



## Erneuerbares Heizen und Kühlen aus einer globalen Perspektive

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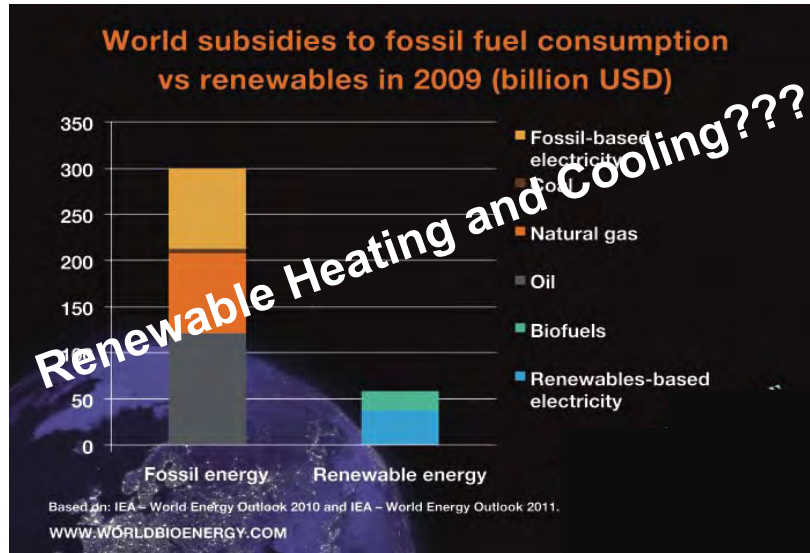
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und die Rolle des Wärmesektors
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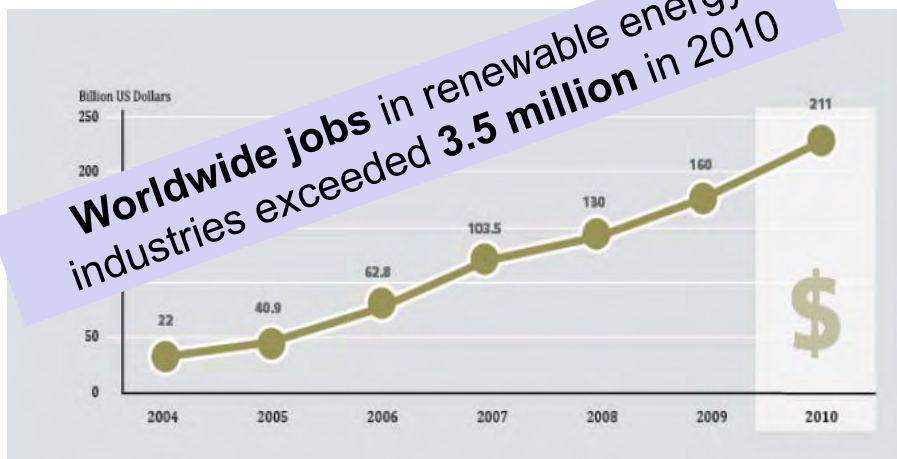
## World Subsidies for Fossil Fuels



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## Global Investment and Jobs in Renewable Energy 2004 - 2010

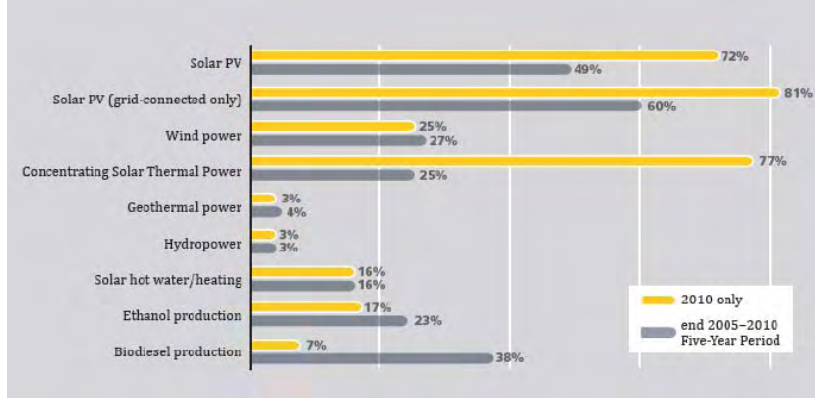


Source: REN21, Renewables 2010 Global Status Report

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## Average Annual Growth Rates Renewable Energy Capacity and Biofuels Production, 2005–2010



From the **end of 2005** through **2010**, global capacity of many renewable energy technologies grew at rates ranging **15%** to nearly **50%** annually

**Solar PV** increased the **fastest**, followed by **biodiesel** and **wind**

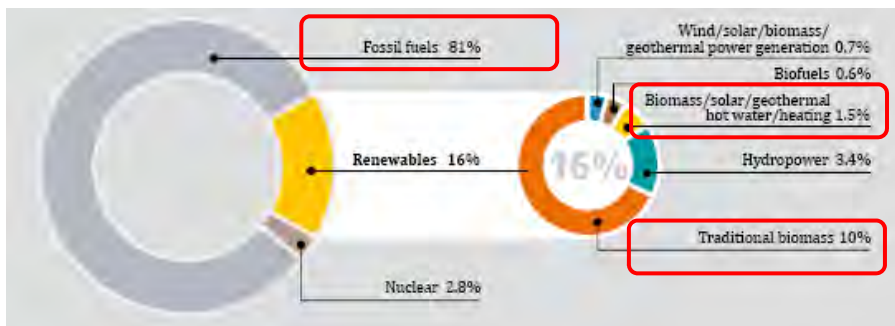
Source: REN21, Renewables 2010 Global Status Report

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## Renewable Energy Share of Global Final Energy Consumption, 2009

In 2009, RE supplied an estimated **16%** of **global final energy consumption**



Source: REN21, Renewables 2010 Global Status Report

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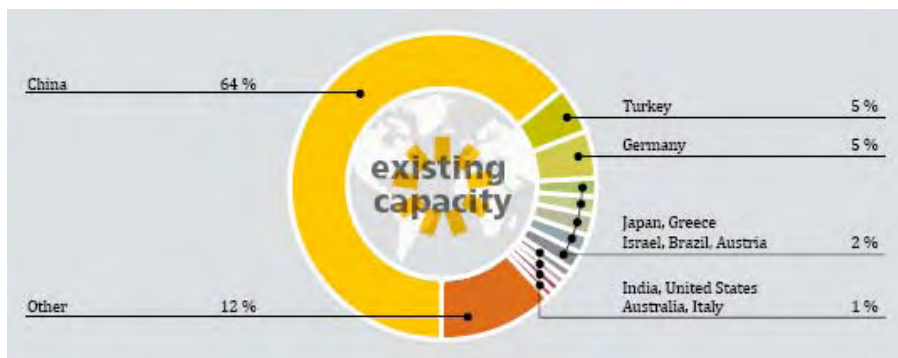
## Heating and Cooling

Modern **biomass** accounts for the largest share of renewable heating, followed by **solar thermal** and then **direct geothermal heat**.

Trends toward increasing use for industrial heat, and use of solar for cooling, ground-source heat pumps.



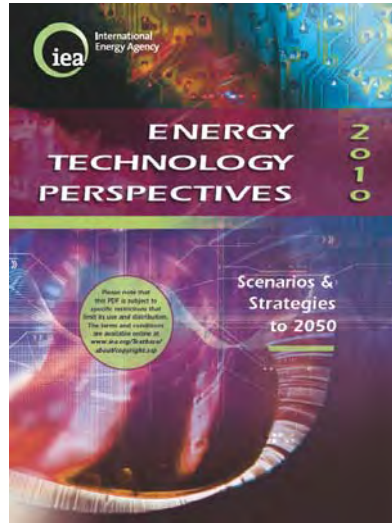
## Solar Heating existing Capacity Top 12 Countries



Source: Weiss and Mauthner in: REN21, Renewables 2010 Global Status Report



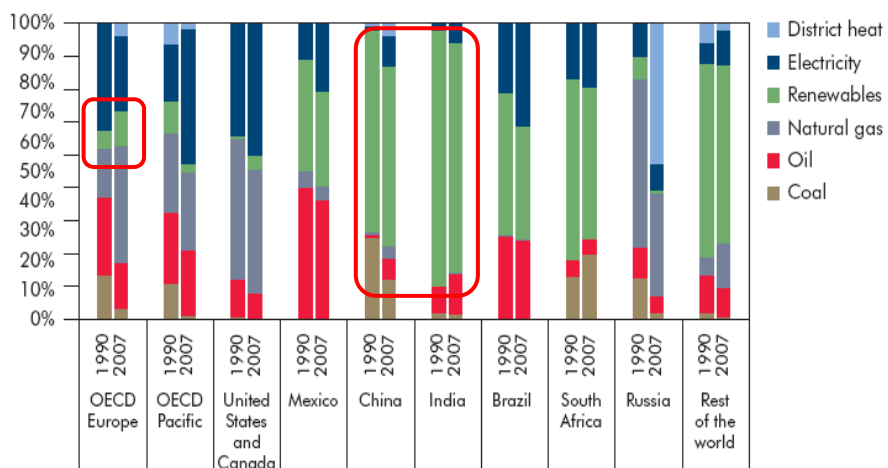
# IEA Perspectives on Renewable Heating and Cooling



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## Building Sector Household energy use by energy commodity



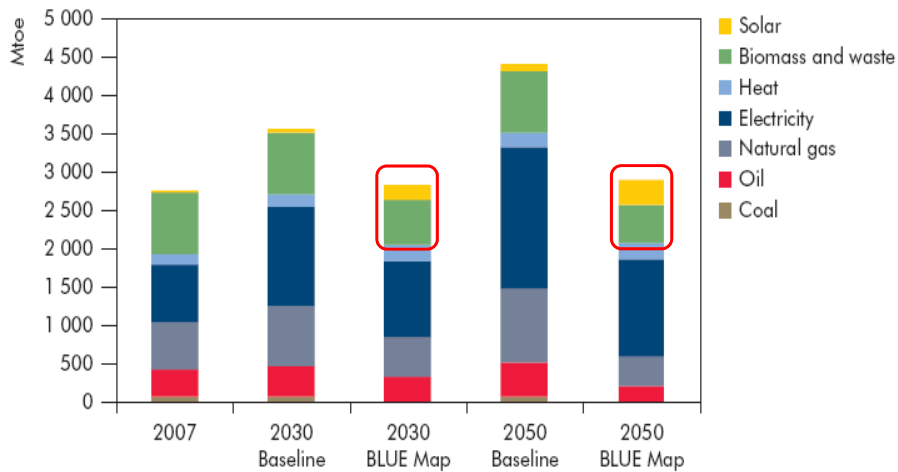
Source: IEA Energy Technology Perspectives 2010

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## Buildings Sector

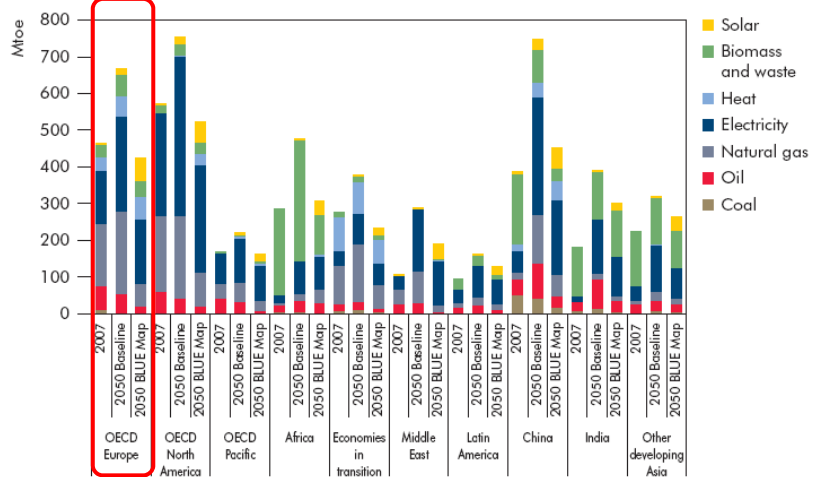
### Energy consumption by fuel and by scenario



Source: IEA Energy Technology Perspectives 2010



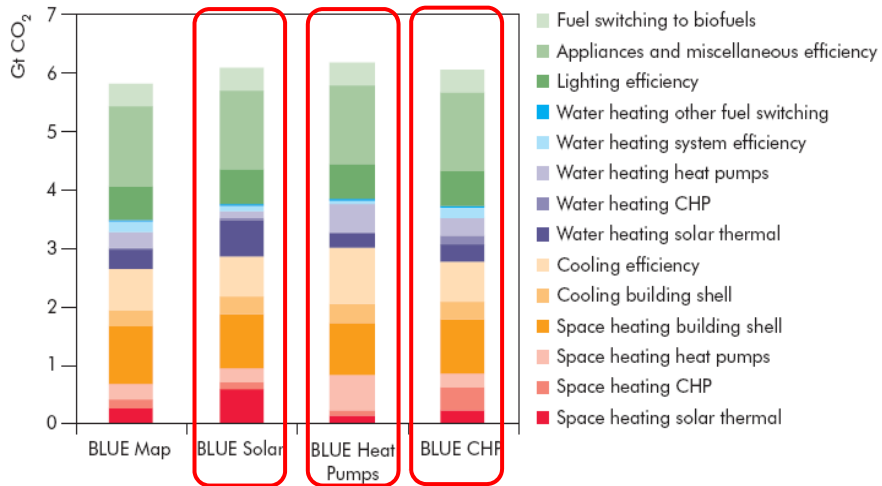
## Buildings sector energy consumption by fuel, by scenario and region



Source: IEA Energy Technology Perspectives 2010



## CO2 emissions reduction buildings sector BLUE scenario variants, 2050

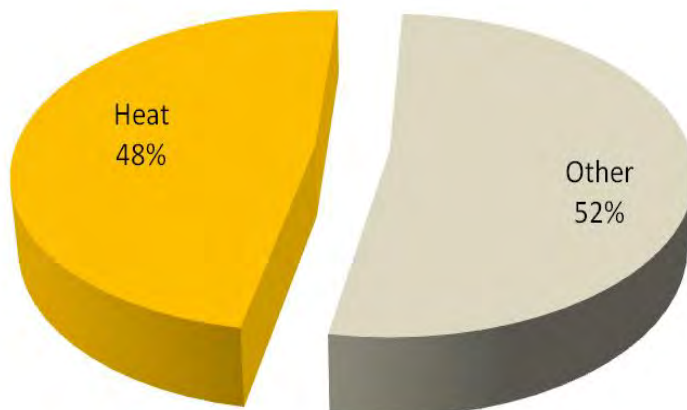


Source: IEA Energy Technology Perspectives 2010

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## Final Energy Consumption in the EU



Source: ETP RHC 2010

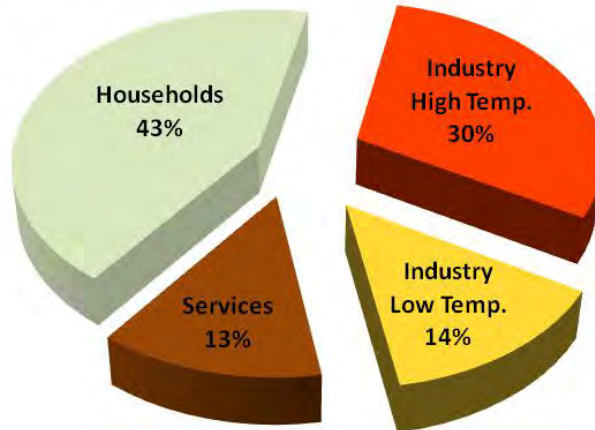
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## Distribution of Heat by Use Types in the EU

Residential and Service sectors

Industrial processes



Source: ETP RHC 2010

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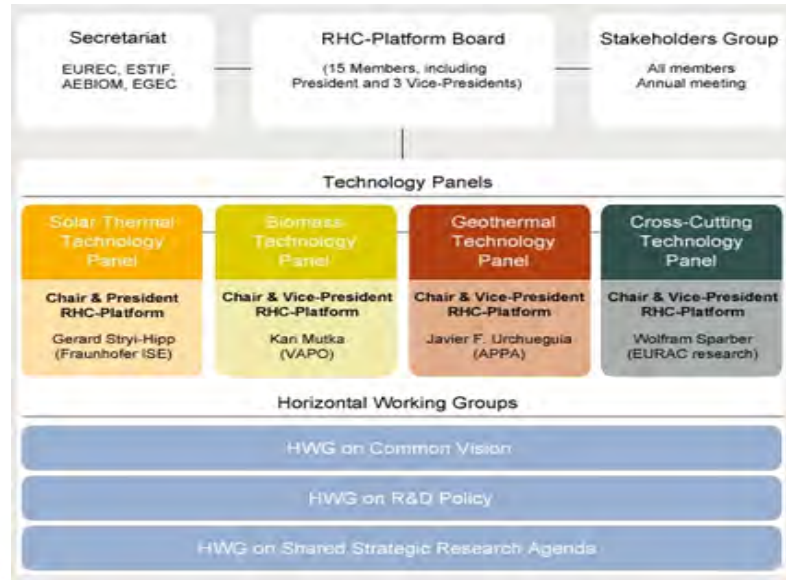
## Vision - European Heating and Cooling Technology Platform

**RHC** Renewable Heating & Cooling  
European Technology Platform

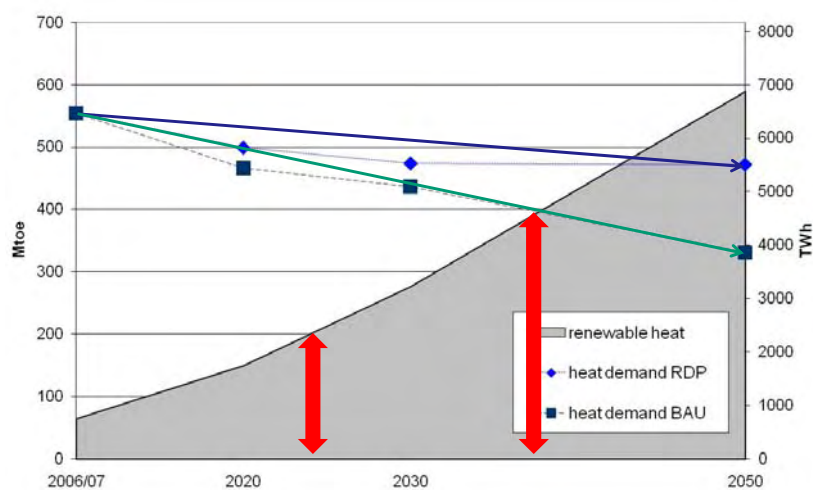
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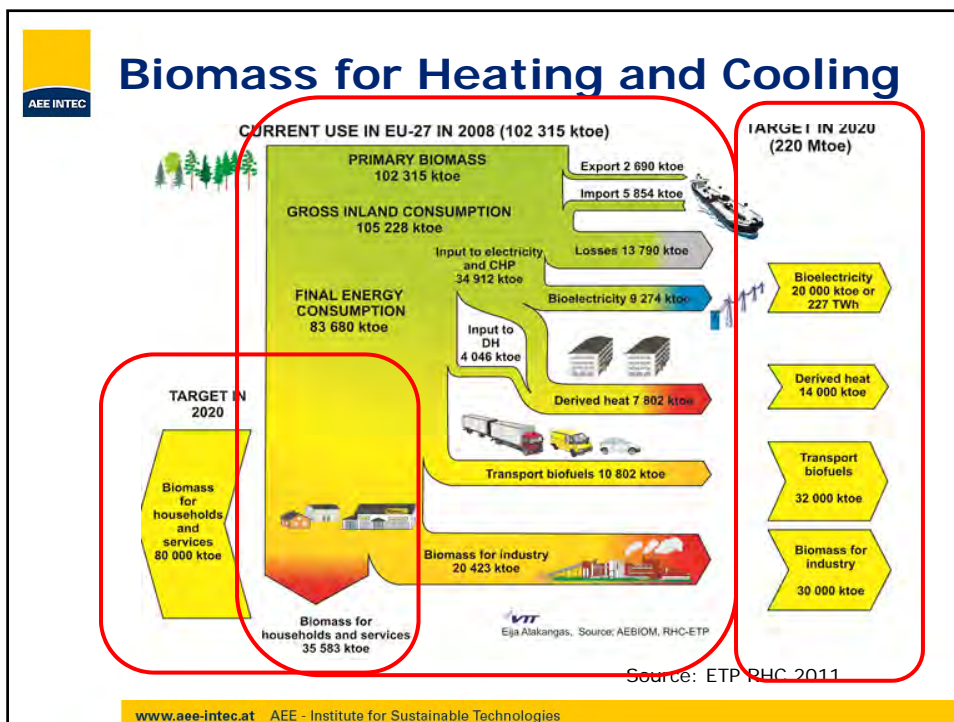
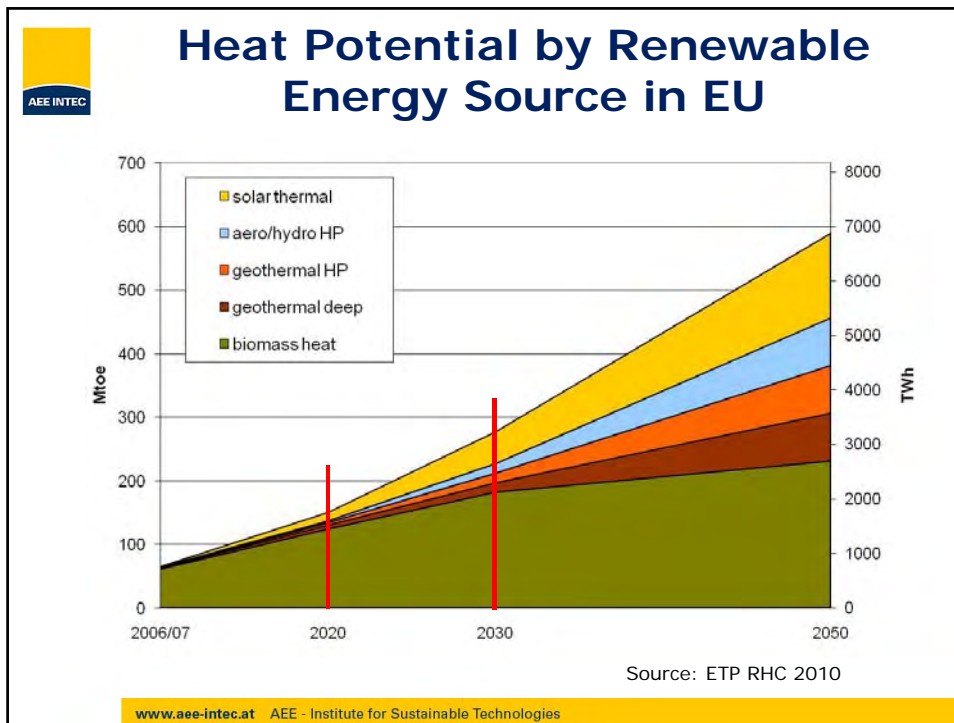
## ETP-RHC Structure



## Heat Supply from Renewable Energy Sources in EU

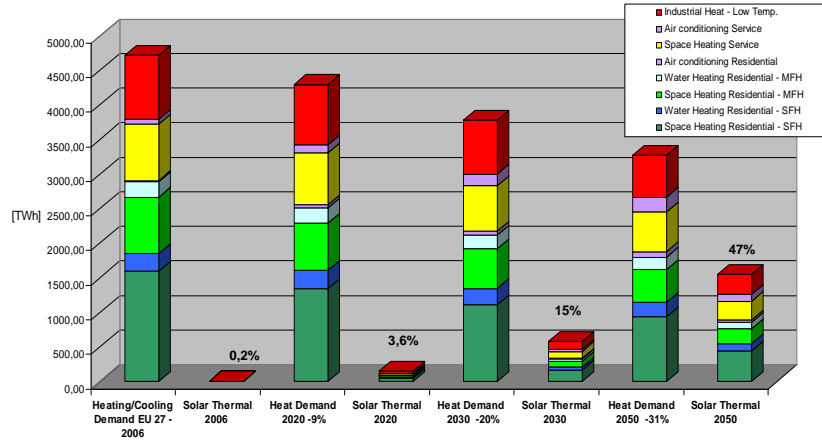


Source: ETP RHC 2010

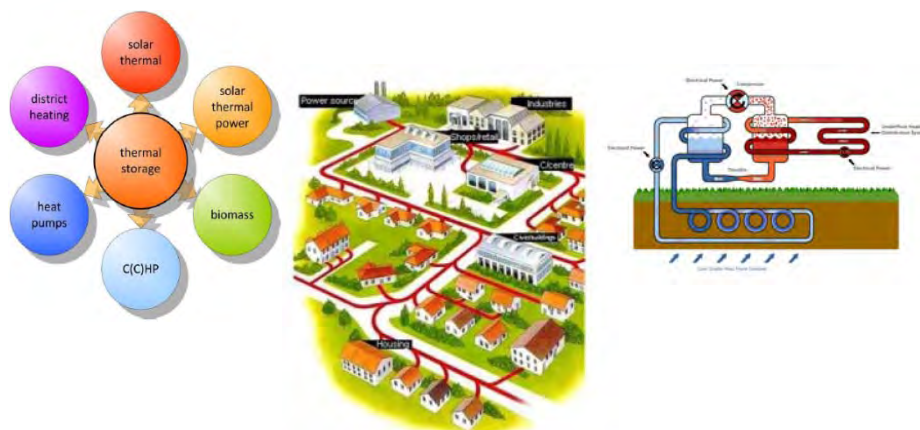


# Solar Thermal Potential EU27

## Contribution of Solar Thermal to the EU 27 Heating and Cooling Demand by Sector



# Cross Cutting Technologies



## Hybrid Systems

Source: ETP RHC 2011

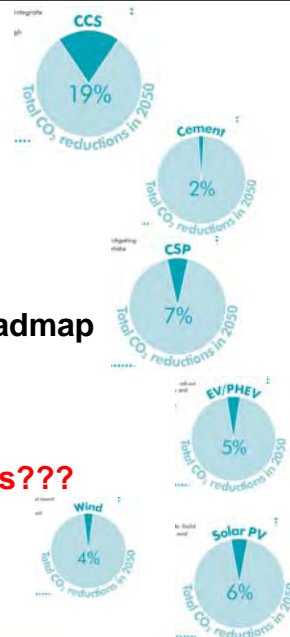


## IEA Technology Roadmaps

- Carbon capture and storage roadmap
- Cement sector roadmap
- Concentrating solar power roadmap
- Electric and plug-in hybrid vehicles roadmap
- Solar photovoltaic power roadmap
- Wind energy roadmap

### Renewable Heating and Cooling Roadmaps???

... under preparation

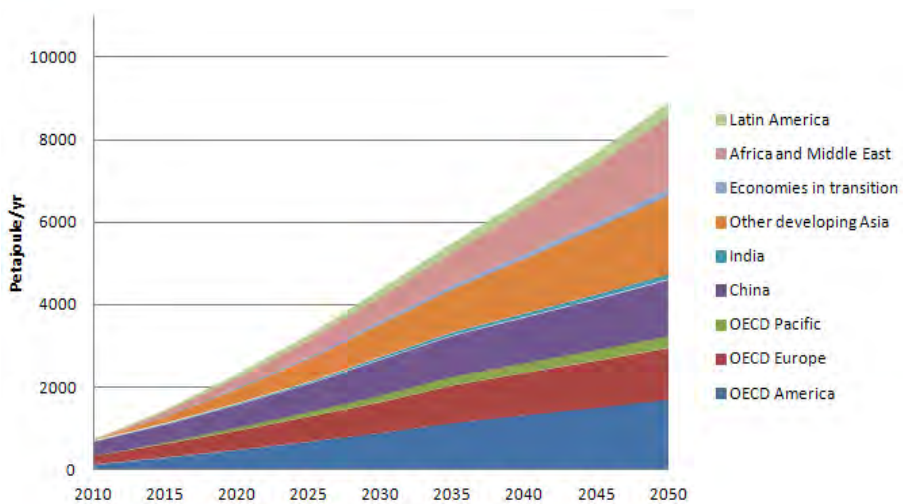


Source: IEA Energy Technology Perspectives 2010

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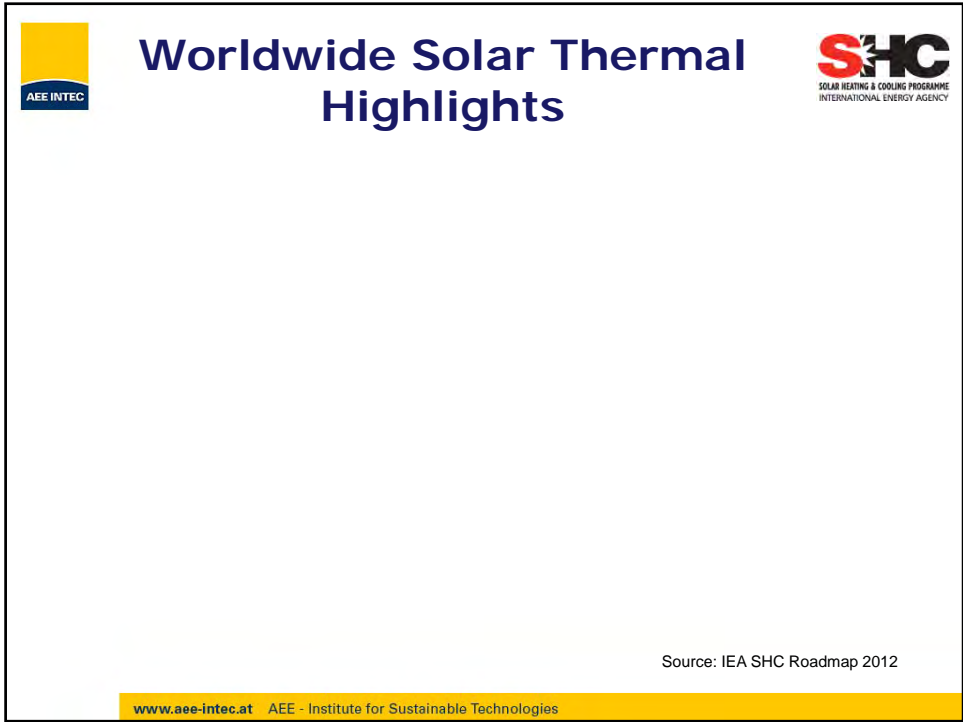
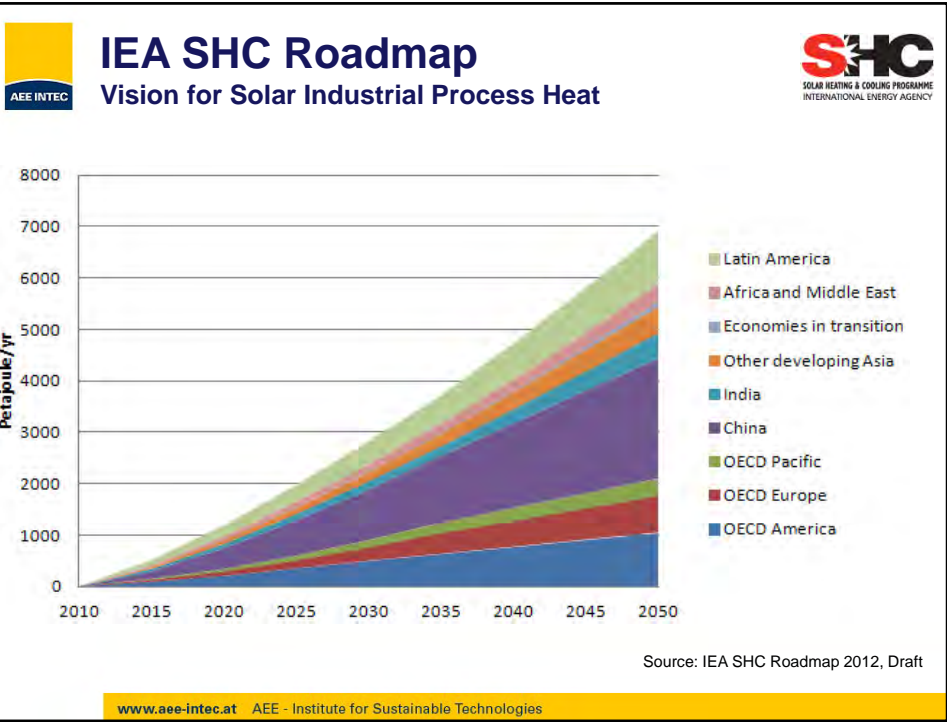


## IEA Solar Heating and Cooling Roadmap

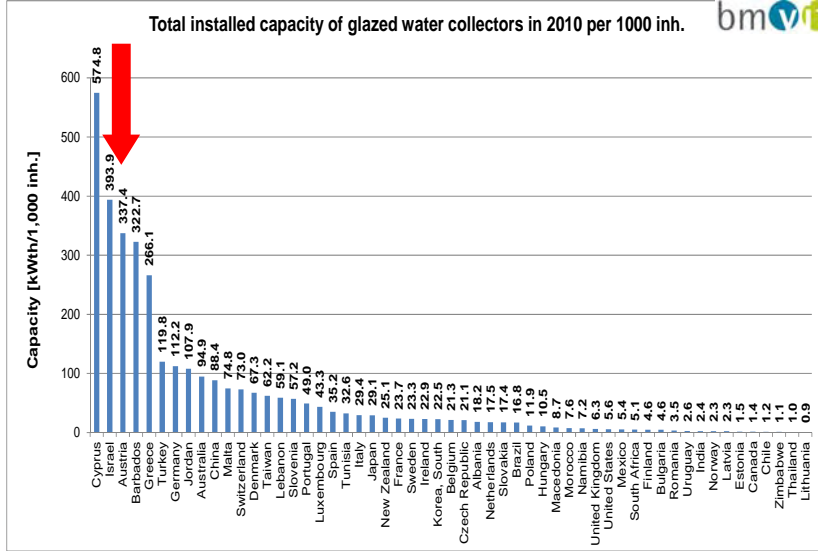


Source: IEA SHC Roadmap 2012, Draft

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# Solar Heat Worldwide



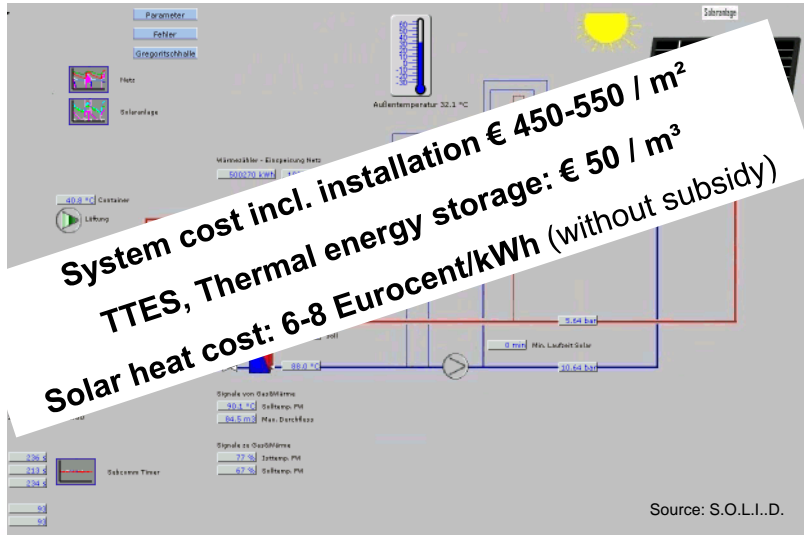
# District Heating, 3MW<sub>th</sub>, AEVG, Graz



Source: S.O.L.I.D.



## Integration into District Heating



**System cost incl. installation € 450-550 / m<sup>2</sup>**  
**TTES, Thermal energy storage: € 50 / m<sup>3</sup>**  
**Solar heat cost: 6-8 Eurocent/kWh (without subsidy)**

Source: S.O.L.I..D.



## Denmark - Hilleroed Solar District Heating



Source: <http://www.altomsolværme.dk/solværmecenter/fotostore.htm>



## Denmark- Principle of the smart district heating plant of Dronninglund

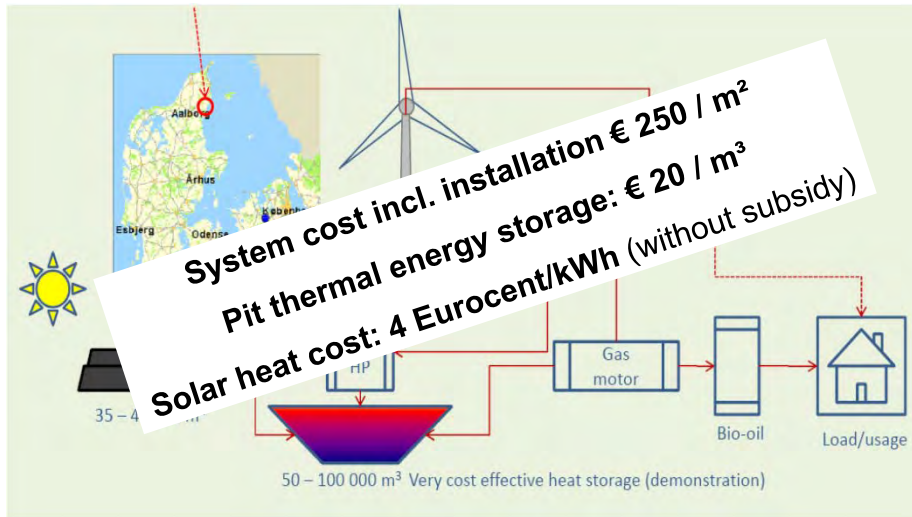


Figure source: Jan-Erik Nielsen, PlanEnergi, Cost source: SDH, Report „success factors in district heating, Dec 2010

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## Biggest System Worldwide, Saudi Arabia 36.000 m<sup>2</sup> / 25 MW<sub>th</sub>



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## Solar Air Conditioning and Refrigeration



Collector area: 1,579 m<sup>2</sup>  
Absorption cooling: 545 kW  
Commissioned: 2008

Source: SOLID, Graz

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## Industrial Process Heat



Source: SOLID GmbH, Graz Austria

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