Heat from Renewable Energy Sources

The RES-H initiative and related Directives

Contractor:

VHK
Van Holsteijn en Kemna BV

Ir. R. Kemna
Ir. M. van Elburg

Delftech Park
Elektronicaweg 14
2628 XG Delft
Netherlands

Client:

European Commission,

Climate Change Unit, DG ENV
contact: Stefaan Vergote

in collaboration with Unit D1, DG TREN
contact: Randall Bowie

Rue de la Loi 200
1100 Brussels
Belgium

VHK nr. 332, 5 Sept. 2002

MANAGEMENT SUMMARY

During the first phase of the ECCP[1] (European Climate Change Programme, concluded in June 2001) the idea of a Directive promoting the use of heat from renewable energy sources (hereafter called the "*RES-H Directive*") was put forward. This legislation would complement other types of actions mentioned in the Commission's 1997 White Paper on 'Energy for the Future: Renewable sources of Energy'[2]. And it would be modelled on the format of the RES-E directive[3] for electricity from renewable energy sources, i.e. covering targets, support schemes, certification, easier administrative procedures, etc. for heat from

- biomass (e.g. local space-/hot water heating, CHP and distributed heat, district heating)
- active solar systems (e.g. local space-/hot water heating)
- geothermal sources (including heat pumps to an extent [4]).

This is an important area for energy conservation and thereby CO2 emission reduction[5]. In addition, it is an even more important area for Security of Energy Supply [6]because indigenous energy sources are used. The Commission's 1997 White Paper mentions a heat production from renewable sources of 38.7 Mtoe in 1995 (mainly biomass) and a projection of 80 Mtoe in 2010 for active systems, to be supplemented by 35 Mtoe for passive solar (building design contributing to space heating). In terms of primary energy, <u>RES-H is six to seven times more than RES-E (excl. large hydro)</u> and thereby very important in achieving the 12% objective for renewables.[7]

Nonetheless, it has been questioned whether a separate Directive is really needed, as grid issues with heat distribution are less prominent and because of a number of other legal instruments that are in place or being proposed that also cover at least some of the RES-H issues, such as

- the *RES-E Directive*[8], (2001)
- the *Performance of Buildings Directive*[9] (expected Summer 2002) and
- *CHP Directive* and a directive on *Energy Services* (under development)

This report gives a short update of the current status of RES-H in the EU, identifies barriers to deployment and sketches the saving potential. In the final chapter, it is checked to what degree the elements of RES-H are covered by the four existing/ planned directives mentioned above.

---

[1] COM (2000)88 final
[2] COM(97)599 final.
[3] Directive 2001/77/EC: "... on the promotion of electricity produced from renewable energy sources...", mainly relating to electricity from phoptovoltaics, wind and hydro.
[4] RES-H with heat pumps, who also consume fossil or electric energy, relates only to the free energy part (e.g. temperature differences with ambient). This also excludes types of heat pumps that do not use free energy.
[5] Kyoto target.
[6] COM(2000)769. Green paper: Towards a European strategy for the security of energy supply.
[7] Compare: EU-15 inland consumption 2000 is 1384 Mtoe (Eurostat 2002)
[8] Directive 2001/77/EC: "... on the promotion of electricity produced from renewable energy sources..."
[9] COM(2001)226 final: "Proposal for a Directive ... on the energy performance of buildings"

Main findings:
The RES-E directive gives a definition of renewable energy sources, but leaves out heat pumps (free energy from ambient temperature differences). Targets, certification, support schemes, etc. for RES-E will help RES-H only when the green electricity comes from CHP plants (e.g. biomass), but there are no specific targets nor certificates –certainly not at an EU level—for heat production.

The Buildings Directive is a Council directive that will be implemented by Member States in the coming years. It should be this implementation that will contain parameters which favour certain technologies and – given existing national building performance legislation in Member States - it is very likely that these parameters will favour biomass boilers, solar water and space heaters, heat pumps and other forms of (especially local) heat production from renewables, following article 5 of the Directive. But – at this stage - it is too early to tell. There will not be specific targets for RES-H, but it is envisaged that any targets under this directive will relate to the primary energy requirement of the new buildings and renovated large existing buildings (>1000 m^2) as a whole.

The presently developed CHP directive will be centred around the concept of promoting 'high efficiency CHP', for which support schemes and certification will be used and saving potentials established. And in that context the reference values for CHP from renewable energy sources compare very favourably to e.g. CHP from fossil fuels. In other words, the efficiency requirements for a CHP plant using e.g. biomass are far less stringent to be qualified as 'high efficiency' than for e.g. a fossil fuel fired plant.

The CHP directive does not give targets: not for CHP as a whole, let alone for CHP from RES-H. Member States will be required to identify saving potentials. It does however intend to deal with other elements for a possible RES-H directive, such as provisions laying down the principles for the interaction between cogeneration producers and the electricity grid ('grid issues'), provisions to facilitate grid access for cogeneration units using renewable energy sources and provisions requiring Member States to evaluate current administrative procedures with a view to reducing the administrative barriers to the development of cogeneration.

A directive on Energy Services is underway[10], aimed – amongst other things—at facilitating and promoting active energy services such as performance contracting, leasing, selling, renting appliances by energy services companies (ESCOs). For these ESCOs, which might or might not be utilities, the supply of (district) heat is often an important 'service product'. Certain extra provisions in this directive-to-be could promote heat from renewable energy sources (RES-H).

Summary of Conclusions

1. Coverage of RES-H.
The existing and upcoming legislative action covers a significant part of the issues that would be part of a possible RES-H directive, especially regarding support, certification, grid issues and administrative procedures for CHP from RES and local RES-H solutions in new buildings and large existing buildings (>1000 m^2) when they are renovated. The promotion of district heating (DH) plants from RES-H (non-CHP) could partly be covered through extra provisions on the subject by the Energy Services directive that is underway.

[10] Stakeholders meeting 8.5.2002

2. No specific coverage of RES-H

Certain opportunities for promoting DH from RES through legislation will not be covered, which might be an important subject in view of the New Accession Countries (NACs). Specific RES-H targets are also missing, but could partly be an integrated part of targets for the energy performance of buildings or an integrated part of the saving per Member State for CHP.

Also, more in general, the existing and upcoming legislation will not cover RES-H related to small scale biomass boilers and thermal solar in existing buildings smaller than 1000 m^2, nor does it cover larger scale application of biomass boilers in industry, waste heat from biomass power plants, etc.. Depending also on the evolution of the Buildings Directive, the existing and planned directives might miss out on more than half of the RES-H applications.

3. Option 1: Directive.

A major problem is, that at this point in time, there are no guarantees and there is no apparent or explicit strategy for the legislation that interfaces with the various areas and aspects of RES-H. This could be a reason to embark on a process to develop a RES-H Directive with specific targets and explicit links to the other legislation, covering also the missing subjects mentioned under point 2.

4. Option 2: Communication

On the other hand, within the timeframe of two to three years that it takes to establish a Council directive, more certainty could be obtained from implementation in MS under the Building Directive and from Member States' projections for CHP. In addition, the direction of the forthcoming directive Energy Services—especially regarding the issue of District Heating—would become clearer.

As an alternative to immediately starting the preparation of a RES-H Directive, it is therefore conceivable that the Commission prepares a Communication that

- clearly sets out an overall <u>strategy</u> for the promotion of RES-H (through legislation), possibly with indicative targets at EU and MS level based on a thorough background study.
- lists legislative (and non-legislative) <u>actions</u>, under implementation and soon to be implemented, related to RES-H and how they interact,
- provides a <u>time planning</u> for these actions
- gives an impact analysis of the relevant directives, forthcoming and already in force and
- announces a <u>review</u> of the strategy in 2005, especially in the light of the legislation mentioned above that will develop in the 2002-2005 period and the expected effectiveness of the legislation in the promotion of RES-H especially regarding New Accession Countries (NACs), and will on that basis decide whether <u>at that time a separate RES-H directive</u> is needed and how it should be shaped.

5. Future work needed.

For both options mentioned in point 3 and 4 a thorough background study is needed. Special focus points ('white spots') that should be covered are:

- Heat production from <u>biomass</u>, which is by far the most important source for RES-H but also an area where vital market data are lacking
- <u>Drivers and barriers</u> for RES-H especially in NACs
- An inventory of <u>policies, actions and measures at MS level promoting RES-H</u>

Table: RES-H Aspects covered by some existing and planned directives

	Possible RES-H articles	**A**: RES-E dir.	**B**: Building dir.	**C:** CHP dir.	***Remarks***
1	purpose				Reference to RES but not to heat
2	definition				Definition of RES but without heat pumps
3	Targets				No specific RES-H targets, but RES-H promotion implicit in RES-electricity from CHP(**A**), targets for primary energy building (incl. RES-H) (**B**) and reporting on MS saving potential CHP (incl. RES-H) (**C**)
4	support schemes				**A:** includes MS support for CHP from RES; **B:** favourable parameters for RES-H in MS implementation directives; **C:** includes MS support for CHP from RES
5	certification (origin)				no certificate for RES-H, but certificates for green electricity (**A**), buildings energy performance (**B**) and CHP(**C**)
6	admin. procedures				administrative barriers adressed with CHP (incl. from RES-H) in (**A**) and (**C**)
7	grid issues				grid issues handled in (**A**) and (**C**), not applicable in local RES-H (**B**)

Area gives a qualitative indication of coverage by these directives

= relates to general issues

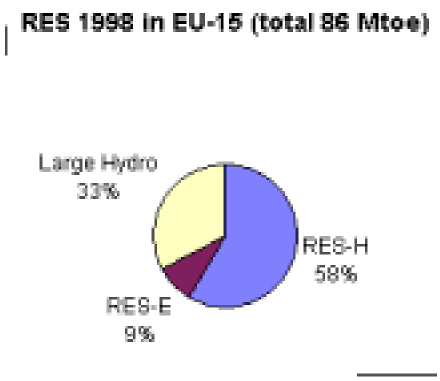
= relates to RES-H from CHP *(biomass, etc.)*

= relates to local RES-H *(biomass boiler, solar, etc.)*

Graph: RES-H Areas covered by some existing and planned directives

(Partly) covered by directives

RES-E
Small Hydro (& large Hydro) 3
Biomass electric 3
Wind 1
PV 1
Tidal, wave
Biomass CHP
Biomass DH (ESCOs)
Biofuels
Buildings new and large (max. 20%):
Biomass DH
Biomass CH boilers & WH
Geothermal heat & heat pumps
Solar thermal



No or partly specific coverage

Industrial biomass boilers/heat ***(partly IPPC)***
Biomass DH (non-CHP, non-ESCO)
Waste heat of biomass power plants
Landfill-gas
Municipal solid waste
Biogas, sewage, etc. (Agro-food)

Partly: Buildings existing and <1000m2 : (boiler replacement, e.g. 50% till 2010)
Biomass CH boilers & WH
Biomass local & aux. heating(stoves)
Geothermal heat & heat pumps
Solar thermal

Contents

1 INTRODUCTION

1.1 The ECCP

During the first phase of the ECCP (European Climate Change Programme) in the first half of 2001, Working Group 2 of the ECCP came forward with the idea of a "clean energy" family of Directives, based upon the approach as laid down in the *RES-E Directive* [[11]]. The idea behind this family of Directives was to extend the RES-E approach to cover other forms of renewable energy such as heat or fuel from renewable sources.

In the second phase of the ECCP it became apparent that one of these proposed "clean energy" Directives, the so-called *RES-H Directive* (on heat from renewable energy sources) struck a chord with some of the stakeholders involved. It therefore became necessary to take a closer look and explore the idea, taking it beyond its first phase and checking its relevance against other existing and planned policies and measures.

This report describes this last activity, to weigh up the relevance of a possible RES-H Directive against other policies, existing and planned, on the same subject. Four Directives have been identified that interlock with the RES-H objectives. These Directives are: the *RES-E Directive*, the *Directive on Energy Performance of Buildings* (proposal), the *CHP Directive* (proposal) and the directive on *Energy Services* (under development).

1.2 Structure of the report

Chapter two presents an overview of the current status of application of RES-H in the EU. The number of systems installed and sold annually are presented, together with current trends and opportunities relevant for the uptake of RES-H systems.

Chapter three describes the policies (existing and planned) with relevance to the uptake of RES-H. In this Chapter elements of the *RES-E Directive*, the *Directive on Energy Performance of Buildings* and the *CHP Directive* are assessed for their potential effect on increasing application of RES-H systems. The last chapter gives the conclusions.

[11] Directive 2001/77/EC of the European Parliament and of the Council on the promotion of electricity produced from renewable energy sources in the internal electricity market of 27 September 2001 ("RES-E Directive").

2 HEAT FROM RENEWABLE ENERGY SOURCES (RES-H)

2.1 Introduction

The main objective of a RES-H Directive would be to enhance the application of heat from renewable energy sources in the EU. Before we can assess the effect of other Directives on the application of RES-H, some aspects should be clarified. First, what are “renewable energy sources” and their applications and, second, what is the state-of-play of RES-H systems in the EU? This Chapter aims to provide an answer to these questions.

2.1.1 Heat from Renewable Energy Sources

Heat is used in the residential, services and industry sectors of society for space heating and tap water production. Process heat is used in the industrial sector. Normally heat is produced by combustion of fossil fuels, but renewable energy sources can be used to provide heat with a low or neutral contribution to CO_2 emissions.

In the *RES-E Directive,* the following definition of Renewable Energy Sources (RES) is applied:

“Renewable energy sources” shall mean renewable non-fossil energy sources (wind, solar, geothermal, wave, tidal, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases).

Not all renewable energy sources are equally fit to provide in heat. Of these renewable energy sources, only solar, geothermal, biomass, landfill gas, sewage treatment plant gas and biogases become available in the form of heat (solar, geothermal) or are usually converted into heat. Of these sources, landfill gas and sewage treatment gas are usually directly converted into electricity on-site by combustion, while biogases are still in development stage.

A renewable heat source which is not included in the RES-E definition of RES is “ambient heat”. Ambient heat can include geothermal heat but also heat from (exhaust) air or water (ground water or surface water). With the use of heat pumps this ambient heat can be elevated to the temperature level used for space heating or tap water production.

The three main forms of renewable energy sources for heat are: biomass, solar and geothermal (including ambient heat from heat pumps).

2.1.2 EU Overview

Renewable energy policy at EU level is based on the European Commission's White Paper for a Community Strategy and Action Plan[12] . This strategy aims to double the share of renewable energies in gross domestic energy consumption across the EU from the present 6% to 12% by 2010, and includes a timetable of actions to achieve this objective.

The following table shows the situation in 1995 and the projections 2010 from this White Paper.

[12] "White Paper for a Community Strategy and Action Plan, Energy for the Future: Renewable Sources of Energy" (COM(97)599, 23.11.97).

Table 1.
RES-H (White Paper 1997)

Type of Energy	Actual in 1995 (in Mtoe)	Projected by 2010 (in Mtoe)
1. Biomass	38 ,04	75
2. Geothermal (incl. Heat pumps)	0 ,40	1
3. Solar Thermal Collectors	0 ,26	4
Total Renewable Energies	**38 ,7**	**80**
4. Passive Solar	-	35

Source: COM(97)599, 23.11.97

This overview shows the importance of biomass as renewable energy source in total energy consumption.

Heat pumps are a somewhat awkward application of renewable energy sources since they still require input of primary fossil energy (f.i. natural gas) or electricity in order to elevate ambient heat to a useful temperature level. Some sources therefore do not consider heat pumps as an application of a renewable energy source, other sources might call them a hybrid application (partly renewable and non-renewable). In this report, the authors chose to include heat pumps as an application of renewable energy sources.

The same goes for heat from waste inceneration, which is often not considered as a renewable energy source in a general sense, but certainly contributes to a sustainable energy situation and security of supply.

The following paragraphs describe the state-of-play of RES-H applications in the EU:

- Biomass, with a focus on two market segments:
  - small scale biomass boilers and
  - biomass district heating
- Solar Thermal
- Heat Pumps
- Geothermal

2.2 Heat from biomass

Heat production from biomass amounted to 38.04 Mtoe (=1592 PJ= 440.9 TWh) in the EU 1995.[13] In the White Paper on Energy for the Future, the Commission's projection for 2010 amounts to 75 Mtoe. The Atlas database, however, is less optimistic and predicts that heat from biomass will not grow in 2010 with respect to 1995. In any case, heat from biomass constitutes by far (>90%) the largest heat production from RES.

Main market segments for biomass heat are:

- ***Small scale*** space-heating application of firewood in ***traditional stoves and open fireplaces:*** By far the largest market. Casual and unregulated character does not allow for reliable statistics. The decline of traditional rural lifestyles is threatening the informal structures of fuelwood use. Often low energy efficiency of 20-25% and questionable environmental merits. But cleaner and higher efficiency alternatives exist)
- ***Small scale*** space- and hot-water applications of ***modern biomass boilers***. Emerging market (approx. 1 million installed in the EU). Fuel is usually pellets (with or without auto-feeder), wood logs, etc.. Energy efficiency in the 70-80% range (on l.h.v.[14]). Relatively clean combustion. Larger installations used for heating of flats.
- ***Larger scale: Dedicated biomass boilers for district heating (DH).*** Fuels are hay, grass, peat, wood. Sometimes biomass is combined with waste. Small part of DH installations, esp. in Scandinavia. Also an alternative in converting coal-fired DH plants. Smaller installations used for block heating. Possibly interesting alternative in the modernisation/decentralisation of DH-grids in NACs.[15]
- ***Larger scale: Industrial heating boilers*** (e.g. from waste products in their own production; paper and pulp industry, sawmills, etc.)
- ***Larger scale: District Heat from biomass-fired cogeneration (CHP) plants.*** In the EU-15 more than 70% of DH comes from CHP. Same considerations as above. In the NACs, the CHP share in DH can be as low as 25%.
- ***Large scale: Biomass as additional mixing-fuel in coal-fired power plants, which then use their waste heat for district heating.*** Emerging as 'greening' strategy of coal-fired plants. Example: Applications were filed in the Netherlands for 4 such projects, saving in total 1.8 Mton CO2.[16] Most merits will go to RES-E, but a part should be partitioned to RES-H as a heat outlet.
- ***Large scale: Biomass conversion to solid, liquid, gaseous (bio)fuels***, which can consequently be used to produce – amongst other things—heat. Examples are pellets (e.g. from biodegrable fraction of waste), liquid biofuels for cars or industrial heating systems and biogas (from landfill, sewage, etc.)

As mentioned, reliable statistics are difficult to obtain, as a large part of the biomass heat production has a 'casual' and unregulated character. An extra difficulty arises from heat of 'waste incineration', which in some countries is classified under RES and in others is not.

---

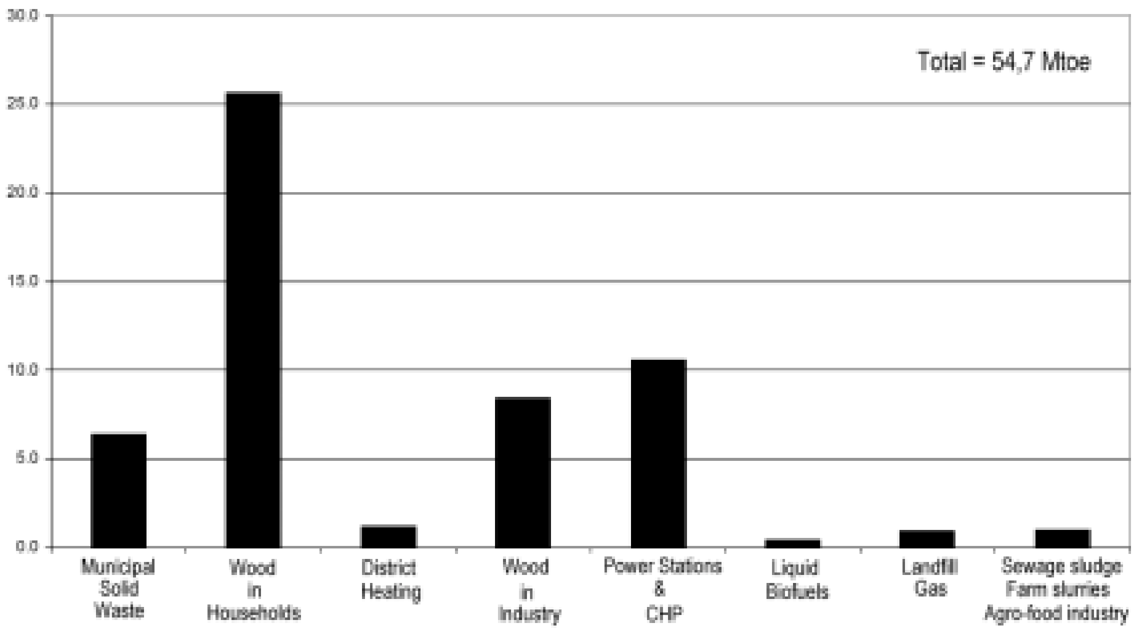
[13] COM(97)599 final. Conversion factors: 1 Mtoe= 41.86 PJ = 11.59 TWh of heat
[14] lower heating value
[15] See also conclusions from PHARE programme.
[16] http://www.co2-reductie.nl/actueel/pers_4_2002_frameset.htm . Relates to 'Convenant Kolencentrales', 2002 agreement between government and electricity producers

The graph below gives an overview of what Eurostat listed as biomass in 1998. The 54.7 Mtoe relates to both heat and electricity generation uses of biomass. And it has to be remembered that this graph is based on (fuel) input and not (heat and electricity) output.

Within the time constraints of the ECCP we therefore concentrate on only a few segments: small scale residential biomass boilers, which are very relevant to the Building Performance Directive, and DH/CHP biomass plants, which are partly relevant to the CHP directive and partly are not covered (yet) by existing/upcoming legislation.

In any case, it is clear that future work is needed to get a better insight into the application of biomass.

Fig. 1.
Biomass resources EU 1998 (for heat and electricity) according to Eurostat (in Mtoe)



2.2.1 Small scale - residential biomass boilers

In this paragraph small-scale biomass boilers are boilers for residential use or use small services (capacity < 50 kW, for space heating and tap water production of one building only), fuelled by either wood logs, wood pellets, straw or other renewable, organic matter.

Stock and sales

Small-scale biomass boilers in the EU are primarily used in Austria and the Scandinavian countries, but also in Germany and for instance Spain. The list below presents the stock of biomass-fired boilers in these countries:[17]

- Austria: 514.000 dwellings (18% of all dwellings) use wood as fuel for main heating. This number can include dwellings that share their heating system, so the actual number of biomass boilers is probably less than 514.000. The same source indicates that 75.000

[17] comm.. CGB 2002

dwellings use tiled wood-fired stoves as main heating system. Some 425.000 households use tiled stoves for additional heating purposes [eva];

- Sweden: 270.000 dwellings (18% of total of single family dwellings) are heated by biomass boilers and another 100.000 boilers are installed as secondary heating systems [nordic ecolabelling];
- Finland: 100.000 dwellings and farmer houses are heated by biomass boilers [eva] [nordic];
- Denmark: some 80.000 biomass boilers are installed in the residential and small services sector. Nordic Swan suggests that only half of these function as primary heating systems. Some 300.000 wood stoves are used as secondary heating systems. [eva] [nordic];
- In Norway, some 40.000 dwellings (less than 2% of the total 2.1 million households) indicate that they use solid fuel as the main heat source. Most of these households use stoves, not boilers [nordic];
- Germany has 380.000 dwellings that use wood or other RES for their primary heating systems (1.1% of dwelling stock) [bundes-statistisches ambt]. It is unclear how many of these dwellings are heated by shared heating systems (block heating, district heating), so the actual number of boilers remains unclear;
- In Andalusia (Spain) some 116.000 dwellings are heated using biomass [eva].

The assessment of the number of biomass boilers is hindered by unclear country statistics. In many cases there is no clear distinction between:

- biomass boilers and solid fuel boilers (the latter includes coal and peat-fired boilers);
- boilers installed in the residential sector, services sector or industrial sector;
- individual and shared boilers (number of households heated by biomass boilers or number of biomass boilers installed).

Besides this number of installed biomass boilers is a large range of secondary or auxiliary heating systems fuelled by biomass such as stoves, (open) hearths and fireplaces. In many countries the size of this auxiliary range is many times bigger than the biomass boiler market (in the Netherlands and Finland one million stoves and fireplaces are installed in each country).

The total of these main markets (excluding Germany and Spain) suggests a stock of at least 1 million biomass boilers as the main heating system in dwellings. Considering a product lifetime of approximately 20 years, this should represent a sales market of around 50.000 units (or circa 1% of the total boiler market).

The largest markets of biomass boilers in the EU are in Austria and the Scandinavian countries. Sales of biomass boilers reached 10.000 units in Austria, 3.000 to 4.000 units in Denmark, some 800 units in Finland and less than 500 units in Sweden and Norway. Other EU countries report sales of a maximum of a few hundred biomass boilers, which are too negligible to quantify [http://www.eva.wsr.ac.at/opet/bioboiler/ for AU, DK, FIN and Andalusia-ES].

Interesting markets are formed by Switzerland (sales of 2.000 units per year) and the new accession countries (Poland, Czech Republic, Hungary). In Poland per year some 60.000 solid fuel boilers are sold (mainly coal fired boilers), but this number probably includes block heaters over 50 kW and service or industrial sector sales [CGB biomass].

Wood boilers are mainly manufactured in Sweden, Finland and Denmark (some 30 manufacturers and 250 type approvals), but also in Austria and in Italy. Pellet boilers are mainly manufactured in Denmark, Italy, Austria, Germany and Sweden (Sweden is the world's second largest pellet producer after the US).

Energy

It is difficult to give an exact estimate of the fossil fuel that is saved because of the use of residential biomass boilers. However, using the figure above of 1 million biomass boilers installed and an average energy consumption for space heating of 10.7 MWh/hh/yr in 2000 that was determined in a recent SAVE study on space heating[18], we arrive at an estimated saving of 10.7 TWh or almost 1 Mtoe.

Drivers and barriers

Important market drivers are:

- The existence of a solid fuel or oil boiler tradition. The major boiler markets (Germany, France, UK and Italy) all have extensive gas networks. It is not likely that households with gas boilers will tend to switch to biomass fuel. More potential for biomass boilers is found in countries without gas networks.
- Relative prices between fossil fuels and biomass fuels. Rising fossil fuel prices have shown to have an positive impact on sales of biomass boilers.
- The availability of biomass fuels. Networks for wood log, chip and pellet distribution are growing, for instance sales of pellets at petrol stations.
- Existence of incentives for installation of biomass heating. In Denmark, government subsidies have significantly boosted biomass boiler sales.

An important barrier to the uptake of biomass boilers is the higher investment costs of biomass boilers compared to conventional boilers (although the running costs might be lower).

Rise in biomass boiler sales is mainly foreseen in the higher output capacity areas (block heating etc.) and located mostly in the new accession countries. However, Germany also has a large potential (sales are expected to triple in the coming years) [cgb biomass].

2.2.2 Large scale - Biomass district heating and CHP

Heat from renewables can also be generated in large-scale heating systems (connecting two or more buildings), such as block or district heating systems. Combined Heat and Power plants can also use renewables as fuel, providing green electricity and heat.

[18] SAVE study on heating systems labelling/ standards, BRE 2001.

Market size

The table below gives an overview of the development of district heating in the EU 1994-1999, showing that the total heat delivered to the pipeline system amounted to 248.6 TWh (21 Mtoe). Source: Euroheat & Power 2001.

Table 2.
District heat in Europe output 1999 and trends

	Maximum heat output capacity	Change 1994 -1999	Heat delivered to the pipeline system	Change 1994 -1999
	1999		**1999**	
	MWth	**%**	**GWh**	**%**
Austria	6000	17,6	11893	34,6
Denmark	17500	15,9	31200	10,1
Finland	17810	9,4	28790	7,2
France	18298	-14,6	27446	-17,1
Germany	44889	-3,7	92047	-2,8
Italy	2911	40,4	4371	89,6
Netherlands	4310	10,4	6400	39,3
Sweden	29000	3,4	46535	5,1
Total	**140718**		**248688**	
Change	2190	1,6	5723	2,4

Source: Euroheat & Power 2002

The development in district heat capacity relative to previous years is more diversified than the development in market shares. Capacity construction in Austria, Denmark, Finland, Italy and the Netherlands is up, even significantly in the case of Italy. The development has been negative in both France and Germany. In Germany, the advance of liberalisation of the energy market has made the compilation of statistics more difficult, which could provide part of the explanation. Several larger networks are not reporting data. In France, it appears certain that production capacity has decreased.

Looking to actual production of district heat, it appears that production in most countries has increased more than the increase of capacity build-up. This would indicate more efficient use of equipment. Again with the exception of Germany and France, production has been increasing from 1994 - 1999, with substantial regional differences. Production of heat in Italy is increasing much above the 2,4% average of the surveyed EU countries. [Euroheat & Power, 2002]

Share of CHP

The link between district heating and Combined Heat and Power (CHP) is close in the EU. In almost all EU countries where district heating plays a role, district heating is produced in plants that also generate electricity. In Austria, Denmark, Finland, Germany and the Netherlands, 68-90% of the heat is generated in electricity generating plants. This high proportion is an indication that the efficiency of fuel utilisation generally is very high in these countries. The district heating networks in Greece are supplied by power plants, and thus reach 100%.

Table 3.
District Heat produced by CHP

	Heat produced in CHP %
Austria	68
Denmark	72
Finland	75
France	8
Germany	79
Greece	100
Italy	n.a.
Luxembourg	75
Netherlands	90
Sweden	
United Kingdom	5

Source: Euroheat & Power 2002

Sweden stands out as a country where the amount of CHP generated electricity is generally quite low. The abundant hydro and nuclear power resources in the region remains a barrier to the expansion of CHP generated electricity.

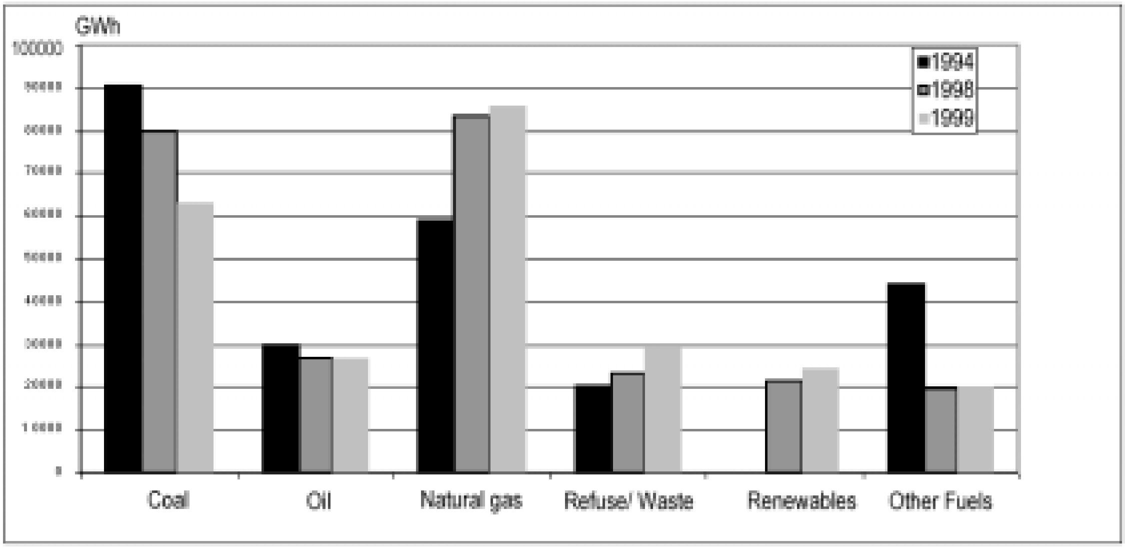
France and the United Kingdom have a large potential for CHP electricity generated in district heating systems, but presently less than 10% of district heating is produced with electricity. There are however signs of a change in the situation.

Share of Renewables

Of the total of 248.6 TWh, around 10% is produced from renewables/biomass (24 TWh= 2.1 Mtoe). And between 1998 and 1999 the amount of renewables rose by 13% (see graph next page). Given that 7% of the total residential space heating in the EU comes from District Heating, this means that 0.7 % comes from biomass-fired district heating.

Remarkable is the 12% share of DH from waste/refuse, which –although debated with respect to its environmental impact—in any case avoids the use of fossil fuels, which is beneficial to the EU’s Security of Supply target.

Fig. 2.
Primary energy used in for district heat and CHP production, EU total, 1994 – 1999



source: Euroheat & Power 2002, District Heat in Europe – 2001.

New Accession Countries (NACs)

District heating is a far more important source of energy in the NACs than in the EU-15. Central and Eastern Europe have long traditions of district heating, even today the market share of district heating is very high, ranging between 13 and 70% of the market, with great technological differences, mostly depending on past history. Systems in Slovenia, Croatia and Yugoslavia (Serbia) are close to "western standards", while countries mostly marked by the soviet model of planning have been most in need of refurbishment.

The process of refurbishment has been going on for 10 years, and the technology applied in several CEE countries is now satisfactory. The data also indicates that a refurbishment was necessary. In Bulgaria and Estonia (from which data is available) district heating capacity has been reduced by over 50% during the 5 year period from 1994 - 1999. Hungary experienced a similar development, but at a more moderate level.

Despite the lack of precise information on many CEE countries, it is known that CHP has not been widely applied in district heating in the past. There is thus a great undeveloped potential to exploit.

The table on the next page gives an overview of the district heating market share in total heating requirement plus the estimated total heat production for a number of countries (source: Euroheat & Power 2001).

As in the present EU countries, development in Bulgaria, Estonia, Hungary and Slovenia is clearly going towards a more environmentally friendly fuel mix. Coal consumption is down across the board, while natural gas consumption is picking up quite strongly. Also, renewable energy is increasingly utilised, especially in Estonia, where this positive development started years ago.

As it will appear, development has only increased existing trends. Bulgaria, Croatia, Yugoslavia and Hungary and are big users of natural gas. They have comparatively CO_2 lean production. Other CEE countries, such as Poland and the Czech Republic still operate many coal fired plants. Renewable energy is generally not widely used in most of CEE despite the big potential.

Table 4.
District Heat in selected CEE countries 1999

1999	DH market share	Heat delivered	
	%	TWh	Mtoe
Belarus	50	51,6	4,5
Bulgaria	19	13,0	1,1
Croatia	15	2,5	0,2
Czech Republic	33	50,6	4,4
Estonia	52	10,4	0,9
Hungary	17	19,6	1,7
Latvia	70	21,7	1,9
Lithuania	68	20,5	1,8
Poland	52	117,8	10,2
Romania	31	?	?
Slovakia	40	29,2	2,5
Slovenia	38	2,5	0,2
Turkey	1	0,0	0,0
Yugoslavia	13	4,0	0,3
Total		**343,3**	**29,6**

Drivers and barriers

The liberalisation of the energy markets is in many cases seen as a barrier to the development of CHP: Low electricity prices in non-CHP plants make investments in CHP less attractive.

Active promotion of biomass-fired CHP is seen as an important market driver. The ‘green electricity’ produced benefits from national tax exemptions in many countries. Naturally this will drive forward the use of green heat as well.

Also for district heating, options exists for biomass to reduce CO2 emissions by co-firing and fossil fuel substitution in coal power plants and in existing district heating networks.

The small-scale use of biomass for domestic heating is generally more commercially mature than for large-scale industrial and district heating applications, but domestic systems tend to have lower efficiency levels and higher emissions, and it is currently expected that the use of wood for domestic heating will continue to decline as natural gas networks are expanded throughout the EU. At the same time, it is expected that the larger scale uses of biomass for industrial and district heating will increase, such that there will be no overall change to the quantities of biomass used for heating in the EU.

2.3 Solar thermal

Solar systems are mainly used in residential applications, for hot water production and sometimes also for space heating. Use of solar thermal systems for space heating is limited since in winter the decreased supply of solar energy is not synchronous with the increased demand for heat. Solar systems for space heating are characterised by a larger collecter surface area and a larger storage tank (to collect as much solar heat during the winter months as possible). Furthermore the collector is more inclined towards the lower orbit of the sun during winter months.

Stock and sales

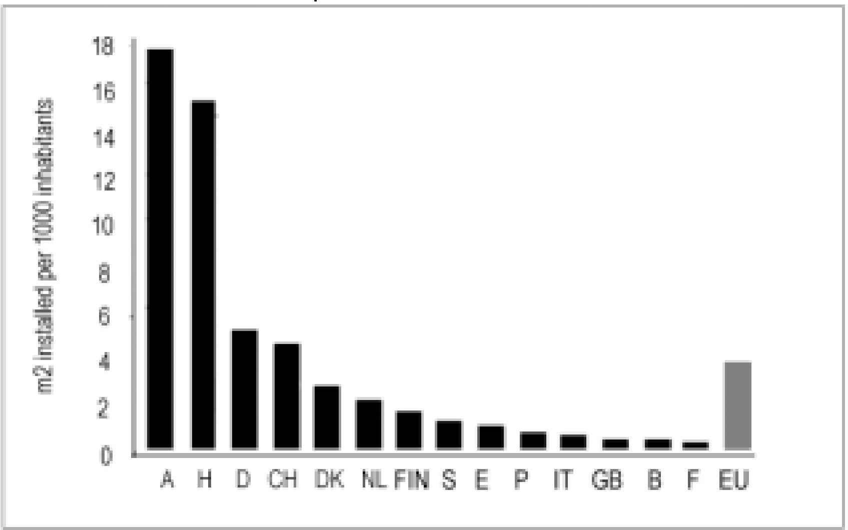
Globally some 30 million m^2 of collector area is installed. About 8.5 million m^2 (28%) is installed in the EU. Greece has the largest installed area of collectors with over 2.6 million square metres installed, mostly in domestic systems. Germany and Austria have approximately 1 million square metres, but the markets differ in that Austria has an emphasis in the Do-It-Yourself sector. Norway, Luxembourg and Ireland have an installed area of less than 2,000 square metres, although Norway does have an additional 70,000 square metres of locally crafted collector area used for hay and grain dryer systems. Household domestic systems play an important part in most of the countries. France has a large proportion of its collector area installed in large systems. 15% of the Danish installed collector area is for large systems, and The Netherlands and Portugal are experiencing increasing interest in active solar heating. The majority of the Finnish collector area is devoted to crop drying.

Table 5
Solar Thermal installed 1999 and sales forecast of 2000 and 2005
(in m^2 collector area)

Country	Stock 1999	Sales 2000*	% of total	Sales 2005	% of total
Germany	2 290 000	615 000	53.6%	3 000 000	59.3%
Austria	1 476 000	170 000	14.8%	320 000	6.3%
Greece	2 645 000	170 000	14.8%	400 000	7.9%
Spain	313 000	40 000	3.5%	350 000	6.9%
Netherlands	146 000	32 000	2.8%	150 000	3.0%
Switzerland	241 000	28 000	2.4%	100 000	2.0%
Italy	244 000	27 000	2.4%	250 000	4.9%
Denmark	282 000	15 000	1.3%	50 000	1.0%
Sweden	157 000	15 000	1.3%	50 000	1.0%
UK	141 000	10 000	0.9%	50 000	1.0%
Finland	12 000	7 000	0.6%	20 000	0.4%
France	296 000	7 000	0.6%	250 000	4.9%
Portugal	219 500	6 000	0.5%	40 000	0.8%
Norway	5 000	3 000	0.3%	12 000	0.2%
Belgium	19 500	2 000	0.2%	20 000	0.4%
Ireland	n.a.	n.a.		n.a.	
Total Europe	**8 488 200**	**1 147 000**	**100.0%**	**5 062 000**	**100.0%**

With an average growth rate of 20 - 25% in the past few years, solar thermal is a fast developing market: during 2001 the 10 million m^2 milestone of installed solar thermal collectors was reached in Europe. The EU targets are 15 million m^2 in 2003 and 100 million m^2 in 2010. It is clear that Austria, Greece and Germany lead the market (with Germany being the main driver behind growth, with sales reaching 615 000m^2 in 2000 or over half of all EU sales), while countries with similar climates show very low figures (see figure 3 below). If Italy, Spain, France and the UK were to show similar growth rates to these countries, the European targets for renewable energy could be reached more easily.

Fig. 3.
m^2 installed collector area per 1.000 inhabitants



The average size of one solar thermal system varies from 2.5 to 4 m^2 for a small domestic tap water system and 8 to 15 m^2 for a domestic tap water and space heating system. If an average area of 5 m^2 per dwelling is assumed, the total number of dwellings with a solar thermal system installed would become 1.7 million dwellings.

The solar thermal market is supplied by small and medium size enterprises. There are around 200 manufacturers of solar thermal in Europe and the US. There is a developing trend for the European heating industry to take over solar manufacturers to expand the product range.

Energy

In the White Paper on Energy for the Future, the Commission estimated that the 5,600,000 m^2 of thermal solar collectors in the EU 1995 gave a 2.6 TWh gain. For 2001, with 10 million m^2, this would then amount to 4.6 TWh (0.4 Mtoe).

If the EU targets of 100 million m^2 in 2010 are met, the contribution would then be 4 Mtoe.

Drivers and barriers

Solar thermal technology for domestic water heating and swimming pool applications is now well established and commercially available across the EU. The main market drivers are government subsidy schemes.

The main barrier for the solar thermal market in Western Europe is investment costs. Payback rates are in the area of 10 to 15 years for an average western European household. In Southern Europe the annual yield of solar systems is higher, but due to, on average, lower incomes, investment costs can still pose a problem.

Some specific aspects of larger systems and the general areas of active space heating and cooling could still benefit from demonstration, but the main priorities for publicly funded activities are for work on product standardisation, innovative financing schemes and building confidence in the market.

2.4 Heat pumps (ambient heat)

Heat pumps use a source of ambient heat and natural gas or electricity to heat up water for tap water production or space heating. The ambient heat source is either ground, water or air. The overall efficiency on the basis of primary energy is in the range of 140% (the useful energy output is 140% of the net energy input).

Stock and sales

Table 6
Heat pumps installed per country

Country	Total in 2000	Heat source			% of total park	% of which space heating	% of which residential heating
		Ground (%)	Water (%)	Air (%)			
Sweden	370 000	72	12	16	44		90
Austria	149 000	80	16	4	18	23	90
Germany	100 000	72	11	17	12	63	95
Switzerland	67 000	40	5	55	8	91	91
Denmark	33 000				4	33	
Norway	30 000	17	2	81	4	83	83
France	30 000	15		85	4	95	95
Netherlands	29 500				4		43
Finland	15 000	52	47		2	mainly	
Belgium	6 500	30	0	70	1		30
UK	3 000						40*
TOTAL	**833 000**						

note: 40% of UK market is for swimming pool heating

The biggest market is Sweden with approximately 370.000 heat pumps installed, which is almost 44% of the total European stock. Other major markets are Austria and Germany.

Most of the heat pumps are ground-coupled: the ‘heat source’ being the temperature difference with the groundwater. The type of application of the heat pump (heating only, tap water only or both) varies according to the country. Reversible space heating heat pumps can also provide in cooling functions and therefore are also popular in countries with hot climates. Tap water heat pumps (heat pump boilers) are mainly used as replacement for electric storage boilers and can be connected to the ventilation system to recuperate heat from ventilation air. In this way reduced energy use for tap water and improved indoor air quality are combined.

Table 7
Sales of residential heat pumps in 1990 - 2000 per country (units)

Country	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Sweden	25 707	20 535	15 478	11 240	10 202	9 028	12 431	17 023	18 699	20 296	24 000
Germany	660	1 700	1 800	2 000	4 500	4 600	4 900	6 300	8 300	7 821	9 273
France								1 700	3 000	6 000	7 500
Switzerland	2 900	2 600	2 300	2 500	3 500	4 300	4 200	5 200	6 200	6 500	7 264
Austria	6 900	8 000	7 000	6 100	6 800	5 300	5 500	5 300	4 900	4 700	5 000
Netherlands								1 150	1 600	950	3 000
Finland	1 000	800	500	300	300	300	500	800	1 500	2 200	2 750
Norway	2 500	2 000	1 700	1 000	1 300	1 200	1 300	2 100	2 313	2 615	2 600
Denmark										1 000	
UK										380	
TOTAL	**39 667**	**35 635**	**28 778**	**23 140**	**26 602**	**24 728**	**28 831**	**39 573**	**46 512**	**52 462**	**61 387**

Problematic when assessing the market size of heat pumps is that many heat pumps are technically identical to (reversible) room air conditioners (RACs). These RACs however are not primarily intended for space heating and should therefore be excluded from this overview. Current country statistics however do not always provide in enough detail to enable this separation according primary purpose (space heating or cooling). The table above however is believed to give a fair overview of sales of heat pumps for the primary function of space heating or tap water production.

Energy

Estimates of energy (and CO_2) savings related to the use of heat pumps can only give an estimate. At 61,387 units installed and an average space heating requirement of 10-15 MWh/ house/year, the energy production from residential heat pumps is now 0.6 to 0.9 TWh. At an assumed COP of 2.5[19] and given that most heat pumps are electric, there is a primary energy saving because of the use of free ambient energy of 28% (40/140) per unit that amounts to 0.17 to 0.25 TWh (0.015 to 0.02 Mtoe).

Drivers and barriers

The market with the highest potential is Germany, although markets with cold climates and cheap electricity, such as Norway and Finland, might follow the lead from Sweden and also prove very interesting.

Introduction in other major EU markets such as France, the UK and Italy has failed so far. In France the heat pump received a bad reputation due to inferior products entering the market. In the UK and Italy the electric heat pump is facing competition from gas appliances. The gas driven heat pump might stand a better chance there, as in the Netherlands.

Application of electric heat pumps for space heating is controversial, also due to many inefficient examples (e.g. reversible air conditioners). Less controversial is the alternative of heat pump water heaters, especially in the case where the electrical flow-through or storage water heater is the only alternative[20]. A new development is the gas-fired heat pump for space

[19] COP=coefficient of performance. COP of 2.5 means that 40% comes from fossil fuel and 60% is free energy.

[20] Efficiency on primary energy of electric heat pump water heaters is in the same order of magnitude as the efficiency of high efficient gas boilers (70-80%, according to ongoing SAVE Water Heater study). But also here there is a possible trade-off with balanced ventilation units with waste-heat-recovery (WHR), which saves about the same. If the householder uses the heat pump water heater, the balanced ventilation with WHR will be no longer feasible. In houses where balanced ventilation would be

heating with efficiencies of up to 140% on the lower heating value (compared with condensing boilers at 107%).

2.5 Geothermal heat

The table below gives an overview of geothermal use in Europe. The total annual heat production in the EU-15 amounts to 4762 GWh (4.76 TWh = 0.41 Mtoe).[21]

Table 8.

Geothermal use in Europe (2000/2001)

	Direct heat		Electricity		Main uses
	MWt	GWht/yr	Mwe	Gwhe/yr	
Austria	255	447			Space/heat pumps
Belgium	4	30			Greenhouse/heat pumps
Bulgaria	107	455			Space/greenhouse heating
Croatia	114	154			Space/bathing
Czech Republic	12	36			Bathing/heat pumps
Denmark	7	21			District/heat pumps
Finland	80	134			Heat pumps
France	326	1 360	4	25	District/heat pumps
Germany	397	436			District/heat pumps
Greece	57	107			Greenhouse/bathing
Hungary	473	1 135			Greenhouses/district/bathing
Iceland	1 469	5 603	170	1 138	District/greenhouse/industry
Italy	326	1 048	785	4 403	District/greenhouse/industry
Lithuania	21	166			Heat pumps
Macedonia	81	142			Greenhouses
Netherlands	11	16			Heat pumps
Norway	6	9			Heat pumps
Poland	68	76			District/heat pumps
Portugal	6	10	16	94	Greenhouse/bathing
Romania	152	797	2	8	District/greenhouse/bathing
Russia	308	1 707	23	85	Space/greenhouse/industry
Serbia	80	660			Space/greenhouse/bathing
Slovak Republic	132	588			Space/greenhouse/bathing
Slovenia	42	196			Space/greenhouse/bathing
Sweden	377	1 147			Heat pumps
Switzerland	547	663			Heat pumps/bathing
Turkey	820	4 377	20	120	District/aqua/bathing
United Kingdom	3	6			District/heat pumps
TOTAL	**6 281**	**21 526**	**1 020**	**5 873**	
of which					
EU 15	**1 849**	**4 762**	**805**	**4 522**	

Source: John W. Lund, Geo-heat Center, GHC BULLETIN, JUNE 2001

impossible for other (technical) reasons, the heat pump water heater is a good alternative; otherwise the trade-off is a valid consideration.

[21] Includes the French colony of Guadeloupe.

Recent developments are that extensive direct heat utilization projects have been undertaken in many central European countries, and electric power developed extensively in Italy and Iceland. Finally, geothermal heat pumps have come into their own in Austria, Switzerland, Germany and Sweden.

3 OVERLAP WITH OTHER DIRECTIVES

3.1 The RES-H Directive

The initial idea for a RES-H proposal was based upon the approach applied in the RES-E Directive, but then applied to "heat". Therefore the proposed RES-H Directive would consist of similar elements. These elements are:

1. Purpose of the Directive
2. Definition of RES-H
3. Indicative targets for RES-H
4. Rules for support schemes
5. Guarantee of origin
6. Dismantling administrative barriers
7. Grid access
8. Reporting
9. Administrative provisions

A RES-H Directive however would inevitably overlap with other existing and planned Directives with similar goals, most notably the Directives on RES-E and Energy Performance of Buildings. The question is whether these existing and planned Directives can reach the same goal as the proposed RES-H Directive. This Chapter provides a comparison of the proposed RES-H Directive with these two other Directives.

Furthermore, although they are only at the developing stage, the conclusions of this chapter (par. 3.4) will refer to what is known of the CHP Directive and a planned directive on Energy Services.

3.2 Comparison with the RES-E Directive

The table below presents a short overview of whether the elements of the RES-H Directive would be covered by the RES-E Directive.

Table 9

RES-H elements	Covered by RES-E ?
1. Purpose of the Directive	No, only indirect promotion of heat through promotion of electricity production (by 'green CHP')
2. Definition of RES-H	Partly, the RES-E definition only partially covers RES for heat - what is lacking is ambient heat (partly overlaps with geothermal heat depending on definition)
3. Indicative targets for RES-H	No, RES-H is only indirectly promoted by 'green CHP' but there are no targets attached to green CHP or any other individual RES system for that matter - only an EU overall RES (12%) and RES-E (22.1%) target.
4. Rules for support schemes	(see comment on next page)
5. Guarantee of origin	(see comment on next page)
6. Dismantling administrative barriers	(see comment on next page)
7. Grid access	(see comment on next page)
8. Reporting	Not relevant for comparison with RES-H
9. Administrative provisions	Not relevant for comparison with RES-H

Comment
Articles 5 to 7 deal with issues related to the realisation of production capacity, access to the distribution grid and trade in RES.

These articles are not really relevant for the promotion of (residential) biomass boilers, solar thermal systems and heat pumps since the production and consumption of heat from RES will occur on-site in most, if not all, occassions.

The situation is however more complicated for heat from RES in district heating and CHP networks. In theory the heating grid could operate as a marketplace for third party heat producers, just like the market for electricity. In practice the market for heating grids is not liberalised and grid acces, trade and guarantee of origin cannot be treated in the same way as for electricity.

This does not mean that district heating and CHP grids are "lost" for the use of RES-H. On the contrary, district heating and CHP grids provide an excellent opportunity to deliver green energy to urban users.

The options are:

- Heating grids have small boiler stations for supplying heat during peak heat demand. These boiler stations can be converted into biomass-fired boiler stations;
- Coal- and oil-fired stations can be converted into biomass-fired stations;
- In urban development, greater emphasis can be put on alternatives to conventional energy supply, such as biomass-fired heating grids instead of gas networks.

3.3 Comparison with the Directive on Energy Performance of Buildings

The table below presents a short overview of whether the elements of the RES-H Directive would be covered by the Directive on Energy Performance of Buildings ('Buildings Directive').

Table 10.

RES-H elements	Covered by Directive on Energy Performance of Buildings?
1. Purpose of the Directive	No. But the Directive offers the possibility to indirectly promote the use of RES-H systems through the required methodology and energy performance standard
2. Definition of RES-H	RES-H systems fall within the scope of the Buildings Directive
3. Indicative targets for RES-H	No. The Buildings Directive does not set quantitative targets
4. Rules for support schemes	(see comment below)
5. Guarantee of origin	(see comment below)
6. Dismantling administrative barriers	(see comment below)
7. Grid acces	(see comment below)
8. Reporting	Not relevant for comparison with RES-H
9. Administrative provisions	Not relevant for comparison with RES-H

Comment
The most relevant articles of the 'Buildings Directive' are described in its Articles 3 (methodology) and 4 (minimum standards for energy performance). Although this Directive and these two articles do not oblige MS to install a certain capacity of RES-H systems, they do explicitly support these systems:

- Art 3 requires establishment of a methodology for the integrated calculation of the energy performance of buildings. This methodology is to take into account the positive effects of solar systems, CHP and district heating and other heating and electricity systems on the basis of RES. The article also mentions the possible inclusion of a CO_2 emissions indicator for expressing the energy performance of a building.
- Art 4 obliges MS to set minimum standards for the energy performance of new buildings and to assess the feasibility of alternative energy supply systems in large new buildings (based upon RES, CHP district heating or, under certain conditions, heat pumps).

In practice the builders will use cost-benefit analysis to define the best set of technologies to apply in the building ("how can they fulfill the requirements of the energy performance standard against least costs"). Therefore the success of RES-H systems depends to a large extent on actions taken by the two main (parties of) actors:

1. On one side the MS must ensure that the use of RES-H systems is promoted by "shaping" the required methodology and standards in such a way that RES-H systems become more attractive to apply. They can do so by giving "extra credit points" to the use of RES-H systems in buildings, making it more easy to comply with the standards using RES-H systems than other technologies. Another way can be the use of a CO_2 emissions indicator. This requires active involvement of MS (and indirectly the Commission) in the development of the methodology and checking whether the methodology fulfills the requirements of the Directive and its Annex.
2. On the other side the builders and clients themselves play an important role since they are in the position to deem certain RES-H systems feasible or not. They decide on the basis of technical, economic and environmental assessments and, although these assessment reports should be made available to stakeholders, it can be expected that any party disagreeing with the decision will have "a tough case" in proving this assessment is flawed. Furthermore, the Directive does not foresee any legal power to overrule their decision.

Depending on the methodology and the required energy performance standard, certain types of RES-H will probably find their way in the market easier than others:

1. Specifically heat pumps and solar boilers are relatively low risk investments. Their costs and environmental benefits can be assessed over a reasonable period of time (the lifetime of the system).
2. The process of applying (biomass fuelled) CHP and district heating is many times more complicated and extends beyond the range of developing a building. The current Directive does not lay down energy performance standards for development of an area or site.

3.4 Findings

The <u>RES-E directive</u> gives a definition of renewable energy sources, but leaves out heat pumps (free energy from ambient temperature differences). Targets, certification, support schemes, etc. for <u>RES-E will help RES-H</u> only when the green electricity comes <u>from CHP plants</u> (e.g. biomass), but there are no specific targets nor certificates for heat production.

The <u>Buildings Directive</u> is a Council directive that will be implemented by Member States in the coming years. It should be this implementation that will contain parameters which favour certain technologies and – given existing national building performance legislation in Member States - it is very likely that these parameters will favour biomass boilers, solar water and space heaters, heat pumps and other forms of (especially local) heat production from renewables, following article 5 of the Directive. But – at this stage - it is too early to tell. There will not be specific targets for RES-H, but it is envisaged that any targets under this directive will relate to the primary energy requirement of new buildings and renovated large existing buildings (>1000 m^2) as a whole.

The presently developed CHP directive will be centred around the concept of promoting 'high efficiency CHP', for which support schemes and certification will be used and saving potentials established. And in that context, the reference values for CHP from renewable energy sources compare very favourably to e.g. CHP from fossil fuels. In other words, the efficiency requirements for a CHP plant using e.g. biomass are far less stringent to be qualified as 'high efficiency' than for e.g. a fossil fuel fired plant.

The CHP directive does not give targets: not for CHP as a whole, let alone for CHP from RES-H. Member States will be required to identify saving potentials. It does however intend to deal with other elements that can be found in the RES-E directive that serves as a role model for a possible RES-H directive, such as provisions laying down the principles for the interaction between cogeneration producers and the electricity grid ('grid issues'); furthermore there are provisions to facilitate grid access for cogeneration units using renewable energy sources and microcogeneration plants below 1 MW and provisions requiring Member States to evaluate current administrative procedures with a view to reducing the administrative barriers to the development of cogeneration.

A directive on Energy Services is underway[22], aimed –amongst others—at facilitating and promoting active energy services, such as performance contracting, leasing, selling and renting appliances by energy services companies (ESCOs). For these ESCOs, which might or might not be utilities, the supply of (district) heat is often an important 'service product'. Certain extra provisions in this directive-to-be to promote heat from renewable energy sources (RES-H) could cover this area of what otherwise would require a separate RES-H directive, but it is doubtful whether the whole area would be covered.

[22] Stakeholders meeting 8.5.2002

4 CONCLUSIONS

1. Coverage of RES-H.
The existing and upcoming legislative action covers a significant part of the issues that would be part of a possible RES-H directive, especially regarding support, certification, grid issues and administrative procedures for CHP from RES and building-related local RES-H. The promotion of district heating (DH) plants from RES-H (non-CHP) could partly be covered by the Energy Services directive that is underway.

2. No coverage of RES-H
Certain opportunities for promoting DH from RES through legislation will not be covered, which might be an important subject in view of the New Accession Countries (NACs). Also, more generally, the existing and upcoming legislation will not cover RES-H related to the large scale application of biomass boilers in industry, waste heat from biomass power plants, etc.. Depending also on the evolution of the Buildings Directive, the existing and planned directives might miss out more than half of the RES-H applications.

3. Option 1: Directive.
A major problem is, that at this point in time, there are no guarantees and there is no apparent or explicit strategy for the legislation that interfaces with the various areas and aspects of RES-H. This could be a reason to embark on a process to develop a RES-H Directive with specific targets and explicit links to the other legislation, also covering the missing subjects mentioned under point 2.

4. Option 2: Communication
On the other hand, within the timeframe of two to three years that it takes to establish a Council directive, more certainty could be obtained from implementation in MS under the Building Directive and from Member States projections for CHP. As an alternative to immediately starting the preparation of a RES-H Directive, it is therefore conceivable that the Commission prepares a Communication that:

- clearly sets out an overall <u>strategy</u> for the promotion of RES-H (through legislation), possibly with indicative targets at EU and MS level based on a thorough background study;
- lists legislative (and non-legislative) <u>actions</u> related to RES-H and how they interact;
- provides a <u>time plan</u> for these actions; and
- announces a <u>review</u> of the strategy in 2005, especially in the light of the legislation mentioned above that will develop in the 2002-2005 period and the expected effectiveness of the legislation in the promotion of RES-H especially regarding NACs, and will on that basis decide whether a separate RES-H directive is needed and how it should be shaped.

5. Future work needed.
For both options mentioned in point 3 and 4 a thorough background study is needed. Special focus points (‘white spots’) that should be covered are:

- Heat production from <u>biomass</u>, which is by far the most important source for RES-H, but also an area where vital market data is lacking
- <u>Drivers and barriers</u> for RES-H especially in New Accession Countries <u>(NACs)</u>
- An inventory of <u>policies, actions and measures at MS level promoting RES-H</u>