2012 Annual Conference on RENEWABLE HEATING AND COOLING

Opening

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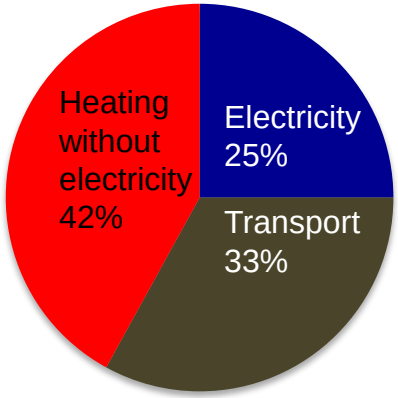
Relevance of the Heating and Cooling Market

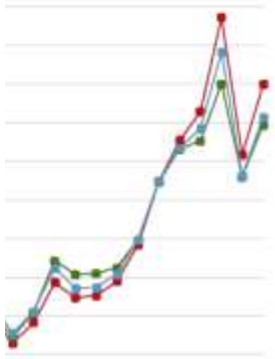
- **Heating & cooling** has the largest share on final energy demand
- **Oil and natural gas price** is growing continuously
- **Dependency** on fossil fuels import is growing

⇒ **In future, energy policy must focus equally on electricity, transport AND heating & cooling**

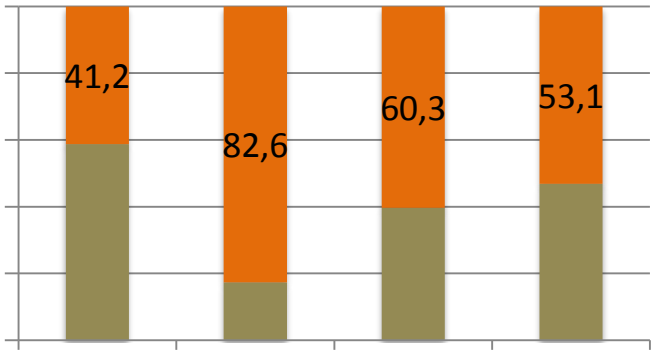
Final energy EU 27



Oil price development



1998 2010



Energy import of EU 27 in 2007

Heating and Cooling Market is often Omitted - Why?

SET-Plan (EC):

"The SET-Plan establishes an energy technology policy for Europe to accelerate the development and deployment of low carbon technologies."

8 Initiatives:

Bio Energy (fuels), CCS, Electricity Grid, Fuel Cells and Hydrogen, Sustainable Nuclear, Solar (PV + CSP), Wind

=> Heating & Cooling is only part of Smart Cities & Communities Initiative

Energy 2050 (Roadmap of EC):

Acknowledges that *renewable heating and cooling is vital to decarbonisation*

=> A thorough analysis of the heating & cooling sector is omitted

REASONS

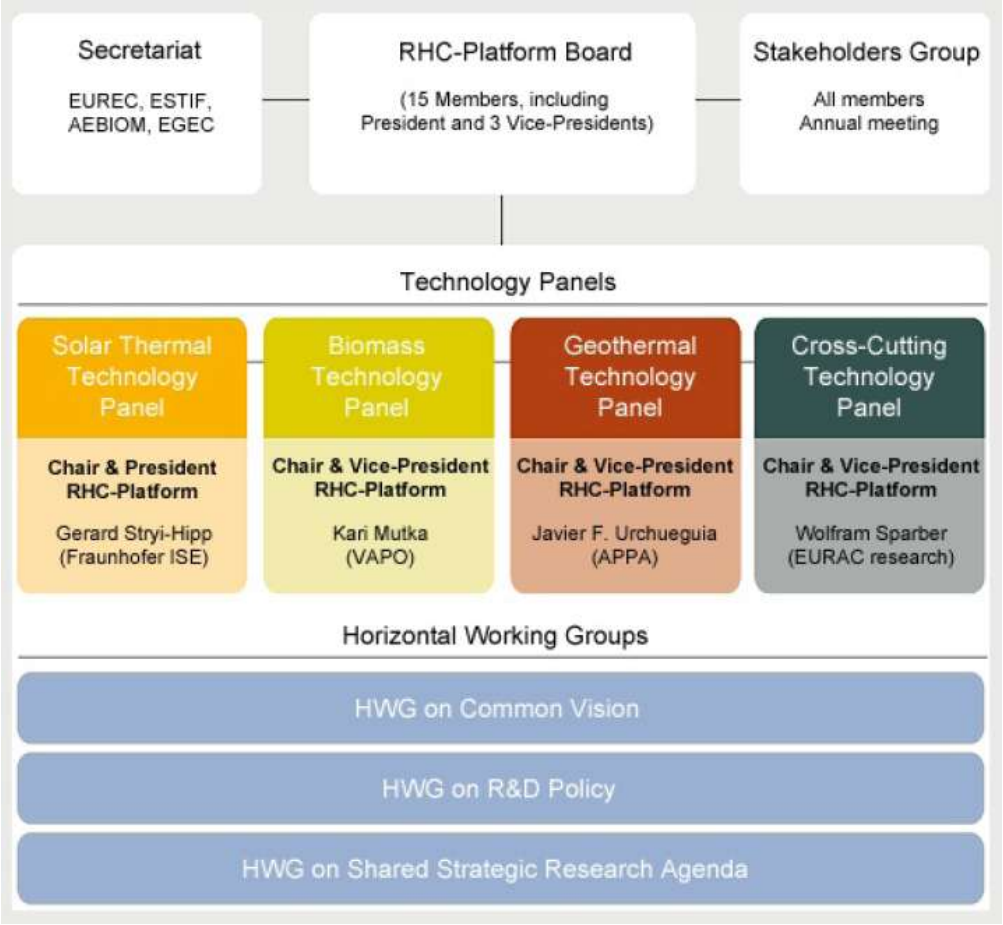
- **H&C sector** is decentralized and very inhomogenious in its structure *(technologies, actors, demand, sources, costs, ...)*
  => Difficult to understand
- **H&C market** depends strongly on oil price fluctuations
  => Difficult to influence by policy
- **Policy instruments** in the H&C sector are not strong or expensive (subsidies), complex or hard to implement (obligations)
  => Difficult to influence

Accelerating the Development of RHC: RHC-Platform

- Created in 2009
- Endorsed and financially supported by the EC
- **Objective: accelerate the technological development**
- **Industry, research & policy**
- Structure: 4 panels & 3 HWGs
- 600 members from 40 countries

<u>Achievements</u>

- Annual conferences *(Bilbao, Budapest, Copenhagen)*
- Common Vision published 2011
- **Strategic research priorities** defined for all technologies
- **Shared Strategic Research Agenda** will be ready in summer 2012



Important Part of the Solution: RHC-Technologies

Heating & cooling demand can be reduced significantly and satisfied increasingly by RHC.

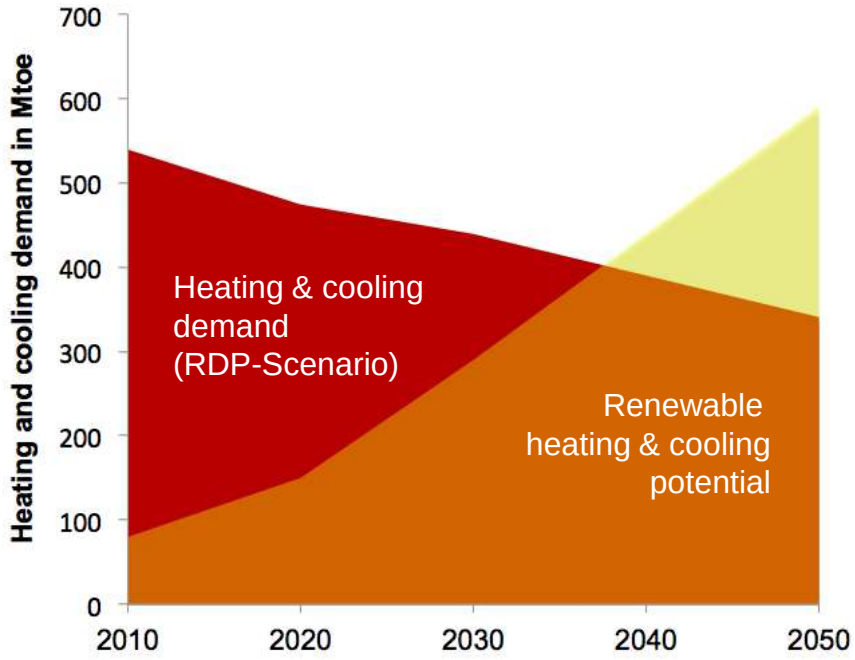
⇒ **Until 2040 we can reach 100% RES for heating & cooling**

⇒ **District heating & cooling is an important pillar of this scenario**

Benefits by using RHC-technologies

- Mitigation of climate change
- Reducing import dependencies
- High security of supply
- Protection against oil price increase (social aspects)
- Increased local added value, creating jobs

Heating and cooling demand and RHC-potential in EU 27



Source: EHC-platform, Common vision for the RHC-sector, 2011
RDP-Scenario = Full Research, development and policy scenario

Solar Thermal Energy

MARKET 2010 (EU-27 + Switzerland)

- Newly Installed: 3.7 Mio m^2 / 2.6 GW_{th}
- Total installed: 34 Mio m^2 / 24 GW_{th}
- **Heat produced: 1.5 Mtoe / 17 TWh**

CHARACTERISTICS

- Solar radiation: for free and everywhere
- Daily and seasonal solar variation
  Storage and auxiliary heating source needed

CHALLENGES

- Increase the solar fraction per building
  From hot water to Solar-Active-Houses
- Enlarge the type of applications
  Large systems, district heating, process heat, higher temperature, solar assisted cooling
- Reduction of costs

APPLICATIONS

Domestic hot water & space heating

- One/two/multi family homes
- Hotels, hospitals, residential homes,…
- District heating systems
- Multifunctional façades
- PV-Thermal (PV-T) hybrid collectors

Process heat

- Low up to 100°C
- Medium up to 250°C
- Solar assisted cooling and refrigeration

Biomass

MARKET 2010 (EU-27)

- Newly Installed: 16.9 GW_{th}
- Total installed: 393 GW_{th}
- **Heat produced: 61 Mtoe / 712 TWh**

CHARACTERISTICS

- Stored renewable energy
  Ideal as auxiliary heat for variable RES
- Limited / sustainable production needed
  Used for electricity and transport as well
  Imports & trade possible in & out Europe

CHALLENGES

- Developing sustainable biomass supply chains for different sources
- Definition of sustainability criteria for biomass
  Strong influence on the biomass potential
- Increase efficiency of burning biomass
- Increase efficiency by using combined heat, power and cooling biomass plants
  Most efficient way to use biomass

APPLICATIONS

Small burners

– Pellets stove
– Wood chip boiler
– Log wood stove/boiler

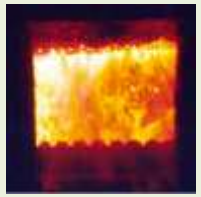

District heating & cooling and process heat

Heat only or combined heat and power

– Pellets boiler
– Wood chips boiler
– Waste & agricultural feedstock boiler





Use of

– Solid biomass
– Bio fuels / bio gas

Geothermal

MARKET 2010 (EU-27)

- Newly Installed: 2.7 GW_{th}
- Total installed (with GSHP): 15 GW_{th}
- **Heat produced: 2.8 Mtoe / 33 TWh**

CHARACTERISTICS

- Continuous heat source
  Ideal for base demand, peak demand suitable
- Resources principally everywhere
  Quality of deep GT resources depending on local geology and depth

CHALLENGES

- Improvements of exploration and underground reconnaissance
  Investment risk of successful drilling
- Increase of efficiency / cost reduction
- Deployment of EGS

TECHNOLOGIES and APPLICATIONS

Shallow GT

– Geothermal HP
– Underground thermal storage

Applications

– DHW, space heating & cooling
– process heat

Deep GT (>400m)

– Direct heat use
– Comb heat & power

Applications

– District heating
– Agriculture and industrial processes
– Balneology
– Cooling








HP = Heat pump, GSHP = Ground source heat pump, EGS = Enhanced geothermal systems, DHW = Domestic hot water

Cross Cutting Technologies

TECHNOLOGIES

- District heating and cooling (DHC)
- Thermal energy storage
- Hybrid systems and heat pumps

CHARACTERISTICS

- Enabling technologies for high uptake of renewable energy
- Optimization / integration to framework conditions necessary

CHALLENGES

- Develop smart solutions and ICT for complex systems
- Increase efficiency and COP
- Reduce costs

APPLICATIONS

DHC

– District heating
– District cooling
– DH&C with seasonal storage

TE Storage

– Water storage
– PCM
– Thermo chemical
– Underground storage (UTES)

Hybrid systems and heat pumps

– Innovative system design
– Ground, water and air heat pumps








COP = Coefficient of performance, PCM = Phase change material, GT = Geothermal , UTES = Underground Thermal Energy Storage

Conclusions and political message

- EU energy objectives and mitigation of climate change can only be achieved **with strong contribution of RHC-technologies**
- RHC-technologies can deliver **100% of the heating & cooling** demand
- **District heating & cooling** will be an important pillar of the RHC-structure
- The **technological potential and important R&D topics** to achieve the goals are identified by the RHC-platform
- **However, a much stronger political support for RHC is essential:**

  1. **H&C must become equally important in energy policy** as electricity and transport
  2. **R&D-budget for RHC-technologies must be significantly increased**
  3. **This must be reflected in Horizon 2020**
  4. **Specific H&C statistics are needed**