

# European Heating and Cooling Strategy

## Background: Why is the European Commission working on a Heating and Cooling Strategy

- In February 2015 the European Commission (EC) announced preparations on policy strategy on Heating and Cooling as part of the new “Energy Union” policy
- Commission identifies three main issues:
  - Reduce EU fuel dependency from third countries
  - Reach the environmental goals set for 2030 and 2050, incl. decarbonisation
  - Boost the European economy
- Building sector plays a key role in solving for at least the two first issues
- Action points specifically mentioned in the “Energy Union” policy
  - Capture efficiency gains of district heating and cooling
  - Retrofitting existing buildings to make them energy efficient
  - Facilitate investments in heating and cooling
- Current EU legislation (EPBD, EED, RES etc.) to be revised, no new legislative instruments
- Completion by end of 2015

## European Heating and Cooling Strategy

### Issue Papers and Consultation Forum

- **Five Issue Papers to clarify the EC's view**
- **EC invited stakeholders in September to a Consultation Forum with 76 industrial associations and 20 Member State presented to comment on issues. Main conclusions of the meeting:**
  - **There is general support for having a heating and cooling strategy.**
  - **How to address existing barriers - a major concern.**
  - **Consumers and markets must be considered a key element.**
  - **Technological neutrality should be ensured.**
  - **Member State, regional and local levels, should be analyzed.**
  - **The heating and cooling strategy is to be an integral part of energy and climate policy.**
- **The final objective is a decarbonisation by 2050.**

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### EU Energy and environmental goal projections

#### Residential sector 2030

- Energy consumption decrease by 22-25 %
- Renewable energy share 26-35 %

#### Residential sector 2050

- Energy consumption decrease by 38-62 %
- Renewable energy share 46-54 %

**Commission is not yet ready to give any confirmed figures for the goals:**

EU legislation, implemented through national legislation and strategies, aims at increasing the efficiency of Europe's building stock and the share of renewable and other low carbon supply sources.

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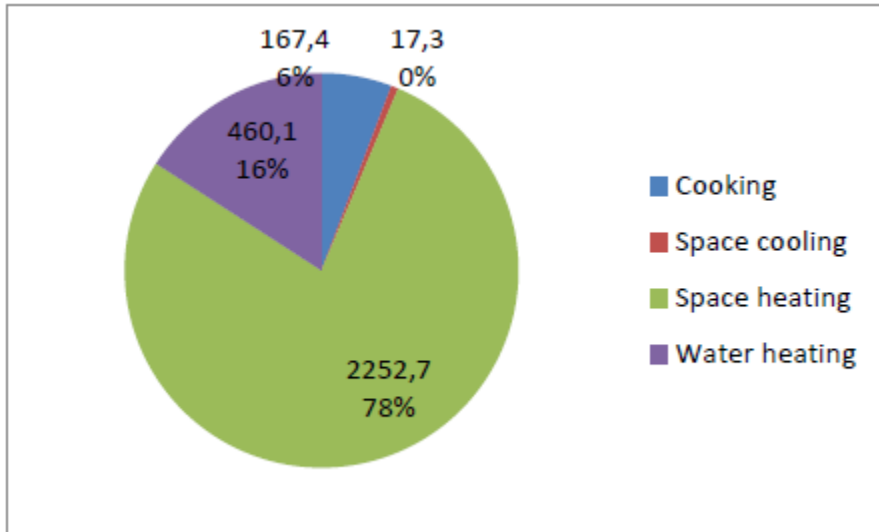
### Some EU28 figures

- **Around 510 M inhabitants**
- **Around 240 M residents (homes)**
- **40 % of the buildings built before 1960**
- **Share of non-residential buildings about 25 %**
- **Great differences in buildings, nominal energy consumptions examples:**
  - **Single family house pre-1920 in UK average 585 kWh/m<sup>2</sup>a**
  - **Single family house post-2005 in Slovenia 34 kWh/m<sup>2</sup>a**
  - **Residential average 168 kWh/m<sup>2</sup>a incl. DHW, and 118 kWh/m<sup>2</sup>a space heating only**
  - **Residential nearly-Zero-Energy-Buildings (nZEB) 33 - 95 kWh/m<sup>2</sup>a, majority 45 - 50 kWh/m<sup>2</sup>a**
  - **Deep renovation rate of the existing buildings 1.48 - 2.43 % per year**
  - **New built, low-energy buildings at a rate of 1 % per year**

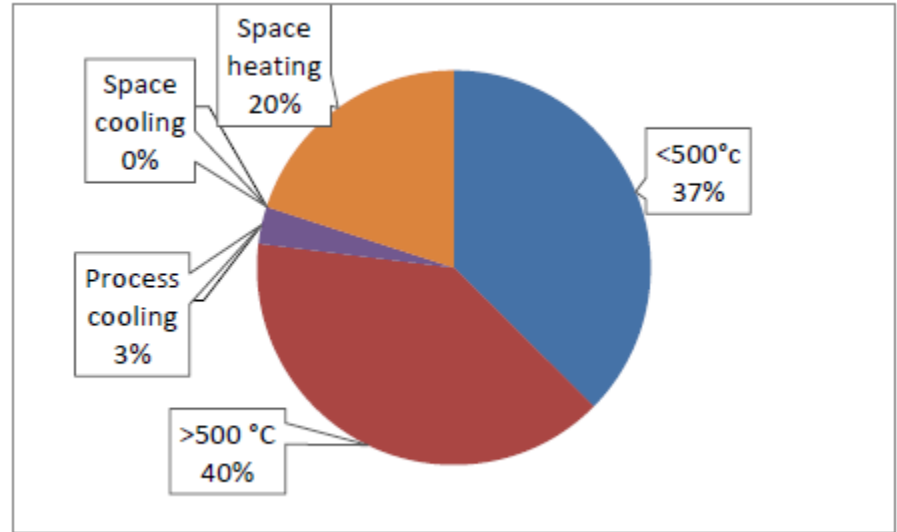
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Some key point from the Issue Papers

- Energy consumption heating, cooling and warm water (2012)
  - Residential sector 237 Mtoe/a – 2714 TWh/a
  - Industry 36 Mtoe/a – 412 TWh/a
  - Tertiary sector 78 Mtoe/a – 893 TWh/a



Heat consumption residential sector



Energy consumption industry

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Synergies needed for energy efficiency and renewable energy.

Here some given examples:

- Linking heating and cooling with electricity and gas networks – cogeneration
- Industrial waste heat, up to 270 Mtoe/a, plus district heating – where applicable
- Solar energy plus heat pump – on-site solution
- Solar energy plus biomass boilers provide 100 % renewable heating – on-site solution
- Biomass plus heat pump – on-site solution

Although choice of technology is up to Member States and consumers, EC clearly has a preferable solution:

The results show that district heating is cost-effective in high heat and population density cities, and can be deployed to cover between 40%-70% of total heat demand, while in less dense or rural areas heat pumps combined with biomass and other renewable solutions produce the best results in terms of energy savings, CO<sub>2</sub> reduction and energy system costs. In

The European Heating Industries Association and others have criticized this type of "generalized" solution and prefers multi-technology approach where more options are available and keeps the door open for further development.

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Energy efficiency and decarbonisation of heating and cooling can be implemented through three main factors:

- Improvement of the performance of building envelope<sup>30</sup>;
- Improvement of the efficiency and deployment of renewable or low carbon energy in heating and cooling supply;
- Behaviour and use of buildings (*i.e.* human factors in the use of buildings).

<sup>30</sup> These include the implementation of demand reduction measures using architectural and building fabric measures, optimising orientation, using natural ventilation when possible, better quality of building envelope and structures (e.g. enhanced air tightness, adequate use of thermal mass, improved insulation materials), use of heat recovery, reduction of internal loads, optimisation of solar gains using high performance building materials, etc.

### Preferable principles:

- **Circular economy - reduce, reuse, recycle**
- **Sequencing should start with energy efficiency**
- **Sharper focus on increasing deep renovation**
- **Holistic approach**
- **Consumer focus**

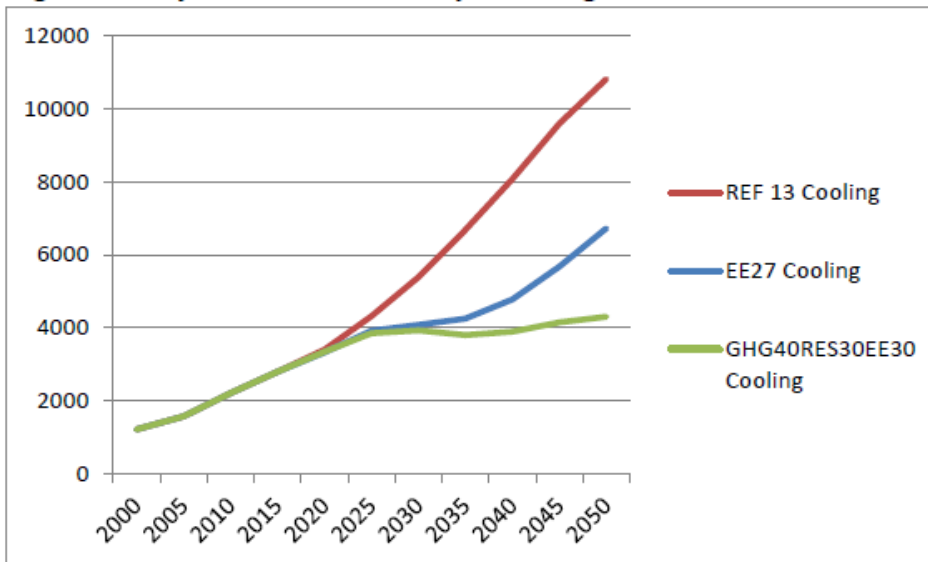
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## Cooling

### Energy consumption share of the final energy

- Residential sector around 1 %
- Tertiary sector around 9 %

All studies\* indicate a significant increase in cooling:



### Technologies

- Mainly Carnot-process heat pumps
- District cooling
  - Deployment of heat to cooling, absorption heat pump
  - Free cooling from earth, seas, lakes, rivers etc.

\*Issue Paper I



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## Energy storage

### Key to the renewable energy efficient usege

- Storage systems available: chemical, electrochemical, electrical, mechanical, thermal
- Common concern: Power and energy capacities and often low efficiency rate
- Further development is required

One new promising solution is P2G – Power to Gas\*

Methanation with help of electrolysis and metabolism of Archaea bacteria:

- Excess power of solar/wind plus CO<sub>2</sub> can be converted to methane gas and storage it in the gas grid.
- High conversion efficiency
- $CO_2 + 4 \times H_2 \rightarrow CH_4 + 2 \times H_2O$

*\*Not mentioned in Issue Papers*

