Report on Verification of conditions for implementing Heating and Cooling (H/C) Guarantee of Origin Systems

D3.3 of WP3 from the RE-DISS project

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Abbreviations

AIB	Association of Issuing Bodies
AEBIOM	European Biomass Association
BAU	Business as Usual Scenario
CEN/CENELEC	The European Committee for Standardization/The European Committee for Electrotechnical Standardization,
CHP	Combined Heat and Power
CHP-GO	Combined Heat and Power Guarantees of Origin (related to high efficient CHP according to the Directive 2004/8/EC)
DL	Decree-Law
EECS	European Energy Certification System
EGEC	European Geothermal Energy Council
EGS	Enhanced Geothermal Systems
ESTIF	Enhanced Geothermal System
ESTTP	European Solar Thermal Technology Platform
ETPs	European Technology Platforms
EU	Europe
EUREC	European Renewable Energy Centre
GO	Guarantees of Origin
H/C	Heating and Cooling
LNEG	Laboratório Nacional de Energia e Geologia
MS	Member States
NREAPs	National Renewable Energy Action Plans
RE-DISS	Reliable Disclosure Systems for Europe
RECS	Renewable Energy Certificate System
RES	Renewable Energy Sources
RES-C	Renewable Energy Cooling
RES-E	Renewable Energy Sources for Electricity
RES-H	Renewable Energy Heating
RES-H/C	Renewable Energy Sources Heating and Cooling
RES-T	Renewable Energy Sources for Transport
RDP	Full Research, Development and Policy
RHC	Renewable Heating and Cooling
SET	Strategic Energy Technology
SRA	Strategic Research Agenda

1 Introduction

The RE-DISS project (RE-DISS Project, 2010) aims at improving significantly the relia-bility and accuracy of the Guarantees of Origin (GO) for electricity from renewable en-ergy sources (RES) and from high-efficiency cogeneration and of the electricity disclo-sure information provided to consumers across Europe. Thus the projects helps to properly implement the requirements on Member States (MS) set out in the new RES Directive 2009/28/EC (herein referenced as the RES Directive) as well as in the Co-generation Directive and Internal Energy Market Directive. This project establishes and supports a group of responsible bodies from major European countries which are dedi-cated to improve procedures for GO and electricity disclosure.

At the time of writing of this report, the group of participating domains established by RE-DISS comprised competent bodies from: Austria, Flanders (Belgium), Wallonia (Belgium), Netherlands, Norway, Luxemburg, Denmark, Finland, Sweden, Switzerland and Italy.

The RES Directive sets out, under Article 2 (definitions), that a GO is defined as: an electronic document which has the sole function of providing proof to a final customer that a given share or quantity of energy was produced from renewable sources as re-quired by Article 3(6) of Directive 2003/54/EC, being this only applicable to the use of the GO in the renewable electricity market. However, Article 15 of the RES Directive transfers the concept of the GO to the RES – Heating and Cooling (H/C) sector: Mem-ber States may arrange for guarantees of origin to be issued in response to a request from producers of heating and cooling from renewable energy sources. Although not obliged to, MS can introduce a GO scheme for RES-H/C.

Although the RE-DISS project in principle focuses on electricity, under its Work Pack-age 3, project partners aim at looking and verifying the conditions for implementing GO for H/C. This report highlights the findings of the project partners and provides general guidance to the participating domains about their framework conditions regarding the introduction of GO for H/C from RES.

This report presents in Section 2 a brief analysis of the renewable heating and cooling sector in Europe, with the identification of the EU targets, the current and projected H/C demand in Europe and the RES technologies that can be used in this specific market. Section 3 presents an analysis of the RES-H/C national frameworks within the EU; Section 4 identified the status of implementation of RES-H/C GO systems and the feedback from the Competent Bodies. Section 5 presents an analysis of the possible applicability – potential users, links and benefits with other H/C certificates and demand – of a RES-H/C GO system. General recommendations for the implementation of RES-H/C GO are provided in Section 6 and concluding remarks in Section 7.

2 Overview of renewable Heating and Cooling in Europe

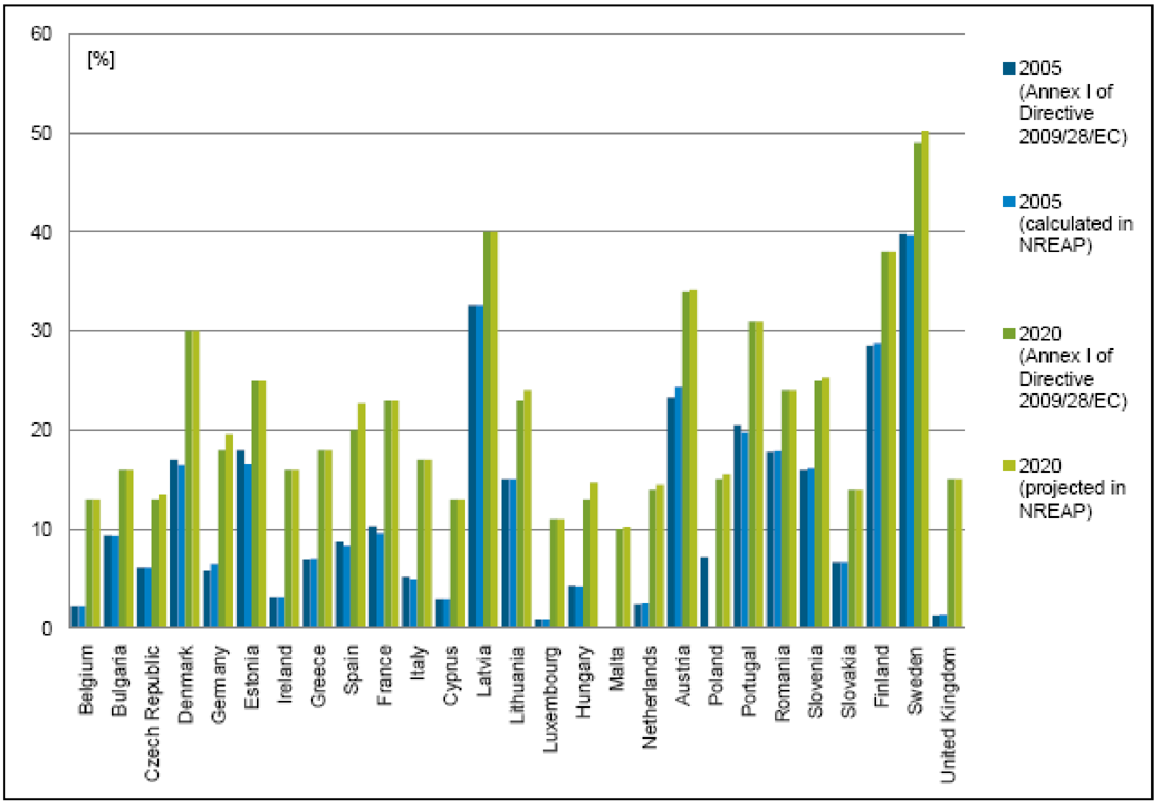
2.1 Main EU Policies and Targets for RES-H/C

According to the European Technology Platform on Renewable Heating and Cooling (Sanner at al, 2011), almost 50% of the total energy consumed in Europe is used for heat generation, either for domestic or industrial processes. The biggest share of this energy is produced through the combustion of fossil fuels such as oil, coal and gas, which contribute to climate change. Cooling as well, with few exceptions, is produced by processes driven through electricity, which is still predominantly produced from fossil fuel sources. Due to high social, environmental and economic costs of climate change there is an urgency to shift towards a more sustainable energy economy based on renewable energy sources.

For this reason, renewable energy penetration in the heating and cooling sector is essential. This has been recognised at the European level by the new RES Directive and in the necessity of MS to set targets in this regards. The RES Directive addresses various subjects related to the development of renewable energies in the European MS, amongst others the legally binding share of renewable energy in gross final energy consumption. Thus the Directive, by promoting renewable energies, covered the legislative gap that existed until then for the heating and cooling sector and created a positive climate for the long term development of solar thermal technologies in Europe.

The RES Directive required all MS to develop and adopt National Renewable Energy Action Plans (NREAP), to be delivered to the European Commission by 30 June 2010, in which MS should set out separate national targets for 2020 for the share of energy for renewable sources consumed in transport, electricity and heating and cooling. The following figure shows the renewable energy shares for the EU MS stated in the RES Directive and in the NREAPs.

Figure 1: Overall renewable energy shares according to Annex I o the RES Directive and according to the NREAP documents (Beurskens and Hekkenberg, 2011)



According to the report produced by Energy research Centre of the Netherlands (ECN) on the NREAPs submitted (Beurskens and Hekkenberg, 2011), the total gross production from RES for the 27 European MS will amount to 244.5 Mtoe in the year 2020, with the largest contributions of renewable energy originating from heating and cooling (RES-H/C, 46% in 2020) and from renewable electricity (RES-E, 42% in 2020). Renewable transport (RES-T) is expected to contribute with 13% to the overall renewable energy in 2020. On average this projection results in a growth for overall renewables of approximately 6% annually for the period 2010 - 2020. In terms of the overall growth rates per renewable energy type (average values), ECN reports the smallest rates for renewable heating and cooling (between 4.4% and 5.7% annually, depending on the period) and faster growth rates for renewable transport (7.1% to 8.5% annually, with a very high growth rate for the period 2005 - 2010 (31.2% per year). Renewable electricity is expected to have a growth rate of 6.0% to 6.7% (please see Table 1 for the statistics)

Table 1: Total contribution from RES for all 27 European Union MS (Beurskens and Hekkenberg, 2011).

	Energy				Share	Average annual growth		
	2005 (Mtoe)	2010 (Mtoe)	2015 (Mtoe)	2020 (Mtoe)	2020 (%)	2005-2010 (%/year)	2010-2015 (%/year)	2015-2020 (%/year)
RES-E	41.1	55.0	76.2	103.1	42	6.0	6.7	6.2
RES-H/C	54.7	67.9	84.8	111.6	46	4.4	4.5	5.7
RES-T	3.9	15.1	21.3	32.0	13	31.2	7.1	8.5
RES-T*b	4.1	15.8	22.8	35.3	-	30.8	7.6	9.1
Total RES	**98.7**	**137.0**	**180.9**	**244.5**	**100**	**6.8**	**5.7**	**6.2**

Notes:

- *a The percentage refers to the share of the renewable energy types (electricity, heating and cooling and transport) in total renewable energy in the year 2020.*
- *b In 'RES-T*' the amount of renewable energy in transport is reported according to the Renewable Energy Directive (2009/28/EC). Renewable electricity in electric road vehicles is to be accounted for 2.5 times the energy content of the input of electricity from renewable energy sources (Article 3.4c). Moreover, the contribution made by biofuels produced from wastes, residues, non-food cellulosic material, and ligno-cellulosic material is to be considered twice that made by other biofuels (Article 21.2).*
- *All 27 European Union Member States are considered in this table. This concerns the following countries: Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovenia, Slovakia, Spain, Sweden and the United Kingdom.*

All NREAPs provide projections for gross final energy consumption (reported for electricity, heating and cooling and transport separately) in the period 2010 – 2020 and most MS have specified these projections for two scenarios: a 'reference' and an 'additional energy efficiency scenario'. Taking the results of these two scenarios into account (see Table 2) it can be seen that if the reference scenario is followed the share of RES in the gross final energy consumption in 2020 is lower than the target of 20% in 2020. However if the 'additional energy efficiency scenario' is followed the target will be slightly over achieved.

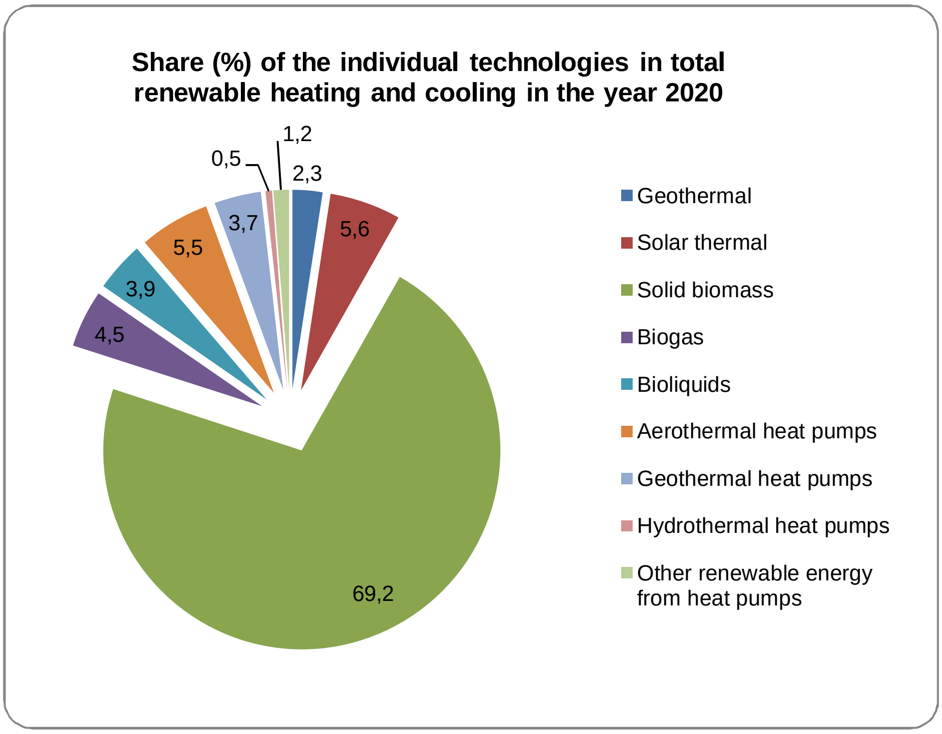
Table 2: Overall RE share in the aggregate of all 27 European Union MS for the two reference scenarios considered

	Reference scenario				Additional efficiency scenario			
	2005 (%)	2010 (%)	2015 (%)	2020 (%)	2005 (%)	2010 (%)	2015 (%)	2020 (%)
Electricity	15.3	19.3	24.9	31.3	15.3	19.4	26.0	34.0
Heating and Cooling	9.9	12.2	14.9	19.2	9.9	12.5	15.9	21.4
Transport a	1.3	4.7	6.3	9.2	1.3	4.8	6.8	10.2
Transport target b	1.4	4.9	6.8	10.1	1.4	5.0	7.2	11.3
Total before aviation reduction	**8.5**	**11.3**	**14.3**	**18.6**	**8.5**	**11.5**	**15.2**	**20.6**
Total after aviation reduction	**8.5**	**11.3**	**14.4**	**18.7**	**8.5**	**11.6**	**15.3**	**20.7**

Notes:

- *a The share for transport simply expresses the share of RES-T (excluding double counting of renewable electricity ,hydrogen and biogas in transport, as specified in Article 5.8 in the Directive) in gross final energy consumption and is not to be interpreted as the renewable share in transport.*
- *b In 'Transport target' the share of renewable energy in transport is reported according to the Renewable Energy Directive (2009/28/EC). See footnote b above.*
- As it can be seen from the table above, the achievement of the 20% RES on final energy consumption in 2020 to be achieved involves a clear stake on the use of renewable for heating and cooling. Figure 2 shows the contribution of the individual technologies in the total renewable heating and cooling technologies in the year 2020.

Figure 2: Share of the individual technologies in total renewable heating and cooling in the year 2020. Figure produced with data from the ECN report (Beurskens and Hekkenberg, 2011)



Note: the percentages in the figure sum up 96.4% instead of 100% because the Romanian NREAP did not present values for the share of renewable in total renewable heating and cooling

As it can be seen from the figure above, for renewable heating and cooling the largest share in the year 2020 is expected to come from biomass (77.6%), notably solid biomass (69.2%). Second is renewable energy from heat pumps (10.9%), followed by solar thermal (5.6%) and deep geothermal heat (2.3%).

Besides the RES Directive, the European Strategic Energy Technology (SET) Plan (Commission, 2009), created by the European Commission to accelerate the deployment of low-carbon technologies, has recognized the essential role of using RES sources for heating and cooling as part of the European strategy to improve the security of energy supply and to create markets for highly innovative technologies that are useful to society and where the European industry can take a lead role.

European technology platforms (ETPs) focus on strategic issues where achieving Europe's future growth, competitiveness and sustainability depends on major technological advances. ETPs bring together industry and research stakeholders to define medium to long-term research and technological objectives and to develop roadmaps to achieve them. Their aim is to contribute to increasing synergies between different research actors, ultimately enhancing European competitiveness.

Within the ETPs the European Technology Platform on Renewable Heating & Cooling (RHC-Platform) brings together stakeholders from all RES (biomass, geothermal and solar thermal sector) to define a common strategy for increasing the use of RES for heating and cooling. The main objectives of the RHC platform are (RHC-Platform, 2005):

- Define a common Vision for the short-, medium- and long-term evolution of the renewable heating and cooling sector in Europe.
- Set up a shared Strategic Research Agenda (SRA) for all renewable heating and cooling technologies which sets research priorities to maintain Europe's scientific and industrial leadership in the renewable heating and cooling sector.
- Establish and implement a roadmap for the large scale development and deployment of renewable heating and cooling systems, including a programme to harmonise Europe's training and education, whilst renewing its research infrastructures.

The RHC-Platform together with EUREC Agency, AEBIOM, EGEC and ESTIF and building on work of the European Solar Thermal Technology Platform (ESTTP) has been working together to define a Common Vision and Strategy Research Agenda for the renewable heating and cooling sector. This Vision (Sanner et al, 2011), publicized in 2011, states the short-, medium- and long-term evolution goals for the heating and cooling systems in the European Union, taking into account the expected trend of energy demand and consumption patterns, and the potential of RES to provide a secure and sustainable supply of heating and cooling. According to this report:

- 25% of the heat consumed in European Union could be generated with renewable energy technologies in 2020,
- 50% of the heat supplied in Europe could be supplied through renewable heating and cooling technologies in 2030;
- By 2050 100% of the European heating demand can be satisfied though renewable heating and cooling technologies

2.2 RES-H/C Demand

In Europe around 50% of the final energy consumption took the form of heat; in 2007, heat accounted for 86% of the final energy consumption in household, 76% in commerce, agriculture and services and 55% in industry (Sanner et al, 2011).

According to the RHC European Technology Platform report, the EU 27 use heat in different ways, and heat users have a specific demand profile that should be met, and this is only possible if different energy supply technologies are used to cover the demand. For RES this represents a major challenge which can only be met if the RES contribute with their advantages.

Figure 3 shows the distribution of heat by user type in 2006 and Figure 4 shows the distribution of low-temperature heat by use types. The distribution of high-temperature heat corresponded to 30% of the heat demand in 2006 in the EU 27. As it can be seen by the figures below industry (including low and high-temperature heat) and households are more intensive heat consumers. The main uses of low temperature heat (<250ºC) are for residential space heating, industrial uses and services space heating.

Figure 3: Distribution of heat demand in 2006 (Sanner et al, 2011)

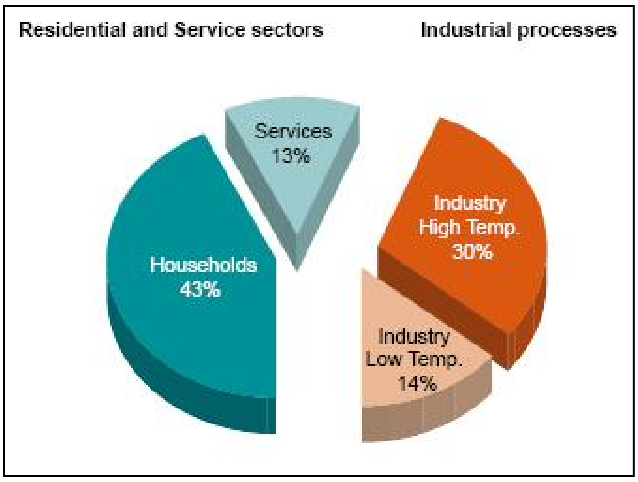
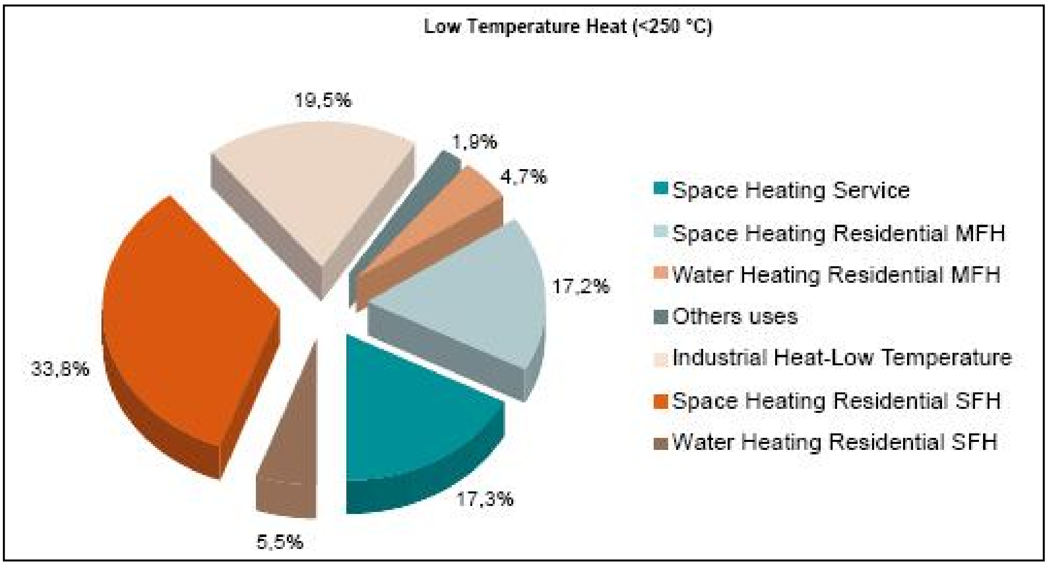


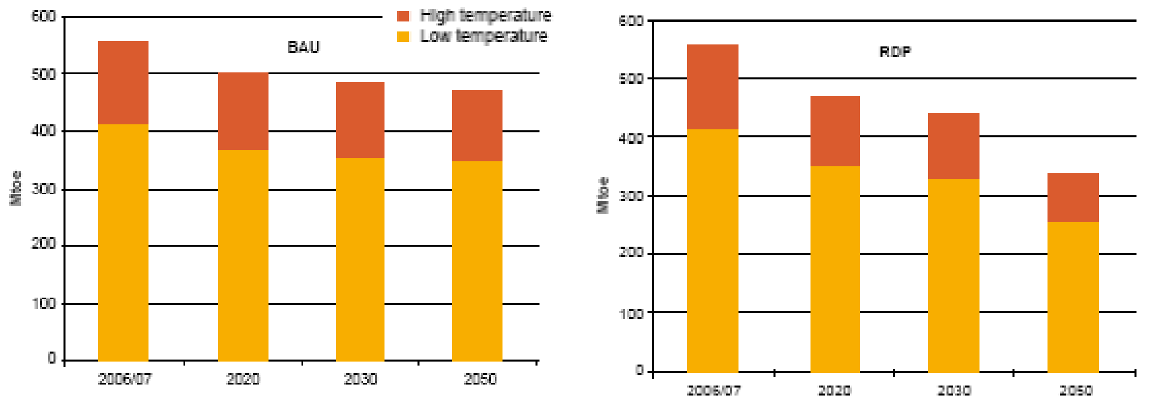
Figure 4: Distribution of low-temperature heat by use types in the EU in 2006 (Sanner et al, 2011)



RES-H/C deployment must go hand in hand with a substantial improvement in the energy efficiency of buildings and of heat consuming processes. It is important that both these pathways are developed as rapidly as possible so that energy efficiency in the domestic and service sectors may increase and replacement of the remaining heating and cooling demand by RES occurs.

The RHC report on the Common Vision for the Renewable Heating & Cooling sector in Europe provides estimates for the heat demand in 2020, 2030 and 2050, for two different scenarios: a "Business as Usual Scenario" (BAU) and a "Full Research, Development and Policy" (RDP) scenario. In both scenarios high and low temperature heat demand is expected to decrease due to efficiency gains in insulation of the buildings envelope, in conversion of the respective heat-supply technology and in energy distribution. The following figure shows the evolution in low and high temperature heat demand as well as a summary of the assumptions for the development of both referred scenarios.

Figure 5: High and low temperature heat demand under the BAU and RDP scenarios (Sanner et al, 2011)



Assumptions of the “Business as usual Scenario” (BAU):

• Moderate reduction of the heating demand compared with 2006 (on average: -5% by 2020, -10% by 2030 and -20% by 2050).

• Policy support: RE obligations only for new residential buildings; subsidies for existing residential, service and commercial buildings as well as for industrial applications (subsidies: 10 - 30% of the system cost) or constantly moderate rising energy prices of fossil energy.

• Medium R&D rate and therefore solutions for high energy density heat stores and new collector materials; sufficient and cost competitive solutions for solar thermal cooling by the year 2020.

• Medium growth rate of RHC installed capacity (10-15% per annum until 2020).

Assumptions of the “Full Research, Development and Policy Scenario” (RDP):

• Significant reduction of the heat demand compared with 2006 (depending on the country but on average: -10% by 2020, -20% by 2030 and -30% by 2050).

• Full policy support: RE obligations for all new and existing residential, service and commercial buildings as well as for low-temperature industrial applications or high energy prices of fossil energy.

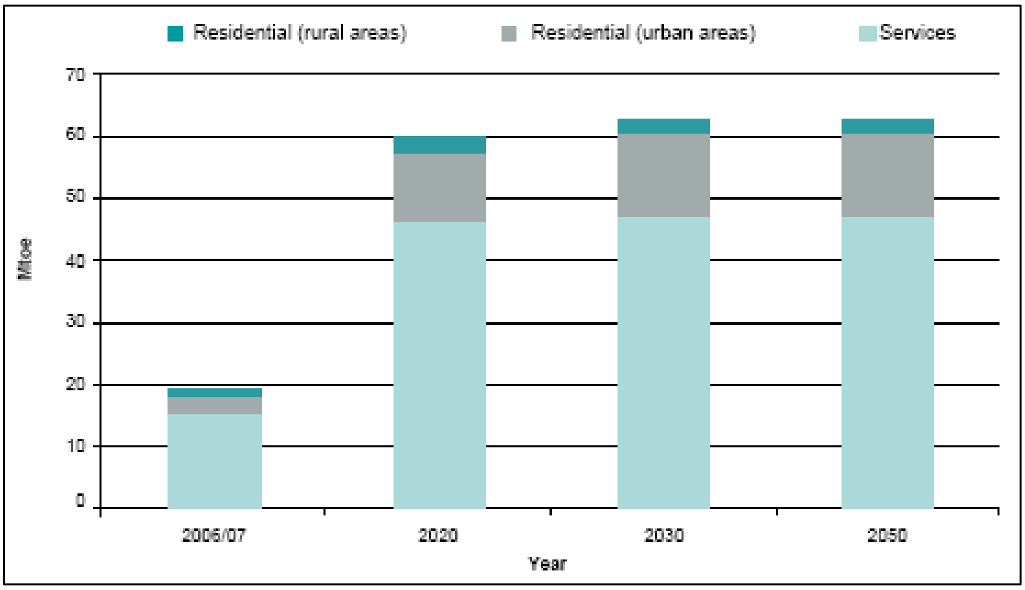
• High R&D rate delivers solutions for cost efficient high energy density heat stores and new collector materials; sufficient and cost competitive solutions for solar thermal cooling available by 2020.

• High growth rate of RH&C installed capacity (approx. 25% per annum until 2020).

In terms of cooling the evolution of energy consumption for cooling is expected to follow a different path trend to that of heating: instead of a decrease it is expected to increase with time. The drivers for the expected increase in cooling demand are the growing feeling among people that “cooler is better”, the fact that the architecture and technical equipment of large commercial buildings also generates a necessity for more and more active cooling and the share of these buildings is expected to rise at least by 60% until 2020.

The trend in increasing cooling demand has been hard to spot by Governments as this need is traditionally met by electrical air conditioners, hiding the cooling element within the building’s overall electricity consumption. Although the impact of energy consumption of cooling demand is difficult to assess, the RHC European Technology Platform within its Common Vision reports presents an expected evolution for residential (rural and urban areas) and for the service sectors. As it can be seen a high increase in cooling demand is expected mainly in the service and residential urban areas. Also an increase in cooling demand is shown for the residential rural areas; however this is not so significant.

Figure 6: Expected trend in cooling demand in the EU (Sanner et al, 2011)



2.3 Potential of RES-H/C Technologies

Solar thermal, biomass, geothermal and aerothermal/hydrothermal technologies are the directly relevant renewable technologies that can be used for heating and cooling production.

Each RES has its own particularities and that impacts its applications. For example for heating, each RES can only be used to deliver a certain temperature:

- Shallow geothermal is best for temperatures up to 50ºC;
- Solar thermal up to 100ºC (with the exception of concentrated solar that can reach very high temperatures);

- Deep geothermal heat supply temperatures in the rage from 50ºC-150ºC, depending of the local conditions
- Biomass can supply heat at any temperature below the combustion temperature of the resource being used.

2.3.1 RES- H Technologies

Geothermal

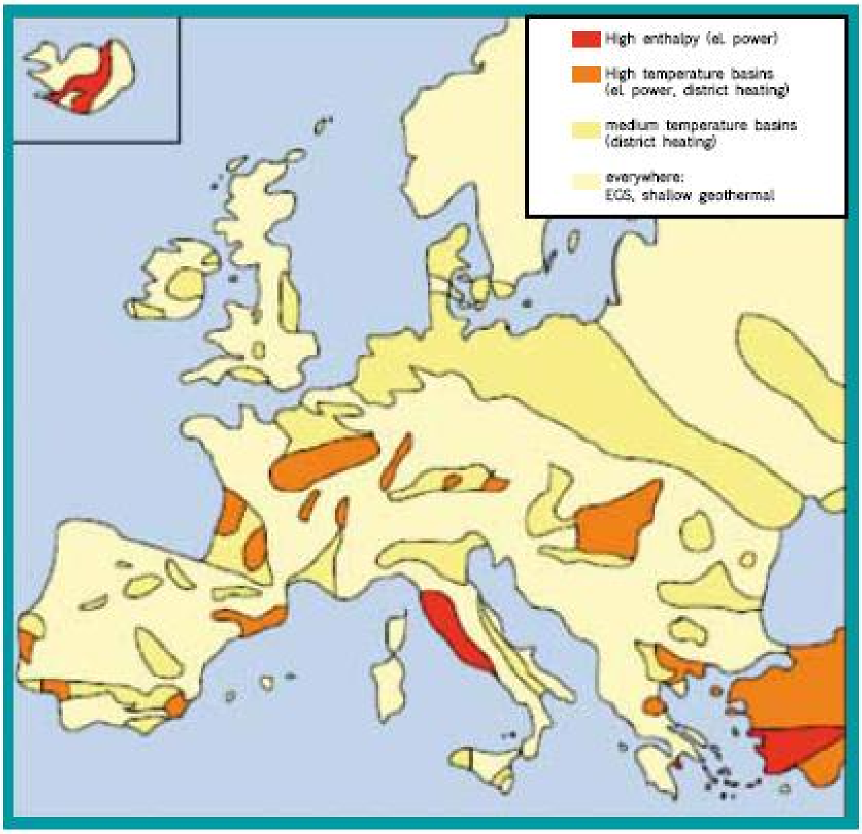
Currently geothermal energy is used for electricity production, district heating and cooling, and to heat and cool single buildings or groups of buildings (offices, shops, houses, schools, greenhouses, swimming pools), mostly in combination with electric heat pumps.

Shallow geothermal energy (geothermal heat pumps) has already achieved a market share in new buildings of about 20% in some countries. Most low-temperature energy demand found in existing houses can be supplied by geothermal district heating systems.

However this technology still faces several challenges before its direct use can be widespread. In terms of the shallow geothermal the main challenges are: the integration of a geothermal heat supply as a standard in the building energy system; the development of heating and cooling networks that can integrate geothermal heat pumps and geothermal storage (UTES), including hybrid systems where appropriate and the development of solutions for retrofitting existing infrastructure for geothermal energy. In relation to deep geothermal, the main challenges are: the exploitation of the full potential of sedimentary basins suitable for deep conventional geothermal energy and the deployment of Enhanced Geothermal System (EGS) technology (a technique to reliably engineer the subsurface heat exchangers in a reproducible way to harness the heat flux at the required temperature).

The geothermal energy potential in Europe is huge. At present, deep geothermal technology is only deployable in certain areas (**Fehler! Verweisquelle konnte nicht gefunden werden.**) but geothermal heat pumps and EGS, after successful demonstration, can be used virtually everywhere. It is expected that by 2050, a value in excess of 150 Mtoe of heat production could be possible (45% of heat demand under the RDP scenario). However, it should be noted that the heat pumps required to harvest much the geothermal energy, will consume electricity, which must by then be produced from RES as well.

Figure 7: Geothermal resource potential (Sanner et al, 2011)



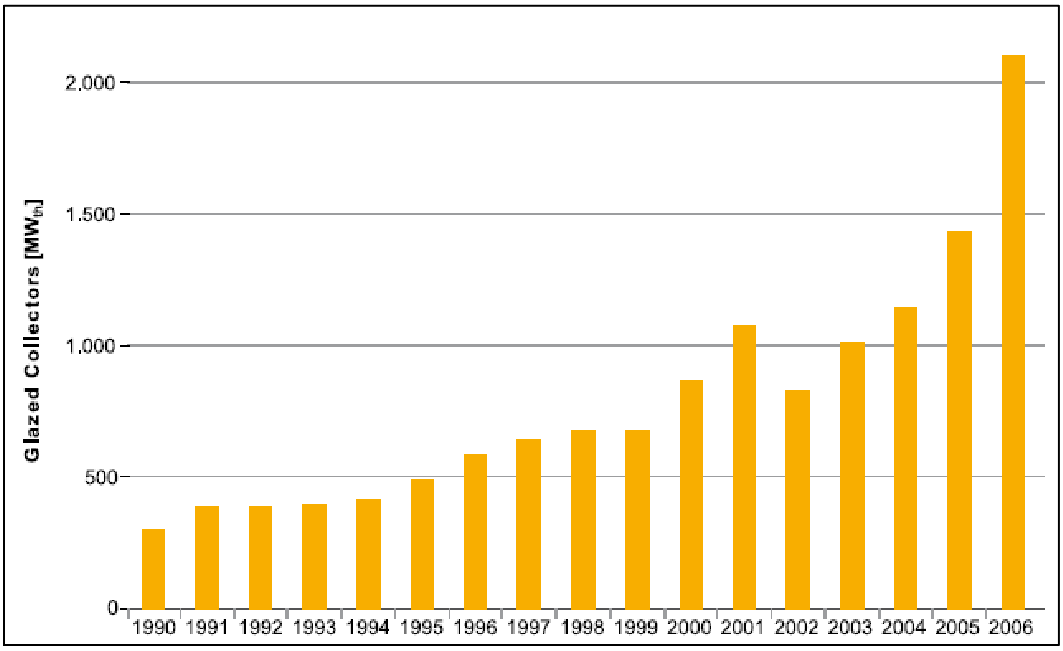
Solar Thermal

The current applications of state of the art of solar thermal technology are:

- Domestic hot water for buildings with typical solar thermal fractions between 40-80% (given that the energy of sunlight meets these shares of demand for this specific use)
- Space heating for single houses or buildings with typical solar fractions between 15% to 30%;
- Hot water for hotels and the service sector.

There are some EU countries where solar assisted district heating systems are installed, such as Austria and Sweden. Also in recent years, with the introduction of labelling schemes for buildings, countries such as Portugal and Spain, have been installing solar water heating systems in their new buildings. Between 2002 and 2006 the solar thermal market in Europe has more than tripled (see **Fehler! Verweisquelle konnte nicht gefunden werden.**) and the worldwide market for solar system has grown 10-20% per year since 1990 (ESTTP). Furthermore the number of solar thermal systems for cooling and air conditioning and industrial process heat has considerably increased in recent years. However there is still a large potential to be tapped in new applications such as sea water desalinisation and water treatment.

Figure 8: Solar Thermal Market Development in the EU (ESTTP)



Within all RES-H/C, solar thermal has the following specific benefits:

- leads to a direct reduction of primary energy consumption
- can be combined with nearly all kinds of back-up heat sources
- does not rely on finite resources, needed also for other energy and non-energy purposes
- does not lead to a significant increase in electricity demand, which could imply substantial investments to increase power generation and transmission capacities
- is available nearly everywhere and thus can generate heat almost everywhere (current limitations, for instance at very high latitudes or in case of limited space for heat storage, can be largely overcome through R&D in the next years)
- provides energy at a predictable price. Most of the costs occur at the moment of investment, and therefore does not depend on future oil, gas, biomass, or electricity prices
- Has an extremely low life-cycle environmental impact
- And it can create local jobs, as a large portion of the value chain (distribution, planning, installation, maintenance) cannot be delocalised.

Examples of the current great development in solar thermal market are the increasing number of solar thermal combi-system installation which provide both hot-water and space heating; the demonstration that 100% solar heated buildings (Active Solar Building) work at both individual and multi-family houses and the increasing use of solar thermal technologies in district heating systems.

In terms of potential of solar thermal technology, this RES-technology can supply 133 Mtoe (1,552 TWh) of final energy within the RDP scenario, which corresponds to 2,716 GWth of installed capacity. Considering the European energy mix in 2005 (reference year of the RES Directive), solar thermal systems could contribute to meet the total new renewable energy installed capacity target by 2020 with a 12% share (ESTTP, 2009).

Biomass

Most often when biomass is used for energy purposes, it is for heating. In Europe, 66% of the biomass is used to produce heat, 31% for electricity and cogeneration and 3% for liquid fuels. Small-scale heating systems for households typically use firewood or pellets; medium-scale systems burn wood chips in grate boilers; large-scale systems are able to burn a greater variety of fuels such as wood waste. Heat can also be produced on a medium or large-scale through cogeneration that, besides electricity, provides heat for industrial processes in the form of steam and can supply district heat.

Other biomass technologies include: gasification (where medium- to large-scale units are just beginning to be available commercially), pyrolysis, fermentation and esterification. These different conversion technologies allow biomass to supply heat, electricity or energy stored chemically in liquid, gaseous or solid form.

Biomass development has depended on the incentives provided by the MS and its future will still depend on that. A complete integration and utilisation of the fully existent potential of biomass in the production of RES-H depends on the competitiveness of the bioenergy or other biomass products; sustainability of the biomass resources and the rate of progress of biomass conversion technologies.

With the development of new technologies the production of high quality fuels; secure, sustainable supplies; clean and effective combustion processes and optimally-integrated solutions for households, industry, and district heating and cooling will also increase.

The RHC-Platform expects biomass use to more than double by 2020 (220Mtoe of primary energy) and to reach around 370 Mtoe of primary energy in 2050, to meet the projected heat demand. Aquatic biomass has the potential to make a large contribution of this supply in many regions of Europe (Sanner et al, 2011).

However, limitations in the supply of sustainable biomass might occur. In a long term sustainable energy strategy, biomass should therefore be used primarily for those purposes where they cannot be reasonably replaced by other renewable energy.

2.3.2 RES- C Technologies

Household cooling as well as commercial and industrial cooling will account, as referred to above, for an increasing part of thermal energy demand. The increase in cooling demand is probably difficult to be stopped or reduced in future – modern buildings, lighting, office technology, etc. typically require cooling (and any rise in average global temperatures will not make the situation easier).

Although cold can be generated from RES-E power, there is an alternative, to use renewable energy sources directly to produce cold. Cooling can also be delivered by thermal driven devices or directly from the ground in shallow geothermal systems.

A number of RES-H based cooling plants (sorption cooling) have been successfully demonstrated. Sorption cooling allows the use of heat to produce cold. The heat, which has to be at a temperature of 70 °C upwards, can come from any available RES, including: Solar thermal in individual collectors and in concentrating arrays), biomass (biomass or biogas boilers) and geothermal (direct geothermal heat from greater depth or in high-enthalpy areas).

Moreover, waste heat from industry processes, power generation through thermal cycles or waste incineration offer as well potential for cooling applications. The heat source might not be renewable, but the heat is generated as a by-product, instead of being dissipated to the environment. The utilisation of this heat for cooling processes, either onsite or in district networks, enhances cold production without the need to exploit other energy sources.

3 Overview of existent RES-H/C Support Schemes in EU MS and in participating domains of the RE-DISS project

3.1 RES-H/C Support Schemes in EU MS

The EU member states use different types of support schemes for RES-H/C, that can be classified into two different categories: financial and fiscal mechanisms, and non-financial mechanisms.

The most commonly used policy instruments for promoting renewable energy technologies for heating and cooling are fiscal and financial mechanisms. The main measures used under this category are investment subsidies, tax refunds for installations or fuels as well as soft loans.

Investment subsidies have been applied in many MS (including Austria, Greece, Germany, the Netherlands, Poland and the UK) and aim at raising the competitiveness of RES technologies and render them more attractive to investors though the granting of grants/subsidies. In general, capital grants are applied at an early stage of deployment and are meant to provide an initial stimulus for a technology by reducing the up-front investment costs. Capital grants/subsidies can be offered to the plant owners on different basis: capacity installed (€/MW), percentage of total investment, etc. Operational grants can also be attributed to energy generated, which are financial incentives paid based on the heat/cold actually produced (€/GJ).

Low interest loans (soft loans) are mostly applied to support large-scale renewable heating and cooling installations. Generally, the risk associated with investing in new technologies raises the capital costs or even prevents the access to capital. Soft loans provided for RES-H/C technologies installation address this fact by providing capital with low interest rates and long-maturity financing conditions.

In EU MS tax-related instruments for deploying RES-H/C have been introduced in different ways:

- Tax or a tax increase on fossil fuels - this indirectly affects the economics of RES. Also, the revenues can be used for subsidising renewable heating and cooling installations via, for example, a grant programme.
- Tax breaks – which might include an exemption from VAT on either the purchase of RES installations or the sourcing of energy from such installations, as well as the possibility of income tax declaration of RES investments and therewith the deduction of taxable income.

In the UK a new financial instrument, the Renewable Heat Incentive (RHI) has been recently adopted (DECC, 2011) that provides financial incentives to install renewable heating in place of fossil fuels. The RHI will pay a fixed sum for each unit of heat generated by various RES-H/C installations on a technology-specific basis.

Non-financial instruments supporting RES H/C include: education and training of professionals, consumer information, standardisation and use obligations.

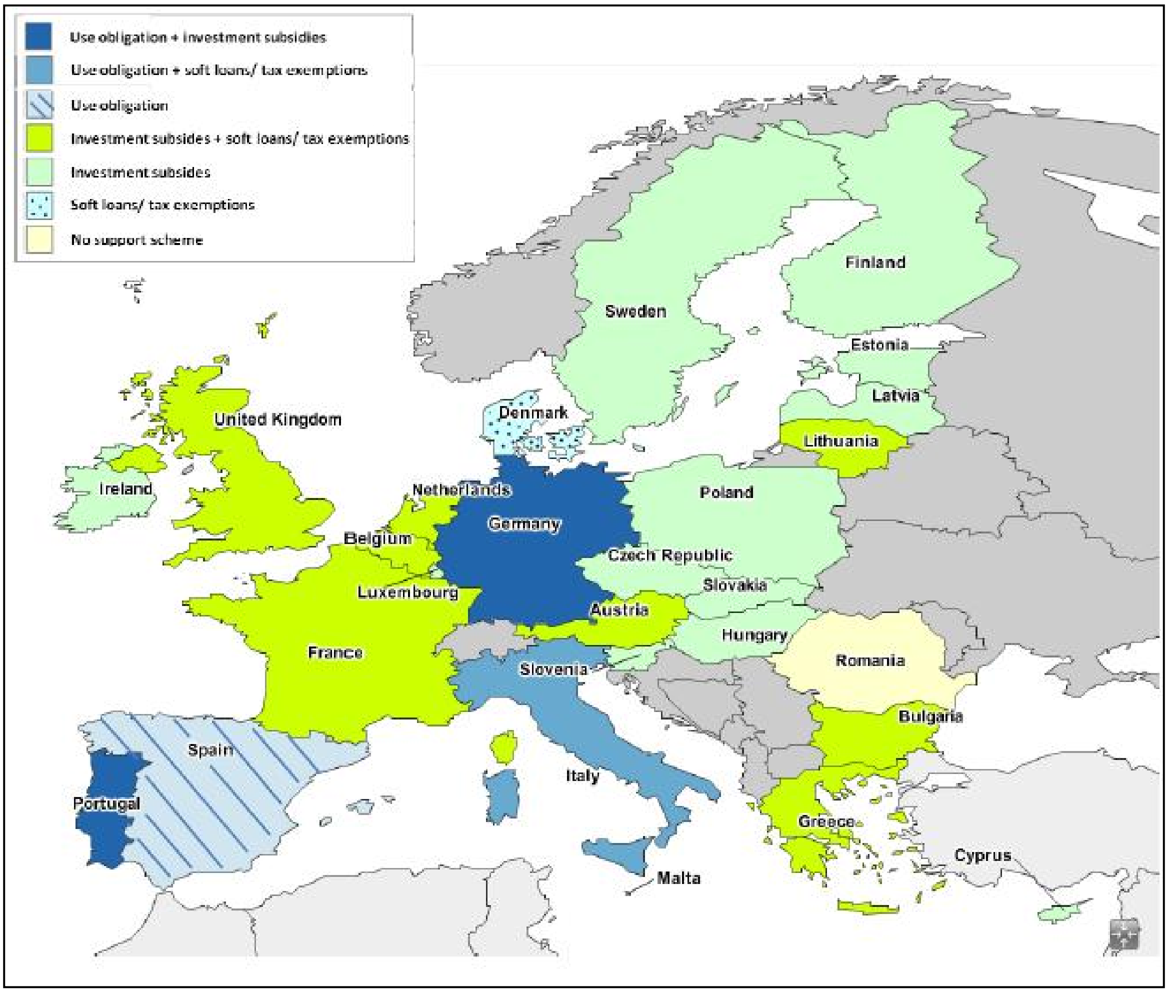
Information and awareness raising measures on RES-H/C technologies have played an important role in the overall renewable energy expansion in the EU. These measures are often introduced at at regional level as a supplement to a national financial support mechanism. Educational measures for professionals and technicians on RES-H/C technologies are of major importance for the RES deployment as well as for commercial development of the RES sector.

Another non-financial mechanism is standardisation (also mostly employed as part of a financial support scheme) where minimum performance standards for subsidised RES-H technologies guarantee that public funds are deployed to the best available technologies.

Use Obligation is a fairly recent non-financial mechanism used at national MS level. Within this mechanism building owners are obliged to source a minimum amount of their H/C energy demand through RES. The Use Obligation mechanism has been used in different ways within EU MS: in Germany it is used for different renewable heating options, whereas in Italy, Portugal and Spain solar thermal obligations form part of the building codes.

Most part of the EU 27 use financial and non-financial mechanisms for the promotion of RES-H/C deployment. The following figure illustrates the RES-H/C support schemes in place in the EU 27.

Figure 9: Overview of existing RES-H support schemes in the EU 27 (Steinbach, 2011)



3.2 RES-H/C Support Schemes in the RE-DISS participating domains

The following table summarises the RES-H/C support schemes present in the eleven participating domains of the RE-DISS project.

Table 3: RES-H/C Support Mechanisms in the eleven RE-DISS participating domains

Participating Domain	RES-H/C Support Mechanism (s)	Specification
Austria	Feed in tariff for Heat	Heat tariff (combined support of electricity and heat) for solid biomass power plants that receive tariffs according to the feed-in tariff legal regulations of 2002. Support tariff for existing or refurbished combined heat and power plants for public district heating supply.

Participating Domain	RES-H/C Support Mechanism (s)	Specification
	Investment subsidies:	Federal/regional/local schemes on RES-H/C (for private houses mainly by the provincial housing subsidy systems, for private companies mainly by the federal "Umweltförderung im Inland" which is handled by Kommunalkredit public consulting (Kpc): • Geothermal: grants of 20 – 40 % of the total costs of investment for private investors • Solar Thermal grants up to 30% of the investment costs. Federal level support for companies. Support is given to private households at province level. Private households benefit from grants between € 600 and € 1,700 for systems used for domestic hot water needs (dependent on the province) The federal government supports renewable energy devices at buildings in the private sector (e.g. Hotels) with grants up to 30% of the investment costs. The "klima:aktiv" programme managed by the Federal Ministry of Environment is based on partnerships in the regions, the industry and the Austrian Energy Agency. The objectives of the programme are to promote RES technologies and Energy Efficiency. It has an important RES-H component to cover also information campaigns, education and training for installers, certification measures. Support to specific projects is implemented at regional level with the support of the Austrian Energy Agency.
Belgium-Flanders	Investment subsidies	All RES-H/C Technologies: 40% of eligible investment for small and medium enterprises, 20% for large enterprises. Eligible investments vary strongly by technology. Micro-CHP and heat pumps: 20% investment support for public buildings and non-profit sector. Geothermal heat pumps: 210 euro/kW additional for companies and for households. Maximum 1680€. Solar thermal: 300 € additional on subsidy for lower energy level. The Flemish government is currently revising the subsidy mechanism for RES-H. This revision seems to be going towards a more production based support mechanism instead of investment subsidies, at least for the larger plants (starting with installations as of 1 MW). However this decision has not been taken yet. Furthermore the investment subsidies for heat pumps and solar thermal will also be changed in the near future.
	Fiscal Incentives for all RES-H/C	For companies: Tax deduction of 13.5 % for all investment in equipment in order to reduce energy consumption. For private persons: tax reduction of 40% with a

Participating Domain	RES-H/C Support Mechanism (s)	Specification
	Technologies	maximum of 2,770 € for investment in 2009 in heat pumps and biomass heating and 3,600 € for investments in solar boilers. For one investment however, you can get the maximum support during four years. The fiscal mechanisms are decided at federal level and for the time being there are no changes foreseen.
Belgium - Wallonia	Investment subsidies	All RES-H/C technologies: 40 % of eligible investment (rules of the Community guidelines on state aid for environmental protection OJEC, 2001/C27/03, 3.2.2001). Combustion small-scale furnace: from 250 € to 3,500 € depending on the capacity of the boiler, the system for loading (manual or automatic), the nature of biomass used (wood or crops) and the nature of the investor (private or public). Maximum 50% of the total investment – maximum investment of 25,000 €. Geothermal heat pump: 75% of the invoice. Maximum 1,500 € for the heating of a new building and 750 € for water heating of any building. Solar Thermal: 1,500 € for all installations from $2m^2$ to $4m^2$ + 100 €/m^2 for additional surface. Maximum 1,500 € for heating in a new building and 750 € for water heating of any building.
	Fiscal Incentives for all RES-H/C Technologies	For companies: Tax deduction of 13.5 % for all investment in equipment in order to reduce energy consumption. For private persons: tax reduction of 40% with a maximum of 2,770 € for investment in 2009 in heat pumps and biomass heating and 3,600 € for investments in solar boilers. For one investment however, you can get the maximum support during four years. The fiscal mechanisms are decided at federal level and for the time being there are no changes foreseen.
Denmark	Tax exemptions	Solar heating: exemption from CO2 and energy tax Biomass: exemption from CO2 tax
Finland	Grants	Dedicated energy assistance targeted at increasing the efficiency of the use of renewable energy, applicable in 2011. Assistance sums will be decided annually.
	Tax incentives	Tax credits granted for expenses caused by deploying renewable energy, changing the heating system.
Italy	Investment subsidies	For micro, small scale and diffused cogeneration units. The overall amount of contributions is equal to 30,000,000 €, to be distributed to eligible and selected projects with the following criteria: • Up to 20% of capital cost (maximum limit of 200,000 €) for units fed by natural gas (increased to 30% in case

Participating Domain	RES-H/C Support Mechanism (s)	Specification
		of tri-generation). • Up to 30% of capital cost (maximum limit of 300,000 €) for units fed by biomass or for hybrid units fed by natural gas- biomass (increased to 40% in case of tri-generation). For projects in areas not serviced by gas network the contribution is increased to 40%.
	Tax incentives	Italian citizens may deduct 55% of the investment costs of their solar thermal systems (and any other energy efficiency investment) from their tax bill, spread over ten years. This deduction decreases to 36% if the national fund planned for each year is exhausted. Any refurbishment to a house incurs VAT at 10% instead of 20%. Eligible refurbishments include the installation of solar thermal systems.
	Investment incentives	A regulation from January 2007 establishes among others investment incentives for the solar thermal installations of 50 to 500 m². The scheme covers 30% of eligible investment costs of these systems based on the following calculation: • Glazed flat collectors: C (€/m^2) = 1/3 (1600 + 25000/S). S is the surface in m^2. • Unglazed flat collectors: C (€/m^2) = 1/3 (550 + 25000/S). S is the surface in m^2. • Evacuated tube collectors: C (€/m^2) = 1/3 (1900 + 25000/S). S is the surface in m^2. For citizens, grants are available through the programme "Comune Solarizzato", from the Ministry of Environment and Territory Management in combination with funds from Italy's regional governments. Both parties contribute 50% to a scheme that refunds citizens who install domestic solar thermal systems. The programme includes as well awareness-raising campaigns at the level of the provinces, based on the agreements they have with the Ministry.
Luxemburg	Heat premium	Since January 2008, a so-called "heat premium" (prime de chaleur) has been introduced. This premium differs according to technologies (solid biomass, biogas and waste wood) and is granted for each MWth commercialised. For biogas, waste wood and solid biomass, the producer gets 30 €/MWh if certain conditions are fulfilled. The new tariffs can apply to existing biogas installation (existing before the 1st January 2008) in case of extension of capacity.
	Investment subsidies	In January 2008, new grants for private households promoting RES-H entered into force (regulation from 21st December 2007). These investment subsidies promote the use of solar thermal panel (50% of investment costs), biomass boilers (25-30%), geothermal heat exchanger (50%), and geothermal heat pumps (40%).

Participating Domain	RES-H/C Support Mechanism (s)	Specification
Norway	Support for heat	The Enova SF Energy Fund has designed a programme specifically for renewable heating in order to achieve its specified targets by supporting new heating plants, distribution systems for heating, and sustainable supplies of biomass. It provides economic support for projects throughout the value-chain from extraction, transport and production of biomass, to the development of heating plants and distribution systems. Very little support is available for solar thermal. Incentives for Non-electric Heating Technologies in the form of loans available for builders to incorporate solar thermal systems, biomass boilers and GHPs in new constructions. Basic Fund for Renewable Energy and Energy Efficiency: subsidies for renewable energy in terms of actual energy generated (€/kWh).
The Netherlands	Support for heat	Energy Investment Allowance (EIA): A tax bonus on investment in renewable energy and energy saving. In 2006, 44% of investment costs in renewable heating construction and equipment, and/or CHP were eligible for deduction. Incentive programmes for research and development and the application of renewable energy and energy saving. Private house owners can receive a subsidy on the purchase of thermal heating systems or heat pumps.
Sweden	Investment Subsidies	Grant scheme for investment in solar heating on commercial premises.
	Tax exemption	Renewable heat has been supported in an indirect way by raising taxes on fossil fuels. Bioenergy, solid waste and peat are tax-exempt for most energy uses. The investment aid to district heating grids indirectly reinforces the promotion of bioenergy.
Switzerland	Support for heat	Feed-in tariff (FIT) in place since 1 May 2008 to promote electricity production from geothermal and other renewable. Funding programs and tax incentives are available in cantons for heat pumps installation. The Swiss Federal Office for Energy (BFE) promotes the development of the use of ambient heat through research programmes on heat pumps, cogeneration, refrigeration.

4 Guarantee of Origin for RES-H/C: Status of Implementation and Feedback from the Competent Bodies

Few countries in Europe have established RES-H/C GO schemes with the transposition of the 2009 RES Directive. Up until now only Portugal and Austria passed national legislation that establishes such a scheme.

When transposing the RES Directive to national legislation, Portugal referred that with the DL 141/2010 of 31st December 2010 (Diário da República, 2010) that creates a system for issuing GO for RES-E and RES-H/C. In this system the GO will be electronic documents that will be used for disclosing information to the final consumers. The GO information content was directly transposed from the RES Directive, and thus includes the requisites referred above. The operating model of the system is left to be specified in secondary legislation. However there is no GO system in place yet for both RES-E and for RES-H/C, as there is no secondary legislation enacted. When consulted, the competent body, Laboratório Nacional de Energia e Geologia (LNEG), stated that at this moment they are still trying to establish a RES-E GO so that it can start operating in the beginning of 2012.

Austria has a RES-E GO and CHP-GO schemes operational. The competent issuing body for issuing these GO is E-Control, and these systems are fully operational. E-Control is also the competent body for establishing and maintaining a RES-H/C GO system. Although the system formally exists, it is not operational and there is no further legislation or guidelines on it, as up until now there was no demand for this specific type of GO.

The applicability, potential uses and potential design of H/C-GO system was presented to the competent bodies at the 4th RE-DISS Domain Workshop. This included a presentation on development of H/C from RES and the support mechanisms that were being used by the different MS to promote its deployment; the RE-DISS proposed concept for the further development and implementation of RES-H/C GOs (which is presented in Section xxx) as well as the presentation/discussion of specific issues that the RE-DISS project identified to be relevant in the development of such systems. The aim of this presentation was to (i) get feedback from the competent bodies on the necessity and willingness to develop such systems as well as (ii) to discuss how these systems could be deployed in the MS.

From the consultation of different competent bodies across the EU, which have participated in the 4th RE-DISS Domain Workshop, they stated that they were not thinking about implementing a RES-H/C GO systems in their countries as this system is not obligatory and part of these countries are still struggling to implement operational RES-E and RES-CHP GO schemes. Also the participating domains that stated to have RES-H/C GO systems, such as Austria, will only develop further this system when there is demand for these GO, which has not happen yet at the time of writing of this report.

In terms of the potential design for such a system, the competent bodies did not raise any questions on the proposal put forward by the project. They agreed that as it is not something on the MS agenda, that it would be better to only provide a general guidance as the presented one.

In summary, even in the few countries that have established in its national legislation RES-H/C GO systems, these systems are not operational. Thus up until now no RES-H/C GO have been issued yet and there are no requirements or further secondary legislation established for this type of GO. The non-development of this system may be due to different reasons the main one being the lack of demand for this type of GO.

5 Applicability of RES-H/C GO

5.1 Potential Uses for RES-H/C GO

The RES Directive clearly states that GO do not have any function in terms of EU MS RES targets accounting. In addition, in the sense of the RES Directive GO have no role within the flexibility mechanisms related to the national RES targets. Therefore potential use for GO, and more specifically for RES-H/C GO, lies in the disclosure of the renewable origin of heating or cooling energy in the voluntary market. Within support system RES-H/C GO should not play any role, as according to the RES Directive RES-H/C GO should only be used for disclosure.

In terms of uses, RES-H/C GO could be used in principle for decentralised small-scale RES-H or RES-C installations or for large-scale grid-connected RES-H or RES-C installations.

In the case of decentralised small-scale RES-H/C installations, the producer and the consumer are generally the same actor, the heat and cold tend to be produced for private use in residential and non-residential buildings. Thus the implementation of a GO system in this specific case, and in particularly in the case of private households, does not seem to provide any practical benefits.

The grid-connected RES-H/C installations produce heat and cold separately from the consumer (in local or district heating/cooling systems), and the energy is supplied to the consumers through a heat or cold grid. Thus in this case, a RES-H/C GO system could have a role, especially in terms of larger supply systems where heat and cold produced from fossil fuels is also available. Here the GO would enable a clear allocation between the supplier and the consumer of the environmental value associated with RES-H/C. In the case of small local grids with few connected consumers GO seem to be of limited practicability due to the relative high cost-benefit ratio (the absolute costs for the certification and monitoring of production sites are relatively similar in small and larger installations). Thus one way to cancel out this effect is to set a minimum amount of energy in a heat or cool grid for which a GO is to be issued. This is also in line with the GO requirements in the RES-Directive: GO schemes could be restricted to large RES-H or RES-C installations, and should be issued only in response to a request from the respective producers. In such a case, only devices exceeding a minimum capacity limit would be eligible to the GO system.

In terms of technologies, RES-H/C GO can be applied to all technologies, but auditing and measurement mechanisms must be put in place.

5.2 Potential Links and benefits of RES-H/C GO with other certificates

In general heat and cooling are usually consumed close to where they are produced, which results in an absence of homogeneity and country-wide transmission grids like it is common in the electricity sector. In the case of district heating or cooling, these grids are generally limited in scale to a locality or a small region. Therefore, RES-H/C GO are only expected to be used in the region in which they have been issued.

As stated in the Directive, RES-H/C GO, similar to RES-E GO and CHP-GO, should only be used for disclosure and not for support. Nevertheless, a national certificate system with the same concept of a GO could play a role in administering a public support instrument for at least part of the RES-H/C production, which in principle could even be operated in a harmonised way across European Countries.

In a subsidy scheme, in which RES-H/C investors can apply to receive financial support for their investments, there seems to be no use for a certificate similar to a GO, as there is no need for documentation on the amount of heat or cold produced for this request. In this type of schemes the investors only have to prove fulfilment of the eligibility criteria, which may include proof that the investment has been made, proof that the production facility is operating (generally in a form of a statement by the facility installer) and, whenever necessary, proof that certain technological minimum criteria have been met (for example, quality certification of a solar collector).

In the case of a RES-H/C use obligation, a certificate system similar to a GO system may have a role in supporting the verification procedure. This type of mechanism imposes an obligation, specified in legislation, on parties to source a minimum amount of their energy use from RES; usually expressed as a percentage of the total estimated energy demand of the building or the facility. Thus a RES-H/C certificate system similar to a GO could be used to prove fulfillment of the obligation. However, the use of such certificates would not simplify the verification procedure as they would only reflect the amount of energy produced by a certain installation and thus might not provide all data necessary to verify the fulfillment of an obligation. However, there are variances of a use obligation where a certificate system similar to a GO system could have a role, for example in the introduction of compensation mechanism to reward the installations that over-fulfill the obligation. Here, as an alternative to physically sourcing a share of the H/C demand from RES, a more abstract allocation based on “support certificates” would be established. In this case the certificate could prove the over fulfillment of a given use obligation by one actor and make it transferable to other actors, which might not be able to meet the use obligation. Thus, a system of support certificates could create an incentive to optimally exploit a certain RES-H/C potential. In general, these certificates can be traded, banked or consumed and can be used to verify and provide flexibility in achieving compliance of the use obligation (the quota). Compliance is proved by each obliged actor through the submission and/or cancelling of a number of certificates equivalent to its quota obligation. In case that such a system of support certificates is to be established, it is necessary to tailor-make the certificate system based on the need of the support system. For example, the support certificates should only be issued for RES-H/C generation that is eligible under the quota system. In this case a certificate, which is technically quite similar to a GO, but different in legal terms, would be accepted as proof of compliance under quota schemes.

In bonus systems certificates similar to RES-H/C GO could have a similar role to the one in the quota systems. In the bonus systems the operators of RES-H installations are entitled to receive a fixed bonus payment for each unit of heat that is produced. Usually the heat is consumed at the site of production and the bonus is not paid for actual feed in, but for a surrogate (e.g. certificates) that represents the environmental value of a standard volume of RES-H/C (e.g. 1 MWh). In this system the RES-H/C producers only have to prove the quantity of heat or cold produced by submitting certificates issued for RES-H/C generation, which again are technically similar to a RES-H/C GO. Although this seems simple, there are some issues in terms of the practicability of a system like that, especially in the case of small-scale facilities. For small-scale installation the bonus can be paid on a different basis than heat/cold generated – simple parameters can be used, such as collector surface in the case of solar thermal – and in this case the bonus certificates do not seem to add value to the system, but it would certainly add costs. For larger installations, that are subject to more stringent monitoring requirements and need to provide proof of the RES-H/C actually produced, the bonus certificates could serve as a proof of evidence.

5.3 Potential demand for RES-H/C GO

It is somewhat unclear what the potential demand for the type of GO will be in the future. As it was reported above, the countries that stated that they have already established a RES-H/C GO system or that they will create such a system, have not yet received any request for the issuance of this type of GO. Obviously there is not (yet) any relevant voluntary demand for “green heat/cold”, which could be comparable to the demand for green power in the electricity sector. Furthermore, as discussed in the previous section, any system of transferable support certificates, which might facilitate a support scheme for RES-H/C, may not be based on RES H/C GO, but would rather have to use support certificates, which are different from GO at least in legal terms. Currently there is no relevant mechanism in sight, which could lead to a relevant market demand for RES-H/C GO.

6 General Recommendation for the development of a RES H/C-GO system

6.1 Guarantees of Origin for RES-H/C: as defined in the RES Directive

Article 15 of the RES Directive provides specific regulation and design requirements of the GO of electricity, heating and cooling produced from renewable energy sources. In respect to RES-H/C, the article states that:

- MS are allowed, but not obliged, to introduce a GO scheme for RES-H/C.
- GO schemes can be restricted to large RES-H or RES-C installations, and should be issued in response to a request from the users to the respective producers. In such a case, only devices exceeding a minimum capacity limit would be eligible to the GO system. Provided that a RES-H/C GO scheme is in place, each eligible RES-H and RES-C producer would be entitled to request a GO.
- H/C-GO should be of the standard size of 1 MWh and the same unit of energy from RES should be taken into account only once. Thus, each GO should reflect 1 MWh of RES-H or RES-C produced, to avoid double counting of the environmental benefit associated with RES-H/C.
- When establishing its RES-H/C GO schemes, MS are allowed to restrict the eligibility of these schemes to RES-H/C production that does not receive any other form of support.
- Although the RES Directive sets binding national renewable targets for all Member States, neither the GO for RES-E nor any GO for RES-H/C could be used in proving that a target has been met. Thus the compliance of Member States with the targets will not be influenced by cross-border transfers of any type of GO.
- Similarly to the RES-E GO, the RES-H/C GO should be an electronic document and the GO system should ensure electronic issuance, transfer and cancellation.
- The RES-H/C GO should be cancelled once it has been used, in order to avoid double counting of the value linked to a GO. The GO lifetime should be limited to a period of 12 months.
- In the case of implementing a RES-H/C GO scheme, a government body or a designated competent body (independent of the RES-H/C market players) shall supervise the main system activities (issue, transfer, cancellation). Only one body should be in place for each geographical region.
- The minimum information that should be displayed in a RES-H/C GO should be:
    - Energy source (e.g. biomass, solar thermal, etc.)

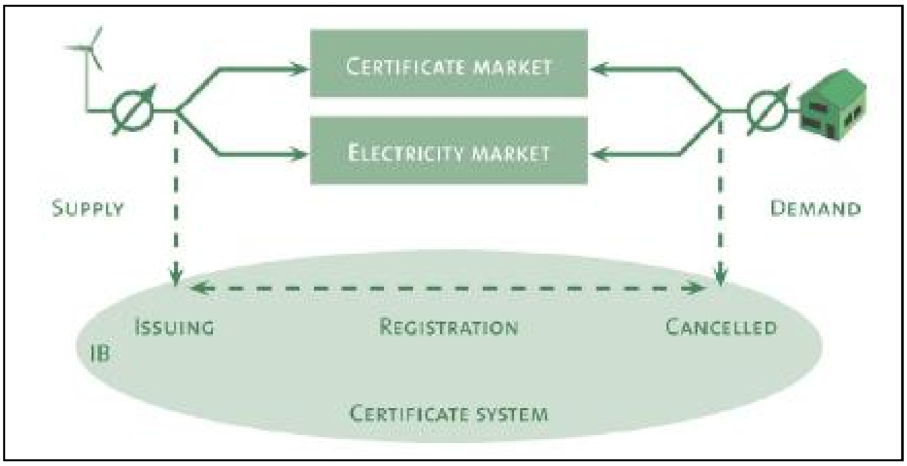
    - o Production period (start and end dates of production)
    - o The location, type and capacity of the production plant
    - o The date on which the production plant became operational
    - o Whether the respective production plant has received any form of public support, and in case it has, which kind of support has it received
    - o The date and country of issue and a unique identification number (which allows unambiguous identification of the production plant).
- A GO for RES-H/C that is transferred to another Member State can only be rejected if there are doubts about the reliability of the GO scheme under which it was issued.
- MS are entitled to adopt regulations that oblige energy suppliers which use GO to inform customers about which share of the delivered energy is from plants or increased capacity that started operation after 25 June 2009. This means that, for example, suppliers of district heating or cooling that are fully or at least partially fed by renewable energy sources and which are using GO to prove this, could be required to display this differentiation.

Although the RES Directive provides regulation and specific requirements for the implementation of GO schemes in MS, the 2009 RES Directive, similarly as the 2001 RES Directive does not specify the detailed design of such systems. Thus GO systems are individually determined in the respective countries.

6.2 Potential Design for RES-H/C GO system

In general a potential RES-H/C system could follow the same principles as the RES-E and RES-CHP GO systems: A GO for RES-H/C should be issued, transferred and cancelled. The RES-E GO system is illustrated in the following figure.

Figure 10: Scheme for the GO process independent of the physical electricity market (RECS)



Producers/market participants which wish to have GO issued firstly need to register with the national issuing body and the required data about the production site and its technical features should be recorded in the registry system. For requesting the issuance of GO for a given production, an independent auditor could be required to compile a Renewable Energy Declaration with the data of the respective production site and the energy input used for H/C production. A GO is then issued for each MWh of energy produced from RES and is electronically stored in a central database. These GO can then be transferred to other market participants, either in the country of origin or in other EU countries, provided that these countries have also established a compatible system of GO for RES H/C. When the value of the GO is realised, it is cancelled. When cancelled, the GO is removed from circulation and market participants can no further use that GO (however its information is kept in the registers as cancelled data). As specified in the Directive, each GO has a maximum lifetime of 12 months.

A GO for H/C should encompass information on the amount of RE energy used for the production of 1 MWh of heat or cold, the energy source from which the heat or cold was produced as well as the place and the time span of production. Also it should have a unique identification number and related technical information on the production device. Additionally it would have to include information whether the production of RES-H or RES-C or the investment in the production device has been supported under any public funding scheme (e.g. quota system or feed-in).

The European Energy Certification System, called EECS scheme, is operated by the Association of Issuing Bodies (AIB) supports RES-E GO as well as RECS certificates for renewable source electricity, CHP-GO for electricity from high-efficient cogeneration and disclosure certificates for fossil and nuclear source electricity. Under these systems GO are issued, transferred domestically or between actors in different countries and cancelled.

AIB is currently discussing the potential impact of opening up the EECS system to GO for RES-H on its own rules and structure (but also for biogas or white certificates for energy efficiency). Also the question whether there should only be one institution per country representing the different forms of GO is being discussed.

A joint working group on "Guarantees of Origin and Energy certificates" has been set up by CEN/CENELEC. It aims to establish a CEN/CENELEC standard for RES-E GO, which includes the definition of the terminology and requirements for registration, issuing, transfer and GO cancellation as well as measurement and auditing methods. In the longer term GO for RES-H/C could also be addressed as well by this standard, and also other energy certificates (e.g. white certificates).

6.3 Recommendations for implementing a RES-H/C GO system

RES-H/C GO can be implemented by EU MS to disclose information to consumers on the renewable origin of heating and cooling supplied. For this purpose the GO should provide all necessary information as specified in the RES Directive, namely:

- Energy source (e.g. biomass, solar thermal, geothermal etc.)
- Production period (start and end dates of production)
- The location, type and capacity of the production plant;

- The date on which the production plant became operational
- Whether the respective production plant has received any form of public support, and in case it has, which kind of support has it received
- The date and country of issue and a unique identification number (which allows unambiguous identification of the production plant).

If such a system is established, one RES-H/C GO should be issued by a competent body for each MWh of heat or cold produced. This GO should be an electronic document and should be registered in an electronic register which is maintained and kept by the respective competent body. For a RES-H/C GO to be issued the RES-H or RES-C installation should first be registered and technical information on the installation should be supplied to the competent body. When issued, the GO can be transferred to other suppliers or used (and in this case, cancelled) within 12 months after the end of the heat or cold production period. In case that the GO are not used within its lifetime, they should be collected and automatically cancelled. The competent body operating the electronic register for RES H/C-GO should possess all information on the life-cycle of each GO.

Within the scope of disclosure of the origin of H/C, GO system probably only make sense in case of RES-H/C installations connected to H/C grids, especially in larger supply systems (where heat and cold produced from fossil fuels is also available). In such systems the differentiation between renewable and other H/C makes sense, and the cost for setting up and operating such a system could be justified. According to the RES-Directive MS may establish a minimum capacity limit that would be eligible for participation in a RES-H/C GO system.

In the case of considering the implementation of a RES-H/C GO system for disclosure, MS can follow some of the recommendations of the RE-DISS project in their system design and operation, such as the 12 months lifetime rule, subject to some adaptations needed for the specifics of the RES H/C sector (such as the minimum size of larger installation for which GO may be requested). Other elements of the RE-DISS Best Practice Recommendation for the electricity market, e.g. the concept of residual mixes and details of the timing for disclosure, seem not to be transferable to the sector of RES H/C.

7 Concluding Remarks

In terms RES-H/C GO the RES Directive made optional for the MS to create H/C-GO systems that should be used for the disclosure purposes. Although the RES Directive provides regulation and specific requirements for the implementation of GO schemes in MS, the 2009 RES Directive, similarly as the 2001 RES Directive does not specify the detailed design of such systems. Thus RES-H/C-GO systems need to be individually determined in the respective countries, similarly to RES-E and RES-CHP GO systems.

Within this, and although RE-DISS aims at improving significantly the reliability and accuracy of the Guarantees of Origin (GO) for electricity from renewable energy sources (RES) and from high-efficiency cogeneration and of the electricity disclosure information provided to consumers across Europe, the project also looked into the potential development of a RES-H/C GO system for RES.

In that, the project analysed the: support systems used at the EU level for the development of RES H/C systems; potential uses and potential demand; as well as well as analysed the status of implementation and willingness of the MS in the adoption of such systems.

From the analysis of the support schemes there are some types of support systems for RES-H/C, which could be operated based on transferable support certificates. However, the RES Directive clearly states that GO may not be used for such purposes. Therefore, although such support certificates might be technically similar to GO, they must have a different form in legal terms.

In terms of applicability, the project found that:

(i) RES-H/C GO probably only make sense in case of RES-H/C installations connected to H/C grids, especially in larger supply systems (where heat and cold produced from fossil fuels is also available)[1]. In such systems the differentiation between renewable and other H/C sources makes sense, and the cost for setting up and operating such a system could be justified. According to the RES-Directive MS may establish a minimum capacity limit that would be eligible for participation in a RES-H/C GO system, thus this minimum amount of energy in a heat or cool grid for which a GO is to be issued should be established in order to avoid very high costs in smaller system (small local grids) where these type of GOs may be of limited practicability.

(ii) RES-H/C GO can be applied to all technologies however auditing and measurement mechanisms must be put in place.

Moreover, the project is also of the opinion that if a GO system for RES-H/C is to be established, that the system could follow the same principles as the RES-E and

[1] For small-scale RES-H/C installations, where the producer and the consumer are generally the same actor (the heat and cold tend to be produced for private use in residential and non-residential buildings) GO system does not seem to provide any practical benefits

RES-CHP GO systems (a GO for RES-H/C should be issued, transferred and cancelled) and most of the recommendation proposed under the RE-DISS project for RES-E and RES-CHP GO could be transferable to a RES-H/C system.

From the analysis of the status of implementation of such system at the MS, it was clear that only very few countries had created RES-H/C GO systems within their national legislation. However, in all these countries the detailed procedures have not yet been developed or implemented, mainly due to the lack of demand for such certificates. Moreover, when consulted at the 4th RE-DISS Domain Workshop, RE-DISS project participating domains did not demonstrate greater interest to establish a GO system for RES-H/C in the near future. At the moment a large part of the participating domains are still working on the implementation of a robust RES-E and CHP-GO system.

The biggest challenge in relation to GO for RES-H/C seems to be the creation of a market environment where a voluntary demand for RES-H/C can emerge. As long as this is not achieved, there is hardly a justification for the effort to implement RES-H/C GO systems.

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