

Project Application Form

Under the Recovery and Resilience Facility

1. Project name
Scheme to support pilot projects for the production of green hydrogen and biogas
2. Description of the project (objectives, main activities)
<p>Presented at the end of 2019 by the European Commission European Green deal and the agreement to achieve climate neutrality of the European Union by 2050 require integrated actions in all areas of socio-economic relations. This is particularly true for economic sectors, where the potential of existing industries to introduce new technologies must be used optimally, ensuring a smooth and just transition to a climate-neutral circular economy, such as the hydrogen economy. The key element in it is green hydrogen, ie. hydrogen produced from renewable energy. This approach opens up opportunities for large-scale integration of renewable energy sources, because the conversion and storage of energy through intermediate renewable gas (hydrogen) ensures its easy redistribution - both spatially and temporally. The concept of "green hydrogen" provides adequate conditions for decarbonisation of key sub-sectors in energy, transport and industry, improving the environment, incl. public and private building stock, air quality, urban mobility and at the same time serves as a key tool in regulating energy systems.</p> <p>Taking into account the technological level, existing practices and the still undeveloped commercialization of hydrogen technology solutions, efforts should be focused on launching projects that can be implemented in close cooperation between research and industry. Essentially these are some more advanced demonstration projects having industrial value, albeit in a more limited scale, but which are the reliable basis for the accumulation of operating experience and development of future large projects.</p> <p>Hydrogen is a raw material for key industrial sectors. Currently, both globally and in Bulgaria, it is obtained mainly by steam reforming of natural gas, as the product of the reaction is hydrogen and carbon dioxide ($H_2 + CO_2$). The consumption of natural gas for this process is about 30% of the final annual consumption. The main consumers in Bulgaria are the oil refining industry, the production of ammonia and nitrogen fertilizers.</p> <p>Hydrogen can reduce energy consumption in a number of industrial high-temperature processes. For industries that cannot avoid CO_2 emissions, such as the cement industry, hydrogen could also be used to produce synthetic fuels / chemicals after CO_2 emissions are captured.</p> <p>Although natural gas has a lower carbon intensity per unit of energy supplied than other fossil fuels, the use of natural gas still needs to be significantly reduced in order to achieve the Union's climate goals. Replacing some of the natural gas and other fossil fuels with</p>

renewable gases can help to address a variety of critical energy challenges. The green hydrogen and biogas offers variety of options for decarbonisation a number of energy-intensive industrial processes where it is difficult to achieve a significant reduction in emissions of greenhouse gases.

In order to provide the Bulgarian market with hydrogen- based technological solutions at cost-effective prices, significant investments are needed for the introduction of the respective production capacities. In this regard, the current project envisages structuring a scheme to support pilot projects for the production of green hydrogen and biogas. This will encourage the entry of renewable gases, which, produced with electricity generated from renewable sources, will play a leading role in the transition to climate neutrality.

Biogas production is still insignificant and amounts to about 50 ktoe. Biogas is used for the production of electricity and heat, and small quantities are used in industry. There is significant untapped potential of products and waste of biological origin from agriculture and forestry, as well as biodegradable fractions of industrial waste and household waste of biological origin that can be used for sustainable biogas production (compliance with sustainability criteria and for reduction of greenhouse gas emissions under Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources).

The specific objectives of the project are:

- Establishing strategic frameworks to identify potential opportunities and challenges through consultation with stakeholders;
- Development of pilot projects allowing the introduction of green hydrogen and biogas in industrial processes, with a view to their future use in transport and for the production of electricity and heat;
- Create a knowledge cluster and solutions for the production of renewable gases, their application for sector integration, in order to stimulate innovation through promotion, exchange of knowledge and experience, knowledge transfer, building a platform with a database of knowledge and innovation, dissemination of information and cooperation between enterprises.

3. Beneficiary

Enterprises

4. Time schedule for project Implementation, including activities, stages¹

1. Consulting with stakeholders about relevant technologies for green hydrogen and biogas production – Q2 2021;
2. Concept development and conditions for Call for Project Proposals: Q3- 2021;

¹ The time schedule shall be relevant for determining interim targets within the framework of the Recovery and Resilience Plan and is directly related to the disbursement of grant instalments from the Recovery and Resilience Fund.

<p>3. Selection procedure of project proposals and concluding contracts: - Q3 2021 and Q1 2022;</p> <p>4. Implementation of projects: up to Q3 2026</p>
<p>4.1. When can the project implementation start at the earliest after its approval?</p>
<p>The implementation of the project activities can start immediately after its approval in 2021</p>
<p>5. Indicative financial resource by activity, including sources of financing (national budget, European funding, private funding, IFIs)</p>
<p>Indicative financial resource – 40 000 000 Euro*.</p> <p>The expected EU funding with funds from the Recovery and Resilience Facility is in the amount of 20 000 000 Euro of total project costs. 20 000 000 Euro will be provided by the beneficiaries with a maximum aid intensity of up to 50%.</p> <p>*https://ec.europa.eu/energy/sites/ener/files/documents/ce_delft_3g84_biogas_beyond_2020_final_report.pdf ;</p> <p>https://www.theccc.org.uk/wp-content/uploads/2015/11/E4tech-for-CCC-Scenarios-for-deployment-of-hydrogen-in-contributing-to-meeting-carbon-budgets.pdf;</p> <p>“Future of Hydrogen Report 2019” International Energy Agency, https://webstore.iea.org/download/direct/2803</p> <p>„Study on early business cases for H2 integration in energy storage and more widely power-to-H2 applications”</p> <p>https://www.hinicio.com/inc/uploads/2018/06/P2H_Full_Study_FCHJU.pdf</p>
<p>5.1. Indicative allocation of the financial resource, depending on the type of expense</p>
<ul style="list-style-type: none"> - Construction of installations for production of hydrogen / biogas - 8 5% - Human capital (skills development, retraining...) - 10 % - Technology (costs for acquisition of intangible fixed assets - patents, software...) - 5%
<p>6. Indicators</p>
<p>6.1. Result indicator (s)</p>
<ul style="list-style-type: none"> • Installed capacity for production of green hydrogen <p>Initial value - [2021] - 0 MW</p>

Intermediate value - [2024] - 7 MW

Final value - [2026] - 17 MW

- **Green hydrogen production**

Initial value - [2021] - 0 tons / year.

Intermediate value - [2024] - 1000 tons / year.

Final value - [2026] - 2 000 tonnes / year.

- **Biogas production**

Initial value - [20 21] - 0 ktoe / year.

Intermediate value - [2024] - 14 ktoe / year.

Final value - [2026] - 28 ktoe / year.

- **Schedule for absorption of funds***

Period	Euro	% from the indicative budget
1 January - 30 June 2021	0	0
1 July - 31 December 2021	0	0
1 January - 30 June 2022	0	0
1 July - 31 December 2022	28 000 000	70
1 January - 30 June 2023	12 000 000	30

**The proposed schedule for absorption of funds is consistent with the need to consult with stakeholders on the applicable technologies for the production of green hydrogen and biogas and the necessary technological time for the implementation of projects. Based on the conducted consultations, a concept and conditions for providing financial support for the implementation of the projects will be developed. It is envisaged that the procedure for selection of project proposals will start in the fourth quarter of 2021 and the conclusion of contracts will be completed at the end of the second quarter of 2022.*

6.2. Effect indicator (s)

- establishing long-term signals to promote investor confidence;
- commercial demand for green hydrogen and biogas ;
- promoting R&D and knowledge sharing;
- harmonization of standards and removal of barriers to wider entry of renewable gases

7. Does the project require the opening of a procedure pursuant to the Public Procurement Act (PPA)?

Not applicable.

7.1. If a procedure under the Public Procurement Act is required, what part of the activities and financial resources will be subject of the public procurement?
Not applicable.
7.2. If a procedure under the Public Procurement Act is required, what is the indicative schedule for its implementation?
Not applicable.
8. Demarcation and complementarity.
8.1. If similar projects have been implemented (regardless of their source of funding), describe how this project builds on/complements what has been achieved with previous projects.
Currently, there are no projects for the production of green hydrogen in the country, the technologies are not developed and there is no information about the declared investor interest.
8.2. If similar projects are envisaged to be implemented under the Partnership Agreement programs, the centrally managed facilities of EU or the Just Transition Fund, outline the demarcation with this project
Similar projects are not foreseen.
9. Does the project directly contribute to the implementation of any of the Council's Specific Recommendations addressed to Bulgaria in the framework of the European Semester in the period 2017-2020? Please describe how.
The proposed project contributes to the implementation of specific Council recommendations addressed to Bulgaria in the framework of the European Semester in the period 2019-2020 and in particular the implementation of Recommendation 3 to stimulate not of private investment to accelerate economic recovery. The project aims to ensure investment in clean and efficient production and use of energy and resources, environmental infrastructure and sustainable transport, contributing to the gradual decarbonisation of the economy.
10. Does the project contribute to the implementation of a reform in a given sector? Please describe how.
The project will contribute significantly to the implementation of reforms on the way to the decarbonisation of the industry. The lack of projects for production of green hydrogen in Bulgaria hinders the necessary technical and regulatory development of the hydrogen

economy. The introduction of hydrogen technologies requires the creation of a legislative and administrative framework. The current project proposal is expected to contribute to accelerating this process at a rapid pace. As yet no update on national laws and regulations with respect to hydrogen and its applications, information generated by the projects will facilitate the development and harmonization of relevant administrative framework for the introduction and use of hydrogen.

11. Does the project contribute to the development of any aspect of sustainable economic development? Please describe how.

Achieving the objectives of the project will have a direct contribution to the achievement of the following UN Sustainable Development Goals :

- *GOAL 7: Affordable and Clean Energy*

The hydrogen economy is considered a viable and preferred option to provide high quality energy services in an efficient, clean and safe way, while generating little or no pollutant emissions at the point of use. Biogas can be produced from various raw materials, including waste and is used in industry, transport and for energy production. The faster introduction of new biogas plants will make it a sustainable alternative to fossil fuels.

- *GOAL 8: Decent Work and Economic Growth.*

The implementation of pilot projects for production of green hydrogen and biogas will contribute to the reduction of greenhouse gas emissions and will have a positive impact on economic growth and job creation. The implementation of projects is considered as an opportunity for the introduction of innovative solutions and as a significant incentive for investment, leading to the restoration of economic activity and growth of the Bulgarian economy. The growth of the industry of renewable energy sources will support and "just transition" to a low carbon economy. The development of the hydrogen economy will support the process of retraining of persons working in non-viable sectors of the economy.

- *GOAL 13: Climate Action*

The green hydrogen contributes to achieving zero carbon dioxide emissions in energy-intensive sectors related to steel and chemical production, in various modes of transport - long distance, shipping and aviation.

The production of biogas by utilization of waste that would otherwise decompose and emit both methane and CO₂ into the atmosphere is an indisputable and cost-effective way to reduce greenhouse gas emissions.

12. Does the project contribute to the implementation of the objectives of the National Development Program BULGARIA 2030? Please describe how.

The main objective of the project is in full accordance with the strategic objective and the National Program for development BULGARIA 2030. The project will contribute to the following objectives:

Axis development №1 "Innovative and intelligent Bulgaria" - the project will contribute to fostering cooperation between universities, research institutes and businesses in the

effective guidance of scientific development to the needs of the market and society and increase their added value by utilizing synergies arising from a similar cross connections. The integration of new technologies in the field of hydrogen production in business processes is an important step towards expanding R&D in the private sector.

Axis Development 2: "Green and sustainable Bulgaria" - the project contributes to the implementation of one of the main objectives of the priority, namely the increase of resource - and in particular energy productivity, while following the principles of the circular economy and stimulating the introduction of low-carbon, resource-efficient and waste-free technologies. Renewable gas production and consumption are in line with the idea of a circular economy that benefits from reduced greenhouse gas emissions, improved waste management and greater resource efficiency.

Biogas production also provides a way to integrate agriculture and industry into the transformation of the energy sector.

13. Does the project contribute to the implementation of the objectives and priorities set out in the National Integrated Energy and Climate Plan? If yes, please describe how.

The project contributes to the implementation of the main objectives set in INECP for stimulating low-carbon economic development, development of competitive and secure energy and reducing dependence on imports of fuels and energy, in particular:

Dimension "Decarbonisation" - the production of green hydrogen will enable renewable energy sources to make an even greater contribution to achieving the decarbonisation targets. Hydrogen is also one of the leading options for storing energy from renewable sources. Wider use of energy from renewable sources, incl. biogas (in compliance with the sustainability and greenhouse gas emission reduction criteria under Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources) have a direct impact on the reduction of greenhouse gas emissions.

Dimension "Energy Security" - The project will contribute to achieving the goals set by Bulgaria in terms of energy security related to: taking measures regarding limited or interrupted supplies from an energy source in order to improve the sustainability of regional and national energy systems.

Dimension "Research, innovation and competitiveness" - the main objective of the project for the implementation of pilot projects for the production of green hydrogen will contribute to increasing the number of innovative companies (introduction and development of innovations) in high-tech and intensive sectors, support for cooperation between research and business, technology transfer and implementation of the results of scientific research, promotion of business investments in research and in the implementation of innovations in industry, etc.

In particular, the project will contribute to the planned development of a pilot project for hydrogen with a total installed capacity of 20 MW, as a basis for the further development of hydrogen capacity after 2030.