Depending on the level of knowledge of the respective end consumers possibly information on the specific tracking instrument (e.g. GO, national residual mix, and indication of own production). Such information could come once end consumers are quite familiar with the principles of disclosure, or when the role of individual tracking instruments is under public debate.

**Other aspects and general recommendations**

- Domains should commission the regulatory authority or another competent national authority to supervise the actual operation of the disclosure scheme. Assigned tasks could not only include supervision of the disclosed data, but also appropriate format and means of presentation. This could be supported by a national monitoring report.
- The reference period should be calendar year, and this information should be provided to final consumers as early as possible in the following year.

The Disclosure Guidelines for Suppliers are consistent with these recommendations as described above, particularly those on the presentation of information and parameters to be disclosed. Still, it is clear that the regulatory framework for suppliers is strongly depending from the national context. Therefore, it is in any case recommended that suppliers act in consistency with national legislation and official regulation. The given recommendations should be followed only in case this is allowed by the national framework. Over and above the recommendations addressing the front-side aspects of disclosure, the Disclosure Guidelines for Suppliers also address the following core recommendations on tracking of information.

**Tracking of information**

- Guarantees of Origin (GO) are considered the preferable tracking instrument. GO should be used for all products with specific claims. As far as possible, this should be based on EECS GO.
- In case that no GO are available (e.g. as is the case for fuels other than RES in most European countries), also other “reliable instruments” can be used according to national regulation. This should ensure that the respective disclosure attributes (e.g. specific fuel type) and the corresponding volumes (in terms of MWh) are notified to a central body, e.g. the National Regulatory Authority (NRA). Only if this is the case, such volumes can be taken into account for calculation of a residual mix in order to avoid double counting.
- Besides GO and possibly other tracking mechanisms which can be considered reliable and transparent, only a centrally calculated national residual mix provided by the national Competent Body should be used. The use of uncorrected generation statistics for purposes of electricity disclosure should be avoided.

## 2.4 Excursus: Application of disclosure information for carbon accounting

Calculation and publication of corporate carbon footprints and of carbon footprints for products and services have become mainstream to a large extent. For many sectors, electricity consumption is a highly relevant item in the energy balance, and related emissions are to be applied in the carbon reporting. In recent years, accountability of a low emission factor particularly for renewable electricity supply (RES-E) has become the major driver of voluntary markets for RES-E for non-household consumers. However, this raises the question of how the emission factor for the electricity consumed should be determined and subsequently be taken into account in the carbon footprint. With a view to existing European regulation on liberalised electricity markets and to fuel mix disclosure for electricity, it is of particular interest how the information on $CO_2$ emissions as provided in an electricity supplier's fuel mix disclosure statement relates to the carbon footprint of the commercial electricity consumer.

The commonly applied approaches to calculate a carbon footprint follow a straight-forward book & claim system of attributes within the system boundaries of the respective organisation, product or service without any assessment if the individual behaviour actually contributes to environmental effects on a global scale. Taking into account that in the end carbon accounting is commonly promoted with reference to its environmental relevance, it is worth analysing to which extent it seems appropriate to follow the ambition that the principles of carbon accounting should lead to results which incentivise decision makers to choose options which actually mitigate climate change, and to which extent the common approaches to calculate a carbon footprint are in line with such ambitions. This question has been analysed and discussed in the RE-DISS II Report "Electricity Disclosure and Carbon Footprinting: Effects and incentives resulting from different approaches to account for electricity consumption in carbon footprints" (RE-DISS II project 2015b).

In that respect, electricity production and consumption are different to other accounting elements in carbon accounting, Due to large amounts of RES-E attributes, which are available for voluntary markets in the form of GO from old RES-E production capacities and RES-E volumes which have benefitted from public support, explicit choice for RES-E does, for the time being, not necessarily cause any pressure for building new RES-E in order to mitigate climate change. This is an important aspect of discussion when RES-E supply is compared to other (competing) options for decreasing the calculated carbon footprint of a company or product. These alternatives are particularly improvements in energy efficiency and energy savings, which can be preferred from an ecological point of view. A comparable effect from RES-E supply would only be reached if new RES-E capacities are directly stimulated, and if this new RES-E directly replaces fossil production (and the related $CO_2$ emissions). This positive effect of RES-E markets is usually referred to as "additionality". This can be reached either by specific "additionality criteria", or by a situation where the demand reaches the level of available production and leads – in combination with a sufficiently high willingness to pay for RES-E – to relevant incentives for installing new RES production plants.

The most fundamental choice when applying a methodology for electricity accounting for a carbon footprint is the choice between what the GHG Protocol calls the market-based approach and the location-based approach (The GHG Protocol 2015). The market-based approach can be roughly understood as the information on $CO_2$ emissions of the chosen

electricity product which is provided by the supplier as part of electricity disclosure. The location-based approach accords to the average production mix of the country or grid area in which the electricity consumption takes place. An analysis of the incentives which are provided by the choice between those two methods gains the following results:

- The methodology chosen for carbon accounting can have a much stronger influence on the carbon footprint results than the actual supply situation of the commercial consumer.
- Both the market-based method and the location-based method can gain results which leave only small incentives for efficiency measures or energy savings (irrespective of the actual level of efficiency potential).
- None of the two "plain" approaches described by the GHG Protocol provides an incentive for choosing a high-quality RES-E product with additionality.
- Under the market-based method, the incentive to apply any measure for reducing the carbon footprint increases with the amount of specific RES claims by other consumers in the respective area (at least in the case that the remaining attributes in the residual mix are fossil rather than nuclear attributes, and thus the residual mix becoming more an more carbon-intensive).
- The market-based approach provides equal incentives to reduce the carbon footprint either by buying electricity from RES-E or by implementing efficiency measures. This choice therefore probably depends most on the price level of such measures.
- Currently, the reference for calculating a grid mix is usually the national electricity system. Due to different national grid mixes companies which compete in a European market have competitive advantages or disadvantages, respectively, when calculating and communicating their carbon footprint. This is very clear for the location-based method, which refers to the (national) uncorrected production mix. But it also applies to some extent to the market-based method when choosing a non-specific electricity supply, which (on average) will correspond to the national residual mix.
- When applying the market-based method, the systematic discrepancy between competitors in different countries decreases with increased relative shares of claimed RES-E attributes which are deducted from the residual mix.

As stated above, one of the challenges to be addressed is an analysis of whether and how different accounting methodologies lead to results which incentivise decision makers to choose options which actually mitigate climate change. In the light of existing regulatory and market framework in Europe (including e.g. high shares of old hydro), this suggests to require a high priority for incentivising efficiency and energy saving measures. Efficiency is incentivised in different framework conditions and with all chosen methodologies to some extent, but under the market-based method efficiency competes with RES-E supply (with a market price for RES-GO which is extremely low and has remained so for years), and under the location based-method this incentive is very low anyway for countries with high shares of RES. Thus, one can conclude that neither of these methods creates a relevant incentive to increase energy efficiency.

A more thorough analysis of the effects of such an undifferentiated incentive structure is mostly depending on the question how realistic the possible scenario of "additionality by overshooting demand" is. Such a situation of increased demand, combined with a high willingness to pay for RES-E on voluntary markets might justify an equal prioritisation of efficiency and RES-E supply from an ecological point of view. European RES-E targets for

2020 amount to an annual production volume of roughly 1.400 TWh (ECN 2011, OED 2013, Eurostat 2012). About one third of this volume (≈ 500 TWh/a) has already been in the system as production by old hydro plants at the beginning of market liberalisation in Europe, and about two third of this volume (2013: ≈ 950 TWh/a) is being produced already today from newly built RES plants, which are usually incentivised by public support systems. At the same time, prices for GO from Norway (which amount for a major share of the European GO markets) are currently in the range of 0,15 EUR/MWh (EEX 2014), while the price level for Elcertificates (as indicator for cost of RES-E development towards 2020 targets) was 21,6 EUR/MWh in the same period (Statnett 2014) – roughly 150 times higher than the price for GO. It is assumed here that the price of Elcertificates is a realistic indicator for the surplus on the price for grey electricity which has to be paid to RES producers in order to make an investment in new RES plants profitable. For comparison, the average market price for electricity at Nordpool was close to 40 EUR/MWh in 2013 (Nordpool 2014), roughly 250 times higher than the price for GO. Although these figures only cover a status quo situation, they provide a numerical framework for necessary changes in consumer's willingness to pay if voluntary markets are really meant to stimulate new RES capacities by overshooting demand. In combination with the high market share of green power products which is needed for the vision of "additionality by overshooting demand", it also becomes clear that this vision would incur large-scale windfall profits for the operators and marketers of existing RES-E production capacities, as these would be paid the same price for their GO as the investors in new capacities. Thus, such distribution effects equally supporting all RES-E producers will reduce the monetary efficiency of this approach significantly. This shows that there is still a long way to go in order to reach additionality by overshooting demand, both in terms of further volume increase and in terms of available funding by increased prices on voluntary markets.

One option to better correlate the incentive structure derived from a carbon footprint with the expected ecological relevance is to change the definition of eligible RES-E attributes which can be claimed as a low-carbon source in a market-based approach for carbon footprint and to make this subject to additionality criteria. For the time being, none of the officially implemented methods for carbon accounting allows for a distinction of RES-E products according to the additional environmental benefit which is related to them. Still, there are some proposals for different approaches which, already under current conditions in Europe, allow for an "additionality-sensitive" approach. Such requirements should ideally be applied consistently in order to avoid systematic disadvantaging those who are using this more "restrictive" approach. Still, the application of such an approach could be also possible on a voluntary basis, as it does not negatively affect carbon accounting results of other stakeholders. Of course, transparency on the applied method would have to be provided in order to allow for interpretation of the results.

But: experience shows that the aspect of additionality is not easy to handle as it introduces an extra level of complexity, which is not considered necessary by some stakeholders or not understood, particularly by non-experts on the topic. So for the time being, and in the absence of an agreement on such additionality-sensitive accounting requirements, at least requirements should be followed which assure high transparency on the driving factors for the carbon footprint and on the actual energy consumption, rather than just providing only one carbon footprint figure as final result. This should include parallel accounting both with the market-based method (which uses data provided under electricity disclosure) and with the location-based method, and an equal use and communication of both figures. Such requirements have been included in the GHG Protocol Scope 2 Guidance (The GHG

Protocol 2015) to some extent. From a practical point of view, this dual approach has the benefit of using established methods and principles. This allows for straightforward accounting and is probably intuitive for the vast majority of those who consider calculating a carbon footprint. Besides that, reporting of additional parameters would further increase transparency on the actual meaning of a carbon footprint, including for example the consumed electricity volume in terms of MWh, and special characteristics of the consumed electricity (according to the market-based method, i.e. the electricity disclosure information). This could refer to information on green electricity labels of the electricity product (if any), to the age of underlying production plants or to the level of public support paid to these plants (as is documented by GO). Still, it is obvious that it has the drawback that reporting of the different values as described above (dual reporting and additional parameters) increases complexity for marketing and communication strategies, which might be easier if based on one single figure.

In general, the evaluation of carbon footprints which have been derived by different accounting methodologies shows that the applied principles of carbon accounting have a strong influence on whether the gained results actually incentivise decision makers to choose options to actually mitigate climate change. As the sensitivity of results with respect to the chosen carbon accounting methodology shows, one can hardly refer to “the correct carbon footprint”. One could thus compare carbon footprint, and more specifically accounting of electricity consumption, with a public tax system. There is no correct and no wrong methodology, but one can expect that systems should be designed so that they are fair, coherent and generally applicable in order to give desirable incentives.

In order to further develop the instrument of carbon accounting towards this goal, and also to further clarify a sensible role of electricity disclosure and related instruments in that respect, several specific actions by different target groups would be needed. Carbon accounting experts (and to some extent also large commercial consumers as the main users of this instrument and electricity system experts) should foster discussions on how RES-E additionality can be fairly accounted for in carbon accounting. The development of such an “advanced” methodology should include not only an agreement by a relevant group of players, but also broad publication and branding of this approach in order to enhance its actual application. Until this is achieved, commercial consumers should ensure to report the non-obligatory aspects when following the GHG Protocol (The GHG Protocol 2015), which can give information about the ecological relevance of the electricity product used (in the market-based approach). Consumer and environmental NGOs should first and foremost become familiar with the issues of carbon accounting and the special role of electricity accounting, and hereby consider the needs of the main target groups of carbon accounting information. This should hopefully put them in a position to contribute to the development and communication of an “advanced” carbon accounting methodology as stated above. In order to increase transparency already in the short term, it would be helpful if all parties calculating and publishing carbon footprints would provide comprehensive information. This should include a parallel accounting according to both the market-based method and the location based method, and publication of additional electricity related parameters like the volume of electricity consumption and e.g. information on green electricity labelling. Also electricity suppliers and national Competent Bodies can support this by providing the relevant background information.

# 3 Recognition of Guarantees of Origin

Proposal for Recognition Criteria

The reasons for non-recognition of imported GO by the importing country are described by the RES Directive only in very vague terms. Therefore they are very difficult to verify in an objective way. Due to this, these reasons need to be interpreted on a more detailed level. The EU-funded project Concerted Action for the Implementation of the Renewable Energy Directive (CA-RES), which focuses on the implementation of the requirements of the RES-Directive into national law, has agreed on five different criteria for the recognition of GO issued in other countries and used for national disclosure purposes. These, however, still give room for substantial interpretation. These five criteria are adapted by the RE-DISS proposal for recognition criteria (RE-DISS II project 2014a). The proposed set of criteria is to be understood as an interpretation of the five criteria defined by CA-RES on a more detailed level. The ambition has been to provide guidance on how these criteria could be interpreted by means of specific and verifiable aspects. This should help Competent Bodies with the definition and application of national criteria for recognition, which are in line with the CA-RES criteria. As stated above, the RE-DISS Best Practice Recommendations support the implementation of GO systems which ensure accuracy, veracity and reliability of GO and therefore do not give reason for non-recognition. In any case, it is clear that a decision on definition and application of such criteria is in the responsibility of each individual Member State.

Based on the text of the RES Directive Member States can assume that a GO can be treated as accurate, reliable and veracious when all requirements coming from the Directive are fulfilled, implemented into national law, and all information required by the Directive is provided on the GO. This still leaves room for interpretation, especially when defining the requirements from the RES Directive for national practices.

After consultation with Competent Bodies and stakeholders in the Domain Workshops and Advisory Group Meetings, the RE-DISS II project defined the term recognition as:

> *"the acceptance of foreign GO for use in national disclosure schemes similar to own domestic GO; this includes eligibility of these GO for import and cancellation in the national GO registry."*

On the Member State level it is up to the individual countries to define and regulate the recognition of GO for disclosure purposes in their national laws, as the RES Directive does not specify details on recognition criteria and procedures.

Most European Member States have not yet formally implemented regulations on the conditions for accepting GO for disclosure purposes, neither in their national laws, secondary laws nor in other documentations which are publicly available. For some countries, the connection to the EECS Hub is the only precondition for the acceptance of GO for domestic disclosure purposes. In other countries, the Competent Bodies, which are appointed by law to be responsible for disclosure and/or for GO systems, decide if imported GO can be used for disclosure purposes in the country. Other countries accept imported GO unless potential complaints arrive. A comprehensive analysis of the status quo how European Countries handle the recognition of imported GO is provided by the RE-DISS II report on potential relevant criteria for acceptance of GO and on different possible approaches for acceptance procedures (RE-DISS II project 2014b).

To structure the recognition process and to make it more transparent, the RE-DISS II project proposed criteria for the recognition of foreign GO for disclosure purposes and made a country based analysis on the status of implementation of the proposed criteria.

The main recognition criteria proposed by RE-DISS II include the criteria as defined by CA-RES in its questionnaire, the results of the RE-DISS II findings together with the Competent Authorities and Advisory Group Members and the requirements from Directive 2009/28/EC and the Internal Markets Directive 2009/72/EC. Each main criterion is of the same relevance and no ranking is included.

1. Implementation of Art. 3 (9) of Directive 2009/72/EC by the Member State
2. The issuing Member State has implemented Art. 15 of Directive 2009/28/EC
3. The issuing Member State ensures that:
    1) no more than one GO is issued in respect of each unit of energy produced
    2) the same unit of energy from renewable sources is taken into account only once
4. The issuing Member State ensures the function of GO (for disclosure purposes)
5. The registry system (of the issuing Member State) is electronic, accurate, reliable and fraud resistant
6. The GO include the minimum (information) content as defined in Art. 15 (6) of Directive 2009/29/EC

As the main criteria need further specification in order to be consistently verifiable, two categories of sub-criteria have been implemented to further specify and elaborate the main criteria. The sub-criteria to a main criterion were defined in a way that they need to be fulfilled in order to meet the respective main criterion.

Almost all criteria as proposed by RE-DISS II are supported by recommendations in the RE-DISS II Best Practice Recommendations document. The respective relation and the sub-criteria are indicated in the tables below. The criteria which are not related to the specific Best Practice Recommendations are straightforward requirements directly deriving from the RES Directive, which countries are obliged to fulfill by implementing them in their national law anyway. In other words, this means that by fulfilling the respective RE-DISS Best Practice Recommendations and the requirements of the RES Directive 2009/28/EC and the IEM Directive 2009/72/EC, Member States can assure to a large extent that their national GO should be considered accurate, reliable and veracious and therefore should not provide any reason for non-recognition when being imported by other countries.

Table 4: Criterion 1: Implementation of Art. (3) of Directive 2009/28/EC by the issuing Member State

| 1 | **Implementation of Art. 3 (9) of the Directive 2009/72/EC (on electricity disclosure) by the Member State;** This can be considered fulfilled based on compliance with the following criteria: | **Compliance supported by BPR Nr.** |
|---|---|---|
| **1.1** | **National legislative implementation of a disclosure system according to Art. 3 (9) of the IEM Directive 2009/72/EC**, also including the following: | **22** |
| 1.1.1 | Disclosure is mandatory at least for company's mix of all suppliers. | 39a |
| 1.1.2 | Annual disclosure statement provided with or on bills and promotional material to customers. | 39a |
| **1.2** | **No double counting with other explicit tracking mechanisms** by fulfilling one of the following criteria: | |
| 1.2.1 | No further tracking mechanism for RES besides GO and residual mix allowed for disclosure | 16, 17 |
| 1.2.2 | If further tracking mechanisms for RES besides GO and residual mix are allowed for disclosure, there should be transparent and reliable mechanisms to exclude double counting of RES production for which a GO is issued | several BPRs, including 16, 17, 23, 24, 29, 30, 31, 32 |
| **1.3** | **No double counting between GO and any implicit default mix (like e.g. an uncorrected production mix).** This can be fulfilled through the implementation of one of the following options: | |
| 1.3.1 | No statistical default mix possible | none |
| 1.3.2 | Statistical default mix contains no RES at all | none |
| 1.3.3 | Use of a robust residual mix according to RE-DISS | 26 a |

Table 5: Criterion 2: The issuing Member State has implemented Art. 15 of Directive 2009/28/EC

| 2 | **The issuing Member State has implemented Art. 15 of the Directive 2009/28/EC;** This can be considered fulfilled based on compliance with the following criteria: | **Compliance supported by BPR Nr.** |
|---|---|---|
| **2.1** | **Standard size of GO is 1 MWh.** | **none** |
| **2.2** | **A GO has to be used within (maximum) 12 months after the end of the production period.** | **3a** |
| **2.3** | **GO has to be issued by a Competent Authority which is officially appointed, independent from production, trade and supply, and whose responsibilities have no geographical overlap.** | **none** |

Table 6: Criterion 3: The issuing Member State ensures that no more than one GO is issued in respect of each unit of energy produced and the same unit of energy from renewable sources is taken into account only once (Art. 15 (2) of Directive 2009/28/EC)

| 3 | **The issuing Member State ensures that: 1) no more than one GO is issued in respect of each unit of energy produced and 2) the same unit of energy from renewable sources is taken into account only once (Art. 15 (2) 2009/28/EC);** This can be considered fulfilled based on compliance with the following criteria: | **Compliance supported by BPR Nr.** |
|---|---|---|
| **3.1** | **No more than one GO is issued in respect of each unit of energy produced** by fulfilling one of the following criteria | |
| 3.1.1 | There should be no issuing of more than one GO for the same unit of electricity. | 14a |
| 3.1.2 | This also applies to cogeneration plants which are using RES as the energy source: only one GO should be issued per unit of electricity. | 15a |
| **3.2** | **GO should be used only once**, also including all of the following criteria | **13 (1)** |
| 3.2.1 | A GO is cancelled when being used. | 13 (2) |
| 3.2.2 | GOs can't be used or transferred after expiry, cancellation, or export. | 13 (3), 13 (4) |
| 3.2.3 | Exported GOs are practically removed from the exporting registry. | 13 (5) |
| 3.2.4 | Processes in the registry exclude duplication of GOs. | 13 (6) |
| 3.2.5 | If suppliers disclose the specific product mix for some of their customers they should be required to give product-related disclosure information, including environmental impacts, to all customers, including those of default products. | 39b |

Table 7: Criterion 4: The issuing Member State ensures the function of a GO (for disclosure purposes) (Art. 15 (2) of Directive 2009/28/EC)

| 4 | **The issuing Member State ensures the function of a GO (Art. 15 (2) 2009/28/EC);** This can be considered fulfilled based on compliance with the following criteria: | **Compliance supported by BPR Nr.** |
|---|---|---|
| **4.1** | **The only purpose for GOs is disclosure, and no other (conflicting) purposes are existing for a GO; particularly no accounting for EU RES targets.** | **13 (1)** |

Table 8: Criterion 5: The registry system (of the issuing Member State) is electronic, accurate, reliable and fraud resistant (Art. 15 (5) of Directive 2009/28/EC)

| 5 | The registry system is electronic, accurate, reliable and fraud resistant (Art. 15 (5) 2009/28/EC);<br>This can be considered fulfilled based on compliance with the following criteria: | Compliance supported by BPR Nr. |
|---|---|---|
| **5.1** | **An electronic registry is implemented. (A GO is an entry in an IT database system.)** | **12 (1)** |
| **5.2** | **GOs are accurate, reliable and fraud-resistant by fulfilling the following criteria** | |
| 5.2.1 | Issuing of a GO is based on actual meter readings. | 10 (1) |
| 5.2.2 | A GO is only issued for electricity which is then used by end-consumers (i.e. no pumped hydro). | 10 (1) |
| 5.2.3 | There are mechanisms implemented for ongoing control of registered data (e.g. re-audits, random checks, etc.). | 10 (2) |
| 5.2.4 | Sufficient measures are taken to ensure correct accounting of the RES share of combustion plants. | 10 (3) |
| 5.2.5 | The Competent Body can correct errors in issued GOs before they are exported and is the only one with this competence. | 10 (4) |
| 5.2.6 | Technical changes to plants are registered as soon as reasonably practical. | 12 (2) |
| 5.2.7 | Issuing, handling, transfer and cancellation of GOs are managed in a secured registry with automated and auditable processes; | 12 (1) |
| 5.2.8 | One comprehensive registry per domain | 12 (1) |
| 5.2.9 | The GOs are imported via AIB Hub or another reliable interface from the other respective national registries. | 7, 8 |

Table 9: Criterion 6: Issued GOs include the minimum (information) content (Art. 15 (6) of Directive 2009/28/EC)

| 6 | Issued GOs include the minimum content (Art. 15 (6) 2009/28/EC);<br>This can be considered fulfilled based on compliance with the following criteria: | Compliance supported by BPR Nr. |
|---|---|---|
| **6.1** | **Energy source** | **none** |
| **6.2** | **Start and end date of production** | **none** |
| **6.3** | **Electricity, heating or cooling** | **none** |
| **6.4** | **Identification number, location, type and capacity of the installation** | **none** |
| **6.5** | **Investment support** | **none** |
| **6.6** | **Funding by any support scheme** | **none** |
| **6.7** | **Date when installation became operational** | **none** |
| **6.8** | **Date of issue** | **none** |
| **6.9** | **Issuing Country** | **none** |
| **6.10** | **Unique Identification number of GO** | **none** |

The proposed RE-DISS II set of recognition criteria is tightly linked to requirements in European legislation. The criteria have either been derived directly from the RES Directive or have been further specified based on the requirements in the Directive.

All criteria have at least one linkage to the RES Directive, some have several linkages. Criterion 2 refers to all requirements of Art. 15 of the RES Directive.

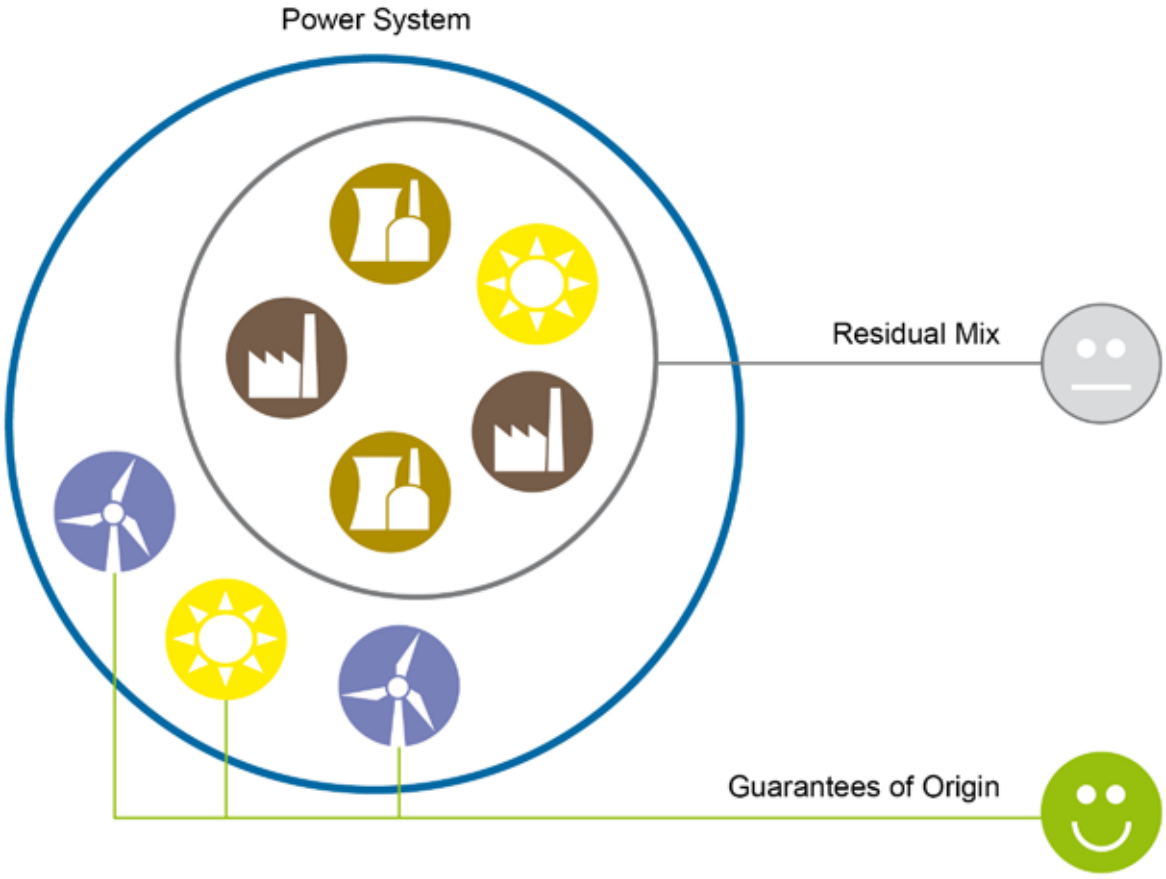
Member States are obliged to fulfil the requirements of the Directive. Therefore RE-DISS II reasons that Member States should fulfil the criteria for recognition with the full implementation of the requirements in Art. 15 RES Directive (taking some specific interpretations of the Directive into account). Further, the implementation of the proposed set of recognition criteria is not in conflict with European law and could therefore be implemented by Competent Authorities on a national basis.

# 4 Residual mix calculation and the European Attribute Mix

## 4.1 Introduction

The basic idea of the residual mix calculation is fairly simple: it represents the production mix of a country corrected with the generation attributes which are explicitly tracked (Figure 9). The residual mix is used to determine the energy origin of untracked consumption, i.e. consumption, which has not been disclosed based on explicit tracking instruments such as GO. Therefore, if all electricity consumption was explicitly tracked to specific generation attributes, the residual mix would not be needed.

Figure 9: Residual Mix comprises of non-tracked generation attributes




Source: Authors' own compilation

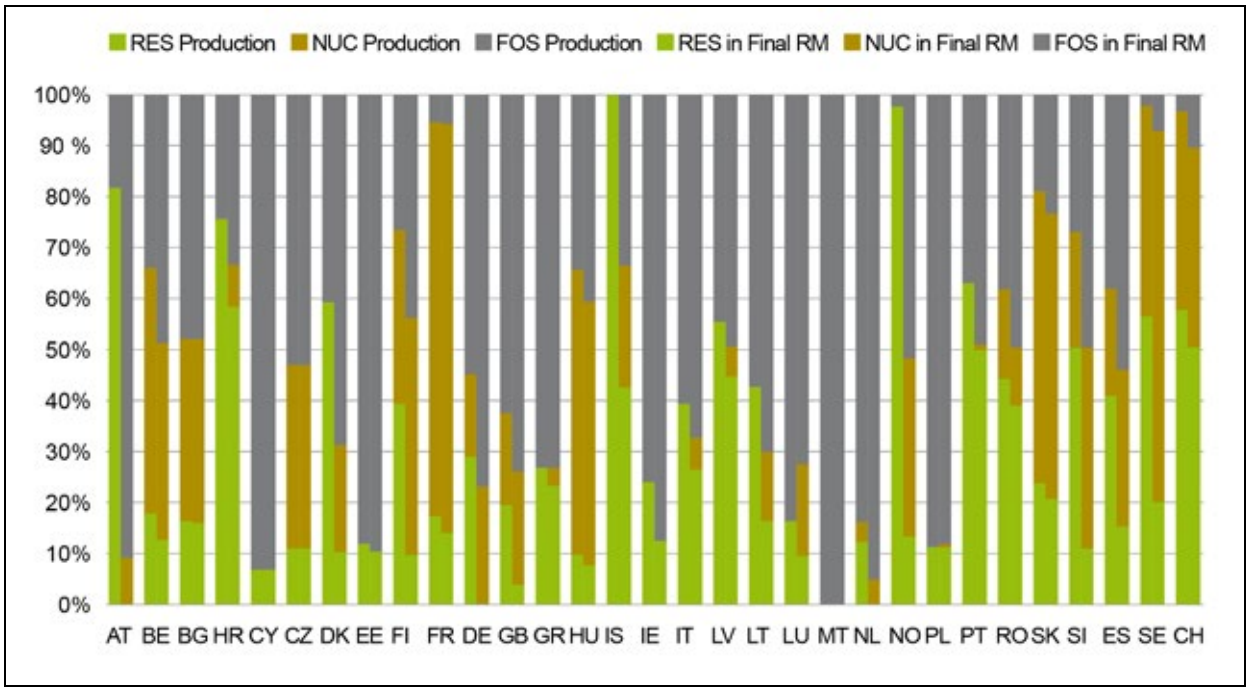
If untracked consumption were disclosed with the production mix (including attributes represented by GO), it would mean that the renewable attributes, which are explicitly tracked, were double counted in electricity disclosure. Therefore explicitly tracked attributes need to be removed from the energy source mix of other consumption (untracked consumption), when complying with Art. 15 (2) of Directive 2009/28/EC[7] and with Art. 3 (9) of Directive

[7] "... Member States shall ensure that the same unit of energy from renewable sources is taken into account only once…" (Art. 15 (2) of Directive 2009/28/EC)

2009/72/EC. Reliable and transparent residual mix calculation, enables this task, and is an accurate way to disclose untracked consumption to consumers and to increase demand for green power.

Figure 10 represents the differences in residual and production mixes of European countries in 2014. The difference is notable amongst the front-runners of electricity tracking, whereas there is no clear difference in countries without an operating electricity tracking system. Results of residual mix calculations were published in years 2010-2014 by the RE-DISS project.

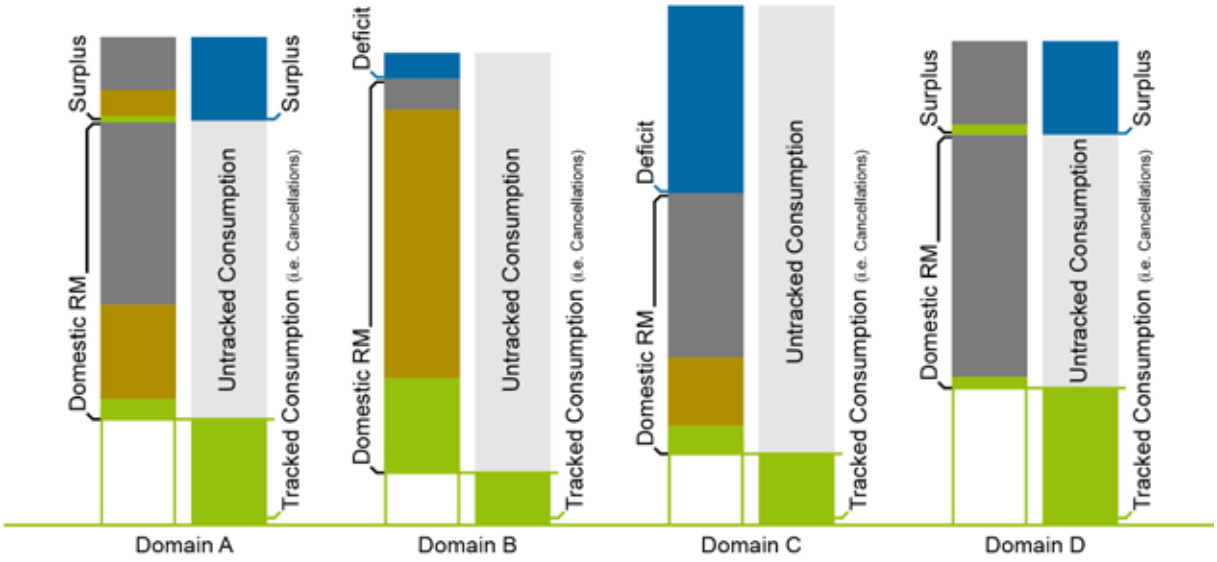
Figure 10: Production (left) and Residual Mixes (right) of 2014




Source: RE-DISS II project (2015c)

“The process of residual mix calculation might seem simple, but the international exchange of both electricity and GO necessitates that also the calculation is coordinated among countries, which adds complexity. (…) Electricity as well as generation attributes (through GO) are transferred across borders, which can significantly alter this equilibrium in a country.” (Figure 11)

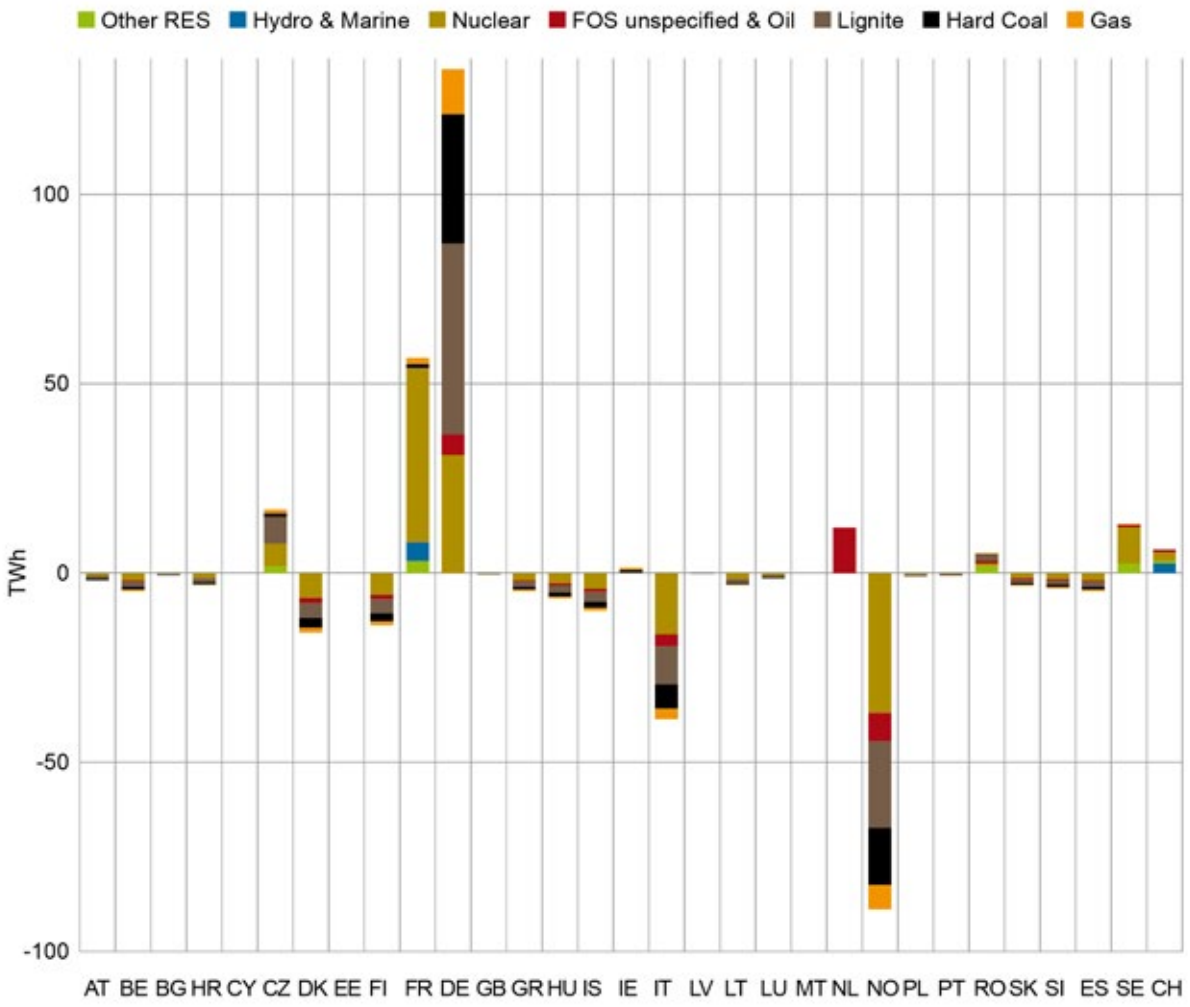
Figure 11: Residual mix balances international GO and electricity trading




Source: RE-DISS II project (2015d)

“One fundamental feature of the RE-DISS residual mix calculation methodology is the concept of a common attribute pool, generally known as the European Attribute Mix (EAM) (…). Instead of different countries interacting with each other, they all interact with this common pool of attributes, which interconnects the domestic residual mixes the same way as the AIB Hub interconnects the explicit tracking of attributes (GO).” (Klimscheffskij et al. 2015) This means countries can themselves calculate the domestic residual mix, but have to coordinate to form the European Attribute Mix (EAM), which is needed in order to establish the final residual mix of each domain. This coordination was, from 2010 to 2014, carried out by the RE-DISS project (Figure 12).

Figure 12: Countries' interaction with the European Attribute Mix in 2014

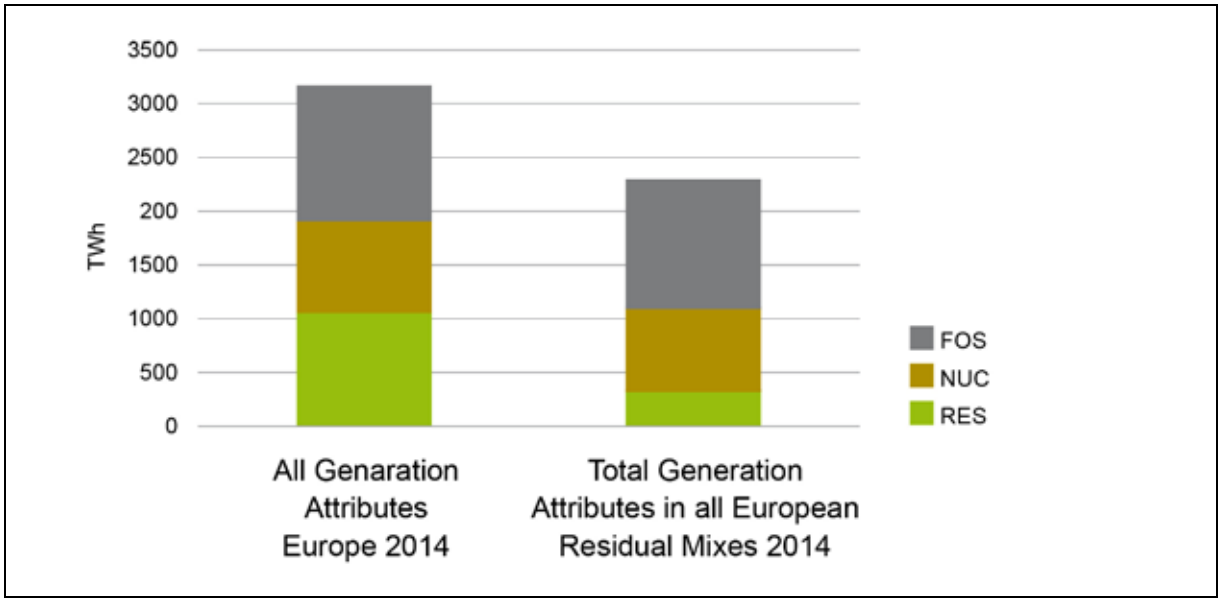



Source: RE-DISS II project (2015c)

Physically, electricity production and consumption in Europe equal each other in volume as long as electricity transfers to and from outside Europe are considered. International trading of GO and electricity distorts the equilibrium of generation attributes and electricity consumption on a national level, but on a European level the balance remains. The coordinated residual mix calculation, through the EAM, returns this balance at the domestic level.

To sum up, the importance of the residual mix is best understood when comparing the volumes of all power generation of Europe in 2014 with the generation volumes that were not explicitly tracked (Figure 13). Without a robust residual mix calculation the whole explicitly tracked part of renewable energy generation (close to 700 TWh, indicated by the difference of the left and right green bar in Figure 13) would risk being double counted!

Figure 13: Total Generation (left) and non-tracked generation (right) in 2014




Source: Authors' own compilation

## 4.2 Methodology

A full outline of the general residual mix calculation methodology is given in a separate RE-DISS deliverable (RE-DISS II project 2015d). Please refer to this report for further details.

The RE-DISS I project set out to develop a common methodology for residual mix calculation in Europe. However, during RE-DISS II, it became clear that too significant differences reside in the disclosure practices of European countries for a common methodology to be feasible. The following lists some of the fundamental reasons:

1. Concept of the residual mix is different
2. Timing of disclosure is not harmonised
3. Different practices on whether the eligibility of a GO for electricity disclosure is bound to its generation year

All of the above are national interpretations of the relevant directives and it is clear that more specific legislation is needed from EU level. Until such time, the various approaches can be seen to persevere.

As a result of diversified national rules in electricity disclosure, different residual mix calculation methodologies are used. Therefore a single methodology on the European level can never deliver compatible results with all national calculations, which means some countries' results will differ from the results of the centralised calculation. The EAM needs to cope with the various implementations and ensure no double counting appears on a European level.

The central residual mix calculation (and the calculation of the EAM) can be done reliably following two different general-level methodologies: Issuance-based methodology (IB) and the Shifted Transaction-based (STB) methodology. During RE-DISS I and II, countries have usually selected one of the alternative methodologies, but to ensure reliability, the EAM calculation needs to follow only one. This choice has been an active question in RE-DISS II.

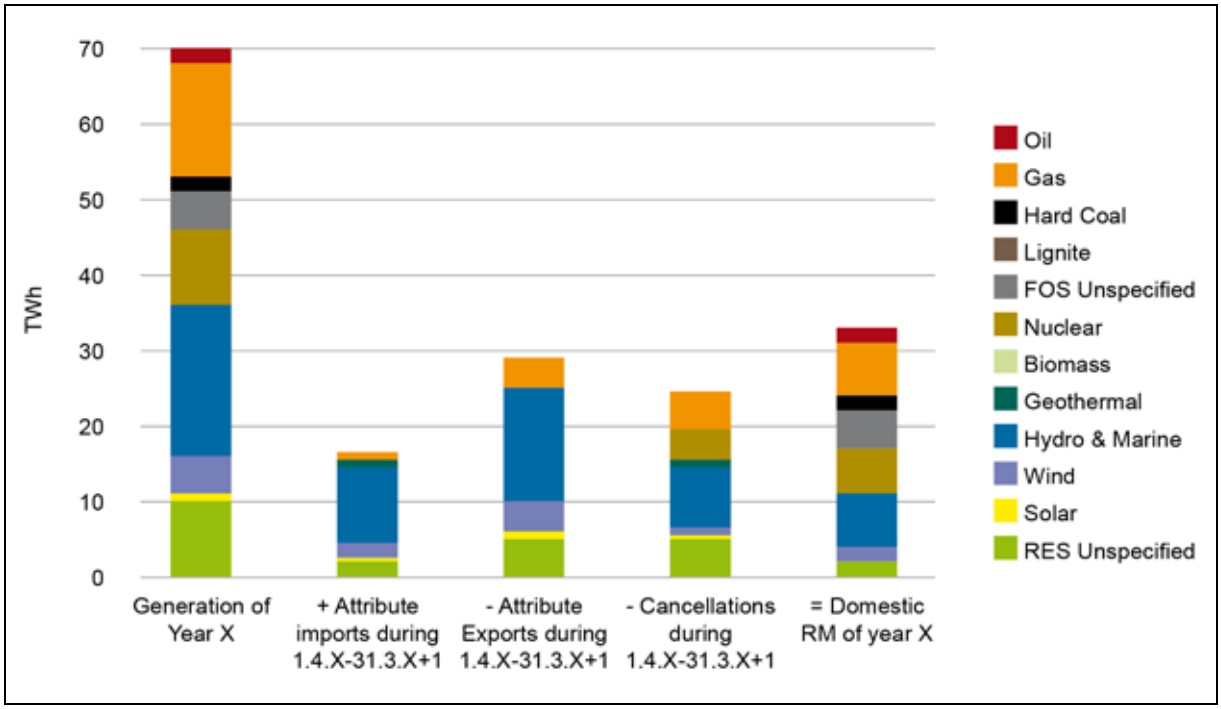
The two methodologies can be defined as follows:

- Shifted Transaction-based (STB) methodology: the focus for the allocation of attributes to the disclosure years lies on the use of the attributes, i.e. attributes represented by cancelled and exported certificates are removed from the residual mix, but consequently attributes represented by imported certificates are added to the residual mix.
- Issuance-based (IB) methodology: the focus lies on the supply of the attributes, i.e. all attributes which are issued (and will thus potentially be used) are removed from the residual mix and those which are, in the end, not used (expired) are added back to the residual mix.

An important precondition for any calculation methodology is that double counting of attributes must be avoided, which can be achieved with both of the alternatives. This is more straightforward in a pure transaction-based methodology as all transactions are always accounted for (once) without need for consideration of the production time. In the IB method, a special provision has to be added to consider the rare case of GO issued after 31.3.X+1 for year X production in year X+1 calculations. Furthermore, the difference between issuance and cancellations might cause divergence in the volumes of surplus and deficit of attributes in the issuance based method. The pros and cons of both alternatives are discussed in detail in the residual mix calculation methodology paper.

To resolve the question on which methodology to pass on, the RE-DISS II project sent out a survey to Competent Bodies. The conclusion from the survey was that since there is no strong will among Competent Bodies to change the calculation methodology for EAM and centrally calculated country residual mixes, the calculation on the European level should be continued following the Shifted Transaction-based methodology.

Figure 14: Calculation of the Domestic Residual Mix according to the Shifted Transaction Based Methodology



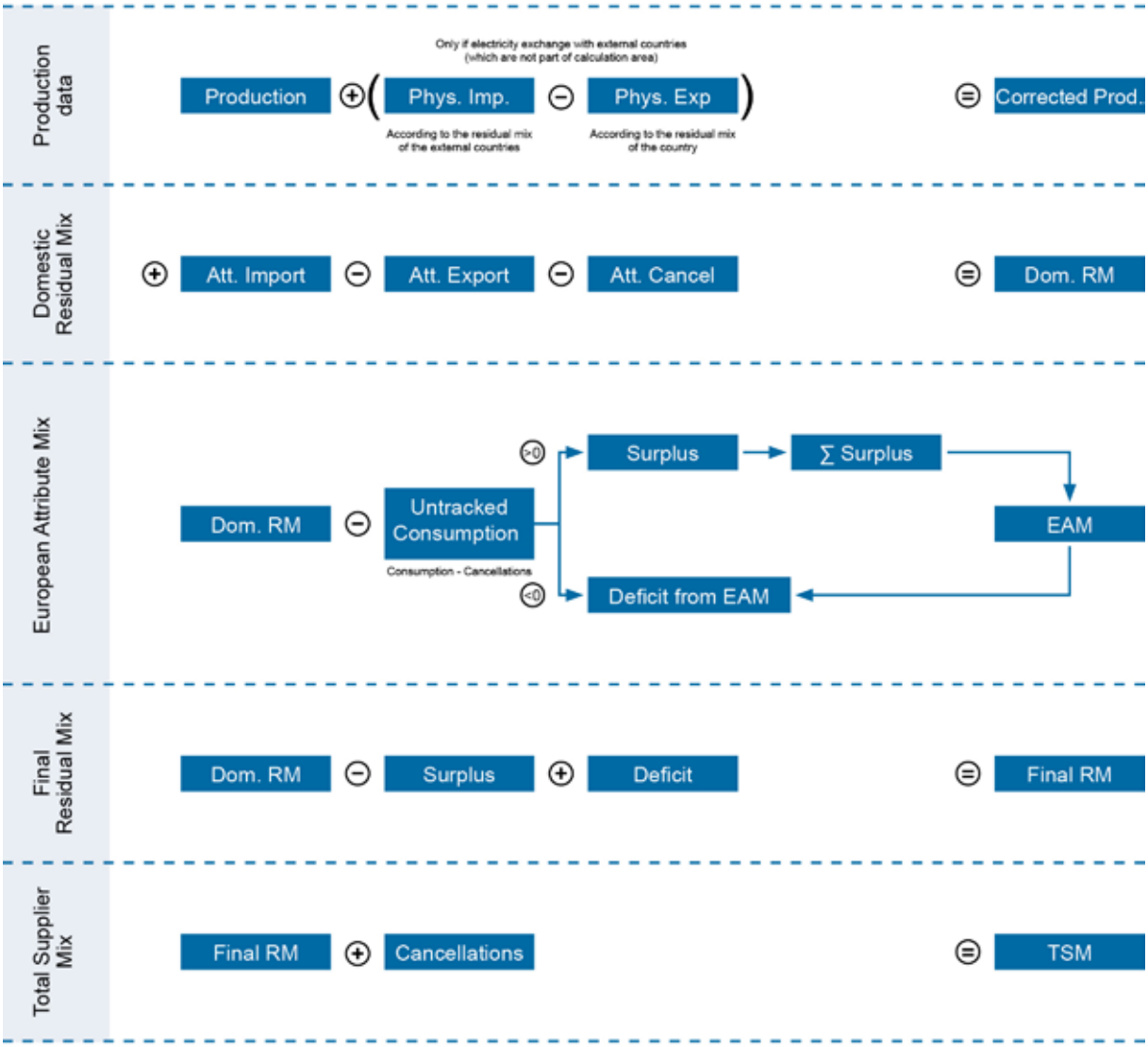

Source: Authors' own compilation

The considerations for Issuance-based methodology should, however, not be lost, but the decision may be revisited if seen necessary by Competent Bodies. The recommendation from RE-DISS is to continue the calculations for 2015 and 2016 following STB methodology after which the issue should be revisited if needed. Individual countries may follow the IB methodology already now.

In the STB method, the central calculation should be made by selecting a unified timeframe for transactions and for the time being focusing solely on the transaction times of GO. This timeframe is selected as 1.4.X – 31.3.X+1 for year X residual mix calculation. This is due to the wide acceptance of the cancellation deadline of 31.3.X+1, which means most of year X disclosure can be assumed to occur during this period.

The domestic residual mix is calculated by deducting exports and cancellations of attributes from the generation mix and adding imported attributes (Figure 14). The pool of available attributes (domestic residual mix) is then compared with the volume of untracked consumption (electricity consumption minus cancellations). Difference of volume in domestic residual mix and untracked consumption of each domain is balanced through the European Attribute Mix (Figure 15).

Figure 15: Residual Mix calculation process according to the Shifted Transaction Based Methodology

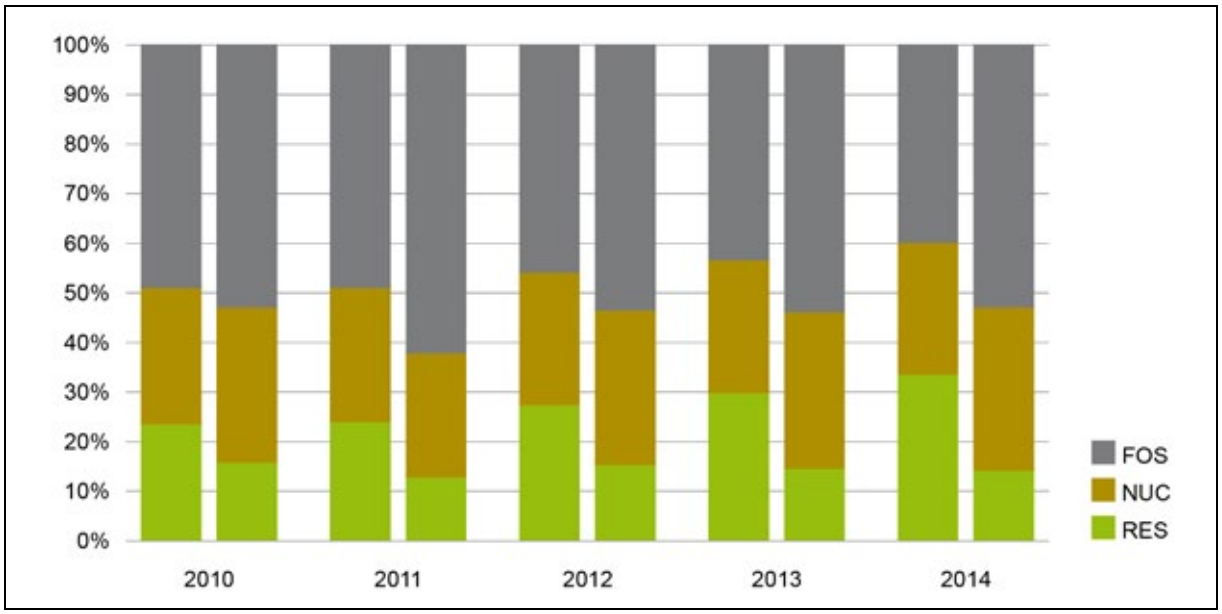



Source: RE-DISS II project (2015d)

## 4.3 Evolution of residual mix calculation results

As seen in Figure 16 the total generation of electricity from renewable energy sources in Europe has steadily increased during the past five years. However, total renewable attributes in residual mixes have been on a slight decline, which is due to increased amount of explicit tracking and underlines the importance of the residual mix. As a whole, in 2014, some 32 % of electricity was produced from RES, whereas in the residual mix the share was 12 %.

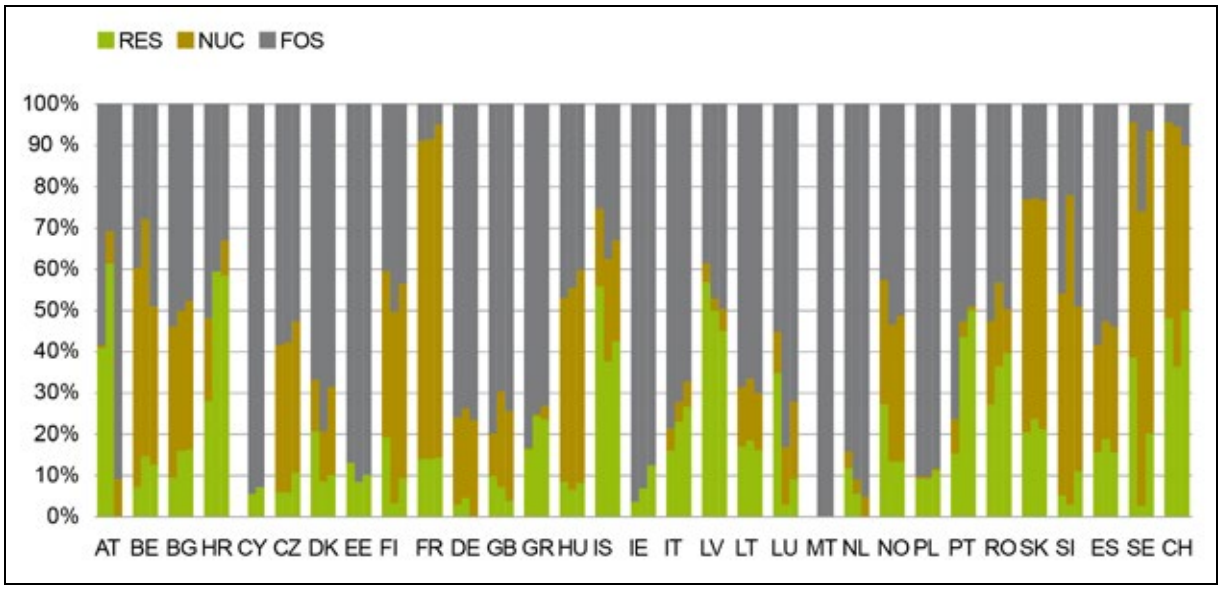
Figure 16: Total Attributes in all European Production (left) and Residual (right) Mixes during 2010 – 2014




Source: Authors' own compilation

Residual mixes of individual countries during 2012-2014 have been fluctuating substantially (Figure 17) which is a major drawback of the Shifted-Transaction Based Method, which doesn't instigate a link between the production year of the GO and its consideration in the residual mix. Especially in AT, FI, IS, LU, SE and CH the mixes seem to be interfered by previous year GO, which is not a reliability issue, but makes the understanding of the results more challenging. On a general level, countries where explicit tracking of generation attributes has increased show a declining RES share in the residual mix, although a clear causal relationship is not perfectly visible with only 3 years of data.

Figure 17: Residual Mixes of European countries during 2012 – 2014




Source: Authors' own compilation

## 4.4 Future considerations

Final decision of the residual mix calculation methodology is of course an important future consideration and should be revisited when more countries have adopted the residual mix in legislation and regulation.

However, for the credibility of the calculation, an even more important aspect is the harmonisation of selected electricity disclosure rules. For example, as long as there are other means to track renewable energy than GO and other centrally monitored schemes, the residual mix will not be able to remove all double counting of renewables in Europe. Furthermore, if certain policies of electricity disclosure were consistently applied across Europe, the calculation could be more centrally driven and the question of the methodology would be an easy one.

For the reliability of the residual mix calculation and on a wider scale, electricity disclosure in Europe, the following recommendations for future regime are made:[8]

- Guarantees of Origin (and in some cases other centrally monitored schemes) should be the sole mechanism to track electricity in Europe. This should not be limited to renewable energy as all tracking (e.g. nuclear or natural gas) which happens through bilateral contracts cannot be accounted for in the residual mix and therefore leads to double counting of these attributes.
- Electricity disclosure of a given year should be done based on transactions of GO and other tracking mechanisms between 1st of April of the year and 31st of March of the following year. Ideally, only generation attributes of the same year should be used for disclosure of electricity consumption in a given year. GO representing generation attributes of year X, which haven't been used by 31st of March of year X+1, should be expired and collected into the residual mix of year X.
- On an electricity supplier level, it should never be allowed to disclose individual electricity products to certain customers without disclosing the product information to all customers of that supplier. This means that if a supplier sells e.g. a renewable electricity product to certain customers, it should disclose to "regular" customers the "leftover product", which is less green than the total energy mix of the supplier, because part of the total mix of the supplier has been explicitly sold as green. Failure to do so, and only disclosing the supplier mix to "regular" consumers, leads to double counting of the products sold. This is a common problem as usually only the supplier mix is required by law (as this is set out in Art. 3 (9) of Directive 2009/72/EC), but suppliers often complete the information with individual product information for their green customers. As explained, this is problematic unless it is done for all customers.
- The problem of "double perception" is closely linked to the residual mix. How to make a consumer of high-RES producing country understand that a large part of the national RES generation has been exported based on GO and the replacement mix consumed by him is much less green? In order for the residual mix calculation to work, a consumer needs to trust and understand the disclosure information presented in or with the bill, which requires more guidelines on the content and format of the disclosure information as well as consumer education.

[8] The four bullet points listed here are a summary of elements of the RE-DISS Best Practice Recommendation. The full text of the current version of the Best Practice Recommendation can be found in the annex to this report.

The four changes proposed above are substantial, but also have the possibility to make a leap improvement in today's GO and disclosure system. These changes can by large not be actualised at country level under the current directives, but require to be addressed in a revision of the relevant directives.

# 5 Environmental Indicators

## 5.1 Different value chain perspectives

The IEM Directive 2009/72/EC, Article 3(9), requires all suppliers of electricity to disclose their electricity portfolio with regard to energy source and environmental impact, specifying at least the emissions of $CO_2$ and the amount of radioactive waste relating to the electricity generation. The term “environmental attributes” is often used when referring to this disclosed information.

The disclosed information should be given to all customers regardless of whether or not they have made an active choice of product specific electricity. However, the Directive does not provide any further specifications on how such environmental indicators exactly have to be defined, and which elements of the product chain have to be taken into account.

In general, the disclosed attributes related to different electricity generation options depend largely on the energy carrier and source for electricity generation, as well as the generation technology. However, the environmental indicators also depend on other issues, such as the method/approach used for calculating the indicators, the specificity level of data etc.

The two major approaches for calculating environmental impacts relate to whether or not upstream, and eventually downstream, impacts (throughout the whole electricity generation value chain) or only direct impacts from the generation (conversion) step are included in the calculation approach. If the approach includes the entire (''cradle to grave” or “cradle to gate”) value chain of electricity generation, it should be based on the Life Cycle Assessment (LCA) methodology, which is an internationally standardised (ISO 14044) method for quantifying environmental impacts that are associated with any products. If only direct emissions, resulting from the electricity conversion step, are included, this approach reflects for example how the national inventories according to the Kyoto protocol are calculated. In this case upstream and downstream emissions are covered by other sectors. Similarly, the mass of radioactive waste relating to the electricity generation can be determined with reference to the electricity conversion step alone or to the whole value chain, including the use of electricity which might partly be generated from nuclear energy.

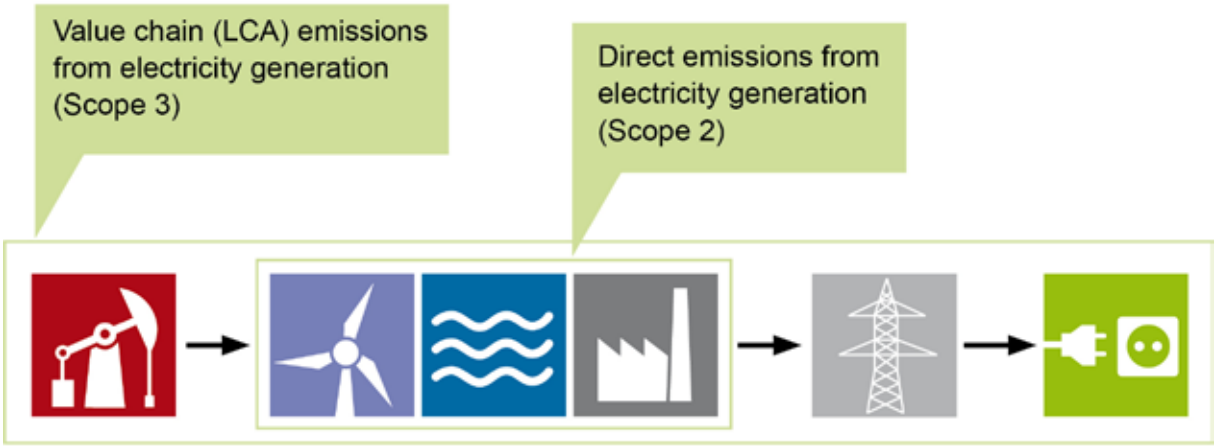
These different approaches are also reflected in the Greenhouse Gas (GHG) Protocol (The GHG Protocol n.d.), which is the most widely used international accounting tool for (corporate and product) greenhouse gas emissions. The GHG protocol categorises direct and indirect GHG emissions into three broad scopes:

1. Scope 1: All direct GHG emissions related to the reporting entity
2. Scope 2: As in Scope 1 + direct GHG emissions related to the generation of purchased electricity, heat or steam, thus indirect emissions for the customers purchasing these energy products.
3. Scope 3: As in Scope 2 + indirect emissions from purchased products and services beyond energy products, e.g. from extraction and production of purchased materials, outsourced activities, waste disposal, etc.

With regard to electricity consumption, Scope 2 reflects the direct emission approach as described above, while Scope 3 takes the life cycle perspective. The differences between

scopes 2 and 3 with reference to electricity generation and consumption are illustrated in Figure 18.

Figure 18: Different value chain perspectives for electricity consumption




Source: Authors' own compilation

## 5.2 $CO_2$ and Greenhouse Gas emissions

When determining $CO_2$ emissions in general, it is important to be clear about whether the data represent only $CO_2$ emissions or total GHG (Greenhouse Gas) emissions. If total GHG emissions are presented, the emissions of $CO_2$ have been summarised with other GHG gases, such as methane and $N_2O$, and converted into $CO_2$ equivalents according to their greenhouse gas potential.

## 5.3 Three new environmental indicators

The RE-DISS II project has calculated the environmental indicators for electricity disclosure as shown in Table 10. The mark "XX" highlights the new indicators when compared to data provided by the former RE-DISS project.

Table 10: Environmental indicators for electricity disclosure

| Environmental indicator | | Unit | Direct emissions | Emissions based on LCA (life cycle assessment) methodology |
|---|---|---|---|---|
| GHG emissions | Single substance | g $CO_2$ per kWh | X | XX |
| | GWP* | g $CO_2$-equiv. per kWh | XX | XX |
| High-level radioactive waste (RW) | | mg RW per kWh | X | |

*GWP: Global Warming Potential

The different environmental indicators can shortly be summarised as follows:

- Direct greenhouse gas emissions given as the single greenhouse gas $CO_2$ emissions (this is equivalent to the $CO_2$ content usually displayed in disclosure statements in previous years)
- Greenhouse gas emissions given as the single greenhouse gas $CO_2$ emissions based on the life-cycle perspective (LCA) and thus including up- and downstream impacts throughout the electricity generation value chain
- Direct greenhouse gas emissions, expressed as Global Warming Potential (GWP) and given as $CO_2$ equivalents ($CO_2e$), which also includes the effects of other greenhouse gases than $CO_2$
- Greenhouse gas emissions based on the LCA approach, expressed as Global Warming Potential (GWP) and given as $CO_2$ equivalents ($CO_2e$). This is the most comprehensive emission figure as it contains $CO_2$ and other greenhouse gases and the full electricity generation value chain
- High-level radioactive waste given as milligrams (mg) high-level radioactive waste per kWh generated electricity, and only provided by the direct perspective (this is equivalent to the radioactive waste displayed in previous years in most countries).

None of the above described GHG indicators are more correct or more wrong than the others. They simply represent different value chain perspectives and the inclusion of different GHG emissions. However, the choice of one indicator above another is dependent on which perspective end-consumers want to take for their disclosed electricity In addition, if end-consumers want to go beyond disclosure, and use the disclosed parameter for carbon accounting, the scope of their chosen carbon accounting standard/guideline determines which indicator to be used. As an example, carbon accounting according to the market-based method defined by the GHG Protocol's Scope 2 standard requires the direct GWP indicator[9], while carbon accounting according to LCA-guidelines requires the LCA-based GWP indicator. Therefore, suppliers are recommended to disclose the different GHG indicators and leave the choice for a potential use beyond disclosure purposes to the end consumers.

## 5.4 Results on specific environmental indicators

Country and energy source/technology specific environmental indicators have been calculated for emissions representing direct $CO_2$ and $CO_2$ equivalents, as well as LCA based $CO_2$ and $CO_2$ equivalents and direct production of high-level radioactive waste of electricity generated from a certain energy source. The results for country and energy source/technology specific direct $CO_2$ emissions are shown in Table 11 below.

[9] The GHG Protocol Scope 2 Guidance (The GHG Protocol 2015) requires companies operating in markets providing product or supplier-specific data in the form of contractual instruments (e.g. Guarantees of origin) to report scope 2 emissions according to two parallel methods: the location-based method (using grid average emissions in the case of electricity) and the market-based method (using the emissions of the product used, based on the environmental indicators of disclosure in the case of electricity).

Table 11: Country and energy source/technology specific environmental indicators (direct $CO_2$ emissions and radioactive waste)

| | Environmental indicator | | | | | |
|---|---|---|---|---|---|---|
| | RW (mg/kWh) | $CO_2$ (kg/kWh) | | | | |
| | Energy source/technology | | | | | |
| | Nuclear | Fossil | | | | |
| | | Hard Coal | Lignite | Natural Gas | Oil | Unspecified |
| AT | n/a | 0,8380 | | 0,4751 | 0,7040 | 0,4861 |
| BE | 2,7 | 0,9480 | | 0,4416 | 0,7900 | 0,4609 |
| BG | 3,5 | 1,0570 | 1,1000 | 0,6092 | 0,7930 | 1,0933 |
| HR | n/a | 0,9490 | 1,2600 | 0,5497 | 0,8270 | 0,5720 |
| CZ | 3,5 | 1,1350 | 1,1300 | 0,4992 | 0,8509 | 1,1340 |
| DK | n/a | 0,8140 | | 0,3430 | 0,7120 | |
| FI | 3,0 | 0,8140 | | 0,4172 | 0,4480 | 0,4329 |
| FR | 2,7 | 0,9490 | | 0,3980 | 0,6500 | |
| DE | 2,7 | 0,9220 | 1,1800 | 0,4610 | 0,9830 | 0,9220 |
| GB | 8,0 | 1,0040 | | 0,4640 | 0,9890 | 0,4642 |
| GR | n/a | | 1,2500 | 0,4397 | 0,7460 | 1,2546 |
| HU | 3,5 | 1,0040 | 1,1350 | 0,4992 | 1,0074 | |
| IE | n/a | 1,0040 | 1,1800 | 0,4616 | 0,7400 | 1,0044 |
| IT | n/a | 0,9070 | | 0,4586 | 0,7610 | 0,4609 |
| LU | n/a | | | 0,3430 | | |
| NL | 2,7 | 0,9490 | | 0,4719 | 0,6070 | 0,6090 |
| NO | n/a | 0,8140 | | 0,4860 | 0,4480 | 0,4861 |
| PL | n/a | 1,0040 | 1,0800 | 0,4992 | 0,8513 | |
| PT | n/a | 0,9020 | | 0,4397 | 0,7830 | 0,4609 |
| RO | 18,0 | 1,0040 | 1,1000 | 0,6500 | 0,8160 | 1,1025 |
| SK | 3,5 | 0,8720 | 1,1640 | 0,4910 | 0,7930 | 0,8723 |
| SI | 2,7 | 0,8480 | 1,1700 | 0,5310 | 0,7070 | |
| ES | 2,7 | 0,9600 | 1,1800 | 0,4330 | 0,8320 | 0,4329 |
| SE | 2,7 | 0,8140 | | 0,4860 | 0,5190 | 0,4861 |
| CH | 2,7 | | | 0,3483 | 0,6694 | 0,3982 |
| CY | n/a | | | | 0,8301 | |
| EE | n/a | | 0,9596 | 0,6029 | 0,9273 | 1,0447 |
| IS | n/a | | | | | 0,4861 |
| LV | n/a | | | 0,6029 | 0,9273 | 0,6201 |
| LT | n/a | | | 0,6029 | 0,9273 | 0,6201 |
| MT | n/a | | | | 0,8178 | 0,8265 |

Source: Authors' own compilation, based on data from Treyer and Bauer (2013), Dong Energy A/S, Energi.dk, Vattenfall (2010), Fritsche and Rausch (2009), Bauer (2008) and GEMIS database (GEMIS, 2015) ) and the IAEA Power Reactor Information System

The direct emissions data for GWP ($CO_2$ equivalents) as well as the life cycle based (LCA) emissions data for $CO_2$ and GWP ($CO_2$ equivalents) have been calculated solely based on the ecoinvent database (ecoinvent v3.01 Database). Due to restrictions from the ecoinvent database with regard to publishing country and technology specific data, the results for these three indicators are shown as weighted European average values, based on the electricity generation energy source/technology and volumes in the respective countries (2013). The results are shown in Table 12 below.

Table 12: Weighted average environmental indicators (Direct GWP and life cycle based (LCA))

| Energy source/technology | | Weighted average | | |
|---|---|---|---|---|
| | | LCA | Direct | LCA |
| | | $CO_2$ (kg/kWh) | GWP (kg $CO_2$-eqv/kWh) | |
| Renewable | Solar | 0,0624 | | 0,0708 |
| | Wind | 0,0182 | | 0,0200 |
| | Hydro & Marine | 0,0053 | 0,0002 | 0,0058 |
| | Geothermal | 0,0549 | | 0,0590 |
| | Biomass & Biogas | 0,1181 | 0,0460 | 0,1762 |
| | Unspecified (renewable) | 0,0299 | 0,0206 | 0,0535 |
| Fossil | Hard Coal | 1,0382 | 0,9660 | 1,1626 |
| | Lignite (or brown coal) | 1,1986 | 1,1641 | 1,2192 |
| | Natural Gas | 0,5258 | 0,4614 | 0,5658 |
| | Oil | 0,8869 | 0,7844 | 0,9142 |
| | Unspecified (fossil) | 0,8060 | 0,7785 | 0,8981 |

Source: Authors' own compilation, based on data from the ecoinvent database (v3.01)

The underlying country specific emission factors for each energy source/technology have been used for the calculations of the environmental indicators for the residual mixes shown in Figure 19 below.

The indicator on radioactive waste per country given in Table 11 has been calculated based on best estimates for the specific production of high-level radioactive waste for five different types of nuclear reactors used in Europe. These are based on typical values for the burn-up of the nuclear fuel and of the net electrical efficiency for each type of reactor. In addition, country-specific sources have been used where easily available. In case that a country is operating reactors with different waste factors, a weighted average of the factors has been determined based on the actual electricity production in 2014 as published in the IAEA Power Reactor Information System (PRIS).[10]

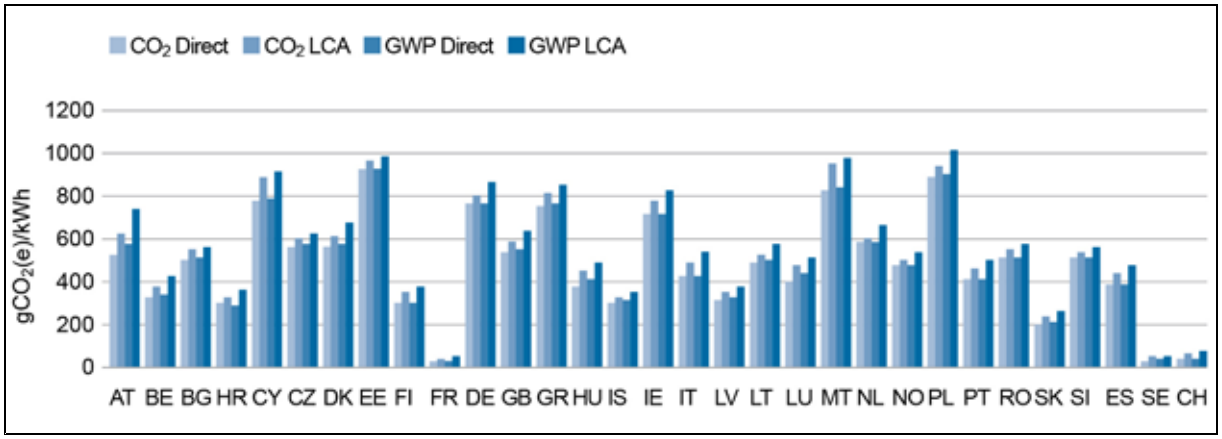
More information on the calculation of the environmental indicators can be found in the RE-DISS II report on the best practice of collection and provision of environmental data for electricity disclosure (RE-DISS II project 2015e).

[10] See the PRIS website https://www.iaea.org/pris.

## 5.5 Results on GHG emissions and nuclear waste production for the national residual mixes

Based on the four GHG indicators calculated specifically for all the countries, the same four GHG indicators for all the 31 national residual mixes have been calculated. These are shown in Figure 19 for the year 2014.

Figure 19: $CO_2$ and GWP emission factor in final residual mixes 2014

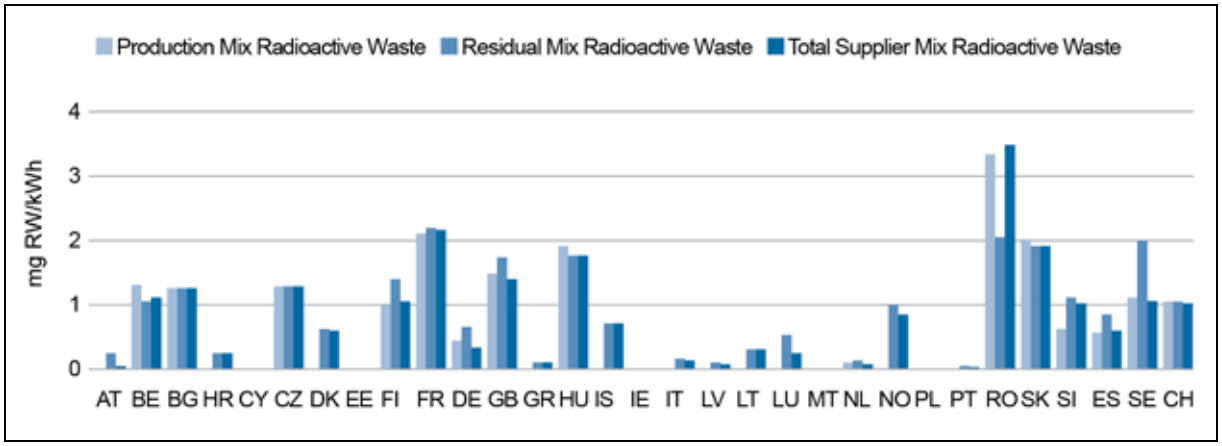



Source: Authors' own compilation, based on data from the ecoinvent database (v3.01)

As seen from the figure, the larger part of the value chain and the more GHG included, the larger is the GHG emissions. Thus, the indicator "$CO_2$ direct" always represents the smallest figure while the GWP LCA-indicator always represents the largest figure for each country.

Based on the indicator on radioactive waste per kWh of nuclear energy produced in a country, the production of high-level radioactive waste per kWh of electricity has been calculated for the electricity production mix of 31 countries, their residual mixes and the Total Supplier Mix (the total volume of attributes disclosed in each country, including those explicitly tracked and those disclosed through the residual mix).

Figure 20: High-level radioactive waste content in the Production Mix, the Residual Mix and the Total Supplier Mix 2014




Source: Authors' own compilation, based on data from the IAEA Power Reactor Information System

In Figure 20, the left bar for each country represents the share of nuclear energy in the countries' generation mix and the specific production of radioactive waste per kWh of nuclear energy in that country. The middle bar, referring to the residual mix, and the right bar are reflecting trading activities with GO and electricity. As can be seen from the figure, this can lead to relevant radioactive waste contents in the residual mix and the Total Supplier Mix even for countries which do not operate nuclear power plants, such as Norway, Iceland and Denmark. The figures for Romania are dominated by the high mass of radioactive waste produced per kWh in the two reactors of the CANDU type, which is about six times higher than the typical indicator in Western type pressurised water reactors (PWR), which are operated in France, Germany and several other countries.

From an ecological point of view, the risks associated with high-level radioactive waste could better be displayed in units of radioactivity rather than volumes or masses of spent fuel or other waste. Thus it may be considered whether the unit MBq/kWh should be communicated towards final consumers of electricity as the indicator for high-level radioactive waste in the future. This indicator is a good measure for the risks associated with radioactive waste and can be calculated quite easily. As a downside argument to this proposal, it must be noted that the unit of Becquerel may not be easily understood by many consumers. Based on these arguments, a potential revision of the environmental indicator for high-level radioactive waste should be considered in future modifications of legislation on electricity disclosure in Europe.

# 6 Development of Disclosure and GO Systems in Europe

The analysis of the development of the disclosure and GO systems in Europe presented in this section summarises the results of the RE-DISS II Assessment Report on Disclosure and GO systems (RE-DISS II project 2015f). This report provides further details on the implementation. The detailed methodology which has been used for this analysis is described in (RE-DISS II project 2015f).

## 6.1 Implementation of Disclosure and GO systems

### 6.1.1 Status quo of implementation at the end of RE-DISS II

Table 13 summarises the results of the analysis carried out on the evolution of the implementation of disclosure and GO systems across the 32 domains in Europe which have been selected for this analysis. For the disclosure system it has been assessed whether the domains had a disclosure system implemented and operational, including legislation on disclosure (for the fuel mix including environmental information and a methodology for the calculation of the energy mix in the domain) and Competent Body assigned. In terms of GO, the existence and operability of both RES and CHP-GO systems were assessed. Moreover, information is displayed regarding the existence of an electronic registry system for RES-GO.

In terms of the disclosure system, at the end of the RE-DISS II:

- 21 out of the 32 domains had a full disclosure system implemented and operational with legislation in place, a Competent Body assigned and an electronic system for GO.
- 10 out of the 32 domains had an “almost in line” disclosure system in place. Reasons for that are:
    - No legislation and or guidelines on the calculation of the energy supplier mix applied to the domain. In the case of Czech Republic every single supplier uses its own methodology for its own disclosure. In Greece although there is legislation in place regarding disclosure, there is no legal provision for the methodology for the calculation of the energy mix.
    - Although there is legislation in place disclosure of information is not yet being carried out (case of Cyprus).
    - Disclosure does not include environmental indicators (case of Belgium-Flanders, Croatia, Italy and Switzerland).
    - Disclosure system is not linked with an electronic register for GO (case of Malta and Slovakia).
    - Legislation is not fully clear on whether the supplier mix or the product mix have to be disclosed to consumers, while in practice it is usually the product mix. Legislation does not require that disclosure information is sent to customers in bills, but states that suppliers at minimum must refer to the Competent Body’s website.[11] (Case of Norway for both issues.).

[11] This approach is reasoned by the fact that the majority of consumers have electronic billing formats.

- 1 out of the 32 domains had no disclosure system or national legislation on disclosure in place, although a Competent Body has been assigned for GO (case of Bulgaria).

In terms of RES-GO systems, at the end of RE-DISS II:

- 29 out of the 32 domains had a RES-GO system in place and operational, with legislation in place and a Competent Body assigned for the issuing, transferring and cancelling of GO.
- 3 out of the 32 domains had a RES-GO system *"almost in line"*. Reasons for that are:
    - GO are issued for internal use but they are not cancelled (case of Poland).
    - The RES-GO system is created by law but not operational (case of Portugal).
    - Although the GO are distinguished from other certificates and only used for disclosure, they are not electronic certificates (case of Slovakia).

Anyway it is important to refer that all the 32 domains have some sort of RES-GO system in place with Competent Bodies assigned for issuing, transferring and cancelling GO, although not all meet the requirements of the RES Directive.

In terms of CHP-GO, at the end of RE-DISS II:

- 22 out of the 32 domains had a CHP-GO system in place that is operational.
- 8 out of the 32 domains had an "almost in line" CHP-GO system in place. Reasons for that are:
    - The actual implementation of the CHP-GO system is unclear (case of Bulgaria, Slovakia).
    - Although created by law the system is not operational (case of Sweden).
    - There is no registry available for CHP-GO (case of Italy, Romania, Malta).
    - CHP-GO can be issued, however they don't specify all information required by Directive 2012/27/EC (case of Finland, Italy and Switzerland)[12].
- 2 out of the 32 domains did not have a CHP-GO system in place (no legislation or Competent Body assigned), which was the case of the Czech Republic and Poland.

[12] In the case of Switzerland GO can be issued for CHP, but they are not formally CHP-GO and they do not specify all information required by Directive 2012/27/EC.

Table 13a: Matrix on the implementation of Disclosure and GO Systems during RE-DISS II

| | Disclosure System | | | | | |
|---|---|---|---|---|---|---|
| | Implemented & Operational | | Legislation in Place | | Competent Body Assigned | |
| | 2014 | 2015 | 2014 | 2015 | 2014 | 2015 |
| Austria | | | | | E-Control | E-Control |
| Belgium-Wallonia | | | | | CWaPE | CWaPE |
| Belgium-Flanders | | | | | VREG | VREG |
| Bulgaria | | | | | SEWRC | SEWRC |
| Croatia | | | | | HERA | HERA/ HROTE |
| Cyprus | | | | | CERA | CERA |
| Czech Republic | | | | | ERU | ERU |
| Denmark | | | | | Energinet.dk | Energinet.dk |
| Estonia | | | | | Elering AS | Elering AS |
| Finland | | | | | Energy Authority | Energy Authority |
| France | | | | | Ministry of Energy | Ministry of Energy |
| Germany | | | | | BNetzA | BNetzA |
| Greece | | | | | LAGIE | LAGIE |
| Hungary | | | | | MEKH | MEKH |
| Iceland | | | | | National Energy Authority | National Energy Authority |
| Ireland | | | | | CER | CER |
| Italy | | | | | GSE | GSE |
| Latvia | | | | | Ministry of Economics | Ministry of Economics |
| Lithuania | | | | | Litgrid AB | Litgrid AB |
| Luxemburg | | | | | ILR | ILR |
| Malta | | | | | Malta Resources Authority | Malta Resources Authority |
| Norway | | | | | NVE | NVE |
| Poland | | | | | Ministry of Economy | Ministry of Economy |
| Portugal | | | | | ERSE | ERSE |
| Romania | | | | | ANRE | ANRE |
| Slovakia | | | | | URSO | URSO |
| Slovenia | | | | | AGEN-RS | Energy Agency |
| Spain | | | | | CNE | CNE |
| Sweden | | | | | Energy Markets Inspectorate | Energy Markets Inspectorate |
| Switzerland | | | | | BfE/ SFOE | BfE/ SFOE |
| The Netherlands | | | | | ACM | ACM |
| Great Britain | | | | | DECC/ OFGEM | DECC/ OFGEM |

Legend: "fully" implemented "almost in line" "not" implemented.

Source: RE-DISS II project (2015f)

Table 13b: Matrix on the implementation of Disclosure and GO Systems during RE-DISS II

| | RES-GO System | | | | | |
|---|---|---|---|---|---|---|
| | Implemented & Operational | | Legislation in Place | | Competent Body Assigned | |
| | 2014 | 2015 | 2014 | 2015 | 2014 | 2015 |
| Austria | | | | | E-Control | E-Control |
| Belgium-Wallonia | | | | | CWaPE | CWaPE |
| Belgium-Flanders | | | | | VREG | VREG |
| Bulgaria | | | | | SEDA | SEDA |
| Croatia | | | | | HROTE | HROTE |
| Cyprus | | | | | CERA / TSO-Cy | CERA / TSO-Cy |
| Czech Republic | | | | | OTE | OTE |
| Denmark | | | | | Energinet.dk | Energinet.dk |
| Estonia | | | | | Elering AS | Elering AS |
| Finland | | | | | Fingrid | Fingrid |
| France | | | | | Powernext | Powernext |
| Germany | | | | | UBA | UBA |
| Greece | | | | | LAGIE / HDNO / CRES | LAGIE / HDNO / CRES |
| Hungary | | | | | MEKH | MEKH |
| Iceland | | | | | Landsnet | Landsnet |
| Ireland | | | | | SEMO | SEMO |
| Italy | | | | | GSE | GSE |
| Latvia | | | | | Ministry of Economics | Ministry of Economics |
| Lithuania | | | | | Litgrid AB | Litgrid AB |
| Luxemburg | | | | | ILR | ILR |
| Malta | | | | | Malta Resources Authority | Malta Resources Authority |
| Norway | | | | | Statnett | Statnett |
| Poland | | | | | ERO | ERO |
| Portugal | | | | | REN | DGEG |
| Romania | | | | | ANRE | ANRE |
| Slovakia | | | | | URSO | URSO |
| Slovenia | | | | | AGEN-RS | Energy Agency |
| Spain | | | | | CNE | CNE |
| Sweden | | | | | Swedish Energy Agency & Svenska Kraftnät | Swedish Energy Agency |
| Switzerland | | | | | Swissgrid | Swissgrid |
| The Netherlands | | | | | CertiQ | CertiQ |
| Great Britain | | | | | OFGEM | OFGEM |

Legend: "fully" implemented "almost in line" "not" implemented.

Source: RE-DISS II project (2015f)

Table 13c: Matrix on the implementation of Disclosure and GO Systems during RE-DISS II

| | CHP-GO | | | | | |
|---|---|---|---|---|---|---|
| | Implemented & Operational | | Legislation in Place | | Competent Body Assigned | |
| | 2014 | 2015 | 2014 | 2015 | 2014 | 2015 |
| Austria | | | | | E-Control | E-Control |
| Belgium-Wallonia | | | | | CWaPE | CWaPE |
| Belgium-Flanders | | | | | VREG | VREG |
| Bulgaria | | | | | SEWRC | SEWRC |
| Croatia | | | | | HROTE | HROTE |
| Cyprus | | | | | CERA / TSO-Cy | CERA / TSO-Cy |
| Czech Republic | | | | | NA | NA |
| Denmark | | | | | Energinet.dk | Energinet.dk |
| Estonia | | | | | Elering AS | Elering AS |
| Finland | | | | | Fingrid | Fingrid |
| France | | | | | Powernext | Powernext |
| Germany | | | | | BAFA | BAFA |
| Greece | | | | | LAGIE / HDNO / CRES | LAGIE / HDNO / CRES |
| Hungary | | | | | MEKH | MEKH |
| Iceland | | | | | Landsnet | Landsnet |
| Ireland | | | | | NA | SEMO |
| Italy | | | | | GSE | GSE |
| Latvia | | | | | Ministry of Economics | Ministry of Economics |
| Lithuania | | | | | Litgrid AB | Litgrid AB |
| Luxemburg | | | | | ILR | ILR |
| Malta | | | | | Malta Resources Authority | Malta Resources Authority |
| Norway | | | | | Statnett | Statnett |
| Poland | | | | | NA | NA |
| Portugal | | | | | REN | DGEG |
| Romania | | | | | NK | NK |
| Slovakia | | | | | URSO | URSO |
| Slovenia | | | | | AGEN-RS | Energy Agency |
| Spain | | | | | CNE | CNE |
| Sweden | | | | | Swedish Energy Agency & Svenska Kraftnät | Swedish Energy Agency |
| Switzerland | | | | | Swissgrid | Swissgrid |
| The Netherlands | | | | | CertiQ | CertiQ |
| Great Britain | | | | | CHPQA | CHPQA |

Legend: "fully" implemented "almost in line" "not" implemented.

Source: RE-DISS II project (2015f)

Table 13d: Matrix on the implementation of Disclosure and GO Systems during RE-DISS II

| | Electronic System for GO | |
|---|---|---|
| | 2014 | 2015 |
| Austria | | |
| Belgium-Wallonia | | |
| Belgium-Flanders | | |
| Bulgaria | | |
| Croatia | | |
| Cyprus | | |
| Czech Republic | | |
| Denmark | | |
| Estonia | | |
| Finland | | |
| France | | |
| Germany | | |
| Greece | | |
| Hungary | | |
| Iceland | | |
| Ireland | | |
| Italy | | |
| Latvia | | |
| Lithuania | | |
| Luxemburg | | |
| Malta | | |
| Norway | | |
| Poland | | |
| Portugal | | |
| Romania | | |
| Slovakia | | |
| Slovenia | | |
| Spain | | |
| Sweden | | |
| Switzerland | | |
| The Netherlands | | |
| Great Britain | | |

Legend: "fully" implemented "almost in line" "not" implemented.

Source: RE-DISS II project (2015f)

In terms of the implementation of Article 3 (9) of the IEM Directive 2009/72/EC regarding disclosure, a big majority of the domains (21/32) had transposed the directive requirements to their national system. On the remaining 11 domains (Belgium-Flanders, Bulgaria, Cyprus, Croatia, Czech Republic, France, Iceland, Italy, Malta, Norway and Switzerland) one or several of the requirements of the IEM Directive lacked implementation at the end of the project.

Reasons for this were several:

- Some domains did not have a disclosure system in place.
- Some domains only disclose the product mix and not the supplier mix to consumers.
- In some domains disclosure information is only available on the Competent Body website and is not included in or with the bills.
- In some domains it is not mandatory to disclosure environmental parameters or it is only mandatory to disclosure one of the environmental parameters ($CO_2$ emissions or radioactive waste).
- Some domains have legislation in place which mandates the disclosure of environmental parameters but the domains still lack further guidelines on how to do this, and thus in practice this information is not disclosed yet.

A detailed analysis of the implementation of Article 3 (9) of the IEM directive on the 32 domains is provided in the RE-DISS Assessment Report on Disclosure and GO systems (RE-DISS II project 2015f).

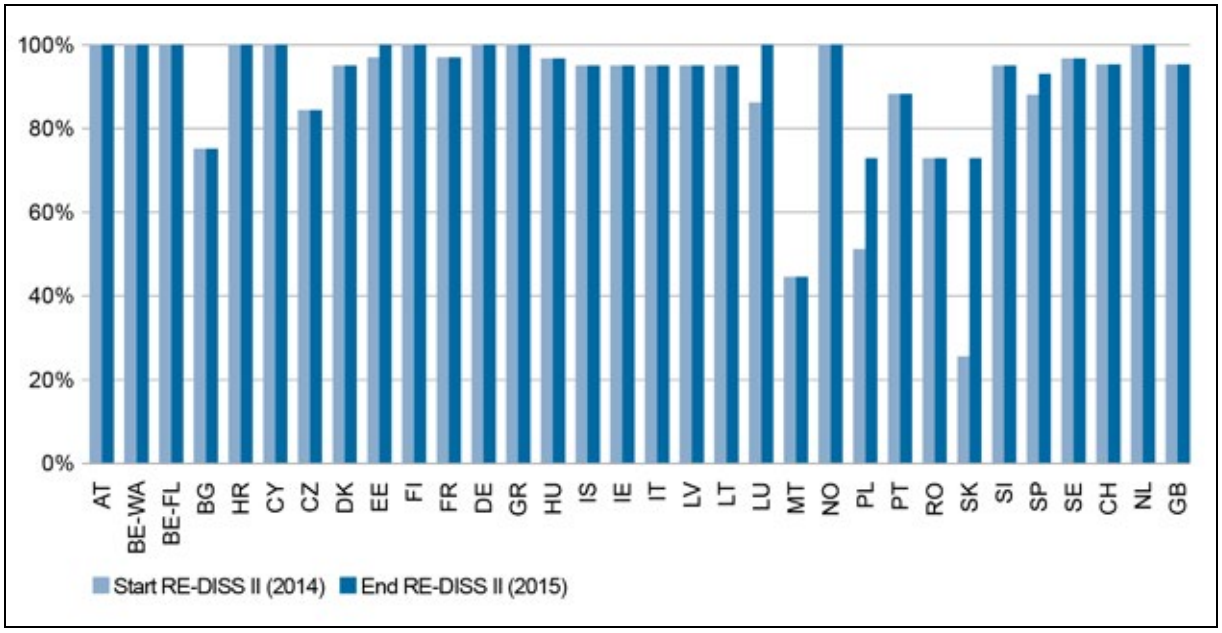
Regarding the GO system and the transposition the mandatory items of Art. 15 of the RES Directive (see Figure 21), it was clear that at the end of RE-DISS II:

- 12 out of the 32 domains had fully transposed the mandatory requirements of Article 15 of the RES Directive (Austria, Belgium-Wallonia, Belgium Flanders, Croatia, Cyprus, Estonia, Finland, Germany, Greece, Luxemburg, Norway and the Netherlands).
- 15 out of the 32 domains transposed more than 80% of the mandatory requirements of Art. 15 of the RES Directive, but not all the mandatory requirements (Czech Republic, Denmark, France, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Portugal, Slovenia, Spain, Sweden, Switzerland and Great Britain).
- 5 domains (Bulgaria, Malta, Poland, Romania and Slovakia) implemented less than 80% of the mandatory items of Art.15 of the RES Directive.

Reasons identified for this were: the GO system implemented was still based on the 2001 RES Directive; the domains were still working in the transposition of the current RES-Directive; and/or the transposition of a given item was not clear and thus “not known”.

It can also be seen from Figure 21 that during RE-DISS II improvements were registered in the implementation of the Art.15 of the RES Directive in five domains (Slovakia, Poland, Luxemburg, Estonia and Spain). Reasons identified for the detected improvements were: transposition of several items/almost all items of Art.15 of the RES Directive into national law through passage/revision of primary or secondary legislation (case of Poland, Luxemburg, Spain and Estonia); implementation of a RES-GO system/passage of secondary legislation on the GO system in accordance with the items of Art.15 of the RES Directive (case of Slovakia); and/or adherence to EECS (case of Estonia). It is important to refer that for the other 27 domains, no improvements were registered during RE-DISS II and that among these were the domains where the mandatory items of Art.15 of the RES-Directive were almost all or all already implemented at the start of RE-DISS II.

Figure 21: Status in the implementation of Art.15 of the RES Directive during RE-DISS II




Source: RE-DISS II project (2015f)

### 6.1.2 Improvements registered since the beginning of the RE-DISS project

Table 14 summarises the improvements in terms of the general implementation of disclosure and GO systems registered during the entire RE-DISS project (including Phase I and II) for the 17 domains[13] analysed at the end of RE-DISS I.

As can be seen, Austria, Belgium-Wallonia, Denmark, France, Germany, Slovenia, Spain and The Netherlands already had full disclosure and GO systems in place since the start of RE-DISS I. In the case of Belgium-Wallonia no improvements were registered on the systems implemented in the domain during the entire RE-DISS projects. The other domains registered improvements[14] in the implementation of disclosure and GO systems in both RE-DISS I and II.

Improvements in the disclosure system in place were registered for Finland, Ireland, Italy, Luxemburg, Portugal and Sweden. These improvements were registered between the start and end of RE-DISS I and maintained throughout RE-DISS II for all referred domains with the exception of Portugal in which the improvement in the disclosure system was registered during RE-DISS II. The improvements registered were mainly associated with the (i) amendment of existing legislation on disclosure; (ii) improvement of GO systems in place and its connection to disclosure and (ii) implementation of an electronic database for GO.

Improvements on the RES-GO system were registered for Ireland, Italy, Luxemburg and Portugal. The improvements registered were mainly associated with: (i) creation and

[13] Improvements registered since RE-DISS I can only be analysed for the 17 domains that were assessed during that project.

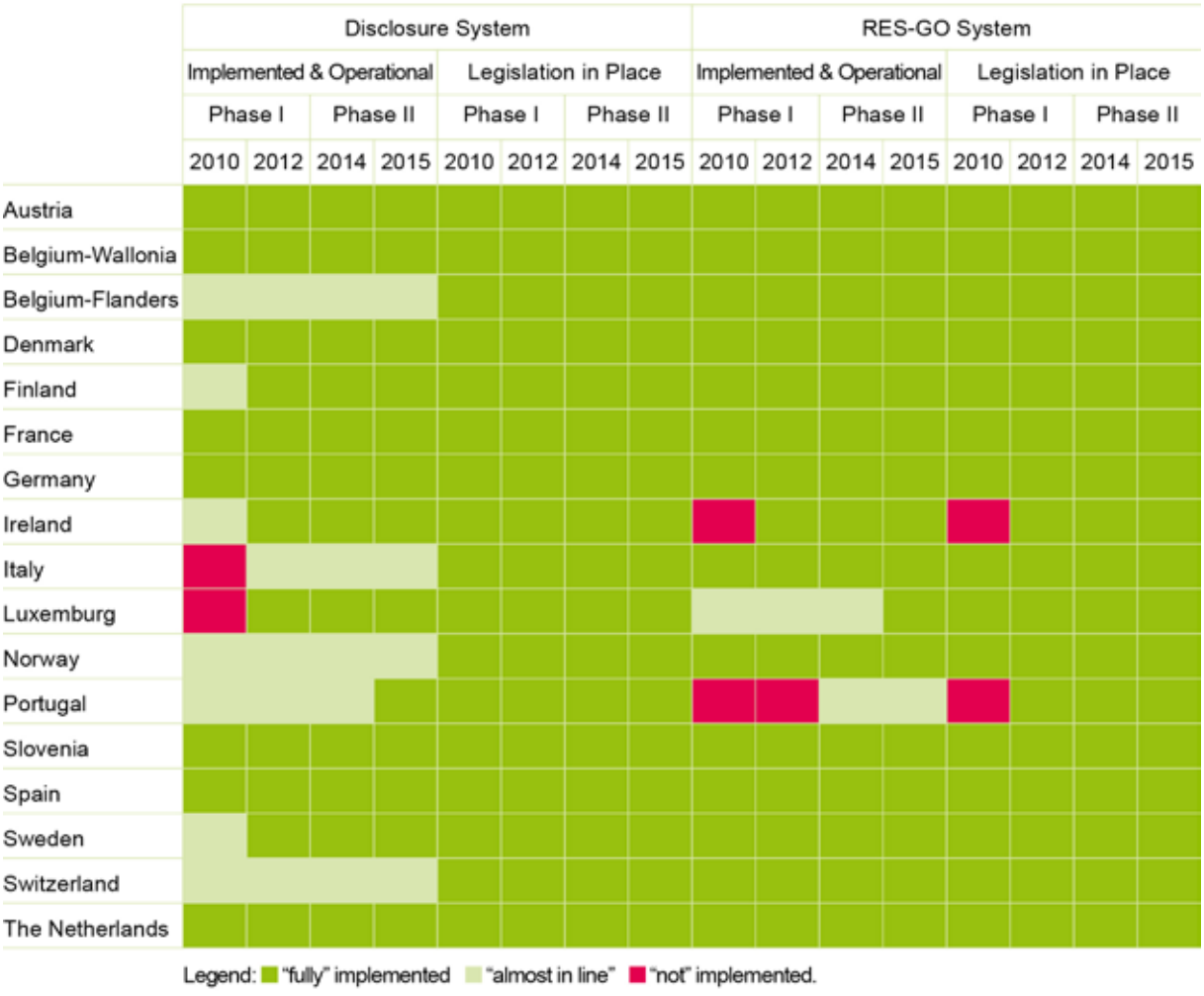
[14] The recorded improvements for disclosure, RES-GO and CHP-GO only refer to the very fundamental situation and initial implementation of the systems, but not on the details of the implementation. On the details of implementation there has been a lot more improvements.

implementation of the system (case of Ireland and Portugal); (ii) revision of legislation on the implemented RES-GO system (case of Luxemburg) and (iii) creation of an electronic registry for the RES-GO system (case of all of the four domains).

Improvements on the CHP-GO system were registered for 5 out of the 17 domains: Ireland (where a CHP-GO system was created and at the end of RE-DISS II legislation was in place and a Competent Body assigned); Luxemburg and Portugal (in which the legislation on CHP-GO was revised and the systems improved); Norway (where an electronic registry for CHP-GO became operational) and Switzerland (where CHP plants start to be covered by GO).

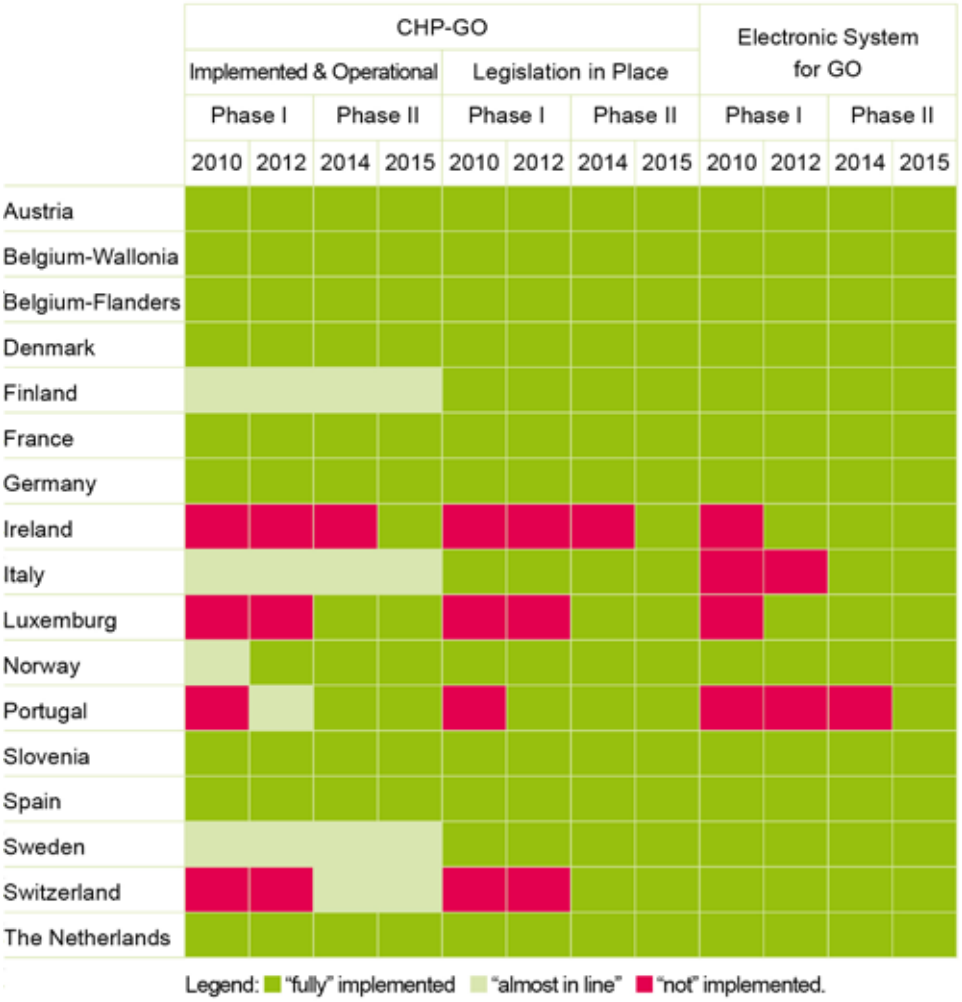
Details on the improvements registered in the 17 domains in terms of general implementation of disclosure and GO system can be found in the RE-DISS Assessment Report on Disclosure and GO systems (RE-DISS II project 2015f).

Table 14a: Matrix on the historical implementation of Disclosure and GO systems since the start of the RE-DISS project in 2010 for 17 domains




Source: RE-DISS II project (2015f)

Table 14b: Matrix on the historical implementation of Disclosure and GO systems since the start of the RE-DISS project in 2010 for 17 domains




Source: RE-DISS II project (2015f)

## 6.2 Implementation of the RE-DISS BPR during RE-DISS

This chapter assesses the progress and state of implementation of the elements of the RE-DISS Best Practice Recommendations (BPR) during the RE-DISS I and II projects. It is important to recognise that these recommendations are not binding in any way for the domains, although they represent the result of intensive work and discussions between the RE-DISS project team and a large number of Competent Bodies.

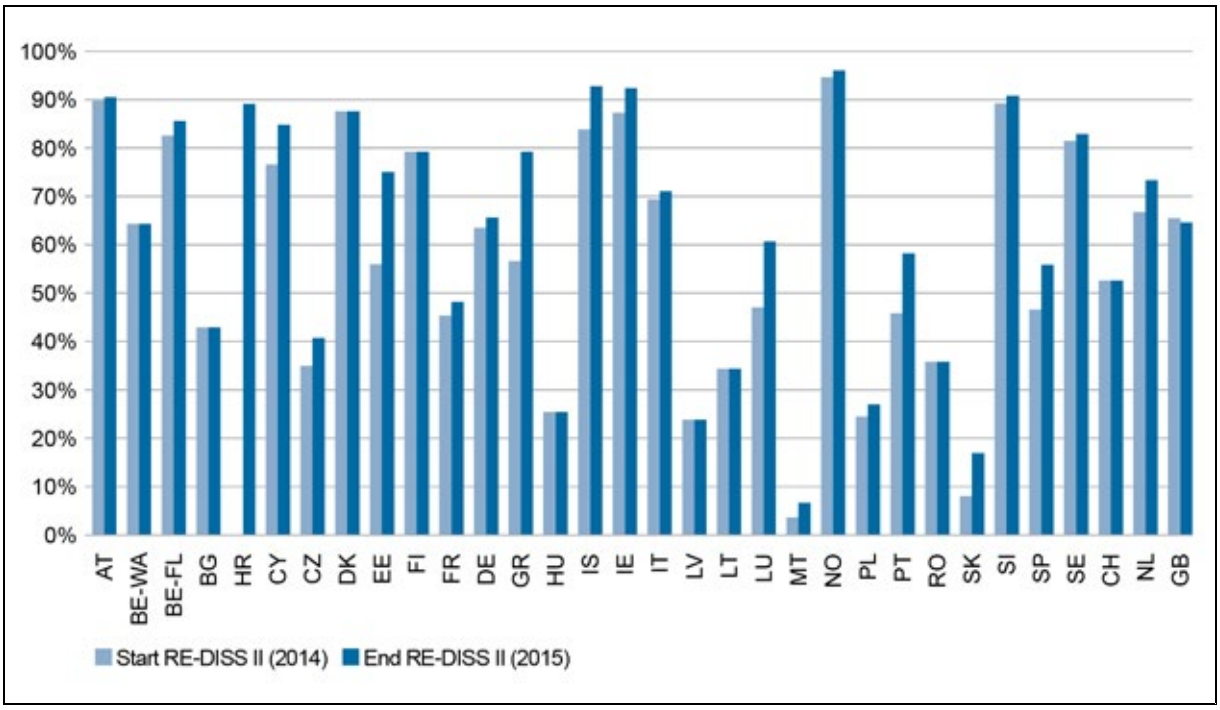
### 6.2.1 Status of implementation of the BPR at the end of RE-DISS II

The state of implementation of each element of the BPR at the "start (2014)" and "end (2015)" of RE-DISS II per country is shown in Figure 22. As can be seen from this figure, all of the 32 countries had most or some of the BPR implemented.

To have a better graphical idea of the status of implementation of the BPR, and the general improvements achieved during RE-DISS II, an assessment of the status of implementation of all BPR across domains was carried out, the results of which are displayed in Table 15. 22 out of the 32 domains had implemented more than half of the BPR elements at the end of

RE-DISS II; 11 domains had implemented at least 80% of the BPR elements; and 10 domains had implemented less than 50% of the BPR elements. Moreover improvements on the implementation of the RE-DISS BPR were registered for 22 out of the 32 domains.

Figure 22: Status of implementation of BPR in the 32 domains at start and end of RE-DISS II




Source: RE-DISS II project (2015f)

This shows that the BPR have been implemented substantially throughout the domains. Domains lacking the implementation of the BPR (with less than 30% of the BPR implemented) are: Hungary, Latvia, Malta, Poland and Slovakia. Nevertheless this can be explained by the fact that the GO and disclosure systems in these countries are still at an embryonic stage and/or are still being developed. Also for these domains there were a lot of BPR for which the information was unknown (“NK”) at the end of RE-DISS II.

Table 15a: Matrix of the Implementation of all BPR for the 32 domains at the start (2014) and end (2015) of RE-DISS II

| | | AT | | BE-WA | | BE-FL | | BG | | HR | | CY | | CZ | | DK | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | BPR ID | 2014 | 2015 | 2014 | 2015 | 2014 | 2015 | 2014 | 2015 | 2014 | 2015 | 2014 | 2015 | 2014 | 2015 | 2014 | 2015 |
| | 1a | | | | | | | | | NK | | | | | | | |
| | 1b | | | | | | | | | NK | | | | | | | |
| | 2 | | | | | | | | | NK | | | | | | | |
| „12 Months | 3a | | | | | | | | | NK | | | | | | | |
| Lifetime Rule“ | 3b | | | | | | | | | NK | | | | | | | |
| for GO | 4 | | | | | | | NA | NA | NK | | | | | | | |
| | 5a | | | | | | | NA | NA | NK | | | | | | | |
| | 5b | | | | | | | NA | NA | NK | | | | NA | NA | | |
| | 6 | | | | | | | NA | NA | NK | | | | | | | |
| | 7 | | | | | | | | | NK | | | | | | | |
| | 7a | | | | | | | | | NK | | | | | | | |
| Usage of | 7b | | | | | | | | | NK | | | | | | | |
| EECS | 8 | | | | | | | | | NK | NK | | | | | | |
| | 9 | | | | | | | | | NK | | | | | | | |
| | 10 | | | | | | | | | NK | | | | | | | |
| | 11 | | | | | | | | | NK | | | | | | | |
| Issuing of GO | 12 | | | | | | | | | NK | | | | | | | |
| for different | 13 | | | | | | | | | NK | | | | | | | |
| energy | 14 a | | | | | | | | | NK | | | | | | | |
| sources | 14 b | | | | | | | NA | NA | NK | | NA | NA | NA | NA | | |
| | 15 a | | | | | | | | | NK | | | | | | | |
| | 15 b | | | | | | | NA | NA | NK | | | | | | NK | |
| GO as the | 16 | | | | | | | NA | NA | NK | | | | | | | |
| unique | 17 | | | | | | | NA | NA | NK | | | | | | | |
| „tracking | 18 | | | | | | | NA | NA | NK | | | | NA | NA | | |
| certificate“ | 19 | | | | | | | NA | NA | NK | | | | | | | |
| Recognition | 20 | | | | | NK | | NK | NK | NK | | | | | | | |
| of GO | 21 | | | | | | | | | NK | | | | | | | |
| Disclosure | 22 | | | | | | | | | NK | | | | | | | |
| schemes and | 23 | | | | | | | NA | NA | NK | | | | | | | |
| other RTS | 24 | | NA | | | NA | NA | NA | NA | NK | | | | NA | | | |
| | 25 | | | | | | | NA | NA | NK | | NA | | | | | |
| Calculation | 26a | NA | NA | | | | | NA | NA | NK | | | | | | | |
| of Residual | 26b | NA | | | | | | NA | NA | NK | | | | | | | |
| Mixes | 27 | | | | | | | NA | NA | NK | | | | | | | |
| | 28 | | NA | | | | | NA | NA | NK | | | | | | | |
| Contract | 29 | NA | NA | | | NA | NA | NA | NA | NK | | | | | | | |
| Based | 30 | NA | NA | | | NA | NA | NA | NA | NK | | | | | | | |
| Tracking | 31 | NA | NA | | | NA | NA | NA | NA | NK | | NA | | | | | |
| | 32 | NA | NA | | | | | NA | NA | NK | | | | | | | |
| Timing for | 33 | | | | | | | NA | NA | NK | | | | | | | |
| Disclosure | 34 | | | | | | | NA | NA | NK | | | | NA | NA | | |
| | 35 | | | | | | | NA | NA | NK | | | | | | | |
| | 36 | | | | | | | NA | NA | NK | | | | | | | |
| | 37 | | | | | | | NA | NA | NK | NA | NA | NA | NA | NA | NA | NA |
| Further | 38 | | | | | | | NA | NA | NK | | | | | NA | | |
| Recommen- | 39 | NA | NA | | | | | NA | NA | NK | | NA | | | | | |
| dations on | 40 | NA | NA | | | | | NA | NA | NK | | NA | | | | | |
| Disclosure | 41 | NA | NA | | | | | NA | NA | NK | NA | NA | NA | | | | |
| | 42 | NA | NA | NK | NK | NK | NK | NA | NA | NK | NA | NK | NA | NK | NK | | |
| | 43a | NA | NA | | | NA | NA | NA | NA | NK | NA | | | NK | NK | NA | NA |
| | 43b | NA | NA | | | NA | NA | NA | NA | NK | NA | NA | NA | NK | NK | NA | NA |

Legend: "fully" implemented "almost in line" "not" implemented.

Table 15b: Matrix of the Implementation of all BPR for the 32 domains at the start (2014) and end (2015) of RE-DISS II

| | | EE | | FI | | FR | | DE | | GR | | HU | | IS | | IE | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | BPR ID | 2014 | 2015 | 2014 | 2015 | 2014 | 2015 | 2014 | 2015 | 2014 | 2015 | 2014 | 2015 | 2014 | 2015 | 2014 | 2015 |
| | 1a | | | | | | | | | | | | | NK | | | |
| | 1b | | | | | | | | | | | NK | NK | NK | | | |
| | 2 | | | | | | | | | | | | | NK | | | |
| „12 Months | 3a | | | | | | | | | | | | | | | | |
| Lifetime Rule" | 3b | | | | | | | | | | | NK | NK | | | | |
| for GO | 4 | | | | | | | | | | | NK | NK | NK | | | |
| | 5a | | | | | | | | | | | | | | | | |
| | 5b | | | | | | | | | | | | | | | | |
| | 6 | | | | | | | NK | | | | | | | | | |
| | 7 | | | | | | | | | | | | | | | | |
| | 7a | | | | | | | | | | | | | | | | |
| Usage of | 7b | | | | | | | | | | | | | | | | |
| EECS | 8 | | | | | | | | | | | | | | | | |
| | 9 | | | | | | | | | | | | | | | | |
| | 10 | | | | | | | | | | | | | | | | |
| | 11 | | | | | | | | | | | | | | NA | | |
| Issuing of GO | 12 | | | | | | | | | | | | | | | | |
| for different | 13 | | | | | | | | | | | | | | | | |
| energy | 14 a | | | | | | | | | | | | | | | | |
| sources | 14 b | NA | | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | 15 a | | | | | | | | | | | NK | NK | | | NA | |
| | 15 b | | | | | NK | | | | | | NK | NK | | | NA | |
| GO as the | 16 | | | | | | | | | | | | | | | | |
| unique | 17 | NK | NK | | | | | | | | | NK | NK | | | | |
| „tracking | 18 | | | | | | | | | NA | NA | NK | NK | | | NA | NA |
| certificate" | 19 | | | | | NK | | | | | | NK | NK | NK | | NA | NA |
| Recognition | 20 | NA | NA | | | | | | | | | NK | NK | NK | | | |
| of GO | 21 | | | | | | | | | | | NK | NK | | | | |
| Disclosure | 22 | | | | | | | | | | | | | | | | |
| schemes and | 23 | | | | | | | | | NK | | NK | NK | | | | |
| other RTS | 24 | NA | | | | NA | NA | | | | NA | NK | NK | | | | |
| | 25 | | | | | | | | | | | NK | NK | | | | |
| Calculation | 26a | | | | | | | NK | | | | | | | | | |
| of Residual | 26b | | | | | | | | | | | | | | | | |
| Mixes | 27 | | | | | | | NK | | | | | | | | | |
| | 28 | | | | | | | | | | | NK | NK | | | | |
| Contract | 29 | | | | | | | | | NA | | NK | NK | | | | |
| Based | 30 | | | | | | | | | NA | | NK | NK | | | | |
| Tracking | 31 | | | | | | | | | NA | NA | NK | NK | | | NA | NA |
| | 32 | | | | | | | | | NA | NA | NK | NK | | | NA | NA |
| Timing for | 33 | | | | | | | | | | | | | | | | |
| Disclosure | 34 | | | | | | | | | | | | | | | | |
| | 35 | | | | | | | | | | | | | | | | |
| | 36 | | | | | | | | | | | NK | NK | | | | |
| | 37 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Further | 38 | | | | | | | | | | | NK | NK | | | | |
| Recommen- | 39 | | | | | | | | | NA | NA | NK | NK | | | NA | NA |
| dations on | 40 | | | | | | | | | NA | NA | NK | NK | NK | NK | NA | NA |
| Disclosure | 41 | | | | | | | | | NA | NA | NK | NK | NK | NK | | |
| | 42 | | | NK | NK | | | | NA | NK | NK | NK | NK | NK | NK | | |
| | 43a | NA | NA | NA | NA | NK | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | 43b | NA | NA | NA | | NK | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |

Legend: "fully" implemented "almost in line" "not" implemented.

Table 15c: Matrix of the Implementation of all BPR for the 32 domains at the start (2014) and end (2015) of RE-DISS II

| | | IT | | LV | | LT | | LU | | MT | | NO | | PL | | PT | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | BPR ID | 2014 | 2015 | 2014 | 2015 | 2014 | 2015 | 2014 | 2015 | 2014 | 2015 | 2014 | 2015 | 2014 | 2015 | 2014 | 2015 |
| | 1a | | | | | NK | NK | | | NA | NA | | | | | NA | NA |
| | 1b | | | | | NK | NK | | | NA | NA | | | | | NA | NA |
| | 2 | NK | NK | | | NK | NK | | | NA | NA | | | | | NA | NA |
| „12 Months | 3a | | | | | | | | | | | | | | | NA | NA |
| Lifetime Rule" | 3b | | | | | | | | | NA | NA | | | NK | | NA | NA |
| for GO | 4 | | | | | | | | | | | | | NA | | NA | NA |
| | 5a | | | | | | | | | NA | NA | | | NK | | NA | NA |
| | 5b | | | | | | | | | NA | NA | | | NK | | NA | NA |
| | 6 | | | | | | | | | NA | NA | | | NK | | NA | NA |
| | 7 | | | | | | | | | NA | NA | | | NA | | NA | NA |
| | 7a | | | | | | | | | | | | | NA | | NA | NA |
| Usage of | 7b | | | | | | | | | | | | | NA | | NA | NA |
| EECS | 8 | | | | | | | | | NA | NA | | | NA | | NA | NA |
| | 9 | | | | | | | | | NA | NA | | | NA | | NA | NA |
| | 10 | | | | | | | | | | | | | NA | | NA | NA |
| | 11 | | | | | | | | | NA | NA | | | | | | |
| Issuing of GO | 12 | NK | NK | | | | | | | NA | NA | | | NK | | NA | NA |
| for different | 13 | NA | | | | | | | | NA | NA | | | | | | |
| energy | 14 a | | | | | | | | | NA | NA | | | NK | NK | NA | |
| sources | 14 b | | | | | | | | | NA | NA | | | | | | NA |
| | 15 a | NK | NK | | | | | | | NK | NK | | | NK | NA | NA | |
| | 15 b | NK | | | | | | | | NK | NA | | | NK | NA | NA | NA |
| GO as the | 16 | | | | | | | | | NA | NA | | | NK | | | |
| unique | 17 | | | | | | | | | NA | NA | | | NK | | | |
| „tracking | 18 | | | | | | | | | NA | NA | | | NK | | NA | NA |
| certificate" | 19 | | | | | | | | | NA | NA | | | NK | | | |
| Recognition | 20 | | | NA | NA | | | NA | NA | | | | | NK | | NK | NK |
| of GO | 21 | | | | | | | | | NK | NK | NK | NK | NK | | | |
| Disclosure | 22 | | | | | | | | | NK | | NK | | | | | |
| schemes and | 23 | | | | | | | | | NK | NK | | | NK | | | |
| other RTS | 24 | NA | NA | | | | | | | NK | NK | | | NK | | | |
| | 25 | | | | | | | | | NK | NK | | | NK | | | |
| Calculation | 26a | | | | | | | | | NK | NK | | | NK | | | |
| of Residual | 26b | | | | | | | | | NK | NK | | | NK | | | |
| Mixes | 27 | | | | | | | | | NK | NK | | | NK | | | |
| | 28 | | | | | | | | | NK | NK | | | NK | | | |
| Contract | 29 | | | | | | | | | NK | NK | | | NK | | | |
| Based | 30 | | | | | | | | | NK | NK | NA | NA | NK | | | |
| Tracking | 31 | | | | | NK | NK | | | NK | NK | | | NK | | NA | NA |
| | 32 | | | | | | | | | NK | NK | | | NK | | | |
| Timing for | 33 | | | | | | | | | NK | NK | | | | | | |
| Disclosure | 34 | | | | | | | | | NK | NK | | | NK | | NA | NA |
| | 35 | | | | | | | | | NK | NK | | | NK | | | |
| | 36 | | | | | | | | | NK | NK | | | | | | |
| | 37 | | | | | | | NA | NA | NK | NK | | | | | | |
| Further | 38 | | | | | | | | | NA | NA | | | | | | |
| Recommen- | 39 | | | | | | | | | NA | NA | | | | | | |
| dations on | 40 | | | | | | | | | NA | NA | | | | | | |
| Disclosure | 41 | | | | | NK | NK | | | NA | NA | | | | | | |
| | 42 | NK | NK | NK | NK | NK | NK | | | NK | NK | NA | NA | NK | NK | NK | NK |
| | 43a | NK | NK | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | | | | |
| | 43b | NK | NK | NA | NA | NA | NA | NA | NA | NA | NA | | | | | | |

Legend: "fully" implemented "almost in line" "not" implemented.

Table 15d: Matrix of the Implementation of all BPR for the 32 domains at the start (2014) and end (2015) of RE-DISS II

| | | RO | | SK | | SI | | ES | | SE | | CH | | NL | | GB | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | BPR ID | 2014 | 2015 | 2014 | 2015 | 2014 | 2015 | 2014 | 2015 | 2014 | 2015 | 2014 | 2015 | 2014 | 2015 | 2014 | 2015 |
| | 1a | | | NK | NK | | | | | | | | | | | | |
| | 1b | NK | NK | NK | NK | | | | | NK | | | | | | | |
| | 2 | | | NK | NK | | | | | | | | | | | | |
| „12 Months | 3a | NK | NK | NK | | | | | | | | | | | | | |
| Lifetime Rule" | 3b | NK | NK | | | | | NK | NK | | | | | | | | |
| for GO | 4 | NK | NK | | | | | | | | | | | | | | |
| | 5a | NK | NK | NK | NK | | | | | | | | | | | | |
| | 5b | NK | NK | NK | NK | | | | | | | | | | | | |
| | 6 | NK | NK | NK | NK | | | | | | | | | | | | |
| | 7 | | | | | | | | | | | | | | | | |
| | 7a | | | | | | | | | | | | | | | | |
| Usage of | 7b | | | | | | | | | | | | | | | | |
| EECS | 8 | | | | | | | | | NA | | | | | | | |
| | 9 | | | | | | | | | | | | | | | | |
| | 10 | | | NK | NK | | | | | | | | | | | | |
| | 11 | | | | | | | | | | | | | | | | |
| Issuing of GO | 12 | NA | NA | NK | NK | | | | | | | | | | | | |
| for different | 13 | | | | | | | | | | | | | | | | |
| energy | 14 a | | | | | | | | | | | | | | | | |
| sources | 14 b | | | | | NA | NA | NA | NA | | | | | | | | |
| | 15 a | NA | NA | NK | NK | | | | | | | | | | | | |
| | 15 b | NA | NA | NK | NK | | | | | | | | | | | | |
| GO as the | 16 | | | | | | | | | | | | | | | | |
| unique | 17 | | | | | | | | | | | | | | | | |
| „tracking | 18 | | | NA | NA | | | | | | | | | | | | |
| certificate" | 19 | | | | | | | | | | | | | NK | NK | | |
| Recognition | 20 | NK | NK | | | | | NK | NK | NA | NA | NA | NA | | | | |
| of GO | 21 | | | | | | | | | | | | | | | NA | |
| Disclosure | 22 | | | | | | | | | | | | | | | | |
| schemes and | 23 | | | | | | | NA | NA | | | | | | | | |
| other RTS | 24 | | | NA | NA | | | NA | NA | NK | | NA | NA | | | | |
| | 25 | | | | | | | | | | | | | | | | |
| Calculation | 26a | | | | | | | | | | | | | | | | |
| of Residual | 26b | | | | | | | | | | | | | | | | |
| Mixes | 27 | | | | | | | | | | | | | | | | |
| | 28 | | | | | | | | | | | | | | | | |
| Contract | 29 | | | | | NA | NA | NA | NA | | | | | | | | |
| Based | 30 | | | | | NA | NA | NA | NA | NA | NA | | | | | | |
| Tracking | 31 | | | | | NA | NA | NA | NA | | | | | | | | |
| | 32 | | | | | NA | NA | NA | NA | | | | | | | | |
| Timing for | 33 | | | | | | | | | | | | | | | | |
| Disclosure | 34 | | | | | | | | | | | | | | | | |
| | 35 | | | | | | | | | | | | | | | | |
| | 36 | | | | | | | | | | | | | | | | |
| | 37 | | | NA | NA | NA | NA | NA | NA | | | NA | NA | NA | NA | | |
| Further | 38 | | | | | | | | | | | | | | | | |
| Recommen- | 39 | | | | | | | | | | | | | | | | |
| dations on | 40 | | | | | | | | | | | | | | | | |
| Disclosure | 41 | | | | | | | | | NK | | | | | | | |
| | 42 | NK | NK | NK | NK | | | NK | NK | NK | | NK | NK | NK | | NK | NK |
| | 43a | NA | NA | NA | NA | NA | NA | | | NA | NA | NA | NA | NA | NA | NA | NA |
| | 43b | NA | NA | NA | NA | NA | NA | | | | | NA | NA | NA | NA | NA | NA |

Legend: "fully" implemented "almost in line" "not" implemented.

When cross analysing Figure 22 and Table 15 it can be seen that at the domain level the following improvements were registered during RE-DISS II:

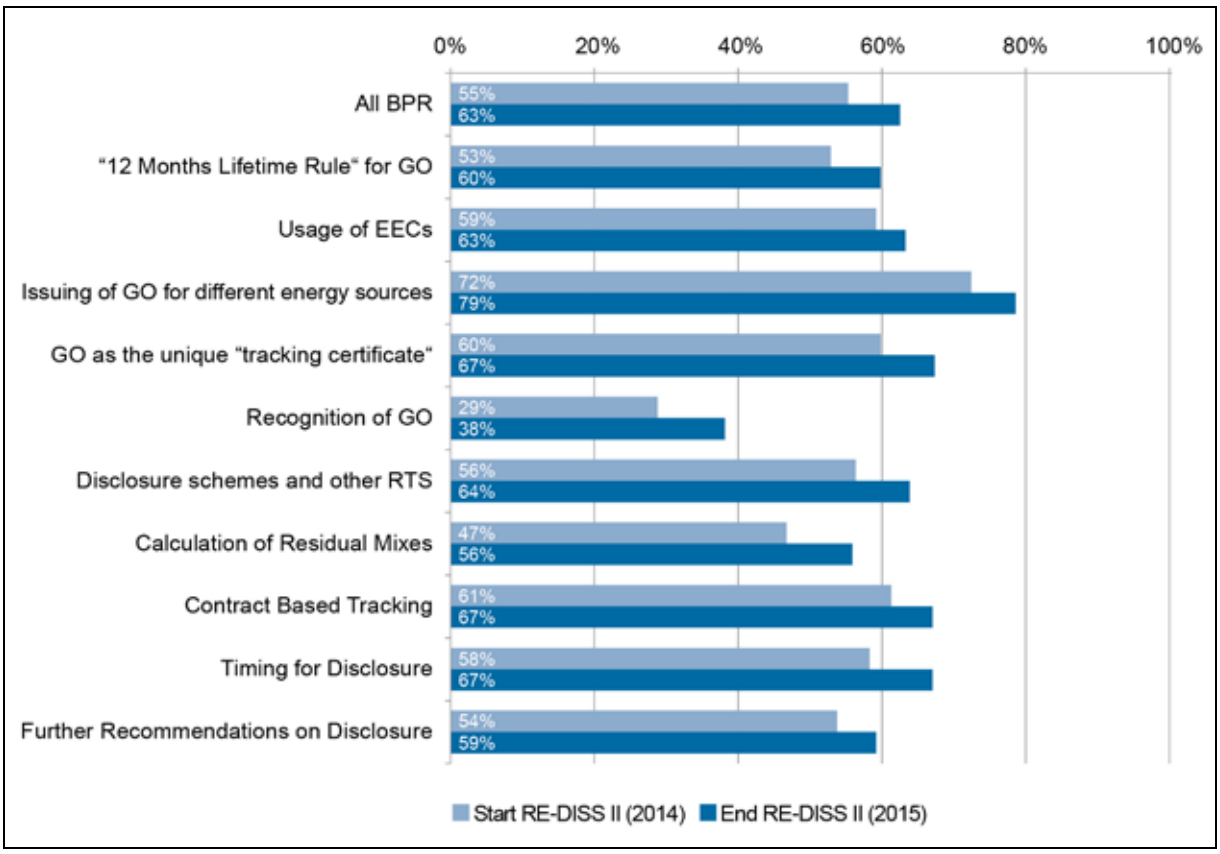
- The largest improvements in the implementation of the BPR were registered in Croatia (90% overall improvement). During RE-DISS II Croatia enacted legislation on both disclosure and GO which followed a big majority of the RE-DISS BPR, became an EECS member country and adopted the RE-DISS methodology for the timing for disclosure and the residual mix calculation, just to name a few. In fact all BPR under the categories "GO as the unique tracking certificate", "Calculation of Residual Mixes", "Contract Based Tracking" and "Further Recommendations on GO" were 100% implemented in the country at the end of RE-DISS II. The categories with the least percentage of implementation in Croatia (already with implementation above 70%) are the "Usage of EECS" and "Recognition of GO".
- Moderate improvements in the implementation of the BPR were registered for Greece (23% improvement), Estonia (19% improvement), Luxemburg (13% improvement) and Portugal (12% improvement). In Greece the improvements were registered in the implementation of the following BPR categories: "12 Months Lifetime Rule for GO", "Usage of EECS", "Disclosure schemes and other RTS", "Calculation of Residual Mixes", "Contract Based Tracking" and "Timing for Disclosure", and thus at the end of the project the system in Greece was fully aligned with the BPR categories "Contract Based Tracking" and "Timing for Disclosure". In the case of Estonia improvements were registered in the implementation of all BPR categories (except from the "GO as the unique tracking certificate" and "Recognition of GO") mainly due to improvement of the legislation on GO which made both the RES-GO system and CHP-GO system aligned with the RES-Directive; the improvement of the GO registry, its alignment with EECS rule and the use of the AIB Hub for electronic transfers of GO just to name a few reasons. In the case of Luxemburg the improvements were registered in four BPR categories ("12 Months Lifetime Rule for GO"; "Usage of EECS"; "GO as the unique tracking certificate"; and "Contract Based Tracking") achieved through the passage of new legislation that aligned the GO systems in place in the country with the RES Directive as well as by regulating Contract Based Tracking clearly. In the case of Portugal, improvements in the implementation of the BPR were registered in the categories of: "Issuing of GO for different energy sources", "GO as the unique tracking certificate", "Recognition of GO" and "Disclosure schemes and other RTS", mainly due to the revision and improvement of primary and secondary legislation on the GO systems.
- Slight improvements (less than 10% improvement in the overall implementation of the BPR) were registered for: Austria, Belgium-Flanders, Cyprus, Czech Republic, France, Germany, Iceland, Ireland, Italy, Malta, Norway, Poland, Slovenia, Slovakia, Spain, Sweden and The Netherlands.
- No improvements were registered for Belgium-Wallonia, Bulgaria, Denmark, Finland, Hungary, Latvia, Lithuania, Romania, Switzerland and Great Britain, because no relevant changes where incorporated on their disclosure and GO systems.

A detailed analysis on the implementation of the BPR per domain can be found in the RE-DISS Assessment Report on Disclosure and GO systems (RE-DISS II project 2015f).

When looking into the implementation of the BPR categories[15] across the 32 domains (Figure 23), at the end of RE-DISS II most of the BPR categories, with exception of the category on "Recognition of GO" were implemented by more than 50%. The category of BPR that was most implemented across the 32 domains was the "Issuing of GO for different energy sources" followed by the "GO as the unique tracking system", "Contract Based Tracking" and the "GO as the unique tracking certificate".

During RE-DISS II improvements were registered in the implementation of the BPR across the 32 domains throughout all BPR categories. The BPR categories with highest improvement registered were the "Recognition of GO" and "Calculation of Residual Mix" (both with 9% improvement) followed by "Disclosure schemes and RTS" and "Timing for disclosure (both with 8% improvement). 4% improvement was registered for the BPR category "Usage of EECS". The following reasons explain the moderate improvements registered: (i) a big part of the domains at the start of RE-DISS II had already disclosure and GO systems compliant with a big part of the BPRs and (ii) only few domains enacted laws and largely changed their disclosure and GO systems.

Figure 23: Improvements in the implementation of BPR in the 32 domains during RE-DISS II




Source: RE-DISS II project (2015f)

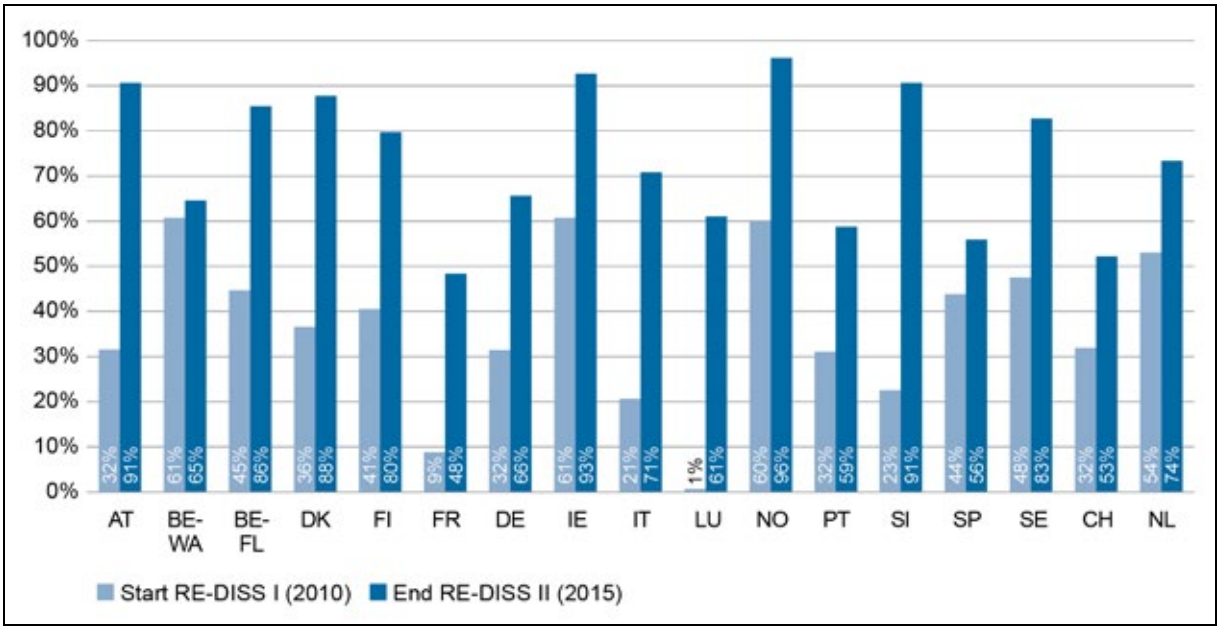
[15] The BPR categories are: "12 Months Lifetime Rule for GO"; "Usage of EECS"; "Issuing of GO for different energy sources"; "GO as the unique tracking certificate"; "Recognition of GO"; "Disclosure schemes and other RTS"; Calculation of Residual Mixes; "Contract Based Tracking"; "Timing for Disclosure"; and "Further Recommendations on Disclosure". Details on the BPRs included in each category are provided in the RE-DISS Assessment Report on Disclosure and GO systems (RE-DISS II project 2015f).

### 6.2.2 Improvements registered in the implementation of the RE-DISS BPR since RE-DISS I

Figure 24 shows the historical evolution of the status of implementation of all BPR during the entire RE-DISS project in the period from 2010 to 2015 for each of the 17 domains, which had been already assessed in the first phase of the RE-DISS project. As it can be seen from this figure large improvements were made in the implementation of all BPR:

- More than 50% improvements were registered for Austria, Denmark, Italy, Luxemburg and Slovenia;
- Improvements between 30-50% were registered for Belgium-Flanders, Finland, France, Germany, Ireland, Norway and Sweden; and
- Improvements up to 30% were registered for Belgium-Wallonia, Portugal, Spain, Switzerland and The Netherlands.

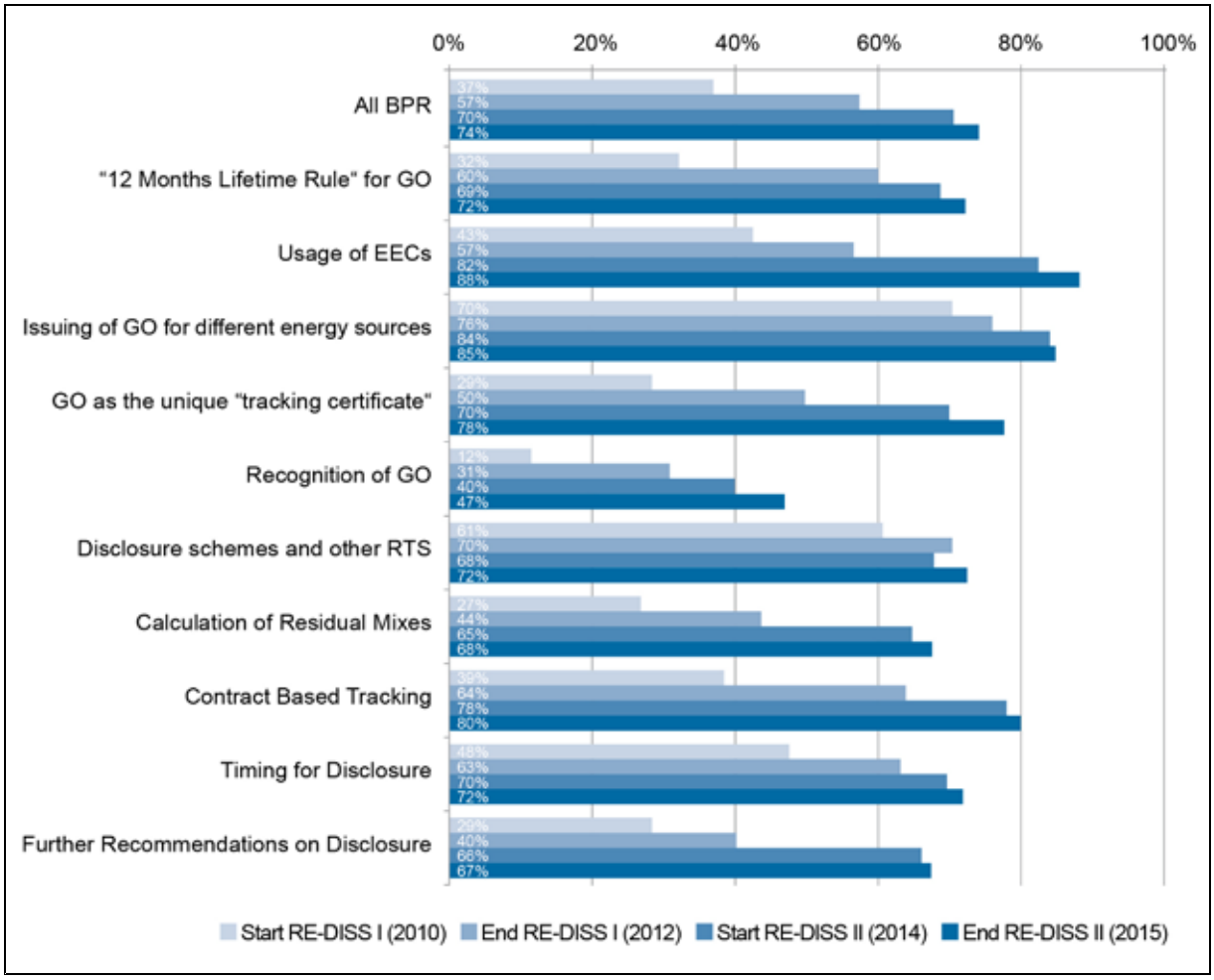
Figure 24: Status of implementation of all BPR in the 17 domains during the entire RE-DISS project




Source: RE-DISS II project (2015f)

As depicted in Figure 25 important improvements were registered in the 17 domains during the RE-DISS project throughout all BPR categories (between 12 and 49 percentage points). The BPR category with highest registered improvement was “GO as the unique tracking certificate” (49% improvement), followed by “Usage of EECS” (45% improvement) and by “Calculation of Residual Mix” and “Contract Based Tracking” (both with 41% improvement). 12% improvement was registered for the BPR category “Disclosure schemes and other RTS”.

Figure 25: Improvements in the implementation of BPR in the 17 domains during RE-DISS




Source: RE-DISS II project (2015f)

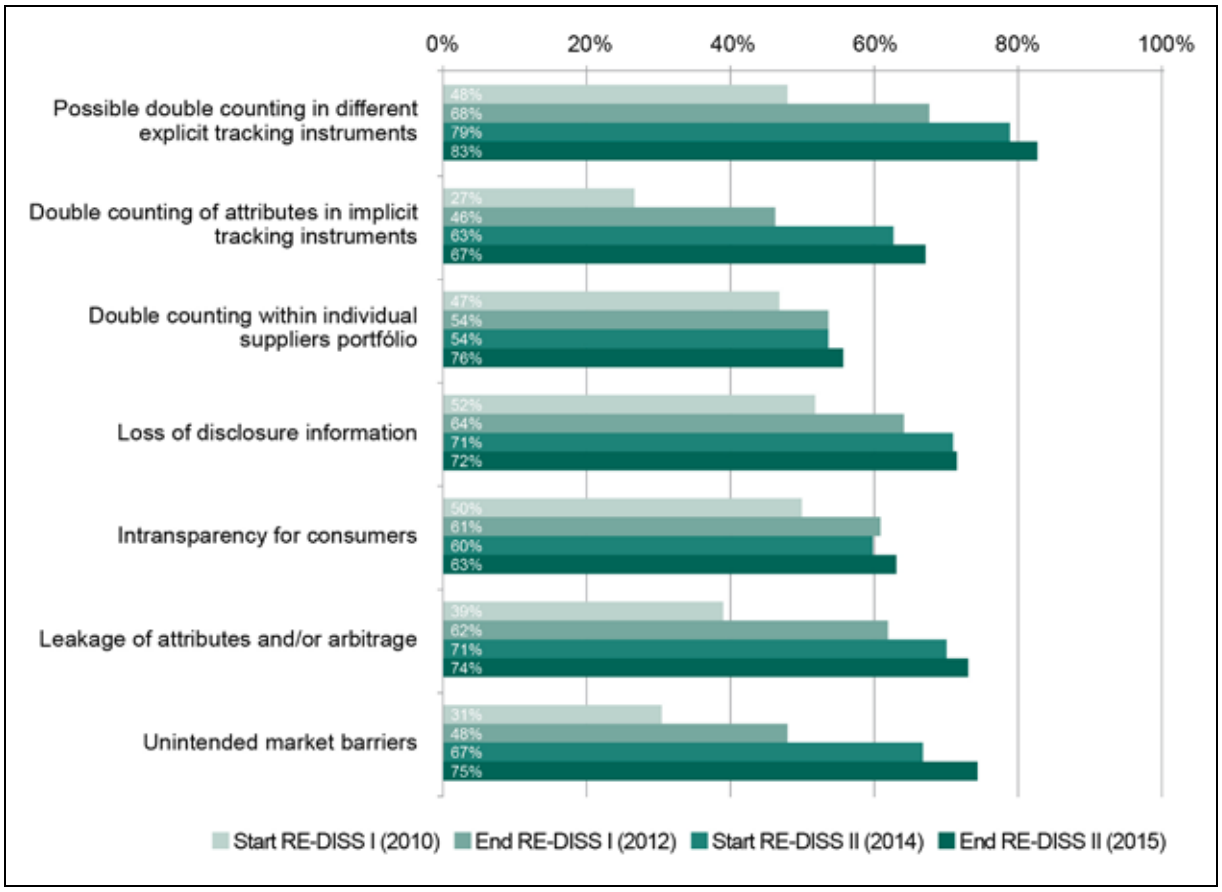
It is important to stress that at the end of the second phase of the RE-DISS project all BPR categories with the exception of "Recognition of GO" were more than 65% implemented across the 17 domains, which shows the strong impact of the project.

### 6.2.3 Improvements registered in addressing the main disclosure problems since RE-DISS I

Similarly to the improvements in the implementation of the BPR categories across the 17 domains, the improvements registered in addressing the main disclosure problems[16] during the entire RE-DISS project were also high: between 9% and 44% (see Figure 26). The biggest improvement was registered in addressing the problem of "Unintended market barriers" (44% improvement registered between the start of RE-DISS I and end of RE-DISS II). The smallest improvement was registered in addressing the problem "Double counting within individual suppliers portfolio" (9% improvement registered).

[16] Details on the analysis and improvments on adressing the main disclosure problems during RE-DISS II (for all 32 domains and at domain level) can be found in theRE-DISS Assessment Report on Disclosure and GO systems (RE-DISS II project 2015f). A full descriprion of the problems can be found in this report and in the report on improvements achieved of the RE-DISS I project (RE-DISS I project 2012A).

Figure 26: Improvements in addressing the main disclosure problems in the 17 domains during RE-DISS I and II




Source: RE-DISS II project (2015f)

## 6.3 Quantified improvements during RE-DISS in avoidance of double counting

The quantitative analysis of the improvements in reducing double counting of attributes by proper implicit disclosure mechanisms simulated residual mix calculation of each of the 31 countries[17] with the methodology containing the issues (see below) relevant for the respective country. The simulation was made with the 2014 data set as collected by RE-DISS for calculation of residual mixes and the European Attribute Mix. The simulation included three cases for each country: before RE-DISS I (2010), after RE-DISS I (2012) and after RE-DISS II (2015). The benchmark was implicit disclosure according to RE-DISS BPR.

Data collection for the quantitative improvement analysis was conducted through seven extra questions in the qualitative data collection sheet, where respondents were asked to specify e.g. whether uncorrected generation statistics are used for implicit disclosure, whether the calculation is coordinated with other countries as well as the exact calculation formula. Based on these answers the emergence of five implicit disclosure issues in the 31 countries was assessed:

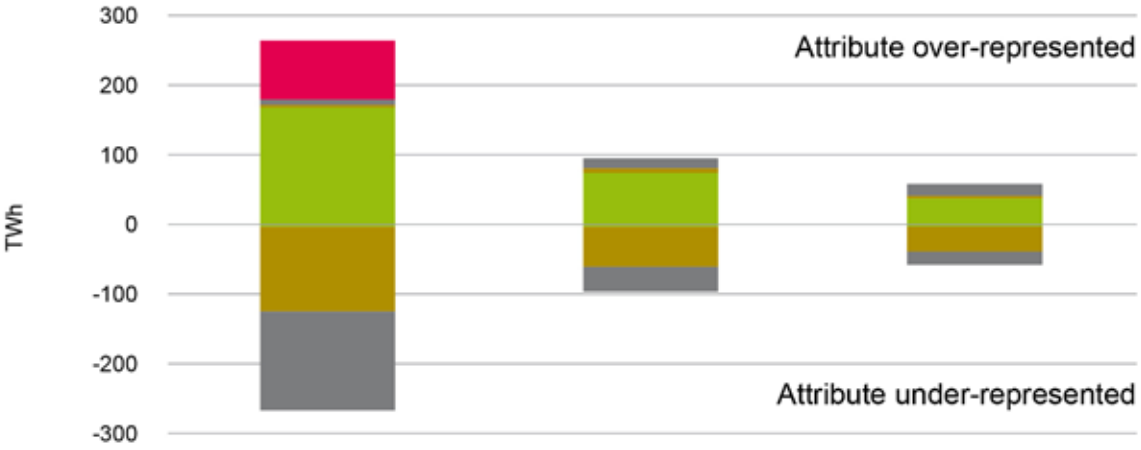
[17] The number of countries differs from the 32 domains, as Belgium is subdivided into two domains (Belgium-Wallonia and Belgium-Flanders).

- Issue 1: Application of uncorrected generation statistics for implicit disclosure
- Issue 2: Use of non-transparent contract-based tracking (CBT) mechanisms
- Issue 3: Residual mix calculation is not harmonised with the rest of Europe
- Issue 4: Geographical domains for implicit disclosure overlap
- Issue 5: Residual mix only considers explicit tracking of the reference production year attributes

The RE-DISS Assessment Report on Disclosure and GO systems (RE-DISS II project 2015f) provides more details about the settings and input data of the analysis. In the following, the main results of the analysis are presented.

On an overall level, Figure 27 presents the reduction of implicit disclosure errors brought about by the improvements described in chapter 6.2. The positive values of Figure 27 demonstrate the total over-representation of the relevant attribute in countries where the attribute was over-represented in implicit disclosure. The total positive and negative errors are equal because if an attribute is over-represented in a domain, another attribute must be under-represented. It needs to be noted that values calculated in this report should be considered as indicative, due to the nature of implicit tracking, which is always subject to some national variance that cannot be accounted for in a centralised error analysis.

Figure 27: Total implicit disclosure error before RE-DISS I, after RE-DISS I and after RE-DISS II




| | Before RE-DISS I | After RE-DISS I | After RE-DISS II |
|---|---|---|---|
| RES | 167,5 | 76,4 | 40,1 |
| NUC | 5,3 | 6,1 | 3,4 |
| FOS | 8,00 | 14,4 | 15,2 |
| Unknown | 85,2 | 0,0 | 0,0 |
| RES | -3,7 | -4,4 | -4,5 |
| NUC | -119,9 | -54,8 | -33,0 |
| FOSS | -142,3 | -37,7 | -21,2 |
| Unknown | 0,0 | 0,0 | 0,0 |
| Total | 265,9 | 96,9 | 58,7 |

Source: RE-DISS II project (2015f)

From Figure 27 we see that the total implicit disclosure error decreased from 266 TWh per year before RE-DISS I (what the error would have been with 2010 practices and 2014 data) to some 60 TWh per year after RE-DISS II. Double counting of renewables in the meantime dropped from nearly 170 TWh/yr. to 40 TWh/yr. between the first and last scenario. These improvements were realised through enhanced implicit disclosure practices implemented in the domains during the entire RE-DISS project (including both phases I and II). It is important to refer that: this only relates to implicit disclosure problems on a national level and not those resulting from disclosure errors inside a supplier's portfolio; and that not all improvements are necessarily a direct influence of the RE-DISS project, although in most cases RE-DISS has doubtlessly assisted.

Furthermore, no "unknown origin" was disclosed in the "after RE-DISS II" case, compared to 85 TWh/yr. before RE-DISS I. This is also a significant improvement, because the "unknown origin" was disclosed in Norway in the before RE-DISS I case, where, given the production mix of the country, it is probable that consumers assumed a renewable origin for electricity without better knowledge.

The decreased amounts of double counted RES and of "unknown origin" were correctly replaced by NUC and FOS attributes, for which the negative disclosure error contracted from -120 TWh/yr. to -33 TWh/yr. and -142 TWh/yr. to -21 TWh/yr., respectively.

These improvements have major impacts also in the disclosure of environmental indicators data. Contraction of the negative disclosure error of FOS by some 120 TWh/yr. would yield to roughly 72 Megatons of $CO_2$/yr. being correctly disclosed with an assumed 600 g/kWh factor. The same applies for radioactive waste: contraction of the negative disclosure error for NUC of some 87 TWh/yr. would avoid incorrect disappearing of 260 tons/yr. of radioactive waste from disclosure with an assumed 3mg/kWh factor.

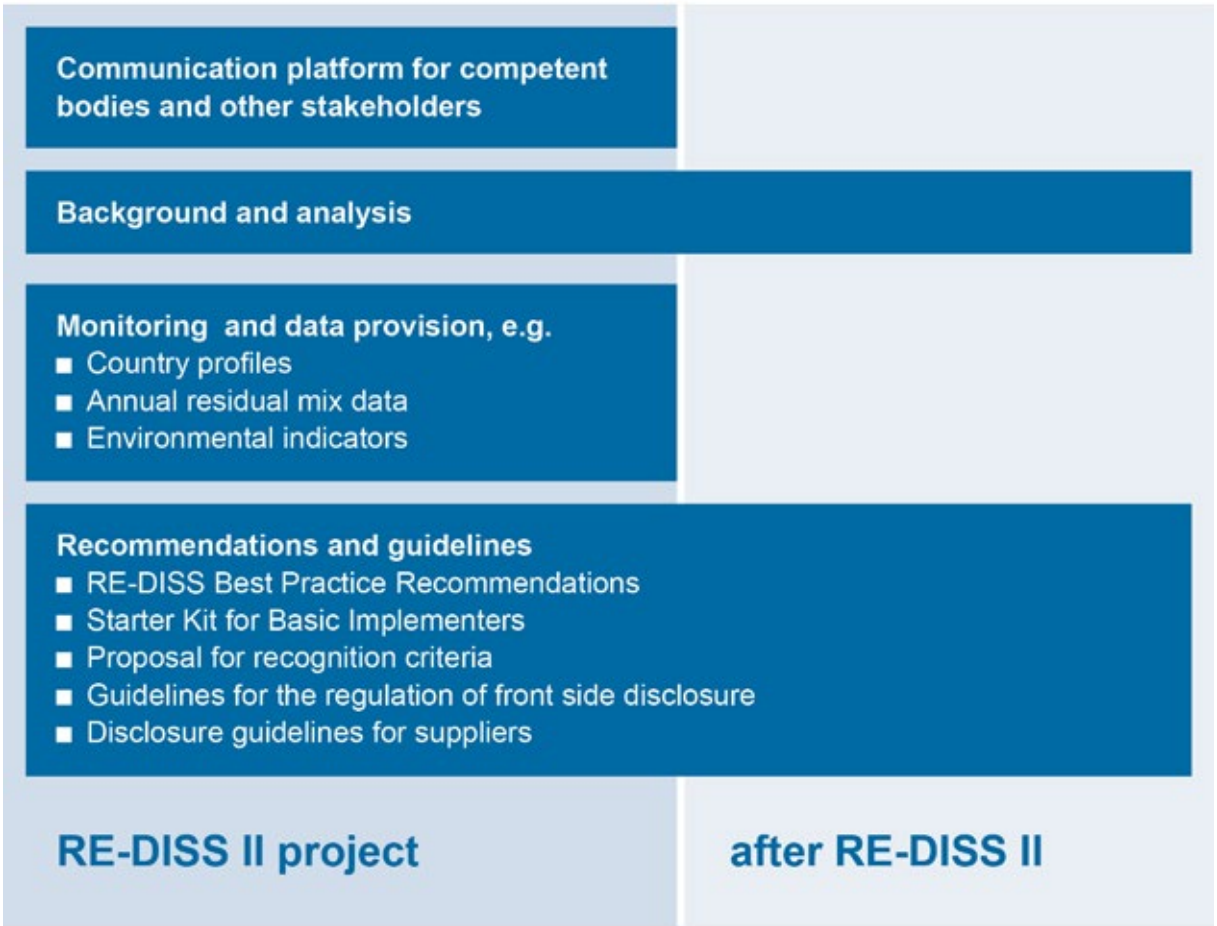
The progress made solely during the RE-DISS II project phase can be observed as the difference between the second and third column of Figure 27. The total disclosure error decreased some 40 TWh/yr. (from 97 TWh/yr. to 59 TWh/yr.) and double counting of renewables by 36 TWh/yr. (from 76 TWh/yr. to 40 TWh/yr.). It is clear that improvements done in the first phase of the project had much greater impact as these related mostly to the active GO trading domains, whereas during the second phase mainly the newcomer domains achieved improvements. However, once these newcomers start actively transferring GO internationally, the improvements achieved today will show a much clearer result. The RE-DISS Assessment Report on Disclosure and GO systems (RE-DISS II project 2015f) represents country specific results of the numeric assessment.

# 7 The Future of Tracking and Disclosure Systems in Europe

## 7.1 Background and Introduction

RE-DISS II has provided quite different outputs and services, including the facilitation of a communication platform for Competent Bodies and other stakeholders, publication of background and analysis, regularly updated data and country descriptions and last not least a lot of different guidelines and recommendations. While it is obvious – and also outlined by Figure 28 – that some of this output will be likewise applicable also after the end of the RE-DISS II project, some other of these services would have to be provided by other organisations in the future in order to maintain their value for the operation of well-established and coordinated disclosure systems.

Figure 28: Outputs and services provided by the RE-DISS II project and indicative illustration of their applicability also after the end of RE-DISS II




Source: Authors' own compilation

The RE-DISS II project team has intensively consulted Competent Bodies and responsible governmental bodies for electricity disclosure and guarantees of origin, as well as other

stakeholders in order to identify the specific needs for further future services. This particularly includes input and requests from Competent Bodies as represented during the RE-DISS II domain workshops in 2013 and 2014 and within Core Theme 5 of the Concerted Action for the Implementation of the Renewable Energy Directive (CA-RES). As a result, RE-DISS II has identified a list of four tasks which have been considered relevant to be carried out on a regular basis in order to assure reliable and trust-worthy tracking and disclosure systems in Europe.

- Annual calculation of a European Attribute Mix, and also national residual mixes;
- Continuous provision of up-to-date information on the national implementation of tracking and disclosure systems in individual European countries.
- Regular meetings / workshop (e.g. on annual basis) of European Competent Bodies for GO and for Disclosure;
- Continuous maintenance of RE-DISS Best Practice Recommendations;

There is broad consensus amongst stakeholders that the responsibility for the tasks described above should lie with organisations which are independent from market actors, have a good knowledge of GO and disclosure systems, which should be European institutions and, of course, should have sufficient options for financing the activities.

The Association of Issuing Bodies (AIB)[18] has decided to take over responsibility for the activities related to the calculation of European Attribute Mix and of national residual mixes as well as the provision of country specific information. The RE-DISS project team thinks that this is an excellent perspective, as AIB is very well positioned for such activities and can tap large synergies with their core activities and interests.

## 7.2 Perspectives for the individual tasks

### 7.2.1 Calculation of the European Attribute Mix and of national residual mixes

The AIB has agreed to be responsible for the provision of the European Attribute Mix (EAM) and of national residual mixes for a period of at least two years. This includes the annual data collection related to production and consumption statistics and to the use of tracking instruments like GO. AIB is perfectly prepared for the latter, as they are operator of the EECS data HUB for GO and thus owner of EECS GO statistics anyway. Still, this has to be completed by further data on national GO systems and on "other reliable tracking systems" (RTS), which are established in some countries e.g. in the context of support systems.

Following the annual data collection, the calculation of the respective mixes has to be performed and results have to be published in due time, which should be 15 May X+1 for the EAM figures according to the RE-DISS Best Practice Recommendations.

AIB and its members should in any case be highly motivated to provide sound EAM and RM figures, as this can be considered an essential precondition for assuring the integrity of GO, and should therefore be a core interest for AIB members.

In October 2015, AIB has awarded a contract to Grexel Systems Ltd. to perform the calculation of the European Attribute Mix and residual mixes for Europe for the years 2015 and 2016, to be published in May 2016 and May 2017.

[18] For more information on the AIB, please visit the organisation's website www.aib-net.org.

### 7.2.2 Provision of country specific information

Furthermore, AIB has decided to provide country specific information with respect to disclosure and tracking policies in the coming two years. It is up to AIB to finally decide which format it considers appropriate in order to provide transparency on this issue, but the RE-DISS project has been asked to prepare its document as being fit for the following approach:

The provision of country specific data will be strongly based on the further maintenance of the RE-DISS data collection spreadsheet, an Excel spreadsheet covering standardised questions on the status quo in the given country, including an assessment of the implementation of the RE-DISS Best Practice Recommendations. This spreadsheet has been handed over to AIB. The national Competent Bodies will be asked to produce updates of the information in the spreadsheets whenever the developments in the country make this necessary. In any case, revisions for EECS domains will be made every three years together with regular audits as foreseen by the AIB audit scheme. Reviewers appointed by AIB will be asked to run a plausibility check. Although this only applies to EECS domains and not for all countries which have been addressed by RE-DISS II (EU28+NO+CH+IS), one should note that the EECS domains cover the most relevant countries with respect to European trade of GO and green electricity.

It is not planned that the textual country profiles as published by the RE-DISS project are further maintained up to date. The latest versions, which are available on the RE-DISS project website, have been handed over to AIB and will also be available on the AIB's website. If a Competent Body finds it appropriate to update the country profile of his own country on own resources and responsibility, he is free to do so and ask AIB to upload a revised version.

The RE-DISS project has also handed over its working documents in order to maintain an overall monitoring of progress and to provide overviews over the status of implementation of disclosure and tracking policies in Europe, allowing AIB and its members to use them whenever necessary.

### 7.2.3 Regular meetings for Competent Bodies

As outlined above, the AIB will be a key player for future activities related to tracking and the use of tracking instruments in disclosure after the termination of the RE-DISS project. AIB as membership based organisation covers Competent Bodies for GO from the most relevant European countries, which meet several times per year in order to discuss the operation of their GO systems and related activities. These meetings meet the needs as have been described for future meetings of Competent Bodies in order to exchange views and experience and to coordinate their respective national systems to quite some extent. However, this leaves the question open how non-members of AIB could be involved adequately in the discussions. This includes both Competent Bodies in domains which are not part of the EECS system, but also disclosure Competent Bodies of EECS domains, which as organisations are not members of AIB. As a future vision, all these actors, together with the members of the AIB, should jointly form a platform for exchange and coordination.

So far, no single organisation (or group of organisations) has indicated clear willingness to organise such a platform. However, the RE-DISS project team has investigated in the interest of Competent Bodies (particularly of non-AIB Members) whether such a platform can be implemented, and also assessed the possibilities and interest of individual Competent Bodies to actively support the organisation and financing of such activities. A consultation in

January 2015 amongst all European Competent Bodies for disclosure and guarantees of origin clearly documented that there is a clear preference for further workshops for Competent Bodies, preferably held back to back with AIB meetings in order to tap organisational and travel synergies. The ideal solution seems to be a central organisation of the workshops and financing through a centralised mechanism. However, for the near future, voluntary hosting of workshops seems more realistic, as the consultation also revealed willingness by several Competent Bodies to organise and finance workshops as hosts or sponsors.

It should also be noted that AIB officially conducts its meetings open for all Competent Bodies for GO and disclosure and responsible governmental bodies. Those organisations can request to participate at AIB meetings a certain number of times as Observers, even if they are not AIB members or HUB users.

### 7.2.4 Further maintenance of the Best Practice Recommendations

With the termination of RE-DISS II, the RE-DISS Best Practice Recommendations remain as a central document describing the definition of sound tracking and disclosure policies under the current European policy framework. The need to define a mechanism how this document can be further maintained, which had been expressed by Competent Bodies, has not further substantiated neither in the form of specific topics where changes actually were found necessary, nor in the form of an agreed group of responsible actors. AIB as central player in a future governance structure has taken the decision to focus on the technical tasks rather than to engage in the more value-driven and potentially political decisions on the contents of the BPR.

Still, this situation in general seems manageable, as organisations like AIB but also CEER bring together a relevant number of Competent Bodies which could at any time agree on the need for discussions on further revisions and could set up an appropriate working context in the short term.

## 7.3 Conclusions and Outlook

The commitment of AIB is an excellent perspective for the continuous provision of operational services in the context of tracking and disclosure policies after the termination of the RE-DISS project. AIB is independent from market activities and is a well-connected pan-European institution with proficient knowledge of GO and disclosure systems. AIB can be seen as a natural candidate for taking over the responsibility for the tasks described in chapters 7.2.1 and 7.2.2. The fulfilment of the respective services can be seen as a core interest of AIB members as Competent Bodies for GO and there is a large potential for synergies between the two tasks and work which has to be done by AIB and its members anyway. Although not officially mandated by the European policy framework, this voluntary role is broadly acknowledged and supported by stakeholders. This has been documented by the RE-DISS consultation amongst European Competent Bodies in early 2015. All European Competent Bodies have been approached, and there was not a single objection to AIB taking on the proposed role in the follow-up to RE-DISS. Although the response rate was only about 50% and most responses came from countries already involved in AIB, all Competent Bodies had a chance to give their view and thus the result of the consultation can be seen as a clear signal of non-objection. Also the members of the RE-DISS II Advisory Group, including European associations of market players and NGOs, clearly support AIB in this role. It would

be in the interest of all actors involved if AIB would extend its role as the provider of disclosure-related information also after the currently agreed period of two years.

With respect to supporting the further development of GO and disclosure systems by meetings of Competent Bodies and revisions of the Best Practice Recommendations, there is currently no clear allocation of responsibilities. Still, the given situation allows for sufficient possibilities to get active once Competent Bodies feel that there is a need for changes or for further coordination. The next major milestone in order to discuss this will most likely be the revision of the Renewables Directive and of the Internal Market Directive which can be expected in 2016. By then, AIB can be expected to be a nucleus which will allow Competent Bodies to trigger further activities.

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# Best Practice Recommendations

## For the implementation of Guarantees of Origin and other tracking systems for disclosure in the electricity sector in Europe

**Version 2.4, 30th September 2015**

## 1 Introduction

This document is meant to provide guidance to competent bodies and legislators which are implementing and managing systems of Guarantees of Origin (GO) for electricity and other tracking systems for purposes of electricity disclosure in Europe. The Best Practice Recommendation builds upon the findings and recommendations of the project "A European Tracking System for Electricity (E-TRACK)".[1] These have been developed further in the RE-DISS project[2] and were discussed in six workshops which involved representatives of competent bodies from 19 European countries. Comments received during and in between the workshops were taken up in version 2.1 of the recommendation, which concluded the work of phase I of the RE-DISS project. It was not intended to ask the workshop participants for a formal approval of the Best Practice Recommendation. However the broad majority of participants supported the proposals and only very few reservations on single elements of the recommendation were made by some workshop participants. The RE-DISS project carried out a second phase and further developed the Best Practice Recommendations based on continued discussions with competent bodies. The RE-DISS team took up comments and suggestions made in the 7th, the 8th and the 9th RE-DISS Domain Workshops for competent bodies that were respectively held on the 26th September 2013, the 24th and 25th June 2014 and the 28th May 2015 in Brussels and that were received from various stakeholders. Other changes to version 2.1 of the BPR were made to integrate the project's findings or new developments coming from e.g. the AIB's work, like the publication of v7.7 of the EECS Rules[3].

The members of the RE-DISS project team recommend that competent bodies and legislators in Europe follow the proposals as specified in this document when implementing the details of GOs and disclosure systems in their countries. This will facilitate an advanced implementation of these instruments, which satisfies the requirements for GOs to be accurate, reliable and fraud-resistant (as set out in Directives 2009/28/EC and 2004/8/EC[4]) and for disclosure information to be reliable (as set out in

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1 See the website of the E-TRACK project, which ran until 2009 (http://www.e-track-project.org). The E-TRACK final report contains a lot of background information which might help in understanding this document, including a glossary.

2 For more information on the RE-DISS project, which ran until October 2012, please see in the project website, the pages dedicated to phase1: http://phase1.reliable-disclosure.org/, which contain useful information regarding GOs and disclosure.

3 Two further versions of the BPR were thus developed under RE-DISS II, v2.2 and v2.3 and published on the project website. Version 2.4 is identical in contents to v2.3 but includes formal changes that acknowledge the end of the project.

4 Note that this Directive was replaced by the new Energy Efficiency Directive 2012/27/EC, which had to be implemented by member states by June 2014.

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Directive 2009/72/EC). Most of the Best Practice Recommendations are for immediate application. However, in some cases, when the project ambition was too far away from the current GO and Disclosure frameworks observed in most countries, the RE-DISS team felt it necessary to sketch what the long term goal was and to provide for intermediary steps that could lead to the ideal vision. Typical examples are BPR [11b] and [11c]. The Best Practice Recommendations cannot be binding for any party, but we hope that it serves as a point for orientation for many countries and that it supports a truly reliable implementation of GOs and disclosure across Europe.

The term "Europe" used throughout this document refers to the EU member states and all other European countries which have implemented systems for Guarantees of Origin and electricity disclosure which are comparable to those stipulated by the EU Directives mentioned above. We speak about "countries" and their competent bodies, but it should be noted here that in Belgium the competent bodies are working on a regional rather than a national level and that disclosure in Ireland comprises the Republic of Ireland as well as Northern Ireland.[5]

After the end of the project on the 30th September 2015, the Best Practice Recommendations may be developed further by a decision supported by a clear majority of competent bodies for GOs and/or disclosure. The new versions should be published on the RE-DISS website."

The following chapters address the most relevant items which have been identified for the Best Practice Recommendation by the project team and workshop participants. After a short introduction to each subject the actual recommendations are given in numbered paragraphs, which makes references easier. Details of the recommended methodology for residual mix calculations can be found on the RE-DISS website as "D7.2 The Residual Mix and European Attribute Mix Calculation".

## 2 How to implement the "12 month lifetime rule" for GOs

Article 15 (3) of the Directive 2009/28/EC specifies:

> *"Any use of a guarantee of origin shall take place within 12 months of production of the corresponding energy unit. A guarantee of origin shall be cancelled once it has been used."*

The production of an energy unit can only be accounted for over a period of time (production period). Thus the term "production" in the text of the Directive needs interpretation. The term "use" could be interpreted as the act of cancelling a GO or as the act of using the information contained in a GO for disclosure.

If the approach to the GO lifetime is not harmonised across Europe, then this could create an incentive to transfer GOs from domains with stricter lifetime rules to those which allow for a longer lifetime.

The following regulations are thus recommended not only for RES-GOs but for any type of GOs.

[5] In order to make the text easier to read we have left out the term "domain" in this paper and are simply referring to "countries", but this is meant to include the regions in those cases in which this is applicable.

Best Practice Recommendation:

*[1]*

a) *The metered production periods for purposes of issuing GOs should not be longer than a calendar month and where possible should not run across the start and end dates of the disclosure periods (see item [33]). If metered production periods are longer, then the allocation of GOs to production periods should be done according to what the EECS rules[6] recommend (C.3.4.1.c).*

b) *Longer intervals up to one year are acceptable for very small plants, for example.*

*[2]*

*a) If possible, the issuing of GOs should be done without delay after the end of each production period.*

*b) Wherever possible, the issuing of GOs for energy produced in year X should be done at the latest by 31st March X+1.*

*[3]*

*a) The lifetime of GOs should be limited to a maximum of 12 months after the end of the production period.*

*b) GOs which have reached this lifetime should be considered as being "expired" and be collected into the Residual Mix (see chapter 5).*

*[4] An extension to this lifetime can be granted if a GO could not be issued for more than six months after the end of the production period for reasons which were not fully under the control of the plant operator. In this case, the lifetime of the GO might be extended to six months after issuing of the GO.*

*[5]*

a) *Cancellations of GOs which take place until a given deadline in year X+1 should be counted in disclosure for year X. Later cancellations should be counted in disclosure for year X+1. (If disclosure periods differ from the calendar year (see item [33]), the deadline should be defined accordingly.)*

b) *Deadline is set on 31st March X+1.*

*[6] The disclosure information from expired GOs (see item 3) can be allocated either to the production year of the corresponding energy unit or to the year when the GOs have expired, depending on the methodology used for Residual Mix calculation in the respective domain. (Note that in the RE-DISS calculation of Residual Mixes, the production year of the expired GOs determines the year for which the disclosure information is allocated.)*

6 All references to the EECS Rules refer to Release 7 v7 from 06th March 2015

# 3 Further Recommendations on GOs

**Usage of the European Energy Certificate System**

The European Energy Certificate System (EECS) is a ready-to-use standard for the implementation of electronic GO systems in Europe which reflects the requirements of European Directives and coordinates the details of GO systems, including the electronic interfaces for transferring GOs between registries in different countries. The Association of Issuing Bodies (AIB) which governs EECS is a membership-based non-profit organisation with high expertise and currently has members from 15 EU member states plus Norway, Switzerland and Iceland.

Further guidance for implementing GOs was given by a CEN standard for Guarantees of Origin for electricity, which was published in summer 2013, and which reflects the achievements of EECS.

Best Practice Recommendation:

*[7]*

a) *The implementation of GOs in all countries in Europe should be based on the European Energy Certificate System (EECS) operated by the Association of Issuing Bodies (AIB).*

b) *If national GO systems are established outside of EECS, then EECS should at least be used for transfers between registries.*

*[8] If not all European countries are members of the AIB, appropriate connections between the EECS system and non-AIB members as well as in between different non-AIB members will need to be established. These include inter alia procedures for assessing the reliability and accuracy of the GOs issued in a certain country and interfaces for the electronic transfer of GOs. To support this, the AIB has developed fallback procedures for allowing non-members to connect their GO registries to the EECS Hub. This option should be used by all countries which have decided not to become members of the AIB.*

*[9]*

*a) Market participants of the respective domain should be provided the possibility to export their GOs and thus participate in the European internal market for electricity.*

*b) So-called ex-domain cancellations of GOs, where a GO is cancelled in one registry and a proof of cancellation is then transferred to another country in order to be used there for disclosure purposes, should only be used if a secure electronic transfer is not possible and if there is an agreement on such ex-domain cancellations between the competent bodies involved. Statistical information on all ex-domain cancellations relating to a disclosure year should be made available differentiated by energy source[7] in order to support Residual Mix calculations.*

The implications of a coexistence of electronic GO transfers within EECS and outside of EECS are not fully clear yet and require further assessments.

7 This information should be provided using a structure for energy sources which corresponds to the highest hierarchy level of fuel codes in the EECS Fact Sheet 5 (see http://www.aib-net.org/portal/page/portal/AIB_HOME/EECS/Fact_Sheets)

**Issuing of Guarantees of Origin**

Best Practice Recommendation:

*[10]*

*1) GOs should generally be issued only for the net generation of a power plant, i.e. gross generation minus the consumption of all auxiliaries related to the process of power production. For hydro power plants involving pumped storage this means that GOs should be issued only for the net generation which can be attributed to natural inflow into the reservoir. This should be consistent with the EECS Rules which for the time being means: net generation may include losses associated with pumping, where the efficiency of the pump is known and can be verified.*

*Issuing = Generation – AuxiliaryConsumption – Pumping*PumpingEfficiency*

*If Pumping Efficiency is unknown, 100% must be assumed.*

*2) Verification mechanisms should be implemented for ongoing control of registered data (e.g.re-audits, random checks, etc.).*

*3) Correct accounting of RES share of combustion plants should be assured by adequate measures such as those recommended by the EECS Rules (cf part N6.3.2 and N6.4.1).*

*4) The competent body can correct errors in GOs it has issued before they are exported, and is the only one with this competence.*

European Directives require the establishment of GOs for electricity from renewable energy sources and from high-efficiency cogeneration. However, in order to support differentiation also between other forms of electricity generation it is recommended to extend the system of GOs to other forms of electricity generation. Moreover, in order to diminish the share of Residual Mix in the different domains, it is recommended to encourage use of GOs by issuing them automatically for all generation.

*[11]*

a) *The GO system should be extended beyond RES & cogeneration to all types of electricity generation.*

b) *GOs should be issued for all electricity production, unless an RTS applies for that production, e.g. for the disclosure of supported electricity.*

c) *Competent bodies should consider to make the use of GOs mandatory for all electricity supplied to final consumers.*

*[12]*

*1) All types of GOs should be handled in one comprehensive electronic registry system per country, which is automated and auditable (For an exception from this recommendation see the coexistence of national GO systems and EECS in item [7]).*

*2) Technical changes to plants need to be registered as soon as is reasonably practicable.*

*[13]*

*1) GOs shall have no function in terms of target compliance and should not be used as support instrument. The only purpose of GOs should be disclosure.*

*2) A GO should be considered as having been used only once it has been electronically cancelled.*

*3) After cancellation, no further cancellation, transfer or export of the given GO should be possible.*

*4) After expiry, no further cancellation, transfer or export of the given GO should be possible.*

*5) An exported GO should be marked as removed from the exporting registry.*

*6) Processes in the registry should exclude duplication of GOs.*

*7) Registries should be audited on a regular basis.*

*[14]*

*a) There should be no issuing of more than one GO for the same unit of electricity.*

*b) If multiple certificates are to be issued, for example, a GO for disclosure and a support certificate for management of a support system, then these should be legally separated.*

*[15]*

*a) This also applies to cogeneration plants which are using RES as the energy source: only one GO should be issued per unit of electricity.*

*b) This GO should combine the functionalities of a RES-GO and a High Efficiency cogeneration GO.*

Note that linking cogeneration GOs to disclosure means that there should be a use of the information content of cogeneration GOs in disclosure statements. For example, suppliers might be encouraged or even required to disclose the share of electricity from high-efficiency cogeneration in their company or product mix.

**The GO as the unique "tracking certificate"**

Currently, other tracking mechanisms are also being used which are very similar to GOs, but do not have the same status. This includes RECS certificates[8] and some "green power" quality labels.

In some domains, GOs may not only be used by suppliers of final consumers, but also by (typically large) consumers or service providers who purchase energy and GOs separately and cancel the GOs for their own purpose. In this case, the related energy might be associated with generation attributes two times (once by the supplier of the energy and once by the consumer itself through the cancellation of GOs).

[8] It is to be noted that AIB has decided to phase out RECS certificates, which have no longer been issued since 31st December 2014 and will not be allowed to be transfered by the AIB Hub after 31st December 2015 (N 9.1.2).

Best Practice Recommendation:

*[16] GOs should be the only "tracking certificate" used. Any other tracking systems of a similar purpose and function as GOs should be converted to GOs.*

*[17] Besides GOs, only Reliable Tracking Systems (which may include contract-based tracking, see chapter 6) and the Residual Mix should be available for usage for disclosure. No other tracking mechanisms should be accepted.*

*[18] Green power quality labels should use GOs as the unique tracking mechanism.*

*[19] European countries should clarify whether and under which conditions the use of GOs by end consumers is allowed independently from the disclosure provided by their electricity suppliers [9]. Such use of GOs should not be based on ex-domain cancellations performed in other countries. If consumers are allowed to use GOs independently, a correction should be implemented in the disclosure scheme which compensates for any "double disclosure" of energy consumed.*

Note that item [18] requires a cooperation between competent bodies and the operators of "green power" quality labels. For example, the GO systems need to become capable to convey label information as part of their data content. EECS provides this through the Independent Criteria Scheme label.

**Recognition of GOs imported from other countries**

Directive 2009/28/EC allows member states to reject the recognition of a RES-GO for disclosure only if they have "well-founded doubts about its accuracy, reliability or veracity". Similar rules apply for cogeneration GOs under Directive 2004/8/EC, which has now been replaced by the new Energy Efficiency Directive 2012/27/EC, which had to be implemented by member states by June 2014.

Best Practice Recommendation:

*[20]*

*a) European countries should choose one of the two followings options and apply it consistently for all foreign GOs:*

- *Rejection of GOs only relates to the cancellation of GOs and subsequent use for disclosure purposes in the respective countries and should not restrict the transfers of GOs between the registry of the considered country and the registries of their countries. This means that the decision about the recognition of a GO by a country should not hinder its import into the considered country.*
- *Rejection of GOs implies blocking their import to the national registry.*

*b) The choice of one or the other option should be transparent for all market parties and clearly communicated.*

9 For more information on the impacts of independent GO consumption, refer to the RE-DISS II working paper "Independent GO consumers".

*[21] Within the rules set by the respective Directives, European countries should consider their criteria for the acceptance of imported GOs for purposes of disclosure.*

- *These criteria should address imports at least from all EU member states, other members of the European Economic Area (EEA) and Switzerland. The parties to the Energy Community Treaty should be considered as well, as soon as GO imports from these countries become relevant.*
- *The criteria should specify the electronic interfaces, specifying data format and contents of GOs to be imported, which the respective country accepts for imports of GOs (such as the EECS Hub and any other interfaces accepted).*
- *Conditions for the recognition of GOs from other countries should be that they were issued based on Art. 15 of Directive 2009/28/EC or compatible national legislation, and that they meet the explicit requirements set in Art. 15, for example, regarding the information content of the GOs.*
- *The recognition of GOs from other countries should be rejected if these countries have not implemented an electricity disclosure system.*
- *The recognition of GOs from other countries should be rejected if the country which has issued the GOs or the country which is exporting the GOs have not implemented appropriate measures which effectively avoid double counting of the attributes represented by the GOs. Such appropriate measures should ensure the exclusivity of the GOs for representing the attributes of the underlying electricity generation, implement clear rules for disclosure, establish a proper Residual Mix (see chapter 5) or equivalent measures, and ensure their actual use. Furthermore, the appropriate measures should ensure that attributes of exported GOs are subtracted from the Residual Mix of the exporting country and cannot be used for disclosure at any time in the issuing or the exporting country by explicit mechanisms, unless the GOs are re-imported and cancelled there.*

A separate document has been drafted by RE-DISS II with proposals for recognition criteria (See document titled “Report on potential relevant criteria for acceptance of GO and on different possible approaches for acceptance procedures”).

European countries should establish a register of their decisions taken regarding the acceptance of imported GOs, which gives guidance to other competent bodies and also provides transparency for market actors.

# 4 Disclosure Schemes and other Reliable Tracking Systems

European Directives require EU and EEA member states to implement full disclosure systems. However, the analysis undertaken in the course of the E-TRACK project showed that as of 2009 not all countries had fully implemented these requirements yet. As of 2015 there are still some hints of incomplete compliance regarding disclosure schemes.

In order to set up a full disclosure system, GOs and a Residual Mix should be implemented (see the following chapter 5 on the Residual Mix). As a third element, other Reliable Tracking Systems may be implemented where appropriate, but these should fulfil certain criteria.

Best Practice Recommendation:

*[22] Full disclosure schemes should be implemented, including the disclosure of $CO_2$ emissions and radioactive waste.*

*[23] (Other) Reliable Tracking Systems (RTS) should be defined where appropriate based on criteria of added value, reliability and transparency.*[10]

*[24] RTS can comprise, where applicable:*

- *Homogenous disclosure mixes for non-competitive market segments where no choice of supplier or different products exists,*
- *Support systems whose interaction with disclosure requires a certain allocation of the attributes of supported generation (for example, a pro-rata allocation to all consumers in a country in which RES electricity is supported by a feed-in tariff),*
- *Contract-based tracking (see chapter 6 below).*

# 5 Calculations of residual mixes

The use of uncorrected generation statistics for purposes of disclosure should be avoided, because this leads to double counting in relation to GOs (and other Reliable Tracking Systems, if applicable).[11] A Residual Mix should be provided for disclosure of electricity of unknown origin, based on the methodology developed in the RE-DISS project. For details of the recommended methodology for residual mix calculations see document "D7.2 The Residual Mix and European Attribute Mix Calculation", which is available on the RE-DISS website.

Best Practice Recommendation:

*[25] All countries should provide a Residual Mix as a default set of data for disclosure of energy volumes for which no attributes are available based on cancelled GOs or based on other Reliable Tracking Systems (RTS, see item [23]). The use of uncorrected generation statistics (for example on national or ENTSO-E, Nordel etc. levels) should not be possible.*

*[26]*

a) *The calculation of the Residual Mix should follow the methodology developed in the RE-DISS project.*

b) *As part of this methodology, competent bodies should ensure that double counting between GOs they have issued, other Reliable Tracking Systems in use in their country and the Residual Mix is excluded.*

*[27] Competent bodies from all countries in Europe should cooperate in order to adjust their Residual Mixes in reflection of cross border transfers of physical energy, GOs and RTS. For this purpose, com-*

10 For more details on the criteria for Reliable Tracking Systems please see the final report of the E-TRACK project.

11 For more details on this issue please see the final report of the E-TRACK project.

*petent bodies should use data provided by the AIB.[12] They should also support the collection of input data for the related calculations by the AIB.*

*[28] As a default, the Residual Mix should be calculated on a national level.[13] However, if the electricity markets of several countries are closely integrated (for example in the Nordic region), a regional approach to the Residual Mix may be taken. This should only be done after an agreement has been concluded between all countries in this region which ensures a coordinated usage of the regional Residual Mix.*

# 6 Contract-based tracking

At the time this version is being drafted, although some progress have been made since when the project started, there are still many countries in which producers and suppliers are using an implicit allocation method for disclosure attributes which follows the bilateral contracts which are concluded in the electricity market. In most cases, market participants simply assume that they are receiving a certain set of attributes from their contractual counterparts in the electricity market. In most of these countries, this tracking mechanism is not clearly regulated, its relation to GO systems and RTS is not clarified and there are no reliable statistics about the volumes and types of electricity attributes which are tracked through this mechanism. This makes it impossible to generate a reliable Residual Mix and inevitably leads to double counting of generation attributes, including those represented by GOs. In order to establish reliable tracking systems, contract-based tracking should either be banned or the related practices need to be improved significantly by clear regulation and statistics.

Best Practice Recommendation:

*[29] If contract-based tracking is allowed in a country, it should be regulated clearly.*

*[30] Such regulations should ensure that*

- *The rules of the tracking system are transparent and comprehensive and are clearly understood by all participants in the system.*
- *Double counting of attributes and loss of disclosure information is minimised within the contract-based tracking scheme and also in the interaction of the contract-based tracking scheme to GOs and other RTS (if applicable). As a precondition for this, the contract-based tracking scheme should be able to provide comprehensive statistics about the volumes and types of electricity attributes which are tracked through it.*
- *The relevant information for disclosure purposes should be available in time to meet the timing requirements set out in chapter 7.*

*[31] If suppliers of electricity intend to use contract-based tracking in order to fulfil claims made towards consumers regarding the origin of a certain electricity product (for example a "green" energy product), GOs should be used in addition to the contract (see also item [38]).*

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12 The Association of Issuing Bodies has taken over from RE-DISS the calculation of Residual Mixes for consumption year 2015 and after.

13 Exceptions may apply when the domestic market is separated into two or more regions. In this case, regional mixes can be determined. See also the introduction of this document on the usage of the term "country".

*[32] If a country implements a system in which generation attributes are allocated to suppliers and consumers of electricity "ex post" based on the contracts concluded in the electricity market, then such a system should fulfil the requirements mentioned above in order to qualify as a Reliable Tracking System (see item [23]). This includes the need to produce reliable statistics about the attributes allocated by this system.*

# 7 Timing of Disclosure

It is necessary to coordinate the timing of the most relevant steps for calculating disclosure data across Europe. This helps to avoid market distortions and possibilities for arbitrage deals between different countries with different deadlines and is a precondition for the recommended cooperation of European competent bodies regarding the calculation of their Residual Mixes (see item [26]).

Best Practice Recommendation:

*[33] Electricity disclosure should be based on calendar years.*

*[34] The deadline for cancelling GOs for purposes of disclosure in a given year X should be 31 March of year X+1 (see item [5]).*

*[35] The timing of the calculation of the Residual Mix should be coordinated across Europe:*[14]

- *By 30 April X+1 all countries should determine their preliminary domestic Residual Mix and whether they have a surplus or deficit of attributes.*
- *By 15 May X+1, the European Attribute Mix should be determined.*
- *By 31 May X+1, the final national Residual Mixes should be published.*
- *As of 1 July X+1 the disclosure figures relating to year X can be published by suppliers.*

It must be noted here that some countries are using diverging disclosure periods: Austria, the United Kingdom and Estonia are using financial years which are different from calendar years. In Portugal suppliers are disclosing based on rolling 12 month invoicing periods[15] and therefore disclosure figures are determined on a monthly basis. In order to avoid market distortions and possibilities for arbitrage deals between countries with different deadlines and in order to support the cooperation of competent bodies regarding the calculation of their Residual Mixes, these countries should move to a calendar year disclosure period whenever possible.

# 8 Further Recommendations on Disclosure

The following additional items have been identified as recommendations for disclosure systems. For details on the background of these items please refer to the E-TRACK final report.

[14] For details of the recommended methodology for residual mix calculations see document "D7.2 The Residual Mix and European Attribute Mix Calculation" on the project website. See also item [28] on the regional scope of the Residual Mixes.

[15] This is now true only for the disclosure that is done on the internet, the disclosure on invoices covers the calendar year.

Best Practice Recommendation:

*[36] All countries should clarify the relation between their support schemes for RES & cogeneration on the one side and GOs and disclosure schemes on the other side. Where necessary, the support schemes should be defined as RTS (see item [23]).*

*[37] If support schemes in a country are using transferable certificates, then these certificates should be separated from GOs and should not be used for disclosure (see also item [14]).*

*[38] All electricity products offered by suppliers with claims regarding the origin of the energy (for example "green" or low-carbon power) should be based exclusively on cancelled GOs. No other tracking systems should be allowed, with the exception of mechanisms required by law, e.g. a pro-rata allocation of generation attributes to all consumers which is related to a support scheme (see item [24]).*

*[39]*

*a) As required by Art. 3 (9) of the IEM Directive 2009/72/EC annual disclosure of the supplier mix on or with the bill should be mandatory. This should also include information on environmental impacts.*

*b) Additionally, suppliers offering two or more products which differ in terms of the origin of the energy should be required to give product-related disclosure information, including environmental impacts, to all their customers including those who are buying the default "remaining" product of the supplier.*

*[40] There should be clear rules for the claims which suppliers of, for example, "green" power can make towards their consumers. There should be rules how the "additionality" of such products can be measured (the effect which the product has on actually reducing the environmental impact of power generation), and suppliers should be required to provide to consumers the rating of each product based on these rules.*

*[41] Claims made by suppliers and consumers of "green" or other low-carbon energy relating to carbon emissions or carbon reductions should also be regulated clearly. These regulations should avoid double counting of low-carbon energy in such claims. A decision needs to be taken whether such claims should adequately reflect whether the energy purchased was "additional" or not.*

*[42] If suppliers are serving final consumers in several countries rules must be developed and consistently implemented in the countries involved on whether the company disclosure mix of these suppliers should relate to all consumers or only to those in a single country.*[16]

*[43] The following recommendations should be followed with respect to the relation of disclosure to the cooperation mechanisms (Art. 6 – 11 of Directive 2009/28/EC):*

- *If EU member states or member states and other countries agree on Joint Projects, such agreements should also clarify the allocation of attributes (via GOs, RTS or Residual Mix) issued from the respective power plants.*

16 This is also relevant in Belgium, in which disclosure is governed on the regional level.

- *If EU member states agree on Joint Support Schemes, such agreements should also clarify the allocation of attributes (via GOs, RTS or Residual Mix) issued from the power plants supported under these schemes.*

The RE-DISS team has produced a separate document, "RE-DISS Guidelines for the Regulation of the Front-side Disclosure of Electricity", which gives some suggestions regarding the implementation of nationally harmonised disclosure rules. The document is available at http://www.reliable-disclosure.org/documents/.

# 9 Steps for determining the disclosure figures of a supplier

In order to clarify how the recommendations in this document could be applied by market participants, the following process description is given.

*[44] Suppliers should apply the following steps in order to determine their disclosure figures:*

- *During the disclosure period, suppliers which aim at a certain disclosure mix should use the "explicit" tracking mechanisms which are available in the respective countries in order to acquire the desired generation attributes. In all countries this comprises GOs, but contract-based tracking and certain other Reliable Tracking Systems might also be available.*
- *If suppliers are offering electricity products with claims regarding the origin of the energy (for example "green" or low-carbon power) then they should acquire the related generation attributes during the disclosure period exclusively based on GOs. Besides such products, GOs can also be used for shaping the overall disclosure mix of a supplier.*
- *All GOs which are meant to be used for the disclosure period of calendar year X should be cancelled before the deadline of 31 March X+1.*
- *After this deadline, the total volume of electricity sold to final consumers and all generation attributes which have been acquired based on cancelled GOs and other Reliable Tracking Systems including contract-based tracking (if applicable) should be accounted for. This may include a pro-rata allocation of attributes of electricity supported, for example, under a feed-in tariff to all suppliers, which might have been implemented in the respective country as a Reliable Tracking System.*
- *Any use of contract-based tracking should strictly follow the regulations issued for the respective country. Any attributes assumed for or notified by the contractual counterpart in the electricity market may only be used if explicitly allowed by such regulations. National generation statistics and other data which is not corrected by the different tracking systems in use should not be used at all. Instead, the Residual Mix should be used (see below).*
- *Suppliers should respond in time to requests by the Competent Body on statistical reporting of volumes of electricity sold to final consumers and of any "explicit" tracking mechanisms used.*
- *Typically the volume of electricity sold to final consumers is larger than that of the generation attributes acquired through "explicit" tracking mechanisms. In this case the missing generation attributes should be "filled up" from the Residual Mix for the respective country, which will be determined and published by the Competent Body according to the schedule set out in chapter 7.*

- *The overall supplier disclosure mix consists of the attributes of all electricity sold to final consumers, including all products which might be differentiated.*
- *If electricity products which differ in terms of the origin of the energy have been offered to part of the consumers then these consumers will receive product-related disclosure information based on the GOs cancelled for this purpose. However, in this case such product-related disclosure information should also be given to those consumers who have not purchased a specific product. This means that a "remaining" product should be defined which consists of the disclosure mix of the supplier minus the attributes of all separated products. This information should be disclosed as product-specific disclosure data to the consumers who are receiving the "remaining" product.*[17]
- *$CO_2$ emissions and radioactive waste should be disclosed on the supplier and product levels in direct relation to the fuel mix which is being disclosed.*[18]

The RE-DISS team has produced as a separate document "Disclosure Guidelines for Electricity Suppliers", which shall support electricity suppliers in optimising with regards to contents and format the information they give to their end consumers. The document is available at *http://www.reliable-disclosure.org/documents/.*

17 This recommendation avoids the implicit double counting of attributes which might be part of, for example, a "green" power product and which also appears in the overall disclosure mix of the supplier. See the E-TRACK final report for more details.

18 For this purpose, generic technology-specific emission factors could be applied, which are defined by the domain in which the GO is used.

**Disclaimer:**

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