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Intelligent Energy Europe

Green Power Labelling

An Instrument to enhance Transparency and Sustainability on the Voluntary Green Power Market

Final Report from the project "Clean Energy Network for Europe" (CLEAN-E)

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The CLEAN-E project

Quality labels that define a minimum standard for green power products assist consumers to verify the ecological performance of such products. National labelling programmes which have emerged in some European countries are important and powerful instruments to strengthen consumer confidence in the voluntary green power market.

Scope of the project

The CLEAN-E project accompanied the establishment of new and the improvement of existing green power product labels in selected EU Member States. In this regard the CLEAN-E project supported the efforts of the European Green Electricity Network Eugene[1], a non-profit approach that has set up a minimum standard for green power labelling schemes (Eugene Standard). The Eugene Standard served as the major point of orientation throughout the project.

The establishment of new labels was accompanied by a wide range of activities. This included the development of ecological minimum standards for the two key renewable technologies hydropower and biomass. The project also investigated the feasibility of widening the scope of green power labelling towards the integration of energy efficiency as well as renewable heat. CLEAN-E analysed the interface of green power labels with RES related policies on the national and the EU level including the Guarantee of Origin for renewable electricity and Electricity Disclosure. Finally, the project included a wide range of activities that aimed at disseminating and sharing best practices for green power procurement.

The Final Report

The Final Report is based on the main findings resulting from the activities carried out in the scope of the CLEAN-E project. In this respect the relevant work package reports are

WP 1: Overview of existing and intended green power labelling schemes – Willstedt/Bürger (2006)

WP 2.1: Development of ecological standards for hydropower – Markard/Vollenweider (2005)

WP 2.1: Transfer of the greenhydro standard to Germany (Feasibility study) – Ruef/Markard (2006)

WP 2.2: Development of ecological standards for biomass in the framework of green electricity labelling – Oehme (2006)

[1] Eugene (www.eugenestandard.org) is an independent network bringing together non-profit organisations such as national labelling bodies, experts from environmental and consumers organisations, and research institutes. The Eugene network pursues no commercial interest. Some of the Eugene activities have been partly funded by the EU Commission (DG Environment).

WP 2.2: Evaluation report on the experience with pilot applications of biomass standards – Tritthart (2006)

WP 3.1: Options for integration of energy end-use efficiency and energy services into green power products and labels – Ruggieri (2006)

WP 3.2: Integration of measures in the field of RES-H/C into the scope of green power labels – Bürger (2006)

WP 5: Report on the Interaction of Green Power Labelling with Renewable Energy Policies – Ölz et al. (2006)

In addition we have summarized the major lessons which we have learnt throughout the process of setting up new labelling schemes in some selected countries as well as improving existing labels towards the Eugene Standard (work package 4).

All data provided in this report reflect the status of mid 2005.

Executive Summary

Apart from the mandatory green power market which is formed by renewable electricity generated within public support schemes liberalised electricity markets set the generic framework conditions for the establishment of a market segment which is determined by voluntary demand. On this voluntary market consumers who are actively asking for green power supply are affecting the electricity volume which is sold as "green". The size of the voluntary green power market differs widely among European countries. For the time being in most cases the market share is rather small both compared to the overall consumption volume as well as the total share of renewable electricity production. However, under certain circumstances the voluntary market is also setting incentives that renewable power plants are installed and connected to the grid beyond those plants that are already running and those which are built due to public support.

Voluntary demand vs. public support

Growing consumer interest in green power offerings might bring additional funding to the renewable electricity sector. However this effect should not result in limited public supporting efforts. Since mitigating climate change and improving supply security (which are two of the main drivers for supporting renewables) are public challenges, the financial burden of supporting renewables should be spread on the shoulders of the whole society which is causing the negative effects of power supply. It should not be taken over only by those who are willing to pay more than other electricity consumers. For that reason growing demand for green power products offered on the voluntary green power market should rather complement but not substitute any form of public support.

The role of green power labels

On the voluntary green power market products usually are offered at a higher price compared to products consisting of conventional electricity generation. In this regard the voluntary green power market can be characterised as premium market. On this market transparency and credibility are key issues in order to maintain and enhance consumer confidence.

On the other hand for the average consumer it is rather difficult (and correlated with high transaction costs for gathering all required information) or even impossible to verify the ecological performance of different green offerings. Consumers face a considerable challenge in distinguishing between the different green products offered on the market. Here quality labels that define a minimum standard for green electricity products, ensure independent verification of the product claims, and which are operated and/or are endorsed by organisations with an excellent public reputation have the potential to assist consumers to find their way through the variety of different offerings and to finally take informed purchase decisions.

Environmental standards characterising green power labels

In the European Union green power labels have been in place since 1990. Green power labels differ in many aspects, especially the criteria, the labelling routines and their institutional set-up. The environmental criteria applied by a label on which most auditing and verification routines are based on are usually laid down in a criteria document. The criteria can be generally differentiated in two elements, *eligibility* and *additionality*.

Eligibility criteria define which energy sources and technologies are in principle eligible under the scope of a green power label, which ecological plant based and technology specific standards power plants have to meet in order to qualify for being marketed under a labelled green power product and which technologies are entirely excluded in the scope of the scheme (e.g. nuclear, fossil fuelled electricity generation). Most commonly the assessment of eligibility criteria is plant based.

Although the Directive 2001/77/EC provides a definition of the term 'electricity produced from renewable energy sources' most labels apply additional requirements devised to reduce the environmental impact of specific renewable energy sources. As green power labels operate on a voluntary market segment their criteria should – at least to a certain extent – reflect what consumers perceive to be sustainable in this specific field, irrespective the scientific view on this. As European and also national legislation in some cases allows power plants to be operated which do not comply with those perceptions (e.g. imported palm oil, wood from unsustainable sources, hydropower plants destroying natural river ecosystems), labels have to set up stricter eligibility standards than just stipulating legal compliance. Labelling organisations are advised to define eligibility criteria especially for the two key technologies hydropower and biomass.

The voluntary green power market can be regarded as voluntary support mechanism for renewable energy. Against this background many consumers that switch to green electricity products expect a positive effect on the environment resulting from their purchase decision. In order to fulfil these expectations some labels have introduced the concept of *additionality*. *Additionality* is given when a green power product leads to an extra measurable and quantifiable environmental benefit compared to a baseline defined by the development on the electricity market which would have occurred under the current market conditions and the existing legal framework including public support.

Additionality can be created in many ways, for instance by investments in new renewable power plants which need additional support in order to run economically viable. This applies both for such plants for which public support is not sufficient and for those that are not supported at all. Furthermore *additionality* could derive from implementing electricity saving measures which are triggered and financed through the premiums paid for a green power product. Other additionality concepts (e.g. via carbon offsetting or support of measures in the renewable heating and cooling market) are conceivable provided that they lead to a quantifiable environmental benefit that goes beyond the trend being mandated anyway by the legal framework and which can be unambiguously assigned to a labelled product.

The Eugene Standard

In order to set up the development and to promote a harmonised green electricity standard across Europe the European Green Electricity Network (Eugene) has been launched in 2000. Eugene is an independent network bringing together non-profit organisations such as national labelling bodies, experts from environmental and consumers organisations, and research institutes. The network has agreed on a common European reference standard for green electricity (the "Eugene Standard") that aims at providing a minimum standard for existing and new green power labels. National labels can be accredited against the Eugene Standard. The three integral elements of the Eugene Standard encompass *eligibility*, *additionality* and *independent third party verification*. In the meantime the Eugene Standard has been endorsed by many parties that are interested in the environmental integrity and efficiency of green power offerings. The Eugene Standard has been used as reference standard in the scope of the CLEAN-E project.

Interaction with regulatory framework

Green power labels act in a market environment which is regulated by a wide range of different policies that have mainly been adopted on the European and the Member State level. Relevant policies range from regulations governing the electricity market in general, support instruments for specific generation types (such as feed-in tariff systems for renewable electricity), market transparency tools such Electricity Disclosure to climate policy regulations deriving from the Kyoto process (e.g. Emissions Trading).

A wide range of these policies directly or indirectly influence the development of RES-E and have – at least to a certain extent – some form of interaction with the initiatives on the voluntary green power market (e.g. labels). The interaction between these instruments means that the impact of the voluntary market segment on RES-E is not always straightforward and the effects of the instruments may, under certain circumstances, even counteract each other. For green power labels it is crucial to be structured in such a manner as to minimise the negative interaction with other RE policy instruments.

On the other hand policy regulation (for instance the Guarantee of Origin for renewable electricity and high-efficiency CHP) might be designed in such a way as to provide routines or tools which could be beneficial for green power labels. Such synergies should be identified and exploited to the largest extent possible.

Glossary

Additionality: In the context of green electricity labelling additionality is the key concept in order to ensure that the voluntary green power market contributes to increasing sustainability in the electricity sector, especially mitigating climate change. Additionality is given when a green power product leads to an extra environmental benefit compared to a baseline defined by the development on the electricity market which would have occurred under the current market conditions and the existing legal framework including public support. For instance additionality can be reached by initiating the installation of new RES plants or by improving the environmental performance of existing plants.

Bilateral contract: A direct contract between two market participants (e.g. power producer, supplier, trader) outside of a centralised power pool or power exchange.

Carbon offsetting: Service that compensates the greenhouse gas emissions of a party with an equivalent carbon dioxide saving by using 'carbon offset' credits from emission reduction projects.

Certificate: The term is used twofold: (I) The successful certification of information is indicated by a certificate. This is an official document issued by the certifying body. In the context of green power labelling a certificate indicates that a certain product meets the standards applied by a label. (II) Certificates can also stand for a standardised official record proving that a specified amount of electricity has been generated from specific sources. Certificates are well known from the renewable electricity market. Usually green certificates (often referred to as Tradable Renewable Energy Certificate TREC) represent the environmental value of renewable electricity production. The certificates can be traded separately from the energy produced. By that, the certificates get an own monetary value.

Certification: The process of verifying specific information on products by independent bodies. Certification provides a guarantee that a particular company or product has been tested and that they meet the specific requirements, e.g. set forth by a green power label.

Cogeneration (or Combined Heat and Power, CHP): A CHP plant is an installation which simultaneously generates usable heat and power (usually electricity) in a single process. The term CHP is synonymous with 'co-generation'. Electricity generation from CHP plants with an inherent non-CHP component (e.g. many district heating plants with steam turbines are operated in condensing mode in summer time emitting a large portion of the residual thermal energy into the environment) needs to be divided up into a CHP mode and a condensing mode.

Double counting, double selling: Occurs when the attributes of the electricity generated (e.g. benefits from renewable sources) are sold or accounted for more than once.

EECS: The European Energy Certificate System (EECS) provides a standard for the use and transfer of different kinds of TRECs. This includes amongst others Guarantees

of Origins for renewable electricity following Directive 2001/77/EC. The EECS standard has been developed by the Association of Issuing Bodies (AIB).

Electricity Disclosure: The fundamental idea behind Electricity Disclosure is to provide consumers with information about the electricity which they buy, e.g. information about the supplier's fuel mix or the related environmental impact associated with electricity generation. The concept of Electricity Disclosure has been introduced in the European electricity market by the revised Electricity Directive 2003/54/EC concerning common rules for the internal market in electricity.

Electricity product: An electricity product has particular properties distinct from a supplier's overall supply mix and is often marketed and sold to consumers on the basis of these properties e.g. green electricity products, no nuclear content products, etc.

Eligibility: In the context of green power labelling eligibility criteria define which energy sources and technologies are in principle eligible to contribute to labelled products, which ecological standards eligible power plants have to comply with and which technologies are entirely excluded in the scope of the scheme.

Eugene: The **Eu**ropean **G**reen **E**lectricity **Ne**twork is an independent network bringing together non-profit organisations such as national labelling bodies, experts from environmental and consumers organisations, and research institutes.

Eugene Standard: Eugene has developed a meta-standard for green electricity to which national green electricity labels can be accredited. The three main elements of the standard comprise Eligibility, Additionality and Independent Third Party Verification.

Green Electricity, Green Power: There is no common definition of this term. In many cases green electricity is understood as electricity from renewable energy facilities that have a low impact on the environment. There are varying opinions about what type of electricity should count as green and the criteria can vary from country to country. In some countries "Green Electricity" might be generated from non-renewable sources, too, e.g. by highly efficient CHP plants. A term used similarly to "Green Electricity" is "Green Power". In practical terms there is no difference between "Green Power" and "Green Electricity".

Green Power Labels: Green Power Labels usually define minimum standards for products and are normally based on subjective criteria of the issuing organization (e.g. environmental or consumer organizations). To get the permission to carry a respective label, a product must fulfil this minimum standard. Normally it is subject to an independent audit verifying the quality of the product. Auditing may be offered by official bodies (e.g. government agencies) or by non-governmental organisations.

Green Tariffs: This term can be regarded as synonym for "Green Product". It is used to distinguish between green electricity offers in regulated markets from offers in liberalised markets.

Guarantee of origin (GoO): A Guarantee of Origin for a certain type of electricity is a document proving that a certain volume of electricity has been produced from a certain

fuel source or by a certain technology. On the European level Guarantees of Origin have been implemented by the Directive (2001/77/EC) on the promotion of electricity produced from renewable energy sources and the Directive (2004/8/EC) on the promotion of cogeneration. Member States are required to establish appropriate GoO systems which allow producers of renewable electricity or electricity from high-efficiency CHP to request such a GoO.

Label: A seal put on a product to provide specific information to the customer. In the context of product labelling it indicates that a product fulfils the criteria applied by the labelling organisation. Instead of deciding on multiple different criteria the customer may rely on the label, the specific criteria standing behind the label and the organisations representing the label.

Product portfolio: The collection of generation attributes all owned by the same company or supplier.

RECS: The Renewable Energy Certificate System (RECS) is an open pan-European initiative of energy companies, environmental organizations, trade associations and governmental agencies which has established the organizational, technical and procedural framework for the pan-European trade in green certificates. RESC is administered by the Association of Issuing Bodies (AIB) and has recently be further developed to the EECS System which now provides a harmonised standard for the issue, transfer and redemption of different kinds of TRECs including Guarantees of Origins.

Renewable Energy: In general, the term renewable energy refers to ‘energy obtained from persistent and continuing flows of energy occurring in the environment’. EU Member States have historically taken differing approaches of defining which technologies are classified as being renewable. This is an issue particularly regarding sources linked to waste and to large hydropower plants. Likewise categorisation of the many forms of agricultural ‘biomass’ and ‘biofuels’ may vary between countries. These decisions have partly been dependent on government policy objectives and public perceptions in each given country. A commonly accepted definition is provided by the Directive (2001/77/EC) on the promotion of electricity produced from renewable energy sources in the internal electricity market.

Supplier: Entity that sells electricity to final customers.

Switching: The process of changing electricity supplier (i.e. electricity company) or to a different electricity product or tariff of the default supplier.

Tariff: A tariff is the price or schedule of prices, contractual terms and conditions for a defined service or set of services, e.g. supply with an electricity product.

Transmission System Operator (TSO): Entity responsible for the secure and reliable operation of the transmission grid and taking care for the provision of system services (e.g. balancing power).

UCTE: The "Union for the Co-ordination of Transmission of Electricity" (UCTE) is the association of transmission system operators in continental Europe.

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1.1 Market development

In view of climate policy targets and the enhancement of supply security the EU and its Member States have set ambitious targets for increasing the share of renewable energy sources on the electricity market. With the Directive 2001/77/EC[1] all EU Member States have agreed upon national indicative targets in order to allow achieving an overall Community target of 22% for the contribution of electricity produced from renewable energy sources to gross electricity consumption by 2010. In some Member States government support schemes for renewable electricity (RES-E) generation (especially feed-in systems) have been demonstrated to be effective instruments to stimulate the commissioning of new renewable power plants (e.g. COM 2005), but achieving the targets is still a long way to go (e.g. COM 2004).

Apart from the mandatory green power market which is formed by renewable electricity generated within public support schemes liberalised electricity markets set the generic framework conditions for the establishment of a market segment which is determined by voluntary demand. On this voluntary market consumers who are actively asking for green power supply are affecting the electricity volume which is sold as "green". Under certain circumstances which are outlined throughout this report the voluntary market is also setting incentives that renewable power plants are installed and connected to the grid beyond those plants that are already running and those which are built due to public support.

The size of the voluntary green power market differs widely among European countries. In most cases the market share is rather small both compared to the overall consumption volume as well as the total share of renewable electricity production. In many Member States typically, fewer than one percent of all electricity customers have switched to a green power product. On the contrary in the Netherlands the green electricity market had expanded to 3,0 million customers by October 2004 corresponding to nearly 38% of Dutch domestic consumers. This level of demand is the result of the financial support measures, combined with market liberalisation and the media campaign promoted by environmental NGOs (Willstedt/Bürger 2006).

In recent years voluntary demand of green power is distinctly rising in particular from business customers and public bodies. In addition opinion polls such as Eurobarometer[2] consistently indicate public preference for renewable energy sources. This indicates a principle market potential which exceeds the current market share by far and might be developed once the framework conditions (see below) have improved.

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[1] Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market

[2] The Eurobarometer survey was carried out via face-to-face interviews with 29.430 people in October and November 2005. The survey covers all 27 EU Member States as well as Croatia, Turkey and Northern Cyprus (Turkish community).

However, against the background of the market shares of the two market segments and the low switching rates to green power products in most Member States it must be emphasised that the role of voluntary demand in stimulating RES-E generation is still rather limited. Hence the existence and further development of a voluntary market should not been abused to cut down the support through public regulation (e.g. price-based or quantity-based regulations). Indeed, growing consumer interest for the voluntary market might bring additional funding to the renewable electricity sector. However, since mitigating climate change and improving supply security (which are two of the main drivers for supporting renewables) are public challenges, the financial burden should be spread on the shoulders of the whole society which is causing the negative effects of power supply. It should not be taken over only by those who are willing to pay more than other electricity consumers. For that reason growing demand for green power products should rather complement but not substitute any form of public support.

Apart from consumer demand the ongoing electricity market liberalisation has created incentives for suppliers to diversify their product portfolio by offering a green power product. For instance in Germany more than 140 out of a total of approx. 900 electricity suppliers have launched a green product since the domestic market has been opened in 1998. The reasons behind that are manifold. They comprise strengthening customers relationship and supplementing pure price competition by additional characteristics other than price (such as the "quality" of the product). Products offered on the green power market differ in terms of generation sources, price (resp. price premiums) and environmental effects.

Typical determinants for the development of the voluntary green power market are

- the regulatory market environment (especially the degree of liberalisation and the question to which level the market has been opened for the domestic sector) and the specific market design,
- the degree of general consumer awareness towards issues related to their electricity supply (ranging from aspects such as switching opportunities, price, supply security and environmental impacts of electricity production),
- the current generation mix of national electricity markets (in electricity markets with a large share of carbon low energy sources such as renewables but also nuclear many companies that base their sustainability programmes on lowering the companies climate impact may focus their activities on non-electricity related actions),
- aspects concerning the supply side, especially the way electricity suppliers (including incumbent suppliers diversifying their portfolio as well as new market entrants) promote their green offerings and the general framework conditions for new supply companies entering the market, and finally
- the access to renewable capacities for those companies which are willing to market a green product.

1.2 Types of green power products

There are two basic types of green electricity products which are offered on the market (Willstedt/Bürger 2006):

Consumption based products (often referred to as supply model)

Under consumption based products, green electricity customers are supplied with electricity generated by environmentally sound facilities. The supplier ensures with legal agreements (supply contracts) that the electricity is delivered through the electricity grid from the production facility to the customer. Obviously it is not possible to ensure that physically "green" electrons are supplying the specific customers of the green product since electrons follow physical principles rather than legal or economic rules. The supplier rather has to prove periodically that he has acquired property rights on environmental attributes associated to eligible green electricity generation which correspond to the amount of electricity supplied to green customers. The determining factor in this regard is the contractual supply of electricity from eligible sources.[3] Environmental benefits assigned to the product accrue from the characteristics of the power plants which feed the respective product.

Another important issue related to this type of product is the concept of synchronicity of production and consumption of the green electricity. Many certification systems demand prove of the balanced volumes of production and consumption only on an annual basis. This means the quantity marketed as green electricity in a specific year must be the same as the amount produced by eligible power plants. Other concepts require balanced production and consumption for shorter periods than one year or even total synchronicity.

Due to the characteristics described above it is only possible to supply consumption-based green electricity in liberalised markets. National legislation needs to empower customers to choose among different electricity suppliers in order to be able to purchase consumption based green electricity.

Contribution based products (often referred to as fund model)

Under contribution based green electricity schemes, a green supplier charges a premium on top of the supply of electricity which might either come from renewable or conventional sources (such as fossil fuelled or nuclear power plants). The premiums build a fund which is invested in expanding eligible green energy capacity.

Provided the fund model is based on the delivery of conventional electricity a customer does not acquire any property rights on green electricity. His property rights only cover conventional electricity.

[3] In this respect it does not make any difference as to whether the contractual supply is facilitated by physical supply (that is reflected in the load schedule of the different contract partners) or by the delivery of certificates which hold the attributes (e.g. the "greenness") associated to the respective electricity generation.

In those cases where renewable electricity is supplied (meaning that the delivery part of a product consists of RES-E) the model can be regarded as a combination of fund and supply model: The green electricity supply would reflect the consumption based part of the product whereas the premium payments would represent the contribution based part (fund).

2 Green power labelling

2.1 The role of labels on the voluntary green power market

On the voluntary green power market products usually are offered at a higher price compared to products consisting of conventional electricity generation. In this regard the voluntary green power market can be characterised as premium market. On this market transparency and credibility are key issues in order to maintain and enhance consumer confidence. Suppliers which offer a green product for which the green claims are not properly backed by corresponding green electricity generation would undermine this confidence and would substantially harm the market.

For the average consumer it is rather difficult (and correlated with high transaction costs for gathering all required information) or even impossible to verify the ecological performance of different green offerings. Consumers face a considerable challenge in distinguishing between the different green products offered on the market.

Here quality labels which

- define a minimum standard for green electricity products,
- ensure independent verification of the product claims, and
- which are operated and/or are endorsed by organisations with an excellent public reputation

have the potential to assist consumers to find their way through the variety of different offerings and to finally take informed purchase decisions.

2.2 Definition of labels and other green electricity products

A general classification of labelling, environmental declarations and environmental claims can be found within the ISO-standards. The following classification is partly based on the ISO system (Willstedt/Bürger 2006):[4]

Environmental labels or eco-labelling (Type I): Environmental labels or ecolabels are voluntary systems operated by a third party organisation, which allows the use of a specific environmental label on products (e.g. electricity products) that comply with certain ecological criteria. The labelling body must be a third party, meaning a person or body that is recognized as being independent of the supplier ("first party") and purchaser ("second party") interests. The labelling body establishes environmental criteria assessing the environmental performance of the product during its life cycle. The aim is to differentiate environmentally more sound products from others in the same product category, based on a measurable difference in the environmental impact. It is important that environmental labels should demonstrate transparency through all stages in order to achieve credibility among the consumers.

[4] E.g. ISO 14024 that provides the principles and protocols that third-party labelling, 'seal' or practitioner programs should follow when developing environmental criteria for a particular product.

Environmental claims (Type II): An environmental claim is a statement, graphic or a symbol that indicates an environmental aspect of the product; commonly to indicate less environmental impact compared to a standard product. In case of electricity, such products are usually production-declared electricity such as wind or hydropower, commonly marketed under its own brand. By adding statements like G*reen electricity*, *Ecoelectricity* or even *100% hydropower*, the supplier aims to convince the consumer that the offered product has a lower environmental impact compared to system power. In these cases, the consumer has to trust the supplier that the self-defined environmental claim is correct. In most countries, there is no specific law dealing with environmental claims on electricity products. The legal restrictions are however specified in national marketing laws which usually comply with the guidelines by the International Chamber of Commerce (ICC).

Environmental product declaration (Type III): Similar to labels, Environmental Declarations (ED) provide standardised information about the environmental impact of a product, however the actual assessment of the product is left to the consumer.

On the European electricity market several labels comply with general principles of the ISO 14024 Type I label category. In addition there are many green power products which follow a product standard which has been set up by the respective product supplier (roughly following the ISO 14204 Type II definition). Although such products use in many cases independent third party auditing in order to verify compliance with this minimum standard this concept can not be claimed as an environmental label or ecolabel since the labelling criteria have not been established independently from market interests and since the minimum standard is operated by the supplier himself and not by an independent third party labelling body.

In many cases, non-profit NGOs (e.g. environmental or consumer groups) are the organisations behind green power labels. It must be noted that these organisations may not necessarily always agree with the requirements of the ISO 14024 standard.

2.3 Labelling vs. Electricity Disclosure

The concept of Electricity Disclosure was introduced in the European electricity market by the revised Electricity Market Directive 2003/54/EC.[5] The idea behind Electricity Disclosure is to provide consumers with information about the electricity they buy and by that to facilitate them to make purchase decisions using their own individual preferences (such as environmental values).

The term "label" often is used in the context of both instruments, Electricity Disclosure and green power labelling. However both instruments need to be carefully distinguished (Ölz et al. 2006). One difference between the two instruments is that Electricity Disclosure is covering the whole electricity market and must be implemented by all suppliers. Green power labels operate only in the segment of the voluntary green power market

[5] Directive 2003/54/EC of the European Parliament and of the Council of 26 June 2003 concerning common rules for the internal market in electricity

and mandatory implementation is not foreseen. Another difference is that in most Member States Electricity Disclosure labels do not underlie any auditing or verification requirements which is the core of green power labelling schemes.

Both instruments aim to bring more transparency to the electricity market, however with different concepts: Whereas Electricity Disclosure provides objective information about all suppliers' portfolios, green power labels evaluate the quality of specific products against a set of criteria based on subjective preferences of the labelling organisation. Therefore the introduction of Electricity Disclosure does not replace the need for green power labels.[6]

2.4 Overview of existing labels

In the European Union green power labels have been in place since 1990. Green power labels differ in many aspects, especially the criteria (cf. section 2.5.1), the labelling routines (cf. section 2.5.2) and their institutional set-up. Table 1 provides an overview of some selected labels operated in Europe. A detailed overview of the various characteristics of the different labels in Europe and some selected countries abroad (e.g. Australia, US) can be found in Willstedt/Bürger (2006).

2.5 Elements characterizing green power labels

Green power labels can be characterised by various aspects which are outlined in the following sections.

2.5.1 Environmental criteria

The environmental criteria applied by a label and on which most auditing and verification routines are based on are usually laid down in a criteria document. The criteria can be generally differentiated in two elements, *eligibility* and *additionality*.

Eligibility

Eligibility criteria define which energy sources and technologies are in principle eligible under the scope of a green power label, which ecological plant based and technology specific standards power plants have to meet in order to qualify for being marketed under a labelled green power product and which technologies are entirely excluded in the scope of the scheme (e.g. nuclear, fossil fuelled electricity generation). Most commonly the assessment of eligibility criteria is plant based.

Whereas the baseline for renewable power plants to classify eligible in the scope of a label is determined by the legal requirements given in the national context most labels apply additional requirements devised to reduce the environmental impact of specific renewable energy sources (such as hydropower or biomass) or technologies as to reflect what consumers expect from different technologies (cf. section 3.2).

[6] Potential synergies between these two approaches are discussed in section 5.2.

Table 1: Overview of Green Power Labels in Europe

	Label	Country	Contact Details
	Umweltzeichen (Richtlinie UZ 46 Grüner Strom)	Austria	Verein für Konsumenteninformation (VKI) phone +43-1-58877-0 email: konsument@vki.or.at www.umweltzeichen.at
	Norppa-ecolabel	Finland	Finnish Association for Nature Conservation phone +358-9-228 08 213 email: ekoenergia@sll.fi http://www.ekoenergia.info
	ok-power	Germany	EnergieVision e.V. phone +49-761-45295-25 email: info@energie-vision.de www.ok-power.de
	Grüner Strom Label	Germany	Grüner Strom Label e.V. phone +49-228-2891449 email: info@gruenerstromlabel.de www.gruenerstromlabel.de
	TÜV Süd: EE01, EE02, UE01, UE02 TÜV Nord: VdTÜV-Merkblatt 1303	Germany	TÜV Süddeutschland AG phone +49-89-5791-0 email: info@tuev-sued.de www.tuev-sued.de TÜV Nord Umweltschutz GmbH & Co. KG phone +49-40-8557-2150 email: umwelt@tuev-nord.de www.tuev-nord.de
	100% Energia Verde (Bollino Verde)	Italy	REEF O.N.L.U.S. phone +39 050 531 588 e-mail: info@centopercentoverde.org http://www.centopercentoverde.org
	Milieukeur groene elektriciteit	Netherlands	SMK phone: +31-70-3586-300 email: milieukeur@milieukeur.nl http://www.milieukeur.nl
Bra Miljöval	Bra Miljöval	Sweden	Dep. Ecolabelling and Consumer Issues phone +46 31 711 64 50 email: gbg@snf.se http://www.snf.se/bmv/english-more.cfm
basic naturemade star naturemade	naturemade basic naturemade star	Switzerland	VUE *naturemade* phone +41-44-213 10 21 email: info@naturemade.ch www.naturemade.ch

Source: Willstedt/Bürger (2006)

Additionality

In addition to eligibility requirements some labels have introduced the concept of additionality. Additionality is given when a green power product leads to an extra measurable and quantifiable environmental benefit compared to a baseline defined by the development on the electricity market which would have occurred under the current market conditions and the existing legal framework including public support. Additionality is the key concept in order to ensure that the voluntary green power market contributes to increasing sustainability in the electricity sector, especially mitigating climate change. The assessment of additionality is product based.

Currently most green power labels do not include or apply only weak criteria on additionality (cf. section 4.2).

2.5.2 Roles, responsibilities and labelling routines

With regard to the institutional set-up of a labelling scheme three parties have major roles within the scope of a labelling scheme.

Green power suppliers

Green power suppliers are the customers of a labelling scheme. Generally all major labelling requirements are regulated within a labelling contract between the supplier and the legal body representing the label. With concluding the contract the supplier is accepting the regulatory framework applied by the label. At the same time in most cases the supplier is entitled to use the label (e.g. within his marketing campaign) once the contract has been signed.

Auditors

Green power labelling requires thorough auditing procedures to verify the green product claims made by the suppliers who offer labelled products. Sound auditing and verification processes are vital in strengthening consumer confidence in a labelling scheme.

Within an audit the auditor evaluates whether a product complies with the ecological minimum standard that is laid down in the criteria document. The core element within each audit is the verification whether a green power supplier has matched the total supply volume sold under the labelled product name with an adequate volume of green power generation or purchases over a fixed period of time. And it must be assessed whether the product performance complies with all eligibility and additionality requirements applied by the label.

For this purpose it is necessary to draw unambiguous links to the power plants which feed a labelled product. The creation of these kind of links is called "electricity tracking". Obviously, it is not possible to base these links on the physical electricity flows since any electricity which is fed into the public electricity network flows into a homogenous pool of electricity and cannot be distinguished with regard to its source.

Therefore, other means of linkages, e.g. following the contractual links between market actors have to be established between generation and supply.

Existing green power labelling schemes use different methods of tracking electricity and the respective attributes associated to it. The main tracking options applied in Europe involve (Ölz et al. 2006)

- Contract based tracking: In this option electricity contracts provide evidence that green electricity (or at least the corresponding green attributes) has been transferred between power plant and supplier.
- Tracking based on an acknowledged certificate system, such as the European RECS system[7]: In such a system, certificates holding the attributes, such as the greenness, which are required by the labelling scheme, are used as proof of origin. For instance, RECS certificates are eligible as proof of origin in the scope of the Swiss nature made star label and the German "ok-power" label; however, the eligibility of RECS certificates is subject to several constraints (e.g. Willstedt/Bürger 2006).
- Tracking based on the Guarantee of Origin for renewable electricity following the EU Directive (2001/77/EC). For instance, this concept is applied by the Dutch "Milieukeur Groene Elektriciteit" label.

Labelling Body

Labelling bodies of existing labels follow rather different structures. Whereas the Austrian "Umweltzeichen" is operated under the responsibility of the state, many other labels involve major non-profit organisations that have strong links to the environmental sector. Moreover labelling bodies and the underlying governance structures distinguish distinctly in the degree that market actors, in particular green power suppliers, have influence on decisions concerning the standard. Whereas the Italian "Bollino Verde" label as well as the Swiss "naturemade" labels directly involve those stakeholders in the formal governance structure (e.g. as members of the label board) other labels (e.g. the two German labels "ok-power" and "Grüner Strom Label") have been designed as to avoid any formal interference. However this does not automatically mean that the customers of a label have been completely excluded from any major discussion process concerning the development of the standard. In many cases they are intensively consulted before a major decision is taken, especially when it might have an impact on the standard (e.g. revision of the criteria document).

The role of the labelling body is manifold. The labelling body is the main contractual partner of the electricity supplier concerning the labelling process. In this role he is also

[7] The Renewable Energy Certificate System (RECS) is an open pan-European initiative of energy companies, environmental organizations, trade associations and governmental agencies which has established the organizational, technical and procedural framework for the pan-European trade in green certificates. For further information see http://www.recs.org.

responsible for the definition and any further evolution of the labelling criteria which build the heart of a label.

In addition the labelling body is the main contact point for suppliers, consumers, NGOs and the general public with regard to all questions and requests related to the label. Within the auditing process the labelling body is responsible for assisting the auditors to correctly interpret and apply the labelling standard. In some cases the relationship to the auditors is strengthened through regular auditor workshops and trainings. Within the auditing and verification process some labelling bodies (e.g. EnergieVision in the case of the German "ok-power" label) take the role of verifying the audit reports submitted by the suppliers or their auditors, respectively (following the four eyes principle). In many cases labelling bodies have the right and duty to perform regular spot checks of the labelled products.

2.6 The Eugene Standard

In order to set up the development and to promote a harmonised green electricity standard across Europe the European Green Electricity Network (Eugene) has been launched in 2000. Formally Eugene has been established as a non-profit membership-based association under Belgian law in 2003. Eugene is an independent network bringing together non-profit organisations such as national labelling bodies, experts from environmental and consumers organisations, and research institutes. The network has agreed on a common European standard for green electricity (the "Eugene Standard"[8]), which is the product of several years of work and consultation among the major stakeholders in the green power market.

The intention of the Standard is to use it as a common reference, against which national labels can be accredited. In addition the Standard helps labels to improve their criteria. In the meantime the Eugene Standard has been endorsed by many parties that are interested in the environmental integrity and efficiency of green power offerings. The Eugene Standard has been used as reference standard in the scope of the CLEAN-E project.

The three integral elements of the Eugene Standard encompass eligibility (cf. section 3), additionality (cf. section 4) and independent third party verification. Up to December 2006 two labels ("ok-power" in Germany, "naturemade star" in Switzerland, see Table 1) have been accredited against the standard. Most other labels not accredited yet would need to introduce additionality and complementary hydropower and biomass criteria in order to be fully compatible with the standard.

2.7 Market impact

With the exception of the Netherlands (where in fact after 2002 the amount of sold green electricity has soared above local production prompting the import of large quan-

[8] The Eugene Standard can be downloaded at: http://www.eugenestandard.org/mdb/docs/15_Eugenestandard.pdf

tities of green electricity from other EU countries), all countries in Europe in principle still have a great potential to increase the amount of labelled green electricity on the market.

However this potential is limited as soon as the concept of additionality is applied (cf. sections 2.5.1 and 4). Furthermore it has to be noted that in several countries (e.g. Austria, Germany) public support instruments have been designed as to mandatorily distribute RES-E which has received funding through the system among the market, e.g. to all companies supplying final customers. In such cases only limited RES-E volumes might be available to the voluntary market (even if no additionality requirements are applied).

In general terms it can be stated that for the moment, demand of labelled green electricity is not the key driving factor for substantially expanding renewable electricity generation. It is rather the public support framework (e.g. feed-in systems, obligation schemes, investment support,…) applied by Member States which is the main stimulus for the expanding renewable capacity. Therefore it must be emphasised that even in the mid-term voluntary demand will not be able to substitute public support. However green power products, provided they apply the concept of additionality, have the potential to contribute to a limited share to the expansion of RES-E generation above what is initiated by public support instruments.

3 Environmental Eligibility

3.1 Why striving for Eligibility

Although the Directive 2001/77/EC provides a definition of the term 'electricity produced from renewable energy sources' many Member States apply different legal definitions based on which energy is to be considered as renewable in the scope of e.g. national support schemes. Varying definitions concern especially hydropower and the diverse sources of biomass. Varying definitions might also be appropriate in the scope of green power labels.

Green power labelling is aiming at the voluntary market on which the market volume is determined by voluntary demand. In most countries the voluntary green power market represents a premium market segment in which credibility is the key element for maintaining consumer confidence in suppliers, their green offerings and green power labels and for allowing such markets to develop successfully.

As labels operate on a voluntary market segment their criteria should – at least to a certain extent – reflect what consumers perceive to be sustainable in this specific field (if, for instance consumers perceive some forms of biomass as not being sustainable, labels will loose credibility) – regardless of the scientific view on this – if they qualify green power products which are produced from such substances for being eligible.

As European and also national legislation in some cases allows power plants to be operated which – based on the requirements applied by the respective regulations – do not comply with many consumers' perception of what should be regarded as "green", labels have to set up stricter eligibility standards than just stipulating legal compliance.[9]

3.2 Currently applied Eligibility criteria

As a baseline most green power labels classify all kinds of renewable energy sources and technologies as eligible, however for some technologies specific restrictions are applied (cf. Table 2). Few labels also accept – to a limited extent and under specific restrictions – electricity from highly efficient CHP plants to feed labelled products.[10] This concept is led by the rationale that in countries in which a significant share of total electricity consumption is deriving from coal-fired power plants fossil high-efficiency CHP plants are regarded as efficient means to reducing GHG emissions in the electricity sector.[11]

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[9] Under European law green power producers are for example allowed to burn palm oil or wood from unsustainable sources in their power stations. Sustainability assurance should be required for such energy sources, to avoid deforestation and other negative environmental and social impacts.

[10] Some labelling schemes (as the Eugene Standard) require a restriction to natural gas, a certain overall capacity factor (e.g. 85%) on an annual basis taking into account power and heat production and CHP is eligible only up to a maximum limit of 50% of any consumption-based green electricity product. And only that part of electricity generation from natural gas-fuelled cogeneration is eligible, which is related to maximum heat production ("back pressure" operation).

[11] Compared to the separate production of power and heat, CHP can significantly reduce the fuel input to a power plant thus lessening the environmental impact related to burning fossil fuels.

Table 2: Overview of eligibility criteria currently applied by selected green power labels throughout Europe (status mid 2005)

Label	Geothermal, Wind, PV	Hydro	Biomass[12]	Fossil Cogeneration
Umwelt-zeichen (AUT)	Only legal compliance	Specific requirements for different types of installations (run of river, storage, pumped storage)	Primary, secondary, agricultural, forestry all eligible, not sludge or landfill gas	Not eligible
Norppa (FIN)	Only legal compliance	An audit of the plant and an action plan to reduce ecological impacts are compulsory	Primary, secondary, agricultural, FSC-labelled forestry all eligible, sewage and biogas also	Not eligible
ok-power (GER)	Only legal compliance	Primarily from re-commissioned or up-graded plants; new plants restricted to run-of-river plants	Primary, secondary, agricultural, forestry all eligible if certified, not sludge or landfill gas	Only from high efficient gas-fired CHP; allowed, up to 50% of the product with emission limits
Grüner Strom Label (GER)[13]	Only legal compliance	Only legal compliance	Only in CHP with annual efficiency > 70%	Maximum 2 MWel
Bollino Verde (ITA)	Only legal compliance	Run-of-river under 50 MW; maximum of 20%	<30 MW	Not eligible
Milieukeur groene elek-triciteit (NL)	Only legal compliance	Max 15 MW plus addi-tional requirements	Minimum installation standards (also on emissions) above national regulations	Not allowed; co-firing possible with strict stan-dards
Bra Miljöval (SWE)	Legal compli-ance; Wind power, with additional crite-ria on location and decommis-sioning	Plants until end 1995 eligible with criteria Maximum 95% of prod-uct.	Not GMOs, FSC-labelled forest fuels, waste biomass only if more than 90% bio-mass and free from dangerous substances	Not eligible
naturemade star (SWI)	Only legal compliance	EAWAG Greenhydro Standard	Organic waste, wood and agricultural biogas allowed	Not eligible

Source: Willstedt/Bürger (2006)

[12] A detailed overview of the biomass eligibility criteria applied by different labels is provided by Oehme (2006).

[13] The criteria of "Grüner Strom Label" have been revised in 11/2005 which is already reflected by the table.

3.3 Proposed Eligibility criteria

Table 2 illustrates that most labels base their eligibility criteria for wind power, geothermal electricity generation and photovoltaics on legal compliance, whereas specific eligibility criteria are applied for hydropower and various biomass sources (in light of the potential environmental impact associated to those technologies). These standards differ from label to label quite substantially.

Against this background and in order to strive for a certain degree of harmonisation of different eligibility standards we have developed a proposal for environmental minimum eligibility standards for these two key technologies as well as guideline how to best implement such standards.

3.3.1 Hydropower

Hydropower is a key source for renewable electricity generation and due to its widespread use in many European countries, it has an important potential to be marketed as green power, i.e. as an environmentally sound form of power supply. While offering ecological advantages from a global perspective, the construction and operation of hydropower plants may cause quite severe environmental impacts at the local and regional level.

Hydropower plants in river streams, for example, represent barriers for the migration of fish and for the transport of sediments that are vital for natural habitats in rivers. Some power plants also diverge water into a channel, leaving originally natural river stretches with very little or even no water at all. In the case of reservoirs, large concrete dams have been built and areas have been flooded. Reservoirs also release large amounts of water at peak load hours during the day when power is needed. This hydro peaking alters natural water flows and affects negatively the ecological quality of rivers. Extinction of fish populations, loss of aquatic habitats as well as sinking groundwater levels can result from such practices. National and European legislation do not necessarily capture these effects. In order to achieve true environmental improvements, the local and regional impacts of hydropower plants need to be evaluated, reduced and minimised.

The environmental impact of hydropower can be quite significant. And also the public attitude towards hydropower differs quite significantly across Europe. Especially in countries with a high share of hydropower (such as Austria, Switzerland or Sweden) many customers do not consider hydropower as "green" but have rather developed a distinct awareness of the general problems related to the installation and operation of hydropower plants. Public opposition against new hydropower plants is primarily based on the anticipated environmental impact of this technology. Selling hydropower as green electricity therefore requires a thorough evaluation of the benefits on the global scale and the shortcomings at the local-regional level.

The idea underlying "green" hydropower is that certified hydropower plants follow environmentally sound practices that keep the negative effects on local ecosystems at a

minimum. The task to develop sound criteria for hydropower plants is all the more challenging as every hydropower plant has its particularities and simple thresholds like for instance the power capacity (i.e. small hydropower below 10 MW is eligible) make absolutely no sense in ecological terms. Green hydropower plants must meet specific ecological conditions, regardless of their size (e.g. installed capacity), age or mode of operation. On the other hand, application of the same criteria faces small power plants with comparably high transaction cost.

Good standard provided by the Swiss greenhydro standard

So far, encompassing and scientifically sound assessment procedures for hydropower plants have only been developed and applied in the US and in Switzerland (e.g. Bratrich/Truffer 2001, Markard/Vollenweider 2005). In Switzerland the *greenhydro* standard (http://www.greenhydro.ch/), that is applicable to many kinds of situations and installations has been applied for many years.[14] Especially the basic principles developed in the scope of this standard can serve as a good reference for ecological hydropower criteria in other European countries.

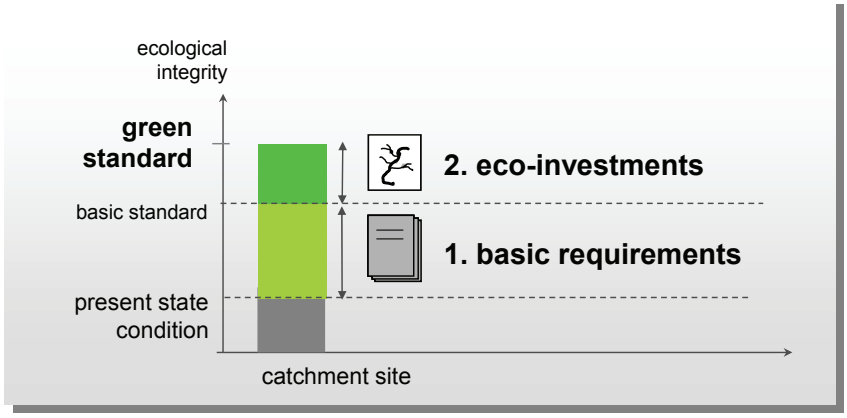
The idea underlying the *greenhydro* standard is that certified hydropower plants are characterised by environmentally sound operation and effectively protect the local aquatic ecosytems. This guiding principle applies to all plants, independently of their installed capacity, age or mode of operation. For these requirements to be put into practice in a plausible way, a power station must not only achieve a general standard, but also fulfil more specific requirements adapted to the river's individual ecological needs and the technical framework conditions of the plant.[15] For this reason the *greenhydro* standard consists of two components (cf. Figure 1).

First, hydropower plants have to fulfil a set of basic requirements, which have been formulated in a general way. The basic requirements ensure that all certified power plants reach a comparable ecological standard. Second, power plants commit to carrying out measures for the ecological improvement of their immediate surroundings and for the protection of the utilised river. Such measures are financed by an income generated by a fixed surcharge per kiloowatt-hour of green electricity sold (eco-investments). The eco-investments are specifically adapted to the ecological situation of the power plant at hand.

[14] The *greenhydro* standard is applied in the scope of the Swiss green power label "naturemade star". This demonstrates the principal organisational and financial practicability of integrating the *greenhydro* standard into a green power quality label.

[15] Although the *greenhydro* approach has a focus on individual power plants and their catchment area our analysis has shown that the green hydropower concept complies with the aims of the European Water Framework Directive.

Figure 1: Two-step concept of the greenhydro standard: basic requirements and eco-investments



Transition of the greenhydro standard to other countries

As the principle structure of the *greenhydro* standard contains scientifically objective criteria and follows a rather generic approach, a transfer to other types of rivers and power stations should be generally unproblematic. For instance within the CLEAN-E project the general applicability of green hydropower certification systems has been demonstrated for power plants in Germany (Ruef/Markard 2006). Obermoser (2005) has demonstrated the general transferability of the *greenhydro* standard to Austria. However, both processes have shown that particularities of certain types of hydropower plants and of legal frame-conditions have to be considered in the transfer and adaptation process. Furthermore, depending on the legal requirements, the current ecological situation of hydropower plants may vary from country to country, thus resulting in different costs to fulfil the basic requirements.

The ecological basis of the *greenhydro* standard should take into account the general level and the particularities of national legislation on environmental and aquatic protection and should not contradict, but rather sensibly complement national legislation. Clarification of the legal situation further facilitates practical support of the standard, as technical agencies and consultancies can be referred to current practice with regard to the professional standards established in the fields of environmental impact assessment and renewal of licenses.

Next to the objective scientific criteria of the basic requirements the *greenhydro* standard is additionally dependent on a series of value-laden decisions which have to be taken at a political level.

The issues and questions requiring political determination can be described as follows:

- Which legal standard or which specific power station(s) can serve as reference for illustrating the ecological level of the basic requirements in a national context?

- How should the use of the contributions for eco-investments be managed? And how high should the surcharge be?
- How to deal with newly constructed power plants? Under which circumstances will they be eligible for certification? Can extensions to existing power stations be certified and if so, will the entire plant be affected or only the extension?
- How can the certification process of small power stations be simplified without jeopardising the ecological standard?

Although many of these questions seem to be quite fundamental, propositions on how to deal with as well as experiences are readily available (Markard/Vollenweider 2005). It is recommended to carry out this process within a network in which the most important interest groups are represented in order to create broad support and to avoid criticism later on.

Furthermore a network of auditors is needed besides ecological and political criteria, which can guarantee a transparent and credible auditing process. Auditors must have several years of technical and professional expertise in water management, technical hydropower expertise and the necessary know-how in quality assurance. Evaluating the ecological basic requirements calls for knowledge of aquatic ecology and reliability in practical data acquirement within this field. To achieve objective and comparable results the technical auditing of the power stations should only be carried out by experienced parties. For a transfer of the *greenhydro* standard it is therefore important to initially clarify how the country's experts - who may be considered for technical auditing - are organised and which minimal conditions are to be placed on their professional expertise. In this context, national labelling bodies may consider to establish a regular exchange of knowledge and experience at the international level in order to assure a good and comparable practice of applying the *greenhydro* standard.

Recommendations in general terms

In general terms we recommend labelling bodies which strive for ambitious eligibility criteria for hydropower plants to consider the following three principles (Markard/Vollenweider 2005):

- Principle 1: Basic requirements

  All certified green hydropower plants should fulfil basic requirements, which are based on a set of scientific criteria. These criteria include but are not limited to the following:[16]

  - Power plants should be designed in a way that allows fish to migrate unimpeded.

[16] If it turns out that for a new label the fulfilment of all listed basic requirements represents a too large hurdle (e.g. in terms auf auditing effort or compliance costs) the respective labelling organisation should at least aim for the implementation of a reasonable selection of some of the basic requirements.

- In terms of minimum flow, the hydropower plant has to ensure a discharge regime that closely reflects the natural characteristics of the river system involved.
- Hydropeaking should not seriously damage the river biocoenoses or cause any long-term biodiversity degradation.
- Power plants should enable sediment transport.
- Bank reinforcements and constructions should be designed to prevent deterioration of the connection between the riparian zone and the main river channel.

- Principle 2: Eco-investments

  The certified green hydropower plant should invest a fixed payment per kilowatt-hour produced (e.g. 0,1 ct/kWh), or sold respectively. These eco-investments should be used to restore, protect or upgrade the environment in the catchment area of the plant and are directly related to the sales of green power to end users. Eco-investments should be specific for each plant and how they will be used should be agreed upon in consultation with local and regional stakeholders.

- Principle 3: Reliable assessment procedure

  Compliance with conditions 1 and 2 should be assessed through an initial audit of each power plant. Follow-up audits should be carried out at regular intervals. The audit and certification procedure should be clearly defined, transparent and should not discriminate any hydropower plant or operator.

Hydropower has tremendous potential in providing sustainable renewable energy in Europe. In order to assure effective environmental benefits, the local and regional impacts of hydropower plants need to be reduced. The three conditions described here - environmentally sound practices, continuous upgrade of the local environment, and a transparent audit and certification system - would bring about a source of green power that delivers environmental benefits and one that consumers can trust.

3.3.2 Biomass

Directive 2001/77/EC on the promotion of electricity produced from renewable energy sources in the internal electricity market defines biomass as "*the biodegradable fraction of products, waste and residues from agriculture (including vegetal and animal substances), forestry and related industries, as well as the biodegradable fraction of industrial and municipal waste*". Compared to other kinds of renewable energy sources such as wind energy or hydropower, biomass is an aggregation of heterogeneous feeding materials and conversion technologies that are linked to different traditions and connotations in different European regions.

Surveys in different EU countries have shown that electricity from biomass is not necessarily perceived as 'green'. Awareness of bioenergy or biomass is generally rather low and a wider public recognizes especially wind energy or solar power as the main types of renewable energy. Compared to those homogenous energy sources, the range of available fuels and feeding material which we encounter in the bioenergy sector may

also be perceived in remarkably different ways. While some fuels may be seen as 'clean' (pellets, forest residues) others may be perceived as 'dirty' fuels (e.g. waste). However, this separation might differ from country to country. For instance in countries with little forest areas the use of waste as bioenergy may be more accepted than the idea of cutting trees (Rohracher et al. 2004).

Recommendations in general terms

Taking into account the diversity of biomass sources and the rather heterogeneous perception of the different sources as supportable renewable energy sources it is rather difficult to develop overall eligibility criteria which can be applied by green power labels all over Europe. However, based on our analysis carried out within the CLEAN-E project we recommend labelling bodies which strive for ambitious eligibility criteria for biomass (biomass sources as well as power plants using biomass) to base their criteria on the principles outlined below (Oehme 2006, Tritthart 2007).

Biomass criteria applied in the scope of a green power label should comprise two items: the definition of eligible feeding materials (as well as the exclusion of certain types of biomass) including criteria defining the ecological quality of the biomass, and the specification of the technologies (plant types) which shall be eligible to convert biomass in green electricity in the sense of the labelling scheme.

- Principle 1: General eligibility of biomass sources

  Eligible biomass sources for the production of green electricity should be defined as follows:

  - woody biomass (forests and plantation wood; wood processing industry, by-products and residues; used wood, blends and mixtures),
  - herbaceous biomass (agriculture and horticulture herb including cereal crops, grasses, oil seed crops, root crops, legume crops, flowers and landscape management herbaceous biomass; herb processing industry, by-products and residues; blends and mixtures),
  - fruit biomass (orchard and horticulture fruit; fruit processing industry, by-products and residues, blends and mixtures),
  - separated biodegradable waste (for biogas only),
  - animal excrements, e.g. manure or chicken litter etc. (but no animal bodies or parts of them),
  - sewage gas

  The use of genetically modified organisms (GMO, agricultural crops as well as trees) for electricity production should not be permitted.

- Principal 2: Eligibility criteria for wood fuel

  All wood fuel including wood fuel from thinning and residues from harvesting operations should originate from forests that are managed as to comply with the principles and measures aimed at ensuring sustainable forest management. In Europe, the principles and measures should at least correspond to the definition of Sustainable Forestry Management that was adopted in Resolution 1 of the 2nd Ministerial Conference on the Protection of Forests in Europe (Helsinki, 16-17 June 1993), the Pan-European Operational Level Guidelines for Sustainable Forest Management, as endorsed by the 3rd Ministerial Conference on the Protection of Forests in Europe (Lisbon, 2-4 June 1998) and the Improved Pan-European Indicators for SFM, adopted at the MCPFE Expert Level Meeting of 7-8 October 2002 that were endorsed at 4th Ministerial Conference on the Protection of Forests in Europe (Vienna, 28-30 April 2003).

  Preferably – and this should at least apply to wood fuel from plantations and imports – wood fuel should be certified according to the standard developed by the Forest Stewardship Council (FSC, www.fsc.org). Other certificates or standards should be accepted, as far as it can be proven that an equivalent quality level will be met.

  Up to date in several European countries not enough certified wood fuel is available. In this case it must be proven (1) that wood fuel does not originate from illegal harvesting[17] or from High Conservation Value Forests[18]. In addition (2) the availability of certified wood fuel or of wood fuel endorsed with a sound tracking mechanism (see below) shall be reviewed regularly.

- Principal 3: Eligibility criteria for energy crops

  Energy crops should not be produced and short rotation tree plantations should not be grown on arable land which has been gained by conversion of pasture or grassland.

- Principal 4: Eligibility criteria for biogas plants using manure

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[17] Illegally harvested wood: wood that is harvested, traded or transported in a way that is in breach with applicable national regulations (such regulations can for example address CITES species, money laundering, corruption and bribery, and other relevant national regulations).

[18] High Conservation Value Forests (HCVF) are forests for which one or more of the following attributes can be assigned: Forest areas
- containing globally, regionally or nationally significant concentrations of biodiversity values (e.g. endemism, endangered species, refugia)
- containing globally, regionally or nationally significant large landscape level forests, contained within, or containing the management unit, where viable populations of most if not all naturally occurring species exist in natural patterns of distribution and abundance
- that are in or contain rare, threatened or endangered ecosystems
- that provide basic services of nature in critical situations (e.g. watershed protection, erosion control)
- fundamental to meeting basic needs of local communities (e.g. subsis-tence, health)
- critical to local communities' traditional cultural identity (areas of cul-tural, ecological, economic or religious significance identified in cooperation with such local communities).

Emissions of CH_4, N_2O and NH_3 by usage of manure should be reduced by covering the storing tank and by applying manure with accurate methods at appropriate time (e.g. trailhose or similar device).

- Principal 5: Maintenance of soil fertility

  Forest residues, like branches, needles, foliage and roots should be left at the site as far as possible to maintain soil fertility and to reduce risk of erosion (especially needles, foliage and roots should not be accepted as eligible wood fuel). Ash quality from conversion processes should be monitored and where possible nutrient-rich ash should be recycled back to the land.

  The withdrawal of straw or other agricultural residues for energetic use should be adopted site-related according to the nutrient and humus level in accordance with Good Agricultural Practice to secure soil fertility in a sustainable manner. Soil fertility can also be ensured by returning of fermenting residues from biomass production to the arable land.

- Principle 6: Integrated Farming

  Biomass from dedicated cultivation on arable land needs to comply with guidelines for integrated crop protection. If livestock waste (manure, chicken litter, etc.) is used for energy production, the conditions under which animals are housed and reared should comply with the principles of Integrated Farming.

- Principle 7: Transport and auxiliary energy

  The non-renewable proportion of the energy that is used for extraction, transportation and processing of fuel, processing energy at the plant, transportation of residual products, and also balancing, should be limited (e.g. to 10% of the electricity produced from the respective biomass sources).

- Principal 8: Technology specific criteria

  It should be considered to apply minimum efficiency requirements on the power plants which could result in the restriction to highly efficient CHP plants (according to the definitions applied by the Directive 2004/8/EC[19]).

  Co-firing of solid biomass should be permitted but could be subject to overall efficiency requirements or only be accepted if the ashes are not contaminated. The generated electricity has to be mathematically allocated according to the caloric value of the biomass.

Several of the proposed criteria require auditing and verification of the original location where the biomass fuel has grown. In this respect for many biomass sources one of the key issues to guarantee that all eligibility criteria are met is the availability of a sound

[19] Directive 2004/8/EC of the European Parliament and of the Council of 11 February 2004 on the promotion of cogeneration based on a useful heat demand in the internal energy market and amending Directive 92/42/EEC

tracking scheme for the respective substances. If the biomass fuel is harvested and sold by forest owners located close to the power plant where it is burned the proof of origin of the fuel might be simple. However, especially for wood fuel that often comes from various different forests and is transported over longer distances or which is imported from non-EU countries it is rather difficult to prove that the fuel is complying with the environmental quality standard the respective fuel supplier is claiming. The situation becomes even more complicated when fuel is passing through several suppliers or brokers where fuel from different places often is mixed. Physical tracking seems to be impossible in this case and only a tracking scheme based on some form of certificates (which are traded separately from the physical fuel transactions) seems to be a suitable solution.

The lack of a comprehensive tracking system for biomass fuels has been identified as one major drawback for the credibility of green power products which are based on sustainable biomass. Labelling organisations, environmental NGOs and forestry experts should jointly strive for implementing a reliable tracking scheme in order to close this credibility gap.

4 Environmental Additionality

4.1 Why striving for Additionality

As outlined in section 1 the voluntary green power market can be regarded as a voluntary support mechanism for renewable energy. For that reason many consumers that switch to green electricity products expect a positive effect on the environment which results from their purchase decision.

Currently many green power products or tariffs which are marketed as being "green" fail to represent real improvements for the environment. This mainly applies to all countries in which RES-E production goes far beyond demand. Where a green power product is solely fed with electricity from existing (and already depreciated) renewable power plants or with renewable electricity that a supplier is legally obliged to hold in his portfolio anyway (e.g. due to the obligation to purchase a certain amount of renewable electricity under a quota system or the obligation to take up and compensate for a certain volume of renewable electricity under a feed-in tariff scheme), such a product is not bringing any additional benefit to the environment. The effect of such products is simply to decrease the green attributes in the electricity supplied to other customers: The "green" customer would receive the "green" part of a suppliers portfolio, the "normal" customers would receive the remaining conventional part.[20]

However in many cases this would conflict with consumers' expectations, as they anticipate/believe to contribute to an expansion of environmental benefits (such as mitigating climate change) in return to their willingness to pay a premium for green power products. For that reason only those green power products qualify for environmental additionality which ensure that premiums paid by consumers result in additional environmental measures (e.g. the installation of new renewable power plants, investments to increase demand side energy efficiency) above those already stimulated by existing framework conditions (such as existing legislation). For instance additionality can be created by investments in new renewable power plants which need additional support (irrespective as to whether such plants are not adequately funded through public support or whether they do not receive any public support at all) in order to run economically viable. Alternatively additionality could derive from implementing electricity saving measures which are triggered and financed through the premiums paid for a green power product.

[20] In countries in which demand for green power outstrips generation (e.g. the Netherlands) the view might be taken that any new national RES-E capacity is automatically additional (for instance this view has been adopted by the Dutch "Milieukeur groene elektriciteit" label). However this leads again to the question whether the installation of new RES-E power plants is mainly linked to the stimulating effects of public support or to market forces due to increasing voluntary demand. Whereas in the first case additionality has to be questioned it would undoubtedly be give in the latter case.

4.2 Currently applied Additionality criteria

Additionality is one of the main differentiating characteristic between the labels which we have analysed in the scope of the CLEAN-E project (Willstedt/Bürger 2006). Table 3 illustrates that only few green power labels have introduced the concept of additionality so far.

Table 3: Overview of additionality elements currently applied by selected green power labels throughout Europe (status mid 2005)

Label	**Additionality elements**
Umweltzeichen (AUT)	no specific criteria on additionality in the sense of section 4.1
Norppa (FIN)	no specific criteria on additionality in the sense of section 4.1
ok-power (GER)[21]	- ≥ 33% of the electricity delivery must be generated in RES-E or highly efficient gas-fired CHP plants (CHP share max. 50%) that have started operation not later than six years before the respective settlement period - additional ≥ 33% must derive from eligible installations which are not older than 12 years (again CHP share limited to 50%) - all contributing RES-E must be generated in power plants which are not supported by the EEG (feed-in tariff system)
Grüner Strom Label (GER)[22]	- additionality is created by financing eligible RES-E or fossil CHP (max. 50%) plants for which the tariffs paid through the EEG (feed-in tariff system) or the payments through the bonus scheme for CHP would not result in their financial viability - only those RES-E plants qualify for additionality for which the construction of the plant has not begun before the funding assurance has been given
Bollino Verde (ITA)	no specific criteria on additionality in the sense of section 4.1
Milieukeur groene elektriciteit (NL)	no specific criteria on additionality in the sense of section 4.1
Bra Miljöval (SWE)	in products based on hydro at least 5% of the electricity delivery must come from non-hydro renewable sources (additionality is based on the fact that those sources , e.g. new wind, solar and wave power do not receive enough support through the national quota system)
naturemade star (SWI)	≥ 2,5% of the power must be generated by new wind, solar or biomass plants (definition of new plants see above) which hold *naturemade star* certification and which are not older than 5 years

Source: Willstedt/Bürger (2006)

However, an increasing number of labels has launched an internal discussion process whether to take up additionality elements (e.g. Italy) or to improve existing additional-

[21] Additionality criteria provided here refer to supply models. Additionality requirements for fund models follow similar principles.

[22] The criteria of "Grüner Strom Label" have been revised in 11/2005 which is already reflected by the table.

ity requirements (e.g. Sweden). But it must also be noted that some labelling bodies (e.g. in the case of the Austrian Umweltzeichen) have deliberately taken a decision against the inclusion of additionality. Such labels can be classified as guarantee of origin for green power products which is focussing on market transparency. Consumers of such labelled products receive a guarantee that their product is adequately backed by eligible electricity generation, their financial contributions does not trigger the installation of additional renewable capacity though.

Whereas labels without additionality requirements are mainly intending to be an environmental marketing tool for the promotion of green electricity sales and to raise awareness among consumers on renewables, labels which apply additionality elements pursue the objective to increase the amount of RES-E put on the market.

4.3 Options to create Additionality

A label can ensure additionality by following rather different additionality concepts. The following sections describe some recommendable additionality models whereby suppliers are free to combine different concepts within one product.

4.3.1 Additionality concept 1: New plant generation

In this additionality category labelled products lead to an expansion of RES-E or eligible CHP generation over and above the baseline determined by existing RES-E/CHP generation and the effects of public support instruments. In concrete terms a product (regardless of whether it is a supply or a fund model) creates additionality by supporting new eligible power plants which produce electricity which can be regarded as being (partly or entirely) beyond the effects of public support (for a definition what this means in detail see below).

This additionality concept requires a clear definition for which plants are generally classified as new:

- The most stringent definition would be to classify only those plants as new for which construction or at least plant operation has not begun before a customer has signed the supply contract for the labelled product which is based on this requirement. However, against the background of often rather long construction periods – this applies at least for some technologies such as hydropower – this would mean that in many cases customers have to wait several years until they are really supplied by such plants.
- Alternatively green power labels could consider to classify all power plants as new that have started operation not later than a certain number years (e.g. five years) before the respective labelling period. Such a definition would correspond to a dynamic new plant definition as each power plant would be classified as new only for a limited period of time.
- A third option would be a static new plant definition. Labels define a fixed date (e.g. the year the national wholesale market for electricity has been liberalised in

the specific country in which the label is operating) whereby all power plants would automatically qualify for being new that have been put into operation after this date.

It could also be considered to allow major refurbishments in existing power plants to create new plant generation. For instance re-investments might qualify an old renewable power plant for being "new" if the re-investment occurs after the respective dates for defining "new" plants. In this case the fraction of the plant output should be regarded as new, which corresponds to the ratio of the re-investment (in current prices) to the value of a comparable new plant (in current prices). If the re-investment leads to a determinable increase of the plant output, at least this additional generation should be regarded as "new".

What do we mean with the term "beyond the effects of public support": As the main principle additionality requirements should be met entirely over and above governmental renewable legislation, such as renewables' obligations or incentive tariff schemes. Additionality can be created by investments in new eligible renewable and CHP power plants which need additional support in order to run economically viable. This applies both for such plants for which public support is not sufficient and for those which do not receive any public support at all.

Where a power plant receives public funding through a fixed tariff scheme (be it a feed-in or bonus scheme) but requires additional support (on top of the public funding) in order to run economically viable the share of power generation should be considered to be beyond public support which corresponds to the share of support contributed by the customers of the labelled product.

Under an obligation scheme additionality should be based on the concept of additional redemption of certificates above what is mandated by the obligation; by redeeming the additional certificates the respective certificates will be removed from the market and can not be used by another company to match its obligation. In this regard additionality is created by implicitly increasing the obligation target defined by the mandatory scheme.[23]

4.3.2 Additionality concept 2: Demand side energy efficiency

Most existing green power labels which have introduced additionality apply concept 1 aiming at an extension of renewable electricity generation. However market conditions might exist which are rather unfavourable for designing green power products that

[23] It must be noted that redemption of additional certificates does not automatically lead to additionality. The level of additionality which will be achieved through this option is determined by the specific design of the obligation scheme, especially depending as to whether a buy-out option has been introduced and at which level the buy-out price has been set. Removing additional certificates from the market might result in more suppliers choosing the buy out option which does not necessarily lead to additional RES-E generation. This also depends on the destination of buy out payments, e.g. recycling as being implemented in the UK, being deposited in a dedicated fund for RES-E projects or simply being included in the general public budget. For more details see Ölz et al. (2006).

solely aim at the installation of new RES-E installations.[24] Under specific conditions it might be reasonable to leave the "narrow" restriction on investments in the RES-E sector. Among others this could be facilitated by accepting measures in the field of energy end-use efficiency/energy services.

This additionality concept is led by the principle that "the cleanest kilowatt-hour of energy is the kilowatt-hour that does not have to be produced". Furthermore, it seems reasonable to suppose that customers interested in green power products may also be interested in financing energy efficiency schemes, which could be implemented in their own buildings, thus reducing their electricity demand and offsetting the green power's extra costs.

Since green power labels are operating on the electricity market, eligibility may be restricted to measures which save electricity (and not heat, cold,…). However, this decision should be left to the national labelling bodies.

The recognition of energy savings measures as additionality concept should be based on the following conditions (Ruggieri 2006):

- Measures must lead to measurable and quantifiable demand side energy savings (compared to an anticipated business as usual development) which go beyond the effects of public support.
- This additionality category should only be eligible for countries which apply demand side efficiency instruments for that underlying bottom-up measurement and verification processes for the quantification of savings have already been set up.
- In countries with an obligation for energy efficiency activities (e.g. an energy savings quota system that is facilitated through a White Certificate system) only those activities over and above the baseline defined by the obligation should be eligible (in the case of White Certificates additionality could be created by additional certificate redemption above the quota). When no certificate system is in force, the national labelling body should be responsible for coordinating with the authority or agency responsible for the monitoring of the implementation of Directive 2006/32/EC[25].

In addition we recommend that all efficiency programmes based on the labelled product should be open to all customers of the respective product. A final customer may be reluctant to finance energy efficiency activities that will reduce the energy bill of other customers, and not his own. This might become an issue when not all of the customers of a labelled product have access to the energy savings measures which a supplier carries out using the premiums paid by its customers for the green power product.

[24] Examples for such market conditions are provided by Bürger (2006).

[25] Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services.

Moreover labelling bodies are advised to thoroughly develop straightforward and clear messages to communicate the new concept. Finally green power tariffs should by no means have a regressive shape, otherwise an incentive to increase consumption would be given to the final customer.

4.3.3 Other Additionality concepts

Other additionality concepts are conceivable provided that they lead to a quantifiable environmental benefit that goes beyond the trend being mandated anyway by the legal framework and which can be unambiguously assigned to a labelled product.

Support of Renewable Heating or Cooling

The idea behind this concept is to broaden the scope of green power products towards measures in the field of renewable heating and cooling (RES-H/C). Additionality would be created by investments in this specific field.

This concept is ideally fulfilled through a fund model: A green power supplier delivers to its customers electricity which comes from RES-E installations that are eligible under the label. Customers of this product pay a premium on top of the regular electricity price. The premium is invested in measures in the RES-H/C sector such as the installation of new solar collectors, wood pellet boilers or heat pumps.[26]

Labelling bodies which set up additionality requirements for RES-H/C investments must take into account especially the national legal framework for the support of RES-H/C generation. A thorough analysis shows that different national support concepts for RES-H/C installations (e.g. installation obligations, efficiency obligations, bonus systems) require specific rules for creating additionality (Bürger 2006). In any case it should be ensured that RES-H/C measures funded through a labelled green power product should contribute to an expansion of RES-H/C generation over and above the supportive effects of governmental legislation.

It must be noted that especially this additionality concept requires a well developed communication strategy when being introduced. The integration of RES-H/C measures into the scope of green power labels does not appear to be logical at first glance. It can be assumed that most customers of green electricity products expect to support RES-E power plants or at least electricity related measures. Thus they might wonder to partly

[26] Green power labels which introduce the concept of RES-H/C integration need to set up criteria for defining which energy sources and technologies are eligible to be supported via a labelled product. Eligibility criteria need to be established for all major technologies in the field of RES-H/C. In order to exploit synergies eligibility criteria should be based on existing certification schemes (e.g. schemes for specific biomass sources such as FSC or specific technologies such as quality certification of solar collectors) where possible.

Labelling Bodies might also decide to define specific areas to which the installation of RES-H/C devices might be restricted to. Examples of possible restrictions might be that eligible RES-H/C devices have to be installed in a way that only customers of the labelled product benefit from the measure or that eligible RES-H/C investments have to be directed to public buildings.

support RES-H/C generation when they switch to a labelled offering applying this specific additionality approach. For that reason labelling bodies should thoroughly develop clear and understandable messages that will be used to communicate the new concept. These messages should also be tested in the relevant consumer groups before the integration of RES-H/C measures will be actively communicated to a broader audience.

Carbon offsetting

Most existing green power labels are designed as to contribute to the mitigation of climate change. Following this principle additionality could also be based on carbon offsetting.

In principle carbon offsetting is a service that compensates the greenhouse gas emissions of a party with an equivalent carbon dioxide saving by using "carbon offset" credits from emission reduction projects. Currently many organisations promote carbon offset credits on the market. Offset actions which stand behind the carbon credits most commonly are forestation projects (tree planting), renewable energy and energy savings projects.

On the offset market two segments have to be differentiated, the so called Kyoto project market and the voluntary project market. The market deriving from the Kyoto process refers to emission reduction projects performed under the flexible Kyoto mechanisms comprising Emissions Trading Schemes (ETS), Clean Development Mechanism (CDM) and Joint Implementation (JI). This market is facilitated by so called Certified Emissions Reductions (CER). On the voluntary project market Verified Emissions Reductions (VER) are issued for emission reductions of small scale projects that are carried out outside of the Kyoto system and which are assessed and verified by third party organisations rather than through the UNFCCC[27].

Green power labels which introduce additionality on the basis of carbon offsetting have to bear in mind, that offsetting projects have to be additional to what would have happened under an anticipated business-as-usual development. For instance additionality would be automatically ensured by redeeming CO_2 allowances from the European Emissions Trading Scheme (ETS). For CDM or other non-Kyoto projects only those credits ensure a net benefit for the climate that have been issued for climate related projects which lead to emission reductions that would have not occurred otherwise. With the Gold Standard (http://www.cdmgoldstandard.org) the WWF has introduced an independent best practice benchmark for CDM and JI greenhouse gas offset projects as well as voluntary projects (resulting in VERs) outside the Kyoto system. The standard can be applied for renewable energy and energy efficiency projects. Tree planting projects are explicitly excluded. As Gold Standard projects ensure a high additionality level and independent third party verification we recommend labelling bodies to rely on carbon credits resulting from projects complying with this standard.

[27] United Nations Framework Convention on Climate Change

5 Interaction of green power labelling with renewable energy policies

Green power labels act in a market environment which is regulated by a wide range of different policies that have mainly been adopted on the European and the Member State level. Relevant policies range from regulations governing the electricity market in general, support instruments for specific generation types (such as renewable electricity or CHP) to climate policy regulations deriving from the Kyoto process (e.g. Emissions Trading).

A wide range of these policies directly or indirectly influence the development of RES-E and have – at least to a certain extent – some form of interaction with the initiatives on the voluntary green power market (e.g. labels). The interaction between these instruments means that the impact of the voluntary market segment on RES-E is not always straightforward and the effects of the instruments may, under certain circumstances, even counteract each other. For green power labels it is crucial to be structured in such a manner as to minimise the negative interaction with other RE policy instruments.

On the other hand policy regulation might be designed in such a way as to provide routines or tools which could be beneficial for green power labels. Such synergies should be identified and exploited to the largest extent possible.

5.1 Interaction with national renewable energy support mechanisms

Established regulatory RES-E instruments, such as price-based mechanisms (e.g. feed-in tariffs) and quantity-based regulations (e.g. quota obligations), currently represent the main financial support for the promotion of RES-E generation in Europe. In contrast, green power labelling is linked to voluntary initiatives, thus relying on consumers' motivation, but may have the benefit of generating additional finance from consumers and encouraging greater consumer participation.

The voluntary green power market has to be regarded as a supplement to governmental support schemes as it cannot be an alternative (cf. section 1.1). Therefore the evaluation of the interplay between green power labelling standards and mandatory instruments is critical for ensuring that the effects of both mandatory and voluntary initiatives on supporting/increasing RES-E generation are actually supplementary, e.g. do lead to environmental additionality and do avoid "over funding" of renewable power plants as well as "double counting" and "double selling" of RES-E attributes.

Based on our analysis carried out in the scope of the CLEAN-E project we recommend all labelling bodies who operate a green power labelling scheme under the regulatory environment of a feed-in system (such as implemented for instance in Austria, Germany and Spain) to design their scheme in such a way as to avoid over funding of labelled RES-E (Ölz et al. 2006). In case of inclusion of already subsidised electricity, care should be taken that additionality criteria are met. This could be ensured by allowing

only generation facilities that are not adequately funded under the feed-in system to qualify to contribute to additionality requirements (cf. section 4.3.1).

Quota schemes as e.g. operated in UK, Sweden or Italy generally are facilitated through a system of tradable certificates. As for the interaction between quota systems and green power labels, labelling bodies are recommended to ensure additionality by additional redemption of certificates above what is mandated by the obligation (cf. section 4.3.1).

In order to allow a well ordered coexistence of green power labels and mandatory support instruments also policy makers can make some valuable contributions. This concerns especially the question who is owning the environmental attributes associated to renewable electricity generation. Often Member State legislation for the RES-E support framework lack clear regulations on this specific issue. As a result it is often not clear whether the green attributes are compulsory transferred to those parties which underlie the funding obligation (e.g. all obliged suppliers within a quota system or all supply companies who are obliged to pay into the feed-in system) or whether they stay with the RES-E producer. In such an environment several parties might simultaneously claim and use the environmental benefits deriving from 1 kilowatt-hour of green electricity which automatically leads to double counting. In order to avoid such shortcomings which have the potential to undermine the credibility of the voluntary green power market policy makers are advised to unambiguously clarify who owns the environmental attributes of supported RES-E.

Furthermore in the case of quota obligations respectively in countries in which more than one certificate schemes are operated at the same time (e.g. TREC facilitating the quota system, Guarantees of Origins (GoO), certificates facilitating tax redemptions) we recommend policy makers to clearly state that only one form of evidence is accepted for supply with renewable energy. In other words it should be clarified which of the different certificate types is holding the green attributes associated to RES-E. This should namely be the Guarantee of Origin (GoO), which should be redeemed when used. In consequence other green certificates should be clearly advertised as a purely financial mechanism.

In addition to that labelling bodies would benefit from regulations that GoO are automatically earmarked when public support has been received. This would enhance transparency and help to facilitate more straightforward verification throughout the labelling process.

5.2 Interaction with Electricity Disclosure

Electricity Disclosure (cf. section 2.3) can be classified as transparency tool that is aiming at better information for electricity consumers about the various products offered on the market. The main synergies between green power labels and Electricity Disclosure

lie in the tracking mechanism which is required by both instruments (cf. section 2.5.2).[28]

Green power labels need to apply an explicit tracking mechanism as only this tracking option ensures the creation of unambiguous links between generation and demand.[29] An explicit tracking mechanism is an indispensable prerequisite for the verification of product claims to exclude multiple counting of favourable electricity attributes, in particular attributes associated to renewable electricity. Thus, it is essential for the credibility of a labelling scheme.

Green power labelling bodies therefore should thoroughly coordinate their tracking mechanism with the one applied in the context of the corresponding national and neighbouring Electricity Disclosure schemes. In particular, we give labelling bodies the following recommendations:

a) Where a Member State bases its disclosure scheme exclusively on an implicit tracking system (meaning that it only uses statistical data) the green power labelling scheme should use its own tracking mechanism which is operated independently from the disclosure scheme. This is necessary as a reliable labelling scheme must be based on unambiguous links between generation and supply, allowing the clear identification of the power plants involved. Statistical data will not facilitate this form of identification.

b) Where a Member State bases its disclosure scheme on a mixture of explicit and implicit tracking elements (e.g. explicit elements: data on own generation, RES-E covered by GoO; remaining portfolio assigned to a statistically derived default production mix such as the UCTE mix) the green power labelling scheme could use this mechanism. This is only applicable as long as it is ensured that all electricity eligible for the label is covered by the explicit elements of the tracking mechanism.

c) Synergies arise especially where Member States operate an explicit tracking mechanism for Electricity Disclosure. In such an environment the green power labelling scheme should base its verification scheme on the same mechanism. However, in cases where the explicit tracking scheme is based on a central registry that is operated and maintained by the national market regulator or the TSO regula-

[28] For a detailed description of different tracking options see Lise et al. (2006) and the reports produced in the scope of the research project "Consumer Choice and Carbon Consciousness (4C Electricity, http://www.electricitylabels.com)" which was sponsored by the Altener programme of the European Commission as well as the project "Consumer Choice on Electricity (CIE, http://europa.eu.int/comm/energy/electricity/publications/index_en.htm)" funded by DG TREN.

[29] In contrast to implicit tracking schemes which primarily rely on statistical data and all sorts of averages explicit tracking systems are based on mechanisms which create unambiguous virtual links between power plants and supply portfolios. In the scope of Electricity Disclosure currently primarily two explicit tracking methods are pursued: (1) contract-based tracking and (2) certificate-based tracking (see also Lise et al. 2006).

tions need to be implemented allowing the auditors and the labelling body to get access to all data required in the scope of the labelling procedures.

It must be noted that even in the scope of a fully explicit tracking system the information content provided by the disclosure tracking system will not cover all data required by a labelling scheme. For instance it can be expected that none of the disclosure schemes will be designed as to deliver information about a power plant's compliance with the eligibility criteria applied by a voluntary green power labelling scheme.[30] This means that auditors working in the scope of a label have to gather additional data from contributing power plants in order to be able to assess compliance with all labelling criteria.

Several policies, such as support schemes for renewable electricity, need some form of mechanism to track electricity attributes. In general terms policy makers are advised to integrate all different tracking approaches finally allowing only one tracking scheme to facilitate all different purposes.

5.3 Interaction with the Guarantee of Origin for electricity from renewables and CHP

The Renewable Electricity Directive 2001/77/EC and the CHP Directive 2004/8/EC introduced the concept of a "Guarantee of Origin" (GoO) for renewable energy and for electricity from high-efficiency cogeneration, respectively. Member States have been required to have legislation in place which establishes a system enabling producers of electricity from renewable energy sources (respectively high-efficiency cogeneration) to obtain, on request, a Renewable Energy Guarantee of Origin (RES-E GoO) and a CHP Guarantee of Origin (CHP GoO) for electricity produced from their plant, as proof that the electricity they sell is effectively produced from renewable energy sources and high efficiency cogeneration respectively. Member States are required to recognise RES-E GoO and CHP GoO from other EU countries. This allows the GoO to become a powerful tool to facilitate reliable information transfer in the case of cross border trade of RES-E and CHP electricity.

Provided a Member State has implemented a reliable GoO scheme GoO can become a very useful tool within the auditing routines applied in the scope of a green power quality label. In this case labelling bodies are advised to integrate GoO in their tracking scheme. In concrete terms labelling bodies should ask for redemption statements of GoO backing the whole electricity volume subject to labelling. Redemption statements should clearly indicate the purpose for redemption (e.g. redemption for green offering xy in the year z). Where no formal redemption procedure is in place (e.g. as no registry exists) GoO should directly be submitted to the labelling body.

[30] For instance, Electricity Disclosure will not distinguish between electricity from biomass which originates from forestry operations with FSC certification and electricity from biomass grown without any quality certification. Whereas the first fuel category (FSC wood) might be eligible to a labelling scheme, the latter could be excluded.

In order to maximise synergies we recommend labelling bodies to be active in requesting Member State governments to align the content (e.g. inclusion of information about the commissioning date of a renewable power plant) and the general design (for instance labels usually have a balancing period corresponding to the calendar year) of the GoO to the needs of green power labels.

5.4 Interaction with the European Energy Certificate System EECS (including the Renewable Energy Certificate System RECS)

The European Energy Certificate System (EECS) is a framework standard for the harmonised introduction and operation of energy certificate schemes and allows for the issue, transfer and redemption of RECS certificates, RES-E GoO, CHP GoO and certificates used in the scope of Electricity Disclosure. The EECS has been developed by the Association of Issuing Bodies (AIB)[31] basing on the experiences gained with RECS certificates, which have been introduced by the voluntary RECS initiative (cf. section 2.5.2). For the time being, RECS certificates have a high share in the certificate market. However, this share will decrease with increasing establishment of GoO.

EECS could be of greater relevance for green power labelling schemes across Europe than it is now. Through the Renewable Energy Declaration (RED) the EECS system provides a lot of relevant plant specific data which satisfy a major part (however not all) of the requirements in the scope of the product audits which build the core of green power labelling procedures. However, most of these data are neither integral part of the EECS certificate nor the redemption statement which are issued once a certificate has been redeemed (i.e. "used"). For that reason a key element to increase synergies between EECS and green power labelling activities would be to give auditors operating in the scope of green power labels access to the data RED records.

On the other side the redemption scheme applied by EECS can be considered as transparent (in order to avoid double counting) and independent third party auditing of power plants is ensured. However, appropriate regulation for the design of the redemption statements should be adopted. Redemption statements should clearly specify the purpose and the company for which a certificate has been redeemed as well as the generation period for which a certificate has been issued.

It is advisable that European countries comply with the EECS standard (including the issuing of GoO) to avoid double counting and other incompatibilities of different schemes and to generate synergies with voluntary labels, international trading of certificates and policy instruments to support RES-E.

5.5 Interaction with Emissions Trading

The interaction between green power market and Emissions Trading is primarily concerning communicative aspects. While the use of RES-E may be one of the ways to re-

[31] For further information see http://www.aib-net.org

duce emissions, commonly green power products can not be said to contain any greenhouse gas emissions benefits, as this would automatically lead to multiple counting.

Most greenhouse gas (GHG) emissions of the electricity sector are defined in, and captured by the Emissions Trading Scheme (ETS). Were green power to contain such emission reductions then both the RES-E generator and the fossil fuel generator whose electricity generation might partly be replaced could claim to own the respective benefits: the RES-E generator through the GoO/green label/certificate or even without any proof of origin and the fossil fuel generator through the excess allowances. It is therefore clear that renewables do not represent emission reductions nor would this be desirable given the resulting multiple counting of emission reductions were this is the case.

Suppliers of green products, green power labels, and customers of green products face the same communicative restrictions as RES-E generators. However for labelling bodies it should be noted that the benefits resulting from an extension of renewables in the electricity sector go well beyond their contribution to climate change. The benefits encompass positive contributions to the environmental, social and economical development of the national electricity sectors including supply security. All these benefits are important drivers for the transition of the electricity sector to greater sustainability. For that reason green power suppliers as well as national labelling bodies should be encouraged to focus their communication on these aspects.

Finally, it is not quite clear how the post-Kyoto process will look like, in particular whether global climate policy will be based on further GHG caps. In this respect it is also not certain for how long Emissions Trading will be the predominant instrument in the field of climate protection policy for the industrial sector. It is therefore recommended to pursue a multidimensional policy mix which addresses different policy fields (e.g. technology development, market regulation, strengthening plurality of market players, enhancement of market transparency) in order to stabilise climate policy. In this respect reinforcing the voluntary green power market (e.g. by the establishment of acknowledged green power labels) is also a key element to ensure continuity in the efforts to tackle climate change even if the post Kyoto process fails. In other words, green power labels are an important tool in the field of climate protection policy even whilst they are not entitled to claim any CO_2 emissions reductions under the EU ETS.

6 Development and evolution of green power labels

One of the objectives of the CLEAN-E project was to support interested organisations in launching new green power product labels across some selected EU Member States. Existing labelling schemes have been assisted to further develop their criteria towards the Eugene Standard (cf. section 2.6). The experiences gained and lessons learnt from the respective national processes which were running over two years might be rather helpful. They should thus be shared with labelling bodies that are aiming at setting up and introducing new labels or improving an existing standard.

6.1 Favourable market conditions for labelled green power products

The main success factor for an effective development of a label is set by the general framework conditions of the electricity market in which the label is operating. A favourable market environment is given when the following parameters are fulfilled:

- The electricity market should be fully liberalised as to allow all consumer groups including the domestic sector to generally switch between different suppliers. All major switching barriers (such as imposing switching charges) should be removed. At the same time the regulatory framework as well as the actual market development should allow newcomers to enter the market without restrictive barriers. This includes a non-discriminatory access to green power plants.
- The electricity market should be designed as to provide mature conditions for the green power market. Even in markets that are formally fully liberalised, this is not given by default. In the context of the CLEAN-E project a rather bad example was given by Spain. The Spanish electricity market is regulated under two different systems: a regulated market segment (with regulated tariffs set each year by the Government) and the free market. Green power products have to be offered on the free market. However with a free market price level which exceeds the regulated tariff by a factor of 2-3 the actual market design does not admit a voluntary green power market to develop properly.
- At the supply side a handful of progressive suppliers should be willing to take the risk of launching a green product and to undergo the labelling process. Hereby it is irrelevant whether those pioneers are new market entrants or incumbent companies.
- At the demand side consumers (business, public and domestic) should to a certain extent be aware of the environmental benefits associated to green power supply (respectively to the negative environmental impact deriving from conventional nuclear or fossil electricity generation). In addition consumers should be well informed about the opportunity to change supplier.
- Finally at the production side there should be sufficient capacity available that fulfils the labelling standard (including eligibility and additionality requirements) and is able to satisfy growing demand once the label has been launched. If this

condition is not given labelling bodies should consider to open the scope of their label to electricity imports from eligible sources.

In countries in which the market characteristics noted above are not fully given labelling bodies have to specifically address the respective deficits. For instance labelling bodies are recommended to take political actions in order to improve market conditions or should think of implementing awareness raising tools and campaigns in order to stimulate demand.

6.2 Developing appropriate communication to explain the new label approach

Green electricity labelling is a transparency tool specifically aiming at the voluntary green power market. In this respect good communication is a key element for labelling. Only those labels which manage to get a clear and simple message across that – at least to a certain degree – aligns to what consumers expect from the green power market will become successful. Moreover, from the consumers' perspective it is rather the message which has been built around a label that attracts customers to switch to a labelled product than a detailed assessment of the criteria.

In this context labelling bodies which strive for introducing a new label on the electricity market should also seek endorsement by major NGOs, especially those which work on environmental and consumer protection issues. Experiences from the launch of new labels have shown that the promotion of the label through NGOs (e.g. within their own network, their members and supporters) can provide the necessary push for the market success of the label and the products which are sold using it.

Where the labelling body does not actively include at least one of the larger and well-known NGOs public endorsement is essential to back the credibility of the label.

Furthermore communication should be straightforward in clarifying that the voluntary green power market (respectively the label operating in this market segment) is not a tool to challenge public support for RES-E. It should be thoroughly explained that this market segment can rather become a powerful mechanism complementing the effects of it.

6.3 Developing of labelling criteria

The environmental criteria including eligibility and additionality requirements are the core of a green power label. Thus labelling bodies should put a great emphasis on the development of this specific element.

The starting point for designing a labelling standard should be the legal framework which applies for those energy sources and power plants which in principle shall be eligible in the scope of the label. In this respect all legal requirements should be identified which have an impact on the performance of such technologies under existing national legislation. The specific support framework for renewable electricity generation (but also for efficient CHP plants provided they qualify for eligibility) is the second

legal element which thoroughly needs to be taken into account, in particular when it comes to the development of the additionality concept applied by the label.

A critical aspect throughout the development of labelling criteria is the question at which level eligibility standards for different technologies as well as the additionality requirement should be fixed. Here a well balanced compromise needs to be found between the ecological claims of the organisations which stand behind the label and the economical constraints of the market players who finally will use the label for their products. On the one hand the environmental standard should be that ambitious as to make a clear difference to green products which do not bring additional environmental benefits on the market. If the standard is too low, the label will suffer credibility as it can be expected that major NGOs from the environmental side will publicly criticise it. On the other hand labelling criteria must be that balanced as to allow suppliers to create compliant products at reasonable costs. Criteria which mean that labelled products result in premiums (compared to products on the conventional market) which lie far above the price level of conventional electricity products won't be accepted by a number of consumers beyond a small niche.[32]

In order to avoid double efforts for developing label criteria and to strive for harmonisation to the largest extent possible labelling bodies should always consider to transfer standards that are already successfully applied abroad. For instance this might concern eligibility standards for hydropower and biomass.[33] However it must be taken into account that standards underlie procedures which often are the result of an evolutionary process that went over a longer time period. This includes the institutional frame (comprising experienced technical auditors and national experts) which has "learned" to handle such a standard. For instance the Swiss greenhydro standard is dependent on the expertise of its auditors which regularly apply the standard. Labelling bodies have to bear in mind that such structures need time and resources to emerge, although the principle standard has been imported as "finished product".

Furthermore it must be considered that standards from abroad might counteract with national legislation. Results from a pilot assessment of the greenhydro standard in Sweden indicate that the Swedish water legislation and the hydropower licenses often build up non negligible hurdles to full compliance with the Swiss standard. As an example a license may include strict limitations concerning the regulation of the water level in a reservoir which decreases the possibility to introduce increased minimum flow or a more natural flow regime in general. A second complication is that several requirements deriving from the greenhydro standard would require a new license, meaning that the

[32] For instance it has turned out that the implementation of the full greenhydro standard (cf. section 3.3.1) including the level of ecofund payments as applied in Switzerland for many hydropower plants might result in too high premiums thus limiting the potential market volume for such products from the start.

[33] In this respect we have assessed the possibility to transfer the Swiss greenhydro standard to other countries, in particular to Germany (Ruef/Markard 2006).

necessary changes have to pass through the environmental court. This process might take a long time (minimum one year) and could be costly for the operator.

Generally labelling bodies which plan to launch a new label should consider to commence with a relatively moderate standard. A low entrance level might allow many suppliers to set-up a labelled product from the very beginning. However it should be clearly communicated that this level will be further developed over time (within a specified medium term schedule) whereby the whole evolution of the standard would allow all labelled companies to actively accompany the respective process.

6.4 Developing sound auditing procedures

As outlined in section 2.5.2 the core element of the auditing procedure is the tracking mechanism that is used to prove that a labelled product really is fed by the energy sources claimed by the respective supplier. We recommend labelling bodies to adopt clear rules which tracking mechanisms are generally accepted in the scope of the label in order to ensure reliability. In this respect one of the main requirements which has to be met by a tracking system is to exclude multi counting of certain attributes. Multiple counting would be given if selected attributes associated to a certain unit of electricity (such as the "greenness" created by renewable electricity generation) are used several times for the same purpose. For instance this would be the case when the greenness of a unit of RES-E were to appear in more than one unit of electricity sold as green electricity. To prevent multiple counting a tracking mechanism which is used in the context of a product audit needs to ensure that the respective "greenness" a) has been transferred to the supplier, and b) will not be "used" in other green products than the labelled one. Tracking mechanism which fulfil this criteria have been outlined in section 2.5.2.

6.5 Introducing a label on the market

The labelling structure should be supported by as many stakeholders as possible. This implies that the core organisation starting the set-up process for a label should involve parties from all relevant stakeholder groups from the very beginning (e.g. in form of the establishment of national labelling teams, workshop series,…). Relevant groups comprise environmental and consumer NGOs, renewable energy associations, energy agencies and research institutes. Whereas the first groups offer valuable channels to promote the labelling approach, energy agencies and research institutes may provide the scientific background which is necessary to compile the detailed labelling criteria. However, experiences have been made that such groups (especially consumer groups) often lack sufficient awareness towards green power issues in particular in those countries in which the domestic market segment has not been fully opened yet. In addition the focus is often laid on price related issues and not on environmental issues.

In addition we recommend to invite especially NGOs from the consumer and environmental side to actively join the labelling body. Such an inclusion would have two specific benefits: Firstly, this would involve a specifically angled input of the respective

groups, secondly it would assist to build a well recognised labelling body which would enhance the reputation of the whole label.

Labelling bodies are recommended to involve some progressive electricity suppliers in the whole development process from the very beginning. Experiences gained with existing labels show that the market introduction of a new label can be much more straightforward when a handful of pioneers already have committed themselves to undergo some form of pilot labelling thus offering a labelled product from the very beginning. Moreover good relationship and regular interaction between the labelling body and its customers became apparent to be another success factor of a label. Any major amendment of the labelling standard should always be thoroughly discussed with the labelled suppliers. Such discussions serve as important reality check as to whether the impact of the amendments have been assessed accurately in particular concerning the price effects of such revisions.

Another precondition for a successful launch of a label lies at the demand side. Here labelling bodies as well as the pioneers should aim at triggering demand for labelled green power right from the start. Especially the business sector and public authorities should be addressed, the latter due to their role as good example. The stimulation of demand has turned out to be a key condition as suppliers often are quite reluctant to design high quality green power offerings until they are sure that there is adequate demand for such products. Once large business customers have publicly announced to be willing to buy labelled green power, suppliers start to react in order to satisfy this demand.

7 Green power for large consumers

At the demand side the CLEAN-E project team decided from the start to focus on large power consumers (such as business customers and public bodies), to make the most efficient use of the project's resources and to maximise the impact of the project in terms of quantities of labelled green power sold.

7.1 Why do companies switch to green power?

There are several reasons why companies show an increasing interest in green power purchases. Green energy supply (including green electricity) as well as energy demand reduction are part of a corporate social responsibility performance of a company. Moreover it helps companies to raise their company sustainability profile. Drivers for this may be twofold:

Firstly, companies strive for building up a green image targeting their customers; in crowded marketplaces companies strive for 'X Factors' which can separate them from the competition in the minds of consumers and brands built on environmental values can benefit from building a reputation for integrity and best practice. Quoted companies pursue such strategies in view of sustainability ratings (e.g. Dow Jones Sustainability Group Index).

Secondly, companies and public bodies have learned that switching to green power does not need to be expensive. Experience shows that a premium between 5 and 10% is common practice. These premiums can easily be compensated through energy efficiency measures.

7.2 Why do companies ask for labelled green power?

Apparently the price of electricity supply is the major decision factor for most companies when choosing between different green power offers. However several companies ask for additional characteristics, often comprising eligibility and additionality criteria as applied by green power labels. More specifically many companies have deliberately chosen or are looking for green power suppliers that comply with the principles set forth in the Eugene Standard.

Labelled products generally assure independent third party verification of the product characteristics. For many companies this is deemed to be of utmost importance in order to keep credibility of their "green behaviour". Finally NGO endorsement of a green power standard is also regarded as supportive element for the own company sustainability profile.

7.3 Some selected case studies

7.3.1 Tetra Pak

The international packaging material manufacturing company Tetra Pak decided to purchase green electricity from NaturEnergie (www.naturenergie.de) for its German pro-

duction sites. This product is labelled by the German "ok-power" label (cf. section 2.4), which is accredited against the Eugene Standard.

Earlier this year Tetra Pak contracted green power from NUON in the Netherlands for their Dutch operations. "These contracts are part of a larger scheme for greenhouse gas emissions reductions", says Lars Lundahl, senior environmental specialist at Tetra Pak. "Last year we set a goal to reduce the company's GHG emissions by 10 percent in the next five years, compared to 2005. Considering our growth of business, this is a challenge. We are already investigating the purchase of green power in other countries, like Spain." Green power purchase and energy efficiency measures are the two ways to meet this 10 percent reduction target.

Tetra Pak is not satisfied with any green power brand. "We want to buy Eugene Standard approved green power where possible. The Eugene Standard condition that the green power we purchase is contributing to setting up additional renewable capacity is particularly important for us. Tetra Pak really wants to contribute to an increase in renewable energy generation."

7.3.2 FIFA World Cup 2006

The World Cup's 'Green Goal' programme strived for the first ever 'climate neutral' football World Cup. Despite running contracts some of the stadiums had with other suppliers, Energie Baden-Württemberg (EnBW), the third-largest energy supplier in Germany, promised to feed 13 million green kilowatt-hours into the grid. This amount equals the total electricity demand of the 12 stadiums incl. the hospitality facilities and the media centres in Germany that were used for the World Cup. The green power, under the brand name EnBW NaturEnergie GreenGoal™, was provided by Swiss hydropower installations. This compensatory power supply was "ok-power" labelled. On top of that the Green Goal programme will invest in a biomass plant in India in order to compensate for some of the GHG emissions resulting from the World Cup. This investment is also worth some 30.000 tonnes of CO_2.

7.3.3 Swedish Railways

Ten years ago Swedish Railways (SJ), the freight and passenger traffic railway company in Sweden, decided to gradually switch to green electricity and since 1997 the green power share has reached 100%, or 600.000 MWh yearly. The electricity SJ buys - mainly from the electricity supplier Fortum – is a mix of mostly hydropower and a small share of wind power, all from domestic sources. The idea of switching to green electricity came from the environmental department. SJ acknowledges the value of labelling electricity. 30%

of the electricity the company buys is labelled with the Brå Miljöval label (see section 2.4). In addition to the purchase of labelled green power SJ also tries to make trains more efficient. "New trains are built with lighter materials, so less energy is needed to bring them into motion", Marie Hagberg of SJ says. But there is more to the environment than just energy. When a passenger wagon has become useless, its material is re-used. "We recycle up to 99 percent".

7.4 Lessons learned: What would make labels even more attractive in the future?

Large companies' power purchasers often struggle with the technicalities of green power offers and of labels. Labels are supposed to make these people's life easier, not more complicated. Labels need to improve their communication in order to gain the hearts of the businesses.

European companies very often prefer to buy their green power from one single source. This saves them the efforts of contracting power or certificates in various countries for various facilities. A practical solution for these companies could be to centralise the sale of any form of certificates, which are accredited by Eugene. That would allow these multinationals to purchase all the greenness of the power in one place, for a good price.

Large companies can choose to purchase labelled green power only for a percentage of their consumption. Even then this can generally result in a bigger impact on the renewable energy market than large numbers of residential customers purchasing 100% green power.

Finally, large companies can influence their power suppliers. However, they will be more successful in changing their suppliers' behaviour in a structural way if they persuade them to follow the criteria of quality labels.

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