DRAFT

European Commission

Leadership in renewables

Heating & cooling: the impact of EU R&D funding

Power | **Heating & cooling** | Transport

OBJECTIVES

A comprehensive study of renewable heating & cooling research and development (R&D) support within the EU over the past 20 years

1. Identify the impact of EU R&D support for the renewable heating and cooling sector
2. Understand how the renewable heating and cooling sector has developed

METHODOLOGY

EFFECTIVE DATA COLLECTION ACTIVITIES USING A RANGE OF METHODS

- **DATA FROM EXISTING DATABASES**
- & **STAKEHOLDER QUESTIONNAIRE**
- & **LITERATURE REVIEW**
- & **EXPERT INTERVIEWS**
- & **CASE STUDIES**

KEY FIGURES: EU R&D FUNDING

Number of EU Framework Programme projects

- **304** projects for renewable heating & cooling
- **126** projects for only renewable heating & cooling
- **178** projects for renewable heating & cooling combined with electricity generation

Value of funding for EU Framework Programme projects

- **€576 m** for renewable heating & cooling technologies
- **€236 m** for renewable heating & cooling only
- **€340 m** for renewable heating & cooling combined with electricity generation

Renewable heating & cooling by technology

- **54 %** of renewable heating & cooling for bioenergy
- **26 %** of renewable heating & cooling for solar thermal
- **11 %** of renewable heating & cooling for geothermal

EU funding by Framework Programme

EU funding for heating & cooling was highest during Framework Programme 6 (FP6) (€35 million/year) and lowest during FP5 (€24 million/year). In the first half of Horizon 2020, €31 million/year was invested

IMPACT ON KNOWLEDGE GENERATION

Patents

EU share of global patents in renewable heating and cooling technologies declined between 2000 and 2014

In 2014, the EU share of global patents was highest in the geothermal sector (11 %), followed by the solar thermal sector (8 %) and the bioenergy sector (6 %)

Publications

EU has retained a leading share of global publications for renewable heating and cooling technologies

In 2017, the EU share of global publications was highest in the bioenergy sector (43 %), followed by the geothermal sector (36 %) and the solar thermal sector (32 %)

IMPACT ON SECTOR DEVELOPMENT

197 000 GWh

of annual heat generation from renewables in 2016

Grew from 44 000 GWh in 1995

In 2016, bioenergy represented 82 % of renewable heat generation, solar thermal 12 %, geothermal 5 % and biofuels 1 %

Heat generation

17 %

of gross final heat consumption from renewable sources in 2016

Grew from 10 % in 2004

% EU heat

250 000

people employed in the EU heating & cooling sector in 2016

28 000 new jobs since 2008

In 2016, bioenergy accounted for 88 % of jobs, solar thermal for 10 % and geothermal for 2 %

Jobs

€24 billion

EU heating & cooling sector turnover in 2016

Grew by 2.4 billion from 2008

In 2016, bioenergy accounted for 86 %, solar thermal for 12 % and geothermal for 2 %

Turnover

EXAMPLES OF IMPACT FROM R&D PROJECTS

UltraLowDust
Next generation small-scale biomass combustion technologies with ultra-low emissions

- FP7 project that demonstrated ultra-low emission biomass combustion for residential heating applications, based on three novel technologies
- Compared with the base case, the project was able to increase energy efficiency, and reduce carbon monoxide (CO) emissions by more than 200 mg/MJ, oxides of nitrogen by 27 %, organic gaseous compounds (OGC) by 85 % and total suspended particulate matter (dust) by 94 %. This was proved by certified bench tests based on EN 303-5 type testing conditions after the project had been completed
- A new ultra-low emission boiler technology (PuroWIN) was developed for wood pellet/chip combustion and is now commercially available. PuroWIN provides the lowest CO, OGC and dust emissions in the world – almost zero

SOLARBREW
Solar brewing the future

- FP7 project developed the use of large-scale solar process heat for use in the brewing industry
- Project developed in conjunction with world-renowned brewer Heineken and implemented at three sites with a total planned capacity of 5.08 MWth
- The project led to significant improvements in the technologies and economics of solar process heat systems