European Commission

Leadership in renewables

Solar thermal: the impact of EU R&D funding

Bioenergy | Biofuels | Geothermal | Hydropower | Ocean | Solar PV | **Solar thermal** | Wind

OBJECTIVES

A comprehensive study of solar thermal energy research and development (R&D) support within the EU over the past 20 years

1. Identify the impact of EU R&D support of the solar thermal energy sector
2. Understand how the solar thermal energy sector has developed

METHODOLOGY

EFFECTIVE DATA COLLECTION ACTIVITIES USING A RANGE OF METHODS

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

KEY FIGURES: FUNDING OF R&D

EU Framework Programmes funding

- **168** solar thermal energy projects funded through the Framework Programmes (FP5-Horizon 2020)
- **€400 m** EU funding through the Framework Programmes (FP5-Horizon 2020) for solar thermal technologies
- **61 %** of funding to concentrated solar power (CSP), followed by 39 % of funding to solar heating and cooling

Member State funding

- **€73 m** R&D budget grew from an average of €40 m per year (pre 2000) to an average of €73 m per year (2001 onwards)
- **Top 5**
  1. Italy
  2. Germany
  3. Spain
  4. France
  5. UK
- **90 %** of solar thermal energy R&D funding is from the top 5 Member States

International funding

The EU is the top region for solar thermal R&D funding with an average of €92 m per year, compared with the next highest – the USA – at an average of €37 m per year

IMPACT ON KNOWLEDGE GENERATION

Patents

EU share of global patents has declined from 32 % in 2000 to 8 % in 2014

The number of EU patents filed grew from less than 1 000 per year in the early 2000s to approximately 2 000 per year (2008-2011). From 2012 onwards, EU patents average 1 300 per year

Publications

EU-based authors were involved in a third of the global publications between 1995 and 2017, making the EU the global leader

EU Framework Programmes funded top publishing organisations and many projects that delivered publications

Additional impacts

Sector experts describe EU Framework Programmes funding as essential for the early development of the CSP sector in the 2000s and for supporting continuity of research

For solar heating and cooling, EU Framework Programmes funding supported demonstration projects for integrating the technology into buildings, district heating systems and industrial heat generation

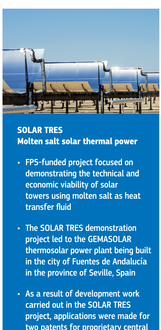
IMPACT ON SECTOR DEVELOPMENT

- **35 000 MWth** installed capacity for heat generation in 2016, growing from 5 000 MWth in 1995 — Heat generation
- **2 300 MW** installed capacity for electricity generation in 2016, growing from less than 100 MW in 2008 — Electricity generation
- **€2 billion+** average exports per year (2011-2015) to the rest of the world (45 % CSP, 55 % solar heating) — Exports
- **€3.4 billion** EU solar thermal energy sector turnover in 2016 — Turnover
- **29 000** people employed in the EU solar thermal energy sector in 2016 — Jobs
- Significant variety in costs for electricity and heat due to location and technology specific variables — Solar thermal cost
- **0.17 %** gross final electricity consumption from solar thermal energy in 2016 — EU electricity
- **0.40 %** gross final heat consumption from solar thermal energy in 2016 — EU heat

EXAMPLES OF IMPACT FROM R&D PROJECTS

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



SOLAR TRES
Molten salt solar thermal power

- FP5-funded project focused on demonstrating the technical and economic viability of solar towers using molten salt as heat transfer fluid
- The SOLAR TRES demonstration project led to the GEMASOLAR thermosolar power plant being built in the city of Fuentes de Andalucía in the province of Seville, Spain
- As a result of development work carried out in the SOLAR TRES project, applications were made for two patents for proprietary central tower receiver technology

Research and Innovation