European Geothermal Energy Council

Geothermal Energy – how can standardisation help?

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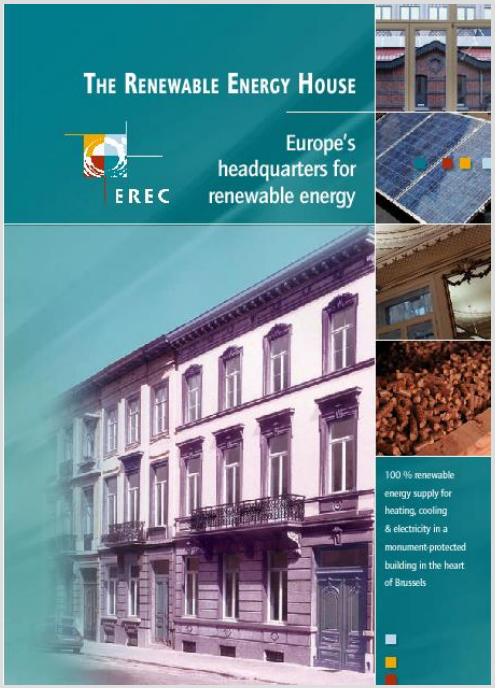
European Geothermal Energy Council

The Voice of the Geothermal Industry in Europe

- Founded May 1998 (in Straubing, DE)
- Offices in Bruxelles, Belgium, in the Renewable Energy House
- Representing the Geothermal Energy Industry towards the EU institutions (mainly EC and EP)



Drilling (2005) and heat pump for geothermal system of REH

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Standards for geothermal energy

Contents:

- **What are the sectors for geothermal standards – a look at the market**
- **The development of Ground Source Heat Pumps (GSHP) in Germany and the role of VDI 4640**
- **Current situation and needs for standards for shallow geothermal (mainly GSHP)**

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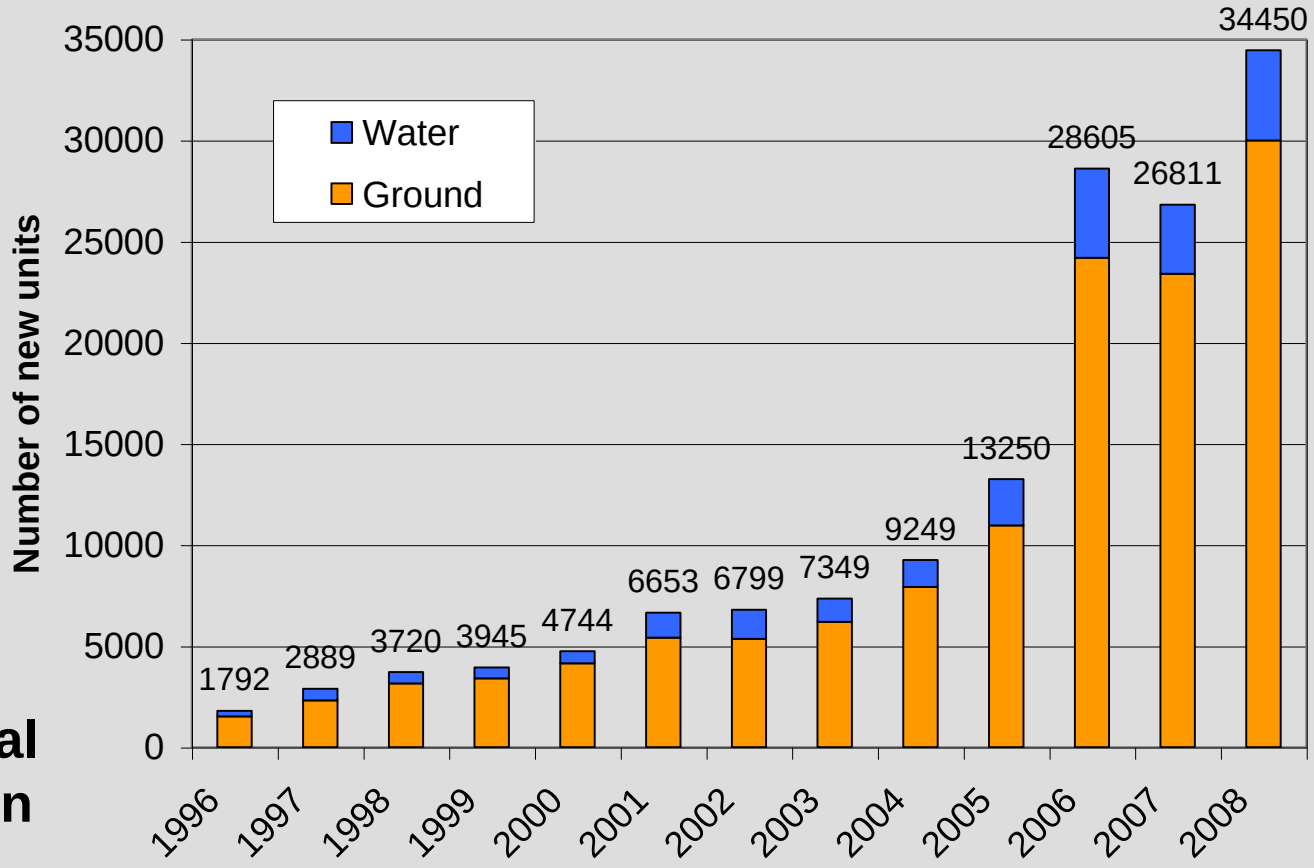
Markets for geothermal energy

- **“geothermal energy” means energy stored in form of heat beneath the surface of solid earth**
  (from Art. 2 of EU Directive 2009/28/EC on Promotion of Renewable Energy Sources)
- **Electric Power from Geothermal Energy:**
  Small market with rather individual installations, industrial costumers, professional planning, standard components
- **District Heating from Deep Geothermal Energy:**
  Small market with rather individual installations, industrial costumers, professional planning, standard components
- **Shallow Geothermal Energy:**
  Large number of small units, end-user market, here standardisation has highest priority

Markets for geothermal energy



Example: Annual sales of GSHP in Germany

(after data from BWP)

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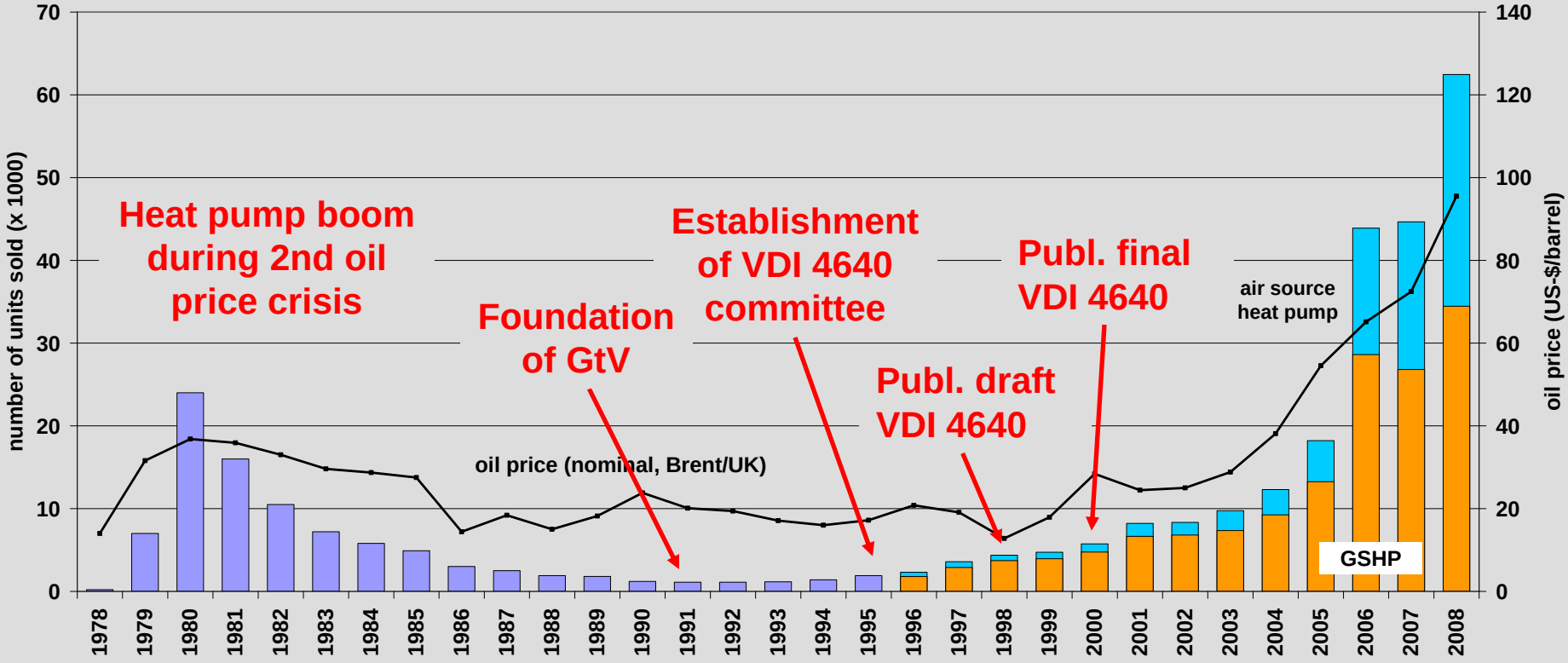
Markets for heat pumps in Germany



Annual sales of HP in Germany

(after data from IZW, BWP)

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Guideline VDI 4640

VDI 4640 „Thermal Use of the Underground“

- **Part 1: General / Licenses / Environment, status 2001, revision draft published 2008-5**
- **Part 2: Ground Source Heat Pumps, status Dec. 2000, under revision**
- **Part 3: UTES, status 2000**
- **Part 4: Direct uses, status 2004**

Very comprehensive, started in 1995 following an initiative of GtV

Elevated shallow geothermal from scratchbuilding to industrial product !

All material for GSHP today available from manufacturers

Borehole heat exchanger (BHE, right)

Material for BHE and grouting on site (below)

Brine-water heat pumps

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Standards for Ground Source Heat Pumps (GSHP)

- For the heat pumps as such, a comprehensive set of technical standards with only few missing issues exists, at a European level.
  Examples: EN 378, EN 12263, EN 14511, etc.
- For the design of the whole heat pump system, a common standard has been published end of 2007 with EN 15450:
  "Heating systems in buildings - Design of heat pump heating systems"
- For the ground side, EN Standards only exist for safety of drill rigs (shallow wells), and from the petroleum industry (some relevance for deep wells)

Standards for Ground Source Heat Pumps (GSHP)

- Specific technical standards for GSHP systems exist in the countries where the market already is developed.
- This includes AT, DE, SE, CH.

Standards for Ground Source Heat Pumps (GSHP)

AT	ÖWAV Regelblatt	Thermal use of the groundwater and the underground, heating and cooling	in prep.
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	2000-2004 *
SE	Normbrunn-07	Drilling for water wells and energy	2008

* Part 1 new in 2009

EN 15450 (2007): Design of heat pump heating systems

German adaptation:
DIN EN 15450

DEUTSCHE NORM Dezember 2007

DIN EN 15450

DIN

ICS 27.080; 91.140.10

Heizungsanlagen in Gebäuden –
Planung von Heizungsanlagen mit Wärmepumpen;
Deutsche Fassung EN 15450:2007

Heating systems in buildings –
Design of heat pump heating systems;
German version EN 15450:2007

Systèmes de chauffage dans les bâtiments –
Conception des systèmes de chauffage par pompe à chaleur;
Version allemande EN 15450:2007

Gesamtumfang 51 Seiten

Normenausschuss Heiz- und Raumlufttechnik (NHRS) im DIN

Preisgruppe 16
www.din.de
www.beuth.de
9654436

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EN 15450 (2007): Design of heat pump heating systems

- EN 15450 elucidates the basic problem for a geothermal standard on a European level:
  - Climatic conditions throughout Europe vary widely giving large differences in heating/cooling demand
  - Geological conditions vary widely from unconsolidated soils to hard, crystalline rock
  - Traditions in heating and cooling vary
- As a result, EN 15450 can only give a general minimum framework for design and installation, with many items to be filled in locally or regionally

What is needed in shallow geothermal standards

- The introduction of EN and ISO standards for heat pumps has been crucial, as these products are manufactured and traded throughout Europe.
- Drilling and installation for shallow geothermal systems is a service rendered by local contractors so the need for harmonised standards is not so urgent
- In many countries no guidelines and standards exist and thus consumer protection is not guaranteed.
- Further Standards at European level seem to be necessary

What is needed in shallow geothermal standards

- **Items to be covered in new, European standards for shallow geothermal applications could include :**
  - **Layout and sizing of the system suitable for the different climatic and geological conditions within Europe**
  - **Materials for wells, borehole heat exchangers, other pipe loops, manifolds**
  - **Wells: Drilling, well construction and well completion**
  - **Borehole heat exchangers: Drilling, installation and completion**
  - **Pipe laying for horizontal loops**
  - **Other types of ground heat exchangers**
  - **Connection to heat pump or other systems, system integration and interfaces**

What is needed in shallow geothermal standards

- **Inclusion of persons and committees already active nationally (VDI, SIA) to use their experience**
- **Are geo*technical* standards (in CEN/TC 341) really the best option for shallow geo*thermal* site investigation?**
- **The new project GEOTRAINET within IEE will develop training and certification tools for the ground side of GSHP and work on identification of items requiring standar-disation (project started Oct. 2008)**
  - **Partners from Austria, Germany, France, Ireland, Romania, Spain, Sweden, UK, plus EFG + EGEC**
  - **http://www.geotrainet.eu**

Geo-Education for a sustainable geothermal heating and cooling market

Intelligent Energy Europe

Conclusion

- **Standards and guidelines have a strong impact on market development, as they allow for trade and exchange.**
- **They also can help forming an industry, like VDI 4640 in Germany marked the transition of GSHP from experiment to industrial product**
- **Training and certification of planners and drillers is needed for long-term market development**

Geo-Education
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Thank you for your attention!

http://www.egec.org