Macro Analysis

WP2 – Deliverable D2.2

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List of content

INTRODUCTION

The Ecoheat4EU project is among other objectives carried out to achieve transformations of the general legislative and policy frameworks for district heating (DH) in general. This report tries to identify the more specific conditions that support and/or hinder an introduction of solar heat in existing and new district heating schemes.

The general legislative framework for district heating is very different within Europe, from one "District heating act" in a couple of countries (Sweden and Denmark) to "no legislative framework in a couple of countries (Spain, Italy and UK). See Ecoheat4EU Table 1 in Appendix.

The support measures for district heating are also very different within Europe, from only a few support measures, e.g. carbon tax, to a number of investment grants for different measures and price regulations. See Ecoheat4EU Table 2 in Appendix.

The analyses in this report are based on questionnaires filled in by representatives for DH associations in AT, CZ, DK, DE and IT, together with the results from a devoted workshop held in September 2010 within the SDH Take-off project.

Among the SDH countries DE has by far the largest amount of district heat (about 800 TWh/a) and is (together with FR), viewed as the European country with the largest potential for increased use of district heating. DK has the by far largest market share (about 50%), followed by CZ (about 30%), while DE and AT have about 15% and IT has <5%.

The results from the questionnaires are summarised in the following and the filled in questionnaires are appended. The questionnaires confirm differences, not only for district heating in general, but also regarding solar district heating. The interest and the possibilities to develop solar district heating is mainly shown in DK and AT, which for the time being have the best conditions related to incentives, as well as actor capacity.

The results from the workshop confirm the result from the questionnaires and point also at differences in costs for land and solar collector systems due to the lack of experienced contractors in several countries. The possibility to sell "green heat" via district heating systems was also a topic at the workshop. See Workshop Summary in Appendix.

EUROPE

Summary

There are thousands of district heating systems in Europe. There are only about 40 solar district heating (and cooling) systems with a nominal thermal power >1 MW, out of which 24 in Denmark (13), Germany (7), and Austria (4). All together there are >125 large solar heating (and cooling) systems with a nominal thermal power of >350 kW in operation in Europe, out of which a couple of small plants in the Czech Republic and Italy.

There are varying and week (legislative, financial, etc.) support for solar district heating. The interest to demonstrate solar district heating and to reduce the use of fossil fuels (natural gas) in district heating, are the major driving forces for continued efforts to realize more demonstration plants.

Low cost for waste heat (industry, CHP) together with the lack of requirements, financial incentives and actor capacity, are major threats for the development.

National planning and construction issues

There are varying and weak national, regional and local (legislative, etc.) requirements for renewable heat in new buildings and there are varying and weak national, regional and local (legislative, etc.) requirements for solar heat in new buildings. There are varying restrictions regarding available areas for solar collectors. There are few actors involved in the development and poor capacity for planning, design and construction of solar district heating systems.

National solar support measures

There are varying financial incentives for renewable heat and varying financial incentives for solar heat.

National interfaces between solar heat and district heating systems

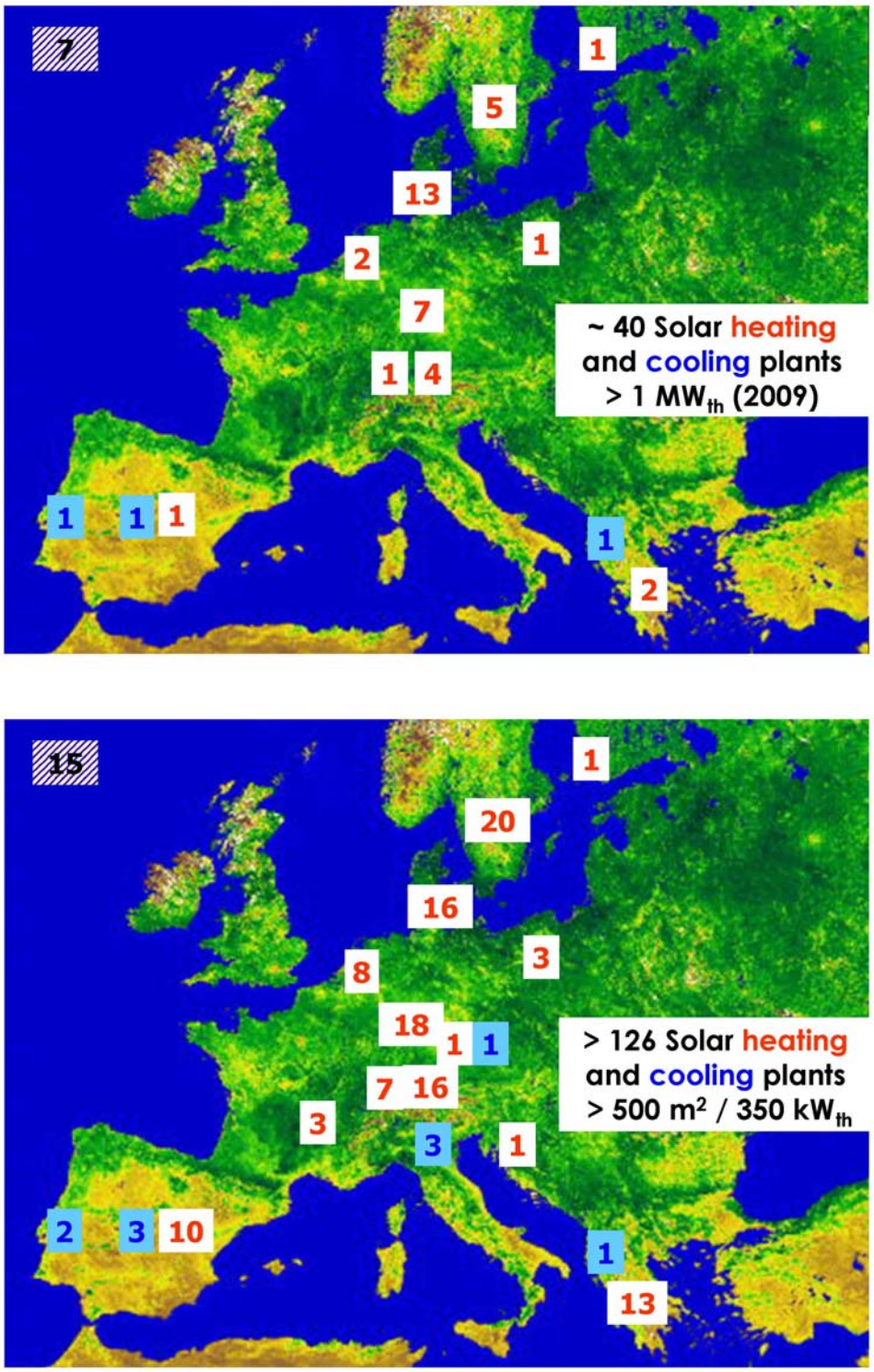
It is possible to sell heat into district heating systems (ESCO) in all SDH countries and possible to apply net metering (for DH customers) in all SDH countries except Italy, while it is only possible to transfer heat (third party supplier to a specific customer) in the district heating systems in Germany.

The main alternatives to solar heat in the SDH countries are waste heat (from CHP, industries, waste, etc.) and heat from fossil and wood fuel boilers. The alternative operation costs vary from low 0 (waste heat) and high 70 €/kWh (natural gas boilers).

Besides in Denmark, where the heat distribution and especially the return temperatures are low (<50 and sometimes <40 ºC), the heat distribution and especially the return temperatures in (old) district heating systems are relatively high for solar heat (>50 and sometimes >70 ºC).

Plants in operation in Europe

The following two maps show the country distribution of solar (district) heating (and cooling - blue) plants in operation in Europe end 2009.



Top: Systems with a nominal thermal power >1 MW, where one third of the plants are found in Denmark. Bottom: Systems with a nominal thermal power >0.35 MW. There are further five new plants built in Denmark in 2010.

AUSTRIA

Summary

District heating covers about 15% of the heat demands in Austria. There are (since 1995) a number of solar district heating systems in operation in Graz and there are plans to establish an increased number of systems.

There is a general support for renewables and solar heat. The interest to demonstrate solar district heating and to reduce the use of fossil fuels (natural gas) in district heating, are the major driving forces.

Low cost for waste heat (CHP, etc.) is a major threat for the development.

National planning and construction issues

There are national requirements for increased use of heat from renewables and specific requirements for solar heat in systems with natural gas and oil in new buildings. There are limited restrictions regarding available areas for solar collectors.

There are a number of actors involved in the development and there is capacity available for planning, design and construction of solar district heating plants.

National solar support measures

There are national financial incentives for renewable heat, but no specific incentives for solar heat.

National interfaces between solar heat and district heating systems

It is possible to sell heat into district heating systems (ESCO) and possible to apply net metering (for DH customers), while it is not possible to transfer heat (third party supplier to a specific customer) in the district heating systems in Austria.

The main alternatives to solar heat are waste heat (from CHP, industries, waste, etc.) and heat from fossil and wood fuel boilers. The alternative operation costs vary from low 0 (waste heat) and high 25 €/kWh (natural gas boilers).

The operating and especially the return temperatures in (old) district heating systems are relatively high for solar heat (>50 ºC).

CZECH REPUBLIC

Summary

District heating covers about 30% of the heat demands in the Czech Republic. There are no solar district heating systems in operation.

There is a general support for renewables, but solar heat is not well recognized. The interest to demonstrate solar district heating and to reduce the use of fossil fuels in district heating, are the major driving forces.

Low cost for waste heat (CHP, etc.) together with the lack of requirements and financial incentives, are major threats for the development.

National planning and construction issues

There are national requirements to increase the use of heat from renewables in new buildings. There are limited restrictions regarding available areas for solar collectors.

There are few actors involved in the development but there is capacity available for planning, design and construction of solar district heating plants.

National solar support measures

There are national financial incentives for renewable heat, but no specific incentives for solar heat.

National interfaces between solar heat and district heating systems

It is possible to sell heat into district heating systems (ESCO) and possible to apply net metering (for DH customers), while it is not possible to transfer heat (third party supplier to a specific customer) in the district heating systems in the Czech Republic.

The main alternatives to solar heat are waste heat (from CHP, industries, waste, etc.) and heat from fossil and wood fuel boilers. The alternative operation costs vary from low 0 (waste heat) and high ?? €/kWh (?????? boilers).

The operating and especially the return temperatures in (old) district heating systems are relatively high for solar heat (>50 ºC).

DENMARK

Summary

District heating is well established and covers about 50% of the heat demands in Denmark. There are (since 1987) a rather large number of solar district heating systems in operation all over Denmark and there are favourable conditions to establish an increased number of systems.

There is no specific support for solar heat, but solar district heating has got attention in the DH sector. Periods with low electricity prices (not feasible to operate CHP) and high operational costs using natural gas boilers at times without CHP, are the major driving forces.

No major threats for the time being.

National planning and construction issues

There are no national requirements for the use of heat from renewables in new buildings. There are limited restrictions regarding available areas for solar collectors.

There are a number of actors involved in the development and there is capacity available for planning, design and construction of solar district heating plants.

National solar support measures

There are national financial incentives for reduced use of energy (and the use of solar heat fits to the requirements on DH actors).

National interfaces between solar heat and district heating systems

It is possible to sell heat into district heating systems (ESCO) and possible to apply net metering (for DH customers), while it is not possible to transfer heat (third party supplier to a specific customer) in the district heating systems in Denmark.

The main alternatives to solar heat are waste heat (from CHP, etc.) and heat from fossil and wood fuel and straw boilers. The alternative operation costs vary from low 0 (waste heat) and high 40-50 €/kWh (natural gas CHP and boilers).

Solar district heating systems are commonly applied in small to medium size district heating systems with natural gas boilers and CHP. The heat distribution systems are rather new and directly connected to the heating systems in the buildings, thus giving low return temperatures (<50 and sometimes <40 ºC).

GERMANY

Summary

District heating covers about 15% of the heat demands in buildings in Germany. There are (since 1995) a number of solar district heating systems in operation all over Germany, but there are not yet plans to establish an increased number of systems.

There is a general support for renewables and solar heat, but not in relation to DH. The interest to demonstrate solar district heating and to reduce the use of fossil fuels in district heating, are the major driving forces.

Low cost for waste heat (CHP, etc.) together with lack of actor capacity, are major threats for the development.

National planning and construction issues

There are national requirements to increase the use of heat from renewables in new buildings. There are restrictions regarding available areas for solar collectors.

There are a few actors involved in the development but there is a lack of capacity available for planning, design and construction of solar district heating plants.

National solar support measures

There are national financial incentives for renewable heat and specific incentives for solar heat.

National interfaces between solar heat and district heating systems

It is possible to sell heat into district heating systems (ESCO) and possible to apply net metering (for DH customers), as well as possible to transfer heat (third party supplier to a specific customer) in the district heating systems in Germany.

The main alternatives to solar heat are waste heat (from CHP, waste, etc.) and heat from fossil and wood fuel boilers. The alternative operation costs vary from low 0 (waste heat) and high 50 €/kWh (natural gas boilers).

The operating and especially the return temperatures in (old) district heating systems are high for solar heat (>50 and sometimes >70 ºC).

ITALY

Summary

District heating covers about 5% of the heat demands in buildings in Italy. There are no solar district heating systems in operation.

There is a general support for renewables and solar heat, but not in relation to DH. The interest to demonstrate solar district heating and to reduce the use of fossil fuels in district heating, are the major driving forces.

Low cost for waste heat (CHP, etc.) together with the lack of actor capacity, are major threats for the development.

National planning and construction issues

There are national requirements for minimum use of heat from renewables in new buildings. There exist solar obligations in a few cases. There are restrictions regarding available areas for solar collectors.

There are no actors involved in the development and there is a lack of capacity available for planning, design and construction of solar district heating plants.

National solar support measures

There are national financial incentives for renewable heat and specific incentives for solar heat, but the latter is not applicable for SDH.

National interfaces between solar heat and district heating systems

It is possible to sell heat into district heating systems (ESCO), while it is neither possible to apply net metering (for DH customers) or to transfer heat (third party supplier to a specific customer) in the district heating systems in Italy.

The main alternatives to solar heat are waste heat (from CHP, waste, etc.) and heat from natural gas boilers. The alternative operation costs vary from low 30-35 (CHP) and high 60-70 €/kWh (natural gas boilers).

The operating and especially the return temperatures in (old) district heating systems are relatively high for solar heat (>50 and sometimes >60 ºC).

APPENDICES

Ecoheat4EU Tables (2 pages)

Marstal Workshop (Summary - 3 pages)

Questionnaire Overview Tables (3 pages)

Questionnaire Template (3 pages)

Questionnaires
Austria (FGW – 3 pages)
Czech Republic (ADHCR – 4 pages)
Denmark (Marstal Fjernvarme – 4 pages)
Germany (AGFW – 4 pages)
Italy (AIRU – 4 pages)

Ecoheat4EU

Table 1. Number of relevant legislative frameworks by country and legislative group.

Count of Legislative group	Country														
Legislative group	CZ	DE	DK	ES	FI	FR	HR	IE	IT	LT	NO	RO	SE	UK	Grand Total
01 Energy act	1				1		1			1	1				5
02 District heating act		1	1				2			1		2	1		8
03 Heat price regulation	1	2					3					4			10
04 No legislative framework				1					1					1	3
05 Energy efficiency act		2		1		3						3			9
06 Renewable act	1	2													3
07 Environmental act	4	1				2						1			8
08 Taxation act	1	1			1	2									5
09 Planning act		1			1	2					1				5
10 Competition act					1										1
11 Public utility act						4						1			5
12 National policies	1							4				1			6
13 Municipal & regional policies		1													1
Grand Total	9	11	1	2	4	13	6	4	1	2	2	12	1	1	69

Ecoheat4EU

Table 1. Support measures within subgroups according to country.

Count of Support subgroup	Country														
Support subgroup	CZ	DE	DK	ES	FI	FR	HR	IE	IT	LT	NO	RO	SE	UK	Grand Total
1 Burden - Carbon tax			1										1		2
1 Burden - Emission trading system									1						1
1 Burden - Energy tax			1												1
2 Support - Favourable loans		1					1								2
2 Support - Feed-in tarif, renewable electricity		1						1		1					3
2 Support - Investment grant, CHP		1						2							3
2 Support - Investment grant, DH connection		1	1		1								1		4
2 Support - Investment grant, DH distribution		2		1		1			1	1	1	2		1	10
2 Support - Investment grant, renewables		2					1	1			1		1		6
2 Support - Operation support, CHP incl FIT	1								1	1		2			5
2 Support - Operation support, renewables									1						1
2 Support - Social support for poor customers										1					1
2 Support - Tax deduction, CHP														2	2
2 Support - Tax deduction, DH					1	1			1	1					4
3 Market control - Consumer complaints board							1								1
3 Market control - Price regulation			1												1
3 Market control - Third party access										1					1
4 Planning - Building regulations								1						1	2
4 Planning - CHP planning			1											1	2
4 Planning - Heat planning & zoning, DH		1	2	1		1			1	1				1	8
4 Planning - National energy policy	11	2	1				5								19
4 Planning - Renewable planning		1						1	1					2	5
4 Planning - Waste planning & landfill bans			1												1
Grand Total	12	12	9	2	2	3	8	6	7	7	2	4	3	8	85

Workshop on Needs and Opportunities for Developing Solar District Heating in New Markets

(Marstal, Aeroe, DK, 23.09.2010)

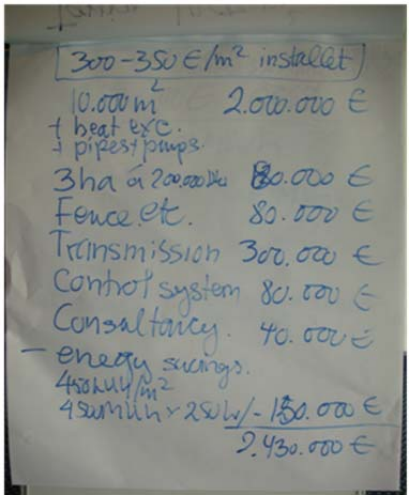
The workshop is divided into four parts:

1. **Presentation on the legislative frameworks for solar district heating**
2. **Hearing on obstacles and possibilities of solar district heating**
3. **Example calculation for solar district heating plant in Toerring, DK**
4. **Work in working groups to calculate typical price examples for solar district heating plants**

In the presentation on the legislative frameworks for solar district by Sven Werner (Halmstad University, SE) it is shown that currently district heating bases on heat from combined heat and power, waste heat and industrial surplus heat as well as heat produced by fossil fuels and biomass. Ecoheat4EU points out that there is a strong legislation in Denmark and almost no framework in other countries. Furthermore the support measures of each country are very different, e.g. fuel taxes, investment grants, etc.

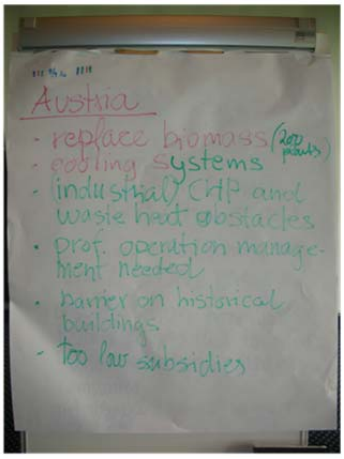
The intermediate results of the undertaken Macro Analysis are presented where the situation in DK, AT, CZ, DE and IT is examined. This is followed by a hearing of representatives of the district heating sector of the participating countries and new solar district heating markets on obstacles and possibilities of solar district heating (see flip charts on next page).

An example calculation for the solar district heating plant in Toerring, DK is done. Main characteristic of the Danish calculation is the cheap price of land. The calculated price of 37 €/MWh can compete with the price of heat from gas because there is tax on gas heat production. In contrast there is no tax on solar heat.



After the Danish example the workshop participants split up in an Austrian, Czech, German, Italian and Norwegian working group. Within these groups country specific examples in the dimension of the Danish plant are calculated.

In the following the above mentioned obstacles and possibilities of solar district heating in each country as well as the conclusions from the example calculations are shown.



Austria

Results of report on obstacles and possibilities

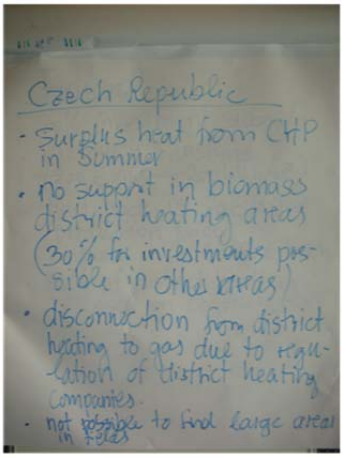
+ About 200 biomass plants could be backed-up by solar district heating
+ Cooling systems could be established

- District heating is dominated by industrial CHP and waste heat
- Professional operation management is needed
- Barriers to install collectors on historical buildings
- The subsidies are too low

Conclusion from calculation in working group

- To reach a competitive heat price the land price is high

Czech Republic



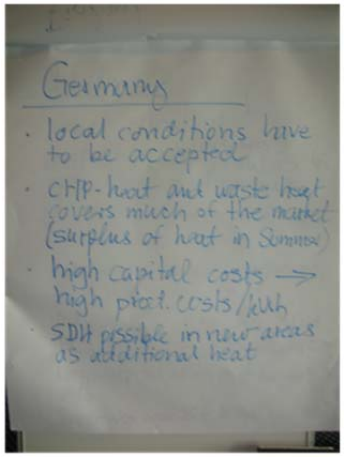
Results of report on obstacles and possibilities

Up to 30% investments subsidies are possible +

There are no subsidies in biomass dominated district heating areas -
Surplus heat from CHP in summer -
Lack of land for solar collectors -

Conclusion from calculation in working group

The collector costs are high in comparison to other countries -



Germany

Results of report on obstacles and possibilities

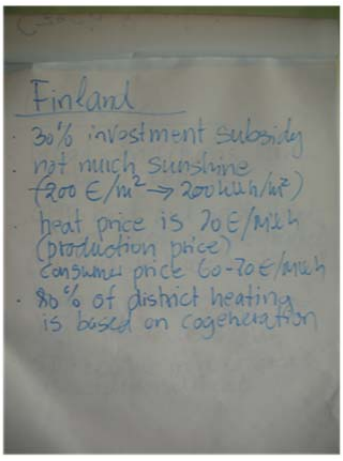
+ Solar district heating can be installed in new housing developments

- CHP heat and waste heat are dominating (surplus heat in summer)
- Local conditions have to be accepted
- High capital costs per kWh

Conclusions from calculation in working group

+ There could be the possibility to successfully promote “green heat”
- As the land price is high the collectors are in general roof mounted

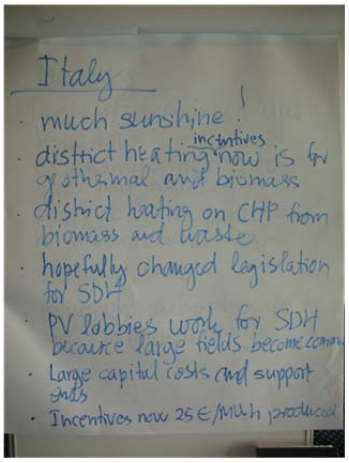
Finland



Results of report on obstacles and possibilities

Up to 30 % investment subsidies are possible +

There is little sunshine -
Heat production price 20€/MWh and heat cons. price 60-70€/MWh -
80% of district heating is based on cogeneration -



Italy

Results of report on obstacles and possibilities

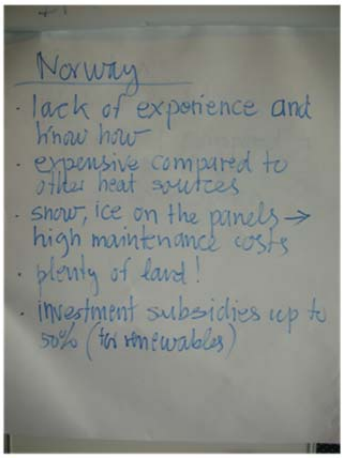
+ There is much sunshine
+ PV lobby "works for SDH", large collector areas become common
+ Incentives of 25 € per produced MWh

- District heating bases on CHP from biomass and waste
- Incentives for geothermal and biomass district heating
- High capital costs

Conclusions from calculation in working group

+ The land price is quite cheap
+ A heat price of 35 € per MWh is possible

Norway



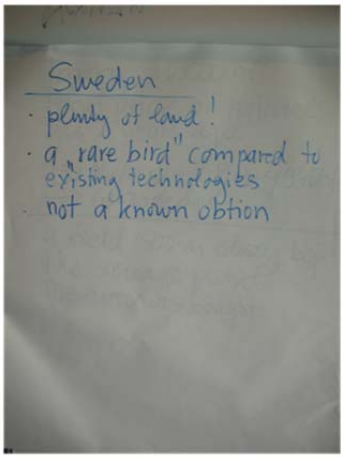
Results of report on obstacles and possibilities

Plenty of land +
Up to 50 % investment subsidies for renewable energies +

Lack of experience and know how -
Solar heat is expensive compared to other heat sources -
Snow and ice on the collectors could cause high maintenance costs -

Conclusion from calculation in working group

There are high subsidies for new techniques in renewable energies +



Sweden

Results of report on obstacles and possibilities

+ Plenty of land

- Solar heat is a "rare bird" compared to existing technologies
- Solar district heating is not a known option

	Denmark	Austria	Czech Republic	Germany	Italy
1. National planning and construction issues					
a) What general demands appear in your national, regional, or local legislation for new building developments with respect to renewable heat supply?	No general demands	High efficiency and heat recycling in DH systems	Over 1000 m2: Renewable, CHP, DH or heat pumps	EnEV and EEWärmeG	*Mandatory* minimum level of renewable heat
b) What specific demands appear in your national, regional, or local legislation for new building developments with respect to solar heat supply?	No specific demands	Solat heat supply if gas or oil used	Included in the general demands	EEWärmeG	Municipal solar only obligations exist
c) Can you identify some barriers to get access to land areas for solar heat supply?	yes	no	no	yes	yes
IF yes: Which barriers?	The price of land			?	Landscape protection with respect to visual aspects
d) Can you identify some barriers to get access to roof areas for solar heat supply?	yes	yes/no	no	yes	yes
IF yes: Which barriers?	Solar collector ownership	Roof access in historical urban areas		?	As above
e) Who takes initiatives for solar district heating in your country?					
□ Housing companies?		+	+	+	
□ District heating companies?	+	+		+	
□ Municipalities?	+	+			
□ Energy service companies (ESCO's)?			+		
□ Others			+		
f) Are the availability of manpower and capacity satisfactory with respect to planning, design and construction of large solar heat supply?	yes	yes	yes	no	no
IF no: What is lacking				Know-how, experts, and suppliers	Planning, design, installation, and maintenance

	Denmark	Austria	Czech Republic	Germany	Italy
2. National solar support measures					
a) Does your country have general financial incentives for renewable heat supply?	no	yes	yes	yes	yes
IF yes:					
□ Investment grants		+	+	+	
□ Tax deduction			+ (reduced VAT)		
□ Others					+
IF yes: is this support also available for Solar Dsitrict Heating		yes	yes/no	yes	yes/no
b) Does your country have special financial incentives for solar heating?	yes	no	no	yes	yes
IF yes:					
□ Investment grants				+	
□ Tax deduction					+ (closed after 2010)
□ Others	+				
IF yes: Are this support measure also applicable for solar district heating	yes			yes	no

	Denmark	Austria	Czech Republic	Germany	Italy
3. National interfaces between solar heat and district heating systems					
a) Is it possible to sell solar heat into district heating systems?	yes/no	yes	yes	yes	yes
b) Can net metering be applied when solar heat is fed in into district heating systems?	yes/no	yes	yes	yes	no
c) Can solar heat be transferred in a district heating system from a supplier to a customer?	no	no	no	yes	no
Economics - Alternative heat supply					
d) What is the typical heat supply during the summer season?					
□ Waste incineration without CHP		+	+	+	+
□ Waste incineration with CHP	+	+	+	+	+
□ Coal CHP			+	+	
□ Gas CHP	+	+	+	+	
□ Biomass CHP		+	+	+	
□ Natural gas in boiler	+		+		+
□ Heating oil in boiler					
□ Biomass boiler	+	+	+		
□ Other					+
e) What is the corresponding running cost (€/MWh) for heat generation during the summer season?	0 (Waste), 27 (straw and wood) and 40-50 (gas CHP)	0-25	?	0 (CHP) -50 (boilers)	30-35 (CHP), 60-70 (NG boilers)
Technical - performance					
Solar heat has higher efficiency when the heat carrier has a low temperature. What is the typical annual average return temperature in district heating systems?					
□ Less than 40˚C	+				
□ Between 40 and 50˚C	+				
□ Between 50 and 60˚C		+	+		+
□ Between 60 and 70˚C				+	+
□ Over 70˚C				+	

SDH solar district heating

Göteborg / Halmstad – May 17-23, 2010

Questionnaire – WP2 – Macro Analysis

The objective is to identify specific national boundary conditions and the answers should be based on surveys by national DH Associations or their representatives.
Click on and write text in assigned boxes. Save and return document !

1. National planning and construction issues

a) What general demands appear in your national, regional, or local **legislation** for new building developments **with respect to renewable heat supply ?**

b) What specific demands appear in your national, regional, or local **legislation** for new building developments **with respect to solar heat supply ?**

c) Can you identify some barriers to get access to land or land areas for solar heat supply (i.e. for solar collectors) ?

☐ Yes
☐ No

If Yes: Which barriers?

d) Can you identify some barriers to get access to roofs or roof areas for solar heat supply (i.e. for solar collectors) ?

☐ Yes
☐ No

If Yes: Which barriers?

e) Who have so far taken initiatives for solar district heating in your country?

☐ Housing companies?
☐ District heating companies / utilities ?
☐ Municipalities ?
☐ Energy Service Companies (ESCO's) ?
☐ Others?

f) Are the availability of manpower and capacity satisfactory with respect to planning, design and construction of large solar heat supply systems ?

☐ Yes
☐ No

If No: What is lacking?

2. National solar support measures

a) Does your country have general financial incentives for renewable heat supply ?

☐ Yes
☐ No

If Yes:
☐ Investment grants Type/amount:
☐ Tax reduction Type/amount:
☐ Others Type/amount:

If Yes, is this support measure also applicable for solar district heating ?
☐ Yes
☐ No

b) Does your country have special financial incentives for solar heat supply ?

☐ Yes
☐ No

If Yes:
☐ Investment grants Type/amount:
☐ Tax reduction Type/amount:
☐ Others Type/amount:

If Yes, is this support measure also applicable for solar district heating ?
☐ Yes
☐ No

3. National interfaces between solar heat and district heating systems

Access to the district heating systems

a) Is it possible to sell solar heat into district heating systems?

☐ Yes
☐ No

b) Can net metering be applied when solar heat is fed into district heating systems?

☐ Yes
☐ No

c) Can solar heat be transferred in a district heating system from a supplier to a customer?

☐ Yes
☐ No

Economics – Alternative heat supply

d) What is the typical district heat supply during the summer season?

- ☐ Waste incineration (without CHP)
- ☐ Waste incineration with CHP
- ☐ Coal CHP
- ☐ Gas CHP
- ☐ Biomass CHP
- ☐ Natural gas boiler
- ☐ Heating oil boiler
- ☐ Biomass boiler
- ☐ Other

If Other, what ?

e) What is the corresponding running cost for heat generation during the summer season?

Technical - Performance

f) Solar heat supply is temperature dependant. What is the typical annual average return temperature in district heating systems?

- ☐ < 40˚C
- ☐ 40 - 50˚C
- ☐ 50 - 60˚C
- ☐ 60 - 70˚C
- ☐ > 70˚C

Here you can write complementary comments to the subject or your answers with your own words …

Questionnaire filled in by

Country:
Name:
Affiliation:
E-mail:

Questionnaire by Jan-Olof Dalenbäck and Sven Werner for SDHTO – WP2

Send filled in questionnaire to Jan-Olof.Dalenback@cit.chalmers.se

SDH solar district heating

Göteborg / Halmstad – May 17-23, 2010

Questionnaire – WP2 – Macro Analysis

The objective is to identify specific national boundary conditions and the answers should be based on surveys by national DH Associations or their representatives.
Click on and write text in assigned boxes. Save and return document !

1. National planning and construction issues

a) What general demands appear in your national, regional, or local **legislation** for new building developments **with respect to renewable heat supply ?**
High efficiency and the use of lost heat for district heating systems

b) What specific demands appear in your national, regional, or local **legislation** for new building developments **with respect to solar heat supply ?**
… to get subsidies for new residential buildings a solar heat supply has to be installed, if the building is heated with gas or oil …

c) Can you identify some barriers to get access to land or land areas for solar heat supply (i.e. for solar collectors) ?
☐ Yes
☒ No

If Yes: Which barriers?

d) Can you identify some barriers to get access to roofs or roof areas for solar heat supply (i.e. for solar collectors) ?
☒ Yes
☒ No

If Yes: Which barriers?
There are roofs in the historic center of Graz and other cities, on which it is not allowed to install solar panels

e) Who have so far taken initiatives for solar district heating in your country?
☒ Housing companies?
☒ District heating companies / utilities ?
☒ Municipalities ?
☐ Energy Service Companies (ESCO's) ?
☐ Others?

f) Are the availability of manpower and capacity satisfactory with respect to planning, design and construction of large solar heat supply systems ?
☒ Yes
☐ No

If No: What is lacking?

2. National solar support measures

a) Does your country have general financial incentives for renewable heat supply ?

☒ Yes
☐ No

If Yes:

☒ Investment grants Type/amount: 30% investment subsidy
☐ Tax reduction Type/amount:
☐ Others Type/amount:

If Yes, is this support measure also applicable for solar district heating ?

☒ Yes
☐ No

b) Does your country have special financial incentives for solar heat supply ?

☐ Yes
☒ No

If Yes:

☒ Investment grants Type/amount: 50% investment subsidy (Klimafond)
☐ Tax reduction Type/amount:
☐ Others Type/amount:

If Yes, is this support measure also applicable for solar district heating ?

☒ Yes
☐ No

3. National interfaces between solar heat and district heating systems

Access to the district heating systems

a) Is it possible to sell solar heat into district heating systems?

☒ Yes
☐ No

b) Can net metering be applied when solar heat is fed into district heating systems?

☒ Yes
☐ No

c) Can solar heat be transferred in a district heating system from a supplier to a customer?

☐ Yes
☒ No

Economics – Alternative heat supply

d) What is the typical district heat supply during the summer season?

- ☒ Waste incineration (without CHP)
- ☒ Waste incineration with CHP
- ☐ Coal CHP
- ☒ Gas CHP
- ☒ Biomass CHP
- ☐ Natural gas boiler
- ☐ Heating oil boiler
- ☒ Biomass boiler
- ☐ Other

If Other, what ?

e) What is the corresponding running cost for heat generation during the summer season?

0 EUR/MWh - 25 EUR/MWh

Technical - Performance

f) Solar heat supply is temperature dependant. What is the typical annual average return temperature in district heating systems?

- ☐ < 40˚C
- ☐ 40 - 50˚C
- ☒ 50 - 60˚C
- ☐ 60 - 70˚C
- ☐ > 70˚C

Here you can write complementary comments to the subject or your answers with your own words …

Questionnaire filled in by

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SDH solar district heating

Göteborg / Halmstad – May 17-23, 2010

Questionnaire – WP2 – Macro Analysis

The objective is to identify specific national boundary conditions and the answers should be based on surveys by national DH Associations or their representatives.
Click on and write text in assigned boxes. Save and return document !

1. National planning and construction issues

a) What general demands appear in your national, regional, or local **legislation** for new building developments **with respect to renewable heat supply ?**
Act N. 406/2000 Sb. (61/2008 Sb.) on power economy; § 6a Energy demand of buildings; A part of the Certificate of a new building of over 1000 m2 overall floor area shall be the evaluation results proving the technical, ecological and economic feasibility of alternative heating systems, such as:
a) Decentralized energy supply systems based on renewable sources energy,
b) combined heat and power production,
c) remote or block central heating, in case of the need of cooling,
d) heat pumps.

b) What specific demands appear in your national, regional, or local **legislation** for new building developments **with respect to solar heat supply ?**
Solar energy use demand is involved in general provisions on RES (abovementioned)

c) Can you identify some barriers to get access to land or land areas for solar heat supply (i.e. for solar collectors) ?
☐ Yes
☒ No

If Yes: Which barriers?
Massive extension of ground mounted photovoltaic in last few years caused some kind of resistance to the installation of any solar device on open land. The usual argument that is used for cancelling the project is distortion of the landscape character. Final decision about permission of the installation leaves on the local authorities that may succumb to public pressure.

d) Can you identify some barriers to get access to roofs or roof areas for solar heat supply (i.e. for solar collectors) ?
☒ Yes
☒ No

If Yes: Which barriers?
In practice necessary to solve individual cases .. historical buildings etc ..

e) Who have so far taken initiatives for solar district heating in your country?
☒ Housing companies?
☐ District heating companies / utilities ?

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☐ Municipalities ?
☒ Energy Service Companies (ESCO's) ?
☒ Others?

f) Are the availability of manpower and capacity satisfactory with respect to planning, design and construction of large solar heat supply systems ?
☐ Yes
☐ No

If No: What is lacking?

2. National solar support measures

a) Does your country have general <u>financial incentives for renewable heat supply</u> ?
☒ Yes
☐ No

If Yes:
☒ Investment grants Type/amount: Supporting Operation Program of the Ministry of the Environment aiming to energy savings (OP MEnvir). The Green Savings Programme Operational Programme Enterprise and Innovations – Ministry of Industry and Trade (30 % of eligible costs) - for physical persons.
☒ Tax reduction Type/amount: reduced VAT from 20 to 10 %
☐ Others Type/amount:

If Yes, is this support measure also applicable for solar district heating ?
☒ Yes
☒ No

b) Does your country have special <u>financial incentives for solar heat supply</u> ?
☐ Yes
☒ No

If Yes:
☐ Investment grants Type/amount:
☐ Tax reduction Type/amount:
☐ Others Type/amount:

If Yes, is this support measure also applicable for solar district heating ?
☐ Yes
☐ No

3. National interfaces between solar heat and district heating systems

Access to the district heating systems

a) Is it possible to sell solar heat into district heating systems?
☒ Yes
☐ No

b) Can net metering be applied when solar heat is fed into district heating systems?
☒ Yes
☐ No

c) Can solar heat be transferred in a district heating system from a supplier to a customer?
☐ Yes
☒ No

Economics – Alternative heat supply

d) What is the typical district heat supply during the summer season?
☒ Waste incineration (without CHP)
☒ Waste incineration with CHP
☒ Coal CHP
☒ Gas CHP
☒ Biomass CHP
☒ Natural gas boiler
☐ Heating oil boiler
☒ Biomass boiler
☐ Other

If Other, what ?

e) What is the corresponding running cost for heat generation during the summer season?
Similar as in heating season

Technical - Performance

f) Solar heat supply is temperature dependant. What is the typical annual average return temperature in district heating systems?
☐ < 40˚C
☐ 40 - 50˚C
☒ 50 - 60˚C
☐ 60 - 70˚C
☐ > 70˚C

Here you can write complementary comments to the subject or your answers with your own words …

Some project designers from solar thermal sector were interested and tried to prepare some SDH projects but any of them did not reach a realization due to a several types of reasons.

Questionnaire filled in by

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SDH solar district heating

Göteborg / Halmstad – May 17-23, 2010

Questionnaire – WP2 – Macro Analysis

The objective is to identify specific national boundary conditions and the answers should be based on surveys by national DH Associations or their representatives.
Click on and write text in assigned boxes. Save and return document !

1. National planning and construction issues

a) What general demands appear in your national, regional, or local **legislation** for new building developments **with respect to renewable heat supply ?**
no general demands

b) What specific demands appear in your national, regional, or local **legislation** for new building developments **with respect to solar heat supply ?**
no specific demands

c) Can you identify some barriers to get access to land or land areas for solar heat supply (i.e. for solar collectors) ?
☒ Yes
☐ No

If Yes: Which barriers?
competition against use as building site, recreative areas, farmland
the price of land

d) Can you identify some barriers to get access to roofs or roof areas for solar heat supply (i.e. for solar collectors) ?
☒ Yes
☐ No

If Yes: Which barriers?
ownership of the solar collectors. If the roof and the solar collectors have different owners and the roofowner wents bankrupt, the solar panels can be seen as a part of the roof owners property

e) Who have so far taken initiatives for solar district heating in your country?
☐ Housing companies?
☒ District heating companies / utilities ?
☒ Municipalities ?
☐ Energy Service Companies (ESCO's) ?
☐ Others?

f) Are the availability of manpower and capacity satisfactory with respect to planning, design and construction of large solar heat supply systems ?
☒ Yes
☐ No

If No: What is lacking?

2. National solar support measures

a) Does your country have general financial incentives for renewable heat supply ?

☐ Yes
☒ No

If Yes:
☐ Investment grants Type/amount:
☐ Tax reduction Type/amount:
☐ Others Type/amount:

If Yes, is this support measure also applicable for solar district heating ?
☐ Yes
☐ No

b) Does your country have special financial incentives for solar heat supply ?

☒ Yes
☐ No

If Yes:
☐ Investment grants Type/amount:
☐ Tax reduction Type/amount:
☒ Others Type/amount: The solar heat production for one year from solar district heating can be used as obligatory saving (value app. 20€/m2 solar collector)

If Yes, is this support measure also applicable for solar district heating ?
☒ Yes
☐ No

3. National interfaces between solar heat and district heating systems

Access to the district heating systems

a) Is it possible to sell solar heat into district heating systems?

☒ Yes
☒ No

b) Can net metering be applied when solar heat is fed into district heating systems?

☒ Yes
☒ No

c) Can solar heat be transferred in a district heating system from a supplier to a customer?

☐ Yes
☒ No

Economics – Alternative heat supply

d) What is the typical district heat supply during the summer season?

☐ Waste incineration (without CHP)
☒ Waste incineration with CHP
☐ Coal CHP
☒ Gas CHP
☐ Biomass CHP
☒ Natural gas boiler
☐ Heating oil boiler
☒ Biomass boiler
☐ Other

If Other, what ?

e) What is the corresponding running cost for heat generation during the summer season?

0 (waste inceneration), 27€/MWh (straw and wood), 40-50€/MWh (Gas CHP)

Technical - Performance

f) Solar heat supply is temperature dependant. What is the typical annual average return temperature in district heating systems?

☒ < 40˚C
☒ 40 - 50˚C
☐ 50 - 60˚C
☐ 60 - 70˚C
☐ > 70˚C

Here you can write complementary comments to the subject or your answers with your own words …

According question 3a and 3b there are no general rules or rights so sell heat to the district heating system. But it is done in Højslev and in Marstal. The owner of the solar plant has to negotiate with the district heating company. In Marstal heat from solar collectors is sold to same price as for bying heat The plant owner will have to pay income tax if he has a yearly income of more than his total heating costs for district heating..

Questionnaire filled in by

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SDH solar district heating

Göteborg / Halmstad – May 17-23, 2010

Questionnaire – WP2 – Macro Analysis

The objective is to identify specific national boundary conditions and the answers should be based on surveys by national DH Associations or their representatives.
Click on and write text in assigned boxes. Save and return document !

1. National planning and construction issues

a) What general demands appear in your national, regional, or local **legislation** for new building developments **with respect to renewable heat supply ?**
EnEV = Energieeinsparverordnung (2009), (German regulation for energy saving in buildings and building systems)
EEWärmeG = Erneuerbare Energien Wärme Gesetz (2009), (Renewable Energy heat regulation)

b) What specific demands appear in your national, regional, or local **legislation** for new building developments **with respect to solar heat supply ?**
EEWärmeG

c) Can you identify some barriers to get access to land or land areas for solar heat supply (i.e. for solar collectors) ?
☒ Yes
☐ No

If Yes: Which barriers?
still checking, answer will be sent in a few days

d) Can you identify some barriers to get access to roofs or roof areas for solar heat supply (i.e. for solar collectors) ?
☒ Yes
☐ No

If Yes: Which barriers?
still checking, answer will be sent in a few days

e) Who have so far taken initiatives for solar district heating in your country?
☒ Housing companies?
☒ District heating companies / utilities ?
☐ Municipalities ?
☐ Energy Service Companies (ESCO's) ?
☐ Others?

f) Are the availability of manpower and capacity satisfactory with respect to planning, design and construction of large solar heat supply systems ?
☐ Yes
☒ No

If No: What is lacking?
Know How
specialized experts
collector suppliers

2. National solar support measures

a) Does your country have general <u>financial incentives for renewable heat supply</u> ?
☒ Yes
☐ No

If Yes:
☒ Investment grants Type/amount: subsidered loans with ca. 30% last subsidy in case of CHP additional feed-in tarifs can be used

☐ Tax reduction Type/amount:
☐ Others Type/amount:

If Yes, is this support measure also applicable for solar district heating ?
☒ Yes
☐ No

b) Does your country have special <u>financial incentives for solar heat supply</u> ?
☒ Yes
☐ No

If Yes:
☒ Investment grants Type/amount: same as a)
☐ Tax reduction Type/amount:
☐ Others Type/amount:

If Yes, is this support measure also applicable for solar district heating ?
☒ Yes
☐ No

3. National interfaces between solar heat and district heating systems

Access to the district heating systems

a) Is it possible to sell solar heat into district heating systems?
☒ Yes
☐ No

b) Can net metering be applied when solar heat is fed into district heating systems?
☒ Yes
☐ No

c) Can solar heat be transferred in a district heating system from a supplier to a customer?
☒ Yes
☐ No

Economics – Alternative heat supply

d) What is the typical district heat supply during the summer season?
☒ Waste incineration (without CHP)
☒ Waste incineration with CHP
☒ Coal CHP
☒ Gas CHP
☒ Biomass CHP
☐ Natural gas boiler
☐ Heating oil boiler
☐ Biomass boiler
☐ Other

If Other, what ?

e) What is the corresponding running cost for heat generation during the summer season?
In case CHP is operated for electricity sales in summer, heat can be conducted as cost-free.In case of oil boilers operating due to shut down of CHP, costs are approximately 5ctEUR/kwh

Technical - Performance

f) Solar heat supply is temperature dependant. What is the typical annual average return temperature in district heating systems?
☐ < 40˚C
☐ 40 - 50˚C
☐ 50 - 60˚C
☒ 60 - 70˚C
☒ > 70˚C

Here you can write complementary comments to the subject or your answers with your own words …

Access to the district heating systems is so far only once realized. Apart from that different operating temperatures, cyclic mechanical problems, property and

legislative problems etc. are high barriers for accessing and coupling of SDH with existing DH networks.

Questionnaire filled in by

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SDH solar district heating

Göteborg / Halmstad – May 17-23, 2010

Questionnaire – WP2 – Macro Analysis

The objective is to identify specific national boundary conditions and the answers should be based on surveys by national DH Associations or their representatives.
Click on and write text in assigned boxes. Save and return document !

1. National planning and construction issues

a) What general demands appear in your national, regional, or local **legislation** for new building developments **with respect to renewable heat supply ?**
The National Law Decree no. 192/2006 and the modifications brought by Decree no. 311) state a mandatory minimum level of renewable heat, which is 50% of the domestic hot water demand; however, this is a framework law and it needs to be practically implemented by the different Regions; so far, only some of the Regions published the application laws and, therefore, only in these regions the obligation is actually valid.

b) What specific demands appear in your national, regional, or local **legislation** for new building developments **with respect to solar heat supply ?**
As stated above, the national framework laws speaks about renewable heat and not solar in particular. However, several local initiatives focused on solar thermal for fulfilling the obligation. For instance, more than 200 Municipalities (most of them small) already introduced a "solar only obligation" in their building codes and also the Region Piemonte included a "solar only obligation", asking for stricter requirements (60% of DHW demand) with respect to the national requirements.

c) Can you identify some barriers to get access to land or land areas for solar heat supply (i.e. for solar collectors) ?
☒ Yes
☐ No

If Yes: Which barriers?
A large portion of the Italian territory falls in the scope of the national law on landscape protection, which foresees the need for a special authorisation when modifying the visual aspect of an area. Large ST plant mounted on the ground, therefore, should fulfill the requirements of this specific law. Differences at regional level also can be found. Some similarities with the problems which, at the moment, are being faced by PV developers, can be established.

d) Can you identify some barriers to get access to roofs or roof areas for solar heat supply (i.e. for solar collectors) ?
☒ Yes
☐ No

If Yes: Which barriers?
See above, but, more specifically, the Italian legislation, also following the indications coming from the recent EU Directive on renewables, tried to start a

process for simpifying administrative procedures and permitting, especially for small ST systems installed on the roofs, even though all the limitations for special protected areas are still valid.

e) Who have so far taken initiatives for solar district heating in your country?
☐ Housing companies?
☐ District heating companies / utilities ?
☐ Municipalities ?
☐ Energy Service Companies (ESCO's) ?
☐ Others?

f) Are the availability of manpower and capacity satisfactory with respect to planning, design and construction of large solar heat supply systems ?
☐ Yes
☒ No

If No: What is lacking?
The production and import capacity of the Italian solar thermal sector strongly increased in the last year and therefore the ST industry can be ready to provide large amounts of collectors for SDH plants.
From the point of view of planning and design, however, for sure experience is lacking, given the low number of large scale ST plants operating in Italy.
Moreover, also experience and adequate skills are lacking regarding installation and maintenance of this kind of plants.

2. National solar support measures

a) Does your country have general financial incentives for renewable heat supply ?
☒ Yes
☐ No

If Yes:
☐ Investment grants Type/amount:
☐ Tax reduction Type/amount:
☒ Others Type/amount: Rebate of 25 €/MWh (about 30% of the tariff cost) for geothermal and biomass

If Yes, is this support measure also applicable for solar district heating ?
☒ Yes
☒ No

b) Does your country have special financial incentives for solar heat supply ?
☒ Yes
☐ No

If Yes:
☐ Investment grants Type/amount:

☒ Tax reduction Type/amount: 55% of the investment cost (the incentive will be closing at the end of 2010)
☐ Others Type/amount:

If Yes, is this support measure also applicable for solar district heating ?
☐ Yes
☒ No

3. National interfaces between solar heat and district heating systems

Access to the district heating systems

a) Is it possible to sell solar heat into district heating systems?
☒ Yes
☐ No

b) Can net metering be applied when solar heat is fed into district heating systems?
☐ Yes
☒ No

c) Can solar heat be transferred in a district heating system from a supplier to a customer?
☐ Yes
☒ No

Economics – Alternative heat supply

d) What is the typical district heat supply during the summer season?
☒ Waste incineration (without CHP)
☒ Waste incineration with CHP
☐ Coal CHP
☐ Gas CHP
☐ Biomass CHP
☒ Natural gas boiler
☐ Heating oil boiler
☐ Biomass boiler
☒ Other

If Other, what ?
Geothermal, Energy recovery from CCGT, Energy recovery from industrial plants.

e) What is the corresponding running cost for heat generation during the summer season?
When the heat generation comes from great industrial systems using heat recovery (CCGT, WTE) the running cost is approximately 30 - 35 €/MWht.

While, for other plants (i.e. additional natural gas-fired stations, not CHP) the running cost is more than double, 60/70 €/MWht.

Technical - Performance

f) Solar heat supply is temperature dependant. What is the typical annual average return temperature in district heating systems?

☐ < 40˚C
☐ 40 - 50˚C
☒ 50 - 60˚C
☒ 60 - 70˚C
☐ > 70˚C

Here you can write complementary comments to the subject or your answers with your own words …

Questionnaire filled in by

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