European Commission

Leadership in renewables

Biofuels: the impact of EU R&D funding

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

OBJECTIVES

A comprehensive study of biofuels 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 biofuels sector
2. Understand how the biofuels 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

- **154** biofuels projects funded through the Framework Programmes (FP5-Horizon 2020)
- **€660 m** EU funding through the Framework Programmes (FP5-Horizon 2020) for biofuels technologies
- **61 %** of funding to biochemical projects, making it the most funded biofuels R&D topic

Member State funding

- **€161 m** R&D budget grew from an average of €57 m per year (1995-2008) to an average of €161 m per year (2009-2015)
- **Top 5**
  1. France
  2. Sweden
  3. UK
  4. Italy
  5. Denmark
- **79 %** of biofuels funding is from the top 5 Member States

International funding

The EU is the second highest region for biofuels R&D funding with an average of €104 m per year (1995-2015). The USA was the highest funding region with an average of €220 per year (1995-2015)

IMPACT ON KNOWLEDGE GENERATION

Patents

EU share of global patents has declined from 28 % in 2000 to 5 % in 2014

The number of EU patents filed grew from less than 250 per year in the early 2000s to approximately 500 per year between 2008 and 2011. From 2012 onwards, EU patents average 290 per year

Publications

EU-based authors were involved in 28 % of the global publications between 1995 and 2017, making it the global leader

The EU is producing approximately 200 publications per year compared with the USA, China, India and Brazil who each produce between 70 and 100 publications per year

Additional impacts

EU funding played a pivotal role in the development of new and improved technologies and products, an integrated biorefinery approach, as well as knowledge development and transfer

The Technology Readiness Level (TRL) of certain advanced biofuels improved – cellulosic ethanol (TRL 2 to TRL 8), pyrolysis oil (TRL 3 to TRL 5) and algae technology (TRL 2 to TRL 3)

IMPACT ON SECTOR DEVELOPMENT

- **33 Mt** production capacity in 2016 from biofuels rising from 1.1 Mt in 2002 — Production capacity
- **13 Mtoe** annual energy production in 2016, growing from 223 ktoe in 1995 — Annual energy production
- **6 %** of fuels in transport in 2016 — Biofuels in transport
- **€13 bn** EU biofuels sector turnover in 2016 — Turnover
- **205 100** people employed in the EU biofuels sector in 2016 — Jobs
- **€5.5 bn** average exports per year (2011-2015) to the rest of the world — Exports

EXAMPLES OF IMPACT FROM R&D PROJECTS

EUROpean multilevel integrated BIOREFinery design for sustainable biomass processing (EUROBIOREF)

- The project integrated the fragmented European biomass industry and maximised collaboration to form a viable and efficient biorefinery
- Covered the whole value chain of sustainable and economical biorefinery processes; and involved many non-edible feedstocks, multiple biochemical and thermochemical processes, fuels and chemicals
- Tested 10 new oil crops; established large test feedstocks fields; developed 5 value-chain scenarios; and constructed a new, highly efficient pilot plant to process woody biomass
- Delivered over 300 dissemination activities, 33 patents (10 granted), 89 scientific papers and a European Master on Biorefineries

Initiative Towards sustAinable Kerosene for Aviation (ITAKA)

- The project developed and tested advanced and sustainable biojet fuel from camelina oil at commercial scale, and was a cornerstone for biojet fuel use worldwide
- Developed a value chain for commercial biojet fuel in Europe between feedstock and biofuel producers and distributors, airports and airlines. This increased knowledge for feasibility and scale-up of each process step, so paving the way to commercialisation
- More than 70 % greenhouse gas savings, 30 % improvement of local air quality at airports and 50 % particulate matter emission reduction
- Commercial flights from Oslo have used biojet fuel since the end of 2015. An important patent was also filed