



Energy research Centre of the Netherlands

# **EXISTING TRACKING SCHEMES FOR ELECTRICITY GENERATION ATTRIBUTES IN EUROPE**

**E-TRACK WP1 report**

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## Abstract

This report reviews the current level of implementation of existing schemes for tracking of generation attributes in thirty-one European countries and in the US and Australia. Generation attributes are defined as detailed information of used technologies, fuel consumption and emissions to the environment, among others. A transparent system for tracking is needed to reliably communicate (disclose) to the consumer the characteristics of consumed electricity. Major experiences with guarantees of origin are gained with support policies for generation from renewable resources, which are currently being expanded to cogeneration. The level of implementation of legislation on guarantees of origin and disclosure varies greatly among the European countries. Major observations are that for the tracking of the generation attributes, Member States should ensure that the best available information is used: a combination of information on own generation related to the supplier, generation of known fuel source, reference to a suitable regional or national residual mix in the case of transferred generation attributes, while the use of estimations and uncorrected statistical averages should be avoided. Measures for preventing multiple counting include the introduction of a register, independent verification of issuing, inclusion of earmarking and redemption procedures.

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## Summary

This report provides a comprehensive overview of existing tracking schemes for electricity across Europe, the US and Australia. Via tracking it is possible to administer and allocate generation attributes to domestic and industrial consumers. Tracking is required for a variety of European and Member State policies, namely disclosure of generation attributes, some support schemes for electricity generated from renewable sources (RES-E) and combined heat and power generation (CHP), verification of RES-E targets and green power quality labelling.

This report focuses on tracking of generation attributes in relation to those policies, which are most relevant for tracking schemes:

1. Guarantees of origin for electricity produced from renewable energy sources, as required by the EU Renewables Directive 2001/77/EC, and guarantees of origin for electricity from high efficiency cogeneration, as required by the EU Cogeneration Directive 2004/8/EC.
2. Schemes for disclosure of generation attributes. The purpose of the disclosure requirement (also known as the labelling provision) of Article 3 (6) in the EU Electricity Directive 2003/54/EC, is to assign the characteristics of power plants to electricity delivered to final customers, and therefore to allow for customer choice based not only on price, but also on electricity generation attributes.

Since guarantees of origin and disclosure of generation attributes is part of European directives, the status of implementation of these directives in individual Member States is an important part of this report.

The geographic scope is the EU31, where we distinguish between the ‘old’ EU15 Member States (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, UK), the NEU10 ‘new’ Member States (Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia) and accession and other European countries (Bulgaria, Croatia, Norway, Romania, Switzerland and Turkey), denoted as OEU6. Australia and the US are also addressed to learn from their experiences with tracking electricity. The status of the information presented in this report and in the Appendix is representative up to mid 2005.

One of the main reasons for tracking is to disclose the origin of electricity, which can be done by issuing Guarantees of Origin. In the recent past various experiences have been gained with tracking. Among them are the recent private sector voluntary initiatives, supported by regulators of some Member States, of the Renewable Energy Certificate System and the European Energy Certificate System. Furthermore, considerable experience has been gained with green electricity quality labels.

This report analyses the status of implementation of Guarantees of Origin (GO), by discussing the status of GO implementation across Europe. This analysis focuses on the GO for RES-E, also denoted as RE-GO, because this instrument has been implemented already or is under implementation in twenty-two European countries. The RE-GO systems for which legislation has already been passed or proposed are analysed. The current state of RES-E support and GOs, together with GO transfers among the GO users within the national borders and between Member States are discussed. Furthermore, GO for high efficiency cogeneration is addressed as well (denoted as CHP-GO). Because most Member States have not yet implemented this requirement, there cannot yet be a detailed analysis of CHP-GO. The chapter concludes with GO implementation strategies.

Fourteen of the 31 countries considered here have actually implemented national (framework) legislation regarding disclosure. The majority of the 14 countries, which have passed legislation to implement disclosure of generation attributes explicitly requires that the energy sources used for generation of the electricity suppliers' fuel mix should be disclosed. Most countries have not yet implemented GO for high-efficiency cogeneration.

For the tracking of the generation attributes, Member States should ensure that the best available information is used: a combination of information on own generation related to the supplier, generation of known fuel source, reference to a suitable regional/national mix in the case of traded electricity, while the use of estimations and statistical averages should either be avoided as much as possible or the quality should be as good as possible. Member States should ensure that multiple counting of generation attributes is avoided.

# 1. Introduction

## 1.1 E-TRACK project

The E-TRACK project investigates the feasibility of a harmonised standard for tracking of generation attributes<sup>1</sup> in Europe. The aim is to outline a comprehensive approach for all tracking requirements which are imposed by European and national legislation. The major benefits of such a tracking standard will be that electricity attributes (such as the fuel type used for generation and related environmental indicators) can easily be accounted for in the internal market; problems with multiple counting of attributes<sup>2</sup> (e.g. from renewable energy sources) can be avoided; verification of tracking procedures can be simplified and cross-border trade of electricity and attributes will be facilitated. The tracking standard will be designed in such a way as to support European and Member State electricity policies. It will not predetermine policy decisions such as the design of support instruments for electricity from renewable energy sources or cogeneration or the relationship of cross-border transfers in RES electricity with the indicative targets set by Directive 2001/77/EC.

The project will provide a detailed insight into the requirements for the design and operation of tracking systems, which are set by European and Member States legislation as well as by market participants. A major result of the project will be a blueprint of a European standard for tracking of electricity generation attributes, which will cover technical aspects (e.g. database and interface specifications) and non-technical issues, such as institutions and processes involved. The project involves partners with scientific expertise as well as electricity transmission system operators, regulators and market players, which will be able to work with the standard. This ensures that results from the project are oriented towards practical implementation and can easily be disseminated. An intensive consultation phase and several dissemination activities will support widespread communication of the project results.

## 1.2 This report

Results of the first Work Package (WP1) in the E-TRACK project are laid down in this report. It provides a comprehensive overview of existing schemes for tracking of generation attributes in Europe as well as insights from selected schemes in the US and Australia. This leads to an overview of features of existing tracking schemes for the allocation of electricity generation attributes.

The E-TRACK project team has collected country information on guarantees of origin, disclosure of generation attributes and other tracking schemes. Each project partner has been responsible for delivering input on one or several countries. In order to structure the information on each country, questionnaires and text reports were prepared and completed. The text reports per country are included in the Appendix to this report. The analysis of guarantees of origin and disclosure of generation attributes in the main report (Chapter 3 and 4) is mainly based on these country text reports and the completed questionnaires.

The scope of this report, and more general for the E-TRACK project, is not only Guarantees of Origin (GO) for renewable energy (Directive 2001/77/EC, referred to as the Renewables Directive), but also GO for high efficiency cogeneration (Cogeneration Directive 2004/8/EC) and

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<sup>1</sup> In E-track a generation attribute is defined as the detailed information of used technologies, fuel consumption and emissions to the environment, among others.

<sup>2</sup> Multiple counting of attributes is defined as a situation where the attributes of the same 1 MWh of generated electricity is redeemed more than once.

disclosure of generation attributes or labelling (Electricity Directive 2003/54/EC). Furthermore, national implementation of those directives, other national initiatives on tracking of generation attributes, and initiatives by market participants are considered in this report. The geographic scope is the EU31, where we distinguish between:

- ‘Old’ Member States (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, UK).
- ‘New’ Member States (Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia).
- Accession and other European countries (Bulgaria, Croatia, Norway, Romania, Switzerland and Turkey).
- Examples of tracking schemes outside Europe (US and Australia).

Whenever EU15 is mentioned in this report, we mean the group of ‘old’ Member States (prior to 1 May 2004). NEU10 refers to the ‘new’ Member States as of 1 May 2004. OEU6 refers to accession and other European countries, namely Bulgaria, Croatia, Norway, Romania, Switzerland and Turkey. Taken together, EU15 and NEU10 comprise the current group of Member States (also denoted by EU25).

The remainder of this report is organised as follows. In Chapter 2 we provide a background for tracking of generation attributes. Chapter 3 and 4 analyse guarantees of origin and disclosure of generation attributes. Main findings are incorporated in Chapter 5. The Appendix provides country details.

## 2. Tracking of generation attributes

### 2.1 Introduction

This chapter is divided into six sections. Section 2.2 provides an overview of tracking options. One of the main reasons to track is to disclose the electricity generation attributes (Section 2.3), which can be done by issuing Guarantees of Origin (Section 2.4). In the recent past various experiences have been gained with tracking already. Among them are the recent private sector voluntary initiatives, supported by regulators of some Member States, of the Renewable Energy Certificate System (Section 2.6) and the European Energy Certificate System (Section 2.7). Finally, experiences with green electricity quality labels are pointed out in Section 2.8.

### 2.2 Overview of tracking options

Tracking is a procedure to allocate electricity generation attributes to individual consumers or groups of consumers (such as all customers of a supply company or all customers of a specific electricity product). Generation attributes might generally include information about the energy source and the technology used for electricity generation and the emissions and nuclear waste associated with the generation process, but could also include more ‘indirect’ attributes such as whether the employees of power plants are unionised or not.<sup>3</sup> Such generation attributes can be distinguished further into several individual attributes, depending on the purposes, which might require tracking of such information.

#### 2.2.1 Why track electricity?

Tracking requires that unambiguous information links be made between power plants and electricity consumers, transferring information on the generation attributes. In physical terms these links are impossible, since the origin of specific electrons cannot be traced once they have been fed into the electricity system. Electricity markets effectively use the public grid as a huge reservoir, which is simultaneously uploaded with generation and extracted with consumption. The actual generation and use of electricity is coordinated by commercial contracts, independent of physical electron flows. The purpose of a tracking scheme is to make these bilateral links explicit, or to establish an independent, comprehensive accounting mechanism for generation attributes and to assign these characteristics to the electricity consumed by final customers.

From the European policies (Directives) outlined here, three basic purposes of tracking electricity attributes can be distinguished (see also Jansen, 2005ab; Uytterlinde et al., 2004; Van der Linden et al., 2004; Kristiansen et al., 2005).

- A *support* attribute can specify whether the underlying generation is eligible for one or several support schemes (such as obligations or feed-in tariffs), whether such support has actually been used and the amount of support provided (€/MWh). Example: eligibility to feed-in tariff only if it comes from a small hydropower plant (e.g. <12MW in France).
- A *target* attribute can specify whether the underlying generation can be credited towards the fulfilment of the indicative target for the expansion of RES-E under the Renewables Directive (2001/77/EC). Table 2.1 gives an overview of the indicative targets per Member State. Example: per 1 MWh credited towards the fulfilment of the indicative target, which includes all form of electricity from renewable energy sources.
- A *disclosure* attribute possibly contains a unique proof that a unit of electricity has been generated and how it has been generated, which can be used to allocate this generation to a unit

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<sup>3</sup> This has been an issue of interest for consumers in some of the US states.

of electricity consumption for disclosure purposes. Example: per 1 MWh generated with hydropower.

Note that depending on the design of tracking schemes, parts of the attributes for the respective unit of electricity might be separated from the disclosure attribute, e.g. in a separate tracking scheme for purposes of support, so that not all attributes are necessarily allocated in parallel to the disclosure attribute. In the latter case multiple counting issue needs special attention as it introduces additional multiple counting risks.

It should also be noted here that the support and target purposes are currently only relevant for limited parts of the electricity market (RES-E and/or electricity from CHP), whereas the disclosure purpose addresses the electricity market in general. This might have implications for the appropriate tracking mechanisms and their design.

A system for the allocation of generation attributes to electricity suppliers and consumers is required to facilitate a variety of policies on the European and Member State level. These policies include:

- Schemes for disclosure of generation attributes, which provide details about the overall fuel mix of the supplier and the respective environmental impact to final consumers (Directive 2003/54/EC).
- Guarantees of Origin for electricity from renewable energy sources and high efficiency cogeneration (Directives 2001/77/EC and 2004/8/EC).
- Accounting of RES-E generation for the fulfilment of the RES-E targets as set out in the Annex of the Renewables Directive (2001/77/EC).
- Support for generation or consumption of electricity from RES-E and/or high-efficiency cogeneration.

Besides these public policies, the tracking system could also be designed to facilitate green electricity quality labels, which are mostly governed by private organisations.

In addition to these three drivers, it is also interesting to point out the interaction between meeting the national CO<sub>2</sub> targets and the EU CO<sub>2</sub> Emission Trading System.<sup>4</sup> Most Member States have already implemented procedures for monitoring emissions from power plants. With regard to CO<sub>2</sub> emissions, a European standard for monitoring is introduced in the course of the EU Emissions Trading Scheme, which commenced on January 2005. This scheme requires fossil fuel power plants above a rated thermal input of 20 MW to monitor and report on their fuel input and emissions and to meet certain emission targets.<sup>5</sup>

The implementation of tracking systems for generation attributes can facilitate the promotion of renewable energy sources and high-efficiency cogeneration in the internal market for electricity once a market emerges, e.g. based on a public support scheme, which attaches values (including financial) to the attributes tracked. However, in the context of disclosure, tracking can support a more general approach towards market transparency, enabling consumer choice based on individual preferences, which might in turn again result in attaching values to the attributes.

Reliability and harmonisation of these tracking schemes across Europe are cornerstones for the development of an internal market for trading electricity and generation attributes. However, other criteria such as implementation and operation cost of tracking schemes and their impact on markets and market actors are also important factors for the design of tracking schemes.

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<sup>4</sup> See also Van der Linden et al. (2004) for the interactions of EU-ETS with GOs for renewables.

<sup>5</sup> Initially, the RECS scheme was based on a single monolithic certificate containing all attributes of electricity generation. However with the EU emissions trading scheme, this model was revised so that the CO<sub>2</sub> benefit was administered separate to other benefits, i.e., the RECS certificate no longer includes CO<sub>2</sub> benefits.

Having a reliable and harmonised tracking system in place can result in benefits such as an increased market transparency, energy security and diversity, avoided greenhouse gas emissions, economic development and job creation. Some of these benefits are more concrete than others.

## 2.2.2 Types of electricity tracking

Tracking generation attributes can be based on explicit tracking or on implicit tracking. Explicit tracking can be defined as the use of a specific procedure, such as a contract-based tracking or transferable certificates for tracking electricity. Such mechanisms require the implementation of either ‘disclosure certificates’ for electricity from non-RES-E sources or a scheme for tracking generation attributes based on electricity contracts. Therefore, two main options for ‘explicitly’ tracking generation attributes are usually distinguished, namely a contract-based approach, where the attributes are linked with electricity contracts, and a certificate-based approach, which allows for separation of the attributes from the power contracts. The EC-funded 4CE and CIE projects have discussed these two approaches, their variations and the related implications in detail (Boardman et al., 2003, Palmer et al., 2003).

The third, ‘implicit’ tracking option that can be identified and can be applied for purposes of disclosure, relies on statistical data and uses appropriate averages to cover part of the market. The E-TRACK Work Package 2 report provides a discussion of the pros and cons of these three tracking options.

## 2.2.3 The issue of multiple counting

However, it is necessary to point out here that any combination of explicit tracking and statistical averages may lead to multiple counting of those attributes which have been tracked explicitly, unless the statistical data is adjusted by those attributes, for which contract or certificate-based explicit tracking has been used. Statistical data that has been adjusted in such a way can be called a ‘residual mix’. The use of a residual mix can be added to a system for explicit tracking based on certificates held in a central registry, which can be used by market players on a voluntary basis. After a given reference period has ended, e.g. a calendar year, owners of certificates can redeem them in order to claim the respective attributes and to disclose the generation attributes. Once this clearing procedure is followed, the registry operator can easily determine the attributes that have been used for explicit tracking. The amount of electricity that is not covered by explicit tracking can then be assigned the required generation attributes with a default value. This default value can be determined on a statistical average basis, e.g. all power generated in the respective country, which is then corrected for all attributes that have been tracked explicitly (this correction is the origin of the name ‘residual mix’).<sup>6</sup> By applying this correction, multiple counting of attributes can be avoided. Also note that such a certificate system does not have to be limited to renewables and/or high-efficiency CHP only, indeed the explicit tracking component could be far more comprehensive. If the certificate system is comprehensive, i.e. it is covering all electricity generation, imports and exports, then the residual mix can be determined directly within the registry by collecting all certificates from the respective reference period, which are not yet redeemed.

## 2.3 Disclosure of generation attributes

Disclosure of generation attributes<sup>7</sup> requires a tracking system, either explicit or implicit or combinations of both, which covers the whole electricity market. The Electricity Directive

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<sup>6</sup> Net imports or exports of electricity without generation attributes will make further adjustments of this residual mix necessary.

<sup>7</sup> The disclosure requirement of the Electricity Directive is sometimes also referred to as ‘labelling provision’. In order to clearly distinguish green power quality labelling from disclosure requirements, we will avoid using ‘labelling provision’ and use disclosure of generation attributes instead.

stipulates that generation attributes are linked to the supplier's portfolios ex-post, i.e. 'over the preceding year'.

Article 3, Paragraph 6 of the Electricity Directive states that:

*"Member States shall ensure that electricity suppliers specify in or with the bills and in promotional materials made available to final customers:*

- a) The contribution of each energy source to the overall fuel mix of the supplier over the preceding year;*
- b) At least the reference to existing reference sources, such as web pages, where information on the environmental impact, in terms of at least emissions of CO<sub>2</sub> and the radioactive waste resulting from the electricity produced by the overall fuel mix of the supplier over the preceding year is publicly available.*

*With respect to electricity obtained via an electricity exchange or imported from an undertaking situated outside the Community, aggregate figures provided by the exchange or the undertaking in question over the preceding year may be used.*

*Member States shall take the necessary steps to ensure that the information provided by suppliers to their customers pursuant to this Article is reliable."*

Hence, the directive specifies what the outcome should be but not how this outcome should be attained. There are various design options for a disclosure system (see e.g. the examples from selected US states in the Appendix). The responsibility for 'how' disclosure of generation attributes is designed is transferred to the Member State governments.

Note again that the tracking system for disclosure needs to cover the whole electricity market, and not only parts of it (as it is the case for RE-GOs and CHP-GOs). This fact has to be taken into account when designing appropriate tracking mechanisms.<sup>8</sup>

By 1 July 2004, EU15 Member States were required to bring into force the laws, regulations and administrative provisions necessary to comply with the Electricity Directive. The Commission is required to report on the application of the Electricity Directive before the end of the first year following the entry into force (i.e. 2005), and thereafter annually. For instance, the overview in Chapter 4 shows that a number of EU15 Member States have not yet implemented the disclosure provision. The new Member States (NEU10), having recently joined the EU, have been given more time to get the necessary legislation in place.

## 2.4 Guarantees of origin

Article 5 of the Renewables Directive introduced the concept of Guarantees of Origin for RES-E (RE-GO). As of 27 October 2003, EU15 Member States were required to have legislation in place to establish a system that will enable renewable energy generators to obtain GO for the electricity produced from their plants. The legislation means that generators will be able to request GO as evidence that they have generated a certain amount of electricity from eligible renewable sources. The system is purely voluntary for the generators, with individual generators being left to decide if they wish to make such a request.

The main provisions of Article 5 state that guarantees of origin:

- *Specify the energy sources from which the electricity was generated, the dates and place of production, and in the case of hydropower, the capacity of the plant.*

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<sup>8</sup> Note that the implementation of the disclosure of generation attributes is left to the Member States while the electricity market is developing into a European market. This can lead to some discrepancy between the development of disclosure (national) and the development of the pan-European electricity market (international).

- *Serve to enable producers of electricity from renewables to demonstrate that the electricity they sell is produced from renewable sources as defined by the Directive.*
- *Shall be accurate and reliable, and Member States are responsible to implement appropriate mechanisms to ensure this.*
- *Should be mutually recognised by Member States, and any refusal to recognise GO should be based on objective, transparent and non-discriminatory criteria.*

The GO provision in the Renewables Directive does not focus on how a RE-GO system should be designed in detail. Also, the relation of the RE-GO to disclosure as defined by the Electricity Directive is not fully clear from the two Directives. It is therefore left to Member States whether or not RE-GO are part of the tracking scheme supporting disclosure.

*Article 5.2 enables Member States to designate competent bodies, which are independent of generation and distribution companies, to supervise the issue of RE-GO. Article 5.3 specifies the minimum information, which a RE-GO should contain:*

- *The energy source from which the electricity was produced,*
- *The dates and place of production,*
- *In the case of electricity generated from hydropower, the GO should also indicate the capacity of the generating station.*

*Article 5.3 states that RE-GO ‘serve to enable producers of electricity from renewable energy sources to demonstrate that the electricity they sell is produced from renewable energy sources within the meaning of this Directive.’*

This wording has given rise to discussion on whether RE-GO should be transferred together with the underlying electricity. Two major views exist, which correspond to the two options for explicit tracking of generation attributes as mentioned in the previous section:

- *The linked approach, where RE-GO are transferred in parallel with the electricity.*
- *The de-linked approach, unbundling the sale of electricity of a renewable electricity producer from the transfer of the RE-GO referring to the production concerned.*

It is also helpful to highlight the limitation of these two views in the relation to RE-GO. On the one hand, the linked approach can be difficult e.g. due to the fact that contracted and actually delivered electricity usually differ. On the other hand, the de-linked approach loses the direct link to electricity and a second market for certificates is needed.

The Renewables Directive contains two recitals directly related to GO:

- *Recital 10 states that ‘the Directive does not require Member States to recognise the purchase of a guarantee of origin from other Member States or the corresponding purchase of electricity as a contribution to the fulfilment of a national quota obligation. However, to facilitate trade in electricity produced from renewable energy sources and to increase transparency for the consumer’s choice between electricity produced from non-renewable and electricity produced from renewable energy sources, the guarantee of origin of such electricity is necessary. Schemes for the guarantee of origin do not by themselves imply a right to benefit from national support mechanisms established in different Member States. It is important that all forms of electricity produced from renewable energy sources are covered by such guarantees of origin.’*
- *Recital 11 states that ‘it is important to distinguish guarantees of origin clearly from exchangeable green certificates.’ Recital 14 explicitly categorises green certificates as a support mechanism.*

For the purpose of the E-TRACK project, we assume that the objective of recital 11 is to point out that, although tradable renewable energy certificates (generally denoted as TRECs) are often perceived to be linked to a quota mechanism, RE-GOs are by no means necessarily linked to

quota mechanisms. Rather they could as well be used for e.g. verifying the validity of claims to eligibility for certain feed-in tariffs, where applicable. Hence, RE-GOs are essentially different from TRECs.

The Cogeneration Directive (2004/8/EC) of 11 February 2004 requires that, as from 21 August 2006, Member States shall ensure that the origin of electricity produced from high-efficiency cogeneration can be guaranteed. The GO for CHP shall:

- *Specify the lower calorific value of the fuel source from which the electricity was produced, specify the use of the heat generated together with the electricity and finally specify the dates and places of production,*
- *Specify the quantity of electricity from high efficiency cogeneration that the guarantee represents,*
- *Specify the primary energy savings based on harmonized efficiency reference values established by the Commission.*

Besides these regulations, which are specific for electricity from cogeneration, the requirements from the Cogeneration Directive on CHP-GOs are mostly identical to those from the Renewables Directive on RE-GOs. This includes that schemes for the CHP-GO do not by themselves imply a right to benefit from national support mechanisms for electricity from high-efficiency cogeneration and that Member States should mutually recognize CHP-GO.

Schemes for the guarantee of origin do not by themselves imply a right to benefit from national support mechanisms and the Member States should mutually recognize GO.

## 2.5 Indicative targets for RES-E

The following table shows the national indicative RES-E targets for EU25 Member States as they are defined in the Annex of the Renewables Directive and in the agreements on accession of the NEU10 countries.

Table 2.1 *National indicative RES-E targets 2010 for EU Member States*

	RES-E % in 1997	RES-E % 2010
Austria	70.0	78.1
Belgium	1.1	6.0
Denmark	8.7	29.0
Finland	24.7	31.5
France	15.0	21.0
Germany	4.5	12.5
Greece	8.6	20.1
Ireland	3.6	13.2
Italy	16.0	25.0
Luxembourg	2.1	5.7
Netherlands	3.5	9.0
Portugal	38.5	39.0
Spain	19.9	29.4
Sweden	49.1	60.0
UK	1.7	10.0
<i>Total EU15</i>	<i>13.9</i>	<i>22.0</i>
Cyprus	0.05	6.0
Czech Republic	3.8	8.0
Estonia	0.2	5.1
Hungary	0.7	3.6
Latvia	42.4	49.3
Lithuania	3.3	7.0
Malta	0.0	5.0
Poland	1.6	7.5
Slovakia	17.9	31.0
Slovenia	29.9	33.6
<i>Total EU 25</i>	<i>12.9</i>	<i>21.0</i>

Note: The percentage contributions of RES-E for the reference year are based on the national production of RES-E divided by the gross national electricity consumption. For the EU15, the reference year is 1997. For the EU10, the reference year is based on 1999-2000 data. Source: SEC (2004) 547.

There is a discussion between Member States as to whether the targets for 2010 are production targets (exclusively relating to the RES-E generation in the respective country, or whether they are consumption targets, where production data is adjusted by exports and imports with generation attributes (represented by RE-GO).

The commission has issued a statement on this regard (COM (2004) 366):

*“A Member State can only include a contribution from import from another Member State if the exporting state has accepted explicitly, and stated on a guarantee of origin, that it will not use the specified amount of renewable electricity to meet its own target and thereby also accepted that this electricity can be counted towards the importing Member State’s target.”*

This makes clear that RE-GO can be used as a mechanism to account imports of RES-E towards the indicative target of the importing country. However, in this case, the exporting country may not use the same volume of RES-E for its target (no multiple counting). In this regard, the use of RES-E for attaining the indicative targets on individual Member States is a tracking issue.

When analysing the interaction of GO with renewable energy policy instruments, the question must be considered whether the owner of GO owns all or part of these (and other) attributes of renewable energy. This boils down to the question whether the ‘value’ of GO equals the value of (some of) the attributes of the underlying commodity. Different Member States may use different interpretations, and for the sake of transparency, four main options are distinguished be-

low (see also Jansen 2003, 2005ab). It should be stressed, however, that it is (currently) up to national governments to specify exactly, in legislation, for which generation attributes GO will be issued.

- a) GO are issued for all attributes related to generation from renewable sources (also known as RE-GO).
- b) GO are issued for all attributes, except for those attributes that are traded separately at the present or in the future (e.g. the carbon benefits).
- c) GO are issued to the buyer of the particular attribute representing the volume of electricity from a renewable energy source. However, the attributes of RES-E generation stay with the seller. Hence, the GO of the buyer represents no benefit beyond the proof that he has purchased a certain volume of generation from renewables.
- d) Any other rules on which attributes are covered by the GO as proof of benefits from generation from renewables, as determined by the legislator of the jurisdiction concerned.

The various Member States' national implementation of disclosure of generation attributes and GO may be using any of these interpretations, and, unless action is taken to harmonise them, these interpretations are likely to be diverse.

## 2.6 The Renewable Energy Certificate System (RECS)

Before the initiation of GO, considerable experience with the Renewable Energy Certificate System ([www.recs.org](http://www.recs.org)) has been gained in Europe. The RECS system as dealt with in the Section does not concern official EU policy. Moreover, RECS is a private initiative, supported by regulators of some Member States, which aimed originally at facilitating a market for TRECs for meeting the voluntary demand for green power. The Renewable Energy Certificate System aims at a harmonised European standard for handling tradable renewable energy certificates. RECS consists of the following elements:

- A joint standard for the certificate system, which is laid down in the 'Basic Commitment'
- Detailed rules for implementation in different geographical domains (which in most cases are identical to the territories of Member States), which are called 'Domain Protocols'.
- Technical specifications of the interfaces between the certificate registries ('Central Monitoring Offices') in different domains, which are called 'CMO-CMO-interface'.

From an institutional point of view, RECS is governed by two separate organisations, which are both established as private non-profit associations:

- 'RECS International', which is the association of the users of the RECS, i.e. generators, traders and suppliers of TRECs and RES-E. RECS International currently has about 110 members in most European countries and in some other countries around the world.
- 'Association of Issuing Bodies (AIB)', which is the organization of those independent actors, which are responsible for the operation of the certificate systems in each domain and which must be independent from market operations with TRECs. As of April 2004, the AIB has members from 18 European countries. Eight of these members are Transmission System Operators and two are regulators in the respective countries. The other AIB members are independent actors, which have been appointed as Issuing Bodies by the users of the RECS system in the respective domains.

The RECS system is currently active in 17 European countries, including all Member States of the 'old' EU15 (except Greece) as well as Norway, Switzerland, and Slovenia as the first new EU Member State. Poland is currently preparing to join the system and other new Member States might follow soon. In each Domain, the users of RECS and the local Issuing Body form a 'Domain Team', which represent a local forum for interaction between all parties involved. The Domain Teams and the Issuing Bodies represent the federal structure of the RECS system and of both institutional bodies.

RECS is based on the definition of electricity from renewable energy sources as it is laid down in the Renewables Directive. Currently RECS certificates are defined to contain all benefits of RES-E compared to other forms of electricity generation. However, taking into account the EU Greenhouse Gas Emission Trading Regime, the definition of a RECS certificate will be changed to providing an ‘unique and exclusive evidence of the production of renewable energy from a specified source’.

RECS International has produced a Code of Conduct for all of its members, which outlines the RECS approach to quality assurance for RECS based green electricity products. The Code of Conduct requires that a supplier opens a redemption account for each green electricity product they supply. Suppliers must guarantee that the green product sales are covered by redemption of the same volume of RECS certificates. The Code of Conduct specifies that, during the contract period with any customer for a RECS-based green electricity product, the supplier shall transfer to the redemption account for the product in question a volume of certificates (with a composition as defined in the green electricity product) corresponding to the actual volumes delivered. An accredited third party shall audit the supplier’s redemption of RECS certificates related to each green electricity product. Any discrepancies between the number and the composition of certificates, and the actual volume and composition of the product delivered shall be reported to the relevant customer.

## 2.7 The European Energy Certification System (EECS)

The European Energy Certification System (EECS)<sup>9</sup> aims at a joint European standard for the handling and transfer of GO. The EECS system as dealt with in this section does not concern official EU policy. The EECS standard originates in the provisions of the RECS Basic Commitment and the respective procedures, which have been developed by members of the Association of Issuing Bodies (AIB) in order to manage the RECS system. However, where the standard of RECS applies to renewable energy certificates, the standard of EECS is developed to facilitate the transfer of energy certificates in general. Thus, EECS envisions an elaborated GO that may include all sources of electricity. The EECS system is defined by the EECS Basic Commitment and the respective Domain Protocols in individual Member States participating in EECS.

This standard has been adapted to provide the specific information content required for GO by the Renewables Directive and support national implementations of the GO system. The EECS standard contains some requirements which go beyond the minimum requirements for GO as they are defined by the Renewables Directive, but which have proved to be operationally desirable elements of a renewable energy certification system (e.g. requirements for GO registries and the definition of interfaces for communication between these registries).

The EECS standard can be implemented by Member States in one of two ways:

- They can adopt the EECS standard directly as the national implementation of GO.
- The national GO system can be linked to the EECS system, in order to use EECS for cross-border transfers of GO.

In countries where the Issuing Body for the RECS certificates is also the Issuing Body for EECS guarantees of origin, individual entries held in the respective registries can represent:

- a RECS certificate,
- a GO under the EECS standard,
- a GO under the EECS standard, which also qualifies for the RECS system.

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<sup>9</sup> This section is based on IT Power (2004).

Figure 2.1 provides a graphical presentation of how GOs and TRECs are traded among countries and what the relation is with EECS and RECS. The RECS system is set up to deal with TRECs, while the EECS system is set up to deal with GOs. The figures shows that in some countries GOs and TRECs exist besides each other and are not treated differently (country A and B), while they are treated differently in country C. The green arrows show that GOs and TRECs are either traded jointly or separately.

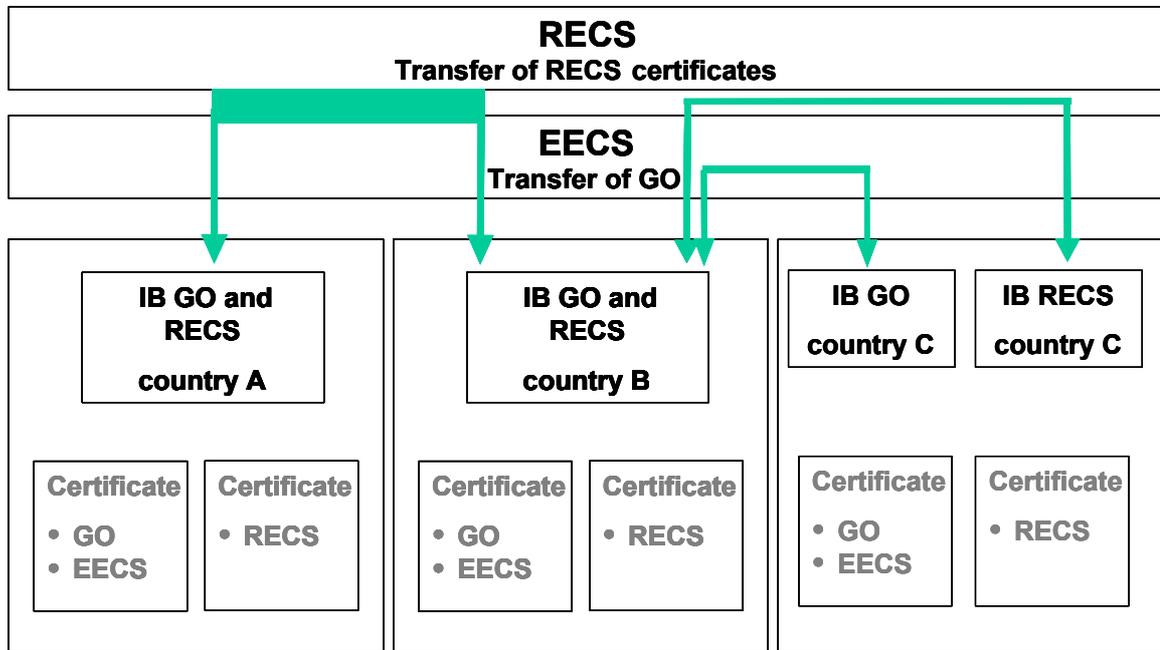


Figure 2.1 Cross-border transfer of GO and RECS certificates

As of June 2004, organisations in six countries have joined the EECS standard system (Austria, Denmark, Finland, Germany, the Netherlands and Sweden), and several million GO have already been transferred between registries in these countries. In each of these countries, the respective Issuing Bodies have developed ways for implementing the GO system in a way that suits the requirements of national legislation as well as those of the EECS Basic Commitment. The compatibility of the national implementations was evaluated by a Working Group of the Association of Issuing Bodies and approved by the AIB General Meeting in June 2004. The compatibility of the national implementations in Norway and Germany are currently being assessed.

## 2.8 Green electricity quality labels

Electricity consumers in many EU countries now have the option of purchasing a green electricity product.<sup>10</sup> Many electricity suppliers are offering a green option and about four million customers (out of about 400 mln inhabitants) in Europe have switched to a green electricity product (see web site [www.greenprices.com](http://www.greenprices.com)). In order to provide consumers with assurances concerning the value of these products, several organisations have established green electricity quality labels, which are granted to those products that meet certain environmental criteria.

Green electricity quality labels are issued to products that meet certain criteria set by private labelling bodies. Such criteria may show a preference for certain renewable energy sources and not allow other sources. This information for quality labels can be different from the regulation on 'disclosure', which requires an objective display of information regarding the electricity pro-

<sup>10</sup> This section is based on Van der Linden et al., 2004.

vided without attaching any value judgement to that disclosed information. Generally, green electricity quality labels are characterised by the following features:

- Consumption-based or contribution-based products (also referred to as supply offerings and fund offerings).
- Environmental characteristics (often referred to as eligibility).
- Energy balancing period.
- Additionality requirement.
- Inclusion of other supply services.

These features are briefly explained below.

#### *Consumption based or contribution based products*

Where the product matches the energy which has been supplied to customers with energy generated from green electricity sources, the product is called a consumption product. For every kWh used by a green electricity customer, one kWh of green electricity is supplied onto the electricity grid. Other green electricity products allocate funds for investment in new green energy projects but do not necessarily match consumption with generation from existing green schemes. Products of this type are called contribution products. Some products mix a supply-based product with an additional contribution. Most quality labels are awarded to both types of product (e.g. the German ok-power label awarded by EnergieVision e.V. ([www.energievision.de](http://www.energievision.de))).

#### *Environmental characteristics*

Most green electricity quality labels specify the environmental characteristics of the product. This may involve a list of renewable energy sources (some also include CHP) used to generate electricity, or may specify the CO<sub>2</sub> saving over the standard product. Suppliers often take different approaches to the definition of green and renewable electricity. A labelling organisation will provide strict criteria regarding the environmental characteristics of products eligible for its quality label. This may include the establishment of ecological standards, which power plants have to comply with in order to be eligible to the respective labelling scheme.

#### *Energy balancing period*

Where the quality product is a consumption-based product, the amount of energy used by the customer is matched by green electricity supply. This is not usually matched in real time (although some products offer this feature), and for many products the energy is balanced over a year. A quality label may have specific criteria for the energy balancing, but may also allow some flexibility when supply does not exactly match consumption over the settlement period. In the case of contribution-based product, the 'fund balancing period' may be treated as the energy balancing period so that the contributions have to be invested within a specified timeframe.

#### *Additionality*

Many consumers expect their decision to switch to a green electricity product to have a positive effect on the environment. In effect, they are often paying a premium for green electricity, which acts as a voluntary support mechanism for renewable energy. If their green supply comes from existing plants, then the effect of the green customer is simply to make supply to all other customers somewhat 'browner'. Therefore many consider it important that new plants are introduced as a result of the green product.

Most consumers would not be happy to pay a premium for electricity generated from projects, which are already profitable to developers through having received public funding in the past, since they have effectively funded such projects through their taxes. Additionality is ensured for consumption-based products if the electricity generated is over and above electricity required to meet existing legal obligations (or over and above electricity which benefits from a state-funded initiative so as to render its cost competitive with electricity from conventional sources). For

contribution-based products additionality will result if the electricity generated from the new plant does not contribute to the existing commitments nor benefit from a state-funded initiative. However, it may still be possible that plants qualify as additional despite receiving feed-in tariff or other financial support, if this existing financial support is insufficient for economic operation of the plant.

Some labelling organisations have strict requirements for additionality. For example, the ok-power label in Germany will not award a quality label to supply offerings based on renewable electricity that has already received a feed-in tariff, since the product is not providing any additionality according to their definition.

#### *Inclusion of other supply services*

A green electricity product may include extra services such as energy efficiency advice, a renewable energy newsletter, loyalty bonuses or donation to affiliated environmental charities. Some labels set criteria for provision of energy efficiency advice or use of environmental management systems.

#### *Certificates and GO as labels*

With the introduction of tradable renewable energy certificates (TRECs) and/or GO in a number of countries, these certificates and GO can simplify the label eligibility assessment for quality labels.<sup>11</sup> They are already proof of compliance with the criteria of the TREC scheme in that country or region. The credibility of such an approach is based on the criteria of the TREC or GO scheme and independent auditing of the redemption of the certificates to green the supply. However, some quality labels may have requirements that cannot be verified through GO, where for example additional information on environmental criteria for hydro plant or biomass sources is not contained on the GO, but is a condition for the labelling body. It may be interesting to note here that the systems that have been set up most recently have used GO as the basis for any TREC (support/obligation) system. Older systems such as UK and Italy use separate certificates.

#### *Governance and supervision*

In order to ensure that green electricity labels are of good quality it is also important to set up legal rules that guarantee this quality. This can also help in reducing the potential for double counting.

#### *Information quality of generation attributes*

Above we discussed the requirement of quality for green electricity products. So far, only for green electricity products a certain quality requirement was needed. As shown in the section above, green labels have to provide consumers with assurances concerning the value of these products, requiring some sort of quality standard. With the introduction of tracking of electricity attributes, the quality issue will be as well important for 'grey' electricity products.

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<sup>11</sup> We note here that TRECs and GOs are not the same. Moreover, Recital 11 of the Renewables Directive specifies that "it is important to distinguish guarantees of origin clearly from exchangeable green certificates". This is also illustrated in Figure 2.1

## 3. Overview guarantees of origin

### 3.1 Introduction

This chapter gives an overview and analysis of the status of implementation of guarantees of origin. Because most Member States have not yet implemented guarantees of origin for high efficiency cogeneration (CHP-GO), most sections of this chapter deal with RE-GO only. Section 3.2 discusses the status of RE-GO implementation across Europe. In Section 3.3, the RE-GO systems for which legislation has already been passed or proposed, are further analysed. This involves 21 countries in total. The different uses of RE-GOs are discussed in Section 3.4. The relation between RES-E support and RE-GOs is discussed in Section 3.5. RE-GO transfer within the national borders and among Member states is dealt with in Section 3.6. In Section 3.7, RE-GO implementation strategies are addressed. Section 3.8 concludes with an outlook on CHP-GO.

### 3.2 Status of RE-GO implementation

In the European Commission assessment of the implementation of a system for a guarantee of origin for RES-E in EU15 Member States three stages are generally distinguished (COM (2004) 366):

1. implementing legislation,
2. appointing the issuing body,
3. establishing an accurate and reliable system (including documents and registries).

On the basis of the results from the country reports on RE-GO implementation (status from April 2005 as presented in the Appendix to this report and summarised in Table 3.1), we can state that the majority of the EU15 Member States has already finished, or is close to finishing, RE-GO implementation. The exceptions are Greece and Portugal. In COM (2004) 366, these countries were also lagging behind their European peers. France seems to have made some progress; together with Spain they are proposing legislation.

Table 3.1 *Status of RE-GO implementation*

	Legislation	Issuing body <sup>a</sup>	Ready for RE-GO <sup>b</sup>
<i>EU15</i>			
Austria	Passed	DSO	Operational
Belgium	Passed	Regulator	Operational
Denmark	Passed	TSO	Operational
Finland	Passed	TSO	Operational
France	Proposed	TSO	Under preparation
Germany	Passed	Auditors	Operational
Greece	Being prepared	TSO	Under preparation
Ireland	Passed	Regulator	Completed
Italy	Passed	TSO	Operational
Luxembourg	Passed	Regulator	Completed
Netherlands	Passed	TSO	Operational
Portugal	Being prepared	TSO	Under preparation
Spain	Proposed	Regulator	Under preparation
Sweden	Passed	TSO	Operational
United Kingdom	Passed	Regulator	Operational
<i>NEU10</i>			
Cyprus	Being prepared	Not appointed	Under preparation
Czech Republic	Passed	Governmental organisation	Completed
Estonia	Being prepared	TSO	Under preparation
Hungary	Proposed	Not appointed	Not started
Latvia	Being prepared	Not appointed	Under preparation
Lithuania	Passed	TSO	Completed
Malta	Passed	Regulator	Completed
Poland	Passed	Regulator	Completed
Slovakia	Passed	Regulator	Completed
Slovenia	Proposed	Regulator	Under preparation
<i>OEU6</i>			
Bulgaria	Passed	Regulator	Operational
Croatia	Not proposed	Not appointed	Not started
Norway	Proposed	TSO	Under preparation
Romania	Proposed	Regulator	Under preparation
Switzerland	Passed	Not appointed	Under preparation
Turkey	Passed	Regulator	Completed

<sup>a</sup> 'DSO' is Distribution System Operator and 'TSO' is Transmission System Operator.

<sup>b</sup> 'Completed' means that required legislation is in force, but a GO system is not yet operational.

From the new Member States, which acceded in 2004 only the Czech Republic, Malta, Poland, Slovakia and Lithuania have passed legislation on RE-GO. Most of the NEU10 Member States are yet in the process of preparing or proposing legislation,. In none of the NEU10 Member States guarantees of origin are currently being issued.

Overall, 19 of the EU31 countries have passed RE-GO legislation up until now, and another 6 have proposed legislation. The remaining 6 countries still need to prepare legislation. However, these figures tell only one side of the story since the existence of RE-GO legislation itself does not automatically imply a fully operational RE-GO system. The implementation of national legislation still tends to be a gradual process. The degree to which the RE-GO system is in operation gives a more accurate picture of the current status of RE-GO.

Only 10 of the EU31 countries have a fully operational RE-GO system where RE-GOs either are being issued or can be issued. More specifically, none of the NEU10 Member States and only one of the OEU6 (Bulgaria) has an operational RE-GO system. Another group of 11 countries has their RE-GO system under preparation.

The EU Renewables Directive lets Member States free in choosing a RE-GO issuing body. Figure 3.1 shows the choices made so far. It turns out that the majority of countries have opted for either the regulator or the TSO, while only one country opted for DSOs (Austria), one country for a group of auditors (Germany) and one country for a government department (Czech Republic). Eight out of the original EU15 Member States have opted for the TSO as issuing body, while the regulator is the issuing body of choice in five EU15 Member States and seven of the NEU10 and OEU6 countries. The choices differ because of various reasons. Austria chose the DSO because the power system is very regionally focussed, which makes the DSO the appropriate level and small hydro can be certified as well. Germany chose auditors because some of these actors had already been providing services to RES-E generators similar to GO, which were developed for the voluntary green power market purely on a private basis.

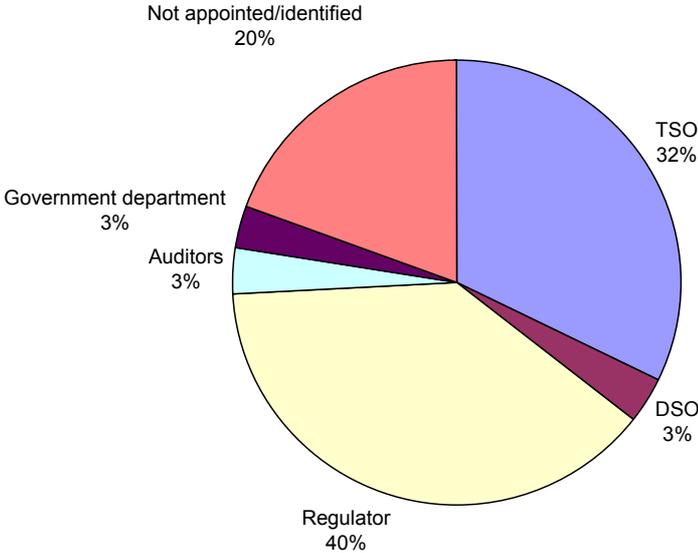


Figure 3.1 *Affiliation of issuing bodies*

### 3.3 RE-GO specifications and procedures

#### 3.3.1 Tasks of issuing body

Besides the difference in issuing body appointed, the tasks assigned to this body vary from country to country. Table 3.2 provides an overview of those countries where other tasks are assigned to the issuing body besides the obvious task of issuing RE-GO. Some issuing bodies are assigned to maintain a national register of RE-GO.<sup>12</sup> Only 8 (27%) of the issuing bodies are also responsible for accrediting the power generating plants.

#### *Accreditation*

The task of plant accreditation and verification of eligibility is more often assigned to another institution than the issuing body. In fact, nine countries state that they have a stringent accreditation process in place and eleven rely on a verification process, which is already established for other purposes.

<sup>12</sup> Four countries have indicated that there will be a register of GO issued, while it is unclear yet who will maintain this register.

### *Maintaining a RE-GO register*

Eleven countries have established national registers for RE-GOs, which are maintained by the issuing body. These registers allow to keep track of ownership of the RE-GOs and to facilitate their redemption, if required.

Table 3.2 *Overview of those countries where additional tasks on RE-GO are taken up by issuing bodies*

	Accrediting plant	Maintain register
Belgium	1	1
Bulgaria	0	1
Cyprus	1	1
Denmark	0	1
Finland	0	1
Ireland	1	0
Italy	1	1
Luxemburg	1	0
Netherlands	0	1
Norway	1	1
Romania	1	0
Slovenia	0	1
Sweden	0	1
UK	1	1
Total	8	11

### 3.3.2 Lifetime of the RE-GOs

#### *Validity period of RE-GO*

Six countries indicate an infinite validity of RE-GO, while in four countries validity is limited to 1 or 5 years. The other twenty countries make no reference to a validity period.

#### *Redemption*

Only five countries have a redemption process in their existent or proposed RE-GO system.

### 3.3.3 Multiple counting and multiple use

A primary issue in the implementation and design of RE-GO systems is the risk of multiple counting of RE-GO. Multiple counting of attributes is defined as a situation where the attributes of the same 1 MWh of generated electricity is redeemed more than once. It is also possible that GOs are used more than once, for example the same 1 MWh of generated green electricity is used to obtain a FIT, meet the country's targets and to disclose the generation mix to the consumer. Multiple use is not problematic, however, in case it is not well administered it could lead to multiple counting which is clearly undesired and should clearly be avoided. Measures for preventing multiple counting include the introduction of a register for RE-GO, independent verification of issuing of RE-GO and inclusion of earmarking and redemption procedures for RE-GO. It is a legal challenge to recognise possible multiple counting of RE-GO. Hence, policies for which RE-GO may be used might have to be adapted (e.g. green power quality labels, support schemes and disclosure requirements).

However, our analysis of the information obtained suggests that multiple counting of RE-GO could occur in a number of countries. In the majority of countries with RE-GO legislation there will be a register of RE-GO issued, while some countries (e.g., Germany and Switzerland) have not yet taken the decision to have a RE-GO register. Five countries have a redemption process

for RE-GO. Only six countries with legislation in place or proposed have considered or established additional measures against multiple counting.

### 3.3.4 Allocation of the cost of RE-GO systems

The picture on charges related to the issuing of RE-GO is far from uniform. In seven countries RE-GO will be issued free of charge, while in five countries RE-GO issuing will be charged and the remaining group is still undecided. In case charges are absent, system costs are usually socialised, i.e. covered by the system operators' and/or regulators' general budget. This picture is further muddled because some countries are using RE-GO for other purposes, such as support for RES-E, while other countries have a separate system in place for these other purposes.

## 3.4 Uses of RE-GO

The Renewables Directive defines that RE-GO should enable producers of electricity from renewable energy sources to demonstrate that the electricity they sell is produced from renewable energy sources. Therefore, most countries with legislation on RE-GO in force or proposed, use RE-GO as such, i.e., as proof of green power generation. This can be interpreted as using the RE-GO for the disclosure of RES-E (the disclosure purpose). However, whether this also means or requires that RE-GO are transferable, e.g. from producers to suppliers of RES-E, is not endorsed nor blocked by the Renewables Directive.

Some countries explicitly identify statistical uses and disclosure of generation attributes as uses of RE-GOs (see also Chapter 4).

In Brussels, Luxembourg, and the Netherlands RES-E support (either by minimum prices for TREC/RE-GO or by feed-in payments) will be or is based on RE-GO. Thus, in those countries the support attribute is important.

International transfers of RE-GOs can also have a significant role in accounting for exports and imports of RES-E for compliance with the indicative RES-E targets in 2010. COM (2004) 366 clarified this issue after some initial confusion. RE-GO imported from outside the EU are not eligible for the indicative RES-E target. However, if a Member State wants to use imported RES-E from another EU Member State for meeting its target, then RE-GOs should be used and the exporting Member State should explicitly accept and state on the RE-GO, that it will not use the specified amount of RES-E to meet its own target. Thus, multiple counting will be prevented. The country reports in the Appendix indicate that exporting RE-GO for target accounting has not yet occurred. This may change in time, when the target year 2010 comes close. However, it is not clear yet under which conditions such exports will be allowed by a Member State.

As already stated generally for tracking mechanisms in Section 2.2, the three main uses for RE-GOs are:

- Accounting the underlying RES-E for disclosure towards final consumers of electricity.
- Facilitating RES-E support schemes and/or creating transparency whether support has been granted.
- Facilitating the accounting of RES-E traded across borders towards the indicative targets of Member States.

## 3.5 Relation of RES-E support and RE-GO

European countries use various policy measures aimed at the increase of the share of RES-E generation. Generally, three types of RES-E support policies are most popular, which are man-

datory quota obligations facilitated by TRECs, feed-in tariffs, and fiscal measures. The inventory of existing RES-E support measures and related schemes in Figure 3.2 gives a picture of the possible interaction of RE-GO systems with these and some other schemes.<sup>13</sup>

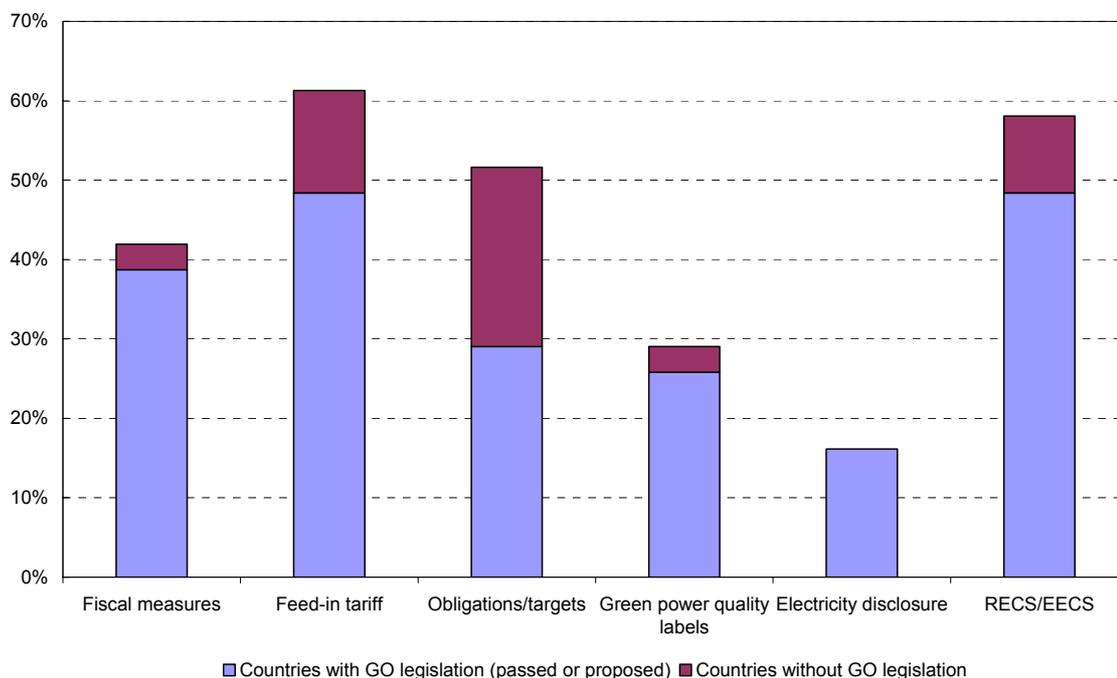


Figure 3.2 Existing RES-E support measures and related schemes in the 31 countries under investigation.

As is apparent from the figure, in about two-third of the countries, a feed-in tariff is given to RES-E. Furthermore, about half of the countries operate some obligatory quota or target system possibly in combination with some sort of tradable certificate system. Belgium (Flanders and Wallonia), Italy, Poland, Sweden and the UK run TREC schemes with mandatory RES-E quota.<sup>14</sup> Norway and Sweden are considering to develop a joint quota scheme based on support certificates (which are different to the GO in terms of disclosure). Ireland is introducing a quota scheme similar to the UK. Some countries operate several support schemes.

Fifteen out of the eighteen countries in which RECS or EECS schemes are operated, have RE-GO legislation in place or proposed in addition to this. RECS/EECS participation is clearly beneficial for the implementation and operation of a RE-GO system.

The potential role RE-GO can play as a tool for renewable energy policy formulation has been analysed and evaluated by Van der Linden et al., 2004.

#### *Obligation schemes based on TRECs*

There are basically two options how RE-GO can interact with an obligation scheme based on TRECs:

Firstly, RE-GO may be regarded as TREC on a one-to-one basis, as is the case in Flanders and Wallonia, where the two instruments are merged. In this case the following requirements are

<sup>13</sup> The EU emissions trading scheme has been omitted here, as this scheme is not a specific support mechanism for RES-E. For possible interactions between GO and EU ETS see Van der Linden et al., 2004.

<sup>14</sup> See Van der Linden and Uytendille (2005) for an evaluation of these quota obligation schemes (including some US schemes).

generally added to the minimum RE-GO requirements mentioned in the Renewables Directive in order to create a consistent support instrument for RES-E:

- A mandatory RES-E quota is set, including penalties for non-compliance.
- RE-GOs will be issued automatically for all generation, which is eligible for support.
- RE-GO should be freely tradable, delinked from power contracts.
- National trade requires a monitoring and tracking system (i.e. registry) in order to determine legitimate holders of RE-GO.
- Redemption of RE-GO should be incorporated into the scheme, and obliged parties to meet the obligation use this mechanism. Redemption of RE-GOs in this case also entitles for RES-E claims under the disclosure policy. This means that the obligation is not only financial support, but it requires the obliged parties to purchase certain volumes of RES-E.

As a second alternative, in Italy, Sweden and the UK, RE-GO and TRECs coexist, i.e., RE-GO implementation does not serve a purpose within the obligation, but may be used for other purposes (e.g. disclosure). This can cause problems related to multiple counting. In order to prevent this, the RE-GO project recommended the following if Member States decide not to merge the systems (Uyterlinde et al., 2004; Van der Linden et al., 2004):

- Legislators should define unambiguously which renewable attributes are represented by the TREC and RE-GO respectively. Usually the RE-GO will carry the disclosure attribute, while the TREC carries the support attribute. The obligation then becomes a purely financial support mechanism, meaning that parties who meet their obligation by redeeming TRECs can not claim under the disclosure policy that they have purchased RES-E, unless they have also acquired RE-GOs.
- RE-GO should be earmarked for the fact that the underlying electricity has also received a TREC.
- RE-GO should be administered in a central registry jointly with the TREC.

For both alternatives, it is crucial that Member State legislation clarifies the purposes for which RE-GOs and TRECs can be used and that governments supervise the correct use of the respective attributes. For example, this has not been the case for the relation of RE-GOs and TRECs issued in Sweden (where the latter are called Elcert).<sup>15</sup>

### *Feed-in schemes*

Interaction between feed-in systems and RE-GO may result in the risk of multiple counting of the environmental benefit of RES-E eligible to both systems. Van der Linden et al. (2004) identify a number of issues as relevant regarding the interaction between feed-in schemes and RE-GO, these include among others:

1. ‘Allocation of electricity’ (support attribute): Who is becoming legal owner of RES-E volumes that have been funded through a feed-in tariff? Is there any mechanism in place to distribute the ownership of RES-E among the market players?
2. Allocation of environmental benefits (target attribute): Who has the right to claim environmental benefits of RES-E, which has been funded through the feed-in scheme?

Countries have made different choices regarding these issues. Typically, three clusters of countries can be identified (see Van der Linden et al., 2004):

- Cluster a) In Germany and Austria, supported electricity volumes are distributed among all electricity supply companies proportionally to their annual sale volumes. The very same supply companies are entitled to claim the environmental benefits because they are obliged to purchase funded electricity proportionally to their annual sale volumes.
- Cluster b) Spain and France represent countries where it is not legally regulated who is becoming the legal owner of electricity funded by the feed-in tariff or who is permit-

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<sup>15</sup> See the chapter on Sweden in the appendix to this report.

ted to claim the environmental benefits (ownership and ‘greenness’ either remains with the RES-E generator or with grid operators who are paying the tariff); however it might be the case that both players claim the ‘greenness’).

- Cluster c) In the Netherlands, legal ownership of supported RES-E and the environmental benefit stays with the generator, who is allowed to sell the electricity on the green power market.

#### *Transparency on support*

Although the support for RES-E via various policy measures is considerable, hardly any country requires RE-GO to contain information on received financial support. Only Denmark, Germany, Flanders and Wallonia require some sort of earmarking. In the UK, RE-GO are earmarked to show accreditation of the plant under the Renewables Obligation and Climate Change Levy. The earmark will however not indicate whether a Renewables Obligation Certificate or Renewables Levy Exemption Certificates (LEC) has been issued. Germany explicitly requires that RE-GO issued for electricity, which has received feed-in support may not be passed on to anybody. Dutch GO for CHP are also non-transferable. However, Dutch GO for RES-E that received feed-in support are tradable and not earmarked.

### 3.6 RE-GO transfers and trade

‘GO are to be distinguished from tradable exchangeable green certificates’ says Recital 11 of the Renewables Directive. As stated in Section 2.4, we assume for the E-TRACK project that this is -referring to tradable certificates- part of a support mechanism (obligation schemes as discussed in Section 3.3 above). Therefore we assume that Recital 11 does not prevent RE-GOs from being transferable (domestic and across borders), but they are not by themselves entitling their holders to any kind of support, nor does the introduction of RE-GOs force Member States to switch to support schemes for RES-E based on obligations.

A distinction needs to be made between trades and transfers: a trade refers to a market and the existence of a market price, while transfer simply means that information is passed on. A transfer will usually follow a trade in RE-GOs. The Directive does not specify whether or not RE-GOs are tradable or transferable, this is up to the Member States implementation. The key is that if RE-GO are used for proving RES-E generation for electricity disclosure, then the information contained in the RE-GO usually needs to be transferred from the generator to the supplier of the end consumer. Trading of RE-GO is not in the focus of the E-TRACK project; transferring of RE-GO or generation attributes and information is the main subject of this study.

RE-GO are not necessarily transferable, however Member States may allow and facilitate transfers in RE-GO. Up to now, most RE-GO systems are still in ‘infancy’ state and mainly focus on the home country. The country reports observe non-transferability of RE-GO in most countries. However, if RE-GOs are transferable the question is whether RE-GOs are transferred together with or separate from the electricity (relating to the contract-based versus certificate-based tracking of attributes). From the 21 countries with RE-GO legislation in place or pending, in nine countries (Austria, Belgium, Denmark, Finland, Netherlands, Norway, Slovenia, Sweden, UK) transferring RE-GO is a possibility. The very same countries also confirm that RE-GO can be transferred separately from the electricity trade.

Note that these countries allow for both inland and cross-border RE-GO transfers. However, it seems that domestic RE-GO transferability is most frequent; some report to have actually exported or imported RE-GO. Austria, Flanders, Denmark, Finland, Germany (probably) and Sweden have exported RE-GO. Only the Netherlands has imported a substantial amount of RE-GO, therefore being the major importing country of RE-GO. The implementation of RE-GO in national legislation of the member states differs as can be seen in the Appendix to this report. This means that requirements for issuing RE-GO, and the possibility for cross-border trade and

transfer will be limited. E.g. German RE-GO may not be exported when the producer has already been granted support for RES in Germany. Therefore, German RES producers have no interest in exporting RE-GO even if there is a demand from e.g. the Netherlands.

Although a consistent overview of international RE-GO transfers is lacking, statistics on certificates transfers under the EECS scheme operated by the Association of Issuing Bodies provide some insights (AIB 2005). International certificate transfer activity supervised by AIB continues to grow. According to the AIB, activity (import and export) is greater than ever before and redemption of certificates has increased significantly, indicating the impact of the introduction of RE-GO in the course of 2004. Moreover, international transfers via the EECS interface commenced in spring 2004, which also suggests that most of these certificates qualify as RE-GOs. However, AIB statistics do not explicitly indicate whether a certificate is a RE-GO, or a RECS certificate or qualifies for both.

Focusing on EECS countries only, i.e. those countries likely to trade RE-GO, the Netherlands continues to be by far the most important importing country (certificates imports were 8.3 mln MWh in 2004 and 2 mln MWh in the first quarter of 2005). The main reason for Dutch companies to import RE-GOs or certificates is to meet the demand for green electricity, i.e. the size of the voluntary green market in the Netherlands<sup>16</sup> is much bigger than domestic RES-E production.<sup>17</sup>

Austria and Germany are also importing EECS certificates. Finland, Sweden and Norway are important exporters of EECS certificates; in 2004 exports of these countries amounted to 5.8 mln MWh, 1.6 mln MWh and 50,000 MWh respectively. Norway is a runner-up, with 0.3 mln MWh of exports in the first quarter of 2005.

### 3.7 RE-GO implementation strategies

Within the RE-GO project (Uyterlinde et al., 2004; Van der Linden et al., 2004), four clusters of RE-GO implementation strategies were identified. These clusters are briefly explained here.

1. Minimum compliance. The information content of the RE-GO and regulatory structure for the RE-GO is limited to the minimum requirements in the Renewables Directive.
2. Advanced implementation. Additional information is included in the RE-GO and the regulatory structure is streamlined, in order to enable RE-GO to play a larger role in facilitating the implementation of national renewable energy policies.
3. Policy integration. RE-GO are fully integrated with the national support schemes and RE-GO can be a key component of the national RES-E support mechanism.
4. Harmonisation:
  - Partial harmonisation. A situation where the RE-GO system and disclosure of generation attributes are partially integrated and harmonised across more than one country.
  - Full harmonisation. A situation where the RE-GO system and disclosure of generation attributes are fully partially integrated and harmonised across countries (not yet achieved). Full harmonisation may increase the possibility for countries to import and export RE-GO, as requirements for issuing GO will become similar in each EU Member State.

Grouping the Member States and OEU6 countries under these implementation models, based on our country reports, results in the overview in Table 3.3. Comparing this result with the RE-GO classification of mid-2004 shows that some progress has been made in France, Ireland and Switzerland. Clearly, from the NEU10 Member States, in particular Slovenia is ambitious in regards to the RE-GO system.

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<sup>16</sup> About 2.5 mln Dutch households use green power (circa 8.5 TWh).

<sup>17</sup> CertiQ reports that during 2004 some 4 mln MWh of GO has been issued for domestic generation, and that some 10 mln MWh has been imported.

Table 3.3 *RE-GO implementation models for Europe*

<i>Not implemented</i>	<i>Minimum compliance</i>	<i>Advanced implementation</i>	<i>Policy integration</i>
Croatie	Bulgaria	Belgium (Brussels)	Austria
Cyprus	Czech Republic	Denmark	Belgium (Flanders)
Estonia	France*	Finland	Belgium (Wallonia)
Greece	Germany	Ireland*	Netherlands
Hungary	Lithuania	Italy	
Latvia	Malta	Luxembourg	
	Slovakia	Norway*	
Poland	Switzerland	Slovenia*	
Portugal	Turkey	Sweden	
Romania		UK	
Spain			
<i>Harmonisation</i>			
EECS			
(Norway/Sweden)			

\* Classification of these countries is based on RE-GO legislation in preparation or proposed.

### 3.8 GO for high efficiency cogeneration

Member States are allowed to use the period until 21 August 2006 to ensure that the origin of electricity produced from high-efficiency cogeneration can be guaranteed. This requirement from the Cogeneration Directive (2004/08/EC) is very similar to the regulations on RE-GOs in the Renewables Directive. Most Member States have not yet implemented this requirement, i.e. the eligibility of high-efficiency cogeneration to receive GO is still unclear. However, in seven countries (Bulgaria, Cyprus<sup>18</sup>, Czech Republic, Finland, Netherlands, Romania and Slovenia) plus Wallonia, GO are or can be issued for CHP. In these countries the CHP-GO is integrated in the RE-GO scheme, although details may differ between CHP and RES-E. For example, in the Netherlands, in contrast to RE-GOs, CHP-GOs are non-transferable and therefore cannot be exchanged with other countries.

It would be logical to integrate CHP-GO with the RE-GO scheme, as is done in the Member States mentioned above. Specifically, for electricity produced in a CHP plant with renewable fuel input, RE-GOs can already be issued. However, it is not fully clear from the Directives whether the CHP-GO for such plants would be a separate GO (relating to the same volume of underlying electricity) or whether in this case the RE-GO and the CHP-GO should be one single GO, qualifying for both schemes. In addition, CHP electricity produced with fossil fuel input will become eligible to receive GO (for CHP) according to efficiency or CO<sub>2</sub> criteria. Table 3.4 illustrates that the definition of GO for qualifying CHP differs between countries. However, based on the country reports prepared for this Work Package, quite a number of countries (not presented in the table) have not yet specified this definition in their legislation. Also note that the criteria for the Netherlands in Table 3.4 concern CHP certificates that qualify for support only, but cannot be used for national targets and disclosure.

<sup>18</sup> Note that Cyprus has no GO legislation proposed or imposed yet.

Table 3.4 *Definition of qualifying CHP in GO schemes*

Country	Qualifying CHP for GO
Belgium (Wallonia)	<ul style="list-style-type: none"> <li>• Reference technology: gas and steam turbine with 55% efficiency, representing 456 kg CO<sub>2</sub> emission per MWh.</li> <li>• GO issued based on avoided CO<sub>2</sub> emissions.</li> <li>• Minimum avoided CO<sub>2</sub> emissions should be 10% (of 456 kg).</li> <li>• For units &gt; 5 MW net capacity, avoided CO<sub>2</sub> emission is maximised at 912 kg CO<sub>2</sub> emission per MWh for the first 5 MW and at 456 kg CO<sub>2</sub> emission per MWh for the remaining capacity.</li> </ul>
Cyprus	Any producer selling CHP electricity, from any energy source.
Netherlands	<ul style="list-style-type: none"> <li>• The amount of avoided CO<sub>2</sub> emissions of a CHP plant is based on the difference between CO<sub>2</sub>-emissions at an average CHP plant (depending on the CO<sub>2</sub> index) and the plant under consideration.</li> <li>• CO<sub>2</sub>-index varies depending upon technology and fuel: <ul style="list-style-type: none"> <li>– Gas turbine CHP: standardised tables determine the CO<sub>2</sub>-index</li> <li>– Other CHP: CertiQ determines CO<sub>2</sub>-index based on a verified metering report.</li> </ul> </li> </ul>

Some Member States have chosen to issue CHP-GO based on avoided CO<sub>2</sub> emissions. This means that not all electricity from high-efficiency cogeneration plants will receive GOs, which will have impact on the relation of CHP-GO to disclosure. This issue will be addressed in the further work of E-TRACK.

## 4. Overview disclosure of generation attributes

### 4.1 Introduction

The requirement for Member States to implement a scheme for disclosure of the fuel mix and selected environmental indicators of electricity sold to final consumers is contained in the revised Electricity Market Directive (2003/54/EC).

This chapter provides an overview on the status of implementation of this policy in the EU31 countries (Section 4.2). Section 4.3 discusses the type of disclosed information, while Section 4.4 indicates to which extent GOs are used as a tracking mechanism for disclosure.

### 4.2 Status of implementation of disclosure

Table 4.1 gives an overview of the extent to which countries have transposed the disclosure requirement of the EU Electricity Directive into national legislation. Fourteen of the 31 countries considered here have actually implemented national (framework) legislation regarding disclosure. In the EU15, Greece, Italy, Luxembourg, Portugal, and Spain are however lagging behind.

From the newly acceded countries the Czech Republic, Hungary, Malta, Slovakia and Slovenia have passed legislation on disclosure of generation attributes. In the other NEU10 Member States and OEU6 countries, disclosure of generation attributes is not an issue (yet). However, Switzerland recently implemented a detailed mandatory electricity scheme for disclosure of generation attributes, including regulation for tracking, accounting and presenting the information.

Obviously, disclosing fuel mix and other information related to electricity consumption makes more sense when the consumer can freely act upon this information and switch supplier based on information of electricity generation.<sup>19</sup> EU15 Member States shall have their electricity markets fully opened by 1 July 2007, while for NEU10 Member States this could be the case by 1 January 2013 (with an intermediate 35% market opening by 1 January 2009).

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<sup>19</sup> In the US some states have disclosure although there is no competition, simply for the customer's right to know.

Table 4.1 *Status of implementation of disclosure*

	Legislation	Market opening <sup>a</sup>	Ready to disclose
<i>EU15</i>			
Austria	Passed	100%	Completed
Belgium (Flanders)	Passed	90%	Completed
Belgium (Wallonia)	Proposed	90%	Under way
Belgium (Brussels)	Proposed	90%	Under way
Denmark	Proposed	100%	Under way
Finland	Passed	100%	Completed
France	Passed	70%	Completed
Germany	Passed	100%	Completed
Greece	Not proposed	62%	Not implemented
Ireland	Passed	56%	Completed
Italy	Not proposed	79%	Not implemented
Luxembourg	Not proposed	57%	Not implemented
Netherlands	Passed	100%	Completed
Portugal	Not proposed	100%	Not implemented
Spain	Not proposed	100%	Not implemented
Sweden	Proposed	100%	Under way
United Kingdom	Passed	100%	Completed
<i>NEU10</i>			
Cyprus	Not proposed	35%	Not implemented
Czech Republic	Passed	47%	Completed
Estonia	Not proposed	10%	Not implemented
Hungary	Passed	67%	Not implemented
Latvia	Not proposed	76%	Not implemented
Lithuania	Not proposed	70% <sup>20</sup>	Not implemented
Malta	Passed	0%	Completed
Poland	Not proposed	52%	Not implemented
Slovakia	Passed	66%	Completed
Slovenia	Passed	75%	Completed
<i>OEU6</i>			
Bulgaria	Not proposed	22%	Not implemented
Croatia	Not proposed	0%	Not implemented
Norway	Proposed	100%	Under way
Romania	Not proposed	33%	Not implemented
Switzerland	Passed	-	Completed
Turkey	Not proposed	45%	Not implemented

<sup>a</sup> Data taken from SEC(2004)1720 (Technical annexes to COM(2004)863 final).

### 4.3 Specifications of disclosed information

The majority of the 14 countries, which have passed legislation to implement disclosure of generation attributes explicitly requires that the energy sources used for generation of the electricity suppliers' fuel mix should be disclosed (see Figure 4.1).<sup>21</sup> However, in Flanders, Finland and Germany this requirement goes for aggregated groups of fuels (e.g. in Finland and Germany only three categories are distinguished: fossil fuel<sup>22</sup>, renewables and nuclear), asking for significantly less detailed information than that recommended by the Commission in its explanatory memorandum (DG Energy & Transport 2003). The disclosure of related CO<sub>2</sub> emissions and radioactive waste is only found in somewhat more than half of the legislation, with all other EU

<sup>20</sup> Based on information of LEI.

<sup>21</sup> Denmark is the exception, but this is perhaps because disclosure of the fuel mix is the obvious thing to do.

<sup>22</sup> Finland clarifies that fossil fuels include peat. This had been a controversial issue before.

Member States thus being in non-compliance with the Directive. For isolated countries without nuclear power capacity, such as Malta, radioactive waste is not an issue. However, including CO<sub>2</sub> emissions of power generation is relevant for all Member States.

Thus, the minimum requirement of the Electricity Directive (fuel mix, CO<sub>2</sub> emissions and radioactive waste) is not met in at least four of the 14 countries with legislation implemented (this applies to Austria, Belgium (Flanders), the Czech Republic and Slovakia). However, some countries require more information: At least Belgium makes reference to the amount of cogeneration in their scheme for disclosure of generation attributes. Germany requires suppliers to provide information on CO<sub>2</sub> emissions and radioactive waste together with the fuel mix (and not only referring to existing information sources such as WebPages), and also obliges suppliers to provide national average figures on the fuel mix and the environmental indicators for comparison. Other environmental indicators such as NO<sub>x</sub> emissions have not been taken up. Hence, most countries have opted for minimum implementation of the requirements of the Electricity Directive.

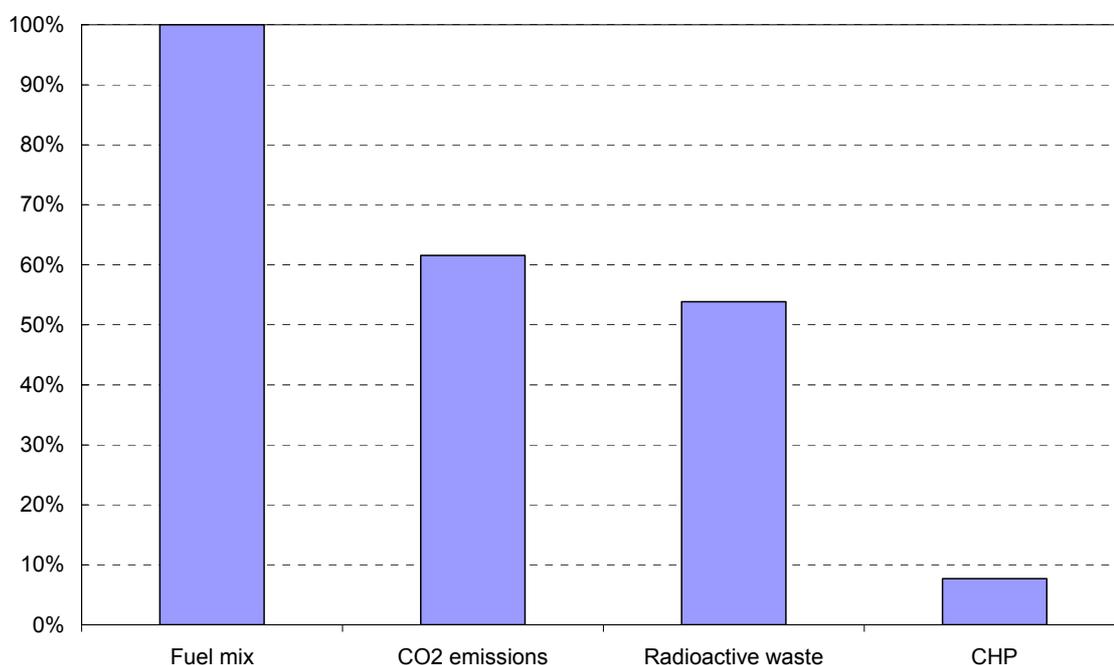


Figure 4.1 *Content of disclosed information for fourteen countries where disclosure legislation has passed.*

#### *Portfolio or product*

Note that disclosure of generation attributes in all countries is based on each electricity suppliers' portfolio. In addition to this, in four countries (Austria, Finland, Germany and Switzerland), the electricity suppliers also disclose information on specific products it sells, which is more important for suppliers offering green tariffs to consumers. Austria and Germany require those suppliers who disclose one or more products in addition to the (mandatory) company mix to also disclose a 'residual product' to all customers of other products. This regulation helps to avoid misleading information for those customers, because otherwise they could assume that the company mix is equivalent to their product, while parts of this mix might actually be sold separately, e.g. in a green product.

#### *Period covered and frequency*

In the majority of countries the information disclosed relates to the electricity supplied in the (preceding) calendar year. Moreover, the electricity supplier is required to report fuel mix and

related information (at least) once a year. However, some variants are possible. In the Netherlands it is left to the supplier for which period he discloses fuel mix information (in practice this will also be the calendar year), while in the UK a 12-month period commencing on 1 October applies.

In Germany, suppliers have nearly twelve months time to collect and process meter and tracking data, i.e. it is not before 15 December of a given year that data from the previous calendar year must be used for disclosure.

#### 4.4 Using GO for disclosure

As discussed in section 3.8, most countries have not yet implemented GO for high-efficiency cogeneration. Moreover, CHP is not a required class to be disclosed following the Electricity Directive (not a fuel source, merely a conversion technology). Therefore, this section can only address the extent to which GO for RES-E are integrated in the tracking mechanism for disclosure.

Since RE-GO represent information about RES-E they can be used as a tracking mechanism for the disclosure system.<sup>23</sup> Eight of the fourteen countries with legislation on disclosure of generation attributes indicate that they will use RE-GO to track information on RES-E. The other countries will use 'other' systems to disclose RES-E information or have not clarified the relation of RE-GO to disclosure of generation attributes. However, for instance, in France RE-GO are only used partially for electricity bought on a power exchange or imported. In the UK, other information sources may initially be used, but RE-GO will be mandatory for RES-E disclosure by 2007. Based on the assumption in the E-TRACK project that RE-GOs are meant to guarantee the origin of RES-E also for disclosure purposes, there are serious concerns about multiple counting of RES-E attributes in those countries which do not use RE-GOs for explicit tracking of RES-E.

In the majority of countries with legislation implemented, producers and traders of electricity are required to provide the necessary information to suppliers and/or authorities for disclosure purposes when available (see Figure 4.2), e.g. Switzerland and the Netherlands. This could be based on RE-GOs or other tracking mechanisms, which are usually not specified in detail in Member State legislation. About one third of the countries with disclosure legislation state explicitly that they will also use statistical data in order to track generation attributes for disclosure purposes.

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<sup>23</sup> Currently this only applies to RES-E, as only very few Member States have implemented GO for CHP yet. Moreover, CHP is not a required class to be disclosed (not a fuel source, merely a technology).

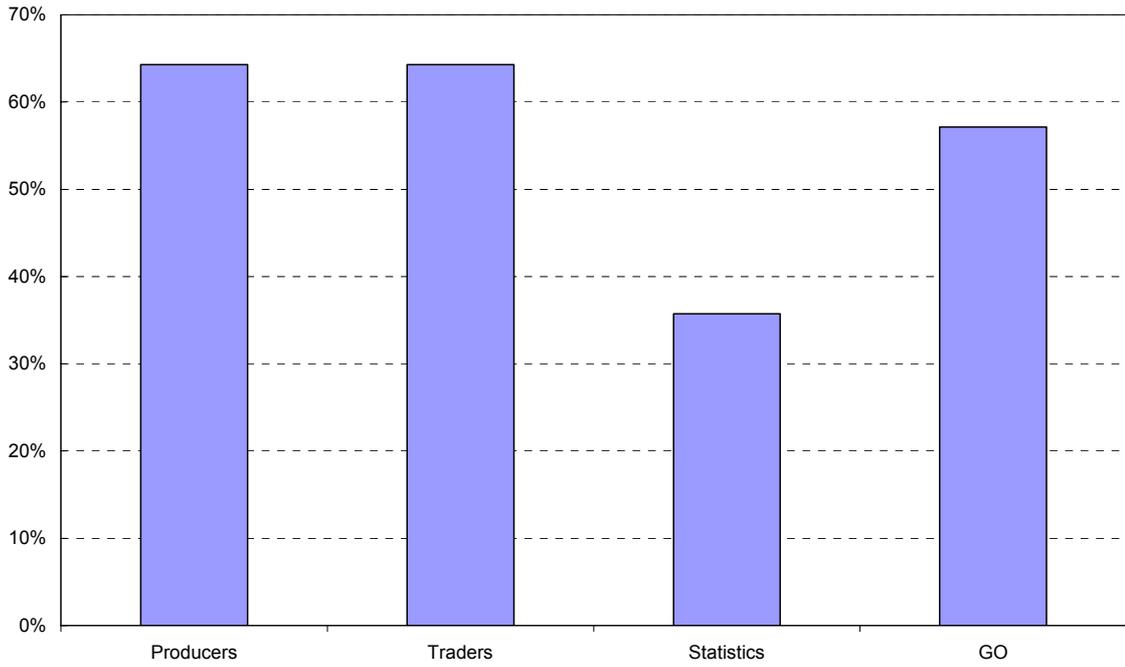


Figure 4.2 *Source of information used for disclosure for fourteen countries where disclosure legislation has passed.*

## 5. Challenges for implementing tracking of electricity attributes

### 5.1 Some general observations

In this chapter we summarise our findings with regard to the implementation of current tracking schemes, i.e. RE-GO and disclosure schemes. These findings are based on some exemplary problems that come up in the studied countries.

#### *Explicit tracking*

Explicit tracking can be defined as the use of a specific procedure, such as a contract-based tracking or transferable certificates for tracking electricity. Such mechanisms require the implementation of either ‘disclosure certificates’ for electricity from non-RES-E sources or a scheme for tracking generation attributes based on electricity contracts. Explicit tracking is the only means by which suppliers (or their consumers) can actively influence the fuel mix and environmental data of electricity generation. Therefore the role of explicit tracking is of major importance when introducing effective European tracking mechanisms.

However, there are serious concerns against the use of contract-based tracking for those volumes of electricity which are subject to trading, either OTC or through power exchanges, because this might seriously reduce liquidity on the electricity market. Therefore contract based tracking can only be, if at all, a solution for electricity being traded on long-term contracts.

This problem with reduced liquidity does not exist with certificate based tracking as the electricity commodity and the certificates are handled separately. A serious concern with certificate-based tracking is, however, the potential cost of a system of separate certificates for explicit tracking.<sup>24</sup>

#### *Implicit tracking may lead to non-info*

Implicit tracking denotes the use of averages or other statistical data for tracking electricity. Extensive use of implicit tracking for purposes of disclosure, e.g. based on national or European data on the overall generation mix, could lead to mostly identical information being supplied to customers of a large number of suppliers, which would contradict to the objectives of disclosure, providing market transparency and enhancing consumer choice.

For example, in the Netherlands, the required tracking procedure for disclosure consists of a green and a brown part. The green part is based on RE-GO, while the brown part is based on

- The national mix for traded electricity (based on OTC and APX data).
- The national mix of country of origin (excluding green part) for bilateral import (based on UCTE and NORDEL data).
- The producer mix for own/domestic production (this includes bilateral long-term contracts).

However, the dimension and liquidity of the Dutch OTC market is large (about 250 TWh (250% of total consumption) is traded via the OTC market). Therefore it can be expected that this procedure will result in similar fuel mix information for all suppliers, which severely degrades the quality of disclosure information.

#### *Combining explicit and implicit tracking*

Many countries allow for explicit tracking and at the same time specify that statistical data might be used for electricity with unknown origin (i.e. traded on power exchanges or OTC, or

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<sup>24</sup> This issue -amongst others- will be addressed in Work Package 5 of the E-TRACK project.

imported). However, if explicit and implicit tracking are combined, multiple counting of attributes and loss of data can easily occur. For example, when all RES-E would be tracked explicitly based on GO, while other electricity is implicitly tracked, e.g. based on the UCTE or NORDEL generation mix, then RES-E would be part of this mix. Therefore RES-E generation would be counted more than once and some non-renewable generation would disappear in the tracking scheme.

These problems could be avoided if the statistical data used for implicit tracking could be corrected by all attributes that have been tracked explicitly. This corrected statistical data can be called a 'residual mix' (see Section 2.2). For example, if explicit tracking was restricted to RES-E, then an easy solution could be to remove the renewable part from the statistical generation mix. However, use of GO is not mandatory and therefore not all RES-E generation might be tracked based on RE-GOs. Also, market players might wish to explicitly track some other generation attributes as well (e.g. low emission electricity from CHP based on natural gas). In this case the determination of a residual mix is more complex and might require the use of a central registry for all explicit tracking transactions.

#### *Multiple counting based on wrong interaction of disclosure and RE-GO*

A variant of the general case of combining explicit tracking and the use of averages, which leads to multiple counting and loss of data, is found in e.g. Flanders and Sweden. The disclosure scheme in Sweden will be based on the assumption that buyers of electricity using a bilateral contract with the seller will always receive the company (generation) portfolio mix of attributes of the seller. This scheme is not linked to GO issued for RES-E. Let us assume that a generator has a portfolio of 50% hydro and 50% nuclear. This generator could sell the hydro generation to a consumer as green power and use the GO to prove the greenness. The other part of his generation (nuclear) will be sold to other parties. Based on the Swedish rules, they will assume that 50% of their electricity purchase is from nuclear and 50% is from hydro. As a result, customers of the supplier in question would receive disclosure information indicating that in total 75% of the suppliers' generation was renewable, which is not the fact. Similarly, half of the non-renewable generation of this supplier would have disappeared from the disclosure scheme.

In Flanders the law requires that disclosure be based on the 'total production park' of the producer, while for RES-E guarantees of origin should be used. Like the Swedish example above, this is inconsistent. The origin of electricity bought from a producer in the form of RE-GO certificates does not necessarily coincide with the amount of RES-E in the fuel mix of the total production park of that same producer. Again this leads to multiple counting and lack of transparency for the final customers (suppliers with a 'green' image are not happy with the verification based on total production park, because it then may seem that their supplies were not green at all, while in fact they were).

The easiest way to avoid such problems would be to integrate all GO for RES-E and CHP into the tracking mechanism used for disclosure.

#### *Exports and imports of attributes without harmonisation*

If physical exports of electricity are not assigned with (explicit) attributes, then the importing country may assume the average attributes of power generation in the exporting country. This means that if there is a market demand for specific attributes (e.g. a high share of RES-E), then

- In case that the actual attributes of the exporter are more attractive to consumers than the average of the importing country, then the importer will assign the actual attributes to the traded electricity, based on an explicit tracking mechanism such as certificates.
- In case that the actual attributes of the exporter are less attractive to consumers than the average of the importing country, then it will not assign any explicit attributes to the export.

In the latter case, the assumption of the average attributes of power generation in the exporting country by the importer will lead to an overestimate of the attributes which are preferred by consumers and to a loss of some less preferred attributes.

### *Coexistence of TRECs and RE-GO*

In the UK, Italy and Sweden (and possibly in the future in Norway as well) the TREC systems, which are used for facilitating support schemes based on quota obligations, and GO are operating separately, with an inherent chance of multiple counting problems. The aim of the TREC system is to meet the obligation at the lowest possible cost, and to verify the fulfilment of the obligation. If GO are issued in addition to TRECs for the same underlying generation volume from RES-E, then -in order to avoid multiple counting- the TRECs may not be used for disclosure. In this case, the TRECs would be a purely financial support instrument.

However, this is in conflict with a widespread common understanding that TRECs are considered to be proof of RES-E generation, which can be used for disclosure, green power offerings etc., and no distinction is being made between GOs and TRECs. This conflict of understanding can lead to multiple counting of attributes, mainly from RES-E generation, when Member State legislation and associated communication does not clearly state the different and exclusive functions of RE-GO on one side and TRECs on the other.

In order to prevent these problems, Member States that wish to issue TRECs in addition to RE-GOs should effectively prevent that TRECs can be mistaken as GOs, which could be used for disclosure, or that TRECs can even be formally converted into a certificate which can serve for disclosure purposes. In addition, GO could be earmarked for the fact that the underlying electricity has also received a TREC, and GO could be administered in a central registry jointly with the TREC in order to enhance control about the two types of certificates.

## 5.2 Some preliminary recommendations

The following preliminary recommendations can be drawn from the analysis of the current implementations of GO and disclosure in European countries:

- Member States should ensure that there is a uniform tracking scheme in place to enable explicit tracking, which avoids multiple counting of generation attributes. This tracking scheme could be expanded by a residual mix, based on statistical generation data, corrected by all attributes that have been tracked explicitly and all physical imports and exports that are not tracked explicitly.
- The use of statistical data without such correction should be minimised.
- GOs should be integrated in the scheme for explicit tracking. Tracking of electricity for which GO have been issued should be based on GO alone.
- For all means of explicit tracking, a redemption procedure should be introduced in order to remove the GOs or other proofs of origin from the market once they have been used.
- The greater the share of explicit tracking, the more accurate the information that can be disclosed to consumers and the smaller the inaccuracies and potential for multiple counting. However, this is likely to require forms of explicit tracking beyond those offered by GO for RES-E and high-efficiency CHP and may require the introduction of ‘disclosure certificates’ for other fuels.
- If any other certificates or forms of proof are issued, Member States need to make explicit which proof carries the information for which policy in order to minimise the potential for multiple counting.
- All GOs or other proofs of origin for explicit tracking should be issued and handled exclusively in one national or regional (supra-national) registry, in order to avoid multiple issuing. Clear interfaces between different registries in place must be defined.
- The operator of this registry should be assigned to determine the attributes of the residual mix.

- The transfer of GO and disclosure certificates from generators to suppliers and consumers can either be bundled with electricity contracts or it can take place independently from transactions on the power market. Governments should make clear which options are possible in the respective tracking system.
- The relation of support schemes to tracking of generation attributes must be clarified. Governments should make clear who owns the generation attributes of supported electricity, and how the transfer of these attributes can be facilitated.
- GOs should be earmarked if support has been granted to the power plant and/or TRECs under an obligation scheme have been issued.

### 5.3 Evaluation of implementing tracking

Some issues have already been dealt with earlier in the report, such as reference period and frequency, portfolio and product, and fuel source information, while others are relatively less important. Therefore, the focus here is on tracking of generation attributes:

- It is recommended that for the tracking of the generation attributes, Member States ensure that the best available information is used: a combination of information on own generation related to the supplier, generation of known fuel source, reference to a suitable regional or national residual mix in the case of traded electricity, information on Guarantees of origin, as defined in Directive 2001/77/EC on Renewable Electricity Sources and the Cogeneration Directive 2004/8/EC.
- The use of estimations and statistical averages, which are not corrected by all electricity being tracked explicitly, should be avoided.
- Member States should ensure that multiple counting of generation attributes is avoided to the extent possible, as this is contrary to the reliability required under the Directive.

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## Appendix A Austria

The Austrian electricity generation system is characterised by a high share of electricity generated by renewable electricity sources (RES-E). About 70% of the electricity generation is based on RES-E mainly on hydro power, the rest is being generated by thermal, mainly gas (16%). The totally installed capacity is about 17800 MW, of which 11500 MW based on hydro power. Nevertheless Austrian energy policy is very active in promoting RES-E and in exploiting additional renewable potential beside hydro power for electricity generation.

In July 2002, the Austrian Parliament approved the so-called Ökostromgesetz (Eco-electricity Act), which is the current legal basis for promoting RES-E. By this act an Austrian wide harmonised RES-E support scheme based on feed-in tariffs was set up starting in January 2003, when the Act came into force. The levels for feed-in tariffs are defined by ordinance of the Minister of Economic and Labour. The first ordinance was effective for plants approved in 2003 and 2004. For newer plants, no tariffs have been defined yet (April 2005).

### A.1 Guarantees of origin

#### A.1.1 Legal basis

The implementation of guarantees of origins in accordance with the RES-E Directive 2001/77/EC was also done in the Eco-electricity Act. The corresponding relevant paragraphs are:

##### *Guarantee of Origin*

§ 8 (1) *Grid operators to whose grids the recognised electricity generating plants using renewable energy sources are connected shall issue to the plant operators at the latter's request an attestation on the quantities on electricity fed in into their grid from these plants. Such attestations may be issued by automated data processing.*

(2) *An attestation pursuant to paragraph 1 shall specify:*

- 1. the quantity of electric energy produced;*
- 2. the type and maximum capacity of the generating installation;*
- 3. the period and place of generation;*
- 4. the energy sources used.*

(3) *The Provincial Governor shall regularly supervise the issue of such guarantees of origin.*

(4) *The operators of eco-electricity plants and the electricity traders selling electric energy from eco-electricity plants as eco-electricity to another electricity trader shall be obliged to give this electricity trade, free of charge and verifiable at this trader's request the guarantees of origin (via automated data processing) that correspond to the quantity sold.[...]*

##### *Recognition of Guarantees of Origin Issued by Other States*

§ 9 (1) *Guarantees of origin on electricity from plants located in another EU Member State, in a state party to the EEA Agreement or in a third country shall be deemed to be guarantees of origin within the meaning of this Federal Act if they comply with or go beyond the provisions of Article 5 of the Directive on the*

*promotion of electricity generated from renewable energy sources in the internal electricity market.*

*(2) In case of doubt Energie-Control GmbH shall determine by decision, in response to an application or by virtue of its office, whether the preconditions for recognition are met.*

*(3) Energie-Control GmbH may issue ordinances specifying countries where guarantees of origin for eco-electricity meet the preconditions pursuant to paragraph 1*

The main goal of the GO scheme in Austria is to facilitate for RES-E generators and traders to prove that the electricity they trade comes from renewable sources. As Austria has a high share of RES-E (mainly hydro power), GO should assist Austrian companies to export and market hydro power as 'high quality' electricity. For the Austrian market, the main purpose of GO is their use within the Austrian electricity disclosure scheme, where RES-E can be proven by presenting the corresponding amount of GO. GO imports will only be recognised in the Austrian scheme if the exporting country has adopted appropriate legislation, which complies with the requirements of the Renewables Directive. In case of doubt E-Control has been appointed to decide whether a country fulfils the conditions.

The Austrian GO scheme specifies the energy source, the date and place of generation and the installed capacity of the corresponding RES-E installation. GO have no standardised size, nor do they cover a standardised time period, so their validity is theoretically infinite. GO are based on the metered amount of renewable electricity fed into the public grid. The Bundesländer (Federal Provinces) are responsible for the operation of the GO scheme, whereas E-Control (regulator) is only supervising the scheme.

### A.1.2 GO procedures

The issuing body for GO is in general the local grid operator, where the RES-E plant is connected to. For RES-E plants that are covered by the feed-in tariff scheme, the local grid operator reports all GO-relevant data to the manager of the eco-balance group.<sup>25</sup> The eco-balance groups use the GO-registry, which has been developed by E-Control, for administrating the GO for RES-E within the feed-in tariff scheme (transferring and allocating GO to electricity suppliers according to the allocation mechanism). For RES-E plants outside the feed-in tariff scheme (mainly big hydropower plants) the respective local grid operators issue GO on request of the generator. As detailed procedures and formats of GO are not specified, the grid operator and generator can decide on it. However, they can also use the GO-registry for handling them.

### A.1.3 Registry for GO

E-Control has developed a central registry for GO based on the former 'small hydro certificate registry'.<sup>26</sup> The central GO-registry was set up as a service tool for the involved market actors, in order to facilitate transparent, standardised and low cost procedures to handle GO. All relevant procedures over the lifetime of GO (issuance, transfer, redemption) can be managed

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<sup>25</sup> Three so-called 'eco balance groups' (one per control zone) are set up in Austria and each control area manager is responsible for its operation. The eco balance groups are responsible to purchase the RES-E (RES-E covered by the feed-in tariff scheme) at the defined feed-in tariffs from the RES-E generators and all electricity suppliers are obliged to buy this RES-E aliquot to their sales volumes to end consumers at a price of 4,5 Cent/kWh. The additional expenses resulting from differences of the purchase of electric energy from eco plants at fixed feed-in tariffs and by selling it to electricity dealers (at 4,5 Cent/kWh) are covered by a surcharge to the grid tariff.

<sup>26</sup> A certificates trading scheme for small hydro power plants has been effective. The trading of the small hydro certificates was based on a central database, which was set up and operated by E-Control. But the certificates market did not function satisfactorily, so the scheme expired at the end of 2002 (scheme ended just after one year) and a feed-in tariff scheme for small hydro power plants was established.

through the registry. The usage of the central GO-registry voluntary and some features e.g. concerning data input go beyond the legal requirements. After some discussions during the starting phase, the GO-registry is well accepted by the market actors and used by most of them.

RES-E generators using the database need to be registered and RES-E plants administered within the registry are assigned to different technology codes. These technology codes can be clearly assigned to the labelling codes required within the Austrian disclosure scheme. The registry will be updated once a month by registering the new GO as electronic records on the accounts of the RES generators. In this regards grid operators and the managers of the three eco-balance groups have to submit the RES-E generation volumes of a certain month by the end of the following month. The standardised unit for the electronic records is 1 kWh.

The registry offers an interface to manually recorded GO that haven't originally been issued electronically in the central database. Once a GO is 'used' (e.g. for disclosure of generation attributes) it will be redeemed. Redeemed GO cannot be traded anymore. In the course of redemption the electronic record will be earmarked in the registry. The entity using GO receives a redemption statement which reveals information on the purpose GO have been used for. If a supplier uses GO to prove compliance with the information on his disclosure label, this information will be printed on the redemption statement. The registry has been set up as to generate the disclosure statements in the required format.

Moreover the Austrian GO-registry will be upgraded to a RECS CMO (Central Monitoring Office). The Austrian database will then be linked to the European RECS system. The database will be set up in such a way that a GO issued can also be a RECS (if the plant has been RECS certified) certificate but it is ensured that it only can be used either as RECS or as GO.

#### A.1.4 Accreditation and verification

Only RES-E plants, which have been accredited, are eligible to receive GO. Accreditation is the responsibility of the Federal Provinces. For the accreditation, operators of RES-E plants have to specify the technology and energy source, capacity, the unambiguous identification of the grid connection and the name and address of the grid operator the plant is connected to. The verification is also organised at the level of the Provinces. If it turns out that a RES-E operator fraudulently obtains GO the normal legal procedures apply. Options to sanction are that the RES -E operator loses the right to be eligible to the feed-in tariff system or the eligibility to receive GO. GO that have been fraudulently issued will be eliminated. For RES-E plants covered by the feed-in tariff scheme, verification is driven by the eco-balance groups. In the feed-in system the eco-balance groups have to pay the feed-in tariffs and have to verify that all devices that apply for the feed-in tariffs really comply with the requirements of the Eco-electricity Act anyway. This process guarantees more or less that GO will not be issued fraudulently.

#### A.1.5 Costs

The accreditation of RES-E plants as well as the issue of GO is free of charge for the plant operators. Moreover, buyers of the renewable electricity do not have to pay any fees for obtaining the corresponding amount of GO. Costs which grid operators incur for issuing GO can be allocated to the grid charges, which are verified and approved by E-Control. Costs that arise at E-Control for operating the registry are not allocated directly to the market participants. Neither holding an account nor transferring GO between accounts, nor redemption are individually charged. All costs related to the registry are covered by E-Control.

## A.2 Disclosure

### A.2.1 Legal basis

The Austrian electricity market is entirely open to competition since 1 October 2001 (based on Electricity Liberalisation Act 2000 - ELWOG 2000). As the very first country in Europe, Austria has introduced a mandatory scheme for disclosure of generation attributes by this date. Thus electricity suppliers and other parties supplying final customers in Austria were required to display the respective proportions of the different primary energy sources used to generate the electric energy supplied by them on final customers' electricity bills. As the legal implementation of the scheme for disclosure of generation attributes is done by the Federal Provinces, different kinds of schemes for disclosure of generation attributes have been set up. In some Provinces electricity suppliers could choose whether to use 'portfolio-disclosure' or 'product-disclosure', and in others the electricity suppliers are obliged to use a 'portfolio-disclosure'. This heterogeneous situation was not very favourable for costumers or suppliers. Therefore a unification of the schemes for disclosure of generation attributes was necessary.

In July 2002, the Austrian Parliament approved the Eco-electricity Act and an amendment of the Electricity Liberalisation Act 2000, implementing a nation-wide scheme for disclosure of generation attributes (§§ 45 and 45a). This scheme is obligatory since 1 July 2004 (after a transitional period). Now all electricity traders and suppliers must identify the primary energy sources their electricity is generated from. This means that the portfolio mix must be displayed on the electricity bills.

### A.2.2 Displayed fuel mix information

All electricity companies supplying final consumers are obliged to disclose the fuel mix used to generate the electricity based on the company portfolio. The information for the single primary energy sources have to be given as a percentage share of total electricity that is sold by the company to final consumers in the previous calendar or business year (ex-post disclosure). Traded electricity that is not sold to final consumers must not be considered in the calculation of the shares.

The primary energy sources to be displayed are:

- solid and liquid biomass
- biogas
- landfill and sewage gas
- geothermal energy
- wind and solar energy
- hydro power
- natural gas
- oil and its products
- coal
- nuclear energy
- other declared sources.

Electricity that cannot be directly allocated (undisclosed imports, electricity traded via the power exchange) must be assigned to the European generation mix (UCTE).

Further details on the format to display the information are not specified by law. Thus suppliers are rather free in how to display this information on the electricity bill. But it must be ensured that the disclosure of generation attributes information is clearly readable and cannot be mixed up with other information. Provisions for displaying information of CO<sub>2</sub> emissions or radioactive waste are not implemented in the Austrian scheme for disclosure of generation attributes.

### A.2.3 Determination of the fuel mix information

All electricity suppliers are obliged to document the primary energy sources for the amount of electricity that is sold to final consumers. The documentation must be finished within four months after the end of the calendar or business year and proven by an independent auditor.

The documentation can be done on the basis of GO for RES-E; suppliers must own the amount of GO for RES-E delivered to the final costumers. Suppliers using the GO registry (the majority is using the GO registry) are able to process the required information directly with the registry. The documentation of RES-E sources for disclosure of generation attributes is the main purpose of the GO registry. When used for disclosure purposes, GO are automatically redeemed. It has to be emphasised that GO, once allocated to the suppliers, are not necessarily linked to physical electricity any more and therefore can be transferred and traded independently from the physical electricity market (certificate based tracking). So a supplier, who wants to have e.g. a specific green portfolio, can try to buy GO from other suppliers. All transactions of GO can be done via the GO registry.

Primary energy sources that are not covered by the GO scheme, must be documented through certifications that are confirmed by accredited auditors; these certifications must show the primary fuel, location, time period of generation, name and address of the generator. So accredited auditors can certify plants. Once this is done (has to be renewed every three years) these plants can be dealt in the same way as GO for RES-E and can benefit from the GO registry.

Primary fuel sources of imported electricity can be documented when they comply with Austrian certification procedures for RES-E and other primary electricity sources. All primary sources that cannot be documented by the above mentioned procedures (undisclosed imports, electricity traded via the power exchange) must be assigned automatically to the European generation mix (UCTE).

Proving the disclosure information of electricity suppliers is in E-Control's authority and the electricity suppliers are obliged to show all relevant documents, that are necessary to prove it. Therefore E-Control published 'Guidance Notes on Power Labelling', where all relevant aspects and procedures are documented.

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[www.e-control.at](http://www.e-control.at)

## Appendix B Belgium

Belgium is a federal state where the three regional governments, Flanders, Wallonia and Brussels-Capital are responsible for the regulation of the electricity market. However, offshore production (wind) is regulated at the federal level.

Since 2002 Flanders and Wallonia have implemented a quota obligation system for RES-E, supported by green certificates. For Wallonia the same green certificates system also supports CHP electricity production. In 2004, the Brussels region also introduced a quota based certificate scheme. Moreover, at the federal level green certificates are issued for offshore production, which may count for the regional quotas. Green certificates are issued to producers of RES-E for production plants that hold a plant accreditation. In Flanders, green certificates are integrated with GO. In Wallonia, GOs will be emitted distinctly from green certificates.

At the federal level, it is the task of TSO Elia to buy green electricity certificates from producers at a minimum guaranteed price, depending on technology (see Table B.1). Elia only buys certificates issued in Belgium by CREG, VREG, CWaPE and BIM, respectively the federal and the 3 regional regulators. The production units should be less than 10 years old. Elia sells the acquired certificates in bi-annual auctions. Until today (March 2005), Elia has only bought and sold certificates for solar power issued by VREG.

Table B.1 *Guaranteed price of green certificates in Belgium*

Production technology	Guaranteed price [€/MWh]
Off shore wind	90
On shore wind	50
Hydro power	50
Solar power	150
Other RES-E (incl. biomass)	20

### B.1 Flanders

#### B.1.1 Guarantees of origin

A quota obligation system based on green certificates is in operation since 1 January 2002 in Flanders. This system is legally based in a decision of the Flanders' government of 5 March 2004 on the support of RES-E ('Besluit van de Vlaamse regering van 5 maart 2004 inzake de bevordering van elektriciteitsopwekking uit hernieuwbare energiebronnen'). A guarantee of origin is part of the green certificate system in Flanders. Regulator VREG is the issuing body and is responsible for accrediting of the plant, issuing, transferring and redeeming of GO, and maintaining the GO registry.

An electricity supplier has to turn in each year a certain number of valid green certificates to meet his quota obligation. The number of certificates to turn in by the end of March is proportional to the amount of electricity supplied in the previous year. The green certificate system has two functionalities, which are separately applicable.

1. Eligibility for quota obligation. Not all certificates can be used for the quota obligation, because not all renewable sources are eligible to meet the obligation. The Flemish definition of renewable resource is more stringent than the European definition (e.g., hydro power > 10 MW is not eligible). Initially, only green certificates issued by the VREG (Flanders) and

the CREG (Belgian sea area) could be used to meet the obligation. However, with a decision of 25 February 2005 ('Besluit van de Vlaamse regering van 25 february 2005 tot wijziging van artikel 15 van het besluit...') this requirement was skipped. I.e., now green certificates from the other Belgian regions, as well as from other countries are eligible to meet the quota obligation of the supplier.<sup>27</sup>

2. Status of the GO. Using GO, a supplier can prove to his customers that his electricity is renewable. The part of a green certificate that is called the Guarantee of Origin has two possible statuses: 'consumed' and 'not consumed'. When supplying an amount of RES-E, a supplier has to earmark the GO as 'consumed' on a corresponding number of green certificates. Being a part of a green certificate, a GO is issued (together with the green certificate) based on metering at the production device. At the creation, all GO are earmarked as 'not consumed' for all RES-E included in the European definition.<sup>28</sup> The VREG has developed a system to ensure that for the amount of RES-E consumed, GO are earmarked as 'consumed' and no multiple counting has occurred.

Green certificates/GO have a validity of five years and are issued on a monthly basis. VREG maintains a registry, which is accessible to all owners of the certificates/GO. Certificates/GO are issued electronically, can be transferred separately from the electricity and transfers are tracked. Certificates/GO are earmarked with other information beyond the minimum requirements of the Renewables Directive.

Certificates/GO are used in Flanders for statistical purposes and for facilitating the RES-E support mechanism. GO are also used for disclosure of generation attributes purposes. Certificates/GO that have been used are redeemed by using a redemption account and by earmarking the GO. Multiple counting is prevented because GO and green certificates are merged into one system, and they have a unique registration number.

#### *Purchase obligation DSO*

Distribution system operators (DSO) are obliged to buy green certificates issued for new production plants (that are in operation since 8 June 2004) at guaranteed prices, which are technology dependent. This obligation does not apply to green certificates older than 4 years (48 months), nor for green certificates that are not eligible to fulfil the quota obligation of suppliers.

Table B.2 *Guaranteed price of green certificates in Flanders*

Production technology	Guaranteed price [€/MWh]
On shore wind	80
Hydro power, tidal, waves, geothermal	95
Solar power	450
Biomass etc.	80

#### *CHP certificates*

Since 1 January 2005 a certificates based quota obligation for cogeneration applies. Each electricity supplier should ensure that a minimum share of his supply is covered by CHP certificates. These shares are: 1.19% in 2005, 2.16% in 2006, 2.96% in 2007 and further increasing to 5.23% in 2012. CHP certificates are issued based on the amount of primary energy savings realised by qualifying CHP, i.e. each certificate represents 1 MWh of primary energy saving.

<sup>27</sup> However, the VREG does not accept 'foreign' certificates for the Flanders quota obligation as yet (VREG, 2005). They argue that a separate decision of the Flanders government is needed for that.

<sup>28</sup> If the electricity is consumed at the site of the production device and not injected into the public grid, the GO will immediately be marked as 'consumed'.

CHP certificates are issued monthly based on metering information. For small CHP, producing less than 10 MWh per year, VREG issues a certificate each time when another 1000 kWh is fed into the grid.

For each CHP certificate the following information is registered:

Owner of the certificate, production year and month, place of production, technology, capacity, starting date of CHP plant, register number, support received for the CHP plant, fuel source and its lower calorific value, matching electricity production from qualifying cogeneration, efficiency of reference technology, relative primary energy savings, efficacy for quota obligation.

For meeting the CHP quota obligation, VREG only recognises CHP certificates that refer to CHP production in Flanders and to CHP units that were commissioned (or strongly refurbished) after 1 January 2002. Moreover, CHP certificates from cogeneration units that are older than 4 years, can only be used to fulfil the CHP quota obligation at a decreasing rate. I.e. a CHP certificate counts for less than 100% for the quota obligation

The status of these CHP certificates with respect to GO for CHP as meant by the EU Cogeneration Directive is unclear.

### B.1.2 Disclosure

Article 11 of the decisions of the Flanders government of 29 March 2002 ('Besluit inzake de openbaardienstverplichtingen ter bevordering van het rationeel energiegebruik', modified on 26 September 2003 and 10 January 2004) requires electricity suppliers to indicate on or with the bill the origin of supplied electricity in the previous year. Five categories of sources are distinguished:

1. electricity produced with renewable energy sources,
2. electricity produced in qualified CHP plants,
3. electricity produced with fossil fuels,
4. electricity produced in nuclear plants,
5. electricity of which the origin is not known. In principle this category should not exceed 5%.

In order to determine the percentages for these categories, the electricity supplier should base his information on direct and indirect contracts with electricity producers that cover his supplies over the previous calendar year, accounting for the total production park of the producer. For RES-E (the first category), guarantees of origin in the meaning of EU Directive 2001/77/EG serve as proof. For imports and electricity acquired via exchanges, aggregated figures provided by the importer or the exchange may be used.

Each year, before 1 February, electricity suppliers inform the VREG about the origin of electricity delivered in the previous year. The VREG sees to it that this information is reliable and reports on its finding each year.

VREG's first report on the origin of supplied electricity in 2003 was published on 24 November 2004. In that report the VREG detects a number of difficulties in the interpretation of the regulation on disclosure. First, verification of information supplied by electricity suppliers is limited. The VREG has focused on RES-E. For the other sources they relied on random checks, annual reports, etc. For electricity traded via exchanges etc. there is no effective system. Second, the notion of 'total production park' versus 'guarantees of origin' in the regulation is inconsistent. The origin of electricity bought from a producer (e.g. proved by GO for RES-E) is not necessarily equal to the fuel mix of the total production park of that same producer, which leads to two problems:

- Multiple counting. Once the verification is based on GO, the production park of the producer should be abandoned as verification mechanism, because otherwise the same amount of

RES-E could be sold twice. In the European context, where GO are being introduced in other Member States, verification based on GO are preferred over production park. However, another problem then is that for non-renewable electricity there is no European GO system required.

- Lack of transparency for final customers. Suppliers with a 'green' image are not happy with the verification based on total production park, because it then may seem that their supplies were not green at all, while in fact they were.

Since, a system of GO was not yet implemented over the full duration of 2003, results for the origin of electricity supplied in Flanders in 2003 are based on the total production park of the producers. The VREG mainly checked the information supplied to them by the electricity suppliers with the information on the electricity bill of the electricity suppliers. Initially these two sources of information differed for quite a few suppliers. The VREG forced the suppliers to bring this in line, therefore the report over the year 2003 was published so late.

The verification of electricity supplies in 2004 will be based on the following steps:

- For RES-E produced in other countries and Belgian regions, GO should be presented
- For RES-E produced in Flanders, green certificates issued by the VREG should be presented
- For other sources of electricity (non-renewable) the production park will be used.

Note that the Flanders disclosure scheme does not mention any provisions for informing the consumer on the environmental impact, i.e. CO<sub>2</sub> emissions and radioactive waste, of the fuel mix supplied. Moreover, although certificates and/or GO are being issued for qualifying CHP production (e.g. in the other regions of Belgium), these will not be used to determine the share of CHP in total supplies.

## B.2 Wallonia

The organisation of the regional electricity market of Wallonia is based in a decree of 12 April 2001. Chapters X, dealing with the support of renewable energy sources and qualifying CHP, introduces a system of minimum quota and green certificates based on avoided CO<sub>2</sub> emissions. This regulation is effectuated further in legislation of 4 July 2002 on the promotion of environmental friendly electricity. The Wallonian energy regulator CWAPE (Commission Wallonne de Regulation pour l'Energie) is responsible for the performance of this legislation.

### B.2.1 Guarantees of origin

Chapter III of the later legislation states that green certificates can only be obtained when the production unit possesses a plant accreditation, historically called 'certificate of guarantee of origin' or CGO issued by a certified verification institution. In practice, this accreditation proves that the electricity produced indeed qualifies as environmental friendly and that it is measured according to the applicable standards. This CGO holds the address of the producer, the energy source(s) used for producing electricity, the production technology, net power capacity of the unit, the technology used to measure electricity (and heat) production, the CO<sub>2</sub> emissions of normal production, the date of commissioning the unit, the production location, and subsidies received for building and operating the unit. The verification institution (and CWAPE in turn) should be notified about any changes to the above. CWAPE controls the CGO and may inspect production units at any time.

### B.2.2 Green certificates

Since the beginning of 2003 the quota obligation scheme with green certificates has been effective. Since the same scheme was intended to support both RES-E and CHP-E, a special method

system was implemented i.e. computing the avoided CO<sub>2</sub> emissions for the electricity production. A green certificate is then issued for each MWh of electricity multiplied by the ratio of avoided CO<sub>2</sub> emissions when compared to a reference technology. As a reference technology, a central gas and steam turbine with 55% efficiency, representing 456 kg CO<sub>2</sub> emission, is used. Thus, for 1 MWh of electricity produced in a wind turbine, one green certificate is issued. However, for electricity produced in e.g. a CHP unit on natural gas, mitigating 30% CO<sub>2</sub> emissions, a green certificate is issued for each 3.3 MWh (1/0.3) produced.

The minimum avoided CO<sub>2</sub> emissions should be 10%, otherwise production is not eligible for receiving green certificates. Moreover, for production units (e.g. cogeneration) exceeding 5 MW net capacity, avoided CO<sub>2</sub> emission is maximised at 200% for the first 5 MW and at 100% for the remaining capacity.

Green certificates are issued on a quarterly basis to production units holding an accreditation ('certificate of guarantee of origin'). The right to obtain green certificates is guaranteed for 10 years after getting the CGO, i.e. new and old units are eligible for green certificates. Certificates are issued for net production (i.e. including own consumption). Exported electricity is not eligible to receive certificates. Certificates are valid for a period of five years.

CWape keeps a register of green certificates, which includes information on the accreditation (CGO), production period, address of the owner of the certificate, registration numbers and prices of transactions. CWape is notified by the seller of green certificates about planned transactions. When green certificates are used to fulfil a quota obligation, they are redeemed (which is separately registered).

Electricity suppliers are subject to a quota obligation based on the electricity they supply to consumers in Wallonia<sup>29</sup>. Chapter VII of the legislation of 4 July 2002 determines that the quota gradually increases from 3% of supply in 2003 to 7% in 2007. In 2005 quota levels for 2008 and beyond are determined. As from 1 January 2004, suppliers can reduce their quota obligation for final customers who entered into an agreement with the federal or Wallonian government to increase its energy efficiency, and who consumes more than 5 GWh in the quarter concerned.

### B.2.3 GO

'Labels of Guarantees of Origin' or 'LGOs' for RES-E and CHP-E will be implemented in 2006, distinctly from green certificates, but on the same basis in order to comply with the Directive 2001/77/CE. The terms 'Labels of Guarantee of Origin' have been preferred to the common designation of 'Guarantees of Origin' from the Directive, in order to avoid possible confusion with the CGO (Certificate of Guarantee of Origin = Plant accreditation) that has been so called for historical reasons.

Once a 'certificate of guarantee of origin' (= plant accreditation) has been issued to a RES-E or CHP-E plant, the producer will quarterly introduce his metering data to the CWape. The CWape will then simultaneously issue green certificates and LGOs, green certificates that are related with the support mechanism for RES-E and CHP-E, and LGOs that permit to facilitate trade in electricity produced from RES and CHP and to increase transparency for the consumer's choice..."

### B.2.4 Disclosure

Disclosure is currently made on statistical basis. From 2006 on, LGOs will be used for disclosure of generation attributes of RES-E and CHP-E.

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<sup>29</sup> Grid operators are also subject to a quota obligation, based on their own consumption and supplies to final customers.

## B.3 Brussels

The ordinance of 19 July 2001 ('Ordonnantie betreffende de organisatie van de elektriciteitsmarkt in het Brussels Hoofdstedelijk Gewest') including its modifications regulates the electricity market in the Brussels region. Article 28 of the ordinance provides that production of RES-E and qualified CHP is supported by a green certificates based quota obligation scheme for electricity suppliers. The quotas are 2%, 2.25% and 2.5% of electricity delivered to consumers in the Brussels region in 2004, 2005 and 2006 respectively. Quotas for future years will be determined after evaluation of the system. The Brussels institute for management of the environment, IBGE-BIM, is responsible for the scheme.

### B.3.1 Guarantees of origin

The decision on the promotion of green electricity and qualifying CHP of 6 May 2004 ('Besluit van de Brusselse Hoofdstedelijke Regering betreffende de promotie van groene elektriciteit en van kwaliteitswarmtekrachtkoppeling') contains provisions for guarantees of origin and green certificates.

Chapter III, article 11, states that GO as meant by article 5 of EU Directive 2001/77/EG can be allocated for a definite period to certified RES-E production plants. The GO nominates the energy source of production, production technology, the period and place of production and production capacity in case of hydro power. For e.g. biomass, only production related to this fraction will receive GO. Article 12 explicitly states that allocation of GO for a definite period precludes that green certificates will be allocated for the same period.<sup>30</sup> Moreover, GO are freely transferable and negotiable, as is the case with green certificates.

### B.3.2 Green certificates

Chapter IV of the same decision further determines the green certificate system. Green certificates are issued by regulator IBGE-BIM at the end of each quarter according to metering information. Certificates will only be awarded to production units younger than 10 years and when the 'relative CO<sub>2</sub> savings'<sup>31</sup> of the plant are greater or equal to 5%. The latter requirement also determines 'qualifying' CHP. The number of green certificates allocated depends on the ratio between realised CO<sub>2</sub> savings of the installation in the quarter considered and the CO<sub>2</sub> emission coefficient of natural gas.

Green certificates are transferable during their validity period of five years. The transfers are tracked by the registrar IBGE-BIM.

By the end of March, the electricity supplier indicates the green certificates in his account that he will use to fulfil his quota requirement of the previous year.

### B.3.3 Disclosure

There are no provisions for disclosure of generation attributes in the Brussels region.

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<sup>30</sup> This means that GO and green certificates are essentially similar and complementary. However, GO do not count for the quota obligation. It seems that the article on GO is incorporated to explicitly fulfil the EU Renewables Directive.

<sup>31</sup> Relative CO<sub>2</sub> saving is defined as the ratio of CO<sub>2</sub> savings realised by the production in a quarter over CO<sub>2</sub> savings of the reference plant for the production of the same amount of net electricity (and heat).

### B.3.4 References

- CWAPE (2003): *Le regime des certificats verts*. June 2003.
- CWAPE (2004): *Rapport annuel specifique 2003 sur 'L' evolution du marche des certificats verts'*. April 2004.
- CWAPE (2005): *Specific annual report for 2004 on 'The evolution of the green certificate market'*. May 2005.
- Vlaamse regering (2001): *Besluit van 7 september 2001 tot bepaling van de voorwaarden waaraan een kwalitatieve warmtekrachtinstallatie moet voldoen*. Belgisch Staatsblad 12 December 2001.
- Vlaamse regering (2002): *Besluit van 29 maart 2002 inzake de openbare dienstverplichtingen ter bevordering van het rationeel energiegebruik*. Belgisch Staatsblad 4 May 2002.
- Vlaamse regering (2004): *Besluit van 5 maart 2004 houdende de openbare dienstverplichtingen ter bevordering van de elektriciteitsopwekking in kwalitatieve warmtekrachtinstallaties*.
- Vlaamse regering (2004): *Besluit van 5 maart 2004 inzake de bevordering van elektriciteitsopwekking uit hernieuwbare energiebronnen*. Belgisch Staatsblad 23 March 2004.
- VREG (2004): *De oorsprong van de geleverde elektriciteit in 2003 in Vlaanderen*. Rapport van de Vlaamse Reguleringsinstantie voor de Elektriciteits- en Gasmarkt van 24 November 2004. RAPP-2004-13.
- VREG (2004): *Het systeem van groenestroomcertificaten voor de leveringen in het kalenderjaar 2003*. Rapport van de Vlaamse Reguleringsinstantie voor de Elektriciteits- en Gasmarkt van 22 June 2004. RAPP-2004-8.
- VREG (2005): *Het systeem van groenestroomcertificaten voor de leveringen in het kalenderjaar 2004*. Rapport van de Vlaamse Reguleringsinstantie voor de Elektriciteits- en Gasmarkt van 10 May 2005. RAPP-2005-3.
- Waalse regering (2001): *Decreet van 12 april 2001 betreffende de organisatie van de gewestelijke elektriciteitsmarkt*.
- Waalse regering (2002): *Besluit van 4 juli 2002 tot bevordering van de milieuvriendelijke elektriciteit (L'arrete du 4 juillet 2002 relatif a la promotion de l'electricite verte.)* (Gewijzigde versie van 22 april 2004).

## Appendix C Bulgaria

Bulgaria has developed an energy strategy specifying in detail its reforms of the energy sector. An Action Plan will be prepared to promote the use of renewable energy through its preferential development. A priority was set for power plants with cogeneration.

The current restructuring of the Bulgarian energy sector emphasises liberalisation, the transformation of nuclear energy and of coal mining as well as energy efficiency. Because the fundamental energy needs are not met appropriately, the 'soft' issues of renewable energy and composition of electricity (disclosure) are not the primary focus, even though under consideration and development.

The Bulgarian Law on Energy outlines the basis for a consistent market oriented energy policy. Chapter 11 (Article 157 - 163) describes the regulation on the 'promotion of power generation from renewable resources and cogeneration'. National indicative targets shall promote renewable energy. Up to an installed capacity of 10 MW, electricity network operators are obliged to buy the renewable electricity generated for a preferential price. A similar rule was introduced for combined heat and power generation. Preferential prices and purchase obligations apply for CHP up to 50 MW.

### C.1 Guarantees of origin

Regulation on certificates of origin is outlined in the following relevant paragraphs of the Law on Energy (DOE, 2005a).

#### *State Energy Regulation Commission*

##### *Article 21*

*In the regulation of the activities of generation, transmission and distribution of electricity, transmission and distribution of natural gas, trade with electricity and natural gas, generation and transmission of heat energy, the Commission:*

- 14) Issues certificates to producers for the origin of the commodity electricity that is generated from renewable energy resources and by way of cogeneration of electricity and heat energy;*
- 15) Issues Green Certificates to producers of electricity utilizing renewable energy resources and generating electricity and heat energy in combined cycle method;*

##### *Article 25*

*The Commission maintains public registers of:*

- 1) Issued licenses, including a record of all licensees, licenses that are issued and other circumstances;*
- 2) Issued certificates of origin, including a record of the principal of the generation capacity, as well as the quantities of electricity for which the certificate was issued and the period of generation;*
- 3) Issued Green Certificates, including a record of the principal of the generation capacity as well as the quantities of electricity for which the certificate was issued and the period of generation;*
- 4) Transactions with Green Certificates, including a record of the principal of the Green Certificate, as well as its buyer and the quantity of electricity that was subject to the underlying transaction;*

#### *Article 28*

- (1) In exercising its regulatory authorities the Commission collects fees for review of applications, issuance of certificates under this Law, sale of documents for tenders under Chapter Four, Section II and licensing fees.*
- (2) The amounts of the fees under para.1, the procedure and deadlines for payment thereof are set in a tariff approved by the Council of Ministers upon a proposal from the Commission.*

#### *Chapter Eleven*

##### *Promotion of power generation from renewable energy resources and combined generation*

##### *Section I Electricity generation using renewable energy resources*

#### *Article 159*

- (1) The public provider and/or public providers who are granted an electricity supply license shall buy out the entire volume of electricity generated in a plant using renewable energy sources and registered with a certificate of origin with the exception of the volumes for which the producer has entered into contracts pursuant to Chapter Nine, Section VII or with which he participates in the balancing market.*
- (2) The public provider and/or public suppliers shall be obliged to buy out the electricity generated in plants using renewable energy sources, including hydroelectric plants, with total installed capacity up to 10 MW at preferential prices pursuant to the ordinance under Article 36, Paragraph 3.*

#### *Article 161*

- (1) The mandatory buying out of electricity pursuant to Article 159 shall be applied until the time of setting up a system for issuing and trade in green certificates.*
- (2) The Minister of Energy and Energy Resources specifies the minimal mandatory quotas for electricity generation from renewable sources as a per cent of the total annual generation by each producer for a ten-year period as of the date of introduction of the system for issuing and trade in green certificates.*
- (3) Each producer shall be considered to have fulfilled his obligation under Paragraph 2 upon submission, to the Commission, of green certificate(s) indicating the volume of electricity from renewable energy sources comprising its obligation; such certificate(s) shall be:
  - 1) Issued by the producer and/or;*
  - 2) Purchased from another electricity producer, as the sale/purchase transaction shall be considered effective on condition that it was entered into the register pursuant to Article 25, Paragraph 1, item 4.**
- (4) The form, contents, terms and conditions for issuing of certificates of origin and trade in green certificates shall be settled in an ordinance issued by the Minister of Energy and Energy Resources.*

##### *Section II Electricity generation in generation plants with combined power and heat generation*

#### *Article 162*

- (1) *The public provider and/or public suppliers shall be obliged to buy out the entire volume of electricity from highly efficient power plants for combined heat/power generation registered with a certificate of origin with the exception of volumes used by the producer to meet its own needs or covered by contracts pursuant to Chapter Nine, Section VII or those with which he participates in the balancing market.*
- (2) *Electricity pursuant to Paragraph 1 shall be bought out as follows:*
  - 1) *At preferential prices as provided for in the Ordinance pursuant to Article 36, Paragraph 3, for volumes generated by each plant of the producer up to 50 MWh per hour;*
  - 2) *At negotiated prices and/or at balancing market prices for volumes generated by each plant of the producer over 50 MWh per hour.*
- (3) *The method for metering the electricity generated by combined heat/power generation according to the type of the technological cycle, the requirements for technological devices for measurement and registering of the electricity from combined generation shall be defined in an Ordinance approved by the Minister of Energy and Energy Resources.*

#### *Article 163*

- (1) *Mandatory buying-out of electricity at preferential prices pursuant to Article 162, para. 1 shall be applied until the establishment of a system for issuing of and trade in green certificates.*
- (2) *The Minister of Energy and Energy Resources specifies the minimum volumes of electricity from highly efficient combined generation for each producer as a percent of the total annual output by each producer for a period of ten years as of the date of introduction of the system for issuing of and trade in green certificates.*
- (3) *Each producer shall be considered to have fulfilled his obligation under Paragraph 2 at his presenting to the Commission of green certificate(s) indicating the volume of electricity from highly efficient combined generation comprising his obligation; such certificate(s) shall be:*
  - 1) *Issued by the producer and/or;*
  - 2) *Purchased from another electricity producer, the sale/purchase transaction considered effective on condition that it is entered into the register pursuant to Article 25, para. 1, item 4.*
- (4) *The terms and conditions for issuing of certificates of origin and trade in green certificates shall be settled in an ordinance pursuant to Article 161, Paragraph 4.*

#### *Additional provisions*

25. *'Green certificate' is a document with a limited term of validity certifying the production of a certain volume of electricity from renewable energy sources or by a combined generation method, indicating the date and place of generation, the generation facility and its owner; transferable separately from the physical electricity whose generation it certifies.*

51. *'Certificate of origin of electricity from combined heat/power generation' is an official non-transferable document verifying a producer, the quantity of generated electricity from combined generation, indicating the generation period, the electricity plant, its power and other data and indicators set out in the Ordinance under Article 161, para. 4.*

52. *'Certificate of origin of electricity from renewable energy sources' is an official non-transferable document verifying a producer, the quantity of generated electricity from renewable energy sources, indicating the generation period, the electricity plant, its power and other data and indicators set out in the Ordinance under Article 161, para. 4.*

#### *Transitional and final provisions*

*§21. Until January 1, 2010, the public provider and/or public suppliers shall be obligated to buy all the electricity registered with a certificate of origin from combined generation generated by the combined electricity/heat hydro-electric plants existing at the time of the entry into force of this Law without achieving high efficiency indicators at preferential prices pursuant to the Ordinance under Article 36, para. 2 with the exception of the quantities the generator uses for their purposes or for which it has concluded contracts under Chapter Nine, Section VII or with which it participates in the balancing market. The provisions of Article 163 shall apply to plants which have achieved high efficiency indicators.*

The Bulgarian government has introduced the ‘Ordinance for Certification of the Origin of Electric Power Generated by Renewable and/or Combined-Generation Sources, Issuance of Green Certificates and Their Trading’ (DOE 2005b). This regulation outlines in detail:

- the certification of renewable energy and combined heat and power generation,
- the mandatory quotas for electricity generation from renewable energy and cogeneration,
- the register for certificates

The ordinance has in general become effective since 1 January 2005. Green certificates will become effective on 1 July 2006.

The State Energy Regulatory Commission (regulator) is the issuing body on certification in Bulgaria. The Commission grants the certificates and maintains the register. The register will be held electronically. The certificate verifies the producer, the volume of electricity generated from renewable energy, the period of generation, the generation plant and its capacity. The basic unit as reference amount is 1 MWh electricity.

There is a distinction between certificates of origin for electricity generation in general (GO) and for electricity from renewable sources and cogeneration (green certificates).

In the future, the Bulgarian Minister for Energy and Energy Resources will define minimum quotas for electricity from renewable sources and from cogeneration. The incentive aims to promote renewable energy and CHP in two ways by:

- preferential prices,
- green certificates.

No detailed information is yet available on the implementation of the ordinance. It is not known, which types of electricity generation, which types of fuels and renewable sources are distinguished here.

## C.2 Disclosure

No regulation on electricity labelling and disclosure of generation attributes is known to the authors in Bulgaria. Whether activities have been started yet and until when regulation on disclosure may be put in place is not known.

## C.3 References

IEA (2005): *Information on Bulgaria in the context of the Johannesburg Renewable Energy Coalition*. <http://www.iea.org/textbase/pamsdb/jrcountry.aspx?country=Bulgaria>.

DOE (2005a): *Law on Energy*, <http://www.doe.bg/cgi-bin/i.pl?l=2&p=623>.

DOE (2005b): *Regulation for Certification of the Origin of Electric Power Generated by*

*Renewable and/or Combined-Generation Sources, Issuance of Green Certificates and Trading.* <http://www.doe.bg/download/dokumenti/zsertif.pdf>.

MEER (2005): *Energy Strategy of Bulgaria.* <http://www.doe.bg/cgi-bin/i.pl?l=2&p=532>.

## Appendix D Croatia

The restructuring of the energy industry (privatisation, unbundling, liberalisation) is under way and harmonization of the energy policy according to the European Union Directives is in progress. Currently there is only one company for distribution, transmission and generation, which all belong to the HEP (Hrvatska Elektroprivreda D.D.) Group (100% state owned) in Croatia.

Customers with an annual electricity consumption above 40 GWh have the right to choose their electricity supplier. This translates to a theoretical 10 percent opening of the Croatian electricity market. There are currently 14 eligible customers in Croatia. By the end of 2003 no eligible customer entered into contract with any registered supplier other than HEP.

### D.1 Guarantees of origin

All HEP Generation hydro power plants received a certificate in 2003 of a hundred percent electricity production from renewable sources, 'green energy', issued by the German certification agency TÜV Bayern. The certification process included a review of all relevant plant documents, environmental documents and procedures, and methods used to train power plant workers. Inspection was carried out of electricity meters and of the method and verification of calculation of electricity produced. Certificates confirm the good quality of maintenance planning and implementation, overhaul and other work, and that all HEP's hydro power plants are environmentally safe and produce electricity in a non-detrimental way.

Legislation in regard to GO is in preparation and it is planned but no distinctive date of enforcing legislation on that topic has been fixed yet.

### D.2 Disclosure

The only supply company in Croatia is HEP. Currently the only information about the electricity source is from the HEP publications as e.g. 'Electricity Data ' or 'Annual Report', which provide information about generation mix of power plants operated in Croatia and imported electricity.

### D.3 References

Energy Law (2001): *Ref. No. 01-081-01-2392/2*, Zagreb, 24 July 2001.

HEP (2004): *Annual Report 2003*.

<http://www.hep.hr/en/publications/annual.html>.

<http://www.hep.hr/proizvodnja/en/aboutus/GreenEnergy.pdf>.

Law on Electricity Market (2001): *Ref. No. 01-081-01-2393/2*, Zagreb, 24 July 2001.

Law on Regulation of Energy Activities (2001): *Ref. No. 01-081-01-2394/2*, Zagreb, 24 July 2001.

## Appendix E Cyprus

### E.1 Introduction and overview

Cyprus is almost totally dependent on oil imports for its energy supply accounting for 91% of the primary energy supply (almost all energy is produced from imported oil and diesel). Therefore, the cost of energy imports on the economy of Cyprus is a considerable burden. At the same time there is no electricity import or export because of the island character.

Virtually all electricity in Cyprus (around 99%) is produced with oil and diesel. There is a small amount of electricity from renewable energy, either solar, small-hydro or biomass. Solar thermal energy is the major available renewable energy in Cyprus, and it is traditionally used by hotels and households for thermal purposes. At the moment 92% of all houses and 50% of the hotels have installed solar water heaters. Cyprus has more solar collectors per capita installed than any other country in the world.

The government has adopted the 'New Grant Scheme For Energy Conservation and the Promotion of the Utilization of Renewable Energy Sources' effective from 2003 to 2007. The RES-E target to be achieved in 2010 is 6%. The grant scheme provides financial incentives in the form of governmental grants (30-40% of investments) for investments in wind energy systems, solar thermal, PV, biomass, landfill and sewage waste using RES. The fixed purchase price for RES-E by EAC is 6.3 €/kWh (3.7 cyp. cent/kWh). In addition to that, the Electricity Authority of Cyprus (EAC), the monopolist of the electricity sector, pays a special premium depending on the technology used from a special fund, financed by a levy on electricity consumption. The feed-in tariffs are as follows:

- Wind: first five years: 9.2 €/kWh (5.4 cyp. cent), for the next 10 years: 4.8 to 9.2 €/kWh (2.8 to 5.4 cyp. cent/kWh) according to the mean annual wind speed.
- Biomass, landfill and sewage: 6.3 €/kWh (3.7 cyp. cent/kWh).
- PV up to 5 kW: 20.4 €/kWh (12 cyp. cent/kWh).

### E.2 Guarantees of origin

Currently a GO system is not in force. A main decision concerning the certification of RES power plants, according to EU Directive 2001/77/CE, has been taken but the overall functioning has not been defined yet.

### E.3 Disclosure

Cyprus plans full electricity market opening to be achieved after 2005. There are no provisions for disclosure of generation attributes.

### E.4 References

COM(2004)366 final. Commission Staff Working Paper. *The share of renewable energy in the EU - Country Profiles. Overview of Renewable Energy Sources in the Enlarged European Union.*

*Grant scheme for Energy Conservation and the Promotion of Renewable Energy Sources (RES) Utilization* (source: CEI, Cyprus Energy Institute, web site <http://www.cie.org.cy/sxediaxorigioneng.htm>).

## Appendix F Czech Republic

RES-E support is based on the new Czech RES-E law, approved by parliament end of March and entered into force in August 2005. This law gives RES-E producers a choice between a standard feed-in tariff and a bonus on the regular market price.

A GO system for RES-E is not yet operational. Legislation is implemented, but a decree specifying details is still outstanding. Next to the Energy Regulator, the Czech Republic established an Electricity Market Operator, which will assume the role of issuing body. GO will be introduced for all sources of energy defined as RES-E. The content of information required on the GO for RES-E will be specified in a special decree. GO may be linked to feed-in tariff

GO for high efficiency CHP will be introduced based on the Energy Act, amended in March 2005. The Energy Act specifies that they will include: name of generator, date/place of production, source of energy/fuel, description of generation process and efficiency of generation.

Disclosure legislation is implemented as part of the amended Energy Act of March 2005.

## Appendix G Denmark

Energinet.dk is the new central corporation controlling the main energy grids in Denmark, merging Eltra (TSO of the western grid), Elkraft System (TSO of the eastern grid) and the gas grid. The merger will take place in the spring of 2005 with retrospective effect as from 1 January 2005. Elkraft and Eltra will carry out their daily operations as usual until the merger has been implemented.

### G.1 Guarantees of origin

As of 15 January 2004, legislation concerning guarantees of origin of RES electricity entered into force in Denmark (Order no. 1 of 6 January 2004)<sup>32</sup>. Chapter 2 of the order states that guarantees of origin will be issued by the responsible TSO, i.e. either Eltra or Elkraft System, on request of an electricity producer (within 30 days after the end of the last month for which the GO is to be issued). GO are issued either in print (on watermarked paper or paper which carries a hologram) or in electronic form. In practice only the electronic GO are used (except for two GO already issued on paper). The order also provides that until 29 February 2004, electricity producers may request the issue of GO for December 2003, the last quarter of 2003, the last 6 months of 2003 or the whole of 2003.

RES-E production eligible for GO are wind power, hydro power, wave and tidal energy, solar energy, geothermal energy, biogas, biomass and the incineration of the biodegradable fraction of waste (80% of the electricity output shall be regarded as RES-E, unless it is proved that a higher fraction is biodegradable).

The GO includes information on the identity of the production plant, RES-E category and the volume of production in the referred period (month, quarter, 6-months or year). In addition, the GO contains information on the issuing body, the date of issuing, and the GO is earmarked in case a price supplement has been paid or other benefits have been granted in respect of the electricity concerned. GO have no validity period and there is no redemption process for GO.

The TSOs maintain a record of GO, which should be consistent with information in the central data register for electricity production plants of the Danish Energy Authority (ENS). The TSO should annually report on the GO it has issued. GO can be transferred, but transfers are not tracked. Costs incurred by the TSOs of issuing and recording GO shall be borne by the electricity producer.

Nearly all GO are issued for wind turbines - both on shore and off shore. For all wind turbines having GO issued, the rights for support/subsidy have expired. In total, the share of renewable production compared to total production is close to 20%. GO have been issued to approximately 20% of this share, i.e. GO have been issued for circa 4% of total electricity production.

A Danish law on GO for CHP is not yet in preparation. For CHP a motivation model for production plants larger than 5 MW has been agreed upon and implemented in order to optimise their income on the Nordic spot market. For production plants smaller than 5 MW it is still possible to receive the fixed feed-in tariff.

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<sup>32</sup> The framework for regulation on GO in Denmark was laid down in Law No. 151, March 10, 2003.

## G.2 Disclosure

The Danish Law on Disclosure was laid down in Law No. 494, June 9 2004, but has not yet been implemented. There is no decision on the model for disclosure to be used. Contacts between the authorities and the electricity industry have been established in order to find a suitable model for disclosure.

Both Eltra and Elkraft submit environmental reports annually, which contain detailed information on the fuel mix of electricity production and related emissions in Denmark (national, east and west).

## G.3 References

Danish legislation and other documents related to the promotion of renewable energy:  
<http://www.opet.dk/>.

Elkraft (2004): *Environmental Report 2004* (including the Environmental Declaration 2003).

Eltra (2003): *Environmental Report 2003* (including the Environmental Impact Statement 2002).

[www.energinet.dk](http://www.energinet.dk).

Lawaetz, H. (2001): *The Green Certificate Market in Denmark. Status of implementation*, The Danish Energy Authority, <http://www.energioplysningen.dk>.

The Danish Energy Authority: <http://www.ens.dk/>.

## Appendix H Estonia

The extensive use of a local solid fuel -the Estonian oil shale- is a peculiar feature of energy production in Estonia and it makes 60-64% in the primary energy supply. More than 90% of electricity is generated in oil shale based power plants. These power plants produce the major share of the pollution load by emission of gases and ash. Energy conversion processes account for about 88% of the total CO<sub>2</sub> emission in Estonia. This is one of reason why Estonian energy policy and legislation support the use of renewable energy sources for electricity generation, heat production and for transport requirements.

The energy policy in Estonia is based on: the Long-term National Development Plan for the Estonian Fuel and Energy Sector; the National Energy Conservation Programme and Action Plan for Energy Conservation; the National Environmental Strategy. The main priorities in Estonian energy policy are: to sustain the production and reliable supply of energy for the country and to provide the energy at the lowest possible cost. This to be achieved by improved energy efficiency, stable overall reliability of electricity generation and distribution, attraction of investment capital where such capital is needed for infrastructure developments, and competition and diversity in the energy sector where monopolies exist.

### H.1 Guarantees of origin

The main development goals of energy sector are given in the new Long-term National Development Plan for Fuel and Energy Sector, enforced in December 15, 2003. One of the strategic objectives of the Estonian fuel and energy sector is to ensure that by 2010 renewable electricity amounts to 5.1% of the total electricity consumption and that by the year 2020 electricity generation in the CHP amounts to 20% of the total electricity consumption.

The Electricity Market Act approved on 11 February 2003 supports the implementation of these goals. This Act obligates the grid operator, which is the state owned Eesti Energia Ltd., to purchase electricity produced from renewable energy sources at 1.8 higher prices than the minimum price for the electricity generated by conventional energy sources. Producers utilizing hydropower and biomass are paid this price for seven years, those utilizing other renewable sources for 12 years, but only until 2015.

Table H.1 *Green Energy Customer Certificates in Estonia*

Type and target group	RES-E per certificate	Certificate price*			Sold**	Issued
		[kWh]	[EEK]	[€]		
Category I Large companies	120,000	103,756.80	6,629.85	55.25	5	15
Category II Large and medium-sized companies	60,000	51,878.40	3,314.93	55.25	13	50
Category III Small companies and government institutions	6,000	5,131.20	327.87	54.65	174	150
Residential Customer	1,200	1,020.00	65.18	54.31	261	800
Total					453	1,015

\* Price includes 18% VAT

\*\* On 1 April 2004.

Eesti Energia has established in April, 2001 an alternative way to increase development of renewable energy production in Estonia by issuing green energy certificates for producers and customers. Currently Eesti Energia offers five different categories of certificate according to the level of supply. Green Energy Producer Certificates are issued to all the generators of renewable energy who sell their production to Eesti Energia. Green Energy Customer Certificates are issued to customers of Eesti Energia. Any company, governmental institution and residential customers having a contract with Eesti Energia may purchase electricity produced from renewable energy sources and receive a Green Energy Customer Certificate. The price for this green electricity depends on the amount of purchased power. There are four types of consumer certificates, depending on consumer type and renewable energy consumption.

Green Energy Customer Certificates are valid for one year as of the date of issuing. Each green energy customer supports the Estonian Fund for Nature (ELF) through donations. ELF was founded on 1 February 1991 as a non-profit NGO for the implementation of environmental projects. ELF uses these funds to finance projects related to nature conservation, environmental education and sustainable development. Companies buying green certificates can label products and services with the 'Green Energy' label, which demonstrates commitment to the environment, a healthier community and social responsibility.

Eesti Energia maintains that the green energy certificates are aimed at raising public awareness of the benefits of using renewable energy and creating conditions for further investment in RES-E. Eesti Energia as grid operator is obliged by the Electricity Market Act to buy all power produced from renewable energy sources. This obligation is proving expensive for Eesti Energia. The fees for the different categories of certificates allow Eesti Energia to recoup some of the costs of buying and marketing the green electricity. Eesti Energia states that profits from the venture will be invested in the further development of renewable energy resources (Financial Times: Energy's Power in East Europe, Issue 56, 30 April 2001).

The amendment of Electricity Market Act, which entered into force in January 2005 states that a grid operator shall develop and publish on its website the conditions and procedures for issuing guarantees of origin. A grid operator shall create a database for administration of GO and shall publish information regarding the issued GO on its webpage.

GO shall contain the following: the name, address of the producer, type of energy source used for electricity production and the place of generation, the amount of electricity generated in MWh, the period of generation, the time for generation in hours and the date of issue of GO, the capacity of installations if electricity is produced at hydropower plant, and other information established by the grid operator.

## H.2 Disclosure

In 2001, about 20% of the Estonian electricity market has been opened. According to the EU Accession Treaty, the Estonian electricity market must be open to the extent of 35% not later than by 31 December 2008, the electricity market will be open to all consumers not later than by 31 December 2012.

There are not provisions for disclosure of generation attributes in Estonia.

## H.3 References

Energy Act of Estonia

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- National Environmental Strategy (1997): *Official Gazette RTI, 1997.*  
<http://www.envir.ee/eng/strategy.html#3>

## Appendix I Finland

Legislation related to GO and disclosure of the technology mix from supplier to consumer in Finland is available via: <http://www.energiamarckkinavirasto.fi/> (in Finnish only)<sup>33</sup>.

### I.1 Guarantees of origin

The electricity guarantee of origin system was introduced in Finland by the Origin of Electricity (Assurance) Act No 1129/2003) and by Government Decree No 1357/2003 on assuring the origin of electricity.

National legislation for implementing GO is in force and the GO system became operational in January 2004 in Finland. However, before that time, RECS certificates were already issued. GO and RECS certificates are essentially similar in Finland (either a GO exists on its own, or the GO is merged with RECS). TSO Fingrid issues and administers the GO for renewable energy and the RECS certificates (Fingrid, 2005).

The GO of electricity covers production based on renewable energy sources. GO are issued at the request of generator for each MWh of net production. The GO is issued either in paper format or electronically into the registration system. Issuing the guarantee of origin requires that an accepted production registrar (appointed by the Energy Market Authority) has verified the power plant, that there is a service agreement with Fingrid, and that the production information is delivered to Fingrid. The regulator (Energy Market Authority) governs the marketing of electricity to consumers (Consumer Protection Act No 38/1978) and may check the validity of GO.

GO can be, and are, transferred separately from the electricity, and the transfer is tracked. GO are valid infinitely in Finland and there is no redemption process in place. GO are not earmarked.

The sole purpose of issuing and trading GO/RECS certificates was for supplying them to the Netherlands (and Austria), where renewable electricity subsidies could be gained. However, as from 2005 this practice has virtually come to an end, because of changes in the Dutch regulations. Thus GO are now mainly used for disclosure of generation attributes purposes and for green power (quality) labelling. There is little domestic demand for GO in Finland, since no real incentives for buying GO exist.

Upon request, Fingrid confirms the green declaration of Finnish production devices in the Dutch certificate system and delivers electricity production information monthly to CertiQ, the organisation maintaining the green certificate register in the Netherlands. This service requires that the Finnish production plant is registered either in the GO system or in RECS. A separate agreement on this service must be signed with Fingrid.

### I.2 Disclosure

The Finnish policy leaves it up to suppliers how they disclose the technology mix of generated electricity to the consumer; the system is voluntary and there are no specific rules. However, Energy Industries (ET) has published guidelines for labelling of electricity in Finnish elec-

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<sup>33</sup> From the same web-address unofficial translations of the electricity market act and electricity market decree are available. This legislation, however, does not have any provisions for tracking the source of generation.

tricity industries. The Ministry of Trade and Industry largely agreed with these guidelines and have taken them into account when preparing legislation.

The ministry's regulation on labelling has recently been published (April 2005, only in Finnish and Swedish). The regulation will enter into force at 1 July 2005. As expected, the regulation follows quite well the guidelines that ET gave last year. The main difference is the requirement to give information on shares of different acquisition sources (the exchange / non- European Economic Area (EEA) countries / others). Another difference is the requirement to give information on nominal CO<sub>2</sub> emission figures that are used in calculations also in terms of different production types (as well as different energy sources).

### 1.2.1 Finnish model for tracking/labelling

Energy sources used for electricity production are divided in at least three categories (Aaltonen, 2005):

1. Fossil fuels and peat
2. Renewables
3. Nuclear power.

Electricity fuel mix disclosure is based on the company's supply in the previous year. If the electricity company has bought electricity from the NordPool (the Nordic electricity exchange) or outside the European Economic Area (i.e. Russia), that electricity should be allocated as well to the three main energy categories. Electricity bought from NordPool is allocated according to Nordel's (organisation for co-operation of Nordic TSOs) declaration, which is in effect the average fuel mix in Nordic markets. The disclosure of the fuel mix of imported electricity from Russia should be provided by the seller.

If a company has 'environmental-friendly electricity products' such as hydropower or wind power, the total sale (percentage share of the total amount of renewable production) of these products should be reported in connection with the fuel mix disclosure. The provision of this information is however not obligatory by the Ministry's regulation. But the regulation will not prevent companies to give this or any other additional information voluntarily.

Companies should also give a reference where their customers are able to find information about the specific emission of CO<sub>2</sub> (g/kWh) and the amount of nuclear waste (fuel spent per kWh produced). Information is usually given on a company's website.

### 1.2.2 Quality labels and trademarks

The Finnish Association for Nature Conservation (FANC) issues the 'Norppa recommends eco-energy' label to green electricity (Lumijärvi et al., 2002). These labels are assigned to electricity generated from a renewable energy source, namely solar, wind, hydro and biomass (85% of renewable energy sources in Finland, see Alakangas, 2002), using specific criteria (see FANC 2004). Norppa usually is a premium priced product. The annual Norppa certified electricity production is circa 1.2 TWh, of which about 8% (100 GWh) was actually sold as 'Norppa recommends eco-energy' electricity in 2001.

'Efficient power' and 'efficient wind' refer to CHP and wind power production respectively. These trademarks are established by a group of Finnish energy companies in order to promote CHP (district heating) and wind technologies (not premium-priced). Under specific conditions efficient power and efficient wind can also carry the Norppa label.

### 1.2.3 Industry examples

There are two major electricity producers in Finland, namely PVO and Fortum. This section focuses on Fortum's activities in disclosing the technology mix and environmental impacts to the consumer.

#### *Fortum*

In Finland, all customers who have a Fortum Kesto electricity agreement receive environmental-labelled 'Norppa' electricity, which meets the criteria of the Finnish Association for Nature Conservation (FANC, 2004).<sup>34</sup> Fortum's customers of 'Norppa' electricity pay the same price as customers of regular electricity.<sup>35</sup> These energy products can be unambiguously linked to a certain energy source or to specified power plants. In Finland Fortum produces 'Norppa' electricity at Imatra and Myllykoski hydro power plants and at the biomass fired power plant at Uimaharju.

Apart from the environmental power brands described above, Fortum's power procurement is made up of many sources. In 2004 their Nordic power procurement consisted of: 87.6% own and partly owned power plants, 4.6% was imported from Russia, while 7.8% was from other purchased sources. The distribution by energy type of the imported electricity and other purchases are unknown. However, production at Fortum's own and partly owned power plants consisted of hydropower 35.2%, nuclear power 47.4%, combined heat and power production 8.7% (including 1.4% biofuels), and condensing power 8.8%. The primary fuels in combined heat and power production were various types of biofuels, coal and natural gas. Condensing power was mainly produced with coal.

The average emissions into the atmosphere from Fortum's own power procurement were: carbon dioxide 112g/kWh, sulphur dioxide 141 mg/kWh, and nitrogen oxides 192 mg/kWh.

## 1.3 References

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<sup>34</sup> See <http://www.fortum.com/document.asp?path=14022;14024;14026;14043;14116;14118;16005;16010&level=3>

<sup>35</sup> In Sweden Fortum offers 'Good environmental choice' labelled electricity according to the criteria set by the Swedish Society for Nature Conservation. In 2003 the total sales of 'Good environmental choice' labelled electricity amounted to 583 GWh.

14043;14116;14118;16005;16010&level=3

On RECS by Fortum: <http://www.fortum.com/document.asp?path=14022;14024;14026;14043;14116;14118;15985;15993;15994;16322&level=5>

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## Appendix J France

### J.1 Guarantees of origin

Guarantees of origin should be established within the coming framework law on energy. This law is presented by the French government as the result of public consultations on energy that was organised in 2003.

The debate resulted in the publication in November 2003 of a 'White book on energies' by Nicole Fontaine, former French delegate Ministry of Industry, which contains a law project. This project has undergone its second review in the Senate after the second review in the Assembly. No final agreement has been found on the text by the two chambers, and the text is to be examined in a joint commission on 9 June 2005. GO is dealt with in Article 9 of the law. The text can be considered as quite final as far as GO is concerned. However it is not detailed regarding the issuing conditions and specifications of GO. Nor does it state the price of the service. This will be done in a later decree. The text deals with GO for CHP as well as GO for renewable energy sources.

The issuing body will be the TSO or the DSO, depending on the grid to which producers are connected. GO can be issued also for non-grid connected producers and in this case, the TSO will be the issuing body. GO are voluntary; GO will be issued upon demand of the producers. RTE (the TSO) will be in charge of the register, which will be accessible to the public.

It is specified that when RES-E is being supported by feed-in tariffs, then the buyer of electricity also gets with the electricity the right to issue GO for the quantity bought. No other interaction with existing support schemes is described for the moment. Feed-in tariffs in combination with large calls for tender are the main tool for supporting RES-E.

Discussions with the Ministry of Industry show that GO are not intended to be used in the same way as green certificates. The Ministry applies the distinction that was made in the introduction of Directive 2001/77/EC between GO and tradable certificates. French GO are not foreseen to be tradable nor redeemable. The register will not lead to transfers. GO are not recognised a commercial value, which is, effectively, embodied by green certificates.

### J.2 Disclosure

The disclosure obligation from Directive 2003/54/EC was transposed in a Decree from the Ministry of Economy, Finances and Industry on 30 April 2004.

Disclosure is ex-post and is an obligation on all suppliers to end consumers. Since 1 July 2004, these suppliers have to indicate on their bill, or an attached document, the share of different primary energy sources that they have used in order to produce the electricity sold during the preceding year. Disclosure applies to the supplier's portfolio. Suppliers also have to indicate in which documents consumers can find information on the quantity of carbon dioxide emissions and/or radioactive waste per kWh produced from these primary energy sources.

Actors that are trading electricity on exchanges have to supply the market operator with the same information for each offer. The market operator then aggregates data for one year and establishes the breakdown for the different primary energy sources on this market. This information is then communicated to the market actors in order to use it to fulfil their disclosure obligation.

When electricity offers are certified by a system that has a legal basis, the market operators do not count this information in the general data and exclude the electricity from these yearly market statistics. The buyer of this electricity can use the certification in his disclosure obligation. When trading the electricity, the information and certification has to follow the electricity.

For 2003, the fuel mix shares were estimated on the basis of available data. After that, suppliers have to send the information on their global mix each year before 31 December. Agents from the Ministry or from the regulator CRE (Commission de Régulation de l'Energie) have the power to enquire in order to verify disclosed data.

### J.3 References

Texte adopté n° 409: *Projet de Loi adopté avec modifications par l'Assemblée nationale en deuxième lecture, 29 March 2005.*

Décret n° 2004-388 du 30 avril 2004 *relatif à l'exercice d'achat d'électricité pour revente aux clients éligibles et aux obligations des fournisseurs relatives à l'information des consommateurs d'électricité.*

## Appendix K Germany

Germany operates a support scheme based on a feed-in tariff, which includes an obligation for distribution system operators to buy electricity from RES at a minimum price defined in the law. The law also specifies how this electricity is distributed equally on a pro rata basis to all suppliers of electricity. A large part of the renewable energy generation in Germany is covered by this regulation, the main exclusion being existing large hydro power plants.

Shortly after the formal liberalisation of the electricity market in Germany in 1998, several private initiatives for quality labels for 'green power' have emerged in Germany. The largest market share (within the niche market for green power in Germany) was soon held by the TÜVs (Technische Überwachungsvereine), which are well established technical verification bodies.<sup>36</sup> The TÜVs established several certification standards, one of which can be seen as a Guarantee of Origin for electricity from hydropower, which at that time was the most important renewable energy source for electricity generation.<sup>37</sup> In addition to this, the RECS system was introduced in Germany in 2001. The Issuing Body is Öko-Institut, an environmental research and consultancy organisation, and two TÜVs are involved in this as Production Registrars. However, due to the strong feed-in support scheme, issuing activity in Germany remained low.

### K.1 Guarantees of origin

The requirements of Directive 2001/77/EC were transposed into German legislation through the revision of the Renewable Energy Law (Erneuerbare-Energien-Gesetz, EEG), which was enacted in 1 August 2004. The main regulations on the GO are contained in Article 17 of the revised law. The implementation of the GO can be qualified as a minimal approach and can be characterised by the following elements:

- Any person or organisation entitled to act as an environmental auditor in the field of electricity production under the EMAS scheme can issue GO in Germany (this applies to some 60 actors, including some TÜV organisations).
- The law does not specify the format of the GO, so both physical and electronic GO are possible.
- There is no formal accreditation procedure for power plants, nor are there any requirement to set up or use a central registry for plants registered or GO issued.
- In addition to the information content required by the Directive, German GO also need to specify whether the EEG support has been granted for the respective instance of generation. In case of biomass, the GO must specify whether the fuel used complies with the German Biomass Ordination.
- If EEG support has been granted, then GO may be issued, but they may not be passed on to anybody (Article 18).

Article 18 of the revised EEG contains a regulation that electricity from RES may not be sold or transferred more than once. However, there are no specific regulations in the law which prevent the possibility of fraudulent or erroneous multiple issuing and/or use of GO. This is of specific concern, because GO can be issued by a large number of actors. A recent proposal to solve this potential problem by registering all RES-E plants and all issued GO in a central registry has not yet been taken up by the government.

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<sup>36</sup> The TÜVs are organised in several regional branches. The most active branch is TÜV Süddeutschland.

<sup>37</sup> All other standards include specific requirements on the electricity products, which go beyond the plain Guarantee of Origin. These usually aim at ensuring that green power products contribute to the expansion of RES-E generation and limiting environmental impact of RES-E plants.

The equalisation mechanism contained in the EEG, which allocates the electricity fed in under the feed-in mechanism to all electricity suppliers, can not be facilitated by GO, because GO issued based on such electricity generation may not be passed on to any other party.

It is not clear yet how and when the requirements of Directive 2004/8/EC on the GO for cogeneration will be transposed into national law.

## K.2 Disclosure

The requirements of Directive 2003/54/EC on disclosure of generation attributes will be transposed into German legislation in the framework of the more general revision of the energy industry act. The second law on the revision of the energy industry act has been agreed between the two chambers of parliament in mid June 2005 and was expected to enter into force at the beginning of July 2005.

### K.2.1 Legal regulations on disclosure

The legal regulations on disclosure are contained in § 42 of the revised energy industry act. They are characterised by the following elements:

- Suppliers have to disclose information *ex post* to their customers on an annual basis. From 15 December onwards each year, information about the preceding year must be disclosed. This means that a period of nearly one year is granted to the energy industry in order to collect and process disclosure data.
- The fuel sources to be disclosed are defined as: nuclear, fossil and other fuel sources, and renewables.
- If electricity is bought from a power exchange or from a seller from outside of the EU, then aggregate figures about the preceding year provided by the power exchange or the electricity seller from abroad can be used, otherwise the UCTE energy mix can be used.<sup>38</sup> If it is not possible to clearly allocate a certain fuel source to an instance of electricity, then the UCTE energy mix must be used.
- Information about environmental effects relating to power generation must be given to the consumer together with the fuel source information, at least in terms of CO<sub>2</sub> emissions and nuclear waste. (This regulation goes somewhat beyond the minimum requirement in the Directive, which could be satisfied with a reference to certain sources of information about the environmental indicators, such as websites.)
- The information provided on the fuel sources and the environmental indicators must be presented together with the corresponding averages for power generation in Germany.
- Disclosure of the supplier portfolio is mandatory; additional disclosure of product information is optional for the supplier. However, if a suppliers discloses part of his supply as specific products, then all other customers must receive information about their 'residual product' as well.<sup>39</sup>

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<sup>38</sup> It is not fully clear from the text whether this refers to the national production mix for Germany provided by UCTE or to the overall production mix for the UCTE system. However, most parties involved agree that the national production mix should be used.

<sup>39</sup> This regulation is meant to avoid implicit multiple counting of certain parts of power generation. For instance, assume that a supplier has a green power product and (in addition to the company mix) discloses this product as 100% renewable to the green customers. If the supplier then provides the non-green customers only with information about the supplier portfolio, then these customers will implicitly assume that the renewable part of the company portfolio is also allocated to them on a pro-rata basis. However, this would in fact not be the case, because at least part of the renewable generation is allocated exclusively to the green consumers. If the supplier is obliged to disclose the 'residual product' to its non-green customers, i.e. the supplier portfolio minus the green product, then the non green customers receive accurate information and no implicit multiple counting would occur. Note that this regulation only applies if a supplier chooses to disclose at least one of its products separately. In all other cases the company mix is sufficient.

The law requires electricity generators and traders to provide the relevant information in order to enable suppliers to fulfil their disclosure obligations. However, the law does not specify details about how this should be done nor which tracking mechanism should be used. The law enables the government to issue an ordinance on details about the design of the information provided to consumers (disclosure label design) and on the tracking mechanism to be used.

### K.2.2 Electricity industry proposal for the implementation of disclosure

The association of the German electricity industry (Verband der Elektrizitätswirtschaft - VDEW) has established a working group in order to develop detailed proposals on how disclosure could be implemented. This process went on in parallel to the lawmaking procedure, and the proposed rules were published in June 2004 (VDEW/dena 2004).

The proposal addresses questions on how the information should be presented to customers, e.g. by presenting a selection of alternative standard layouts for disclosure labels. It also proposes a tracking procedure, which is characterised by three steps:

1. The first step uses the 'best available information approach' (which has also been suggested by Eurelectric) in order to assign disclosure information to all electricity with known origin. Different sources of information can be used for this step.
2. In a second step, the national average data from the UCTE statistics will be applied for all electricity with unknown origin.
3. Finally, the allocation procedure from the EEG support mechanism will be incorporated into the scheme, assigning all suppliers with an equal pro rata share of electricity from the feed-in system.

Most parts of these rules seem to be consistent with the legal requirements, although they had been issued one year before the legislation on disclosure has been passed. However, the VDEW proposal does neither support the display of environmental indicators nor the comparison of the disclosed information with national averages. These aspects will probably need to be adapted to the new legislation.

In any case, the VDEW rules are meant as recommendations only. There are no means of enforcing their consistent use by all parties in the electricity market.

### K.2.3 Concerns about multiple counting of attributes in the German implementation of disclosure

During the discussions about the proposals from the VDEW working group it has been criticised that the proposed tracking procedure would lead to multiple counting of attributes on one side, and loss of information on the other side. These concerns were based on two features of the proposed procedure:

- The parallel use of different sources of information for explicit (bilateral) tracking within the 'best available information approach'.
- The combination of explicit tracking based on the 'best available information approach' and the use of national average data (implicit tracking).

It has been argued that it would be necessary to create a consistent basis of information for explicit tracking and that any statistical data used for implicit tracking would need to be adjusted by those attributes which have been tracked explicitly.

These concerns also apply to the regulations on tracking contained in the revised German electricity industry act. This act specifies that data from the UCTE production mix must be used if an instance of electricity cannot be clearly allocated to a certain fuel source. Therefore, if the

statistical data is not corrected by those attributes, which have been tracked bilaterally, then the rules on tracking laid down in German legislation could lead to multiple counting of attributes.

### K.3 References

Second law on the revision of the energy industry act, as agreed between the two chambers of parliament on 17 June 2005 (not formally published yet).

VDEW/dena (2004): *Klartext auf der Stromrechnung - Der VDEW/dena-Lösungsvorschlag zur Stromkennzeichnung (Clarity on the electricity bill - the VDEW/dena proüposal for implementing electricity disclosure)*, June 2004.

## Appendix L Greece

### L.1 Guarantees of origin

At present (March 2004) in Greece, there is no national legislation or agreed draft documentation regarding a GO system.<sup>40</sup> The information contained below has been provided by feedback from the Greek Regulatory Authority for Energy (RAE) and the Centre for Renewable Energy Sources (CRES), where internal discussions on GO have begun. RAE and CRES recently provided official proposals on the application of GO following a formal request by the Ministry of Development. At present, the proposal is for GO to be issued on a national level by the Transmission System Operator (TSO) for the Greek interconnected mainland and through the Distribution System Operator (DSO) for the Greek islands autonomous grid systems. An alternative proposal is for CRES to be the Issuing Body, utilising data from the TSO and DSOs. RAE will be the body responsible for supervising implementation of the GO system.

The proposal is that GO will be issued monthly, possibly electronically, covering RES-E produced over a month and with a validity of one year. The unit to be used to express electricity amounts is not yet defined. However, it is possible that no standard size will be used. Aside from the information required by the Renewables Directive, a Greek GO may also include the nominal capacity of the station (for all energy sources), whether it is connected to the mainland transmission system or an autonomous Greek island grid, the amount of electricity covered by the GO (if the GO is issued for a hybrid station, only the net electricity production from RES will be issued with GO). The period of electricity production is proposed as a more suitable piece of information than the date of production. The issuing body will keep a register of GO, which in theory is openly available. The TSO and DSOs, or alternatively CRES, have been initially indicated as potential issuing bodies, under the supervision of RAE.

An accreditation process for RES-E generators is in place in Greece, and this may be used with the GO, with some modifications. CRES may be appointed as verification agent. No decision on verification of GO and sanctions for fraud has been made. It is expected that a charge will have to be paid for issuing of GO and verifying their validity. Producers will not have to be grid connected in order to obtain a GO. At present, the accreditation procedure for small producers is proposed to be the same as for large producers, however no lower limit on the size of eligible plant has been proposed.

The existing policy to promote RES-E is based on fiscal measures, fixed tariffs related to non-eligible consumer tariffs, and obligation of TSO to absorb all RES-E produced (priority dispatch) for 10 + 10 year period. It is not yet decided whether existing support instruments and GO will be independent, or merged, nor whether GO will be earmarked to denote support. The proposed GO process could allow trading of GO, nationally and internationally, if given government approval.

### L.2 Disclosure

We have no information in the status of disclosure of generation attributes in Greece.

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<sup>40</sup> This section is based on IT Power (2004), since we were unable to get update information on Greece.

### L.3 References

IT Power (2004): *RE-GO Analysis of Member States' Implementation of a System of Guarantee of Origin after 6 months: Monitoring report*. ITP/0801 August 2004.

## Appendix M Hungary

In accordance with the Directives of the European Union each non-household customers may buy energy as eligible customer both in wire and pipeline energy supply since 1 July 2004. Harmonization of the energy policy according to the European Union Directives is one of the current energy issues in Hungary.

### M.1 Guarantees of origin

In the current legislation there cannot be found any requirement for the establishment of a GO system. A national regulation on this issue has been proposed. Electricity produced from renewable energy sources and with the utilisation of waste materials can get a so-called green certificate.

The government plans to introduce a system of tradable green certificates, as soon as the market of renewable electricity has reached a critical mass for competition of 300-350 MW. In the transition period, there will be a fixed premium system for small-scale power plants based on co-generation or renewables. However, this step needs further legislative procedures and no date for its realization has been fixed.

### M.2 Disclosure

So far there is no legal requirement in Hungary to provide disclosure information to electricity customers. New legislation regarding this topic has been proposed but no enforcement date has been fixed yet.

## Appendix N Ireland

### N.1 Guarantees of origin

No specific legislation has been implemented or bodies appointed in Ireland for the introduction of GO.<sup>41</sup> However, in its 2003 report on the Renewables Directive to the European Commission, the Irish Government states that ‘the origin of RES-E generated ... can be guaranteed’ and therefore concludes that ‘this procedure is compliant as to the results to be achieved’. The report explains that the Irish Electricity Regulation Act 1999 provides the basis for compliance, as separate licensing regimes are in place for RES-E generators and suppliers and ‘brown’ electricity generators and suppliers. The independent regulator of the electricity and gas markets in Ireland, the Commission for Energy Regulation (CER), annually audits generation, imports and exports of RES-E and RES-E supplies to avoid any abuse of the fully liberalised RES-E market and to reassure the public/consumer.

The Irish Government has published a consultation document inviting public comment on future RES-E policy decisions, which includes the possibility of imposing ‘a more detailed [GO] procedure at a higher cost if the market requires it’ (Dept of CMNR, 2003). The CER is of the view that a renewable energy guarantee of origin (REGO) system should be put in place. Such a system has been established both in the UK and Northern Ireland, and thus would be consistent with an all-island market. The CER is willing to administer a REGO system.

Under the current regulation, no actual GO is to be issued. Instead, the regulation is designed to assure RES-E consumers the electricity product they have bought is associated with the generation of a comparable amount of RES-E in that year. National law requires all commercial generators and suppliers to secure an appropriate license to operate. The Irish RES-E market is fully liberalised since 2000 and is open to any interested party. Full liberalisation of the brown market is to be completed in 2005.

Ireland, quoting Recital 11 of the Renewables Directive, does not interpret GO as exchangeable certificates. RES-E is tradable under the license for generators and suppliers, as explained above. The licensing procedures in Ireland allow generators and suppliers to operate as RES-E generators or suppliers. RES-E suppliers are required to satisfy the CER annually that they are compliant with the balancing requirement. Accordingly a proportionate tracking system is in place to measure RES-E generated and sold by each RES-E supplier and to verify compliance to RES-E customers.

For historical and geographical reasons interconnection in Ireland is limited. The only direct interconnector to Ireland’s network is between Ireland and Northern Ireland, and from there, to Great Britain. In addition, plant close to the border of Ireland and Northern Ireland can connect to the grid in the other country. The energy regulators have a bilateral arrangement in place to monitor RES-E product transiting the international interconnector. RES-E generated within the State and RES-E imported/exported can thus also be verified under a proportionate tracking system.

However, there are some small differences between definitions used by the Renewables Directive and the Irish Electricity Regulation Act 1999. The latter licenses a ‘green’ supplier for electricity from ‘renewable, sustainable or alternative forms of energy’, which is defined as ‘energy used in the production of electricity which uses as its primary source one or a combination of more than one of the following (a) wind, (b) hydro, (c) biomass, (d) waste, including waste heat,

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<sup>41</sup> This section is based on IT Power (2004), since we were unable to get updated information on Ireland.

(e) biofuel, (f) geothermal, (g) fuel cells, (h) tidal, (i) solar, (j) wave'. This definition is different in three ways:

- The Renewables Directive has three added categories of renewables: landfill gas, sewage treatment plant gas and biogases. However, these categories are included in the Irish definitions of biomass.
- The Irish definition includes waste heat and fuel cells that are not included in the Renewables Directive's definition of renewables and should therefore not result in the issue of GO. No licenses for these generation technologies have been issued as yet; this generation would have to be (and will be) excluded from calculations for the purpose of demonstrating compliance with the Renewables Directive.
- Finally, the use of the term 'primary source' in the Irish definition could be explained as being a divergence from the Renewables Directive. However, there is no reason to believe that CER, whose responsibility it is to avoid abuse of the liberalised 'green' market, would not verify only the proportion of electricity produced from renewable energy sources in hybrid plants, and thus comply with the Renewable Directive. Indeed, it is being interpreted as the start up and/or reactive power component, which may be fossil-fired.

'The existing national arrangement is the least cost and lightest possible means of delivering the current objective [of the Renewables Directive].' There is no cost to the generators.

There is minimum interaction with other policies. Indeed the consultation of 2003 on RES-E issues talks about the 'limited function of the Guarantee of Origin' and concludes that 'the sole purpose of the guarantee is to allow producers to reassure consumers that the electricity purchased is associated with generated RES-E'. No provision has been made to date for a link with support mechanisms or an earmark to show previous financial support. Imported and exported RES-E does not have access to the national support mechanism, avoiding dual support.

In Ireland the GO is seen as reassuring consumers the product purchased is generated from RES-E. Any trade of GO is expected to occur as bundled with the electricity. The market regulators track RES-E crossing the interconnector to/from Northern Ireland and a mutual recognition arrangement for RES-E is in place between the relevant national regulators. By this means customers are reassured as required by the Renewables Directive and the system is operating with least administrative costs to the competent authority of the State and also with least administrative cost to generators and suppliers.

Standalone RES-E production plants not connected to the electricity network and not connected directly to any electricity consumer do not sell RES-E in Ireland. They are therefore excluded from any mechanism of trading and settlement for RES-E generators and suppliers.

Regarding the attitude towards tradable certificates, the Irish Authorities stated: 'A green credit regime is an additional or alternative support measure to competitive tendering (the national support mechanism). A Green Credits regime established in law is not without its costs, requiring administrative layers to deal with certification, balancing and preventing or detecting fraud. At this point in time Ireland is pursuing the AER model (the national support mechanism) as the most efficient tool at the national level to increase renewable energy based electricity generating capacity (RES-E). On the other hand, an EU or global trade in green credits does provide possibilities, which should not be lost to Ireland.'

A decision has been made to merge the markets of the Republic of Ireland and Northern Ireland, part of the UK, and create the All-Island market. Discussions are currently ongoing as to the required changes and the impact on existing national legislation. This is further complicated by the introduction from 1 April 2005 of the new system of the Northern Ireland Renewables Obligation (NIROC) and certificates to meet the obligation (NIROCs). The All-Island system will have to be able to track explicitly the electricity sold as green in Ireland and that receiving NIROCs.

## N.2 Disclosure

No regulation on electricity labelling and disclosure of generation attributes is known to the authors in Ireland. Whether activities have been started yet and until when regulation on disclosure may be put in place is not known.

## N.3 References

CER (2004): *Consultation on 'Options for future renewable energy policy, targets and programmes'*. Commission for Energy Regulation, 27 February 2004.

Dept. of Communications, Marine and Natural Resources (2003): *Options for future renewable energy policy, targets and programmes*. Consultation document. Department of Communications, Marine and Natural Resources in conjunction with Sustainable Energy Ireland. 19 December 2003.

First E-Track consultation workshop.

## Appendix O Italy

### O.1 Green certificates

A quota obligation system on the production side, based on a Green Certificate (GC) market has been put in place since the 1<sup>st</sup> of January 2001, according to article 11 of the Legislative Decree 16/03/1999 n. 79. In the GC market, demand is defined by the producers' and importers' obligation to inject into the power grid a proportion of electricity obtained from renewable sources. Such proportion is equal to 2% of the conventional electricity that producers and importers have generated or imported in the previous year. According to Legislative Decree 29/12/2003 n. 387, on promotion of electricity from renewable sources, the proportion of the renewable source obligation is increased every year by 0.35% from 2004 to 2006. The supply side of GCs is represented by:

- Private GCs: issued on the basis of the electricity generated by the plants GRTN has qualified as Plants Fed by Renewable Sources (IAFR).
- GRTN GCs: issued for electricity that GRTN purchases from renewable-energy plants commissioned after the 1<sup>st</sup> of April 1999.

In the GC system, the Gestore della Rete di Trasmissione Nazionale (GRTN) is in charge of:

- Qualifying, according to a specific technical procedure, power plants which are fed by renewable energy.
- Issuing GCs as a title proving the production of electric energy by renewable sources (1 Green Certificate = 50 MWh).
- Evaluating the quantity of renewable energy which has to be fed into the national electric system in order to fulfil the quota obligation.
- Checking the quota obligation fulfilment by the producers and importers of electric energy produced by fossil fuels.
- Fixing the price of GCs exchanged in the market.

As mentioned above, before issuing GCs, a preliminary qualification of power plants fed by renewable sources is performed in order to verify their characteristics and production capacity. After that step, GCs are issued according to one of the following ways:

- Ex post (or final balance), with reference to the production of energy made in the previous year: in this case GCs are issued in the generic year N on the basis of the real production of the year N-1, considering the official tax declaration of the producer.
- Ex ante, with reference to the current year N or to the successive year N+1: the amount of GCs is calculated on the expected production in the whole year N or in the year N+1. As soon as the final balance of the production is known, the producer has to communicate the real data to GRTN which makes a clearing of the GCs issued.

Green Certificates can be sold or purchased in two different ways 1) through bilateral contracts, and 2) through a web trading platform managed by GME (Gestore del Mercato Elettrico, a company 100% controlled by Gestore della Rete di Trasmissione Nazionale). To give an idea of the GCs issued and exchanged, in 2004 the amount of GCs necessary to satisfy the obligation was 3.97 TWh (which is 79,488 GCs), while the amount of 'private' GCs due to the production of 'green' energy by qualified power plants was 2.90 TWh (which is 58,000 GC). As a consequence, GRTN issued 21,400 GCs (corresponding to the difference of 1.07 TWh) in order to balance demand and supply. GRTN sold these GCs at a price of 9.739 €/kWh (4,869.50 €/GC without considering V.A.T.), determined by considering the cost of the feed-in tariff system.

## O.2 Guarantees of origin

The GO qualification has been introduced at the beginning of 2004 by article 11 of the Legislative Decree 29/12/2003 n. 387 which has also appointed GRTN as responsible for the entire process of issuing GO for electricity produced by the renewable sources specified in the Decree itself. The GO system has entered into full operation at the beginning of 2005 after the issue of the first GO in March 2005. Though GO have some aspects in common with GCs, they do not have a commercial value. In fact, GO simply certifies the origin of renewable energy and it is issued only if the yearly net production of the power plant is at least 100 MWh (1 GO = 100 MWh).

Guarantees of Origin issued in Italy report:

- location (identification) of the power plant which produces ‘green’ energy,
- renewable sources and technology used for production,
- rated power and net year production of the power plant,
- the specification -only if required by the producer- of possible GCs obtained by the producer itself.

According to article 11, paragraphs 10 and 11 of the Decree, Italy recognizes:

- GO of electric energy from renewable sources issued in EU countries.
- GO of electricity from renewable sources issued in non EU countries as long as they have entered into a specific agreement with Italy. In this case, the conditions the issuing body has to comply with have to be defined together by the Ministry of Industry and the Ministry of the Environment and the foreign Ministries.

It is also worth noticing that GO energy imported in Italy is exempted from the fulfilment of the quota obligation based on GCs (article 20, paragraph 3 of Legislative Decree 387). As with GCs, in the case of GO, GRTN is responsible for the:

- Identification of power plants fed by renewable sources, according to a written technical procedure. Power plants previously qualified for GCs may follow a simplified process for being identified. Renewable sources for GO are the same ones specified for GCs, with the sole exception of *industrial and city waste*: in this case, only the biodegradable part of waste is eligible for receiving the GO.
- Issuing of GO for the production in a generic year for this purpose the producer has to send the official tax declaration by the end of March in the next year.

## O.3 CHP

The Legislative Decree 16/03/1999 n. 79 decrees that the Regulator for Electricity and Gas (AEEG) is in charge to lay down conditions on which CHP can be considered *cogeneration*. Accordingly, on March 2002, AEEG has ruled (Act n. 42-02) that a plant produces in *cogeneration* if its *energy saving index* (IRE) and its *thermal limit* (LT) exceed two respective thresholds. IRE is the percentage of fuel saving that a plant has achieved during the previous year. The fuel saving is assessed by comparison with two fictitious plants, one of which only produces power, and the other only produces heat. IRE is similar to PES (primary energy saving) defined in Annex III to Directive 2004/8/EC. However, unlike PES, IRE also takes into account the saving, if any, that the CHP plant has achieved by avoiding, wholly or partially, power losses due to transformation, transmission and distribution of power. The thermal limit LT index is the ratio of heat to the total amount of energy (heat and power) produced. Also for the LT index a minimum threshold is stated, so as to reject plants producing a very small amount of heat.

Laws presently in force in Italy state the following benefits, among others, for power produced by power plant recognized as cogeneration:

- no obligation to purchase GCs,

- priority of dispatching, after power produced by RES (Renewable Energy Sources),
- issuing of Certificates of Energy Efficiency, which can be sold,
- guaranteed purchase (at high prices) of electricity produced by small (less than 10 MVA) cogeneration plants.

Parties wishing to benefit from the above must declare each year to GRTN the amount of power and heat produced during the previous year, and the amount of fuel consumed to produce them. Technical information such as functional diagram, rated power of machinery, methods of measurement, etc. should be enclosed with the request. By using those data, GRTN ascertains that IRE and LT indexes exceed the respective minimum thresholds. Sample auditing is carried out in CHP plants, in order to verify that the declarations are truthful.

## O.4 Disclosure

At the moment, there is no national legislation to implement the labeling provision of Directive 2003/54/EC. Presumably the Ministry of Productive Activities (former Ministry of Industry and Trade) is responsible for the topic.

## O.5 References

Decreto Legislativo 16/03/1999, n° 79 - Attuazione della Direttiva 96/92/CE recante norme per il mercato dell'energia elettrica.

Decreto Legislativo 29/12/2003, n° 387 - Attuazione della Direttiva 2001/77/CE sulla promozione dell'energia elettrica prodotta da fonti rinnovabili.

Delibera n. 42/02 AEEG: Condizioni per il riconoscimento della produzione combinata di energia elettrica e calore come cogenerazione ai sensi dell'articolo 2, comma 8, del decreto legislativo 16 marzo 1999, n. 79.

Procedura per il rilascio della Garanzia d'Origine dell'energia elettrica prodotta da fonti rinnovabili ([www.grtn.it](http://www.grtn.it)).

Procedura tecnica di qualificazione impianti alimentati da fonti rinnovabili ([www.grtn.it](http://www.grtn.it))

Rapporto sulle Attività del GRTN 2004 - 2005: Bozza

## Appendix P Latvia

High dependency on import of primary energy resources from Russia was one of the major concerns in Latvian energy policy. Therefore the efforts of government were directed to stimulating the use of indigenous and renewable energy sources. The National Energy Program (approved in 1997) until the year 2020 gives priority to the rational use of energy resources, the development of renewable energy sources, the energy diversification and the restructuring of the energy sector. The program sets forth a set of measures for stable provision of Latvia with energy resources to meet quality and quantity requirements of consumers and with minimal impact on the environment. Increasing the use of local electricity production from RES is key issue in the National Energy Program. However, no particular targets for energy production from RES were defined. The National Energy Program should be updated every five years.

### P.1 Guarantees of origin (Legislation on renewable energy)

The Law on Energy, which was approved in October 1998, sets up a structural framework of rules and licensing for energy industry regulation and is designed to promote competition, introduce transparent pricing and develop new energy sources, including renewables. The Energy Policy in the Electricity Sector, which was adopted by Cabinet of Ministers in September 2001, sets the objective to foster the promotion of the use of renewable and indigenous energy resources, which corresponds to approximately 6% of renewable electricity (with large hydro power plants excluded) in the balance of the total electricity consumption. The indicative target for Latvia in 2010, in the framework of the Directive 2001/77/EC, is 49.3% of RES-E (against 42.4% in 1997).

In 2001, the Law on Energy was amended, particularly with regard to the use of RES in Latvia. On the basis of this law, the Cabinet of Ministers adopted a number of regulations in 2002:

- Regulations on the total capacity for installation in 2002 and specific volumes for each type of electricity production, if RES are used for electricity generation (Regulation No.28). These regulations allow the government to set annual quotas for the total power capacity regarding the development of new facilities, utilizing RES for electricity production. Within this quota a certain amount is assigned to each particular RES. In the year 2002 the quota was set at 30 MW.
- Regulations for the installation and dislocation of electricity production capacities if RES are used for electricity generation (Regulation No.29). These regulations take environmental considerations into account and set the conditions under which the installation of a new facility is permitted or prohibited in regards to environmental protection.

Till January 2003 Latvia had a feed-in tariff which was double the average electricity price and which could be granted for a period of 8 years after grid connection. From 1996 to 2002, Latvia experienced significant growth in renewable energy projects as developers took advantage of the so-called double tariff. This tariff was very successful in promoting RES, especially in the small hydro power sector, where the annual electricity production increased from 2.5 to 28 GWh in the period 1996-2002.

As from January 2003 the tariff for small-scale hydro power plants and wind farms is much lower than before and sometimes must be approved and/or negotiated by the Public Utilities Commission (PUC). Currently, the Law on Energy sets mandatory requirements for the licensed electricity from:

- Small scale hydropower plants (<2 MW) and wind turbine generators both launched by January 1, 2003, for 8 years, for a price that corresponds to double average electricity sales tariff. Thereafter, the purchase price will be determined by the PUC.
- Energy facilities that utilize household waste or biogas (<7 MW and launched by January 1, 2008), for 8 years, for price that corresponds to average electricity sales tariff.
- Wind turbine generators (erected after January 1, 2003), biomass, including wood and peat, biogas, solar, sea tide and geothermal energy for the market price or the price determined by the PUC.

Since 2002, a quota system for renewable energy development is in force. Each year the Cabinet of Ministers defines the total amount of allowed newly installed RES-E capacities. For example, in 2004, total capacity for electricity production using renewable or indigenous energy sources is 2 MW: 1 MW for electricity production from biomass, wood or peat and 1 MW for production of electricity using waste or biogas. The quotas defined are typically very small; from 30 MW in 2002 to 2 MW in 2004.

The electricity generation in CHP plants, as one of Latvian energy priorities, are integrated in the Energy Law and its amendments. In January 2002 ‘Requirements for CHP plants and the procedure of setting the price for the purchase of excess electricity’ (Regulation No.9) were adopted. These regulations set a higher power purchase price if indigenous energy sources are utilized. In this case it obliges the electricity distributor to purchase all electricity generated in CHP plants at this particular price under the conditions a) the CHP plant supplies at least 75% of the thermal energy produced in the cogeneration cycle to a district heating system and b) uses the cogeneration cycle with fuel efficiency not less than 80%. If these conditions are not met the electricity may be purchased at an agreed price. The price for electricity surplus from CHP plants depends on the fuel (renewable/fossil) and installed capacity.

Table P.1 *The price for electricity surplus from CHP in Latvia*

Installed capacity CHP using RES [MW]	CHP using fossil fuels
< 0.5	Average sales tariff multiplied by 1.12 Average sales tariff multiplied by 0.9
0.5 - 4	Average sales tariff multiplied by 0.95 Average sales tariff multiplied by 0.75
> 4	Tariffs shall be set by the PUC Tariffs shall be set by the PUC

The Law on Electricity Market, which was approved in May 2005, states that an institution authorised by Cabinet of Ministers shall issue the guarantees of origin. The Cabinet of Ministers shall specify procedures for the issue of GO.

## P.2 Disclosure (Market opening)

Guided by the EU Electricity Directive, in October 2000, the Latvian government approved a plan for the reorganisation of the utility, in order to prepare it for free market conditions. A separate transmission system operator has been established and in 2003 the right to choose electricity supplier was established for those consuming more than 20 GWh per year. The degree of electricity market opening was 17%. Since 1 July, 2004 all non-household consumers are eligible. Full market opening is foreseen in July 2007.

There are no provisions for disclosure of generation attributes in Latvia.

### P.3 References

- Cabinet of Ministers (2001). Energy Policy for Electricity Sector, approved on 11 September 2001  
<http://www.iea.org/textbase/pamsdb/detail.aspx?mode=jr&id=1454>  
[http://www.em.gov.lv/em/images/modules/items/item\\_file\\_291\\_energpoliuzMK011101.doc](http://www.em.gov.lv/em/images/modules/items/item_file_291_energpoliuzMK011101.doc)
- Law on Electricity Market (2005), adopted 5 May 2005  
<http://www.ttc.lv/New/lv/tulkojumi/E0850.doc>
- Law on Energy (1998). Vēstnesis, No. 273 22 09 1998  
<http://www.sprk.gov.lv/index.php?id=1115&sadala=192>
- Public Utilities Commission (2004). Annual Report 2003.  
[http://www.sprk.gov.lv/doc\\_upl/Annual\\_Report\\_2003.pdf](http://www.sprk.gov.lv/doc_upl/Annual_Report_2003.pdf)
- Regulations for the installation and dislocation of electricity production capacities if RES are used for electricity generation (2002). Regulation No. 29, adopted 15 January 2002  
<http://www.sprk.gov.lv/index.php?id=1121&sadala=192>
- Regulations on total installation capacities in 2002 for each type of electricity generation if RES are utilized for electricity generation (2002) Regulation No. 28, adopted 15 January 2002  
<http://www.sprk.gov.lv/index.php?id=1120&sadala=192>
- Regulations on total installation capacities in 2003 for each type of electricity generation if RES are utilized for electricity generation (2003). Regulation No. 545, adopted 30 September 2003  
<http://www.ttc.lv/New/lv/tulkojumi/E0599.doc>
- Requirements for CHP plants and the procedure of setting the price for the purchase of excess electricity (2002). Regulation No. 9, adopted 8 January 2002  
<http://www.sprk.gov.lv/index.php?id=1119&sadala=192>

## Appendix Q Lithuania

The National Energy Strategy, which was adopted by Seimas (Parliament) on 10 October 2002, sets the main strategic priorities of the State energy policy and Lithuanian energy sector development. One of the main strategic priorities is to achieve a state in which renewable energy sources in the total primary energy balance would make up to 12% by 2010.

### Q.1 Guarantees of origin (Legislation on renewable energy)

The main objectives of the State in energy regulation according to the Law on Energy, which was approved in May 2002, are security of energy supply, energy efficiency, reduction of negative environmental impact, promotion of fair competition, promotion of consumption of indigenous and renewable energy resources.

The main tasks of the State and municipal institutions, managing the energy sector and regulating and controlling the energy sector activities, are ensuring optimum structure of the energy sector, creating preconditions for efficient activities in the energy sector, ensuring uninterrupted energy supply and stability of the established quality parameters, promoting energy efficiency, promoting consumption of indigenous and renewable energy resources, and encouraging enterprises to carry out energy audits. This Law also establishes the Government or its authorised institution, the Ministry of Economy, the Ministry of the Environment, and municipalities as the relevant institutions managing the energy sector.

In July 2000, the Seimas approved the Law on Electricity. This Law establishes basic principles regulating the generation, transmission, distribution and supply of electricity taking into account legal requirements of the European Union. It establishes the relations between suppliers of electricity and customers as well as conditions for the development of competition in the electricity sector. The main objectives of the Law on Electricity are

- To ensure public service obligations related to public safety, environmental protection and electricity generation using indigenous, renewable and waste energy resources.
- To establish objective, comprehensive and transparent requirements and obligations in the electricity sector.
- To promote the environment friendly technologies in generation, transmission and distribution of electricity.

The electricity sector is regulated by the Government or its authorised institution and by the National Control Commission for Prices and Energy.

Together with a set of secondary legislation, the Law on Electricity comprises an important framework encouraging green electricity production in Lithuania. The List of Public Service Obligations, issued in December 2001, indicates that public and independent suppliers of electricity as well as eligible customers engaged in electricity import have an obligation to purchase and sell electricity produced from renewable and waste energy resources. The rules for promotion of green electricity indicate that:

- The purchase of electricity produced from renewable and waste energy resources in electric installations with an installed capacity below 10 MW (amended to 20 MW in August 2002) shall be promoted.
- Electricity generated from renewable and waste energy resources shall be purchased at long-term rates differentiated in relation to the type of renewable and waste energy sources being used, as set by the National Control Commission for Prices and Energy.

- The grid operator must ensure the transportation of electricity generated from renewable and waste energy sources primarily via electricity transmission grids (where the transmission capacity is limited).
- The payment for the reserve capacity at prices fixed by the National Control Commission for Prices and Energy shall not apply to small power stations (< 10 MW and amended to < 20 MW in August 2002) using renewable and waste energy resources.

According to the licensing rules for the power sector, the company carrying out the duties of electricity market operator is obligated:

- To ensure equal and non-discriminatory conditions for all suppliers purchasing electricity produced using renewable and waste energy sources.
- To give priority to the producers using indigenous, renewable and waste energy sources, if the same prices of electricity sale are offered at the auction by several market participants.

The National Control Commission for Prices and Energy approved in February 2002 the average purchase prices of RES-E. Prices are 5.79 €/kWh for hydro power, 6.37 €/kWh for wind power and 5.79 €/kWh for biofuel. Average purchase prices for other types of RES-E should be settled by separate decision of the Commission and could be differentiated.

In January 2004, quantities of RES-E (wind, biomass, solar and hydro power plant below 10 MW) for the period 2004 - 2009 to be supported by purchase prices were established. In March 2004, the Ministry of Economy approved the forms of power plant fuel balance. These forms should be compiled by producers using renewable and waste energy sources except producers which have possibility to use only one type of fuel. The green certificates system will be implemented in Lithuania by 2010.

On 14 October 2005, legislation concerning guarantees of origin of RES-E entered into force in Lithuania. These rules state that GO will be issued by the TSO. The TSO has created a database by 31 December 2005. RES-E production eligible for GO are wind power, hydropower, biomass, biogas, solar energy and geothermal energy.

GO will include information on identity of production plant, the amount of produced electricity in kWh, type of energy source used for electricity production, the capacity of hydropower plant, whether electricity is produced at a hydropower plant, the dates and the place of generation.

GO will be used for statistical purposes and for facilitating the RES-E support mechanism. GO will also be used for disclosure of generation attributes. Moreover, GO will enable producers of green electricity to demonstrate that the electricity they sell is produced from renewable energy sources.

## Q.2 Disclosure

Since 1 January 2002, radical changes in the Lithuanian power system have been introduced. The Law on Electricity entered into force, created new and in principle different relationships and provided for gradual liberalization of the electricity sector. On 1 April 2002, the Lithuanian electricity market started operating. The National Control Commission for Prices and Energy granted the status of eligible customers to 12 companies (consuming more than 20 GWh of electricity) with a right to choose the supplier and to purchase electricity from the selected producers. In addition trading of electricity at the auctions was launched.

The implementation of a competitive market has been started in the sectors of electricity generation and supply, where prices are set in auctions or determined by bilateral agreement between the parties. The National Control Commission regulates the activities of the transmission network operator by setting the price caps for transmission services. The market operator organizes

trade in electricity according to the Electricity Trading Rules. Distribution companies perform two functions: that of a distribution network operator and of a public supplier. The National Control Commission sets price caps for distribution services for a three-year period. For the year 2003, the status of eligible customer (consuming more than 9 GWh) was granted to 25 consumers. Their share was about 26% of total electricity sales. Eligible consumers may freely conclude electricity contracts with any licensed producer or supplier and pay a set price for the electricity transmission and distribution. In 2003, the electricity trading balance was 70% by bilateral contracts, 12% at auction and 18% as Public Service Obligations.

On 1 January 2004, the Government set a new consumption limit (3 GWh) for eligible customers, hour-to-hour balancing was implemented for electricity export, and the automatic electricity accounting system was implemented. At the beginning of the year opening of electricity market has increased to 40% and since 1 July 2004 all non-residential customers are eligible. Thus, about 70% of the electricity market is currently open. The electricity market will be open fully in 2007.

There are no provisions for disclosure of generation attributes in Lithuania.

### Q.3 References

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## Appendix R Luxembourg

### R.1 Guarantees of origin

GO implementation in Luxembourg is found in a modification, on 22 February 2004, of the electricity law of 24 July 2000 (Loi relative à l'organisation du marché de l'électricité). Article 4 of that law reads as follows:

- 1. Pour l'électricité produite à partir de sources d'énergie renouvelables, il est établi un système de garantie d'origine.*
- 2. La garantie d'origine mentionne le nom, l'adresse et la qualité du producteur, la source d'énergie à partir de laquelle l'électricité a été produite, contient le relevé des quantités d'énergie électrique injectées dans le réseau électrique d'un gestionnaire de réseau et indique la puissance installée de l'installation de production, son emplacement ainsi que la date de sa mise en opération.*
- 3. Le régulateur établit et délivre, sur demande, la garantie d'origine. La demande a pour but de permettre au producteur d'électricité utilisant des sources d'énergie renouvelables d'établir que l'électricité qu'il vend est effectivement produite à partir de sources d'énergie renouvelables et lui servira de certificat par rapport à l'Administration.*
- 4. A cette fin, le régulateur peut requérir de chaque gestionnaire de réseau et de chaque producteur d'électricité basée sur les sources d'énergie renouvelables de lui fournir tous documents ou informations nécessaires. Après notification à l'exploitant, le régulateur peut procéder à des contrôles sur le site des installations de production en question.*
- 5. Sauf en cas de fraude constatée, une garantie d'origine délivrée par un organisme compétent d'un autre Etat membre, conformément à la directive 2001/77/CE, est d'office reconnue par le régulateur.*

The regulator Insitut Luxembourgeois de Regulation (ILR) will set up detailed implementation rules. However, no progress has been made so far. Following the intention of the Renewables Directive the suggested GO system in Luxembourg primarily aims to facilitate RES producers to prove that the electricity they sell is renewable. In view of the low interest of the voluntary markets towards GO the main purpose of GO is seen in supporting the operation of the bonus system administered by the Ministry of Environment. Bonus payments can be based on the submission of GO. Beside that, GO are seen as a measure to increase market transparency for final consumers. It is further seen as a possible precursor for the introduction of an internal market for green electricity based on a system of tradable renewable energy certificates.

GO in Luxembourg will specify information about the renewable energy source, the installed capacity of the facility (the Renewables Directive requires specification of capacity only for hydro plants), and the electricity volume it stands for. Going beyond the minimum requirements by the Renewables Directive GO will also specify the name and address of the respective plant operator as well as the location and the commissioning date of the production device. Moreover, ILR is considering to include an earmark as to whether a RES device has received any public support (e.g. feed-in tariff or bonus payment). It has not been decided yet in which frequency GO will be issued (probably once a year for the annual production of a RES device), and it is

not clear yet whether GO will have a standardised size (e.g. 1 MWh) or whether they will differ in the amount of electricity they represent.

As no hybrid stations are operated in Luxembourg no procedures have been developed to handle these. With respect to pumped storage, there is currently only one plant operating in Luxembourg. As this has no natural inflow and as no renewable electricity will be utilised for pumping, the plant will not be eligible to receive GO.

GO will be issued on request of the operators of RES devices. Institut Luxembourgeois de Régulation has been appointed as Issuing Body. GO are based on the amount of renewable electricity fed into the public grid. Electricity consumed by a RES device (e.g. a hydro plant) and supplied by the public grid will not be balanced with the electricity fed into the grid. RES generators have to notify meter readings to the ILR. These will be double-checked with meter reading data of the operators of the respective distribution grid (verification).

It is envisaged to establish a central registry for all GO. The registry will be operated by ILR. The registry is supposed to cover all issued GO. Once a Guarantee of Origin will be issued it shall cause a record in the registry. No detailed plans on the structure and the system rules (e.g. who will be account holders, will market participants be obliged to use the registry, organisation of issue, transfer, redemption, etc.) are available yet.

Lacking any interest from the voluntary market so far, the main purpose of GO (for the time being) is seen in supporting the bonus system for renewable electricity in Luxembourg. Under the bonus scheme the Ministry of Environment grants eligible RES devices specific bonus payments per produced kilowatt-hour. The bonus is paid annually. RES operators have to apply for the bonus payments at the Ministry of Environment. The ongoing application procedure is based on a data set providing information on the RES device such as its location and its production rate (the latter is based on a statement of the grid operator). Apart from this procedure, which will also be valid in future, RES operators will be able to submit GO (which will carry all required information) as proof of origin that the respective electricity volume was generated. GO which have been submitted to the Ministry in order to qualify for in the bonus system will be redeemed. No detailed rules on how redemption will be organised have been established so far. Respective rules (in order to avoid multiple counting) will be due to discussions between ILR and the Environmental Ministry. Generally no rules to exclude multiple counting have been developed yet. This mainly applies to RES devices that are not eligible to the bonus scheme (in which redemption is envisaged to be centrally organised).

With the revision of the electricity act Luxembourg has introduced an accreditation procedure for electricity production facilities. Whereas production devices based on conventional energy sources have to undergo an authorisation process (applications have to be submitted to the respective ministry) operators of RES-E devices need to submit a plant declaration to the regulator. This declaration must contain information about the location of the plant, the plant operator, the energy source, the installed capacity, the projected production rate, and the grid connection. Each change has to be notified to the regulator. Verification of the system will be the responsibility of the IRL. So far no plans have been developed how to implement efficient verification in order to guarantee a reliable system.

Setting up the system will not be costly because there are less than 2,000 RES devices (mainly small private PV plants) which need to be covered. ILR will charge no fees for issuing GO. Additional costs that ILR incurs for this task (e.g. additional personnel costs) will be covered by the ILR budget, which is split between the grid operators in Luxembourg.

The GO system in Luxembourg is mainly aiming to be supportive to the bonus system. As outlined above, ILR considers earmarking GO as to whether renewable electricity has been fallen under a public support scheme.

No proposal has been developed yet how to set up the interface between the GO system in Luxembourg and in the neighbouring countries. GO imports will only be recognised in the Luxembourg system if the exporting country has adopted appropriate legislation that complies with the requirements of the Renewables Directive. It is assumed that all MS that have implemented a GO system will fulfil this requirement. It is not clear yet what recognition will mean to that regard. It is not foreseen to open the bonus system to electricity imports from neighbouring countries.

The GO and RECS systems co-exist. There is no defined interface for transferring GO into the RECS system or vice versa. No rules address the problem of multiple counting between the two systems. Thus it cannot be excluded that RES generators that are members of the RECS system apply for both GO and RECS certificates. Despite the fact that this problem has been identified it is not clear yet whether it will be appropriately addressed in future.

## R.2 Disclosure

The Electricity Directive is (still) not transposed and not even a formal position on ‘information disclosure’ has been drafted. Anyhow, with a large majority of electricity imported from Germany and only little local production, Luxembourg will have to align more or less to whatever the system will be on that side of the border.

For a country like Luxembourg the disclosure of generation attributes information is highly dependent on information provided by Germany (or rather German companies), since a large share of electricity supplied in Luxembourg is imported from Germany.

## R.3 References

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## Appendix S Malta

### S.1 Guarantees of origin

Law nr. 186 of 2004 deals with the ‘Promotion of Electricity produced from Renewable Energy Sources Regulations, 2004’. This law follows from the Malta Resources Authority Act 2000. Article 5 deals with guarantees of origin of electricity produced from renewable energy sources:

- (1) *The competent authority shall issue guarantees of origin of electricity produced from renewable energy sources in response to a request made to it.*
- (2) *The competent authority may designate a competent person or persons, independent of generation or distribution activities, to supervise the issue of such guarantees of origin.*
- (3) *A guarantee of origin shall*
  - (i) *specify the energy sources from which the electricity was produced, the dates and places of production, and in the case of hydroelectric installations, indicate also the capacity*
  - (ii) *enable producers of electricity from renewable energy sources to demonstrate that the electricity they sell is produced from renewable energy sources within the meaning of these regulations.*
- (4) *Guarantees of origin, issued by other Member States of the European Union shall be recognised as proof of elements referred to in sub-regulation (3). Any refusal to recognise a guarantee of origin as such proof, in particular for reasons relating to the prevention of fraud, must be based on transparent and non-discriminatory criteria.*

The regulator Malta Resources Authority (MRA) is designated as the competent authority to issue GO, although this role may be delegated.

Electricity produced from renewable energy sources means electricity produced by plants using only renewable energy sources, as well as the proportion of electricity produced from renewable energy sources in hybrid plants also using conventional energy sources and including renewable electricity used for filling storage systems, and excluding electricity produced as a result of storage systems. Renewable energy sources are wind, solar, geothermal, wave, tidal, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases.

Moreover, Article 3 of the same law stipulates that not later than 27 June 2005, the MRA shall submit a report identifying feasible national indicative targets for future consumption of RES-E for the next ten years. This report should also propose measures to be taken to achieve these national indicative targets.

### S.2 Disclosure

Also by virtue of the Malta Resources Authority Act 2000, Law number 511 of 2004 addresses ‘Electricity Regulations 2004’, including the translation of the labeling provision of the EU Electricity Directive. Article 23, *inter alia*, states that:

- (2) *Final customers shall be provided, by their supplier, with the following information in or with the bills and in promotional materials*
- (i) *the contribution of each energy source to the overall fuel mix of the supplier over the preceding year*
  - (ii) *at least the reference to existing reference sources, such as web-pages, where information on the environmental impact, in terms of at least emissions of CO2 resulting from the electricity produced by the overall fuel mix of the supplier over the preceding year, is publicly available.*  
*The supplier may be audited by the Authority to ensure that the information provided to his customers pursuant to this sub-regulation is reliable.*

This law also prescribes that new generating capacity shall not be constructed without an authorization granted by the MRA. Moreover, monopolist Enemalta Corporation (EMC) is designated the distribution system operator in Malta (EMC also operates the two fossil fuel power stations in Malta).

### S.3 References

Electricity Regulations (2004): Law number 511 of 2004. Malta Resources Authority Act 2000.

Malta Resources Authority website. <http://www.mra.org.mt/>

Promotion of Electricity produced from Renewable Energy Sources Regulations (2004): Law number 186 of 2004. Malta Resources Authority Act 2000.

## Appendix T Netherlands

### T.1 Guarantees of origin

#### T.1.1 Predecessor of GO

The Dutch Transmission System Operator TenneT has been operating a system of Tradable Renewable Energy Certificates (TREC) since the introduction of an ecotax exemption for consumers of RES-E in 2000. Suppliers of green electricity had to redeem certificates in this system in order to prove that they have acquired the proofs of origin for a certain volume of RES-E and for this volume, their customers were exempt from the ecotax.

The operation of the Dutch Green Certificate system was passed on to CertiQ, a subsidiary of TenneT. This system can be seen as the blueprint for the development of the RECS system. The Dutch system of ecotax exemption accepted imports into the Netherlands under the following conditions:

- The production device must meet certain eligibility criteria (e.g. hydro power is excluded).
- The production device must be accredited to the Dutch certificate scheme.
- The importer must prove that he has acquired sufficient interconnector capacity to import the physical electricity together with the certificates into the Netherlands.

The ecotax exemption per kWh consumed has subsequently been reduced (in January 2004) and abandoned completely in January 2005. In parallel to this, the Netherlands increased the payments to domestic generators, which are similar to a premium-based feed-in system (these MEP payments are administered by EnerQ, another subsidiary of TenneT).

#### T.1.2 Transformation into the GO system

Since January 2004, the green certificate system has been transformed into the new Dutch GO system. This system handles two types of certificates in parallel, which both can be either from domestic production or imported:

1. Standard GO, which do not qualify for MEP payments.
2. GO, which qualify for MEP payments (for imports, this is based on reciprocity criteria).

By handling both types of certificates in one system, multiple counting of RES-E can be avoided. The eligibility for the ecotax exemption is recorded within the certificate registry in the form of flags on eligible GO. The production subsidy for domestic RES-E generation ('MEP payments') is also administered based on the GO system. The stringent accreditation process, which was used for the Green Certificate system, is also used for GO. The validity period of GO is one year. Dutch GO carry more information than required by the Renewables Directive, such as serial numbers and an indication of financial support received. The Netherlands (CertiQ) uses the EECS standard for cross-border transfer of GO.

#### T.1.3 Certificates for CHP

As from 1 July 2003, a system of CHP certificates is introduced.<sup>42</sup> Dutch CHP certificates<sup>43</sup> are not tradable and solely serve to pay MEP subsidies. Therefore, CHP certificates cannot be used

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<sup>42</sup> The Electricity Act also contains provisions for stimulating climate-neutral electricity (Dutch abbreviation KNE) via certificates. However, up till now, no such KNE has been identified.

<sup>43</sup> Dutch legislation and regulations talk of certificates instead of GO for CHP.

a proof for supply of environmental friendly electricity. Initially, certificates were issued based on plant efficiency. Since 1 July 2004, the number of certificates for CHP electricity is related to the environmental score or so-called CO<sub>2</sub>-index of the CHP plant. The CO<sub>2</sub>-index determines the level of carbondioxide-neutral CHP electricity.

For CHP that completely consists of gas turbines, this CO<sub>2</sub>-index is set by a standardised table of the Ministry of Economic Affairs. CertiQ determines the amount of certificates for these plants, based on metering information received by the grid operator. For other CHP plants, the producer delivers a metering protocol (a verified metering report) to CertiQ, which is used as a basis to determine the CO<sub>2</sub>-index and the number of certificates.

## T.2 Disclosure

Articles 95j, 95k and 95l of the Dutch Electricity Act (Elektriciteitswet 1998, version of 20 July 2004) serve to implement disclosure of generation attributes as required by EU Directive 2003/54/EC. As of January 2005 *ex-post* labelling of electricity ('stroometikettering') is obliged in the Netherlands.

The electricity supplier should specify the share of each energy source in the total fuel mix of the supplier in the preceding year to their final customers. This should either be done 1) in or with the bill and in promotional materials no later than 3 months after the 1 January or 2) in or with the bill for the period for which the bill applies. Moreover, electricity producers and traders should inform the electricity supplier about the share of each energy source in the total fuel mix of their production or traded amount no later than 2 months after 1 January. The reliability of the information for electricity that received certificates or guarantees of origin, is ensured by these certificates and guarantees of origin.

However, as from 1 January 2007, *ex-ante* labelling is envisioned. At least once a year, the electricity supplier should give the final customer a choice in energy sources (and related environmental consequences) to be used in the coming year. Only when the final customer does not react within the given period, the supplier delivers the mix of his choice. In turn, producers and traders give suppliers a choice in energy sources.

Additional regulation by the Minister of Economic Affairs (Regeling afnemers en monitoring Elektriciteitswet 1998 en Gaswet) of 4 July 2004 (nr. WJZ 4043743) requires that the information on disclosure of generation attributes to final customers is implemented by means of a label, which specifies the number of kWh, as well as the percentage share in the total fuel mix of the supplier, of each of the following energy sources: coal, natural gas, nuclear, renewable energy sources (wind, solar, hydro, biomass, other), and unknown (import, other). For each of these sources, except for the category 'unknown', environmental consequences in terms of CO<sub>2</sub> emission and radioactive waste, should be given, by means of references on the label to publicly accessible information.

The electricity supplier is responsible for the accuracy and completeness of the label, and no later than 4 months after 1 January of each year, he supplies DTe (the energy regulator) with

1. the label of the preceding year,
2. an overview of total electricity supplied to final customers, distinguished by energy source and percentage share of each source in his total fuel mix, and
3. an overview of electricity supplied to final customers for which guarantees of origin are settled (redeemed), distinguished by energy source.

No later than 2 months after 1 January, an electricity producer provides DTe with an overview of electricity delivered to the grid, distinguished by energy source, in the preceding year. The

TSO provides DTe with information on 1) electricity import and export, and 2) the number of guarantees of origin, distinguished by energy source, that are redeemed in the preceding year.

### T.2.1 How to determine the fuel mix of the label?

Legislation and further regulations do not say anything about how electricity suppliers should specifically design and determine their label. The main point of concern is the provision that both producers and traders should deliver information on the fuel mix to suppliers at the end of the year. For electricity sales via traders this information is simply not available.

The federation of energy companies in the Netherlands, EnergieNed, developed a working procedure, which was approved by DTe, to determine the electricity label. This procedure should:

- Allow consumers to compare the (labels of) different suppliers in a consistent way (differences between suppliers are not the result of differences in methodology).
- Provide certainty about the methodology towards DTe and consumers (once published, the labels should not be corrected later on).
- Provide a closed system, i.e. include all possible electricity flows.

In broad lines, the required procedure consists of the following steps for each supplier:

1. For RES-E, determine and use the number of GO for RES-E.
2. For electricity purchased directly from producers: determine the amount of this electricity and use the fuel mix of these producers for this amount.
3. In order to avoid that brown electricity is resold/traded and clean electricity is supplied to the final consumer, make a proportional split of the total amount of electricity under 1) and 2) in the amount supplied to traders and the amount supplied to final consumers.
4. For electricity purchased from traders, i.e. the OTC market and APX, use an average national fuel mix. DTe could publish the national mix.
5. From the producers mix 3) and the traders mix 4), derive an average fuel mix for total electricity supplied to final consumers, proportional to the amount purchased from producers and traders.

In summary, the required procedure effectively results in an electricity label, consisting of a green and a brown part. The green part is based on GO, while the brown part is based on

- the national mix for traded electricity (OTC and APX),
- the national mix of country of origin (excluding green part) for bilateral import,
- the producer mix for own/domestic production.

The dimension and liquidity of the Dutch OTC market is quite large. About 250% of total consumption is traded via the OTC market. Therefore, the required procedure will result in similar labels for different suppliers, which degrades the quality of the electricity label.

Interestingly, this procedure does not follow electricity contracts, as suggested earlier by DTe, because of some costs and difficulties identified, including concerns about market liquidity, difficulty to establish a link between forward contracts and fuel mix, and general complexity.

## T.3 References

CE (2004): *Milieu profiel van stroomaanbod in Nederland*. Delft, November 2004.

Elektriciteitswet 1998 consolidated version of 20 July 2004.

EnergieNed (2004): *Stroometikettering - uitwerking rekenmethode*. Note, 13 December 2004.

EZ (2003): *Regeling certificaten warmtekrachtkoppeling Elektriciteitswet 1998*. 6 June 2003. nr. WJZ 3019622. Staatscourant 20 June 2003, nr. 116, p.13.

- EZ (2003): *Regeling garanties van oorsprong voor duurzame elektriciteit*. 8 December 2003. nr. WJZ 3073206. Staatscourant 15 December 2003, nr. 242, p.18.
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- SenterNovem (2004): *Protocol monitoring duurzame energie*. December 2004.
- TenneT (2002): *Position paper on electricity labelling (etikettering van elektriciteit)*. 27 September 2002.

## Appendix U Norway

Norway is the country with a higher share of renewable electricity than any other European country, which is approximately 99% hydro. Therefore, national targets with regard to generation from RES are aimed at other technologies such as wind power and biomass. This will, to a degree, diversify the risk of energy supply disruptions due to draught.

According to the White Paper No. 29 (1998/99) which deals with Norway's energy policy, growth in energy production must to a greater extent be based on new, renewable energy sources. A set of national goals was approved by the Parliament in the spring 2000:

- An additional of 4 TWh/year of water-borne heat to be produced by 2010. This shall reduce the dominance of electricity for household heating. The heat is to be produced from new renewable energy sources, heat pumps or waste heat.
- To establish wind farms that will produce at least 3 TWh/year of electricity by 2010.

### U.1 Certificate based systems

#### U.1.1 RECS

On 1 January 2001, Norway was one of the six countries starting with voluntary trading in renewable energy certificates (RECS). Since the start of RECS, Norway has been, together with its Scandinavia partners, one of the largest issuers of certificates (SEA, 2004). Domestically, the market for RECs is virtually non-existent; all certificates are exported to primarily the Netherlands, Germany and Austria. In 2003, Norway issued a total of 7.8 mln certificates, while in 2004 this amounted to 5.6 mln certificates. Beginning of April 2005, the total number of RECs issued stood at 20.5 mln. Of the total number of RECs issued, in 2004 1.6 mln were redeemed and 1.4 mln transferred (AIB, 2005).

Previously, Norway has been active as a member of the voluntary TREC system since 2002. Norwegian participation involves some 20 companies, owning a total of about 300 registered units. Norway has adopted EECS for their green certificates.

The issuing body is the TSO, Statnett SF. Statnett is responsible for accrediting the plant and issuing and transferring certificates, as well as maintaining a register. The certificates contain the standard information such as ID-number of the generator, issuer, date, and specific unit of generation, its technology, owner and size.

#### U.1.2 Guarantees of origin

Since Norway is not a MS, it is not obliged to translate EC directives in national legislation. However, not translating the Renewables Directive on GO (Directive 2001/77) would pose a problem for the Norwegian certificate trade since some MS (amongst which the Netherlands) required GO-specification of these certificates. Now, GO legislation has been passed and has led to an operational system from 15 January 2004 onwards. The number of GO issued since operations started is unknown (IT Power, 2004).

Norwegian GO are issued monthly while their validity is infinite. Issuing takes place electronically. The GO also contains information on any kind of subsidy received. Norwegian GO are currently exported to the Netherlands. This is, however, not centrally registered. In addition, no redemption takes place and there are no rules set up to avoid multiple counting (SEA, 2004).

Currently, talks on integrating the current Norwegian certificate system in the Swedish system are still going on. Earlier, it is anticipated that operation of a common mandatory electricity quota and certificate market could start in 2006. The design of the Norwegian system would have to resemble the Swedish system in order to optimally facilitate trade. Like in the Swedish system, consumers must hold a quota share equivalent to a certain percentage of the total consumption. The regulations will also be set with an eye to the development of a future European market. The Norwegian Department of Oil and Energy has submitted a parliamentary bill for consultation, proposing compulsory green certificates, and the Norwegian parliament is expected to vote on the matter during the spring of 2005.

## U.2 Labelling

Norway applies a label scheme, aimed at green electricity that is called 'Bra Miljøval'. Its issuing body is the 'Norges Naturvernforbund' (Norwegian Society for the Conservation of Nature). The scheme was set up together with Swedish and Finnish equivalents. The label can therefore be imported from these countries. The label applies to photovoltaics, wind, hydro (only facilities before 1995 and enlargement projects), biomass, biogas, landfill gas, geothermal and waste.

Although, 99% of total Norwegian electricity generation is hydro powered, the label is valued because it distinguishes domestic green electricity from imported electricity from Denmark and Sweden that is generated from coal and nuclear. This can especially be the case in times of draught.

## U.3 References

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IT Power (2004): *RE-GO Analysis of Member States' Implementation of a System of Guarantee of Origin after 6 months: Monitoring report*. ITP/0801 August 2004.

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## Appendix V Poland

### V.1 Guarantees of origin

Polish Energy Law includes, *inter alia*, the obligation of purchasing electricity generated by renewable sources imposed on energy undertakings having licences to trade electricity, being the basic tool to stimulate development of the 'green' energy sector. A more detailed version of the legal provisions is the regulation of the Minister of Economy from 30 May 2003, where the mandatory limits for 'green' energy sales by undertakings dealing with trade in electricity were laid down. The limits have been defined as the percentage of renewable energy sold to customers using energy for their own use in relation to total sales of energy to those customers, and they are increasing from 2.65% in 2003 to 7.5% in 2010.<sup>44</sup>

The obligation to purchase electricity from renewable sources, imposed on undertakings licensed for trade in electricity, is the basic mechanism of supporting the 'green' energy sector. However, the regulation neither indicates from what exact source the trader is to acquire energy, nor for which price. Therefore, the price is determined by means of negotiations between a producer and a customer of energy or within open tendering on energy supply. National prices of RES-E are differentiated by technology. Their levels in 2002 vary between 35.63 €/MWh (136.45 PLN/MWh) for biomass and 60.22 €/MWh (230.61 PLN/MWh) for wind.

It is expected that in 2004 the way of executing RES-E purchases will be modified, in relation, among other things, with the introduction of certificates of origin, mandatory for all Member States of the European Union. One of the basic obstacles hampering the competitive market development is efficiency of networks connecting the national transmission systems.

### V.2 Disclosure

Polish legislation and regulation have no provisions for disclosure of generation attributes.

### V.3 References

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Energy Law Act (1997): *Journal of Laws*, 4 June 1997 (JoL 97.54.348). Version including amendments until 1 January 2003 (JoL 02.135.1144).

ERO (2004): *The President of the Energy Regulatory Office. Activity Report 2003*. April 2004. [www.ure.gov.pl](http://www.ure.gov.pl).

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<sup>44</sup> Although the European target for Poland is also 7.5%, the national target is actually smaller, as it refers to electricity turnover in distribution companies and not to gross electricity consumption as in the Directive. The difference is ca. 38 TWh (EC BREC, 2003/04).

## Appendix W Portugal

### W.1 Guarantees of origin

The Renewables Directive should be transposed into Portuguese legislation through a Decree-Law (Decreto-Lei) which is currently in its draft form.<sup>45</sup> The draft Decree-Law (DL) aims at the promotion of RES-E in the internal energy market and sets up the main rules and guidelines for the national GO system. It establishes a GO issuing body (EEGO), which will be the entity in charge of the implementation and management of the GO issuing system. A subsidiary of the RNT (Rede Nacional de Transporte de Energia Eléctrica) will assume the role of EEGO, with clear functions and obligations. It also establishes the obligations of the renewable energy producers towards the GO system and the type of fees (but not the amounts) they will have to pay.

GO will be issued electronically for each 1 MWh of electricity produced from renewable sources. A GO will be issued by the EEGO upon request, within 45 working days from the request date. The EEGO will be entitled to perform auditing and monitoring actions to the installations and to the production and metering equipment of the producer. Relevant information regarding the GO issued will have to be made available for public consultation. Every six months, the EEGO shall report to DGE (Direcção Geral de Energia) with information regarding the production of electricity from renewables, so that DGE can follow and monitor the compliance with the 39% indicative target for RES-E in Portugal by 2010. The information to be supplied by the EEGO to DGE will shall include identification of each producer, sites of production, renewable energy source, installed capacity, production equipment, amount of electricity produced by each renewable energy source, electricity supplied to the distribution and/or transportation grid, GO issued, and results of auditing and monitoring actions.

The RES-E producer will pay fees for issuing of the GO, evidence of origin of production, audits as a result of a previous non-compliance with its obligations, and accreditation of a production facility for its recognition in the GO issuing system. The exact amount of such fees will be later determined by specific legislation, in the form of a 'Portaria' by the Ministries of Finance and Economy.

GO are in line with the National Energy Policy defined in the Resolution n. 63/2003 of the Council of Ministers and with the Portuguese targets of 39% electricity from renewables and 15% of gross internal energy consumption as renewable. They are also in accordance with the policies and measures defined for the energy sector under the National Plan for Climate Changes (PNAC). In Portugal, RES-E benefits from a specific feed-in tariff system (DL 168/99 of 18 May). In addition, renewable energy projects are also eligible for support under the PRIME (former POE) Programme and may benefit from both refundable and non-refundable grant aid. The draft legislation does not refer to any particular interactions or exclusions between GO and these support schemes. The draft legislation does not specify whether GO in Portugal will be earmarked to show receipt of financial support. It is not known to what extent GO in Portugal will be tradable, but latest news (June 2005) however indicate that GO will be linked to physical energy.

The draft D.L. establishes that the management of the RECS system in Portugal can also be a function of the EEGO. The REN - Rede Eléctrica Nacional S.A. is the current concessionaire of the RNT and is a member of RECS. Conversations with REN show that they will be attentive not to issue independently a GO and a RECS certificate for the same MWh of energy. There should be a link between redemption of a RECS certificate and the corresponding GO.

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<sup>45</sup> This section is based on IT Power (2004), since we were unable to get updated information on Portugal.

## W.2 Disclosure

At the time when this report is written, there is no disclosure obligation for the electricity suppliers in Portugal. The 'Basic law of the electric sector' has been drafted but not passed yet. It is expected to be passed in July 2005. It deals with the transposition of Directive 2003/54/EC. The disclosure obligation is stated in very general terms and does not recommend any given method to disclose sources of primary energy.

## W.3 References

IT Power (2004): *RE-GO Analysis of Member States' Implementation of a System of Guarantee of Origin after 6 months: Monitoring report*. ITP/0801 August 2004.

## Appendix X Romania

### X.1 Guarantees of origin

The current Romanian Electricity Law (Law 318/2003) stems from 2003 and briefly addresses the issue of RES-E. Chapter V only gives a definition of renewable energy sources, which includes wind, solar, waves, tide, geothermal, hydropower, biomass, landfill gas, sewage treatment plant gas, biogas, alcohol fuel and other renewable energy sources not exploited so far (!). The Law designates the Romanian Energy Regulatory Authority (ANRE) as the competent authority (i.e. regulator) for the energy market, and prescribes that ANRE shall regulate the technical access conditions to the electricity network and the trading of electricity and heat produced in cogeneration, from renewable sources. Finally, it states that the ‘use of renewable energy sources shall be stimulated based on technical and economic in-depth studies. Facilities shall be granted based on Government Decision, upon the proposal of ANRE’.

The issue of guarantees of origin is addressed in the recent ‘Draft 2005 for The Electricity Law’, i.e. the issues discussed below are not yet official legislation. Chapter V of the Draft Law deals with the promotion of electricity produced out of renewable energy sources and in highly efficient cogeneration units. Article 76 and 82 respectively provide that the production of RES-E and high efficient cogeneration is certified by means of guarantees of origin issued by ANRE. Article 77 and 83 respectively provide for the priority connection of RES-E and HE cogeneration to the network.

Support schemes for RES-E will be established and depend on a) the contribution in reaching the national target<sup>46</sup>, b) the compatibility with competitive market principles, c) considering the characteristics of various renewable energy sources and electricity production technologies, and d) promoting renewable energy sources in the most efficient way (Article 79 and 80).

### X.2 Disclosure

Romanian legislation and regulation have no provisions for disclosure of generation attributes.

### X.3 References

ANRE (2003): *The Electricity Law*. Law 318/2003.

ANRE (2005): *Draft 2005 for the Electricity Law*.

Romanian Energy Regulatory Authority (ANRE) [http://www.anre.ro/engleza/default\\_e.htm](http://www.anre.ro/engleza/default_e.htm)

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<sup>46</sup> A national indicative target will be established by secondary regulation (Government Decision).

## Appendix Y Slovakia

The former main legal document (Energy Act No. 70/1998), which was regulating the activities in electricity, natural gas and heat supply industries, was replaced by new legal acts. The Act on the Electricity Sector No. 656/2004 of 26 October 2004 regulates now the relevant topics concerning the electricity sector in Slovakia (e.g. access to the market, rights and obligations of market participants in the energy sector, rights, interests and obligations market participants; state administration and supervision of business in the energy sector). This act has the character of the framework act and most of the detailed implementation still has to follow through secondary legislation.

For renewable electricity sources different types of support schemes exist in Slovakia. The first is a tax relief on the usage of RES for electricity production. The tax exemption is valid for the calendar year in which the facility has commenced operation and then for five consecutive years. In April 2003, the Ministry of Economy adopted further programmes, which aim to promote renewable electricity sources (RES-E) based on subsidies. This program provides financial support of up to 100,000 Euro for the (re)construction of RES-E facilities and it is supposed to be in force until the end of 2006. Moreover, feed-in tariffs are paid to independent power producers. These feed-in tariffs are very low (currently 3 €/kWh) and similar for all types of RES-E.

### Y.1 Guarantees of origin

Section 32 (on RES-E) of the act on the electricity sector states that the RES-E producer has the right to be issued with a guarantee of the origin for the electricity produced. The GO shall specify the source of the generated electricity, the date and place of generation, and, in the case of hydro plants, the level of output. GO will be issued by the Regulatory Office for Network Industries.

No detailed procedures on e.g. how the GO are issued, administrated, redeemed, etc. are specified so far.

### Y.2 Disclosure

In several sections of the act on the electricity sector it is stated that the market actors (electricity producers, electricity suppliers wholesale customer of electricity) have to provide information to household costumers on the share of particular primary energy sources in the electricity generated during the previous year and corresponding information on the impact of electricity generation on the environment. Again no detailed procedures on how this information has to be provided have been fixed so far.

### Y.3 References

Act No 656 in the Collection of Laws of 26 October 2004 on the Energy Sector and consequential amendments.

enerCEE - Energy in Central and Eastern Europe (CEE) on [www.energyagency.at](http://www.energyagency.at).

## Appendix Z Slovenia

The Slovenian electricity sector is characterised by a high share of nuclear electricity (38 %), coal (36 %) and hydro (23 %). The promotion of renewable energy and cogeneration is laid down in the Energy Act. The Energy Act was first put in place in 1999. The most recent amendment was published in May 2004 (EA, 2005).

### Z.1 Guarantees of origin

In several paragraphs of the Energy Act, the promotion of renewable energy sources and sustainable development is mentioned. In Article 29 and 29a, qualified producers and certificates of origin are outlined in detail. A qualified producer is defined in article 4 and 29 as:

*“a producer, which, in individual production facilities, generates electricity with above-average actual efficiency rate during the co-generation of electricity and heat, or uses renewable sources of energy in a manner consistent with the protection of environment”*

Article 29 also states that:

*“The Government shall lay down more detailed requirements for the status of “a qualified producer” including the volume of the production, the type of energy source and the achieved efficiencies, by issuing a special ordinance.*

*The position of qualified producers on the electricity market, the rules for purchasing electricity from qualified producers, as well as the purchasing price and premium for the electricity sold independently by qualified producers shall be laid down by the Government in an ordinance.”*

In article 29a of the Energy Act certificates of origin are being introduced:

*“A power producer who generates electricity by using renewable energy sources or by cogeneration may request a certificate of electricity origin, where the source of energy, the date and place of generation, as well as the capacity of the power station shall be stated.*

*The Government shall lay down, in an ordinance, the content and the manner of issuing certificates of electricity origin issued by the Energy Agency.*

*Certificates of electricity origin may also be issued for the electricity generated by qualified producers from whom the electricity is purchased in accordance with the provisions stipulated in this Act.”*

The implementation of guarantees of origin in Slovenia is currently in preparation. The Decree on Guarantees of Origin (‘Uredba o vsebini in načinu izdaje potrdil o izvoru’) is under discussion in the Ministry and not yet publicly available. It is expected to become operational by the end of 2005 (Akt, 2005).

The Energy Agency of the Republic of Slovenia will become the issuing body<sup>47</sup> and will also have the responsibility for redeeming GO and maintaining the register. The register will be available to the Energy Agency, the system operators and the producers. A limited amount of information will be available to the public. The register will be held electronically and be available over the internet.

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<sup>47</sup> The Energy Agency is also the issuing body for RECS certificates and member of the Association of Issuing Bodies (AIB).

The information issued will include the source of energy, date and place of production and the name of the producer. In the case of electricity produced in an efficient cogeneration facility, the guarantee also has to include details regarding the utilisation rate of the facility. Wind energy, solar, hydro, biomass and high efficiency cogeneration will be eligible for GO. It will refer to 1 kWh net electricity production. An accreditation process will be based on a detailed verification for the beginning. From time to time it will be followed by audits. The data will be based on information from metering data of the regional grid operator. Double counting will be prevented through redemption.

The GO system will be free of charge for the producer. The costs will be covered by the system operator and the Energy Agency. The GO system will be implemented in Slovenia in a way that the certificates can be transferred. GO is separated from the electricity trade and the transfer of the certificates can be tracked. No lower limits for the amount of electricity generated will exist. GO can only be obtained for grid-connected systems.

Renewable energy is supported in Slovenia by a feed-in-tariff. No fiscal measures or other support schemes are implemented in Slovenia.

## Z.2 Disclosure

On 11 April 2005 the Act on the method of determination and disclosure of shares of individual production sources of electricity (*Akt o načinu določanja posameznih deležev proizvodnih virov električne energije in načinu njihovega dokazovanja*) had been accepted. It outlines in detail, how the utilities need to describe the origination of the electricity sold to their customers.

The information is based on contracts of the electricity purchased. It distinguishes between the type of fuels, and provides information on both the CO<sub>2</sub> emissions and the amount of radioactive waste. Electricity from combined heat and power is not taken into account here. The following types of electricity generation and fuels are distinguished:

- Coal, gas, oil, nuclear, others.
- Renewables: hydro, wind, solar, biomass, geothermal, waste gas, waste water gas, biogas, others.

The fuel mix will be based on the supplier's portfolio. The information will be updated on an annual basis per calendar year. The disclosure of renewable energy is based on guarantees of origin.

## Z.3 References

Akt (2005): *Akt o načinu določanja deležev posameznih proizvodnih virov električne energije in načinu njihovega prikazovanja*. Ljubljana 2005.

EA (2005): *The Energy Act (Inofficial translation from Slovenian to English)*. Provided by Mr. Skerbinek, Slovenian Energy Agency. Ljubljana 2005.

Energy Agency of the Republic of Slovenia <http://www.agen-rs.si/>

## Appendix AA Spain

### AA.1 Guarantees of origin

A Royal Decree (Real Decreto) that will transpose the EU Renewables Directive into the Spanish law has not yet been agreed.<sup>48</sup> However, the draft Decree designates the National Energy Commission (CNE, the regulatory body for Spain's energy systems) as the competent body to issue the GO. The main objective of a system of GO is promoting the use of renewable energies.

It is proposed that GO will be issued upon the electricity producer's request, who will indicate the period to be guaranteed (between one month and one year). The GO will be expressed in MWh and only grid connected generators will receive GO. There will be a register of GO managed by the regulator CNE. GO will contain information on the name of the generation installation and place of production, identification of the producer, renewable energy source from which the electricity is produced, installed power capacity, period of time for which the electricity is certified and the amount of electricity. For hybrid stations, only the renewable energy part will have the right to obtain GO.

Accreditation and verification processes will follow existing rules, as the GO will take the data already available in the Administrative Registers of Electricity Generation Installations. The GO will be recorded in a register (Register of Certificates on Guarantee of Origin), and will be related to RES-E, by the installations registered in the Administrative Registers of Electricity Generation Installations. (There are two existing registers, one for those producers which produce electricity under what is called the ordinary system (mainly non-renewable) and another for those under the special system (mainly renewable energy sourced)).

It is the Spanish intention to make GO compatible with the existing support system for RES-E (feed-in tariffs, complemented by fiscal measures). It is not yet known whether GO will be earmarked, nor to what extent GO in Spain will be tradable.

The Spanish system operator Red Eléctrica (REE) is a member of RECS. However, the competent body to issue the GO will be, as stated above, the regulator CNE. Therefore, there are no plans to implement the RECS approach to GO.

### AA.2 Disclosure

The labelling provision of the Electricity Directive has not yet been translated into national laws in Spain. Greenpeace (2005) recently provided some input for discussion in Spain, which seems to have had some influence in the Congress. Indeed on the 30th of June 2005, the Spanish Congress adopted in a plenary session a Law on the development of productivity, which contains a part on disclosure. The Government will have to establish a harmonised format of electricity disclosure for all suppliers. This will enable consumers to compare the supply mix on a coherent basis. Apparently, this was not the intention of the Ministry of Industry, which had drafted a Decree including disclosure obligation for electricity suppliers. This Decree was enabling the suppliers to choose their own format of disclosure. Within this session on the 30th of June 2005, the MPs also voted for a system of independent monitoring and verification of the information displayed on the label. Following the adoption of this law, the draft Decree will have to be changed accordingly.

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<sup>48</sup> This section is based on IT Power (2004), since we were unable to get updated information on Spain.

### AA.3 References

Greenpeace (2005): April 2005. *Etiquetado Electrico. De donde viene la electricidad que consumimos?*

IT Power (2004): *RE-GO Analysis of Member States' Implementation of a System of Guarantee of Origin after 6 months: Monitoring report*. ITP/0801 August 2004.

## Appendix BB Sweden

Sweden relies heavily on nuclear and hydropower for its electricity supply. In 2003, approximately 90% of electricity was either hydro (45%) or nuclear (45%) based. The Swedish electricity system is widely integrated into the Scandinavian market with interconnectors to Norway, Finland, Denmark, Germany and Poland, and its participation in NordPool. Sweden's 2010 target for electricity generation from RES is set at 22%, while being about 14% at present. In order to reach this goal, the Swedish government has opted for a certificate system with quota obligations in combination with a traditional investment grants scheme.

### BB.1 Guarantees of origin

An electricity certificate system, completely designed according to GO specifications, is in place since 1 May 2003 (Electricity Certificate Act, SFS 2003:113). The objective behind this legislation is that the amount of electricity generated by renewable energy sources (RES) reaches an additional 10 TWh per year by 2010 compared with 2002. Up until now, the Swedish electricity certificate (Elcert) system only involves electricity produced in Sweden. However, it is the intention of both the EU, as the Swedish government (see draft bill 2002/2003:40) to aim for an international system in the future. A first step towards a European system could be the emergence of a Scandinavian certificate system, following their cooperation in NordPool. Recently, the Norwegian Minister of Oil and the Swedish Minister of Sustainability reached agreement on the introduction of a joint certificate system by 1 January 2007.

The GO scheme is separated into two parts:

- Plants which receive Elcerts (for the obligation scheme) can also receive GO, but these GO are issued on paper only.
- Plants which are not eligible for Elcerts can receive electronic GO based on the EECS standard.

Elcerts can be transferred into RECS certificates, but not the other way around (this possibility might be changed if the Swedish system is transformed into a joint market with Norway). This regulation can lead to multiple counting of RES-E generation from Sweden. One MWh of RES-E may both receive an Elcert and a GO (on paper). The Elcert can be transferred into a RECS certificate and used to disclose 1 MWh of RES-E in e.g. Austria. At the same time, the paper GO may be exported and used to disclose 1 MWh of RES-E in e.g. Germany.

The Swedish system is based on quota obligations. Table BB.1 gives the quota obligations until 2010.

Table BB.1 *Quota obligations and minimum certificate prices*

Year	Number of certificates per sold or used MWh	Minimum price	
		[SEK/MWh]	[€/MWh]
2003	0.074	60	6.58
2004	0.081	50	5.48
2005	0.104	40	4.39
2006	0.126	30	3.29
2007	0.141	20	2.19
2008	0.153	0	0
2009	0.160	0	0
2010	0.169	0	0

Formally, the obligation lies with every electricity consumer. In practice however, it will be the electricity distribution companies that will carry this obligation. From the beginning of 2004 onwards, electricity consumers may choose to be active in the obligation scheme themselves, taking responsibility for ensuring fulfilment of their quota liabilities. This could be especially beneficial (financially) for larger companies, county councils and local authorities. In the initial phases of the scheme some energy-intensive industries are exempted from the quota obligation. It is uncertain whether and when they will also be included in the certificate system. The electricity supplier has the right to recover the costs of handling the quota obligation for the end-user.

Upon request, every generator receives an electronic certificate, monthly in arrears, for every 'full' MWh produced. Remaining, 'unrewarded' kWh can be carried into the next month. Market forces determine the price or value of a certificate. However, the Government has put a 'floor' in the market for the first years, decreasing to zero in 2008. The minimum guaranteed prices are given in Table BB.1. On the other hand, the upper limit of certificate prices is given by the penalties imposed by the government upon under-performing of the quota. In the first two years of operation, these are fixed at 175 SEK (19.19 €/MWh) and 240 SEK (26.32 €/MWh) respectively in 2004 and 2005.<sup>49</sup> Afterwards, the penalty is set to 150% of the volume-weighted mean-value of the certificate price during the previous accounting period.

The renewable energy sources that will be eligible for certificates are: wind power, solar energy, geothermal energy, biofuels, wave energy, hydro power (smaller hydro power plants (< 1500 kW), increase of production from existing hydro plants, and new hydro power plants).

There are two organisations involved in the certificate system in Sweden, the National Energy Agency ([www.stem.se](http://www.stem.se)) and the Swedish TSO Svenska Kraftnät ([www.svk.se](http://www.svk.se)). The National Energy Agency is responsible for the following tasks:

- Approving and checking plants on their eligibility for electricity certificates.
- Processing declarations from those with quota liabilities.
- Deciding on penalty charges for those that have not submitted declarations.
- Redeeming electricity producers' certificates at a guaranteed price.
- Monitoring compliance with the Act and rules decided on by Government and energy Agency.
- Providing information on the electricity certificate system.
- Monitoring and analysing certificate market developments.

Svenska Kraftnät has the following tasks:

- Issuing electricity certificates on the basis of metered production from eligible electricity producers.
- Establishing and maintaining the register of electricity certificate accounts.
- Cancelling certificates according to the declaration from the quota-obligators.
- Publishing information on number of certificate issuers, certificate turn-over, number of cancelled certificates and their average price.

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<sup>49</sup> The exchange rate is about 9.12 SEK for 1 Euro. For reference purposes, the NordPool average spot price in 2004 was 256.29 SEK per MWh, which is about 28.1 €/MWh. The average price of an electricity certificate in the period of March 18 2004 to March 18 2005 was 235 SEK per MWh, which is about 25.8 €/MWh.

Table BB.2 *Overview on accredited electricity generating capacity*

Technology	No. of approved plants	Installed capacity [MW]	Electricity production [MWh]
Hydro	1029	743	1725827
Wind	562	416	719081
Biofuel	100	3192	6986721
Solar	1	0.008	0
Total	1692	4351	9431629

In addition to the green certificate system, there is currently complementary support for wind power, both onshore and offshore. In 2004, the subsidy for onshore and offshore wind power was set at 12 öre/kWh (1.32 €ct/kWh) and 17 öre/kWh (1.86 €ct/kWh) respectively. The subsidy will be progressively reduced for technologies until a total withdrawal of the support in 2009. In addition, large-scale wind power is supported in technical development and market introduction with a budget of SEK 350 mln (€ 38.4 mln) over five years.

In March 2004, NordPool launched trading in Swedish renewable electricity certificates (green certificates). Currently, this scheme has 18 members. An Elcertificate forward market is likely to emerge in 2005.

### BB.1.1 Certificates for CHP

In 2003, total gross electricity generation amounted to 132.3 TWh. Of this total, 12.8 TWh was generated with CHP technology (5.2 TWh by industrial CHP and 7.6 TWh by district heating CHP). As from April 2004 onwards, also the use of peat as a fuel in CHP is entitled to certificates within the electricity certificate system.

## BB.2 Labelling

In Sweden, there are about three different label schemes by which only green electricity can be certified. The three schemes are:

- ‘Good Environmental Choice (Bra Miljöval)’ programme of the Swedish Society for Nature Conservation (SNC).
- Certified Environmental Product Declaration (EPD) developed by the Swedish Environmental Management Council (SEMC).
- Production specified electricity scheme (PS).

The first two labels are applied to a wide range of environmental products. The EPD and PS labels do not involve value judgements and only confirm the origin of electricity. An independent institute runs the EPD, while the PS-label involves a guarantee from the producer that electricity is generated in a specified way. The Bra Miljöval was set up in 1996 in conjunction with the Norwegian and Finnish labels. This means that these labels are ‘tradable’. The label is accredited to photovoltaics, wind, hydro (only facilities before 1995 and enlargement projects), biomass, biogas, landfill gas, geothermal and waste. Peat is excluded from the scheme (IT Power, 2004).

### BB.3 Disclosure

The law on disclosure is not yet taken. However, a planned draft ordinance is expected in September 2005. The disclosure scheme in Sweden will be based on the assumption that buyers of electricity using a bilateral contract with the seller will always receive the company mix of attributes of the seller.

## BB.4 References

- ITP Power (2004): *RE-GO Analysis of Member States' Implementation of a System of Guarantee of Origin after 6 months: Monitoring report*. ITP/0801 August 2004.
- RECS (2004): *RECS Domain Protocol Sweden*, release 2, April 2004
- Svenska Kraftnät (2004): *The Swedish electricity market and the role of Svenska Kraftnät*.
- Swedish Energy Agency (SEA) (2003): *Renewable electricity is the future's electricity*. Brochure on the Swedish Elcertificat system.
- Swedish Energy Agency (SEA) (2004): *Energy in Sweden 2004*.
- Swedish Energy Agency (SEA) (2004): *SETREC Report on existing trade mechanisms, actual trade and policy interactions related to TRECs side-effects in Sweden*, May 2004, Part of the SETREC second phase country reports.
- Swedish Government (2003): *Electricity Certificate Act SFS 2003:113*.

## Appendix CC Switzerland

### CC.1 Guarantees of origin

The EU Directive 2001/77 on guarantees of origin (GO) does not apply for Switzerland. However, the Swiss parliament has passed a law, which enables the government to introduce a GO scheme. Currently, no such scheme is in place but a task force has been set up, in which government officials, utility representatives and experts from other organizations like the Swiss Association of Issuing Bodies (AIB) work towards a blueprint of a GO system.

#### CC.1.1 Legal basis

In November 2004, the legal basis for the future implementation of a national system of guarantees of origin was laid in the Swiss Energy Regulation (EnV); mainly in the articles 1d, 1e and 21a (EnV, 1998, see Section CC.2.1 below). The Energy Regulation just formulates some general requirements and key principles without specifying any details of the system. Article 1d, for instance, prescribes that the guarantees should contain information about

- the amount of electricity,
- the energy carriers used for the generation of electricity and
- the time span and location of production.

Article 1d also makes an explicit link between the guarantees and the legal requirements on disclosure of generation attributes. Furthermore, it is emphasized that the Swiss GO system can be adapted to the requirements set by international rules (e.g. the EU Directive 2001/77). Article 1e states that a verification scheme has to be set up, which functions in a transparent and reliable way.

Based on these paragraphs, the detailed procedures for the Swiss guarantees of origin will be defined by the responsible government department (UVEK). And it is actually the Swiss Federal Office of Energy (BFE), which prepares implementation guidelines on behalf of the department.

#### CC.1.2 Development process of a GO system

So far, no specific requirements have been developed. Under the newly built association 'ECS Switzerland' (Association Energy Certificate System) a task force GO has been put in place recently. Aim of this task force is the development of the future GO system for Switzerland. Ideally, the national GO system will be in place and operational by the beginning of 2006. Within ECS the main actors of the electricity industry of Switzerland are present (such as major producers and distributors, the TSO, stakeholder associations and the BFE). Based on the work of the task force, the BFE (respectively the UVEK department together with the government) will set in force the national GO system for Switzerland.

### CC.2 Disclosure

#### CC.2.1 Legal basis

In March 2003, together with other changes, an Article 5<sup>bis</sup> was added to the Swiss Energy Law (EnG, 1998). Article 5<sup>bis</sup> (EnG) provides the legal basis for the Swiss government to implement regulation for the disclosure of generation attributes:

*“For the protection of end users, the Bundesrat can pass regulations for the disclosure of generation attributes, especially about the method of electricity generation and the origin of the electricity. He can introduce a mandatory disclosure.”*

In November 2004, a regulation for mandatory disclosure of generation attributes was set in place by a change of the Swiss Energy Regulation (EnV, 1998). These changes introduce a disclosure obligation (Art. 1a), an information obligation (Art. 1b) and requirements for electricity accounting (Art. 1c). In a second section, the tracking of generation attributes, i.e. the basics of guarantees (Art. 1d) and of verification (Art. 1e), are outlined. Finally, in the appendix of the Swiss Energy Regulation additional regulations are formulated for electricity accounting and on how to provide the information to end consumers. Here, a translation of these articles is given.

*1a Chapter: Disclosure of generation attributes and guarantee on the method of production and the origin of the electricity*

*1<sup>st</sup> Section: Disclosure of generation attributes*

*Article 1a Disclosure obligation*

- 1 Companies, which supply end users in Switzerland with electricity (companies responsible for disclosure), have to inform their end users at least once a year, and with relation to the overall amount of electricity delivered to end users, about:*
  - a. the relative shares of used energy carriers of the electricity supplied (supplier mix),*
  - b. the origin of electricity (production in the inland or abroad),*
  - c. the basic year,*
  - d. name and contact of the company responsible for disclosure.*
- 2 The company responsible for disclosure has to collect the data for the information according to paragraph 1 letter a-c in an electricity accounting, except when otherwise stipulated.*

*Article 1b Information obligation*

- 1 Companies, which supply companies responsible for disclosure or suppliers of companies responsible for disclosure in Switzerland with electricity (companies responsible for information), have to inform the companies supplied with electricity about:*
  - a. the supplied amount of energy,*
  - b. the energy carriers used for the generation of electricity,*
  - c. the origin of electricity (production in the inland or abroad).*
- 2 Information according to paragraph 1 have to be provided for each calendar year latest until end of April of the following year.*
- 3 The company responsible for information has to collect the data for the information according to paragraph 1 in an electricity accounting.*

*Article 1c Requirements for electricity accounting and disclosure*

*The requirements for electricity accounting and disclosure are made in Appendix 4.*

*2<sup>nd</sup> Section: Guarantee on the method of production and the origin of the electricity*

#### *Article 1d Content of the guarantee*

- 1 *On demand of an electricity producer, verification and conformity assessment institutions issue a guarantee on:*
  - a. *the produced amount of electricity,*
  - b. *the energy carriers used for the generation of electricity,*
  - c. *the time span and location of production.*
- 2 *The Federal department for Environment, Transport, Energy and Communication (Department) can regulate the details for the guarantee according to paragraph 1. It can formulate additional requirements to achieve compliance with international norms.*
- 3 *The guarantee according to paragraph 1 can be used to comply with the information obligation according to article 1b.*

#### *Article 1e Verification procedure*

- 1 *The verification procedure has to be designed in a transparent and reliable way, especially to avoid double counting of the same amount of electricity.*
- 2 *The Department regulates the verification procedure.*

#### *Article 21a Control and conformity assessment institutions*

- 1 *Control and conformity assessment institutions, which issue reports or certifications have to:*
  - a. *be accredited according to the accreditation and labeling regulation of June 17, 1996,*
  - b. *approved by Switzerland as a part of international agreements,*
  - c. *be otherwise authorized by Federal law.*
- 2 *Who makes a claim based on the documents of someone not mentioned in paragraph 1, has to argue credibly that the procedures applied and the qualification of this institution fulfils the Swiss requirements (Art. 18 Abs. 2 THG).*

Just recently, in addition to the law and the regulation, the Swiss Federal Office of Energy (BFE) has released an implementation guide on disclosure of generation attributes (BFE, 2005a) as well as an Excel-spreadsheet as a template for electricity accounting calculating the supplier mix (BFE, 2005b).

Article 1a-1e of the Swiss Energy Regulation has become effective by 1 January 2005. As the disclosure is implemented on an ex-post basis, end consumers receive a first electricity declaration latest at the end of 2006.

## **CC.2.2 Disclosure requirements**

Electricity suppliers have to disclose the following to end consumers of electricity:

- the relative shares of energy carriers,
- the origin of electricity (distinction between inland and abroad),
- the basic year as well as
- company name and a contact.

The relative shares have to be determined on the basis of the amount of electricity, which has been delivered to *end consumers* in the corresponding year (supplier's mix). All information will be presented on an ex-post basis but not later than 1 July of the following year. The electricity declaration has to be sent to the end consumers at least once a year - on or together with the electricity bill. Other information channels like company websites, annual reports, brochures and the like are welcome, though neither mandatory nor sufficient.

The energy carriers have to be declared according to a pre-defined scheme, see Table CC.1.

Table CC.1 *Categories for the declaration of energy carriers*

Mandatory main categories	Sub-categories
Renewable energies	
Hydropower	
Other renewable energies	Solar energy
	Wind energy
	Biomass
	Geothermal
Non-renewable energies	
Nuclear energy	
Fossil energy carriers	Oil
	Natural gas
	Coal
Wastes	
Non-identifiable energy carriers	

Whereas the mandatory categories have to be displayed under any circumstances, sub-categories must only be mentioned if the share in the corresponding mandatory category (e.g. fossil energy carriers) is not zero. In this case, the energy share for every sub-category (e.g. oil and natural gas and coal) has to be shown.

Furthermore, the display of the electricity declaration has to follow a standardised layout including a table, which is at least 10x7cm large. Additional graphics like pie charts and data relating to a specific electricity product may also be shown as long as the comprehensibility is not compromised. In Figure CC.1, one of the three examples from the appendix of the Swiss Energy Regulation is shown.

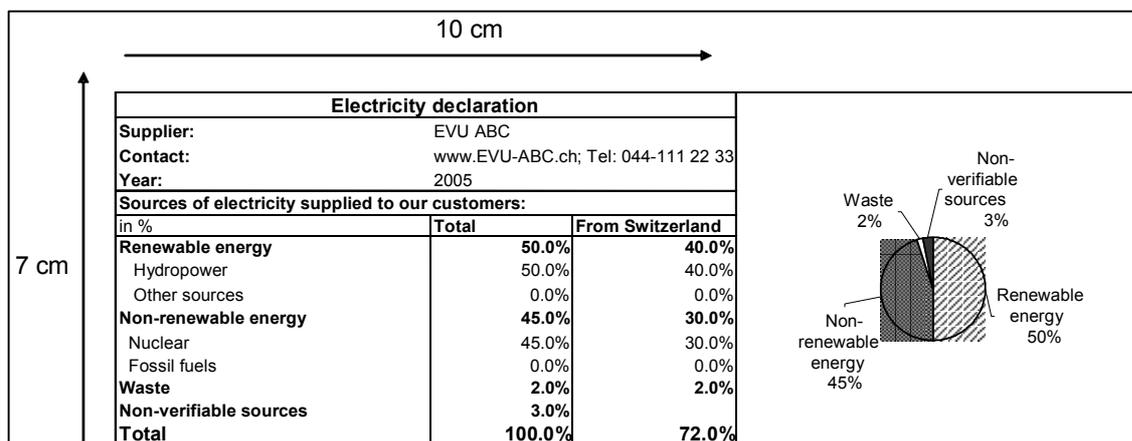


Figure CC.1 *Layout of the declaration with an additional pie-chart (example)*

### CC.2.3 Tracking requirements

In order to make tracking of generation attributes feasible, the Swiss Energy Regulation, on the one hand, introduced the information obligation (see above). This obligation is similar to the disclosure obligation but addresses utilities or electricity producers, which supply other electricity companies (traders, suppliers). The information obligation encompasses:

- the amount of electricity supplied,

- the energy carriers used for the generation of electricity,
- the origin of electricity (production in the inland or abroad).

The figure shows how disclosure and information obligation are related and which company has to fulfil which obligation.

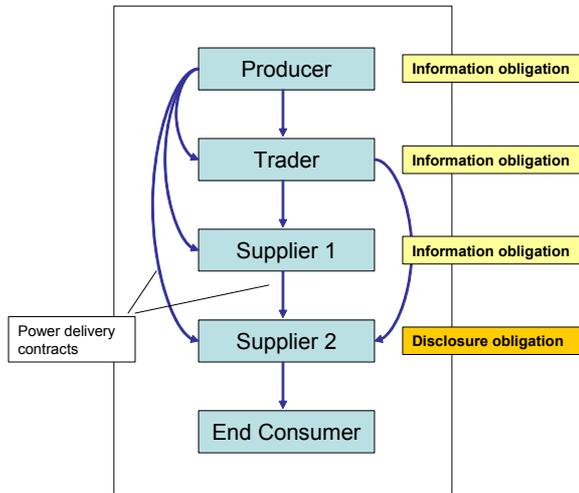


Figure CC.2 *Information and disclosure obligation along the electricity supply chain*

On the other hand, the Energy Regulation foresees the introduction and issuing of specific guarantees as a basic tracking mechanism (Art. 1d). These contain information about

- the amount of electricity,
- the energy carriers used for the generation of electricity,
- as well as the time span and location of production.

Apart from these ‘official’ guarantees of origin, several other guarantees will be accepted for tracking, including

- guarantees of origin according to Article 5 of the EU Directive 2001/77,
- third-party quality certificates or eco-labels,
- RECS certificates,
- power delivery contracts, which explicitly state the method of generation,
- self-declarations of energy producers.

Electricity, for which no guarantee is available or the guarantee is ambiguous, has to be declared in the category ‘non-identifiable energy carriers’, see Table CC.1.

To sum up, tracking in Switzerland is basically thought of as a contract based system (Figure CC.2) but it will actually be implemented with a combination of contract based and certificate based guarantees. Due to the fact that the various kinds of guarantees are not necessarily linked to one another the Swiss system runs the risk of being compromised by inconsistencies and double counting. The issue of double counting was explicitly addressed in the Energy Regulation (Art. 1e), although no verification mechanism has been implemented so far to avoid double counting. The Swiss Energy law, however, holds a new sub-paragraph, concerning penalties in the case of non-compliance. A fine up to 40,000 Swiss Franks (€ 26,000) can be imposed to anyone who violates the disclosure regulations.

#### CC.2.4 Differences in relation to the European Directive on disclosure

The Swiss system for disclosure of generation attributes is basically compatible with the EU Directive 2003/54. Disclosure in Switzerland is mandatory, based on the supplier’s mix and in-

cludes the main renewable as well as non-renewable energy sources. There is a minor difference as information about the origin of the electricity and the category of wastes is not foreseen in the EU directive. Moreover, the EU requirements on disclosure are more encompassing with regard to the environmental impacts (CO<sub>2</sub> and nuclear waste) of electricity generation. No such information is foreseen in Switzerland. The Swiss system, on the other hand, is more consumer friendly as it foresees a standardised display of the information.

### CC.3 Tracking in the case of the voluntary eco-label 'Naturemade'

Voluntary schemes like eco-labels that have the task to highlight and promote environmentally sound electricity products also need some kind of tracking mechanism to assure that the consumer actually receives (or better: pays for) a certain kind of power generation.

#### CC.3.1 The basic concept of the 'Naturemade' eco-label

The naturemade eco-label indicates that power plants or electricity supply products fulfil a pre-defined ecological quality standard ([www.naturemade.org](http://www.naturemade.org)). The label encompasses two levels. All power plants based on renewable energy sources can apply for the Naturemade 'basic' label without any additional requirements. The Naturemade 'star' label, in contrast, is only awarded if additional environmental criteria are fulfilled that relate to potential local-regional impacts of power generation. The latter are particularly important in the case of hydropower plants, which usually affect local aquatic systems in a negative way (Bratrich et al., 2004). The Naturemade label is owned and operated by a private institution, the Association of Environmentally Sound Electricity (VUE).

#### CC.3.2 Consumer information requirements

According to the Naturemade certification guidelines (ZK-L8), the green power supplier has to provide product information, which contains the following:

- relative share of energy carriers used for power generation,
- origin of the energy carriers used,
- location of the power plant(s), in which the electricity was generated.

Moreover, the product information may contain the licence number (of the product) and the global environmental impacts of the green electricity calculated on with the eco-indicator 99 method.

The product information has to be handed over to the customer together with the delivery contract. There are no specific requirements with regard to layout of this information or the communication channel (in many cases product specific brochures are used or a web-address is given). The disclosed information has to be provided on an ex-ante basis, i.e. the supplier has to make sure that he keeps the electricity mix he has promised when the contract was concluded.

#### CC.3.3 Tracking requirements

Before a green electricity supplier actually obtains the eco-label, he has to declare the product related electricity mix including its origin to the VUE ('declaration of power supply products'). For each billing period (usually one year), the supplier and VUE agree on a maximum amount of energy that can be sold as green electricity. Only this amount of energy is actually labelled. Tracking is contract based on an ex-ante basis, i.e. the supplier has to provide in advance specified delivery contracts for the amount of energy he wants to be awarded with the Naturemade label. The supplier has to maintain an electricity accounting system, which, besides all data necessary for product information, contains the unique licence numbers of all contractors.

Verification is carried out by independent, specialised auditors, who perform random examinations of delivery contracts and electricity accounting. Verification is done before the first issuing of the label and repeated every following year. The VUE has implemented a central database (registry), in which all key data is stored and can be unambiguously identified by the licence number. The database can also be used for plausibility checks.

## CC.4 References

- BFE (2005a): *Leitfaden Stromkennzeichnung - Vollzugshilfe für Energieversorgungsunternehmen zu den Bestimmungen über die Kennzeichnung von Elektrizität*. Bundesamt für Energie, Bern.
- BFE (2005b): *Vorlage für die Elektrizitätsbuchhaltung (MS Excel)*. Bundesamt für Energie, <http://www.stromkennzeichnung.ch>.
- Bratrich, C., B. Truffer, K. Jorde, J. Markard, W. Meier, A. Peter, M. Schneider, B. Wehrli (2004): *Green Hydropower: a new assessment procedure for river management*. River Research and Applications. 20 (7), 865-882.
- EnG. Energiegesetz vom 26. Juni (1998): 730.0, June 26th, AS 1999, 197-206.
- EnV. Energieverordnung vom 7. Dezember (1998): 730.01, December 7th, AS 1999, 207-228.

## Appendix DD Turkey

Restructuring of the Turkish electricity market commenced with the enactment of the Electricity Market Law in February 2001. This law led to an unbundling of the generation and transmission corporation (TEAS) into generation (EUAS), trading and contracting (TETAŞ) and transmission (TEİAŞ), and to the establishment of the Energy Market Regulatory Authority (EMRA). As part of the liberalisation process, Turkey will be divided into 21 distribution regions, while six generation companies are expected to be created of around 2.6 GW capacity each. These constitute 54.5% of total generation capacity, the remaining capacity is already privately owned. Total installed capacity amounts to 37 GW.

Article 5p of the Electricity Market Law states, with regard to the environmental effects of the electricity generation operations, the objective to take necessary measures for encouraging the utilization of renewable and domestic energy resources and to initiate actions with relevant agencies for provision and implementation of incentives in this field.

### DD.1 Guarantees of origin

On 10 May 2005 Turkey ratified the law number 5346 on RES-E (Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy). The purpose of this Law is to expand the utilization of renewable energy resources for generating electrical energy, to benefit from these resources in secure, economic and qualified manner, to increase the diversification of energy resources, to reduce greenhouse gas emissions, to assess waste products, to protect the environment and to develop the related manufacturing sector for realizing these objectives (Article 1).

The law recognizes the following electricity generation sources: wind, solar, geothermal, biomass, biogas, wave, current and tidal energy resources together with hydraulic generation plants either canal or run off river type or with a reservoir area of less than 15 km<sup>2</sup> (Article 3.11). The regulator EMRA monitors the decisions for recognizing a source as renewable and issues RES-E certificates (YEK Belgesi) accordingly. These certificates are not to be marketed, but will just be used as a label.

The implementation principles are explained in article 6 of the law and reads:

*Article 6 - The legal entities holding licenses to generate and transact electricity from the renewable energy resources in the scope of this Law are subject to the principles of implementation specified hereunder:*

- a) The electrical energy generated from the renewable energy resources in the scope of this Law shall be purchased by the legal entities holding retail sale license on the basis of bilateral agreements to be concluded in pursuance with the provisions of paragraphs (b), (c) and (d) of this article.*
- b) Within the framework of prepared projection by the Ministry, the relevant information on amount of RES certified electrical energy, which shall utilize the implementations in the scope of this Law, shall be issued by EMRA annually. Each legal entity holding retail sale license shall be entitled to purchase RES certified electrical energy in an amount declared by EMRA considering the proportion of the energy amount he has sold within the previous calendar year to the total electrical energy amount which all legal entities holding retail sale license offered for sale in Turkey.*

*In case the total electrical energy amount with RES certificate is sufficient, the legal entities holding retail sale license shall be entitled to purchase RES certified electrical en-*

ergy not lower than eight per cent of the electrical energy they have sold in the previous calendar year.

- c) *Until the end of 2011, the applicable price for the electrical energy to be purchased in pursuance with this Law within each calendar year shall be the Turkish average wholesale electricity price in the previous year determined by EMRA. The Council of Ministers is entitled to raise this price up to 20 % at the beginning of each year.*

*As of the end of 2011, this pricing methodology shall not be applicable for the RES certified electrical energy generation plants which are in operation for more than seven years. The retail companies shall purchase the certified RES-E, which they are obliged to purchase on the basis of the provisions of this Law, primarily from those plants which have not yet completed a business period of seven years, in accordance with the pricing methodology laid down in part (c) of this article, and in case the purchased amount of electrical energy is less than the ratio specified in part (b) of this article, they shall buy the remaining amount, until reaching the ratio referred hereof, through bilateral agreements at the price formed in the market without exceeding the Turkish average wholesale electricity price.*

## DD.2 Disclosure

As for the disclosure of the electricity generation mix to the consumer, there is a desire to implement this in the near future, but no exact date has yet been set to achieve this.

## DD.3 References

Electricity Market Law (2001): *Law No: 4628, Ratification Date: 20.02.2001, Enactment Date: 03.03.2001.* <http://www.epdk.org.tr/english/regulations/electric/law/EML.doc>

Energy Market Regulatory Authority (2003): *Electricity Market Implementation Manual* <http://www.epdk.org.tr/english/reports/electric/manualapril2003.doc>

Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy (2005): *Law No. 5346, Ratification Date: 10.05.2005, Enactment Date: 18.05.2005.* <http://www.epdk.org.tr/mevzuat/diger/yenilenebilir/reseng.doc>  
<http://www.eurosolar.org.tr/html/mevzuat/5356noluYEKkanun.htm>

## Appendix EE United Kingdom

### EE.1 Guarantees of origin

The electricity market for the UK has three distinct parts: (1) England and Wales, (2) Scotland, and (3) Northern Ireland.<sup>50</sup> The interconnection between these three distinct markets has traditionally been limited, but the UK government and the energy regulator are working to integrate the markets in the British mainland (England and Wales, and Scotland) as interconnection capacity has increased. Beta, the British Electricity Trading and Transmission Arrangements, effectively unifies the markets on the British mainland and came into effect on 1 April 2005. Interconnection with Northern Ireland is still very limited.

In the UK, the GO scheme is referred to as REGO, and a GO issued in the UK is referred to as a REGO. The approaches taken across the three regions are similar, but not completely the same.

The Electricity (Guarantees of Origin of Electricity Produced from Renewable Energy Sources) Regulations 2003, implementing the requirement for GO in the Renewables Directive, have come into force on 27 October 2003. Ofgem (Office of Gas and Electricity Markets), the regulator, has been identified as the issuing body for GO. The most relevant sections of the legislation are (as quoted from the Regulations):

#### *Request for issue of Guarantees of Origin and information required*

4. (1) *The issue of guarantees of origin may be requested*
  - (a) *in respect of electricity which has been purchased under a qualifying arrangement by the nominated person ...; and*
  - (b) *in respect of any other electricity, only by the producer of that electricity.*
- (2) *No request for the issue of guarantees of origin may be made under paragraph (1) in respect of electricity produced outside Great Britain.*
- (5) *A request under paragraph (1) shall be accompanied by a statement signed by the person making the request (or, if the person making the request is a body corporate, by a representative of that body) that -*
  - (a) *the person making the request is entitled under these Regulations to the issue of guarantees of origin in respect of the electricity which is the subject of the request; and*
  - (b) *that the person making the request has not made, and does not intend to make, a request in another Member State or Northern Ireland for the issue of guarantees of origin in respect of the same electricity.*

#### *Issue and transfer of Guarantees of Origin*

6. - (1) *... where the Authority has received a request for the issue of guarantees of origin which has been duly made in accordance with these Regulations, it shall issue guarantees of origin in respect of so much (but no more) of the electricity to which the request relates as the Authority is satisfied was electricity produced from renewable energy sources.*

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<sup>50</sup> This section is based on IT Power (2004).

### *Recognition of Guarantees of Origin*

9. - (1) *A competent authority shall recognise a guarantee of origin issued by the Authority under regulation 6(1).*
- (2) *Subject to paragraph (3), or if, following a refusal to recognise a guarantee of origin under paragraph (3), it is required to do so by the Commission of the European Communities acting pursuant to article 5(4) of the Directive, a competent authority shall recognise a guarantee of origin issued pursuant to article 5(1) of the Directive in another Member State or Northern Ireland.*
- (3) *A competent authority shall refuse to recognise a guarantee of origin issued in another Member State or Northern Ireland -*
- (a) *if it has been requested to refuse such recognition by the non-Great Britain authority which issued or supervised the issue of that guarantee of origin;*  
*or*
- (b) *if it is satisfied that such refusal is necessary for the prevention of fraud or that the guarantee of origin was mistakenly issued.*
- (4) *Where a competent authority has recognised a guarantee of origin in accordance with paragraph (2), it shall withdraw that recognition*
- (a) *if it has been requested by the non-Great Britain authority which issued or supervised the issue of that guarantee of origin to refuse or withdraw such recognition; or*  
*or*
- (b) *if it is satisfied that such withdrawal of recognition is necessary for the prevention of fraud or that the guarantee of origin was mistakenly issued.*
- (5) *Paragraphs (2), (3)(b) and 4(b) impose no obligation on a competent authority to satisfy itself that a guarantee of origin issued in another Member State or Northern Ireland has been properly issued.*
- (6) *Recognition by a competent authority of a guarantee of origin issued under regulation 6(1) or in another Member State or Northern Ireland shall be in such form as that competent authority may determine.*

The regulation enables a GO to act as proof of renewable energy production and follows the Renewables Directive with issuance on request, but it also allows for a GO to be revoked. The regulation requires the implementation of a central registry for GO, which is not a requirement of the Renewables Directive.

In addition to the information required for a GO as laid out in the Renewables Directive, the legislation requires that the GO in England, Wales and Scotland will include the address of the producer, whether the producer is accredited for the Renewables Obligation (RO) scheme, and whether the producer is accredited for the Climate Change Levy (CCL) exemption scheme. The GO will be issued on request, at most once monthly. Each GO will represent 1 kWh. GO are expected to have infinite validity, and GO will be issued for the proportion of the power which has been generated from renewable sources in hybrid stations. The GO will include a number of earmarks, including on RO and CCL, which are further discussed below. Earmarks will only identify whether the station is accredited for the RO or CCL, not whether any certificates under RO and CCL, ROC or Renewables Levy Exemption Certificates (LEC), have been issued.

The key actors are:

- The Authority. Ofgem, the energy markets regulator in the UK, has been appointed as the issuing body. Ofgem also runs the registry, i.e. maintains the registry, transfers GO etc. Additionally, Ofgem will accredit the eligible plant. It is likely that the registry function will be outsourced, just as is the case with the ROC and CCL register.
- Nominated person. For plant under a qualifying arrangement (previous support systems such as NFFO/SRO), the nominated person, i.e. the NFFO/SRO purchaser, may request issue. Unless he has notified the Authority that he does not intend to request issue, in which case the generator may request issue.

- Generator. The renewable electricity generators may request issuance of GO if they are not contracted under one of the previous support schemes.
- Trader and other. A GO may be issued or transferred into the account of any person.

Ofgem will maintain a register of GO, which will be accessible -at least in part- via the internet. This registry will detail the registered holder of a GO, thereby allowing for some tracking of transfer of GO. At the time of writing the register is being tested, so while the legislation is in place for GO, the tools to implement GO have not been available. Once the IT system is up and running it will be possible to issue backdated GO from the implementation date (27 October 2003). The registry does not currently include a redemption process.

This register will allow for transfers of GO. The legislation allows the issue to be made to the person requesting issuance, or to such person as the person making the request may direct. Additionally, the owner of the GO may request the Authority to transfer a GO to any other person. GO are separately tradable from the underlying electricity.

There already exists a system of accreditation for generators under the RO and CCL exemption schemes, and these will be extended for use with GO. Ofgem will be granted powers to gain access to generating stations in order to verify the accuracy of information provided for GO. Falsely issued GO will be revoked, and this will impact on other Member States if these UK GO would have been exported. Other rules are expected to ensure prevention of multiple-counting of RES-E within the various schemes, but the prevention of multiple counting is mostly reliant on the existence of the registry, and the full electronic nature of the UK GO system.

GO will be issued free of charge.

In England, Wales and Scotland there are fiscal measures, obligations, the UK and (from January 2005) EU emissions trading schemes, all providing direct and indirect support to RES. GO will exist along side, but independently from these other support systems. The European Commission reviewed and approved the Renewables Obligation scheme under the EC rules on state aid, but reserved the right to conduct a second review once Member States were bound to provide a Guarantee of Origin under the Renewables Directive. The Commission indicated in its decision that a second review would assess in particular the justification for restrictions currently imposed on imported green electricity and green certificates. Currently a GO can only be used for proof of green supply and only the owner of the GO can claim the 'greenness' of the underlying power. However, it is foreseen that a GO may be used for disclosure of generation attributes and renewables statistics. It is planned that from July 2006 onwards (i.e. second year of fuel mix disclosure) REGOs could be used to fulfil the renewables requirements of fuel mix disclosure (i.e. for electricity generated from April 2005-Mar 2006 to encompass national accounting practices). An interim measure based upon generator declarations/national fuel mix figures will be used to fulfil the first year's requirement under the Electricity Directive.

As per Schedule 2 of the regulations, each GO will be earmarked to show whether the generation is accredited under the RO and CCL. However, the earmark will not indicate whether a ROC or Renewables LEC has been issued.

So far, no international trade has taken place. No formal government support of trade of GO is planned. Ofgem will publish GO that it recognises which were issued in another MS on its website but not in the Register.

The lower limit for a GO will be 1 kWh generated within a 1 month period (however, it will be possible to obtain a GO for 0.5kWh generated within a one month period, as the figure is rounded up or down to the nearest kWh). Grid connection is not a requirement in order to receive GO. Small generators who are not already accredited under the RO or CCL exemption

scheme will be required to approach Ofgem and provide verifiable information as to the type and quantity of RES-E they are producing.

The RECS system is widely known in England, Wales and Scotland, and discussions have been held regarding the RECS approach to GO. A UK GO is very similar to a RECS certificate and Ofgem have requested information on the RECS certificate format and specification of the RECS system interface. However, early indications imply that the RECS/EECS approach is not intended to be implemented by Ofgem.

## EE.2 Disclosure

The EU Electricity Directive requires electricity suppliers to provide details to their customers of the mix of fuels used to generate the electricity they supply. This requirement will be implemented by the Department of Trade and Industry (DTI) by way of a new supply licence condition under 'section 2(2) of the European Communities Act'. The 'Electricity (Fuel Mix Disclosure) Regulation, Statutory Instrument No. 391', which transposes the labelling provision provided in Article 3(6) of the European Electricity Directive, into national legislation. The new legislation, in force since 18 March 2005, will require electricity suppliers to inform customers in or with bills and on promotional materials of their overall fuel mix for the preceding year (i.e. ex-post labelling), as well as making available information on the associated carbon dioxide emissions and nuclear waste. 'S.I. 391' also specifies the evidence that may be used to support disclosure of generation attributes to customers and the procedure for its verification.

The 'disclosure period' is from 1 April to 31 March and the information that customers are entitled to receive -at least once per year- is harmonised through the provision of a 'Fuel Mix Disclosure Table' prepared by the Department of Trade and Industry, which is updated annually on 1 August starting 2005. The provision of a unified label allows consumers to compare the fuel mix and the resulting reported environmental impacts of different suppliers in a consistent way. However, disclosure is subject to the condition that electricity supply by a licensed supplier to a customer has covered a complete disclosure period. Provided that this is the case the supplier is required to disclose the information within twelve months commencing on 1 October following the disclosure period.

The disclosure of information requires the supplier to reveal the share of each energy source (i.e. coal, natural gas, nuclear, renewable or other) in relation the total amount of electricity sold over the disclosure period. Where applicable, the associated carbon emissions and radioactive waste generated during the production of electricity needs to be provided in grams/kWh for the total amount of electricity supplied over the disclosure period.

To strengthen the audit of the legislative requirement the information provided by the supplier to the consumer is required to be verified through different processes depending on the energy source. Renewable Energy Guarantees of Origin (REGOs) form the basis of reporting the renewable share of suppliers fuel mix under the licence condition. Suppliers are required to hold and retain evidence to verify that the total amount of renewable energy sold under green supply arrangements does not exceed the amount of renewable generation claimed in the supplier's fuel mix disclosure label. For each unit of renewable electricity provided in the disclosure period suppliers are required to hold a REGO at midday on 1 July. However, this requirement will not come into effect until July 2006 and in the meantime a generator declaration relating to the disclosure period will serve as verification of a renewable energy source. For all other energy sources a generator declaration relating to the disclosure period is required to indicate the origin of the specific source. In cases where electricity has been purchased by the supplier, either via an electricity exchange or imported from outside the European Community, the amount of electricity from each energy source needs to be disclosed where this information is directly or indirectly available.

In order to avoid double counting of electricity produced from renewable sources two mechanisms are provided. First, REGOs or renewable generator declarations from outside Great Britain can only serve as proof if the supplier holds evidence of supply in Great Britain of the electricity referred to in the aforementioned verification document. Second, the REGO or generator declaration must not be used as evidence of fuel mix outside Great Britain. The risk of double-counting renewable energy production would be further minimised if an explicit link could be made between S.I. 391 and green supply offerings, currently reviewed in the consultation document to the 'Revision of Guidelines on Green Supply Offerings'.

### EE.3 References

Department of Trade and Industry (2005): *Explanatory Memorandum to the Electricity (Fuel Mix Disclosure) Regulations 2005* No. 391.

Department of Trade and Industry (2005): *The Electricity (Fuel Mix Disclosure) Regulations*. Statutory Instrument 2005 No. 391.

IT Power (2004): *RE-GO Analysis of Member States' Implementation of a System of Guarantee of Origin after 6 months: Monitoring report*. ITP/0801 August 2004.

Ofgem (2005): *Revision of Guidelines on Green Supply Offerings - Consultation Document (March)*.

## Appendix FF United States

The regulation of energy and electricity in the United States is divided between the federal government and the states. States are generally responsible for siting intrastate generation and transmission as well as for regulating the rates and services of electric utilities. This includes the promotion of new renewable generation. In the last several years, at least 13 US states have adopted legislation mandating an increase in electricity generation from renewable resources. Such legislation, typically referred to as a Renewable Portfolio Standard or RPS, generally requires that retail power suppliers acquire a certain percentage of their energy mix from renewable resources. In an effort to effectively implement RPS legislation, and to reduce the cost of compliance, states and groups of states have developed certificate based tracking systems. To date, there are four certificate based tracking systems in operation in the United States and several others in the planning stages. While the primary function of these tracking systems is to facilitate RPS legislative mandates, the certificate systems are also being used to facilitate disclosure of generation attributes legislation and to facilitate Green-E certification programs. In the future, certificate based tracking systems may be used for other purposes as well. The existing and proposed systems are summarized below.

### FF.1 Texas ERCOT system

Texas was the sixth state in the US to promulgate renewable energy portfolio legislation, but was the first to implement a renewable energy certificates trading program. The Texas RPS law provides that 2,000 MW of new generating capacity from renewable energy technologies be added to the state energy market by 2009. In order to meet this goal the Texas legislature created a renewable energy credits trading program that aims to encourage the development and construction of new renewable energy resources in the most efficient and economical manner possible. The REC Trading Program, which began operating in July 2001, is administered by the Electric Reliability Council of Texas (ERCOT).

At the center of the Texas program is the requirement that each year electricity retailers must acquire and retire Renewable Energy Credits (RECs) in an amount equal to a specified percentage of their retail sales. The actual REC requirement for each retailer in a given compliance is determined by ERCOT based on annual capacity targets.<sup>51</sup> These annual capacity targets are increased yearly so that the 2,000 MW new generation target set for 2009 will be achieved. The value placed on these RECs creates the necessary financial impetus to develop greater renewable capacity. The annual capacity target is adjusted to account for out of state generation metered in Texas (imports) and generation from existing renewable facilities (pre-1999 facilities). For a more detailed description of this allocation process please refer to Section 14.10 of the ERCOT Protocols.

ERCOT issues two types of certificates: Renewable Energy Credits (RECs) and REC Offsets. A REC is created from generation at a *new* renewable facility. A new facility is defined as one that was commissioned after September 1, 1999. A REC Offset is issued, only upon request, for generation from facilities commissioned before September 1, 1999. A REC represents all of the renewable attributes associated with one MWh of production from a certified renewable genera-

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<sup>51</sup> Key to understanding the REC holding requirement is the Capacity Conversion Factor (CCF). The CCF acknowledges that renewable generation does not operate at 100% capacity and therefore sets capacity at a much lower factor - 35% for 2002-2003. Using the CCF, REC requirements are calculated as follows: (MW of new capacity) \* (hours/year) \* (CCF) = total quantity of RECs required.

tor.<sup>52</sup> RECs are distributed to generators on a quarterly basis and are deposited directly into a REC account maintained for each generator by ERCOT. Information contained on REC certificates is rather limited and includes: year, quarter, type of renewable resource, facility identification and unique REC number. Data for RECs comes from electronically transferred settlement quality meter data. RECs have a useful life of three compliance periods (the year the REC was generated plus two years). A compliance period is a calendar year (January 1 to December 31). After three years, an unused REC expires. A REC may be freely traded, transferred and retired by its owner.

REC Offsets represents one MWh of renewable generation from an existing facility. REC Offsets may be used in place of a REC to meet the renewable energy requirement of a retail supplier. REC Offsets are not transferable or tradable and will remain valid until the Texas Public Utility commission determines that they may no longer be used to offset renewable energy requirements.

REC accounts are maintained by ERCOT for any party obliged or desiring to participate in the REC Program. Participation in the program is mandatory only for competitive retailers participating in the Texas retail market. RECs may be traded or transferred at any point during the three year period that they are valid, so long as they have not been retired. All trades must be reported to ERCOT so that transfers can be properly recorded in REC accounts. It is dependent upon account holders to notify ERCOT to request retirement of a REC. RECs may be retired for three purposes: (1) mandatory compliance with the Texas renewable energy requirement, (2) voluntary retirement (e.g. green power sale), and (3) expiration.

By March 1<sup>st</sup> of every year, ERCOT allocates REC compliance requirements for competitive retailers for the previous years compliance period (the formula for this calculation is rather complex and can be found in Section 14.10 of the ERCOT Protocols). This allocation determines the exact number of RECs and/or REC Offsets that each retailer must retire to satisfy its compliance obligation (ERCOT also provides several methods by which a retailer can estimate its obligation through the course of the compliance year). Competitive retailers have until March 31 of the same year to submit its annual REC compliance retirement information to ERCOT. RECs are retired after they have been used to satisfy RPS compliance.

Although designed primarily for RPS compliance, the Texas RECs system has been utilized for other purposes such as green power marketing. RECs provide a simple and easily verifiable instrument to demonstrate to customers purchasing green power that the renewable attributes have been retired.

As part of its 1999 electric utility restructuring legislation, Texas retail electric providers (REPs) are required to disclose certain information to customers on an Electricity Facts Label. Beginning July 1, 2002, REPs were required to provide standardized format Electricity Facts Label to customers upon their request. The label must include electricity prices, contract terms, sources of generation, and emissions levels.<sup>53</sup> Although the ERCOT REC system is not the vehicle by which retail disclosure labels are produced - as is the case with other tracking systems in the US, there is some overlap between the two requirements. Under the Texas disclosure law, a retired REC is considered 'authenticated generation' and is used to calculate fuel mix and environmental impact disclosures. In the absence of a REC, fuel mix and emission rates are calculated using a default scorecard based upon averages. For a more detailed understanding of how RECs are used under the Texas disclosure law please see Texas Public Utility Commission Substantive Rules § 25.476.

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<sup>52</sup> Eligible renewable energy sources include solar, wind, geothermal, hydro, wave, tidal, biomass, biomass-based waste products, and landfill gas from new renewable power plants commissioned after September 1, 1999 and all renewable plants less than 2 MW capacity, regardless of date of installation.

<sup>53</sup> The text of the Texas disclosure rule can be found at the following link <http://www.dsireusa.org/library/docs/incentives/TX01Rb.htm>

## FF.2 New England States - NEPOOL GIS

The New England Power Pool (NEPOOL) comprises six states - Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont. As of 2005 three of these states had enacted RPS legislation and at least five have enacted some form of emission and power content disclosure requirement. In order to facilitate and verify compliance with these legislative mandates, the NEPOOL Generation Information System (NEPOOL GIS) was established. The system, which has been in operation since 2002, creates an electronic certificate containing generation attribute information for every MWh of energy produced in the NEPOOL market as well as for energy imported into the control area. Certificates are used by regulators to verify compliance with disclosure and RPS laws imposed by individual states within NEPOOL. What makes NEPOOL unique among tracking systems is both the scope of the attributes tracked, and the fact that the system tracks all generation and not just renewable generation.

Certificates are created quarterly on the 15<sup>th</sup> day of each calendar quarter. There is a two quarter delay between generation and certificate issuance. This means that energy generated in January, February, or March (first quarter), will result in a certificate being issued on July 15<sup>th</sup> (third quarter). Every certificate issued contains multiple fields, including: fuel source used, renewable portfolio standard (RPS) eligibility for each state, emissions characteristics, labor characteristics, vintage information, owner information, location of generation unit, and Green-E eligibility.<sup>54</sup> The system is capable of adding additional fields in the future.

Certificates are produced based on data received by the GIS administrator from the system operator. This data is issued by the system operator from the monthly settlement statements (maintained for financial settlement purposes) for NEPOOL generators. Non-NEPOOL generators must provide information directly to the GIS administrator. In addition, every NEPOOL generator and importer who holds an account with the system administrator must, upon initial registration, provide all information required by the GIS administrator to complete all certificate fields. This may include U.S. Environmental Protection Agency emissions data, labor characteristics for individual facilities, fuel source, multi-fuel capability, detailed generation facility information, and eligibility for state attribute laws.

Initially, certificates are deposited into the account of the generator or the entity holding legal title to the generating unit. Energy imported into the NEPOOL control area will also be accounted for through the creation of a certificate. These certificates are deposited into the account of an importing account holder, typically a retail load serving entity. Any entity may open a GIS account by registering with the GIS administrator. Required account holders include all retail load serving entities in the NEPOOL region and generators within the NEPOOL control area.

Certificates may be sold or otherwise transferred between account holders at anytime during a trading period.<sup>55</sup> A trading period is defined as the two month period between the creation date of a certificate and 15 days prior to the end of the quarter in which the certificate was created. For example, if a certificate is created on July 15, the trading period for that certificate ends on September 15 of the same year. Accordingly there are four trading periods in a calendar year. All transfers or trading of certificates must be noted in the GIS database and confirmed by the parties.

At the end of each trading period all trading must cease. All certificates that are not (a) held in a sub-account of a NEPOOL retail load serving entity (retail LSE), (b) associated with an export

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<sup>54</sup> See, New England Power Pool Generation Information System Operating Rules, Appendix 2.4, January 1, 2005 Version, for a complete list of GIS certificate fields.

<sup>55</sup> Account holders may also transfer certificates in advance of their creation date in the form of a 'forward certificate transfer'. Details for this mechanism can be found in Rule 3.3 of the Operating Rules.

transaction, or (c) held in a 'banked' certificate sub-account, are retired and referred to as 'unsettled certificates.' Once a certificate is retired it may not be used again in the GIS.

Each retail LSE will have a certificate account and sub-accounts with the GIS administrator. Retail LSEs have an obligation to hold certificates equal to its retail energy sales in each calendar quarter. In addition, retail LSEs may maintain sub-accounts for the purpose of demonstrating compliance with attribute laws (e.g. RPS). Central to the proper functioning of the system is the requirement that there is a MWh for MWh match between energy generated and imported into the NEPOOL control area, with certificates created. Therefore each MWh recorded in the system operators' monthly settlement statements that does not have a GIS certificate, is assigned a 'residual mix certificate'. Residual mix certificates are created using averages of the aggregate characteristics of all remaining 'unsettled certificates' at the end of each quarter. In this way, residual mix certificates represent the attributes of all generation in a quarter that have not been placed in a sub-account by an LSE, exported, or banked.

In addition, the system also allows and accounts for the trade of renewable certificates. Renewable certificates are those certificates representing MWhs generated from a fuel source that has been designated as 'renewable'.<sup>56</sup> Account holders may sell renewable certificates directly to third parties. Typical of this type of transaction are green power sales and sales to environmental groups. In order to avoid double counting of these certificates, account holders who sell renewable certificates must transfer the certificates to a 'reserve certificate account'. At the end of a trading period, all certificates in the 'reserve certificates account' are retired. These certificates are not utilized to calculate the residual mix. However, a 'residual mix certificate' must be created in its place to account for the removal of the certificate from the system.

Account holders may also bank renewable certificates by depositing them in a 'banked certificate sub-account'. Banked certificates may be removed from the sub-account and used in any trading period within the same calendar year that the certificate was created. For example, if a certificate is created on July 15, 2005 and properly banked, it may be utilized for any eligible purpose until June 15, 2006 (June 15 represents the end of the fourth trading period following the creation of the certificate).

All energy imported into the NEPOOL GIS control area must acquire a certificate. Certificates created for imported energy will contain the most recently available overall mix of fuel sources and emissions data from the source control area.<sup>57</sup> All external sales of energy (exports) that are not accounted for through the designation of specific certificates are assigned 'residual mix certificates' at the end of the trading period. This is done to ensure the one for one match between certificates and energy in the system (when energy leaves the control area, an equal amount of certificates must also be removed). Certificates may be exported without energy through the use of the 'reserve certificate accounts' described above.<sup>58</sup>

Account holders receive quarterly and annual reports from the GIS administrator summarizing account information and aggregation of various certificate fields listed on the certificates owned by the account holder. These quarterly reports form the basis for retail LSEs to make filings with the state agency or agencies that administer the relevant attribute laws. Compliance with other attribute laws is determined by the regulatory authority of each individual state based upon the reports generated by the GIS. In addition, regulatory agencies and the system operator have access to quarterly and annual reports generated by the GIS Administrator.

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<sup>56</sup> The designation of a fuel source as renewable is determined on a state by state basis through law or regulation.

<sup>57</sup> For more detail on how imports into the NEPOOL GIS are treated see, Rule 2.7 of the New England Power Pool Generation Information System Operating Rules.

<sup>58</sup> For more detail on how exports are treated in the NEPOOL GIS see, Rule 3.6 of the New England Power Pool Generation Information System Operating Rules.

The NEPOOL system is the most advanced in use in the United States. Not only does it track all generation sources and include more attributes, but it is also used for multiple compliance schemes - RPS, disclosure, and emissions reporting. In addition, non-state actors are using the system for green pricing (retailers) and green-e marketing. Because of the broad array of attributes recorded on certificates, it is anticipated that additional uses and markets will develop in the future. The initial costs for developing the system have been estimated to be around \$200,000. Annual operating costs were \$2.5 mln a year for the first two years, and then \$1.25 mln a year thereafter. The cost of the system is borne by the retail LSEs.

### FF.3 Wisconsin - Renewable Resource Credit System (RRCS)

In 2003, the state of Wisconsin launched a web-based system to track renewable energy generation. The system is called the Renewable Resource Credit System (RRCS) and it allows Wisconsin electric providers to use a web site to track and report deliveries of renewable power for compliance with the State's renewable portfolio standard (RPS). The system issues RRCs (also known as renewable energy certificates (RECs)) for deliveries exceeding RPS requirements, which are deposited in each electric provider's account. Trading of RRCs is facilitated through an electronic bulletin board, which can be sold or traded to others in Wisconsin, the Midwest, and beyond.

The system provides an audit function for verifying generation and preventing double-counting of renewable energy production. The program provides an easy method for the electric providers to report their renewable energy information, and an automated report for the regulators (Public Service Commission of Wisconsin and the Department of Administration) to monitor compliance with the RPS regulation. The RRC system tracks the RRCs over time, including retirements, transfers, and year-to-year carryovers. It also provides a means of tracking the renewable output of dual-fueled generators.

Relatively speaking, the cost for creating the Wisconsin RRCS was low. The initial start up costs were approximately \$50,000 and yearly operating expenses come to around \$65,000 per year. The system is financed through a \$0.135/MWh fee on the MWhs purchased by utilities to meet their RPS obligation. Although limited information surrounding the creation of the Wisconsin system is available, internet literature suggests that low relative cost, and accounting and administrative simplicity were the main consideration in the development of the system.

### FF.4 Pennsylvania/New Jersey/Maryland - PJM GATS

The most recent tracking system to be developed in the US is the PJM 'Generation Attribute Tracking System' or GATS. The system is set to begin operation in New Jersey and Maryland in late 2005 and will eventually be introduced throughout the PJM interconnection, an area that includes 12 states and 45 mln people.

The system was designed to collect and track generation attribute information based on four market needs: (1) information disclosure by retailer suppliers to customers; (2) to facilitate proper functioning of state RPS mandates; (3) to track emission performance standards of electricity suppliers<sup>59</sup>; (4) to serve voluntary green power markets. Like the NEPOOL system, GATS will produce a certificate for every MWh of generation produced in the power pool and imported into the area. The certificates will include all generation attribute information necessary to support individual state policies (e.g. RPS and disclosure) and voluntary green markets.

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<sup>59</sup> An emissions/generation performance standard requires an electricity supplier not to exceed a maximum threshold of specific pollutants in its mix of electricity supplied to customers.

A GATS certificate is created for every MWh of energy within the PJM system. Certificates represent all of the attributes from each MWh of electricity generated. Each certificate created by GATS includes the following data fields: name of generation unit, date of generation, serial number, fuel source, RPS eligibility (by state), emissions characteristics, vintage, asset identification, location of generation unit, Green-E eligibility, and import characteristics (if applicable). Data for the certificates is obtained from several sources. The dynamic data (monthly production data) is obtained via the PJM market settlement system. Static data<sup>60</sup>, describing the attributes of the generation unit, is obtained directly by GATS from account holders. Typically, this occurs as part of the initial registration and occurs annually thereafter. Emissions data is created either from information provided by the generator or by using default emission rates based on the latest data available from the United States Environmental Protection Agency.

GATS certificates will be deposited monthly into generator accounts. Generators and retail suppliers may maintain multiple sub-accounts to which certificates may be transferred. GATS users may use these accounts to comply with state mandates and to retire certificates for environmental benefits. Certificates are transferable between GATS system users at any time during the trading period. All certificate transfers will be recorded in GATS. Retirement of certificates is initiated by account holders by transferring certificates to sub-accounts for purpose of compliance with RPS or for purposes of making environmental claims/benefits (e.g. green-e tags). At the end of a trading period retail suppliers use the certificates in their accounts and residual mix certificates to issue disclosure information to customers. The system also allows for the import and export of certificates.

#### *Account details*

Certificates are created on a monthly basis and are initially deposited into the Active Subaccount or Clean Energy Portfolio Standard (CEPS) Subaccount associated with the Registered Generator. The Active Subaccount is the holding place for all active GATS certificates that originate from PJM Generators and GATS Registered Import Generators. The Active Subaccount is like a cash checking account. The GATS certificates in it are liquid and can be transferred at the discretion of the account holder. The Active Subaccount is the first point of deposit for any GATS certificates associated with PJM or GATS Registered Import Generators.

A Clean Energy Portfolio Standard (CEPS)<sup>61</sup> Subaccount holds unsold, unused, CEPS Eligible Certificates. The CEPS Subaccount will enable certificates eligible for state CEPS/RPS requirements to continue to be active (i.e., banked) beyond the trading period. States will determine CEPS eligibility (i.e., RPS resources, resources identified as environmentally preferred, etc.). If a generating resource qualifies for a portfolio standard in any state in the PJM region, certificates from that generator will be eligible to be deposited in the account holder's CEPS Subaccount. CEPS certificates can be accumulated in these accounts and/or transferred. Certificates in CEPS Subaccounts are excluded from any load serving entity's disclosure label.

A Retail LSE Subaccount is used by Retail Load Serving Entities to designate certificates to be used for fuel mix and emissions disclosure purposes. Unlike the CEPS and Reserve Subaccounts, a certificate in a Retail LSE Subaccount can be transferred back to the Active Subaccount again. Each Retail LSE must obtain certificates equal to all of its retail LSE certificate obligation. Account holders that do not have retail load obligations would not be required to obtain certificates. Account holders who serve retail load but have only minimal or no interest in the certificates associated with the power they provide will be assigned Residual Mix Certificates on a pro rata basis at the end of the transfer period.

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<sup>60</sup> Static data includes EIA Form 860. This is an annual US Department of Energy form that collects detailed data on electric generating units.

<sup>61</sup> Here the term CEPS means the same as a Renewable Portfolio Standard.

The Reserve Subaccount is established to track certificates that are reserved by the account holder, exported from GATS, or retired. For example, the Reserve Subaccount can be used as a repository for GATS Certificates that the account holder wishes to designate as: (1) Sold to a third party which is not a GATS account holder and is not an account holder in a compatible tracking system; (2) Retired, and claim ultimate ownership of the GATS Certificate (e.g., for RPS compliance); (3) Exported for conversion to a Compatible Certificate Tracking System.

GATS does not define the life time or expiration date for certificates. States may do so outside of GATS to meet their own requirements. The process of posting certificates to accounts will include an account holder Review Period to allow for review of the data and a dispute resolution process.

Any party that registers with GATS may establish an account. Account holders who are generators are required to provide information related to the generation units. Much of this generation unit specific information appears on certificates. Retail LSE account holders must identify the specific states in which they wish to use GATS. GATS will then set up sub-accounts for these LSEs corresponding to the attribute laws of the states selected. All Retail LSEs have a GATS certificate obligation equal to the amount of retail load served by the account holder in MWh. An equal number of certificates must be acquired by the Retail LSE for fuel mix and emission disclosure reporting. During the certificate creation process, GATS will calculate the Certificates Obligation of each Retail LSE for the month based on electrical load data from the PJM Settlement System.

#### *Transfer of certificates*

GATS account holders may transfer active certificates to other GATS account holders at any time during the trading period. Transfers require an affirmative action by both buyers and sellers and confirmation by the GATS. The trading period is approximately one year in duration starting in February of the calendar year and ending in February of the next calendar year.

#### *Retirement of Certificates*

GATS certificate retirement can occur 1) automatically at the end of the trading period as part of the Residual Mix calculation, or 2) as initiated by the GATS account holder. Retirement removes a certificate from circulation within the GATS system. Retirement initiated by the GATS account holder is effectuated for certificates in its own account(s) by transferring certificates into a Reserve Subaccount. The account holder must specify the reason the certificate is being transferred into the Reserve Subaccount. Reasons for retirement and transfer to the Reserve Subaccount include: (1) Use by account holder for compliance with an RPS mandate; (2) Use by the account holder to make environmental claims or to take out of circulation for environmental benefit reasons; (3) Sale as part of a retail certificate only product to an end use customer (e.g. environmental group or organization that wants to offset electricity use or make environmental claims), (4) Export of certificate out of PJM.

#### *End of Trading Period / Annual Settlement*

At the end of each trading period, (i) all trading of Certificates for that Reporting Period shall cease, (ii) Residual Mix Certificates will be created based on Unsettled Certificates, and (iii) the GATS Administrator will issue any required reports. Unsettled Certificates used in the calculation of the Residual Mix will be retired and cease to exist for the purposes of GATS. Unsettled Certificates include all Certificates in the Administrator's Subaccount and all Certificates issued for that Reporting Period that have not been transferred to one of these other Subaccounts: 1. CEPS Subaccount, 2. Retail LSE Subaccounts, and 3. Reserve Subaccount. The attributes contained on any Unsettled Certificate at the end of the trading period shall become part of the pool of attributes upon which the Residual Mix Certificates shall be based. Residual Mix Certificates created by GATS will reflect certificate fields that are per MWh averages of the aggregate characteristics of the remaining Unsettled Certificates for that reporting period. After the close of each trading period, GATS shall assign Residual Mix Certificates to each MWh of Certificates

Obligations in each Retail LSE Subaccount that does not have a certificate already associated with it.

#### *Disclosure Labels*

The LSE's disclosure label is based on the certificates in their Retail LSE Subaccounts. Certificates in the Active, CEPS and Reserve Subaccounts are excluded from the disclosure label. The Retail LSE Subaccounts are cleared out once this disclosure label is created in preparation for the next trading period. Retail LSEs can create their disclosure label in GATS for any timeframe and state.

#### *Imports and exports*

GATS can issue certificates for generating units located outside of PJM whether or not all or a portion of the energy generated is delivered into PJM. The energy must be delivered into PJM for the certificate to be counted on a Retail LSE's environmental disclosure label. Energy delivery might also be required for a certificate to be RPS-eligible in some PJM states. For fuel mix and emission disclosure purposes, all energy imported into the PJM Control Area must be accounted for through the creation of certificates for the amount of such imported energy. The vast majority of imported energy is not unit-specific. For these non-unit specific imports, System Mix Certificates are created and placed in the Active Subaccount of the account holder that imported the energy. Each certificate associated with Imported System Energy will reflect the most recently available overall mix of fuel sources and emissions of the source control area. Certificate fields for each adjacent control area shall be based on the average of the emissions and fuel source data for such control area as included in the most recent year's data in the EPA's EGRID software. Certificates may also be imported into GATS from a compatible certificate tracking system by a process of conversion. Certificates imported from a compatible system must meet equivalent standards to GATS. Export of certificates out of GATS can occur without associated energy deliveries out of PJM. Certificates can only be exported out of GATS using the Reserve Subaccount.

#### *Reporting*

There will be four general types of reports available through GATS: (1) administrator, (2) account holder, (3) state agency / regulator, (4) public. All reports are electronic and have some limited customisation options to meet specific needs. Notwithstanding the availability of reports to Agencies and Regulators, each entity subject to any state requirement is responsible for demonstrating compliance with that state requirement, and neither the GATS Administrator nor PJM LLC has any responsibility for ensuring an entity's demonstration of compliance with state requirements.

## **FF.5 California and the Western Region - WREGIS System**

The state of California and other western states, including Washington, Oregon, Montana, Idaho, Nevada, and Arizona, are in the process of developing a regional tracking system. The Western Renewable Energy Generation Information System, or WREGIS, is envisioned as a certificate based renewable energy generation attribute tracking system. The system will be used primarily for the purpose of supporting RPS mandates and will initially only track renewable generation. Operating rules for the system are currently being developed and it is hoped that the system will begin operation by the end of 2005.<sup>62</sup>

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<sup>62</sup> An excellent needs assessment report for the WREGIS system can be found at the following web-address: <http://www.westgov.org/wieb/wregis/12-30-03fnl.pdf>

## FF.6 References

- ERCOT Protocols, Section 14: *Renewable Energy Credit Trading Program*, November 1, 2001.  
[http://www.vera.com/downloads/p\\_ercot\\_sec\\_14.pdf#search='ERCOT%20protocols'](http://www.vera.com/downloads/p_ercot_sec_14.pdf#search='ERCOT%20protocols')
- New England Power Pool Generation Information System Operating Rules, January 1, 2005.  
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- Western Renewable Energy Generation Information System (WREGIS), Western Governors Association homepage, <http://www.westgov.org/wieb/wregis/>
- Wingate, M., and M. Lehman (2003): *The Current Status of Renewable Energy Certificate Tracking Systems in North America*, Report to the Commission of Environmental Cooperation, December 2003.

## Appendix GG Australia

Australia was the first country in the world to create a national renewable energy market using tradeable certificates.<sup>63</sup> In 2000 the Australian Federal Government enacted the Renewable Energy (Electricity) Act of 2000 (the 'Act'). The Act established a Mandatory Renewable Energy Target (MRET) which requires the generation of an additional 9500 gigawatt hours of electricity per annum from renewable sources by 2010.<sup>64</sup> The Act seeks to accomplish its goal through the creation of a national renewable energy certificate trading system. The system creates renewable energy certificates (RECs) for the generation of qualifying renewable electricity and requires certain purchasers (called 'liable entities') to annually surrender RECs equal to the 'liable entities' proportional contribution towards the target goal. In this way, the certificate system and the obligation placed on 'liable entities' creates an increasing demand for electricity generated from renewable resources.

### GG.1 Federal Mandatory Renewable Energy Target (MRET)

Australia's MRET aims to encourage the additional generation of electricity from renewable resources. The Act establishes the legislative framework for MRET. The Act places a legal obligation on 'liable entities' to proportionately contribute towards the MRET target of an additional 9,500 GWh of renewable electricity per annum by 2010. 'Liable entities' are generally described as wholesale purchasers and retailers of electricity.<sup>65</sup> The target goal is phased in by specifying a number of yearly interim targets, over the period 2001-2010. Yearly targets are set to ensure that there will be consistent progress towards achieving the 9,500 GWh target by 2010.

The system places an obligation on 'liable entities' to surrender, on a yearly basis, a number of certificates equal to their individual target obligation. Target obligations are calculated based on the proportion of energy purchased by the 'liable entity' in a given year. For example, if a 'liable entity' purchases 5% of liable electricity in the country in a given year, they will be required to satisfy 5% of the yearly interim target. 'Liable entities' that do not surrender a sufficient number of certificates are required to pay a shortfall charge.

#### *Renewable Energy Certificate Creation*

Under the MRET system, RECs are created based on generation arising from the operation of eligible and accredited renewable energy assets or sources.<sup>66</sup> Each REC is equal to (or in the case of solar water heaters, equivalent to) 1 MWh of renewable generation. The Australian Of-

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<sup>63</sup> The Australian MRET Certificate System began operating in April 2001. This is slightly before the Dutch certificate system was established in July 2001.

<sup>64</sup> The Act also created a new statutory agency within the Australian Federal Government called the Office of the Renewable Energy Regulator (ORER). ORER is the entity responsible for administering the renewable energy certificate system mandated under the Act.

<sup>65</sup> The measure applies to all wholesale electricity purchasers on liable grids. A wholesale purchase of electricity is a purchase directly from the electricity pool or from a generator. Where the generator sells directly to an end user, the generator will be deemed to be a notional wholesaler and be the party responsible for holding renewable energy certificates against that sale.

<sup>66</sup> Eligible renewable energy sources include: hydro, wind, solar, bagasse co-generation, black liquor, wood waste, energy crops, crop waste, food and agricultural wet waste, landfill gas, municipal solid waste combustion, sewage gas, geothermal aquifer, tidal, photovoltaic, solar hot water, co-firing, wave, ocean, fuel cells, hot dry rocks. Where electricity is produced from a combination of renewable and fossil fuel energy, the fossil fuel contribution will be netted out. For example, co-firing that utilizes both renewable fuels (biomass) and fossil fuels (coal) requires that fossil fuel contribution be netted out. The ORER has created a guidance document that can assist with this calculation. For more info see the ORER website at <http://www.orer.gov.au/generators/biomass-coal.html>

Office of the Renewable Energy Regulator (ORER) has created a registry<sup>67</sup> that accounts for the creation, transfer, and surrender of RECs. Registered generators wishing to create a certificate must merely log into the registry and provide information necessary to create the certificate. Required information includes data related to the power station, the amount of electricity generated, and number of RECs the operator desires to create.

A registered person may create a certificate for each whole MWh of electricity generated by an accredited power station that the person operates during a year that is in excess of the power station's 1997 eligible renewable power baseline.<sup>68</sup> The power baseline was necessary to account for existing renewable generation that, under the Act, could not be counted towards the yearly interim target goal. RECs may be created by a generator immediately after the eligible electricity has been generated and metered. All RECs created by a generator must be registered with the regulator and a small fee must be paid. The regulator records the REC in a registry and properly notes the owner. Improper creation of a certificate is a criminal offense. ORER conducts random physical audits of generation facilities to determine if RECs have been properly created.

The certificates contain relatively little information. Data fields include: (1) a unique identification code, (2) the electronic signature of the person who created the certificate, (3) the date on which the electricity in relation to which the certificate was created was generated (metered), (4) the date on which the certificate was created. Certificates do not expire and remain valid so long as they are not surrendered to satisfy an annual obligation.

#### *Trade and Transfer*

Trade and transfer of certificates is a matter left to private parties. The registry is not a trading floor for RECs. The only requirement is that the Regulator must be informed through the registry when a trade has been made. This is to ensure that the Regulator can properly identify the owner of every REC. Certificates can be traded at any time throughout the year.

Evidence suggests that trading of certificates is increasing yearly. In 2001 there were 12 transactions representing approximately 35,000 RECs. By 2003 the number of transactions had increased to 548, involving approximately 2.7 mln RECs. Although it is difficult to discern the exact price at which RECs have been traded, reports indicate that the range is between A\$32 to A\$39.50 per REC (19 to 23.70 €/MWh)

#### *Annual Obligation for 'Liable Entities'*

'Liable entities' are required to surrender their proscribed certificate obligation by February 14<sup>th</sup> of every year. For example, liabilities arising from the 2004 liability year (1 January 2004 to 31 December 2004) must be acquitted by 14 February 2005. This process can easily be accomplished using the registry software. The actual quantity of certificates required to be surrendered, or 'rate of liability' as termed in the Act, is set annually and is a percentage of the sum of the 'relevant acquisitions' of electricity by the liable entity. 'Relevant acquisitions' can generally be described as those purchases of electricity by large buyers who did not generate the electricity themselves. The 'rate of liability' represents the percentage of each 'liable entities' power purchases that must come from renewable generation in order to meet the yearly national target. For example, in the year 2001 the national interim target was 300,000 MWh (the target increases yearly until 2010 when it tops out at 9,500 GWh). Distributing this target obligation proportionally to all 'liable entities' requires that ORER calculate a yearly 'renewable power percentage' that each 'liable entity' must achieve. In 2001 ORER calculated the 'renewable

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<sup>67</sup> The registry is a web-based platform and was designed by Marketplace Company Pty Ltd. The registry can be viewed at <http://www.rec-registry.com/>

<sup>68</sup> Certificates are also created for approved installations of solar hot water heaters (where displacing electricity). Solar water heaters can be included where the installation leads to a positive greenhouse gas benefit and where the fossil fuel contribution is netted out. Eligibility of solar hot water heaters and the number of RECs that may be created is based upon a formula developed by the ORER. For more information about this process please refer to the ORER web site at <http://www.orer.gov.au/householders/index.html>

power percentage' to be 0.24%. Therefore, a 'liable entity' who acquired 100,000 MWh in 2001 would be required to surrender 240 RECs ( $100,000 * 0.24\%$ ).

Once a certificate has been surrendered it is considered retired and ceases to be valid. If a 'liable entity' fails to surrender the proper number of certificates, then a renewable energy certificate shortfall charge is levied. As of 2004 this charge was A\$40/MWh (24 €/MWh).

### *Conclusion*

The Australian renewable energy certificate approach has proven to be an effective and efficient method of increasing renewable energy production. Targets have been met every year to date. The system aims only to support the MRET and does not attempt to support other policy directives such as disclosure of generation attributes and green power marketing. Nevertheless the system offers a good example of a minimal tracking system with the limited goal of tracking and increasing renewable production.

## GG.2 References

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