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Integration of measures in the field of RES-H/C into the scope of green power labels

WP 3.2 report from the CLEAN-E project

A report prepared as part of the EIE 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 electricity products assist consumers to verify the ecological performance of green products. National labelling programmes which have emerged in some European countries are important and powerful instruments to strengthen consumer confidence in the voluntary green electricity market.

Objectives

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

The establishment of new labels will be accompanied by a wide range of activities. This includes the development of ecological minimum standards for the two key renewable technologies hydropower and biomass. The project also investigates the feasibility of widening the scope of green power labelling towards the integration of energy efficiency as well as renewable heat. CLEAN-E analyses 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. Furthermore, the project will include a wide range of activities aimed at disseminating and sharing best practices for green power procurement.

Expected key results

- New green power labelling schemes in France, Italy and Spain including the establishment of sound labelling structures and the development of label criteria. Existing labels (e.g. in Sweden and Austria) are intended to be improved towards a harmonised European standard.
- Guidelines how to implement ecological minimum standards for hydropower and biomass in the scope of green power labels.
- Procedures and methodologies how to integrate measures in the field of energy efficiency and RES-H/C into the scope of green power labelling schemes.
- Guidelines how to integrate new policies on the EU and Member States' level (e.g. Guarantee of Origin, Electricity Disclosure) and private sector initiatives (such as RECS) in green power labelling schemes.

[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).

Executive Summary

This report investigates the opportunities to integrate measures in the field of heat and cold generation on the basis of renewable energy sources (RES-H/C) into the scope of green power labelling schemes. Under certain circumstances the integration of such measures might be a reasonable and effective add on to increase the effects of a green power label in terms of environmental power and economical efficiency.

The starting point of the integrative approach which is analysed and discussed throughout this report is as follows: Most existing green power labels are designed as to contribute to the mitigation of climate change. Most of these labels apply criteria that ensure that labelled products trigger an expansion of renewable electricity generation (RES-E), e.g. by the installation of new wind turbines or biomass power plants. However market conditions might exist which are rather unfavourable for designing green power products that solely aim at the installation of new RES-E installations. 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 allowing measures in the field of energy end-use efficiency/energy services or RES-H/C to contribute to the environmental performance of green power products. This report will discuss the latter option whereas the integration of energy efficiency is subject of the CLEAN-E WP 3.1 report (Ruggieri 2006).

RES-H/C policy framework

The 1997 European Commission's White Paper for a Community strategy to substantially increase the penetration of renewable energy sources (RES) sets an ambitious 12% target for RES contribution to the EU's gross inland energy consumption by 2010. To achieve this overall objective it was envisaged to double the 1997 electricity and heat production from RES as well as to significantly increase the share of renewable transport fuels (RTF).

Despite these goals the market penetration of RES in the heating and cooling sector is still lacking appropriate legislation on the EU level. Whereas sector specific policies have been adopted for RES-E and RTF the sectoral target for the RES-H has never been transferred into respective European regulations. This policy hole has been identified as one of the main barriers for the EU to reach its overall White Paper RES target. For that reason the Commission stresses the need for considerable extra action in the RES-H/C sector to reach compliance with the full 12% target.

On the Member State level present supporting measures offer only a limited incentive for a dynamic and lasting development of renewable energies in the RES-H/C sector. The promotion of RES-H/C is up to now mainly focussed on monetary support instruments financed through the tax system. Few countries have – to a certain extent – included RES-H/C support elements into their regulations for the building sector.

The rationale behind the call for improved support for RES-H/C generation

There are several reasons why to strive for increased market penetration of renewable energy sources in the heating and cooling sector. The rationale behind this requirement includes positive contributions to mitigating climate change, supply security and creating employment and wealth at a decentralised level. Having this reasons in mind it becomes apparent that especially the RES-H/C sector is key for complying with long term sustainability targets.

The principle of integrating RES-H/C measures into the scope of green power labels

The basic concept of integrating RES-H/C measures in the scope of a green power label is as follows: Even with the (partly) RES-H/C integration the green power label would still be based on quality labelling of green electricity products. However, different from most existing green power labels the spectrum of measures that are a) generally supportable through the supplier of a labelled green electricity product and b) are eligible to create environmental additionality shall be broadened towards measures in the field of RES-H/C.

This new concept can best be 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 the respective product pay a premium on top of the regular electricity price. Within the scope of a label which is restricted to the RES-E sector a supplier would be required to invest the premium in projects linked to RES-E, e.g. the installation of new RES-E power plants. In the approach discussed in this report the label would also allow the respective supplier to invest the premiums for measures in the RES-H/C sector such as the installation of new RES-H/C devices (e.g. solar collectors, wood pellet boilers or heat pumps). In this case the investments in RES-H/C installations would (partly) contribute to the additionality requirement applied by the green power label.

Development of appropriate communication to explain the new label concept

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 and which – 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.

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 and might wonder to partly support RES-H/C generation when they switch to a labelled offering applying the new approach. For that reason labelling bodies should thoroughly develop straightforward and clear 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.

Definition of eligibility criteria

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. As green power labelling is aiming at the voluntary market such eligibility criteria should – at least to a certain extent – reflect what consumers perceive to be green in this specific field. If for instance consumers perceive some forms of biomass as not being sustainable, labels will get into troubles – irrespective the scientific view on this – if they allowed such substances to be eligible.

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.

Special attention should be drawn to application areas where RES-H/C devices replace existing renewable heat or cold production. For instance this could be the case where a heat pump replaces heat supply through a biomass fuelled district heating system which could even have a negative environmental impact. In order to avoid that a green power label supports such adverse effects labelling bodies should consider to base eligibility only on appliances where fossil fuelled heat and cold generation or electrical heaters are substituted by renewable heating or cooling devices.

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.

Development of additionality criteria

Additionality is the key issue in the voluntary green energy market. Most consumers of labelled products expect to contribute to creating additional environmental benefits beyond what is happening anyway due to market and policy framework conditions. In this respect additionality is given where a green electricity product leads to an extra environmental benefit compared to a baseline defined by the development on the energy market which would have occurred under the current market conditions and the existing legal framework.

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. In any case it should be ensured that RES-H/C measures funded through a labelled green power product should contrib-

ute to an expansion of RES-H/C generation over and above the supportive effects of governmental legislation.

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Abbreviations

AEEG	Autorità per l'energia elettrica e il gas (Italian Regulatory Authority for Electricity and Gas)
BAT	Best Available Technique
CTE	Codigo Tecnico de la Edificacion (Technical Buildings Code, Spain)
EEG	Erneuerbares Energien Gsestz (German Renewable Energy Act)
EU	European Union
CHP	Combined Heat and Power
GHG	Greenhouse Gases
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
LCA	Life Cycle Assessment
MS	Member State of the European Union
NGO	Non Governmental Organisation
RES-C	Cold produced form Renewable Energy Sources
RES-E	Electricity produced form Renewable Energy Sources
RES-H	Heat produced form Renewable Energy Sources
RTF	Renewable Transport Fuel
SEDA	Sustainable Energy Development Authority (New South Wales, Australia)
SPF	Seasonal Performance Factor
TEWI	Total Equivalent Warming Impact
VREG	Vlaamse Reguleringsinstantie voor de Electriciteits- en Gasmarkt (Flemish Regulator for the Electriciy and Gas markt)

1 Introduction

This report investigates the opportunities to integrate measures in the field of heat and cold generation on the basis of renewable energy sources (RES-H/C) into the scope of green power labelling schemes. Under certain circumstances the integration of such measures might be a reasonable and effective add on to increase the effects of a green power label in terms of environmental power and economical efficiency. This might make a valuable contribution to gradually transferring the energy sector towards enhanced sustainability.

The starting point of the integrative approach which will be analysed and discussed throughout this report is as follows: Most existing green power labels[1] are designed as to contribute to the mitigation of climate change. Most of these labels apply criteria that ensure that labelled products trigger an expansion of renewable electricity generation (RES-E), e.g. by the installation of new wind turbines or biomass power plants. However market conditions might exist which are rather unfavourable for designing green power products that solely aim at the installation of new RES-E installations. Under specific conditions (which will be discussed throughout this report) it might be reasonable to leave the "narrow" restriction on investments in the RES-E sector. Among others this could be facilitated by allowing measures in the field of energy end-use efficiency/energy services or RES-H/C to contribute to the environmental performance of green power products. This report will discuss the latter option whereas the integration of energy efficiency is subject of the CLEAN-E WP 3.1 report (Ruggieri 2006).

In other words this report is not discussing options to label green heat or green cold products, an approach that is also pursued by some existing environmental quality labels.[2] The report is rather elaborating on green power labels which – to a certain extent – involve investments in the RES-H/C sector. The easiest way to facilitate such an approach would be through a so called fund model that might be designed as follows: A green power supplier delivers to its customers electricity which is produced in RES-E installations that are eligible under the label. Customers of the respective product pay a premium on top of the regular electricity price. Instead of investing the respective funds in new RES-E capacity the premiums are used to support the installation of new RES-H/C devices.

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[1] A detailed overview of existing green power labelling schemes operated in Europe and some selected countries outside Europe (e.g. Australia, US) is provided by the CLEAN-E WP 1 report (Willstedt/Bürger 2006).

[2] For instance the Finnish Norppa label is ecolabelling green heat by applying environmental criteria for district heating systems (FANC 2000). In general green heat labels should provide guidance to consumers to select the environmentally best heating option at given time and local situation. An alternative would be to label the best technologies for each renewable heating source (e.g. solar thermal, biomass, geothermal).

1.1 Structure of the report

Section 1 provides a brief overview of the current degree of RES-H penetration throughout the European Union. Furthermore the rationale is outlined why additional public effort is necessary to allow a major take off of renewable heating and cooling technologies in the future.

In section 2 some market conditions are identified and discussed under which the integration of RES-H/C measures into the scope of green power labelling schemes might turn out to be a reasonable complement for a quality scheme primarily focussing on the electricity sector.

Section 3 elaborates on the Australian Green Power Accreditation Program that is currently the only green electricity label which allows – to a certain extent – measures in the field of renewable heating to be actively integrated in to the scope of a green electricity label.

Section 4 addresses the methodological issues related to the integration of RES-H/C measures. This includes the discussion under which conditions RES-H/C technologies and fuel sources should be eligible to be integrated into the scope of green power labels (eligibility criteria). Furthermore proposals will be developed how environmental additionality can be generated under particular policy frameworks.[3] In this context it is one of the key elements to decide how to weigh additionality created by measures in the field of renewable heating and cooling in relation to that created by investments in the RES-E sector.

Section 5 develops a brief guideline which is aimed at assisting national green power labelling bodies who wish to integrate to a certain extent RES-H/C measures in the scope of their green power label.

1.2 RES-H penetration throughout the EU

1.2.1 Current RES-H penetration

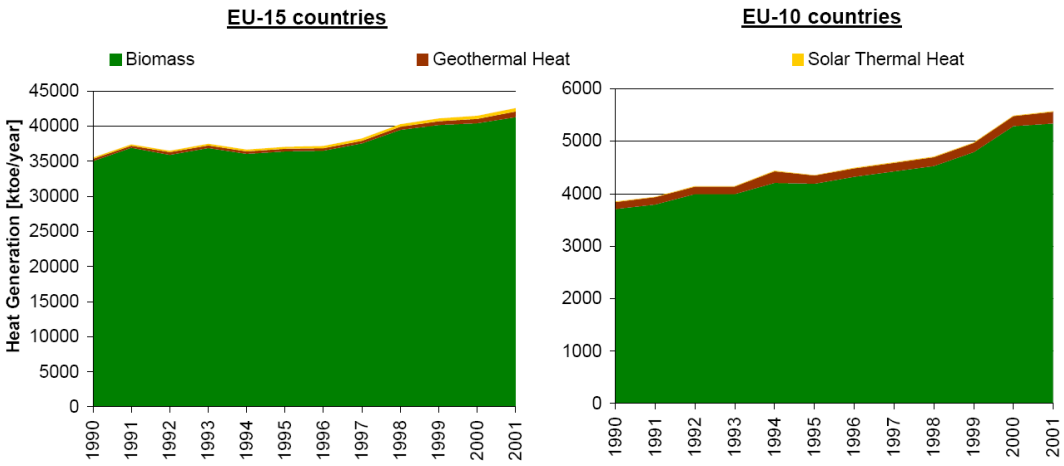
In 2001 renewable energy sources contributed 47,8 Mtoe (EU-15 42,2 Mtoe, EU-10 5,6 Mtoe) to the total heat consumption in the EU-25 Member States, corresponding to a share of approx. 11% (Ragwitz et al. 2005). In 1997 heat production from renewables amounted to 38,7 Mtoe in the EU-15.

The share of renewables in the heating and cooling sector has grown slowly over the last years. Figure 1 illustrates the historic development of the three main renewable energy sources contributing to this sector. It can been seen that the renewable heating sec-

[3] Additionality is one of the key issues in the context of the CLEAN-E project. Additionality means for the CLEAN-E partners that green power labels should ensure that labelled products reduce environmental pressures from power production to a degree that is below 'business-as-usual', realising thus additional improvements compared to what would happen anyway under current conditions.

tor is dominated by traditional biomass. Solar thermal as well as geothermal are still of secondary importance.

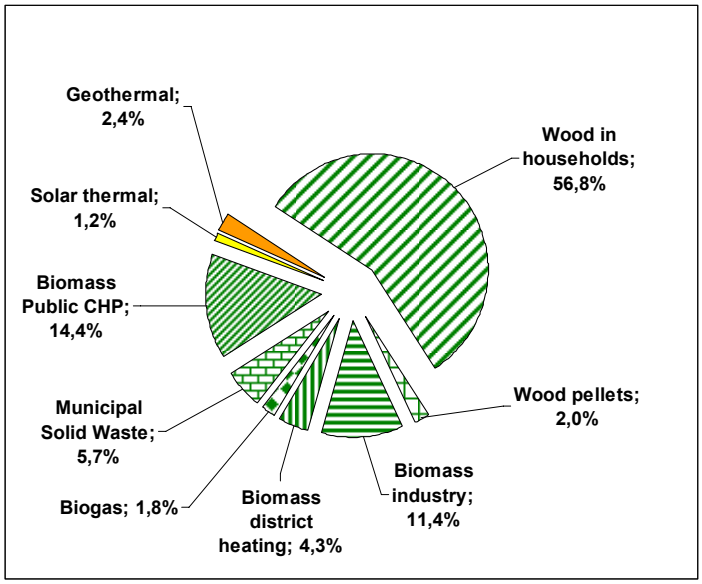
Figure 1: Development of RES-H generation in the EU-15 and EU-10 between 1990 and 2001



Source Ragwitz et al. 2005

In 2001 96,4% of renewable heat generation stems from various biomass sources and technology options (see Figure 2). The contributions of solar thermal and geothermal heat amounted to 1,2% and 2,4% accordingly.

Figure 2: Contribution of different renewable energy sources and technologies to the heating sector in 2001 in the EU-15



Source Ragwitz et al. 2005 (own illustration)

In many EU-25 Member States the penetration of grid based renewable heat supply is still quite low. This is mainly due to the predominance of traditional wood heat generation in households. Only in the three Scandinavian Member States Sweden, Finland and Denmark as well as the UK which are countries with large connection rates for grid-based heating systems grid-connected RES-H heat supply (dominated again by biomass) are primary.

1.2.2 Technology portfolio

Biomass technologies

The heating sector is still the sector in that most biomass is used, however with the smallest growing rate compared to the electricity and transport sector. There are strong traditions of biomass use whereas new technologies (e.g. wood pellet burners that are environmentally safe and easy to handle) are gradually penetrating the market.

Wood is the main biomass source contributing to heat generation. In 2004 approx. 55,4 Mtoe of wood energy (including wood waste, black liqueurs and solid agricultural crop residues) were produced throughout the EU Member States. This production rate is corresponding to a 3,2% share of wood energy to the total primary energy balance of the EU. Among the EU-25 France is the largest wood energy producer, followed by Sweden, Finland and Germany.

The market penetration of wood energy is quite heterogeneous among EU Member States. In particular the Scandinavian countries Sweden and Finland have already a well established wood industry exploiting the existing potentials to a large extent. Other Member States with large potentials (e.g. the Baltic States) are just about to set up the respective infrastructure.

In its White Paper[4] for a Community strategy to substantially increase the penetration of renewable energy sources (see section 1.3.1) the Commission has set out an overall target for the contribution of biomass to the total primary energy supply in the EU of 135 Mtoe. This target does neither differentiate between different biomass sources not between different sectors. The EU Commission has calculated that wood energy should contribute approx. 100 Mtoe to the overall target. With a projected 2010 contribution of approx. 78 Mtoe based on current national growth rates the White Paper target will be failed unless significant steps will be taken to boost the sector (EU-COM 2006). In this regard the Biomass Action Plan[5] adopted by the Commission in December 2005 is a first step towards policy intensification in this sector.

Solar Thermal

Heat production from solar thermal sources is starting to play a major role in Germany, Greece, Austria, the Netherlands and Cyprus. For instance in Greece two thirds of the

[4] Communication from the Commission: Energy for the Future – Renewable Sources of Energy, White Paper for a Community Strategy and Action Plan (COM(97)599 final)

[5] Communication from the Commission: Biomass action plan (COM(2005) 628 final)

domestic warm water demand is covered by solar thermal collectors. In Cyprus the share amounts up to 90%. In Austria the solar thermal share has increased to remarkably 10%. However the share of solar thermal heat production to total heating and cooling demand is still quiet low in most Member States and is primarily based on non-grid connected systems. It is notable that also in several Member States with favourable climate conditions (e.g. Spain, Portugal and Italy) only a marginal share of warm water needs is covered by RES-H.

By the year 2002 approx. 12,8 million m^2 collector surface were installed throughout the EU-15. In order to achieve the goal of installing a total of 100 million m^2 of collector surface by 2010 – this figure was anticipated as to be the necessary contribution of the solar thermal sector in order to reach the 2010 RES target set out in the White Paper - far more significant steps need to be taken in order to initiate a major take off of this technology. Policy measures should especially take the promotion of grid connected solar thermal supply systems into account as this technology path is lagging behind in most countries.

Geothermal

In 2004 EU Member States exploited approx. 2.060 MWth of medium and low temperature geothermal energy for various heating purposes (e.g. space heating, agriculture, balneology or process heating). With an installed capacity of approx. 690 MWth Hungary is the biggest user of medium and low temperature geothermal applications, followed by Italy and France.

For smaller scale geothermal appliances, the European Union has taken a forceful approach to promote the development of geothermal heat pumps which are used for warm water production as well as heating and cooling residential and commercial buildings (very low temperature geothermal appliances). It is estimated that there are more than 379.000 geothermal heat pump units in Europe, equivalent to 4.530 MWth. With more than 185.000 installed heat pumps Sweden takes the lead among EU Member States contributing nearly half of all installed units. Sweden is followed by Germany, Austria and France. Within its "Sustainable Energy Europe" Programme The European Commission has set a benchmark of installing additional 250.000 new heat pumps by 2008. Taking current geothermal heat pump market growth into consideration this objective appears to be feasible.

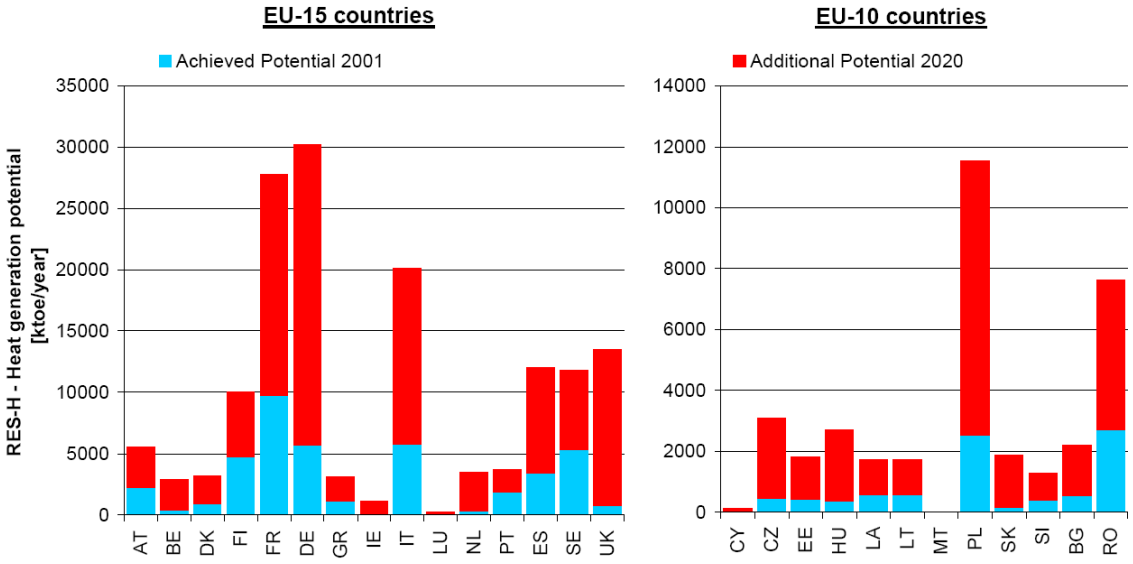
As of 2004 medium, low and very low temperature geothermal heat production amounts to more than 5.000 MWth, the 2010 target set out in the White Paper. It is rather estimated that approx. 10.400 MWth of geothermal heat production could be reached by 2010 (EU COM 2006).

1.2.3 RES-H potentials until 2020

As indicated in section 1.2.1 in 2001 renewable energy sources amounted to 47,8 Mtoe to the heating sector in the EU-25. The additional potential that can be reached by 2020 is estimated to be approx. 133 Mtoe for the EU-25+ including Bulgaria and Romania

(EU-15 106 Mtoe, EU-10+ inkl. Bulgaria and Romania 27 Mtoe) (Ragwitz et al. 2005). Figure 3 illustrates the achievable penetration of RES-H by Member State in 2020. The displayed potentials for the EU-15 include an anticipated contribution of biomass of approx. 40% to the estimated potential and of solar thermal and geothermal (incl. geothermal heat pumps) of approx. 30% each. For the EU-10+ including Bulgaria and Romania the distribution among the different renewable energy sources is rather unequal. Here it is estimated that biomass will contribute 60%, solar thermal 19% and geothermal 17% of the total realisable 2020 potential.

Figure 3: RES-H potentials 2020 by EU Member States incl. Bulgaria and Romania



Source Ragwitz et al. 2005

1.3 European and national policy frameworks for RES-H/C

1.3.1 RES policies on the EU level

The 1997 European Commission's White Paper[6] for a Community strategy to substantially increase the penetration of renewable energy sources (RES) sets an ambitious target for RES contribution to the EU's gross inland energy consumption. The strategy and action plan in this White Paper were directed towards the goal of achieving a 12% penetration of RES in the Union by 2010. To achieve this 2010 overall objective it was envisaged to double the 1997 electricity and heat production from RES as well as to significantly increase the share of biofuels in the transport sector.

[6] Communication from the Commission: Energy for the Future – Renewable Sources of Energy, White Paper for a Community Strategy and Action Plan (COM(97)599 final)

In order to stimulate RES penetration in the electricity sector in 2001, the EU Member States adopted the Directive (2001/77/EC) on the promotion of electricity produced from renewable energy sources in the internal electricity market, hereafter referred to as RES-E Directive.[7] The RES-E Directive requires Member States to put in place appropriate measures to encourage greater production of electricity produced from renewable energy sources (hereafter referred to as RES-E) in line with national indicative targets for 2010. The overall 2010 target for RES-E was originally set at 22.1% for the EU-15, corresponding to almost a doubling of the share of 1997 RES-E production. However the 2010 target was adjusted to 21.0% for the EU-25 following the negotiation of indicative targets in the Accession Treaty for the new Member States.

The utilisation of RES in the transport sector was addressed by the Directive (2003/30/EC) on the promotion of the use of biofuels or other renewable fuels for transport.[8] This Directive aims at promoting the use of biofuels or other renewable fuels to replace diesel or petrol for transport purposes in each Member State. The Directive enforces Member States to ensure that – by setting up national indicative targets - a minimum proportion of biofuels and other renewable fuels is placed on their markets. Reference values for the national indicative targets were set at 2% and 5,75% calculated on the basis of energy content, of all petrol and diesel for transport purposes placed on their markets by 31 December 2005 respectively 31 December 2010.

The market penetration of RES in the heating and cooling sector is still lacking appropriate legislation on the EU level. Although a specific sectoral target for the RES-H sector was included in the White Paper (see above), it was never transferred into respective European legislation. This policy hole has been identified as one of the main barriers for the EU to reach its overall RES target set forth in the White Paper. The EU Commission elaborates in its 2004 communication to the Council and Parliament:[9]

"With the measures that have been put in place, the Commission estimates that the share of renewable energy sources in the EU15 is on course to reach 10% in 2010. The shortfall compared to the 12% target is caused by sluggish growth of renewable energy markets for heating and cooling, leading to the conclusion that considerable extra action is needed in this sector to enable the full 12% target to be reached."

The Commission also estimates that, even if the sector specific targets for renewable electricity generation and biofuels are met, extra 29 Mtoe of renewable energy for heat production would still be needed to meet the 12% overall target.

In order to overcome the policy gap in the field of RES-H support the ITRE Committee of the European Parliament (Committee on Industry, Research and Energy) called on

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[7] 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.

[8] Directive 2003/30/EC of the European Parliament and of the Council of 8 May 2003 on the promotion of the use of biofuels or other renewable fuels for transport.

[9] Communication from the Commission to the Council and the European Parliament: The share of renewable energy in the EU (COM(2004) 366 final)

the European Commission on 26 January 2006 to present a draft Directive for increasing the share of renewable energy for heating and cooling. An EU target should be set to increase the share of renewable heating and cooling from approximately 10% at present to 25% by 2020 throughout the EU. The key element to reach this overall target is considered to be the adoption of nationally binding targets for 2020, which take into account different degrees of market penetration of renewable heating and cooling in the Member States and the geographical distribution of the potentials of each of the relevant technologies (burden sharing approach). On 14 February 2006 after discussions in the European Parliament it was agreed to support this approach but it was decided to lower the overall target on the EU level and to drop the "mandatory national targets" in favour of the weaker formulation "effective national targets".

Apart from this ongoing political process to implement appropriate legislation for the promotion of RES in the heating and cooling sector the use of RES-H is also addressed in the Directive on the Energy Performance of Buildings.[10] This Directive requires Member States to take the necessary measures to ensure that for new buildings with a total useful floor area over 1.000 m^2 the technical, environmental and economic feasibility of alternative supply systems such as those based on renewable energy is taken into account before construction starts. In addition Member States shall apply a methodology of calculation of the energy performance of buildings on the basis of a general framework set out in the Annex of the Directive. The methodology should in particular reflect the positive influence of active solar systems and other heating and electricity systems based on renewable energy sources. Many stakeholder consider the Directive not to be focussed enough (e.g. due to its limitation on very large buildings) to stimulate sufficient additional RES-H demand as it would be necessary to meet the target of doubling RES-H until 2020 (e.g. EREC 2005).

1.3.2 Selected RES-H/C policies on MS level

Although a crucial fraction of European primary energy consumption is used for heating and cooling purposes the present supporting measures applied by the EU Member States offer only a limited incentive for a dynamic and lasting development of renewable energies in this sector. The promotion of RES-H is up to now mainly focussed on few instrument categories. Monetary support instruments financed through the tax system are dominant, whereby three instruments are primarily applied. These are capital investment grants, tax exemptions as well as low interest loans. These tax based support instruments applied on the national level often are accompanied by comparable local and regional measures. In addition some European regions apply installation obligations. An overview of national instruments to support RES-H generation is provided by Ragwitz et al (2005).

In order for renewable energies to penetrate the heating and cooling market more intensely, appropriate instruments need to be developed. In order to ensure lasting stable

[10] Directive 2002/91/EC of the European Parliament and of the Council of 16 December 2002 on the energy performance of buildings.

support conditions such instruments should on the one hand be independent on budget. On the other hand, they should take into consideration the specific structural characteristics of the heating market – for example, there is a lack of a homogeneous and country-wide transmission and distribution networks; moreover, heat production is highly decentralised – as well as the diversified actor structure. Furthermore, the support framework for the renewable heat market has to be so developed that the grid-bound heat production in the form of local and distant heating networks is greatly expanded and that a greater penetration of RES-H/C generation in the building stock is reached.

1.3.2.1 Installation obligation

A comparably new instrument category to support RES-H/C production is represented by installation obligation models. Here building proprietors are obliged (for instance, with regard to new installations or the exchange of a conventional heating installation) to guarantee that a minimum share (e.g. 10 %) of the annual heat demand of the building is supplied by renewable energies.

Spain is the only European country to make the installation of solar thermal appliances obligatory in new and refurbished buildings on the national level. In order to transpose the requirements from the Directive on the Energy Performance of Buildings into national law the Spanish government approved the new Technical Buildings Code (CTE) in March 2006.[11] The CTE includes an obligation to cover 30-70% of the domestic warm water demand with solar thermal energy. The mandatory minimum share depends on the total domestic hot water demand of a building and the climate zone it is located in.

The obligation applies to all new buildings and those undergoing a renovation disregarding their use. Buildings that already cover their hot water demand by other renewable energy sources or CHP are exempted from this regulation.

Prior to this approach on the national level several municipalities including Barcelona and Madrid have introduced in the last few years regional solar obligations. For instance for some years the municipality of Barcelona took the role of the pioneer in the field of local solar obligations. With its "Solar Thermal Ordinance" owners of all new buildings with a warm water consumption of more than 292 MJ/day (this corresponds to residential buildings starting from a size of approx. 16 households) are obliged to cover at least 60% of their domestic warm water demand from solar thermal systems. The obligations also applies to building which undergo major restoration works. For swimming pools the rate amounts to 100%. All regional obligations will remain in force provided that they set more ambitious obligations than the CTE on the national level.

In Italy a number of small municipalities and the city of Rome have adopted similar Solar Thermal obligations for new buildings. The actual regulation depends on the local decision (for example in Rome at least 30% of the total heat demand and at least 50% of

[11] Codigo Tecnico de la Edificacion, Real Decreto 314/2006 of 17 March 2006

the hot water heat demand must be fulfilled with solar thermal collectors). Recently the Italian Government has developed an updated proposal for the implementation of the EU Energy Performance of Buildings Directive, containing the nationwide obligation for new buildings that at least 50% of the hot water heat demand must be fulfilled with solar thermal collectors. This piece of legislation is still under discussion.

In Israel the installation of solar thermal appliances was made obligatory for warm water production in new domestic buildings in 1980. Respective legislation was adopted in view of enhancing security of supply. In accordance with Planning and Buildings Regulation 5730-1970, System Article 9 solar thermal systems underlie specific provisions concerning the daily heat output of collectors, the heat transfer capability, storage tanks and collectors, and backup systems. Furthermore the obligation differs depending on the type of building, if the building is to be used as a hotel, educational institution or other such similar purposes or if the building is to be used for residential purposes (IEA 2006). Due to a large market penetration – more than 80% of all households use solar thermal for warm water generation - solar thermal became a mainstream technology in the meantime. Systems are available for purchase everywhere, installers know how to install them and system prices have decreased substantially over the years. Today the voluntary replacement of old solar systems outnumbers mandatory installations in new buildings by 4:1 (Pilgaard 2004).

1.3.2.2 Efficiency Obligation (White Certificate System)

In Italy solar thermal heat production is partly supported through an efficiency obligation (facilitated by a system of White Certificates) that is mainly aiming at demand side efficiency measures. In April 2001 two regulations were issued, which oblige electricity and gas suppliers to carry out energy saving measures. As the whole system turned out to be quite complex it did not enter into force until January 2005 (Pavan 2005a).[12]

The energy savings obligation applies to electricity and gas suppliers with more than 100.000 final customers. Currently eight electricity and 22 gas companies representing a market share of approx. 98% resp. 60% underlie the obligation (Bertoldi/Rezessy 2006). The obliged companies are required to save a primary energy volume of 2,9 Mtoe compared to a business-as-usual-scenario in the first program phase until 2009. The allocation of the required energy savings to the obliged parties occurs proportional to their market share.

At least 50% of the total savings requirement needs to be achieved through a reduction of electricity and gas end-use consumption. The remaining share can be achieved by primary energy savings in all the other demand side areas, e.g. by fuel switching measures (e.g. oil to gas) provided primary energy savings are reached (Bertoldi/Rezessy 2006). In this respect switching to renewable energies (e.g. photovoltaics, solar thermal,

[12] A detailed description of the design of the Italian energy savings obligation is provided by the CLEAN-E WP 3.1 report (Ruggieri 2006) as well as Pagliano et al (2003), Pagliano (2005), Pavan (2005b) and Oikonomou (2004).

biomass) is also eligible. In general an obliged supplier can claim energy savings from a project for up to five years.

The efficiency quota is facilitated by a system of tradable white certificates. A certificate is issued for each energy saving that corresponds to one ton of oil equivalents. However the certificate system differentiates between energy saving measures carried out in the different areas. Energy savings in the electricity sector receive different certificates than respective savings in the gas sector. In this respect three different types of certificates exist reflecting the three areas in which eligible measures can be carried out (see above).

In order to become eligible energy savings measures must be designed, implemented and evaluated according to criteria established by the Italian Regulatory Authority for Electricity and Gas (AEEG). Furthermore projects verification as well as energy savings certification are under the responsibility of AEEG. For some types of projects AEEG has presented a list of eligible measures as well as standard evaluation methods. In the field of RES-H eligible measures comprise promotion of solar thermal systems for water heating and biomass cogeneration of domestic heating (Pavan 2005). Since evaluation results of the first commitment period will not be published before September 2006 there is no indication yet to which extent the obliged companies have carried out RES-H measures in order to comply with their energy savings requirement.

1.3.2.3 Bonus model

In Germany several support models are currently under discussion in order to stipulate market penetration for RES-H production. The discussion in Germany is mainly driven by the insight that all existing instruments have not effected an expansion of renewable heat production to the extent necessary.[13] Moreover, existing support programmes are generally budget-dependent and thereby do not provide – in particular against the background of strained public budgets – reliable, long-term support conditions.

The main models currently discussed comprise the installation obligation (see section 1.3.2.1) and the so called bonus model. Both models are independent from public budgets and take into consideration the specific structural characteristics of the heating market (e.g. there is a lack of a homogeneous and country-wide transmission and distribution network; moreover, heat production is highly decentralised).

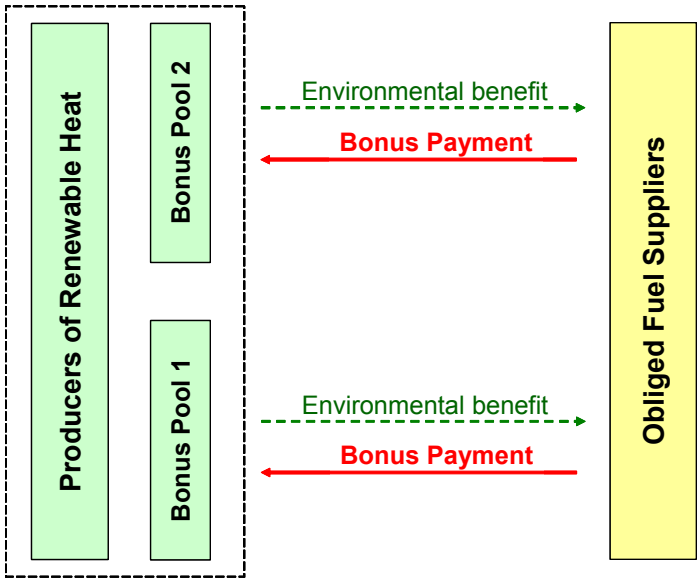
The bonus model which is illustrated by Figure 4 involves major mechanisms of a classic feed-in scheme. The model can be characterised as purchase obligation with fixed reimbursement rates. Operators of renewable heating devices are entitled to receive a fixed bonus payment per kilowatt hour of heat produced. As heat usually is consumed in the same place where it is produced (without using a public grid) the bonus is not paid for feed-in but for a surrogate (e.g. a certificate) which represents the environmental

[13] In recent years RES-H installations were primarily supported by the Market Incentive Programme (MAP), a subsidy and soft loan programme.

value associated to a standardised volume of RES-H (e.g. 1 MWh_{th}). As in such a system in principle each household would be entitled to apply for funding it was proposed to pool the beneficiaries claims by trustees (indicated as "pools" in the figure).

The purchase obligation for the certificates is assigned to the producers/importers of fossil fuels and corresponds to the fuel volumes which are used for heat production (Bürger 2006).

Figure 4: Structure of the bonus model as discussed in Germany as support instrument for enhanced RES-H/C market penetration



1.4 Why do we need increased RES-H/C penetration?

There are several reasons why European and national energy policies should strive for increased market penetration of renewable energy sources in the heating and cooling sector. Reflecting the below listed reasons it becomes apparent that especially this specific sector is crucial for complying with long term sustainability targets such as environmental protection and supply security.

- **Climate protection:** With the Kyoto protocol coming into force on 16 February 2005 a first and important step for the global climate protection policy was reached. In the Kyoto protocol the EU committed itself to lower its greenhouse gas (GHG) emissions in the first reporting period 2008/2012 by 8% (base year 1990/1995). How difficult it is to comply with these first step reduction targets can be illustrated by looking at the emission balances of the Member States. From those EU-15 countries with rather high GHG emissions only Germany and the United Kingdom managed so far to substantially decrease their emissions while most Member States will probably fail to meet their targets (EEA 2006).

But even those countries, that should achieve their Kyoto targets may not "rest on their laurels". The reduction targets agreed upon in Kyoto are only a very first step for global climate policy which aims at mitigating climate change. In order to stabilise the atmospheric greenhouse gas concentration, much higher reduction targets are necessary than agreed upon in Kyoto. Climate experts at the IPCC assume that global GHG emissions would have to decrease by 50% until 2050, in order to limit global warming to a value under two degrees Celsius in relation to pre-industrial times. Since especially developing and transition countries will rise their emissions in the coming years, the industrial nations must decrease their emissions in the next 50 years by approximately 80% (related to the base year 1990) (Enquete-Commission 2002).

In Europe heating (incl. heating of buildings, hot water production, heating for industrial processes) accounts for an estimated 50% of total final energy consumption and demand for cooling is increasing dramatically. Therefore increased penetration of renewable energy sources in this sector is a rather efficient way to mitigate overall greenhouse gas emissions harming the climate. Furthermore, in view of long term climate protection targets that are postulated by climate researchers it is obvious that all sectors including electricity, heating and transport are required to substantially contribute to the reduction of GHG emissions in order to allow for meeting the global reduction goals.

- **Security of supply:** Guaranteeing security of supply is one of the most important objectives of EU energy policy. Because of the rising dependency on fossil fuel imports and the large price volatilities related to these imports, supply security has become one of the major concerns within the EU (see for instance the Commission's Green Paper on Supply Security EU COM (2001)). Increased security of supply has special significance for some of the new Member States which lack indigenous resources and have historically been highly dependent on Russian energy imports.

  Between 1999 and 2006 the average price private households had to pay for natural gas rose by more than 50% (Eurostat 2005). Market experts expect that the price level for oil and gas will further increase in the coming years as the world-wide maximum in oil production will coincide with an increasing demand from densely populated and economically thriving countries such as China and India. Different analysts expect therefore for the end of the decade again a doubling of the crude oil price compared to today's price level.

  All EU Member States have considerable potentials of renewable energy sources that can be utilised in the heating and cooling sector. For most renewable energy sources and technologies heat and cold can be produced at fair costs in particular in light of rising prices for fossil energy sources. Utilising renewables for heat production – in the case of biomass provided that the major part is produced nationally - might mean less imports of fossil primary energy resources from abroad. In this regard domestic (but also to a certain extent imported) renewable energy sources are an important and stable element to enhance security of supply.

- **Creating employment and wealth at a decentralised level:** Heat/Cold generated from renewable sources offers several economic benefits. The main benefit is employment creation. As renewable technologies are more labour intensive (for the same electricity or heat output) than conventional technologies, renewables will provide new jobs at several levels (e.g. planning, construction, operation and maintenance). According to an assessment for the German government the gross employment in the renewable energy sector amounted to approx. 157.000. Employment in production facilities and operation of RES-E installations contributes nearly 50% of the respective jobs (direct employment effect), whereas the remaining jobs have been created at suppliers as well as business sectors (indirect employment effect) (Staiß et al 2006). Particularly in economically underdeveloped regions occupation perspectives exist as many of these jobs have already been created locally, positively contributing to regional economic development. In the same study projections show a positive net employment effect in the magnitude of up to 200.000 new jobs until 2030.
- **Improving regional air quality:** At a regional level the use of renewable energy sources might help to avoid or at least reduce the emissions of air pollutants which are emitted by burning fossil fuels. Relevant pollutants in this respect comprise of acidifying emissions such as NO_x and SO_x as well as aerosol emissions (e.g. dust), organic compounds and heavy metals. However the positive contribution to the regional environmental aspect is depending on the technologies that are used for RES-H/C production, especially where biomass is concerned. Here BAT should be used in order to maximise the positive effect.

2 Why integrating RES-H/C measures into the scope of green power labelling schemes?

Before some market conditions are outlined which might require a green power labelling body to think about the option to integrate measures in the field of RES-H/C the basic concept of such an integration shall be recalled:

Even with the (partly) integration of RES-H/C measures – as discussed in this report – the green power label is still based on quality labelling of green electricity products. However, different from most existing green power labels[14] the spectrum of measures that are a) generally supportable through the supplier of a labelled green electricity product and b) are eligible to create additionality in the sense of section 4.3 shall be broadened towards measures in the field of RES-H/C. This concept can finally only be fulfilled through a fund model:[15] A green power supplier delivers to its customers electricity which is produced in RES-E installations that are eligible under the label. Customers of the respective product pay a premium on top of the regular electricity price. Within the scope of a label which is restricted to the RES-E sector a supplier would be required to invest the premium in projects linked to RES-E, e.g. the installation of new RES-E power plants. In the approach discussed in this report the label would also allow the respective supplier to invest the premiums for measures in the RES-H/C sector such as the installation of new RES-H/C devices. In this case the investments in RES-H/C installations would (partly) contribute to the additionality requirement applied by the green power label.

The integration of RES-H/C measures into the scope of green power labels does not appear to be logical at first glance. This hypothesis is based on the assumption that customers of green electricity products expect to support existing RES-E generation or the installation of new RES-E plants. As a result customers of labelled products might wonder that they do not support RES-E generation when they switch to a labelled offering.

However specific market conditions as well as specific labelling contexts might occur that provoke to think about leaving the very narrow scope of limiting green power products to the support and promotion of green electricity measures. The motivation to think about widening the scope of green power labelling schemes towards the integration of measures in other energy policy fields such as energy end use efficiency[16] or RES-H/C is motivated by the following considerations:

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[14] A detailed overview of existing green power labelling schemes operated in Europe and some selected countries outside Europe (e.g. Australia, US) is provided by the CLEAN-E WP 1 report (Willstedt/Bürger 2006).

[15] Labelling of electricity production from biomass CHP could in principle also be considered as integration of RES-H measures. For instance in the scope of the German ok-power label electricity from biomass is awarded a special bonus when it has been produced in a CHP plant. However this approach will not be focused on in the following sections.

[16] The approach to integrate measures in the field of energy end-use efficiency and energy services is discussed in the context of the CLEAN-E WP 3.1 report (Ruggieri 2006).

1. In some Member States there might be substantial barriers for the installation of new RES-E plants beyond pure costs. Such non monetary hurdles might encompass administrative barriers, problems with grid access, information deficits,…. Labels might of course be designed as to specifically address these non-monetary barriers. For instance a label could ensure that suppliers of labelled green power products provide legal expertise to potential investors in RES-E facilities in order to overcome administrative hurdles against the installation of new RES-E devices. However green suppliers might not be capable to provide respective expertise to satisfactory address these barriers. Moreover labelling organisations might decide that this form of assistance is not appealing enough to attract a lot of customers for the labelled products. In these cases green power labelling bodies might start to think of other options which could facilitate labelled green products to create environmental benefits that might be attractive to consumers.

2. The second possible application for the integration of RES-H/C measures might be given by green power products designed as fund models.[17] In countries with a comprehensive support framework for RES-E generation fund models have turned out to face major problems with finding enough RES-E plants which fulfil the funding requirements applied by a green power label. This aspect shall be exemplified on the basis of the German ok-power label:[18]

   The ok-power label is operated in a RES-E support framework that mainly is determined by the German feed-in system. The feed-in system is regulated through the Act on Granting Priority to Renewable Energy Sources (EEG). The EEG obliges a grid operator whose grid is closest to the location of an eligible RES device to a) connect the respective RES installation and b) buy electricity from the installation in accordance with fixed feed-in tariffs which are set forth in the law.

   In an eligible ok-power labelled fund offering an electricity supplier delivers electricity that under the contract is demonstrably generated from renewable sources. A portion of the electricity price – the funding contribution – must be used for financing RES-E installations that feed power (in accordance with the EEG) into the public grid but for which the revenues paid by the grid operator would not result in their

[17] On the voluntary green power market two main categories of green electricity products can be distinguished

   1. Supply offerings: In supply offerings electricity suppliers generate electricity from renewable sources or purchase this from the producer and wheels it under grid utilization agreements to his customers. The determining factor in this regard is the contractual supply of RES-H/C. Environmental benefits accrue from the characteristics of the supplied electricity.
   2. Fund offerings (often referred to as contribution based offerings): Generally fund offerings charge a premium on top of the supply of electricity which might either come from conventional or from renewable sources. The premiums build a fund that generally is invested in expanding eligible renewable capacity.

[18] A detailed description of the German ok-power label (www.ok-power.de) is provided by the work package 1 report produced in the scope of the CLEAN-E project (www.eugenestandard.org/clean-e).

financial viability. The need for additional funding on top of the feed-in tariff needs to be proven in the scope of the auditing process carried out under the label.[19]

Since ok-power labelled fund models are associated with considerable transaction costs especially for identifying supportable RES-E plants but also for managing all support contracts this product category generally is limited to regional markets. For instance a municipal supplier sets up a fund model in order to support regional RES-E installations through the fund. In this respect the marketing concept of such products often is focussing on local aspects. The marketing campaign shall not promote anonymous power plants which the customers do not know. Within the campaign power plants shall rather be promoted, that can be visited by the customers, which are known from local media and that for that reason have a certain relationship to the consumer.

Dependent on the size of the regional outreach/extension of a product the number of plants which fulfil the regional criterion can be quite limited. This can even go so far that a green supplier fails to find enough supportable installations in the region he is operating in. This is mainly due to the circumstance that the EEG sets out rather high feed-in tariffs that limits the power plants which need additional funding on top of the feed-in tariff they receive anyway. In such cases a green supplier is left with the fund that theoretically he is obliged to spent for RES-E funding purposes. Under this circumstances it might be reasonable to allow for an expansion of the supportable measures such as the funding of measures in the field of RES-H/C.

3. A third potential market framework in which the integration of RES-H/C measures into the scope of a green power label seems to be reasonable might be given in countries with unfavourable RES-E market conditions for green power suppliers. A typical example for this is currently given in parts of Belgium. Since 2002 Flanders and Wallonia have implemented a quota obligation system for RES-E, facilitated through schemes of green certificates. In 2004, the Brussels region also introduced a quota based certificate scheme.

   In Flanders, for instance, every electricity supplier is obliged to annually surrender to the Flemish regulator (VREG) a certain amount of green certificates from green electricity producers. One certificate corresponds to eligible RES-E generation of 1 MWh. The obligation targets were established at 2% from total electricity supply in 2004 and will gradually increase to 6% in 2010. Suppliers that do not comply with this obligation are required to pay a buy-out price. The buy-out price is set by legislation and amounted to 100 EUR per missing certificate in 2004 and 125 EUR in 2005 accordingly.[20]

[19] Otherwise undesirable excessive support could take place which should be avoided as effective as possible.

[20] Detailed information about the Flemish obligation scheme is provided by the regulator's website www.vreg.be.

The combination of considerably high obligation targets with a rather high buy out price has led to a rather high price level for green certificates. In the redemption period 04/2004–03/2005 certificates were traded at a price of approx. 109 EUR per certificate, in the following period 04/2005-03/2006 the price rose up to 114 EUR/certificate.

Under this specific conditions a green power label which pursues the concept of additionality (for a detailed description of the concept of additionality see section 4.3.1) but limits the options to generate additionality to the RES-E sector will cause major problems to green power suppliers. What is the reason behind that? In the context of an obligation scheme additionality can be generated solely by those RES-E installations that operate outside the quota system. With other words only those RES-E devices can contribute to additionality of which the electricity generation is not used by any supplier to proof compliance with the obligation target.

In practical terms under an obligation scheme additionality could be generated as follows: A green supplier has to redeem a certain number of certificates that corresponds to the obligation target set by the obligation scheme (e.g. 2% in 2004). In addition to this (in order to create additionality and in order to comply with the labelling criteria) the supplier needs to redeem an additional number of certificates. This additional number is set up by the labelling scheme and might for instance correspond to 20% of the total product sales. As a consequence, in this case the supplier would be required to redeem certificates corresponding to 22% of his product supply volume in 2004. Neither the requirement to comply with the obligation target (2%) nor the additional certificate requirement (20%) are allowed to be matched by the buy-out option. Additionality is created as by the redemption of additional certificates (supplementary to the quota obligation) the obligation target set-up by the mandatory quota system is implicitly increased (as the respective certificates will be removed from the market and can't be used by another company to match its obligation).

Due to the high price level for certificates the creation of additionality by means of additional redemption of green certificates indicates noticeable extra costs for green power suppliers in setting up a labelled green product. This again leads to an extremely high price level for the respective power products and thus to a substantial market barrier for labelled eco-power.

As a consequence it might be rational also in this specific or similar cases to allow green power labels to tolerate the support of measures in the field of RES-H/C in order to create the minimum additionality required to fulfil the additionality criteria applied by the label. Broadening the narrow scope of a green power label seems to be reasonable – provided it proves to be understandable for consumers - at least for a transition period as long as the basic framework conditions have improved.

3 Experiences from the inclusion of RES-H measures in the Green Power Accreditation Program of Australia

The Australian Green Power Accreditation Program is currently the only known green electricity label which allows green power suppliers to invest in RES-H measures in order to fulfil the labelling criteria. The following section will describe the labelling scheme and especially how the inclusion of RES.H measures has been operationalised.

3.1 Scope of the system

The Australian Green Power Accreditation Program[21] is a green power labelling scheme, that, to a certain extent, includes renewable heat production in its scope. The following description will show that the integration is based on an instrument primarily applied in the RES-E sector.

In 1997, the Sustainable Energy Development Authority (SEDA) in New South Wales set up the Green Power Accreditation Program to accredit green electricity products. The program was developed in consultation with several stakeholders such as the electricity industry and various NGOs (including the Australian Consumers Association, Greenpeace, the Australian Conservation Foundation and the WWF). The program has recently been extended to accredit green products all over Australia nationwide.

The Accreditation Program certifies products not companies. Those products that meet the labelling criteria earn the right to use the Green Power Product logo. Where suppliers offer green electricity products in which only a certain component consists of eligible green power (e.g. in form of a block tariff where customers only want to purchase a fixed volume of accredited green electricity) the Accreditation Program allows limited accreditation of a product component. At the beginning of 2005 the Accreditation Program labelled 18 products corresponding to a labelled volume of approx. 125 GWh.

To be eligible to contribute to a product labelled by the Green Power Accreditation Program renewable installations must meet specific eligibility requirements. These include that the installation must be primarily based on a renewable energy resource. Eligible energy sources and technologies within the Accreditation Program comprise solar photovoltaic and solar thermal electric systems, wind energy, hydropower plants, biomass-fuelled power stations, geothermal, wave and tidal power stations. All eligible energy sources and technologies are subject to detailed technology specific criteria that need to be met (see the Accreditation Document of the National Green Power Accreditation Program).

[21] www.greenpower.com.au

3.2 Integration of renewable heat measures

3.2.1 Political framework

The integration of specific measures in the field of renewable heat is based on a system of tradable certificates. The respective TREC system has been introduced to facilitate the Federal Mandatory Renewable Energy Target (MRET), an obligation scheme for electricity generation from new renewable energy sources which was introduced through the Renewable Energy (Electricity) Act 2000 with the beginning of 1 April 2001. The MRET requires a stepwise increase of additional RES-E generation as to ensure a total renewable electricity production of 9,5 TWh by 2010. To contribute to this target RES-E installations must be qualified as new. This applies to all devices which have started operation after 1 January 1997.

To comply with the obligation each obliged supplier has to purchase and surrender a certain amount of so called Renewable Energy Certificates (1 REC represents 1 MWh of eligible RES-E generation) to the Office of Renewable Energy Regulator. The number of certificates a supplier is required to surrender is corresponding to the annual volume of its electricity sales. Where suppliers do not comply with the obligation a fixed penalty will be applied.

Integration of RES-H is already implemented in the legal framework. The Renewable Energy (Electricity) Act 2000 allows owners of eligible solar thermal appliances for warm water production (solar water heaters) and heat pump water heaters which were installed on or after 1 April 2001 to create RECs after the device is installed. RECs may be either issued and traded by the owner of the system, or assigned to a registered agent who then owns the certificates.

For both technologies one REC can be created for each MWh of electricity substituted by the installation of the new system. As the MRET is targeted at reducing greenhouse emissions from the use of electricity the replacement of fossil fuelled water heaters (e.g. gas or oil fuelled boilers) is not eligible to receive RECs.

To be eligible to receive RECs the solar water heater or heat pump must replace the use of electricity to heat water that is the case when the installation

- is the first installation of a hot water system in an existing building,
- replaces an existing electric hot water system that has been installed at the same location for over 1 year,
- replaces an electric-boosted solar water heater or heat pump that has been installed at the same location for over 1 year, or
- is installed in a new building.

The number of RECs that may be created for a particular installation has to be determined in accordance with the Renewable Energy (Electricity) Regulations 2001 (Regu-

lations). Certificates must be created within 12 months of the solar water heater or heat pump installation date.

To simplify the inclusion of solar water heaters and heat pumps under the MRET, a standard number of RECs that can be claimed for eligible systems has been pre-calculated by the Office of the Renewable Energy Regulator[22] and is published through the Regulations. The number of RECs for solar water heaters depends on the specific system installed and its location. For instance eligible solar water heating systems up to a capacity of 700 litres receive between 10 and 50 RECs.

3.2.2 Principles of the Green Power Accreditation Program

The Green Power Accreditation Program is sharing the aim pursued by the MRET to install new renewable energy generators across Australia. In order to be additional to the MRET (which means that products labelled under the Accreditation Programme should lead to an extension of RES-E generation beyond the development stimulated by the MRET) accredited products shall ensure that customer contributions for green power will result in additional investments in "new" renewable energy generation and an increase in associated greenhouse gas reduction above targets set by MRET.

In this regard additionality is ensured by the following requirements:

1. Green suppliers must source a minimum level of 80% of the total labelled electricity volume from "new" eligible RES-E sources. "Old" plants can contribute the remaining 20%. An installation is considered "new" when it was commissioned after 1 January 1997 or after the launch of the green power product which seeks accreditation under the Accreditation Program.
2. Green suppliers are not allowed to source a labelled product with RES-E that has been used to meet the MRET obligation. To facilitate this requirement the respective suppliers are obliged to redeem within each labelling period RECs (which have been issued in the scope of the MRET) for each MWh sold as part of the labelled product and classified as "new". Certificates that have been redeemed within the labelling process must not be used anymore to prove compliance with the MRET. Suppliers are not obliged to redeem RECs for RES-E classified as "old" in the scope of the labelled product.

Summing up solar thermal appliances and heat pumps – both representing RES-H production – are to a certain extent eligible to receive RECs used within the MRET scheme. As RECs must be redeemed as proof of additionality within the Green Power Accreditation Programme, additionality of a labelled green power product can theoretically be totally created by measures in the field of RES-H.

[22] www.orer.gov.au

4 Key issues for RES-H/C integration

4.1 General scope of RES-H/C integration

The key factors for a green power label to gain considerable outreach within the electricity market are credibility and good reputation. Both factors are strongly linked to the organisations (e.g. environmental NGOs) which stand behind the label. For the success of a label it is fairly beneficial to be operated or at least to be endorsed by organisations that already have a good standing in the public. Another important aspect in this regard is how a label is assessed by relevant market players (such as RES-E producers and suppliers) and the way it is communicated in the public (e.g. by media). Only those labels with a high reputation on the one hand and a positive evaluation on the other hand will be attractive enough for suppliers to bear the efforts (especially costs) which are associated to the labelling process.

Finally it is crucial that a labelling organisation develops a clear communication around the core of the label that are the labelling criteria. The majority of green power customers won't be willing and capable to analyse in detail the criteria which are applied by a green power label. Therefore consumers need to be addressed by simple messages that describe the main aim of the label (e.g. to increase RES-E generation in environmentally friendly power plants). From the consumers' perspective it is rather the message which has been built around the label that attracts customers to switch to a labelled product than a detailed assessment of the criteria.

4.1.1 Communicative aspects

As outlined in section 2 the integration of RES-H/C measures into the scope of a quality seal which is mainly built upon green electricity sounds a bit peculiar at first glance. However, as shown in the same chapter, there might be exceptional market conditions that require green power labelling bodies to think about pursuing such a new concept. Apart from several methodical aspects which will be discussed in the following sections the communicative aspect associated to such an approach needs to be thoroughly addressed. This is primarily about the question whether consumers will accept products that are built upon this concept or that at least allow partly for this possibility. In other words it needs to be asked whether consumers will understand and accept that a labelled green power product is supporting measures in the field of RES-H/C generation (although the consumer is supplied by electricity). Or whether even an opposite reaction will be triggered, namely that consumers will become that confused that they will refrain from buying such products. If the latter would be the case the integrative approach would even be counterproductive as less consumers would switch to labelled electricity products.

The reaction of consumers to such a new concept might differ between different countries. Whereas in some countries consumers might be happy to support e.g. the installation of new solar collectors through their electricity supply, in other countries the ma-

jority of consumers might be quite confused. Therefore it is a key prerequisite for labelling bodies which consider to implement such an approach to investigate to which extent the consumer groups which are mainly addressed by green power suppliers in the respective country will follow, understand and accept the concept to fund the installation of RES-H/C devices through their electricity supply.

In any case involved labelling bodies should thoroughly develop straightforward and clear 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.

4.1.2 Methodical aspects

The methodical aspects which are connected to the integration of RES-H/C measures are manifold. The integrative approach requires a practical methodology that is manageable in particular by the auditors who need to assess whether a product complies with the criteria applied by a green power label. The methodology applied should on the one hand ensure a high degree of credibility by avoiding as many loopholes[23] as possible. On the other hand the auditing efforts (and by that the auditing costs) should be limited in terms of required time resources.

The criteria linked to the integrative approach can be distinguished in eligibility and additionality conditions:

1. Eligibility: Under this aspect it needs to be determined which renewable energy sources and RES heating and cooling technologies should generally be supportable through a green power label (see section 4.2).
2. Additionality: Here criteria need to be developed how additionality can be generated under the existing policy framework targeting renewable heating and cooling (see section 4.3). In this context it might be one of the key elements to agree on a methodology how to weigh additionality created through RES-H/C against that of RES-E measures.

4.2 Eligibility

4.2.1 The concept of eligibility

For a green power label it is necessary to define as a first step which renewable energy sources and technologies are eligible, which ecological standards renewable power plants have to comply with and which sources and technologies are entirely excluded in the scope of the label. For instance the Eugene Standard has developed specific eligibility standards for hydro power plants, biomass sources and technologies converting bio-

[23] In this respect labelling bodies should primarily be striving to avoid that RES-H/C installations are funded beyond their economical viability and that double counting of the "greenness" related to RES-H/C generation can be excluded.

mass in electricity whereas no specific requirements are applied to renewable sources such as wind (on- and offshore), tidal, wave, geothermal and solar electric.

Green power labels which allow green power suppliers to fund measures in the field of RES-H/C (in order to create additionality, see section 4.3.2) need to set up similar criteria for defining which RES-H/C energy sources and technologies are eligible to be supported via a labelled product. The most relevant energy sources in this field encompass all different forms of biomass, solar thermal and geothermal which are utilised to produce heat or cold:

- Biomass technologies include centralised heat and cold production (e.g. wood fuelled CHP plants) as well as decentralised appliances such as domestic wood pellet burners.
- Solar thermal appliances comprise individual installations for domestic warm water supply and support of domestic heating systems as well as large centralised systems using seasonal storages[24]
- Geothermal heat producers include medium and low temperature applications as well as very low temperature geothermal utilisation via heat pumps.

All relevant energy sources and conversion technologies must be analysed in view of their environmental impact and specific minimum standards need to be defined that green power labels should take into account when defining eligibility criteria.

In addition it should be noted that labelling bodies are advised to regularly adjust their eligibility criteria in view of experiences gained from the utilisation of the respective RES-H/C sources over the time and the application of the eligibility standard in the practical labelling work.

4.2.2 Basic eligibility rule

As a baseline only those energy sources and conversion technologies should be eligible that

a) are defined as being renewable by European and national legislation, and

b) fully comply with all legal requirements that they have or will in the short term have to meet within the national, European and international legal framework.

Special attention should be drawn to application areas where RES-H/C devices replace existing renewable heat or cold production. For instance this could be the case where a household is deciding to disconnect from a biomass based district heating system in favour of a electrical heat pump which is operated by system power (and not RES-E). In this case the installation of a specific RES-H/C device might turn out to be ecologically unfavourable as the generation of system power (e.g. in fossil fuelled power plants) for

[24] In addition some initiatives have been carried out in the field of Solar Cooling (see for example the International Energy Agency Solar Heating and Cooling Programme) but up to now they have not gained relevant market dimensions.

operating the heat pump results in higher emissions than the heat generation in the district heating system. In order to avoid that a green power label supports such adverse effects labelling bodies should consider to base eligibility only on appliances where fossil fuelled heat and cold generation or electrical heaters are substituted by renewable heating devices.

An alternative could be to link eligibility to existing product testing campaigns. In some countries environmental or/and consumer groups have launched campaigns to promote sustainable products. In Germany for instance Öko-Institut has developed the so called EcoTopTen campaign[25] that aims at promoting environmental sound and affordable products and sustainable consumption. EcoTopTen focuses on ten product fields of particular relevance in terms of costs and environmental impact. The product fields encompass building/housing, mobility, eating/drinking, refrigerating/cooking/dishwashing, clothing, laundry washing/drying, information/communication, TV/Media, electricity, investment. Based on a product development method (PROSA) various products have been analysed in each of the ten product fields. For instance the performance of different wood-pellet heating systems have been evaluated in the product field building/housing. This is followed by market surveys, and a ranking of products using EcoTopTen criteria. Products which fulfil the ecological and economical criteria are qualified as EcoTopTen products and are promoted through an information campaign. A comparable approach is pursued by Topten, a consumer-oriented online search tool, that presents the best appliances in various categories of products.[26] In the field of RES-H technologies for instance in Switzerland Topten promotes wood pellet burner, pellet suppliers, solar thermal appliances and heat pumps.

Although this sort of product campaigns could provide valuable guidance in defining eligibility criteria for the approach discussed throughout this report it might be too restrictive to solely base eligibility on such campaigns. In most cases such campaigns do not cover all RES-H options available on the market. Furthermore product testing campaigns generally promote and recommend only the top level products in a product category. However, from the global point of view, RES-H appliances which fail to comply with all criteria of such a campaign might still be ecological favourable compared to a non RES solution.

4.2.3 Biomass

Surveys in different EU Member States have shown that consumers perceive energy gained from converting biomass not necessarily as green energy. In addition consumers' awareness of biomass is generally rather low whereas wind and solar power are considered to be the main renewable energy sources. Furthermore and different to wind and

[25] www.ecotopten.de

[26] The Topten campaign (www.topten.info) was launched in 2000 in Switzerland. Currently Topten websites exist in France, Austria and the Netherlands. For the future it is expected that many other countries will follow a similar approach due to the project Euro-Topten which is sponsored by the Intelligent Energy Europe Programme.

solar power consumers perceive the heterogeneous sources of biomass in remarkably different ways. While some fuels may be considered as clean (wood pellets, forest residues) others may be seen as dirty fuels (e.g. urban waste) (Rohracher 2004). Under this circumstances it is rather important to define eligibility criteria for biomass quite thoroughly. As these eligibility criteria are meant to be applied in the scope of a voluntary market which is determined by voluntary demand for the labelled products the criteria have to reflect consumers perceptions and expectations at least to a certain extent.

Several green power labels have already elaborated detailed eligibility criteria for different biomass sources and biomass power plants. Only those types of biomass and technologies that comply with these criteria are permitted to source green electricity products being certified by the respective labels. Biomass used for the production of RES-H/C in principle stems from the same various biomass sources as used for RES-E generation. For that reason eligibility criteria established for biomass in the RES-E sector can without difficulty be transferred to the RES-H/C sector. In other words it might not be reasonable to apply different eligibility criteria for biomass in the two sectors.

4.2.3.1 Eligible biomass sources

The Eugene Standard which can be regarded as European reference standard can be taken as a starting point for biomass eligibility criteria. The Eugene Standard currently applies the following list of eligible biomass sources (applied for the RES-E sector) that could easily be transferred to the RES-H/C sector:

- dedicated energy crops, where crops are grown for energy; dedicated energy crops used in new generating stations[27] shall come from FSC (Forest Stewardship Council) certified sources; for existing generating stations using wood (from dedicated energy crops and forestry and arboricultural material), the plant will have to draw an action plan to ensure that the wood used will be purchased from FSC certified sources within a time of 4 years.
- residual straw from agriculture,
- forestry and arboricultural material (wood from existing plantations, natural and semi-natural woodland and urban forestry),
- woody waste products of the wood industry (e.g. sawdust),
- biomass residues from landscape and park management,
- urban waste wood collected separately (unpainted, untreated, or unpressurised wood, not containing plastics, or metals),
- vegetable processing biomass residues from food industry,
- biogas,

[27] According to the Eugene Standard a generation station is considered "new" if it has entered operation after January 1, 2001.

- sewage gas.

For biofuel such as straw, and their equivalent, which are cultivated on agriculture land, cultivation should be carried out with the goal to reduce water and pesticides use, and taking into consideration national best practices.

RES-H/C from all forms of thermochemical processing of unseparated urban solid wastes and sewage sludge as well as landfill gas is not being considered eligible under the Eugene Standard. RES-H/C deriving from biomass co-firing of fossil fuels should be allowed only if the biomass energy input is separately accounted for. Only the amount of RES-H/C generated from the biomass energy input should be eligible in the scope of a label.

In the case of biogas the scope of eligibility could also cover biogas that is generated elsewhere and fed into the gas grid than it is used for heat generation. Here a prerequisite would be that proof is furnished of the origin of this gas. Furthermore calculations need to prove that the energy content of the gas quantity used is equal to the energy content of the biogas quantity fed into the grid.[28]

In the context of work package 2 of the CLEAN-E project more detailed biomass eligibility criteria (than those currently applied by Eugene) have been developed based on the thorough assessment of the environmental performance of different biomass sources throughout the full life-cycle (Oehme 2006). Different kinds of criteria have been assessed as to whether they can be operationalised in the context of a green power label. The latter is a key criteria from the viewpoint of a labelling body as all criteria applied in the scope of a label need to be auditable and verifiable within reasonable costs.

Taking into account that the trade of biomass fuels (including cross border trade) will likely increase in the near future a proper tracking system for these fuel type will become a key issue in order to maintain credibility. In many cases biomass fuels such as wood pellets are produced far away from the locations where they are used. For instance in Sweden most of the FSC certified forest are located in the north of the country whereas most CHP plants using wood fuels are operated in the south. Even if it is ensured that pellets used in the scope of a green power label have been produced from FCS certified wood a mechanism is lacking which tracks the fuel quality from the facility where it was manufactured to the user of the respective fuel. In other words nowadays it is nearly impossible to prove that wood pellets really hold the "quality" that they are claimed for. As currently no comprehensive tracking mechanism exists joined efforts should be made by all relevant stakeholders to set up such a scheme at short notice.

[28] A similar approach is pursued by the German Renewable Energy Act for the use of biogas for electricity generation.

4.2.3.2 Eligible biomass RES-H/C conversion technologies

Like burning fossil fuels biomass emits pollutants. Such pollutants (e.g. unsaturated hydrocarbons) can to a certain extent be eliminated by emission control techniques which is already standard in many large biomass CHP, heat or condensing power plants. However in particular home heating systems often lack such pollutant filters. For that reason the following eligibility criteria concerning biomass heating and cooling systems should be considered:

- It is important that biomass heat is generated by installations with a high efficiency rate. Biomass heat preferably should be produced in high efficiency CHP plants (simultaneous production of electricity and heat). However this requires sufficient heat demand around the power plant. Furthermore a distribution grid must be available or needs to be installed. In order to avoid that biomass is underutilised a minimum system efficiency should also apply to biomass co-firing in fossil fuelled heat plants.
- Concerning emissions standards all biomass heat production installations (irrespective whether small or large installations are concerned) should at least comply with the legal requirements set forth by European and national legislation. However green power labelling bodies might consider to apply lower emission limits where deemed appropriate.
- In the field of the various available domestic biomass fired heating technologies only those systems should be eligible that dispose of an automatic loading of the burning unit. Open domestic fireplaces should be excluded due to low efficiency and normally high emissions of various air pollutants.

4.2.4 Solar thermal

Solar thermal appliances should comply with all legal performance and operation requirements. In addition to this green power labelling bodies might consider to base eligibility on the environmental performance of the different solar thermal systems. The assessment of the environmental performance should be based on a life cycle impact assessment and LCA weighing methodologies such as Eco-Indicator '99. Furthermore eligibility criteria for solar thermal appliances should be based on existing environmental labelling schemes in countries where such schemes already exist.[29]

[29] For instance in Germany the quality seal "Blauer Engel" is awarded to solar thermal appliances which meet specific environmental criteria (Solar Collectors - Basic Criteria for Award of the Environmental Label, RAL-UZ 73). In order to comply the annual collector output (annual energy supply) related to a solar cover portion of 40% must be at least 525 kWh/m². In addition no halogenated hydrocarbons may be used as heat transfer medium and the materials used for the insulation of the collectors must not be manufactured with the help of such substances.

4.2.5 Geothermal

In the field of geothermal heat production it is assumed that in particular the funding of heat pumps will be of interest when integrating RES-H/C measures into the scope of a green power label.

Heat pumps transfer environmental heat from very low temperatures to temperature levels that are applicable for heating purposes. Heat pumps can also be applied for cooling purposes. Common heat pumps systems can be distinguished in Ground Coupled Heat Pump System (often referred to as closed loop heat pumps), Groundwater Heat Pump systems (often referred to as open loop heat pumps) and Surface Water Heat Pump Systems (often referred to as lake or pond loop heat pumps) (Rafferty 1997). In terms of the conversion technology two main categories of heat pump systems can be distinguished. The first is the vapour compressions cycle heat pump, mechanically driven by an electrical or an internal combustion engine. The second technology are absorption cycle heat pumps which are driven by heat at a high temperature (steam, direct combustion, or hot exhaust gases).

One of the main indicators for assessing heat pump systems (disregarding the system category or the conversion technology) is the so called "Coefficient of Performance" (COP) that reflects the ratio between the total heat output of the system and the work input. An even better indicator is the so called "Primary Energy Ratio" (PER) which stands for the ratio of the total heat output to the primary energy input of a system. The PER provides a clear picture of a system irrespective of the energy source (e.g. electricity, gas, oil…) used to operate it.

It is obvious that from the environmental point of view heat pump systems only start to reduce overall greenhouse gas emissions when the Primary Energy Ratio is larger than 1. Otherwise the system would consume more primary energy (thus causing more greenhouse gas emissions) than would have been consumed by an efficient conventional heating system. For that reason it is proposed that heat pump systems should only be recognised in the scope of a green power label when the amount of heat transferred to the heating or warm water system exceeds the primary energy input necessary for running the system by a certain factor.

The emissions of the refrigerants used in heat pumps must also be taken into account in an overall environmental assessment as they may have a negative impact on the climate. The German environmental label "Blauer Engel"[30] uses an integrative methodology when assessing the impact of electrical heat pumps. The Total Equivalent Warming Impact (TEWI) is a system parameter which encompasses the indirect influence of the climate change potentials arising from the driving energy as well as the direct influence of the refrigerant used. Here the Seasonal Performance Factor (SPF) which describes the ratio of heating output to the electric power input as well as the Global Warming Potential (GWP) and the filling quantity of the refrigerant are used as system specific

[30] www.blauer-engel.de

quantities when determining the TEWI value. Applicants to the "Blauer Engel" need to demonstrate that the TEWI value of a heat pump system does not exceed the limits specified in the labelling criteria.

An alternative would be to base eligibility on a maximum Primary Energy Ratio and in addition to this to apply maximum levels for the GWP of the refrigerants used for a heat pump system.

Furthermore it is recommended to only allow closed loop systems to become eligible. Open loop systems in which (instead of using an antifreeze solution in a closed pipe system) the heat pump is connected to a surface or underground water source (e.g. a pond, lake, well or aquifer) are often prohibited because of environmental concerns. This is mainly due to the risk of contaminations as surface water which might be contaminated with pesticides, fertilizers or other contaminants might get into underlying aquifers or groundwater reservoirs. If open systems shall be eligible they should underlie rather stringent criteria to avoid such effects.

4.3 Additionality

4.3.1 Why striving for additionality?

Additionality is the key issue in the voluntary green energy market. What stands behind the concept of additionality?

At first the principal additionality concept shall be described for conventional green power products:

Currently many green products or tariffs that are marketed as being “green” fail to represent real improvements for the environment (environmental additionality). Only those green products can claim environmental additionality which ensure that customer contributions for a product result in additional environmental measures (e.g. the installation of new RES-E power plants) above those already stimulated by existing framework conditions such as existing legislation. For instance if additionality shall be created by investments in new RES-E installations only those investments can claim additionality that go to plants that are over and above the baseline which is defined by existing RES-E power plants and the effects of public support schemes (such as guaranteed feed-in tariffs or obligations placed on energy suppliers).

If the introduction of green energy schemes only assists an energy supplier in meeting its existing requirements (such as the obligation to purchase a certain amount of RES-E under a quota system or the obligation to take up and compensate for a certain volume of RES-E under a feed-in tariff scheme), then there is no additionality given. Where green products are solely fed with a) electricity from existing RES-E that b) a green supplier is legally obliged to hold in its portfolio anyway, the user of such an offering is only assisting the supplier in meeting its existing requirement without bringing additional benefits to the environment. However this would be in contradiction to the consumers' expectation and perception of the green power market. Consumers of green

products who are willing to pay a premium to be supplied by green electricity expect and perceive to contribute to an expansion of environmental benefits (such as GHG emissions reduction) above legal requirements.

Additionality in a narrow sense (limited to measures in the electricity sector) can be achieved by either producing greater quantities of green power - which is in particular electricity produced from renewable energy sources - than could be expected under current conditions (which are determined by existing sources and the effects of public support). As an alternative additionality can be created by decreasing the environmental impact of existing green power plants beyond mere compliance with existing regulation (e.g. products based on a greenhydro approach, see below).

For instance the additionality concept as it is applied under the current Eugene Standard allows the following alternatives to create additionality:

For supply offerings (see section 2) a 10%/30% (silver/gold level) share of the total product must be from "new" renewable plants. For fund offerings (see section 2), the additionality requirement applies to the minimum contribution per kWh sold, that is used for funding of "new" renewable plants. This contribution is set at 0,5/1,5 ct/kWh (silver/gold level). In both cases a power plant is considered "new" when it has been put into operation on or after January 1 of the year in which liberalisation of the wholesale electricity market in the respective country came into force.

For green power offerings based on green hydropower, additionality can be created by significantly reducing the ecological impact of the plants that contribute to a product.[31] Here a minimum contribution per kWh sold must be invested in measures to reduce the facility's environmental impact (so called green hydro eco-investments). This contribution is set at 0,15/0,5 ct/kWh (silver/gold level).

In all cases the additionality requirement must be met fully over and above governmental renewable legislation, such as renewables' obligations, feed-in tariff schemes and – in the case of hydropower – (re-) licensing requirements for power plants.[32]

4.3.2 Creating additionality by funding RES-H/C measures

Section 2 describes market conditions in that it might be rather difficult for green power suppliers to create additionality solely by measures in the RES-E sector. In this cases and provided the eligibility conditions outlined in section 4.1 are fully met it might be

[31] Environmental criteria for hydropower plants is provided by the CLEAN-E WP 2.1 report (Markard/Vollenweider 2005).

[32] Eugene allows renewables' obligations for electricity suppliers to be included in green electricity products up to the percentage of the obligation, if the obligation has to be met by purchasing a certain share of renewable power. For instance, if the obligation is set at 5% of the supplied electricity, only 5% of the green electricity product sales can be satisfied with renewable electricity purchased to meet the governmental obligation. The environmental additionality requirements may not be fulfilled through the obligation part of the product.

reasonable for green power labels to allow power suppliers to also create additionality by investments on other fields outside the electricity sector.

In order to determine eligible RES-H/C measures for the creation of additionality particularly the national legal framework for the support of RES-H/C generation must be taken into account. For that reason the following sections outline how additionality could be created under specific RES-H/C support policies (see section 1.3.2).

4.3.2.1 Creation of additionality under a "non RES-H/C policy framework"

A "non RES-H/C policy framework" is given where no specific support instruments address the installation of new RES-H/C devices. Under such conditions each new RES-H/C installation which would be funded by a green power supplier in the scope of a green product would be additional. However in order to avoid windfall profits operators of RES-H/C installations should poof that additional funding is needed to run such a plant under current market conditions.

4.3.2.2 Creation of additionality under an installation obligation for RES-H/C

An installation obligation as applied in Spain compels building owners to install a renewable heating device that guarantees that a minimal share (e.g. 10 %) of the annual heat demand of the building is supplied by renewable energies (see section 1.3.2.1). The obligation can be either restricted to new buildings (which means the installation of a completely new heating system) or could also be applied to the building stock. In the latter case the obligation would for example be triggered by the replacement of an existing boiler. The new heating system would then have to be designed as to integrate a RES-H/C device of adequate size in order to fulfil the obligation.

Under an installation obligation of RES-H/C devices additionality can only be created by those plants, which are new and that are not accounted for in the context of the obligation. In other words a green power supplier can only generate additionality by supporting new RES-H/C devices which are not claimed by any party as proof of compliance with the installation obligation. RES-H/C devices that were recognised in the scope of the obligation scheme would not be eligible for the creation of additionality. If for example a building owner installs a new solar thermal collector in order to fulfil the installation obligation, the financial support of such a plant through a green power product would not lead to additionality as the installation of the plant was primarily initiated by the obligation scheme rather than by the green power supplier.

The handling of RES-H/C devices which exceed the minimum requirements applied by an installation obligation is somewhat more complex. This is for example the case where a building owner installs such a large RES-H/C device that he produces more renewable heat than required under the obligation. A typical example for this case would be given by the installation of a wood pellet burner that covers the entire heating and warm water demand of a household instead of only covering the minimum share set forth by the installation obligation. Here the support of the RES-H/C fraction which

goes beyond the minimum share would be absolutely qualified to create additionality. However this would require a thorough evidence tool that determines the share of a RES-H/C device (in terms of installed capacity or total heat output) which would be necessary to comply with the installation obligation and the fraction that would be eligible to contribute additionality once a green power suppliers decides to financially support this fraction.

4.3.2.3 Creation of additionality under an Efficiency Obligation (White Certificate System)

A precondition for this approach is that the efficiency obligation in a country allows RES-H/C measures to contribute to the fulfilment of the quota - at least in the form of some selected measures. Under the Italian energy savings obligation the promotion of solar thermal systems for water heating as well as biomass cogeneration of domestic heating are generally qualified to be accounted for (see section 1.3.2.2).

Where an efficiency obligation is operated on the basis of a certificate scheme (White Certificates) additionality can be derived by the redemption of certificates on top of what is mandated under the obligation scheme. In other words additionality would occur where an obliged electricity supplier would redeem more certificates than he is mandated to do under the efficiency obligation and does not gain any additional profit for that. The mechanism is rather similar to that being described in section 2 where it has been outlined how additionality could be created under a quota system for RES-E.

However, in any case it will be rather difficult to ascertain that additionality is really created by measures in the field of RES-H/C (which means by additional programs in the RES-H/C sector). First, all existing schemes of white certificates have not been designed as to allow to determine from the information content provided by the certificate that a certificate has been issued for a RES-H/C measure. Therefore it is quite difficult for the normal system participant to unambiguously track back a certificate to the measure it represents. Second, even if it was possible to distinguish between certificates representing RES-H/C or other efficiency measures redemption of additional certificates that stand for RES-H/C investments would not automatically lead to additionality in the RES-H/C sector. This is due to the following mechanism: Taking away more certificates from the market than required under the efficiency obligation (in order to create additionality) means that more eligible measures need to be carried out in order to allow all obliged parties to fulfil their target. However, it will be left to the market (and thus will depend on the marginal costs of the different eligible measures) as to whether these additional measures will occur in the RES-H/C or any other efficiency field. For that reason it is not ensured that the redemption of an additional RES-H/C certificate will lead to additional RES-H/C measures.

4.3.2.4 Creation of additionality under a bonus model (as discussed in Germany)

Under a bonus model operators of eligible RES-H/C devices are entitled to receive a fixed bonus payment per kWh of heat produced (see section 1.3.2.3). In addition an

obliged party (in the German discussion the obliged party would encompass all companies which produce or import fossil fuels) is compelled to purchase the environmental benefit (e.g. in form of certificates) associated to the RES-H/C generation at the fixed price and for a fixed period of time (e.g. 20 years).

If under a bonus system a green power supplier would fund RES-H/C devices that simultaneously receive a bonus payment through the bonus system this would lead to double counting of the environmental benefit of the RES-H/C generation. In this specific case the environmental benefit would on the one hand in the scope of the bonus scheme be transferred (e.g. by means of certificates) to the party which is obliged to take up and pay for the environmental attributes associated to the supported RES-H/C generation. It can be anticipated that the obliged companies will pass on the associated costs to their customers by a surcharge on the price for fossil fuels. Accordingly it is finally the end consumer who bears the costs for supporting the expansion of RES-H/C generation (through the bonus system) and who can be regarded as the "holder" of the environmental attributes generated through the system. On the other hand the green power supplier who is funding the respective RES-H/C device in this specific case would also claim the environmental attributes associated to the particular RES-H/C generation. Finally there are two parties that claim the environmental benefit of on and the same kWh RES-H/C which represents the typical case of double counting.

A similar argumentation applies to RES-H/C installations that principally would be entitled to be funded under the bonus scheme but decide to do without the bonus in favour of being supported under a green power scheme. For instance the operator of a wood pellet boiler could abstain from applying for a bonus payment as the financial support granted through a green power scheme provides similar or even better economic conditions than he can receive through the public support scheme. Also here the existence of additionality has to be questioned as it can be considered that in most cases RES-H/C devices will be concerned which would have been set up anyway (due to the bonus system). In this case the support of a RES-H/C device through a green power scheme would primarily lead to a shift of costs from the general public to the specific customers of green power products that pursue such an approach. Measures in the field of RES-H/C which would generally be compensated by the public through the bonus systems would then be solely paid by the group of green power customers.

To sum up under a bonus model additionality would only occur where a green power supplier supports new RES-H/C devices that neither are funded under nor are generally eligible in the scope of the bonus scheme.

4.3.2.5 Weighing RES-H/C against RES-E

As outlined in Willstedt/Bürger (2006) and section 4.2.1 of this report several national green power labels as well as the European Eugene Standard have set up minimum additionality levels which green power products need to meet in order to qualify for receiving the respective quality seal. Many of these labels require a minimum share of

electricity generation that must come from "new" plants.[33] For instance for being entitled to receive the German ok-power label at least one third of the total sales volume of a green power product must be fed by new plant generation.[34]

Labels which will include RES-H/C measures as potential contributors to additionality have to decide the minimum level which such measures need to fulfil in order to comply with the additionality criteria. In practical terms that means that a green supplier would be required to invest the premium payments of his customers in such a way that – depending on his total sales volume in one settlement period of the respective label – it is ensured that the production of a minimum amount of RES-H/C is initiated. Only those products which match this requirement would be eligible to receive the label.

Green power labels that allow several options to create additionality have to decide how to weigh the different measures. For instance a labelling body might decide that new RES-E capacity as well as additional RES-H/C capacity could be eligible to contribute to additionality. That would leave it to the labelled suppliers whether they opt for investments in the RES-E or the RES-H/C sector. In this case it must be decided how RES-H/C measures could be weighed against RES-E generation in terms of environmental value.

A simple methodology would be to introduce a weighing factor between these two options. This weighing factor should reflect the "environmental value" of the respective energy volumes produced. In a first approximation the weighing factor could solely reflect the environmental benefit of the different additionality options in terms of GHG emissions reduction. In this sense it could be assumed that the production of one kilowatt-hour of renewable electricity replaces one kilowatt-hour of conventional electricity (system power) whereas renewable heat or cold generation usually substitutes comparable fossil fuelled production or electrical heat/cold generation. It could further be assumed that the substitution in the electricity sector might concern the average European production mix. Underlying data for the average efficiency of European electricity generation as well as average efficiency values for fossil heat or cold production the weighing factor could be determined as to reflect these ratio.

An alternative option would be to assess for each individual case where RES-H/C measures will be supported which form of conventional heat or cold production will be replaced by such a measure.

4.3.2.6 Other restrictions

In order to increase public awareness of renewable heating and cooling options labelling bodies might consider to restrict investments in this specific field to public buildings. The rational behind this could be that – provided it is ensured that the respective instal-

[33] In this context it is also important to define which plants (depending on the year a plant was put into operation) are considered "new" ("new plant" definition).

[34] Here a plant is considered new when is has started operation not later than six years before the respective settlement period of the label.

lations (which in the case of biomass or geothermal normally is "invisible" to the public as the major device components are located in the cellar of a building) are actively promoted and communicated to the public (e.g. by wall charts) – much more people will be "confronted" with these technologies than with comparable appliances in the domestic sector.

5 Guidelines

This section will provide a brief guideline which is aimed at assisting national green power labelling bodies who wish to integrate to a certain extent RES-H/C measures in the scope of their green power label. The section describes the crucial steps and decisions which a labelling organisation should take before the new approach is published and actively marketed to suppliers, the core "customers" of a label.

1. Develop appropriate communication to explain the new label concept

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 which – at least to a certain degree – aligns to what consumers expect from the green power market will be 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. As communication is a key element for the introduction of a new concept such as the integration of RES-H/C measures labelling bodies are urged to thoroughly develop straightforward, clear and simple messages that will be used to communicate the new concept.

2. Test the main messages used for communication

Before the new concept will be introduced on the market labelling bodies should test the messages which have been chosen to explain and promote the approach. For that purpose tests should be carried out with relevant consumer groups (e.g. households, business customers) and suppliers. Such tests will show whether those consumers which are mainly addressed by the labelled products will understand and accept the concept to fund the installation of RES-H/C devices through their green electricity supply. In addition they will provide first indications whether there is a market for such an approach, or in other words, whether suppliers are willing to apply the approach when setting up new of revising existing green power product portfolios.

3. Consider restrictions for eligible RES-H/C measures

Labelling Bodies should define specific fields in which the installation of RES-H/C devices shall be eligible in the scope of the label. 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 go to public buildings.

4. Set up eligibility criteria

Green power labels which introduce the concept of RES-H/C integration need to set up criteria for defining which RES-H/C energy sources and technologies are eligible to be supported via a labelled product. Again, as green power labelling is aiming at the voluntary market such eligibility criteria should (at least to a certain extent) reflect what consumers perceive to be green in this specific field. If for instance consumers perceive

some forms of biomass as not being sustainable, labels will get into troubles – irrespective the scientific view on this – if they allowed such substances to be eligible.

Eligibility criteria need to be established for all major technologies in the field of RES-H/C. For biomass similar criteria could be applied as already used in the context of labelling green electricity sources. 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.

Special attention should be drawn to application areas where RES-H/C devices replace existing renewable heat or cold production. In order to avoid that a green power label supports adverse effects leading to a higher environmental impact than before labelling bodies should consider to base eligibility only on appliances where fossil fuelled heat and cold generation or electrical heaters are substituted by renewable heating or cooling devices.

5. Develop additionality criteria

Additionality is another key element in the voluntary green energy market. Consumers expect to contribute to creating additional environmental benefits beyond what is happening anyway due to market and policy framework conditions. In order to meet consumers expectations criteria need to be developed how additionality can be generated under the existing framework determining the development of the renewable heating and cooling sector.

In order to determine eligible RES-H/C measures for the creation of additionality especially the national legal framework for the support of RES-H/C generation must be taken into account. 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.

6. Develop routines for measurement and verification

In order to be able to determine and quantify the "environmental value" of a RES-H/C measure (e.g. in relationship to the respective value of additional RES-E generation) labelling bodies must develop routines for measurement and verification of RES-H/C generation. Here labelling bodies should differentiate between small and large RES-H/C installations. Whereas small devices (e.g. individual systems in the domestic sector) should underlie simplified routines (e.g. the determination of the annual heat volume produced based on the installed capacity of a pellet boiler or the installed m^2 of a solar collector) large plants should be required to install a calibrated heat meter for that purpose.

6 Conclusions

Green power labels are primarily a tool to create and enhance transparency on the green electricity market. Existing labels which apply the concept of additionality are usually designed as to either increase the generation of RES-E beyond the effects of public support or to improve the environmental performance o existing renewable power plants. However there might be specific market framework conditions which are rather unfavourable for labels to be restricted to measures in the RES-E sector. Here it might help to broaden the scope of a label by allowing it to integrate measures outside the RES-E sector. Among others this could be facilitated by integrating measures in the field of RES-H/C to contribute to the environmental performance of green power products. In other words, under certain circumstances the integration of RES-H/C measures into the scope of a quality seal for green power products might be a reasonable and effective approach to increase the effects of a label in terms of environmental power and economical efficiency.

The integrative concept which has been outlined and discussed in this report addresses similar aspects as the scope of a label being restricted to the RES-E sector. The main two elements are eligibility and additionality. Whereas eligibility defines the preconditions under which different energy sources and technologies are principally allowed to contribute to a labelled product, additionality is about the question how to create environmental benefits which can be unambiguously assigned to the customer of such labelled products.

Above all labelling bodies applying the integrative approach have to pay special attention to the development of good communication while introducing the concept on the market. Consumers of labelled products which pursue such an approach might be confused to learn that they support investments in the RES-H/C sector while being supplied by green electricity. In the worst case this confusion might undermine consumer's confidence in such schemes. On the other hand – provided appropriate messages have been developed around the new concept and its comprehensibility has been tested among all relevant customer groups – the integration of RES-H/C measures has the potential to become a powerful element in the scope of green power labels.

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