

Querschnittstechnologien inkl. Geothermie F&E Schwerpunkte und deren Implementierungsstrategie

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Themenüberblick (2 Panels)

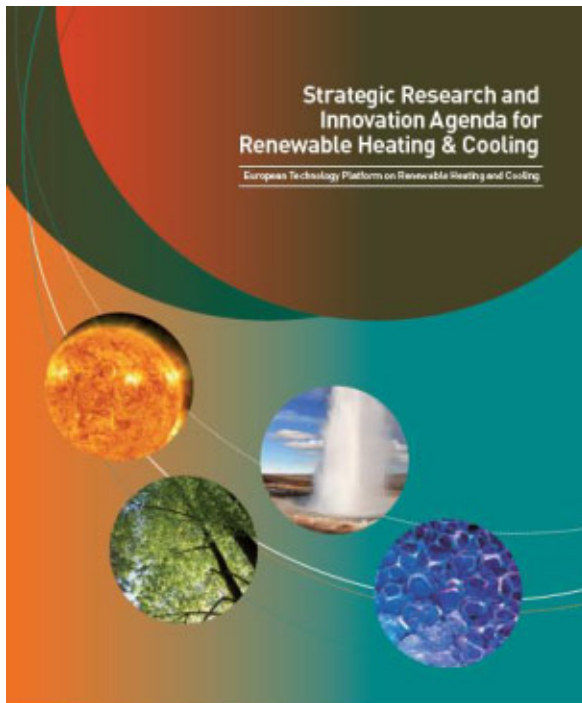
Geothermie

- Oberflächennahe Geothermie (Erdreichwärmepumpen)
- Tiefengeothermie

Querschnittstechnologien

- Fernwärme und Fernkälte
- Thermische Energiespeicher
- Hybridsysteme inkl. Wärmepumpen

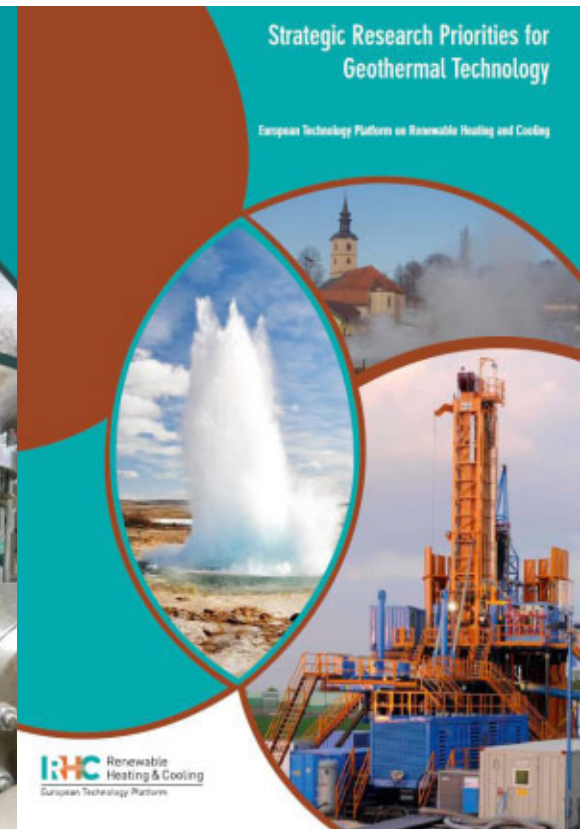
Basisdokumente



RHC Renewable Heating & Cooling
European Technology Platform



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Potential der Technologien

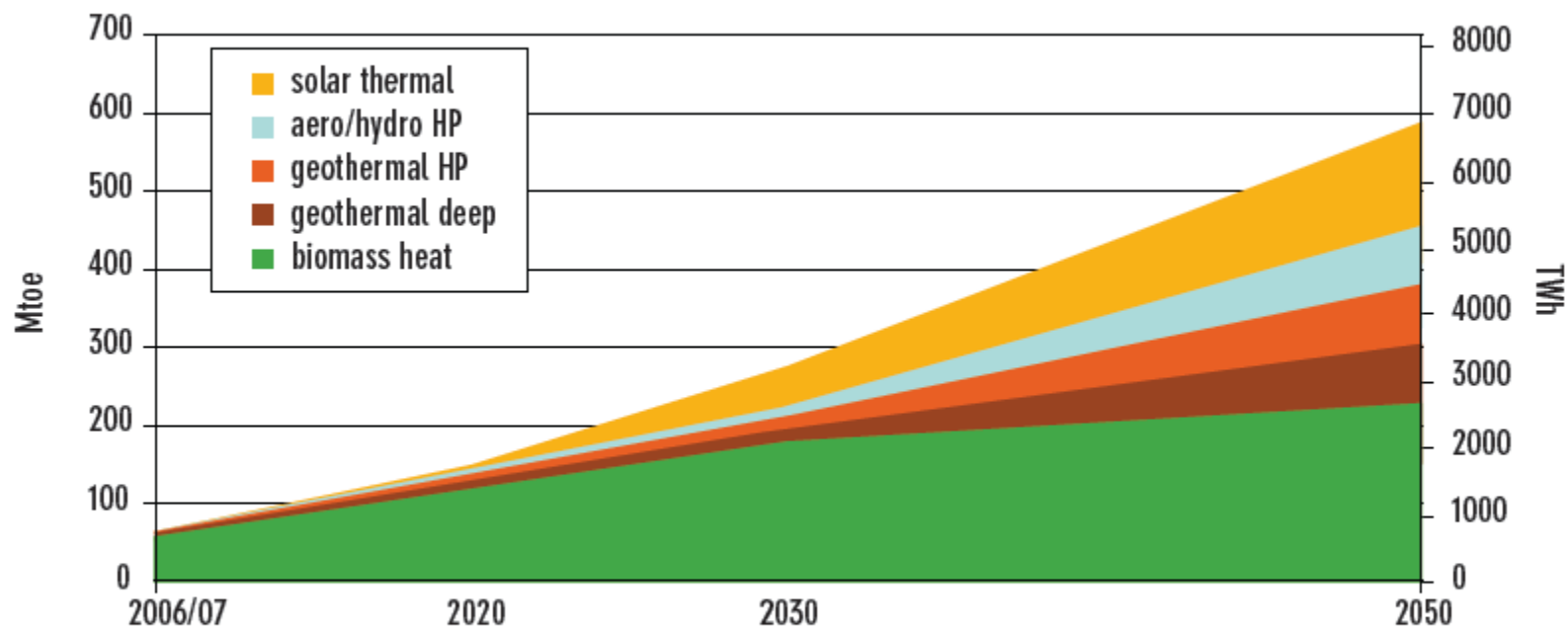
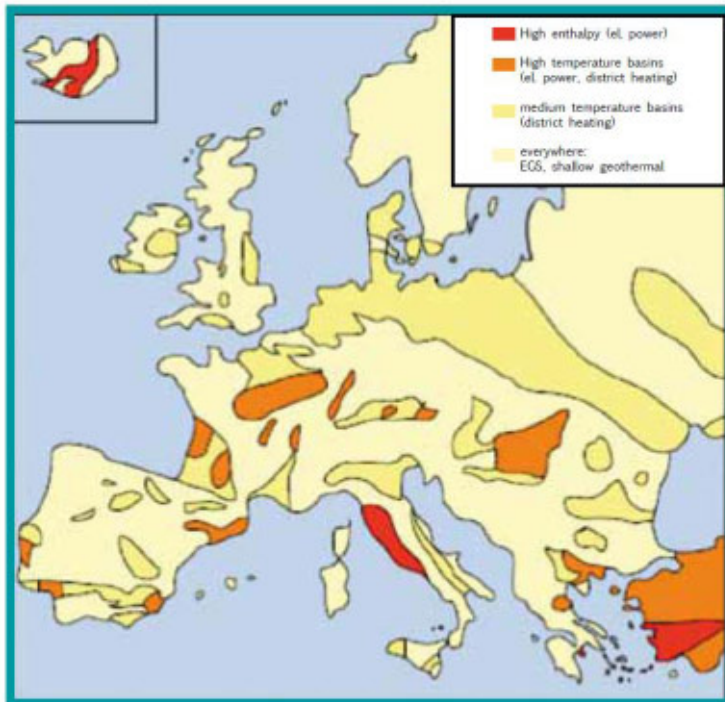


Figure 6 - Heating potential by renewable energy sources in EU. Source: RHC-Platform (2011)

Geothermie

=> Erschließung des Potentials der Geothermie

Verfügbarkeit geotherm. Ressourcen



Wärmepotential in der EU

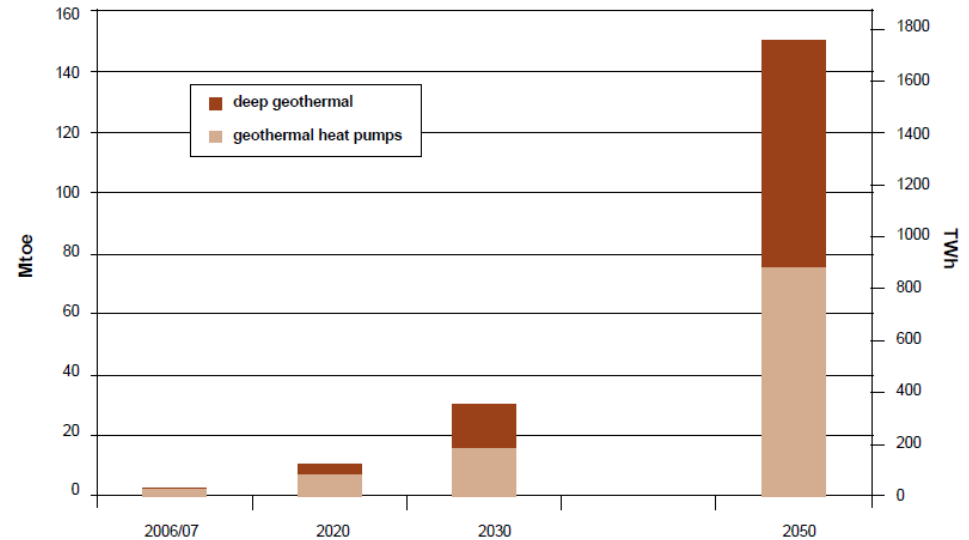


Figure 15 - Heating potential of geothermal energy in EU

Entwicklungsziele Geothermie bis 2030

Heating and Cooling	Costs 2010		Costs 2030
	Range (€-cent/ kWh)	Average (€-cent/ kWh)	reduction by 2030 (% 2010 costs)
Deep Geothermal - District Heating	4 to 8	5	5%
Geothermal Heat Pumps - large systems and UTES	5 to 10	6	10%
Geothermal Heat Pumps - small systems	9 to 15	10	10%

Strukturierung der Forschungsthemen

1. Wohngebäude (Residential)
2. Nicht-Wohngebäude (Non-residential)
3. Industrie (Industry)
4. Fernwärme /-kälte (District Heating)



Geo-F&E Themen: Wohngebäude

GEO.1: Optimisation of ground-coupling technology

GEO.2: Improving the understanding of the shallow geothermal reservoir

GEO.3: Research on pipe material for borehole heat exchangers or horizontal ground loops

Geo-F&E Themen: Nicht-Wohngebäude

GEO.4: System concepts and applications for geothermal cooling in warm climates

GEO.5: Development of ground coupling technologies and installation techniques for high capacities

GEO.6: Integration of design of the shallow geothermal system and building energy system with regard to optimum thermal use and operational strategy



Geo-F&E Themen: Industrie

GEO.7: Geothermal heat for industrial processes up to 250°C

GEO.8: Production pump technology temperatures >180°C

GEO.9: Unconventional resources and very high temperatures (>250 °C)

Geo-F&E Themen: Fernwärme, -kälte

GEO.10: Deep Drilling

GEO.11: Production technologies

GEO.12: Surface systems for heat uses in DHC (incl. CHP)

GEO.13: Enhanced Geothermal Systems

GEO.14: Resource Assessment for deep geothermal heat use

Querschnittstechnologien (CCT)

Umfasst nachfolgende Bereiche (Focus Groups):

- Hybride Systeme und Wärmepumpen (Kompression und Sorption)
- Thermische Speicher (sensible, latent, sorptiv, thermochemisch)
- Fernwärme und -kälte

Überblick Forschungsthemen CCT

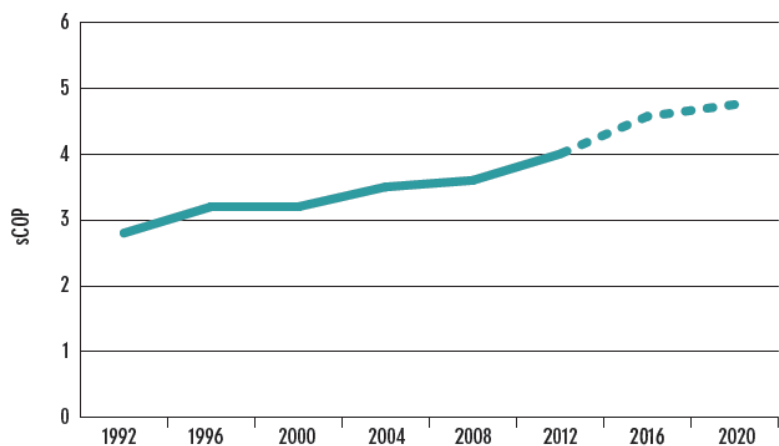
Es wurden 21 CCT Forschungsthemen definiert:

Anwendung	Hybrid / WP	Speicher	Fernwärme / -kälte
Residential	3 / 2	3	-
Non-Residential	1 / 2	-	-
Industrie	0 / 4	1	-
Fernwärme / -kälte	0 / 1	-	4

Wärmepumpe: 9 Hybridsysteme: 4
Speicher: 4 Fernwärme / -kälte: 4

Entwicklungsziele Wärmepumpen bis 2020

Heat pumps	Space heating & hot water	Cooling
Installed cost	-10% to -15%	-3% to -8%
Coefficient of performance	15% to 25% improvement	10% to 20% improvement
Delivered energy cost	-10% to -15%	-5% to -10%



Trend und potentielle Entwicklung des sCOP für Luft-Wasser Wärmepumpen (EHPA)

Entwicklungsziele thermische Speicher bis 2020

Technology	Capacity kWh/t	Power kW	Efficiency (%)	Storage time	Cost (EUR/kWh)	Reduction of installation cost by 2020
Hot water tank	20-80	1-10,000	50-90	day-year	0.08 – 0.10	-20%
Chilled water tank	10-20	1-2,000	70-90	hour-week	0.08 – 0.10	-20%
ATES low temp.	5-10	500-10,000	50-90	day-year	Varies	-15%
BTES low temp.	5-30	100-5,000	50-90	day-year	Varies	-15%
PCM-general	50-150	1-1,000	75-90	hour-week	10 - 50	-30%
Ice storage tank	100	100-1,000	80-90	hour-week	5 - 15	-20%
Thermochemical	120-150	1-100	75-100	Day-Year	8 - 40	-35%

Entwicklungsziele Fernwärme und –kälte bis 2020

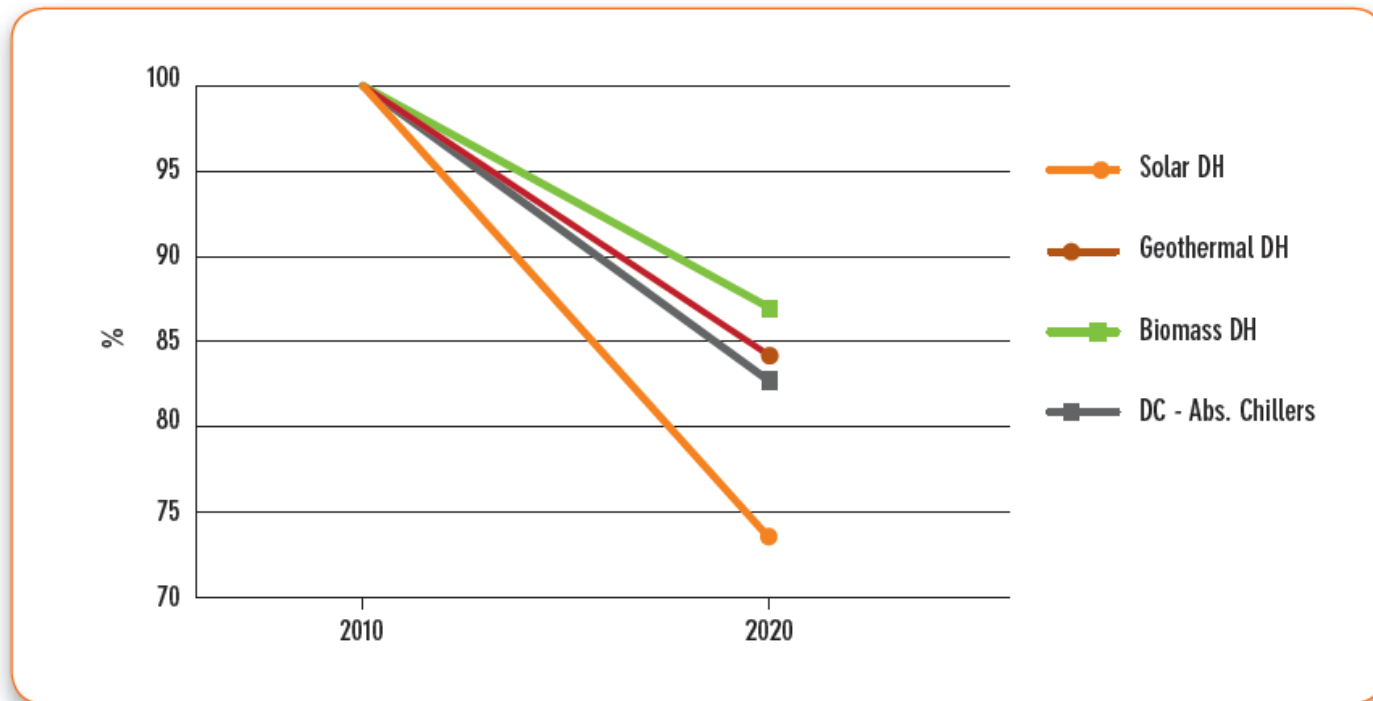


Figure 38: Potential evolution of costs for renewable DHC (Source: Euroheat & Power)

CCT-F&E Themen: Wohngebäude

Wärmepumpen:

CCT.1: Cost competitive heat pump kit for houses with existing boiler

CCT.2: Optimisation of thermally driven heat pumps and their integration in the boundary system

CCT.3: Automation, control and long term reliability assessment

CCT.4: Development of a heat pump for near-zero energy buildings (SFH)

CCT.5: Next generation of highly integrated compact hybrid systems

Thermische Speicher:

CCT.6.: Next generation of Sensible Thermal Energy Storages

CCT.7: Improving the efficiency of combined thermal energy transfer and storage

CCT.8: Increased Storage density using phase change and thermo-chemical materials

CCT-F&E Themen: Nicht-Wohngebäude

Wärmepumpen:

CCT.9: High capacity heat pump for simultaneous production of cold and heat for heating / cooling the building

CCT.10: Integration, automation and control of large scale hybrid systems for non-residential buildings

CCT.11: Sorption cooling systems driven by hot water at moderate temperature

CCT-F&E Themen: Industrie

Wärmepumpen:

CCT.12: Enhanced industrial compression heat pumps

CCT.13: Process integration, optimisation and control of industrial heat pumps

CCT.15: Improvement of sorption cooling from renewable energy sources

CCT.16: New concepts for industrial heat pumps

Thermische Speicher

CCT.14: Improvements in Underground Thermal Energy Storage (UTES)

CCT-F&E Themen: Fernwärme, -kälte

FW-Netze und FW-Infrastruktureinrichtungen

CCT.17: Large scale demonstration of Smart Thermal Grids

CCT.19: Develop and roll-out DHC driven white goods and low temperature solutions for domestic hot water preparation

CCT.20: Improved, highly efficient substations for low temperature networks

Wärmepumpen:

CCT.18: Booster heat pumps for district heating and cooling

Thermische Speicher

CCT.21: Optimised integration of RES in DHC systems and enhancement of thermal energy storage at system level



Vielen Dank für die Aufmerksamkeit!

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