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Recovery and Sustainability Plan



Republic of Bulgaria

FINANCING AGREEMENT

**No PVU-44 of 05.12.2024 /BG-RRP-2.017-0011-C01/
from the Recovery and Sustainability Mechanism for the implementation of investment
under C2I2 "Enhancing the Innovation Capacity of BAS
in the field of green and digital technologies" from the RAB**

Grant scheme: under Call for Proposals BG-RRP-2.017 "Financing of research projects in the field of green and digital technologies-2" under-investment C2I2, Component 2. "Research and Innovation", based on BG-RRP-2.017-0011 Grant Decision 32-38-71-1 of 04.12.2024 and Order No. I -58 /07.03.2023 of the President of BAS as Head of the Monitoring and Reporting Structure (MRS)-BAS in connection with the implementation of Investment C2I2 "Enhancing the Innovative Capacity of BAS in the Field of Green and Digital Technologies", Component 2 "Research and Innovation under the Recovery and Sustainability Plan".

Project name: **"Green hydrogen-powered eco-collaborative robots"**

Project budget: BGN 444 076.32

18 months, but not later than 31.05.2026.

Short description This project will innovate the power subsystem of a service collaborative mobile robot using a hydrogen fuel cell. "Green" hydrogen can be an important enabler for the global transition towards sustainable energy and a zero-emission economy. This project offers an opportunity to increase technological expertise in this area. Robots as autonomous systems need a reliable, safe, and environmentally friendly source of energy. So far, mainly lithium battery systems and in some cases motor-generator systems have been used. These have their advantages, but together with this, they are far from environmentally friendly, or safe enough - for example, lithium batteries tend to self-ignite when unsealed and are difficult to recycle, and generator systems emit harmful emissions. This makes the introduction of hydrogen fuel cell power for robots attractive - both from a technological and environmental point of view.

The goal of the project team is to create a basic prototype of a service collaborative mobile robot using hydrogen fuel cell electricity, which can be upgraded and adapted in the future depending on the specific application. This is an innovative solution in the power subsystem of the robot, which is very suitable for deployment in strict compliance with the requirements of the EU2019/2088 regulation. The requirement will also be met in the implementation of the task of creating a charging station using green energy from a solar panel for the hydrogen fuel cell of the collaborative robot. The implementation of expert systems with artificial intelligence is foreseen, which will offer a new approach to studying and optimizing various processes - including energy ones.

The objectives of the project will be realized through eight work packages. Energy independence and high reliability are an important factor in the choice of a mobile robot, and the hydrogen fuel cell power supply is an innovative solution, using modern technologies to obtain the electrical energy, which in this case is needed to drive the motors of the service collaborative robot. The heat and water released in converting hydrogen to electricity in the fuel cell can be used.