



# Leadership in renewables

## Bioenergy: the impact of EU R&D funding

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

### OBJECTIVES

A comprehensive study of bioenergy 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 bioenergy sector

2 Understand how the bioenergy 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

284

bioenergy projects funded through the Framework Programmes (FP5-Horizon 2020)

€580 m

EU funding through the Framework Programmes (FP5-Horizon 2020) for bioenergy technologies

32 %

invested in combustion, making it the most funded bioenergy R&D topic

Member State funding

€183 m

R&D budget grew from an average of €55 m per year (1995-2005) to an average of €183 m per year (2006-2015)

Top 5

1. Netherlands  
2. Finland  
3. Germany  
4. Denmark  
5. Sweden

69 %

of bioenergy R&D funding is from the top 5 Member States

International funding

The EU region had an average funding in bioenergy R&D of €144 m a year (1995-2015), which makes it the highest globally. The USA spent an average per year of €57 m followed by Japan with €17 m

### IMPACT ON KNOWLEDGE GENERATION

Patents

EU share of global patents has dropped from 23 % in 2000 to 6 % in 2014

The number of EU patents filed grew from approximately 200 per year in the early 2000s to over 350 per year between 2007 and 2012, but decreased back to 200 per year in 2014

Publications

EU-based authors were involved in 44 % of the global publications between 1995 and 2017, making it the global leader. The USA produced 36 % of publications and China 9 %

Additional impacts

EU framework programme funding contributed to the development of various bioenergy technologies, including combustion, gasification and pyrolysis

Through the EU support, the efficiency, performance and emissions of these technologies were improved and newer technologies (e.g. micro-scale biomass combined heat and power, and biomass co-firing with carbon capture and storage) were demonstrated

### IMPACT ON SECTOR DEVELOPMENT

175 TWh

annual electricity generation in 2016, growing from 21 TWh in 1995

Electricity generation

14 000 ktoe

annual heat generation in 2016, growing from 3 000 ktoe in 1995

Heat generation

€6 billion

average exports per year (2011-2015) to the rest of the world

Exports

€40 billion

EU bioenergy sector turnover in 2016

Turnover

450 000

people employed in the EU bioenergy sector in 2016

Jobs

No clear trend due to large variety of technologies and impact of feedstock prices

Bioenergy cost

5.4 %

gross final electricity consumption from bioenergy in 2016

EU electricity

17 %

gross final heat consumption from bioenergy in 2016

EU heat

### EXAMPLES OF IMPACT FROM R&D PROJECTS

Production of Solid Sustainable Energy Carriers from Biomass by Means of Torrefaction (SECTOR)

- The project developed torrefaction, a technology that turns biomass directly into a coal-like renewable pellet, so reducing dependence on fossil fuels
- Investigated and optimised, for the first time, the whole process chain systematically at a demonstration facility
- Paved the way for the first commercial implementation of torrefaction with important benefits for agriculture, the wood-processing sector and end users
- Proposed a new standard (ISO 17225-8:2016) and delivered material safety data sheets for torrefied biomass

Delivery of sustainable supply of non-food biomass to support a 'resource-efficient' Bioeconomy in Europe (S2Biom)

- The project focused on supporting the sustainable delivery of non-food biomass feedstock at local, regional and pan European levels
- The project developed a knowledge base for the sustainable supply and logistics of non-food biomass
- The project developed publicly available strategies and roadmaps that are informed by a 'computerised and easy-to-use' toolset