

OVERVIEW OF ORC and sCO₂ POWER SYSTEMS UNDER HORIZON 2020

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Abstract

The present document provides an overview of the EU-funded projects dealing with ORC and supercritical CO₂ power systems under Horizon 2020 programme for research and innovation (2014-2020). Projects supported include research and innovation actions addressing different energy sources such as solar thermal, geothermal, biomass or heat recovery, and also some more specific aspects of the technology such as the use of nanofluids as working fluids. The projects are significantly contributing to advance the state-of-the-art in the field by developing cost effective, highly-efficient, low-carbon systems allowing the use of different renewable energy and waste heat sources for power, CHP or mobility applications covering a wide scale power range.

1. HORIZON 2020 IN A NUTSHELL

Horizon 2020 is the biggest EU research and innovation programme ever. It will lead to more breakthroughs, discoveries and world-firsts by taking great ideas from the lab to the market. More than €70 billion of funding is available over 7 years (2014 to 2020), in addition to the private and national public investment that this money will attract [1]. Horizon 2020 is helping to achieve this by coupling research to innovation and focusing on three key areas: excellent science, industrial leadership and societal challenges (Figure 1).

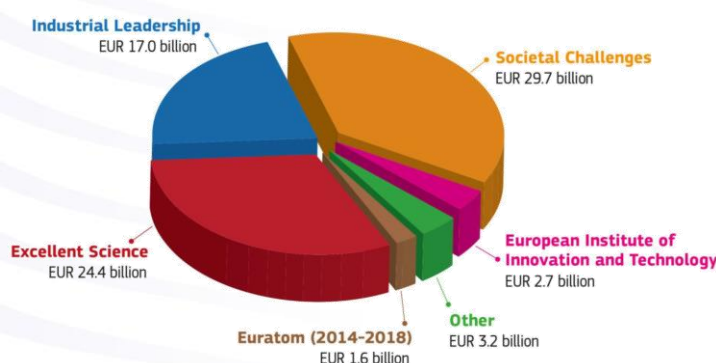


Figure 1. H2020 budget [2]

2. RESEARCH AND INNOVATION ON ORC AND SUPERCRITICAL CO₂ POWER SYSTEMS UNDER H2020

Under the above mentioned key areas, the development of ORC and supercritical CO₂ power systems is currently receiving from the EU a share of around 86 M€. In total, 25 grants (Table 1) with 142 unique participants and 179 total participations (42 higher education, 27 research and 110 private) from 27 different countries (Austria, Belgium, Cyprus, Czech Republic, Denmark, France, Germany, Greece, Hungary, Iceland, Italy, Morocco, Netherlands, Norway, Philippines, Romania, Slovenia, Spain, Switzerland, Turkey, United Kingdom) [3].

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3. UPCOMING CALLS FOR PROPOSALS

For further information on upcoming call for proposals and topics, the Funding & Tender portal is the entry point for participants and experts in funding programmes and tenders managed by the European Commission and other EU bodies [4]. Via this website it is possible to search and apply for funding opportunities in calls for proposals, search a call for tender and submit a tender, manage your grants, etc.

4 H2020 EXPERTS DATABASE

Independent experts assist the Commission services with tasks in connection with the Framework Programme for Research and Innovation. Experts, as peer reviewers, assist in the evaluation of proposals and monitoring of actions [4].

You have a chance of being selected as an expert if you have a high-level of expertise in the relevant fields of research and innovation and can be available for occasional, short-term assignments.

In addition, experts assist in the preparation, implementation or evaluation of programmes and design of policies, providing high quality and timely advice to the Commission. This includes the Horizon 2020 advisory groups [5].

5 ACKNOWLEDGEMENTS

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5 REFERENCES

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[4] European Commission. Funding & Tenders Portal. Available: <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/work-as-an-expert>






[5] European Commission. Horizon 2020. Available: <https://ec.europa.eu/programmes/horizon2020/en/experts>

Table 1. Non-exhaustive list of H2020 projects dealing with ORC and supercritical CO₂ power systems, per type of action (ordered by starting date) [3]

Project Acronym ²	Project info			
	Project title	Start-End date	Overall budget / EU contribution	Further info
Marie Skłodowska-Curie Individual Fellowships (Research/Academia, 1 beneficiary)				
a-Si PVT-ORC	A novel amorphous silicon cell-based solar cogeneration system using the coupled thermal storage/organic Rankine cycle as an alternative to battery	01/01/2017 - 09/01/2019	195,455€ / 195,455€	CORDIS link
NanoORC	Nanofluids as working fluids for organic Rankine cycles	1/03/2017 - 28/02/2020	200,195€ / 200,195€	CORDIS link
DYNCON-ORC	Dynamic performance modelling and controller design of a mini-scale organic Rankine cycle unit for heavy duty vehicles	1/05/2017 - 30/04/2019	212,195€ / 212,195 €	CORDIS link
SuperVGE	Supersonic Variable Geometry Turbine Expanders for High-Efficiency, High Temperature, Organic Rankine Cycle Applications	1/06/2019 - 31/05/2021	224,934€ / 224,934€	CORDIS link
UQ4ORC	Uncertainty Quantification And Design Tools For Robust Organic Rankine Cycles	1/09/2019 - 31/08/2021	187,572€ / 187,572€	CORDIS link
SME Instrument (SMEs, 1 beneficiary)				
DeReco	Feasibility Study on Decentralised Heat Recovery	1/10/2014 - 28/02/2015	71,429€ / 50,000€	CORDIS link
COOL POWER	Efficient microgeneration combined with food cooling systems in trade, crafts and service companies	1/03/2015 - 31/06/2015	71,429€ / 50,000€	CORDIS link
IE-E	Innovative heat-to-power engine for very low temperature heat recovery applications	1/07/2016 - 31/12/2016	71,429€ / 50,000€	CORDIS link

² Project logo, where applicable

Project Acronym ²	Project info			
	Project title	Start-End date	Overall budget / EU contribution	Further info
TORC	Truck with an Organic Rankine Cycle	1/09/2016 - 31/08/2018	3,048,761€ / 2,134,133€	CORDIS link
POWERICE	Organic Rankine Cycle Cogeneration Plant of one-farm size using rice straw as single fuel	1/01/2017 - 31/03/2017	71,429€ / 50,000€	CORDIS link
SPRHOUT	Solar PoweRed Horticultural Off-grid UniT - the first economically viable off-grid energy system to power horticultural projects, boosting the transition towards sustainable food provision	1/07/2018 - 31/12/2018	71,429€ / 50,000€	CORDIS link
Collaborative actions (Academia + Research + Industry, multi-beneficiary)				
	Waste Heat Recovery for Power Valorisation with Organic Rankine Cycle Technology in Energy Intensive Industries	1/12/2014 - 30/11/2018	3,989,248€ / 3,989,248€	CORDIS link
	Organic Rankine Cycle - Prototype Link to Unit Storage	1/05/2015 - 31/10/2019	7,297,149€ / 6,249,316€	CORDIS link
	The supercritical CO ₂ Heat Removal System	1/09/2015 - 31/08/2018	2,791,561€ / 2,791,561€	CORDIS link
	Industrial Thermal Energy Recovery Conversion and Management	1/10/2015 - 31/03/2019	3,996,169€ / 3,996,169€	CORDIS link
	Innovative Micro Solar Heat and Power System for Domestic and Small Business Residential Buildings	1/09/2016 - 31/08/2020	3,999,384€ / 3,999,384€	CORDIS link
	Supercritical CO ₂ cycle for flexible and sustainable support to the electricity system	1/01/2018 - 31/12/2021	5,630,855€ / 5,630,855€	CORDIS link

Project Acronym ²	Project info			
	Project title	Start-End date	Overall budget / EU contribution	Further info
 POLYPHEM	Small-Scale Solar Thermal Combined Cycle	1/04/2018 - 31/03/2022	4,975,961€ / 4,975,961€	CORDIS link
 CHESTER	Compressed Heat Energy Storage for Energy from Renewable sources	1/04/2018 - 31/03/2022	4,999,070€ / 4,999,070€	CORDIS link
 BAMBOO	Boosting new Approaches for flexibility Management By Optimizing process Off-gas and waste use	1/09/2018 - 28/02/2022	18,688,329€ / 11,360,304€	CORDIS link
 SCARABEUS	Supercritical CARbon dioxide/Alternative fluids Blends for Efficiency Upgrade of Solar power plants	1/04/2019 - 31/03/2023	4,950,266€ / 4,950,266€	CORDIS link
 So[B]jo Rev	Solar-Biomass Reversible energy system for covering a large share of energy needs in buildings	1/05/2019 - 30/04/2023	4,790,536€ / 4,790,536€	CORDIS link
GeoSmart	Technologies for geothermal to enhance competitiveness in smart and flexible operation	1/05/2019 - 30/04/2023	19,105,236€ / 17,363,898€	CORDIS link
sCO₂-4-NPP	Innovative sCO ₂ -based heat removal technology for an increased level of safety of nuclear power plants	1/09/2019 - 31/08/2022	2,352,452€ / 2,786,971€	CORDIS link
GeoHex	Advanced material for cost-efficient and enhanced heat exchange performance for geothermal application	1/11/2019 - 31/10/2022	4,989,401€ / 4,989,401€	[PENDING]