

Ground Source Live !

Peterborough, 7-8 June 2011

Increasing deployment of GSHP in Europe - market, incentives, regulations - and savings

Philippe Dumas

European Geothermal Energy Council, Brussels

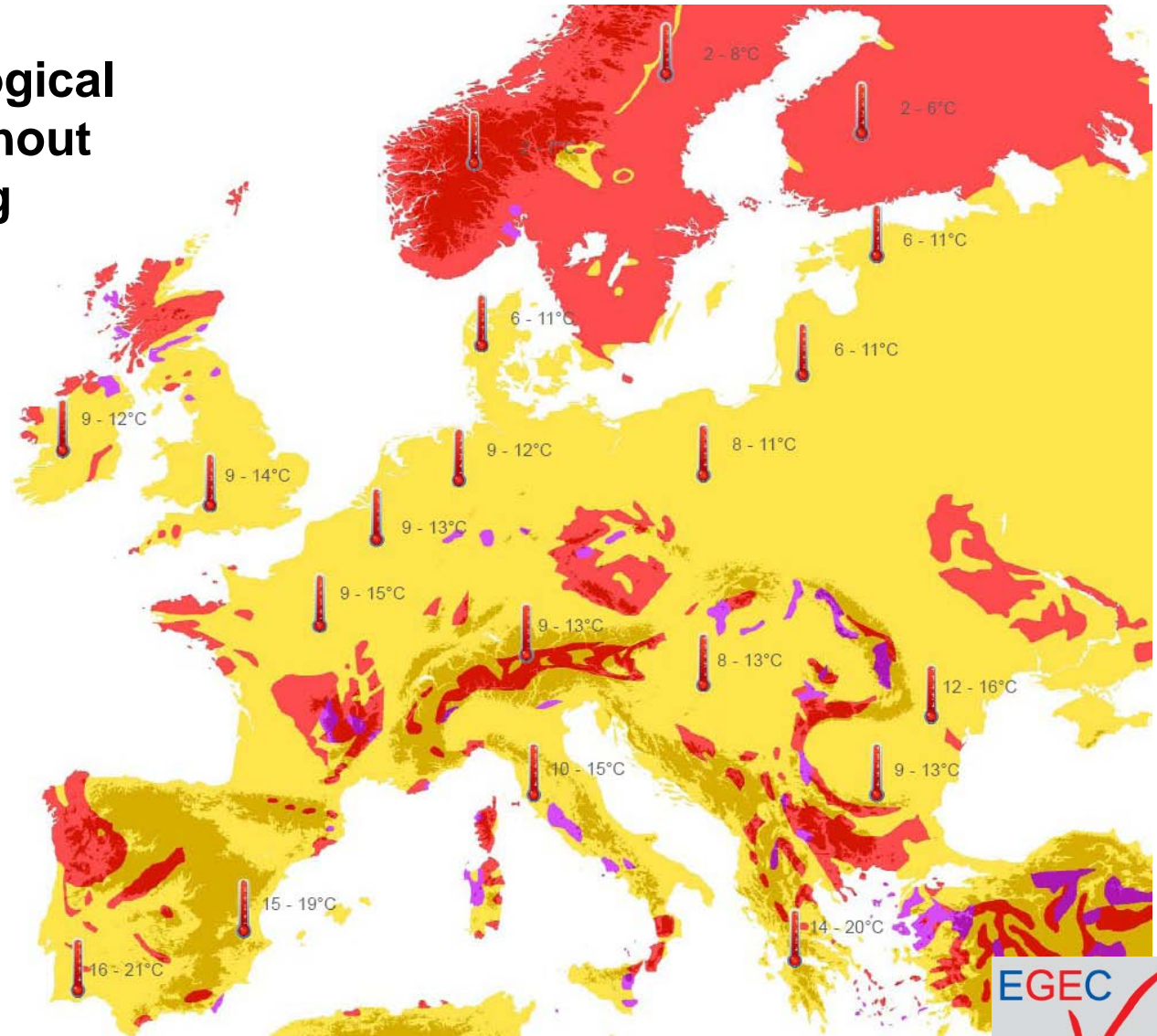


GSHP in Europe – a diverse market

Map prepared by
BRGM for the
Geotrained project

**Climatic and geological
conditions throughout
Europe are varying
wideley**

**Also economic
circumstances
and traditional
construction
methods are
rather different**



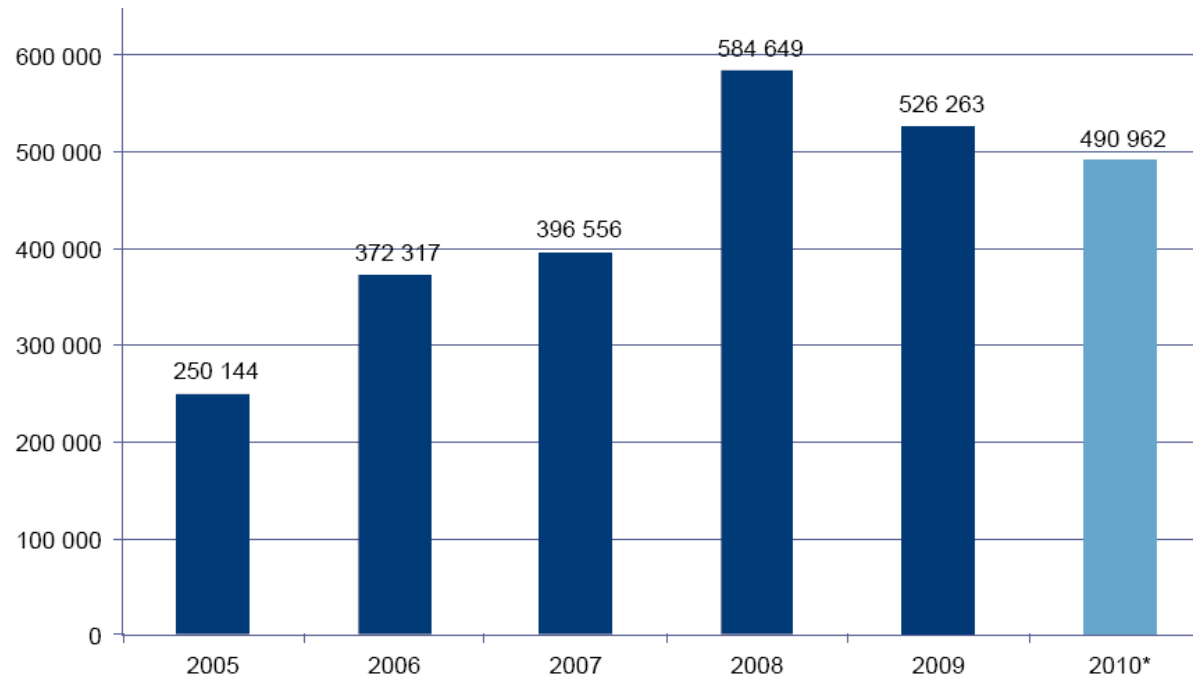
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GSHP in Europe – the Market

Tendency:

- Heat pump sales (all types) generally rather stable
- GSHP share decreasing, in particular in countries with fully developed market



Development of HP sales numbers in 9 countries (AT, FI, FR, DE, IT, NO, SE, CH, UK); graph EHPA (2010)

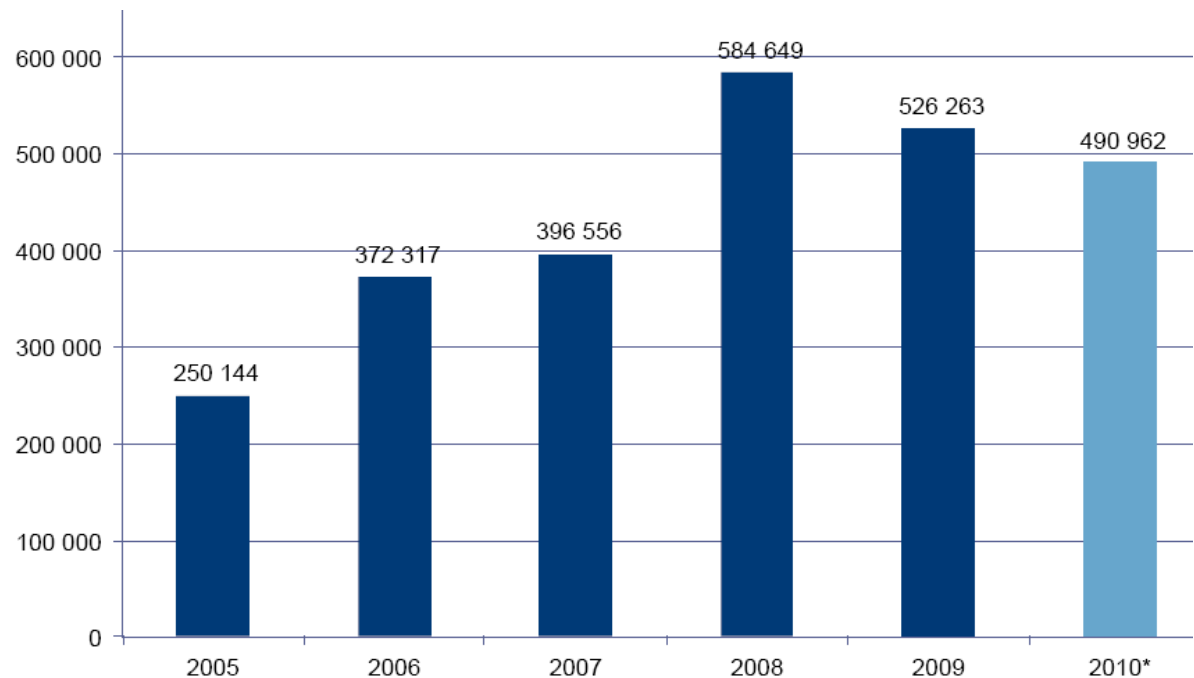
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GSHP in Europe – the Market

Tendency:

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- Interest in GSHP increasing in Southern Europe (starting from low level)



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GSHP in Europe – the Market

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Groundmed:

Advanced ground source heat pump systems for heating and cooling in Mediterranean climate

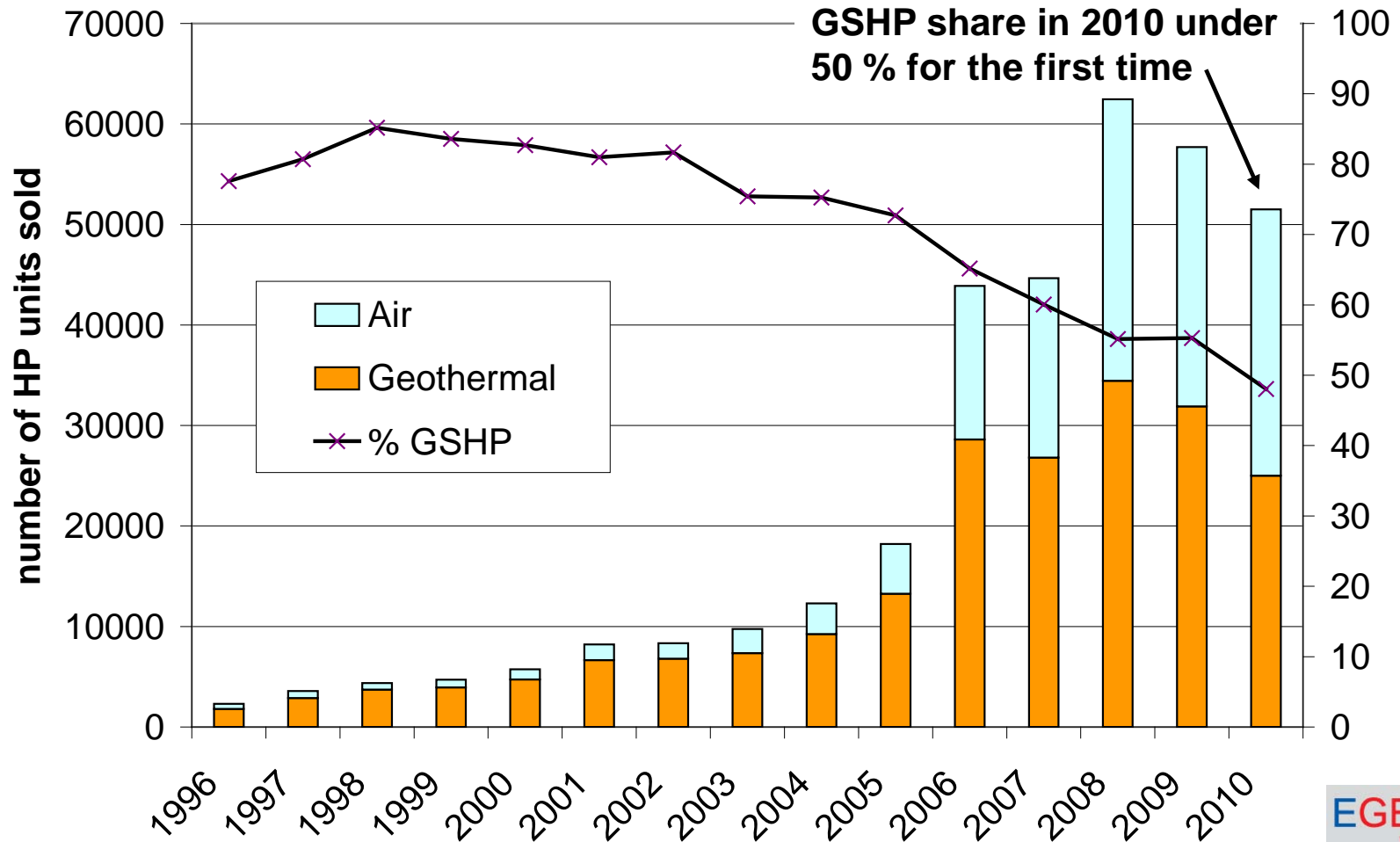
www.groundmed.eu

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GSHP in Europe – the Market

Development of heat pump sales in Germany (after data of BWP)

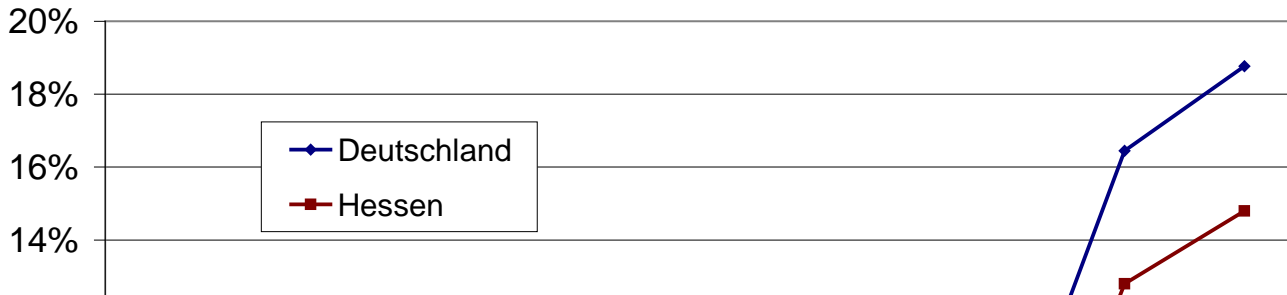


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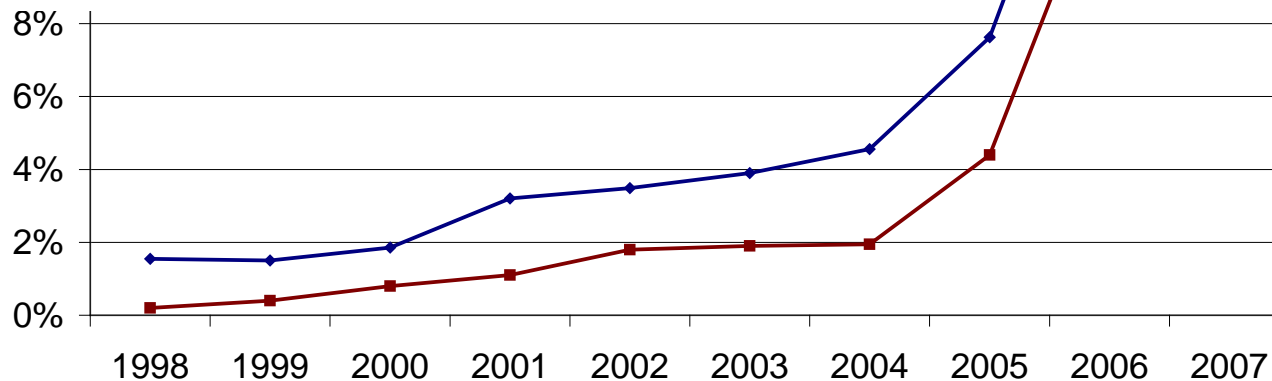


GSHP in Europe – the Market

Market penetration, example: new single-family houses in Germany



Similar development in other countries, e.g. Finland, Austria, Switzerland



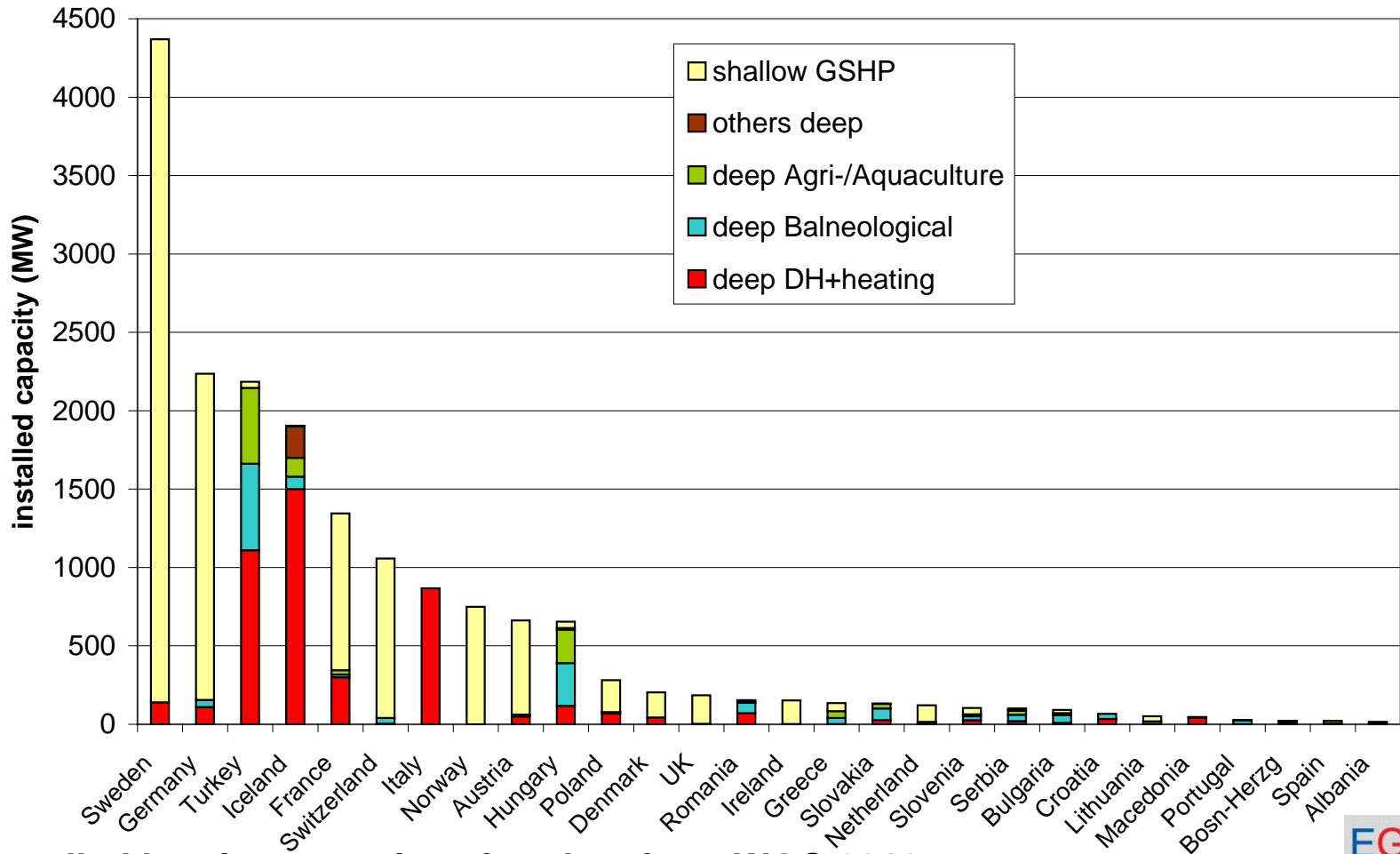
Share of GSHP in single-/double-family-houses in Germany (after Mands et al, 2008, and Rumohr, 2009)

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GSHP in Europe – the Market

Geothermal heating capacity



Installed heating capacity, after data from WGC 2010

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GSHP in Europe – Market incentives

- **Financial incentives:** *Any public policy giving a financial advantage to those who install a RES H&C system or who make use RES energy*
 - Direct grants, Tax reductions, reduced or zero interest rate loan, green certificates, insurance
- **Non Financial:** *Any public policies aimed at increasing the use of RES H&C except those mentioned above*
 - Simplification licensing procedures
 - Information

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GSHP in Europe – Market incentives

Flanking measures are crucial:

- Promotion and information
- R&D and demonstration projects
- Training and certification
- Standards and quality
- Building regulation and RES ordinances



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GSHP in Europe – Market incentives

Financial incentives, a necessary evil?

- Fossil technologies without externalities still too cheap (and receive more subsidies !)
- Difficult to sell long term “pay-back”
- Emerging markets
- However, they provide results...

They lead to strong market uptake but may have unwanted effects

- so right policy decisions are crucial !

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Financial incentives I

	Direct financial incentives		Tax incentives	
	Investment grants	Feed-in Tariffs	Tax reduction	VAT reduction
-	<ul style="list-style-type: none"> • Effect on prices • Red tape 	<ul style="list-style-type: none"> • energy output? • control? 	<ul style="list-style-type: none"> • indirect effect • black market ? 	<ul style="list-style-type: none"> • VAT EU reg • Indirect effect
+	<ul style="list-style-type: none"> • Most common • Very efficient 	<ul style="list-style-type: none"> • Increase RES share • long term 	<ul style="list-style-type: none"> • no application • “Emersione” 	<ul style="list-style-type: none"> • simple • little effect on public finance
Examples	Czech Republic, Germany, Poland, Slovakia, Ireland	UK in 2011	Italy, France	France

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Financial incentives II

	Low or zero interest rates loans	White, green certificates
-	<ul style="list-style-type: none"> • little impact • processing of requests • overhead can be high 	<ul style="list-style-type: none"> • General measure • Complexity
+	<ul style="list-style-type: none"> • good flanking measure • relevant also for specific targets (large installations-R&D) 	<ul style="list-style-type: none"> • Long term • self financed
Examples	France, Poland, Germany, Portugal	Sweden, ESD (France)

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A promising example: the UK Renewable Heat Incentive (RHI)

First phase in force since March 2011

Non-domestic sector:

- RHI payments to be claimed by, and paid to, the owner of the heat installation**
- Payments will be made quarterly over a 20 year period**
- Tariff levels have been calculated to bridge the financial gap between the cost of conventional and renewable heat systems**
- Heat output to be metered and the support calculated from the amount of heat used for eligible purposes, multiplied by the tariff level**

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A promising example: the UK Renewable Heat Incentive (RHI)

Domestic sector, further details to come up soon (and fully in force in 2012), with the following criteria:

- a fair spread of technologies across all regions of Great Britain, including biomass, solar thermal and heat pumps (including air source heat pumps)**
- a well insulated home based on its energy performance certificate**

„The Coalition Government has decided that the RHI will be funded from general Government spending. The previous Government’s plans for an RHI levy to fund the scheme were considered overly complex“

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A warning: Incentives could also lead to unwanted results – like a huge share of electricity for heating

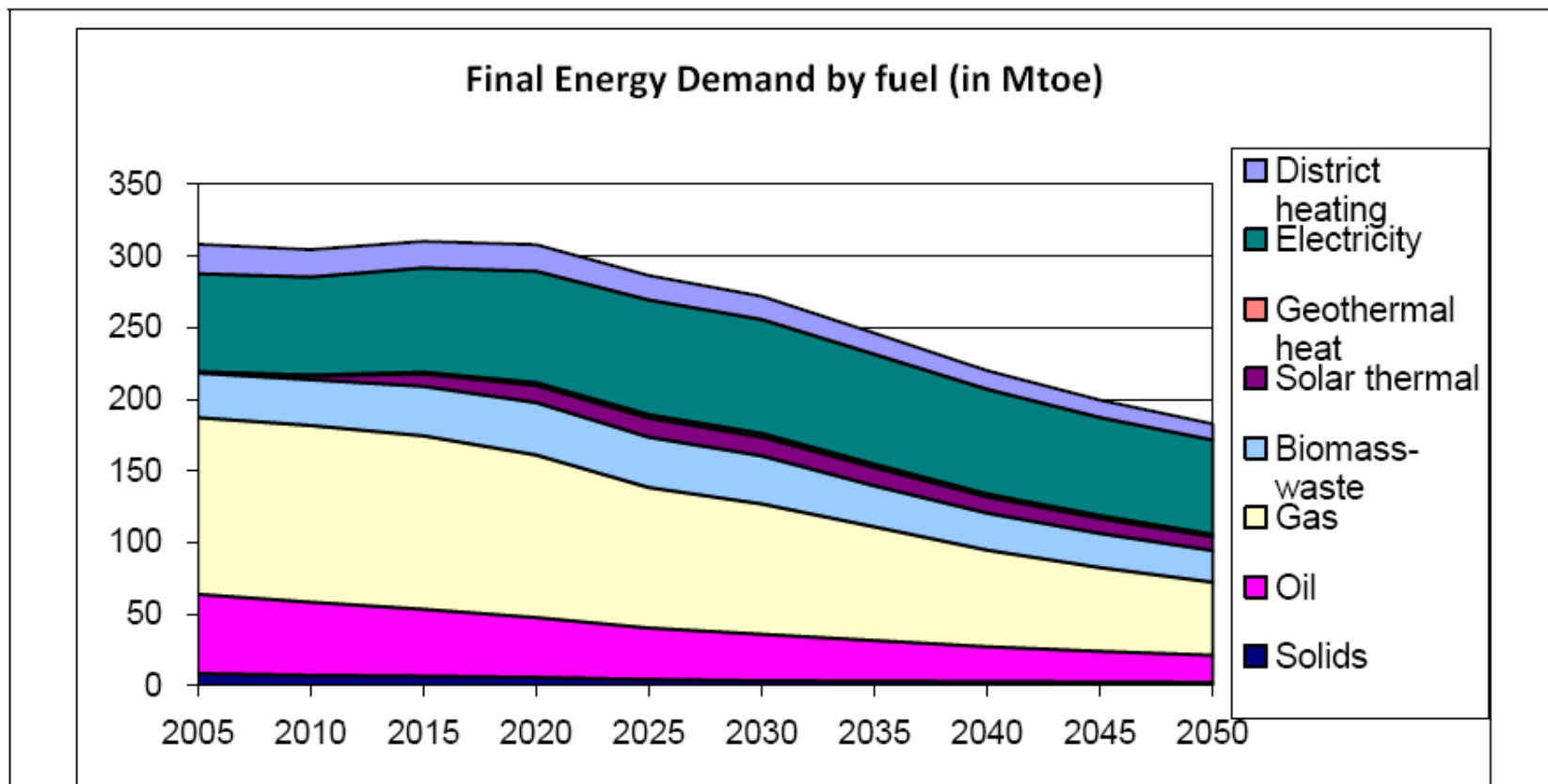


Figure 4: Residential Sector. Final Energy Demand by fuel up to 2050 according to *Power Choices* scenario (EURELECTRIC, *Power Choices*)

From EURELECTRIC Policy Paper April 2011

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GSHP in Europe – Market incentives

Recommendations

- Have mid & long term perspectives:
no stop-and-go schemes !!!
- One-stop-shop for project developers & customers
- Link with quality
- The key positive effects of well designed and managed financial incentive schemes are:
 - Reduction of the upfront investment costs
 - Psychological effect: signal of the public authority to the potential users

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GSHP in Europe – current status

All material for GSHP today readily available from manufacturers

Borehole heat exchanger
(BHE, right)

Material for BHE
and grouting on
site (below)



Austria



France



Germany

Brine-water
heat pumps

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GSHP in Europe – current status

Drilling equipment in various countries



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GSHP in Europe – current status

New standards coming up
in Spain and UK

Specific standards and regulations exist meanwhile

AT	ÖWAV Regelblatt	Thermal use of the groundwater and the underground, heating and cooling	2009
CH	AWP T1	Heating system with heat pumps	2007
CH	SIA D 0190	Use of earth heat through foundation piles etc.	2005
CH	SIA 384/6 (SN 565)	Borehole heat exchangers for heating and cooling	2009
DE	DIN 8901	Refrigerating systems and heat pumps - Protection of soil, ground and surface water	2002
DE	VDI 4640 Blatt 1-4	Thermal use of the underground - part 1-4	2001-2010
SE	Normbrunn-07	Drilling for water wells and energy	2008

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GSHP in Europe – current status design

Subsurface investigation for planning: TRT-equipment in various countries

Germany



Finland

Sweden



Greece

Spain



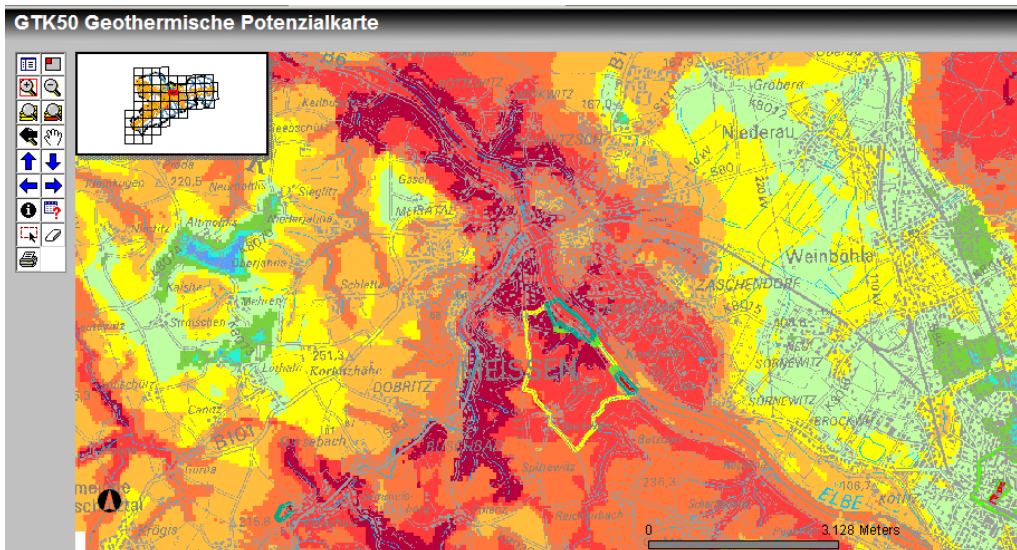
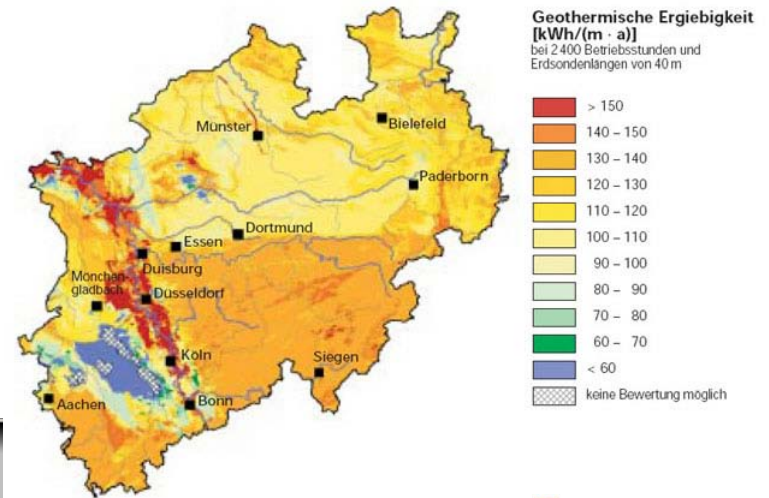
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GSHP in Europe – current status design

Subsurface investigation for planning:
Data from Geological Surveys

Data on CD-ROM from NRW (right),
Online GIS System in Sachsen
(below)



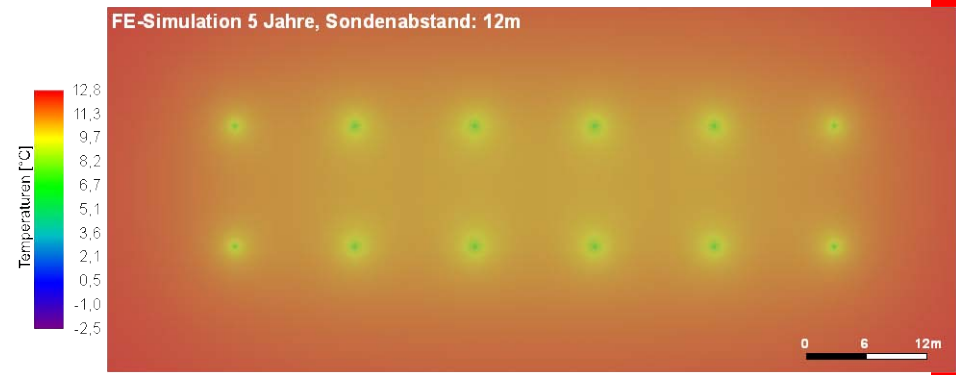
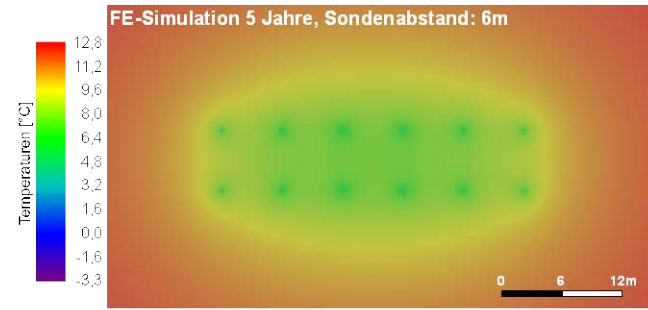
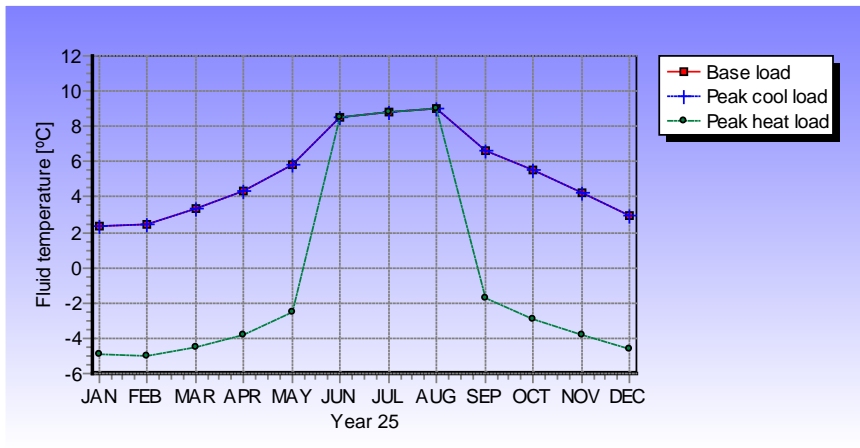
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GSHP in Europe – current status design

Widely accepted GSHP design rules and methods

Calculation with simple software (EED, below) or numerical simulation (right)

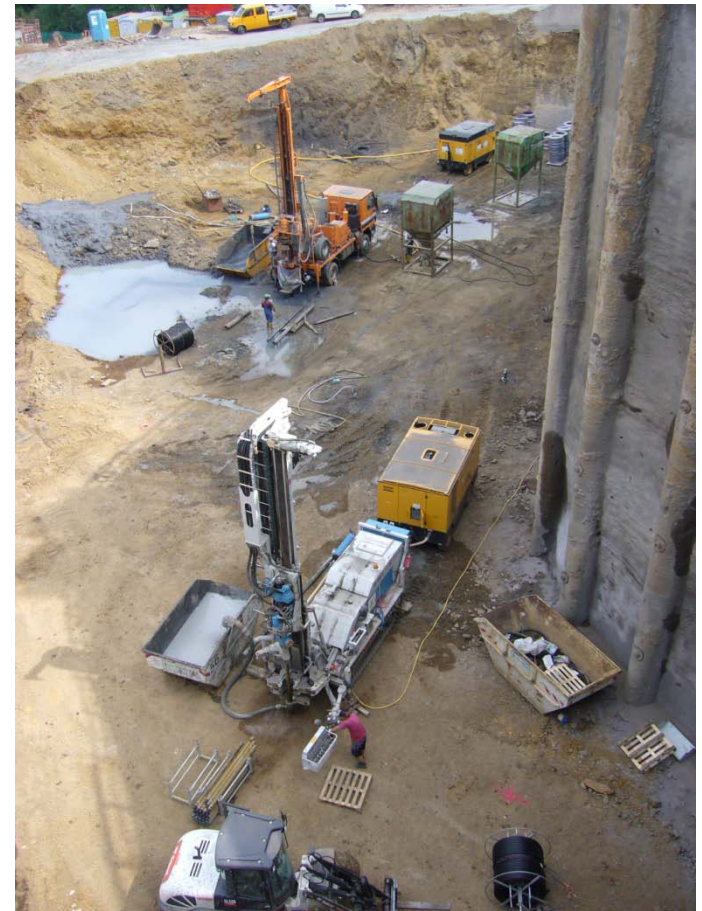


GSHP in Europe – examples

Large GSHP projects



**Heat pump and
BHE manifold
for county
administration
Gelnhausen
(86 BHE)**



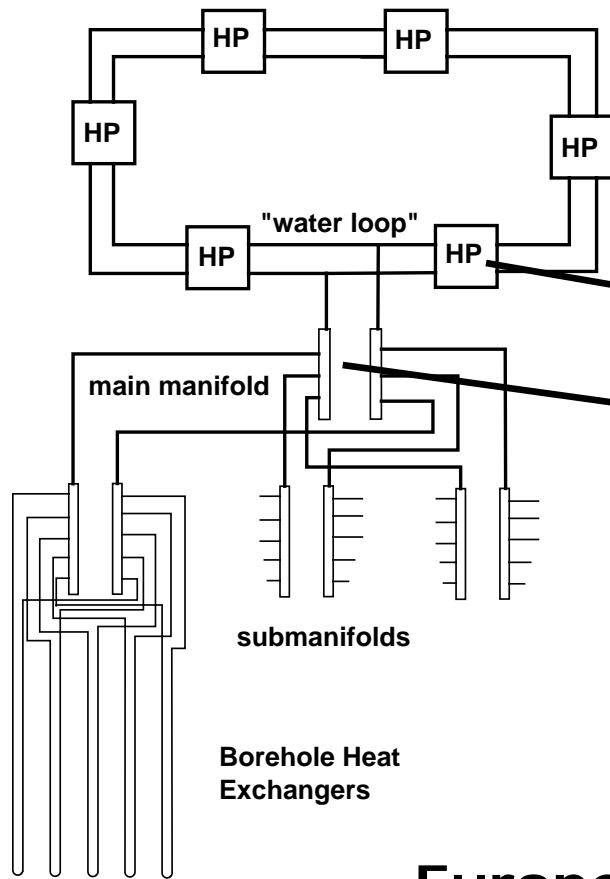
**Drilling in granite for
educational centre**

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GSHP in Europe – examples

Large GSHP project: Ümraniye Meydan Shopping Center (Metro), Istanbul



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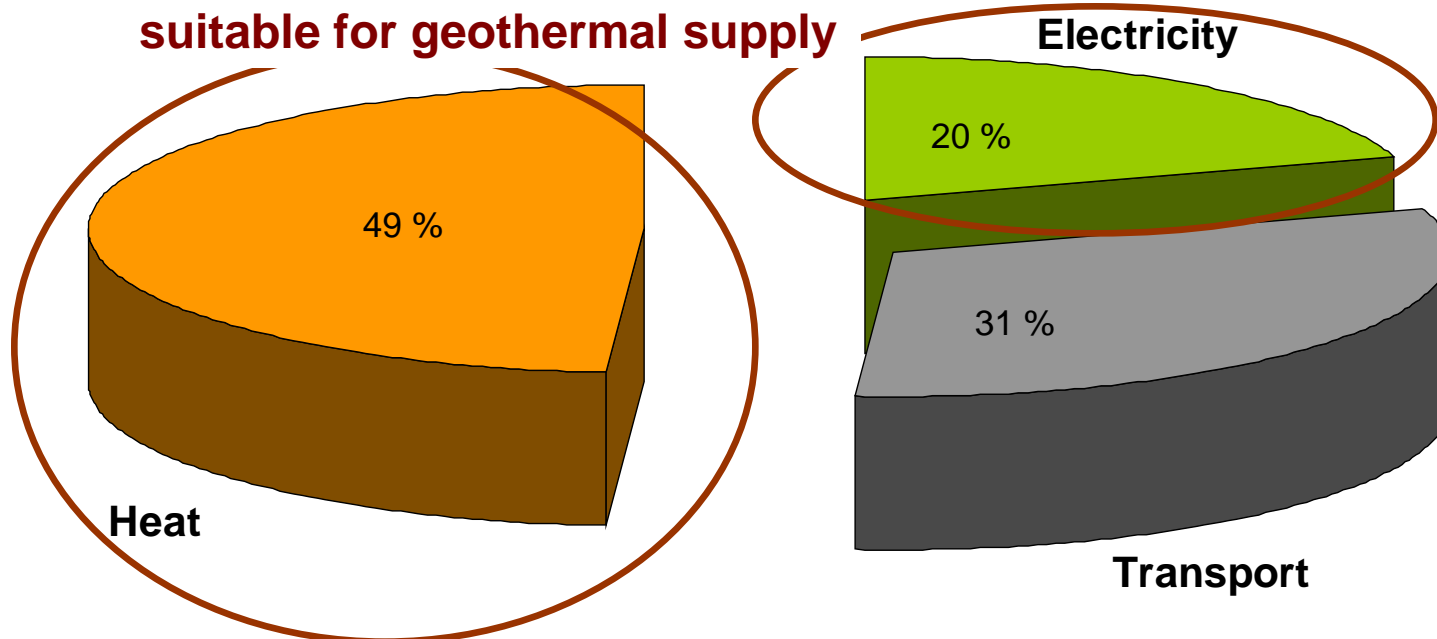


EU-Policy – the way to the future

In 2006, a share of 49 % of the final energy consumption in EU 27 was in the form of heat.

Heat accounted for:

86 % of the final energy consumption in households,
76 % in commerce, services and agriculture, and
55 % in industry.



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EU-Policy – the way to the future



EU Policy related to Shallow Geothermal Systems

Directives:

**EU Directive 2009/28/EC
on the Promotion of Renewable Energy Sources**

**EU Directive 2010/31/EC
on the Energy Performance of Buildings**

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EU-Policy – the way to the future



EU Directive 2009/28/EC on the Promotion of Renewable Energy Sources

Inclusion of shallow geothermal:

Art. 5.4:

Aerothermal, **geothermal** and hydrothermal heat energy **captured by heat pumps** shall be taken into account for the purposes of paragraph 1(b) provided that the final energy output significantly exceeds the primary energy input required to drive the heat pumps. The quantity of heat to be considered as energy from renewable sources for the purposes of this Directive shall be calculated in accordance with the methodology laid down in Annex VII.

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EU-Policy – the way to the future

EU Directive 2009/28/EC on the Promotion of Renewable Energy Sources

Inclusion of shallow geothermal:

Annex VII:

Heat pumps must fulfill the criterion:

$$SPF > 1,15 * 1/\eta$$

(η is the electricity production efficiency per country)

Then all energy from the ground to the system is counted:

$$E_{RES} = Q_{usable} * (1 - 1/SPF)$$

(SPF and η have to be determined by EC / Eurostat)

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EU-Policy – the way to the future

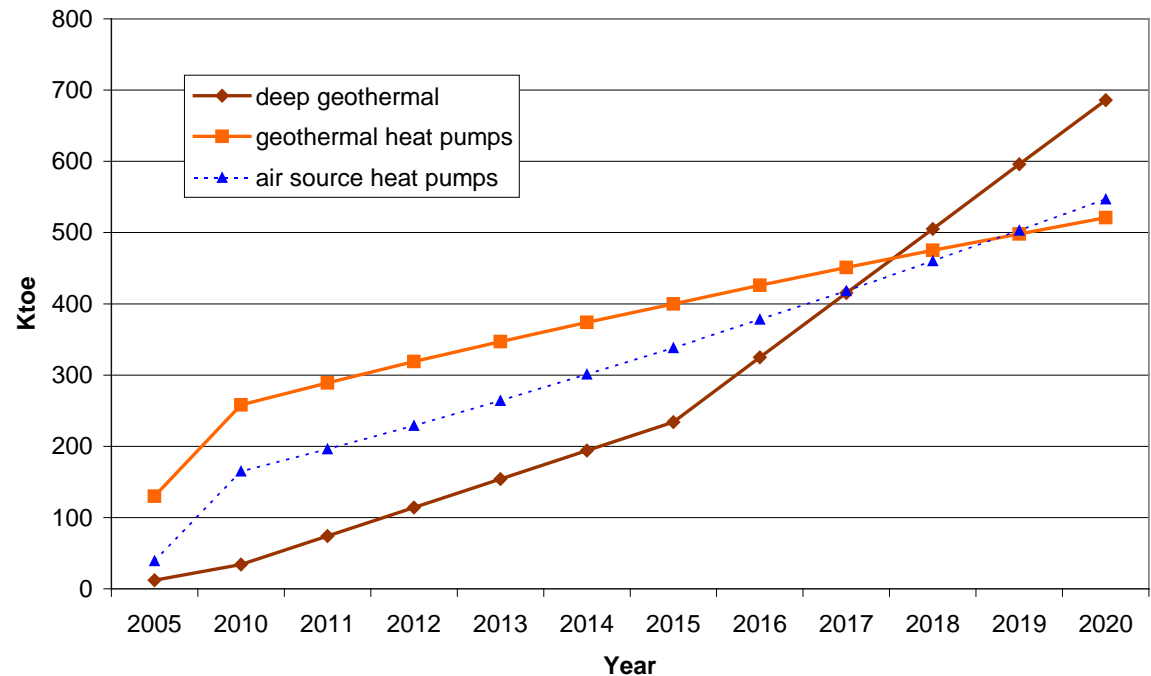


EU Directive 2009/28/EC on the Promotion of Renewable Energy Sources

The implementation
in the member states
is via the National
Renewable Energy
Action Plans
(NREAPs)

Alas, some are not
very ambitious,
others exclude
GSHP completely

Geothermal Heat in the German NREAP draft



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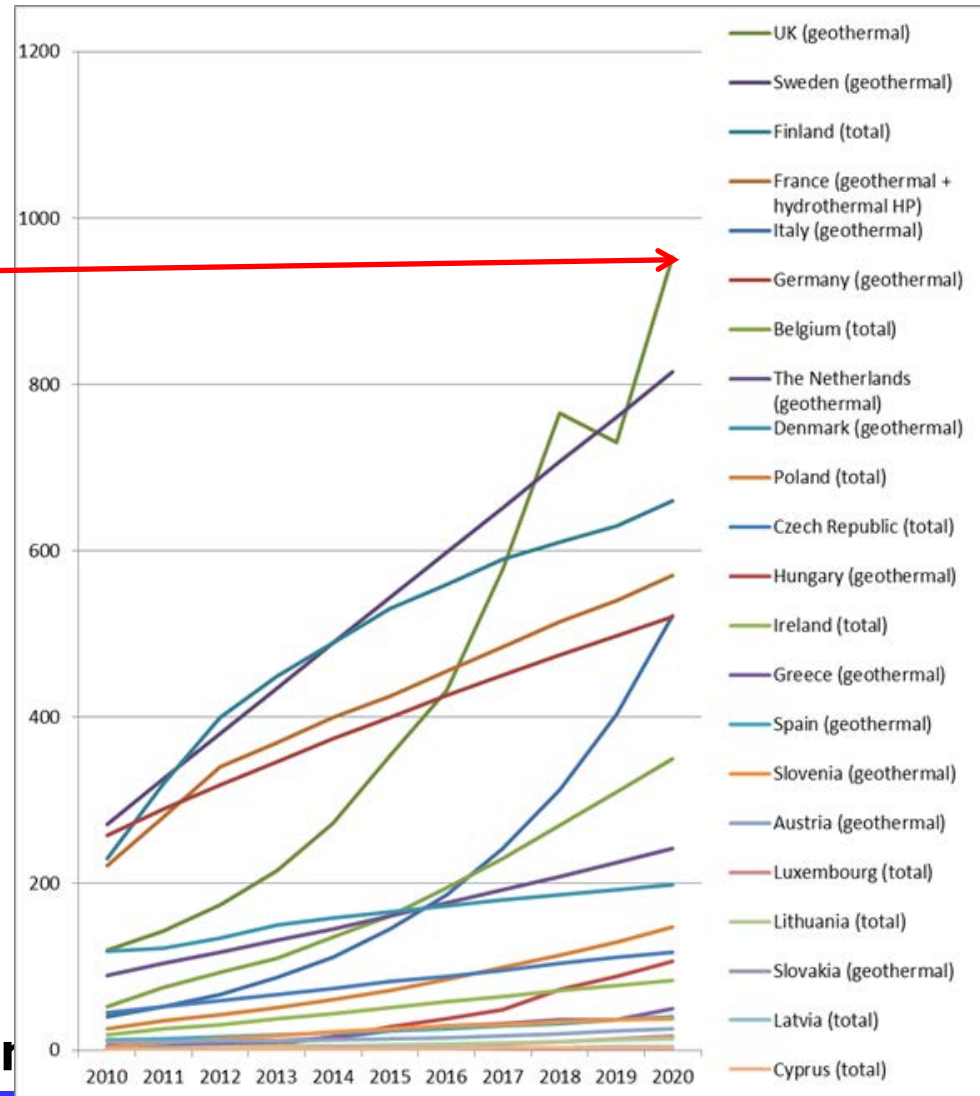


EU-Policy – the way to the future



Geothermal heat pumps as planned in the NREAPS

UK: n 1



European

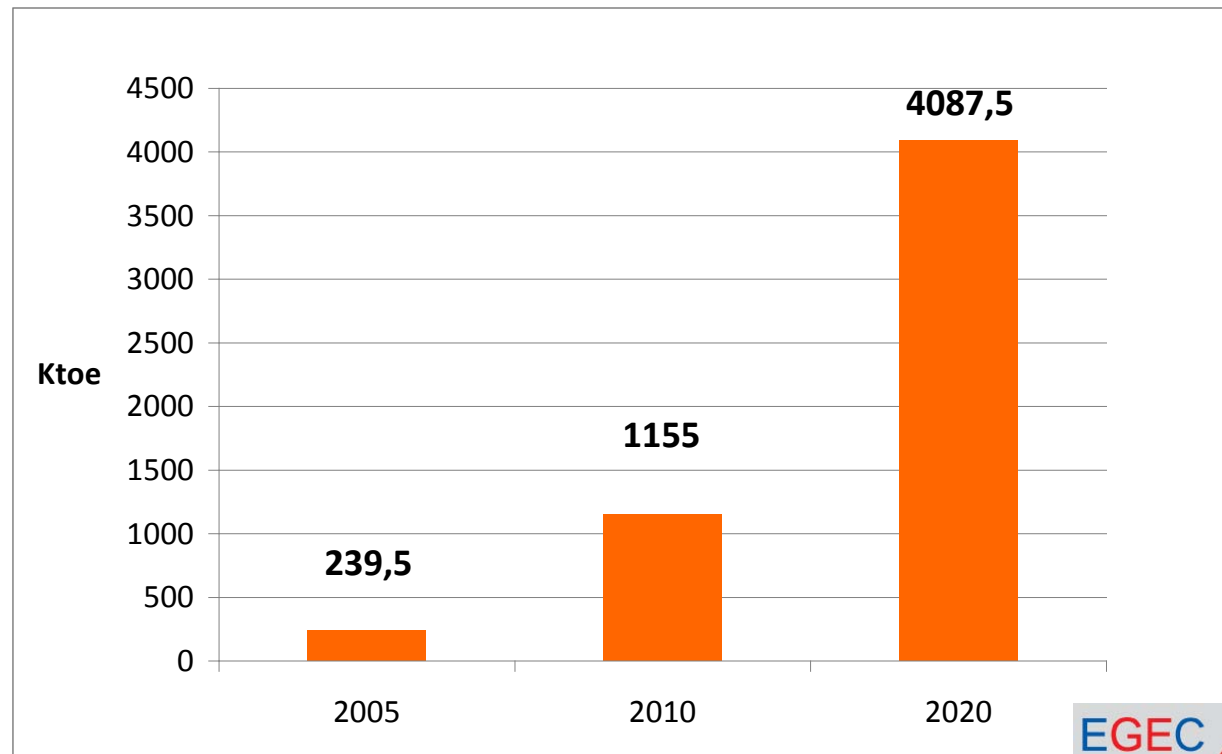
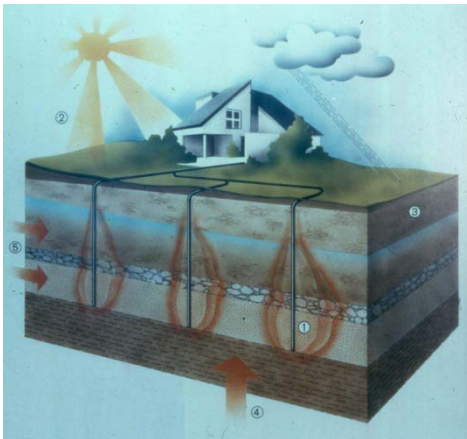


EU-Policy – the way to the future



EU Directive 2009/28/EC on the Promotion of Renewable Energy Sources

Geothermal heat pumps as planned in the NREAPS



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EU-Policy – the way to the future



EU Directive 2009/28/EC on the Promotion of Renewable Energy Sources

Training and certification:

Art. 14.3:

Member States shall ensure that certification schemes or equivalent qualification schemes become or are available by 31 December 2012 for installers of small-scale biomass boilers and stoves, solar photovoltaic and solar thermal systems, **shallow geothermal systems** and heat pumps.

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EU-Policy – the way to the future



Training and certification:

- For a sustainable market, quality of material and services is paramount
- To guarantee the necessary knowledge and skills, training and certification has to be established
- Some countries have national schemes:



The recently completed project **GEO TRAINET** (supported by IEE / EU) aims at providing harmonised material and curricula

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EU-Policy – the way to the future



Training and certification:

- Started with a consortium from 8 countries, needs to be taken over after project end by national associations or similar
- Education board on European level to be established



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EU-Policy – the way to the future

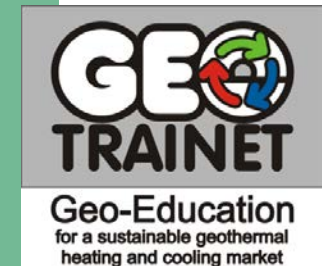
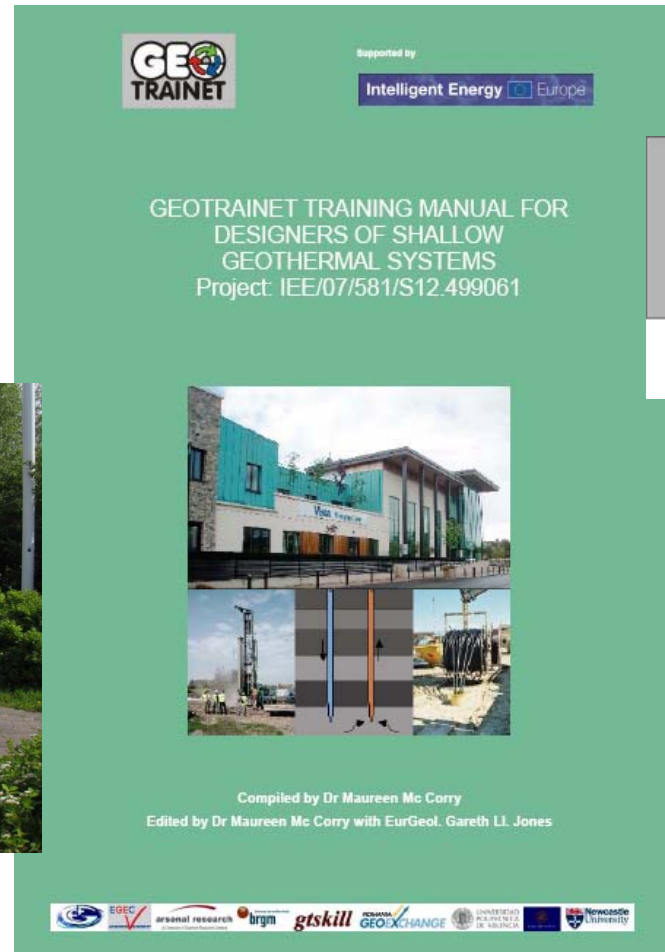


Training and certification:

Geotrinet Training Manual

Geotrinet Website with
E-Learning Platform:

<http://geotrinet.eu>



Geotrinet course
in Uppsala 2009

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European Technology Platform



IRHC Renewable Heating & Cooling
European Technology Platform

The “Common Vision” of the relevant sectors is published, for the time horizon 2020-2050

Official Presentation on 5 May 2011

Available from Website:
www.rhc-platform.org



www.rhc-platform.org

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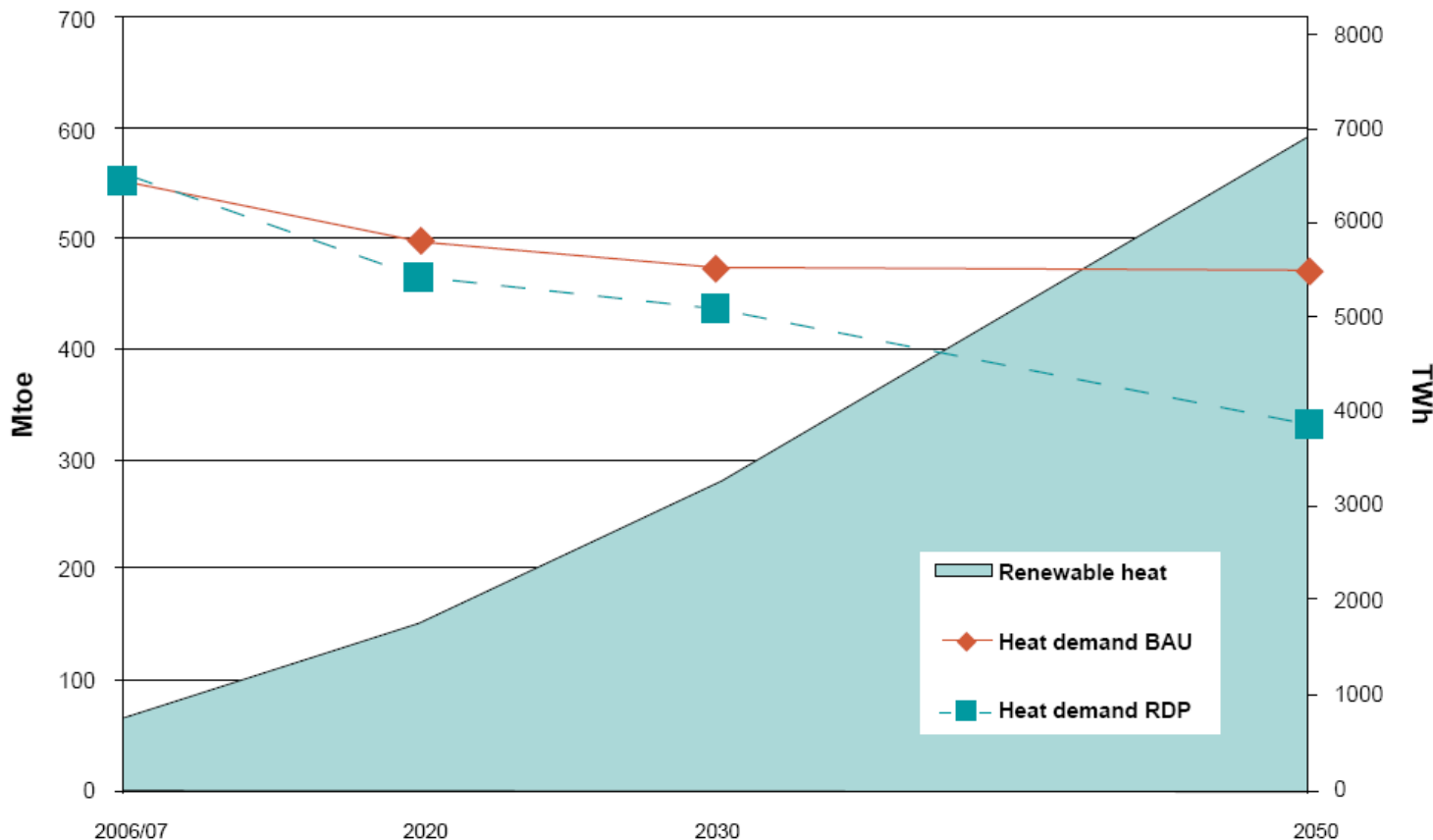


www.egec.org



Main target are 100 % renewable energy for heating

overall scenario



www.rhc-platform.org

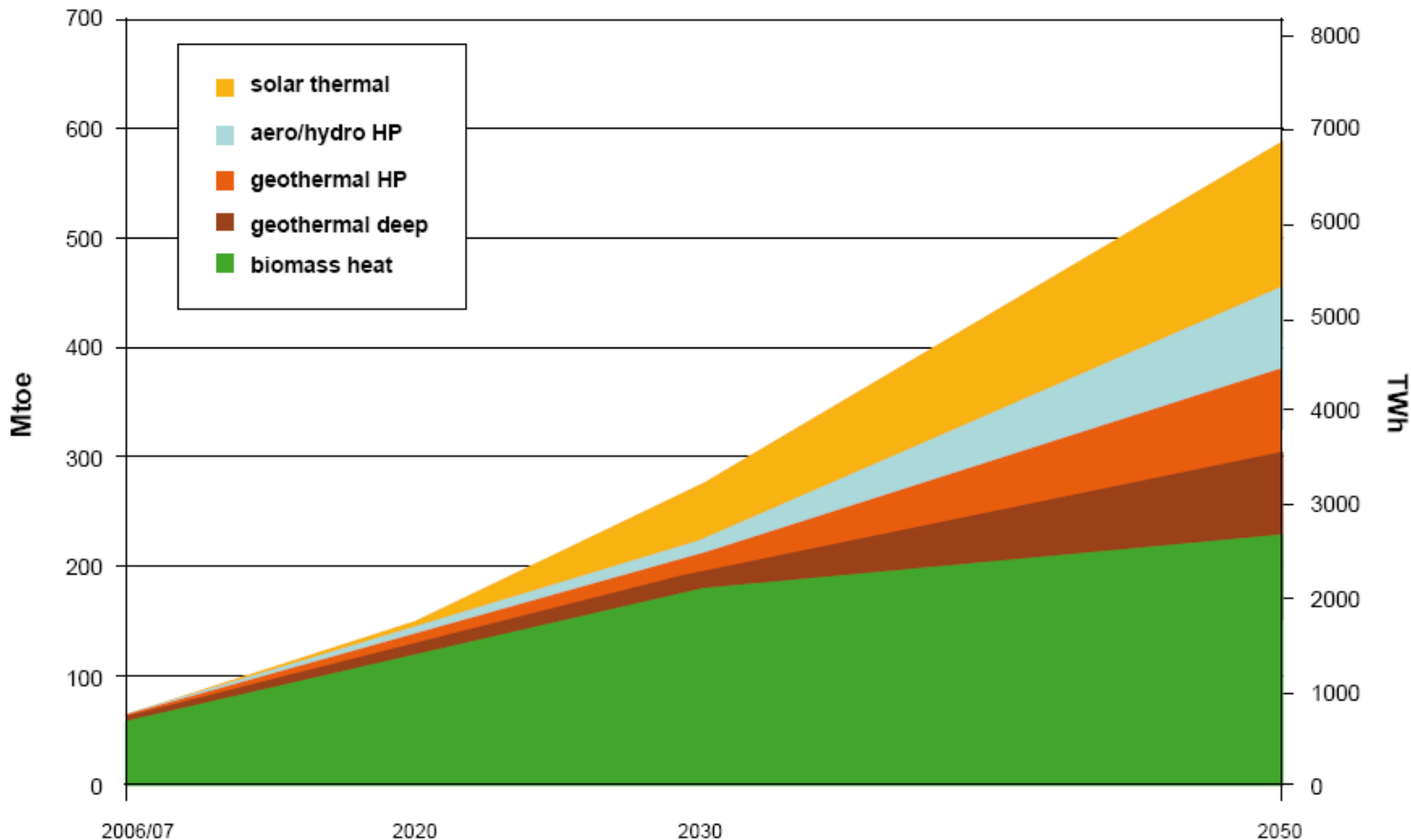
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GSHP are well represented in the Common Vision

overall scenario



www.rhc-platform.org

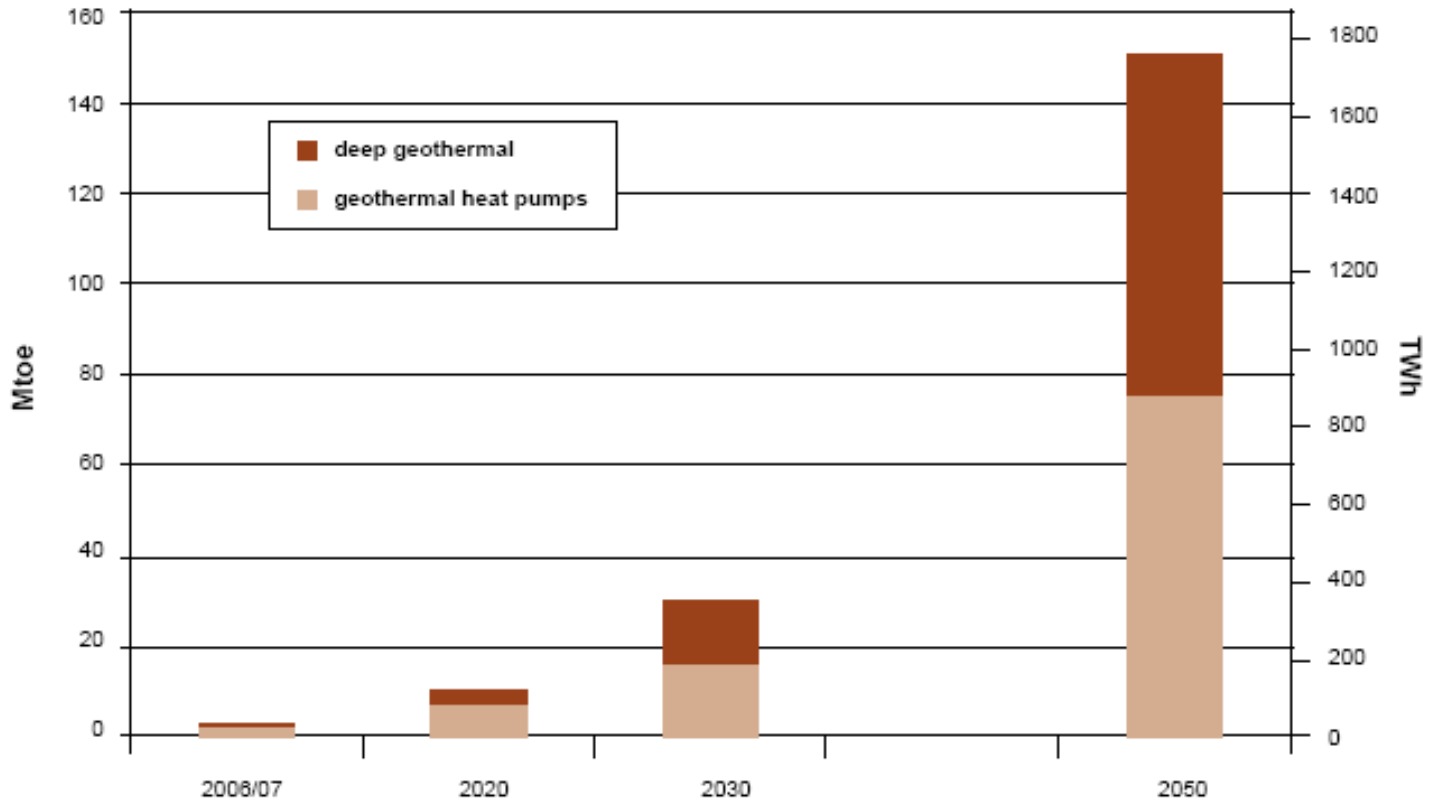
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GSHP are well represented in the Common Vision

geothermal share

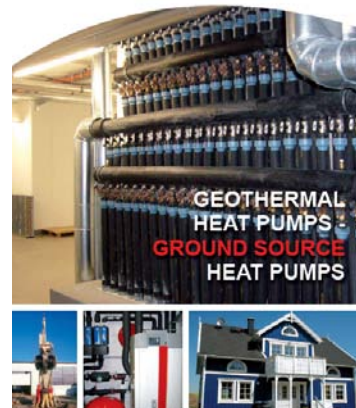
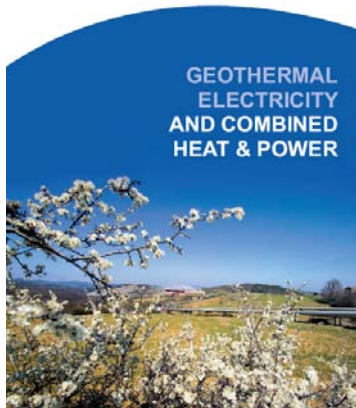


www.rhc-platform.org

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**Thank you
for your
attention !**



GEO THERMAL DISTRICT HEATING

GEO THERMAL ENERGY USE IN AGRICULTURE

GEO THERMAL SNOW MELTING AND DE-ICING

GEO THERMAL DESALINATION

GEO THERMAL ENERGY

GEO THERMAL ENERGY:
from the earth, a renewable energy resource delivering heat and power 24 hours a day throughout the year, an energy resource nearly infinite and available all over the world.

**more information:
www.egec.org**

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