European Commission

Leadership in renewables

Ocean energy: the impact of EU R&D funding

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

OBJECTIVES

A comprehensive study of ocean 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 ocean energy sector
2. Understand how the ocean 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

- **72** ocean energy projects funded through the Framework Programmes (FP5-Horizon 2020)
- **€225 m** EU funding through the Framework Programmes (FP5-Horizon 2020) for ocean technologies
- **47 %** invested in tidal, making it the most funded ocean energy R&D topic

Member State funding

- **€48 m** R&D budget grew from an average of €5 m per year (1995-2008) to an average of €48 m per year (2009-2015)
- **Top 5**
  1. UK
  2. Ireland
  3. France
  4. Denmark
  5. Sweden
- **87 %** of Member State ocean energy funding is from the top 5 Member States

International funding

The funding in the EU region is significantly larger than that in other regions, with an average of €52 m per year (1998-2015). The USA is second with an average of €13 m per year (1998-2015) and its annual R&D budget is increasing

IMPACT ON KNOWLEDGE GENERATION

Patents

The number of EU patents filed grew from less than 100 per year in 2000 to more than 250 per year from 2008 to 2010. From 2011 onwards, EU patents average 200 per year

Patents filed outside the EU grew strongly, which led to the EU share of global patents reducing

Publications

EU-based authors were involved in over 50 % of the global publications between 1995 and 2017, making the EU the global leader

Over the same period, the EU produced approximately 750 publications, the USA produced approximately 250 and China 140

Additional impacts

EU funding has been effective in establishing and maintaining a leading academic position globally and enabled knowledge transfer across the EU

Through EU funding, knowledge and demonstration projects were developed that progressed tidal and wave energy technologies to Technology Readiness Levels up to 8

IMPACT ON SECTOR DEVELOPMENT

Pilot and demonstration plants only, tidal current technologies close to deploying first arrays

Installed capacity

12 GWh generated in 2018 by demonstration plants (approximate figure)

Annual generation

Negligible due to limited installed capacity

EU electricity

Not clear due to limited installed capacity

Ocean energy cost

EXAMPLES OF IMPACT FROM R&D PROJECTS

Simple Underwater Generation of Renewable Energy (SURGE)

- The scope of the project was to design, build and deploy, at a fully exposed test site, an array of WaveRoller wave energy converters and connect these to the electricity grid
- Based on knowledge gained during the project, the devices were modified to further improve the technology
- The SURGE project had a direct impact in demonstrating the technology to customers and forming a solid foundation for a new design methodology. Approximately 60 patents were filed during the project
- The results of SURGE enabled the beneficiary to design a first-of-a-kind large demonstration device using a loan provided by the European Investment Bank under the Energy Demonstration Project InnovFin scheme

Commercial Energy ARray for Widespread Acceleration of Tidal European Resources (CLEARWATER)

- The project supported the design and deployment of an open ocean 4.5 MW tidal energy array (Meygen Phase 1A), and built on previous research supported under FP4
- The project demonstrated the technical and economic feasibility of a multi-turbine tidal energy array, helping the transition from high-cost, single-turbine demonstration deployments of marine turbines to economically viable, multi-hundred turbine arrays in oceans and managed water assets
- It de-risked the environmental consenting process by using novel monitoring methodologies, delivering efficiency improvements in future ocean energy farms and reducing per MW costs by up to 20 % by applying advanced manufacturing processes

Research and Innovation