

DanuP-2-Gas



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PROJECT OUTPUTS



DanuP-2-Gas:
Innovative model to drive energy
security and
diversity in the Danube Region
via
combination of bioenergy with
surplus renewable
energy

START DATE:

01-07-2020

END DATE:

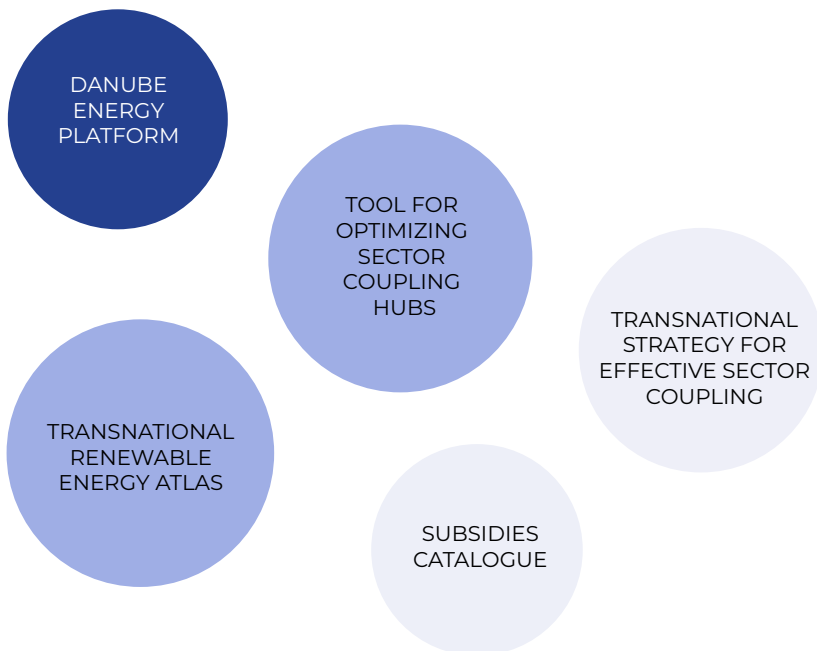
31-12-2022

DanuP-2-Gas project was funded by the Danube Transnational Programme with an overall project volume of 2.5 million Euro. 14 partners from 10 countries in the Danube Region were working on the Danube Energy Platform, the website that brings together energy agencies, business actors, public authorities and research institutions and others.

The main idea of DanuP-2-Gas project was to embrace further development of the technology and the implementation of power-to-gas plants with methanation in the Danube Region. The Danube Energy Platform, that was developed within the project offers all necessary information to potential investors and stakeholders to get pilot and demonstration plant projects started.

DanuP-2-Gas project consortium has successfully fostered transnational cooperation and synergies among crucial players of the energy sector, research, public administration, and businesses and contributed to the improvement of energy efficiency and security in the Danube Region, in order to get closer towards climate-neutrality.

Following specific objectives, that were set at project beginning, to guide the way to the new energy storage investments, building trans-sectoral energy community and developing instruments for the coupling of gas and electricity sector, project partners have developed an interactive **Danube Energy Platform**. It was designed in way to support and connect key players within energy sector, inside the Danube Region. Main feature that can be found on the Platform is **Transnational Renewable Energy Atlas**, which shows various biomass and infrastructure data and enables, together with **Tool for optimizing sector coupling hubs** to perform initial analysis for future investors. To better identify funding programmes and other financial incentives to build a power-to-gas hub in the Danube countries, a **Subsidies catalogue** was also developed. On top of all, the **Transnational strategy for effective sector coupling** was prepared, which includes national roadmaps for simplified implementation.



DANUBE ENERGY PLATFORM



Danube Energy Platform is a web-based tool that was designed to connect and strengthen cooperation among key players of the energy sector inside the Danube Region with special consideration of renewables and energy storage concepts.

The heart of the platform is the Transnational Renewable Energy Atlas, which shows the location of biogenic resources and infrastructural conditions like the availability of renewable energy plants and gas or electricity grids. In combination with the corresponding optimization tool for effective plant design, the atlas greatly facilitates the initial analysis for future investors.

Additionally, the platform provides a partner search tool to find ideal partners for implementation projects. In the subsidies catalogue a stakeholder can identify funding programmes and other financial incentives to build a power-to-gas hub in the Danube countries. The legal framework influencing the described concept was also assessed on national and European level. On the platform there are also roadmaps provided. Finally, effective knowledge transfer was ensured via workshops elaborating future pilot projects and business models with interested stakeholders using the developed platform and its tools.

Harboured by the pre-existing website, originated from the DTP project Energy Barge, this platform now serves as an information source and a link for public and private stakeholders to ensure efficient information flow, knowledge transfer and synergistic cooperation towards effective energy storage and planning.

Through the course of DanuP-2-Gas project, the data from the pre-existing platform was jointly expanded also by help of relevant stakeholder groups and their corresponding information beneficial for the expansion. The platform now provides useful tools and data for and about stakeholders of the energy sector, fostering contact joint projects that lead to increased knowledge transfer and overall level of cooperation.

It is not only a useful source of information for energy planners, providers, investors and grid operators and e.g. engineering companies implementing the developed projects, but also it supports the provision of expertise through manuals and e-learning regarding the provided tools. The idea to build upon the existing platform was founded on the premise to preserve the maximum extent of available tools, knowhow, and established awareness, avoiding the replication of work and unnecessary development, maintaining present functionality for current users in order to minimize disruption. The expansion has therefore left the original tools unchanged and was focused on adding to them. A detailed description of the platform development with additional reference to the DTP projects involved and their respective websites was developed and prepared so users can understand why and how this platform has evolved.



<https://danup2gas.eu/info/project>



TRANSNATIONAL RENEWABLE ENERGY ATLAS

The heart of the Danube Energy Platform, the Transnational Renewable Energy Atlas, shows the location of biogenic resources and infrastructural conditions like the availability of renewable energy plants and gas or electricity grids.

The Transnational Renewable Energy Atlas was built upon one main outputs of ENERGY BARGE, the BIOMASS & BIOENERGY ATLAS and it includes all previous data. The original tool served as the technical framework already providing map and atlas functionality, visualisation of trade flows of feedstock, and specialized companies from the bioenergy domain and transportation including port infrastructure. The expansion of the tool has added the information to the existing tool about energy infrastructure, the electricity and gas grid, existing renewables (e.g. wind and solar power) and further data on fermentable and non-fermentable biogenic residue that can be used for storage of energy in line with the proposed concept.

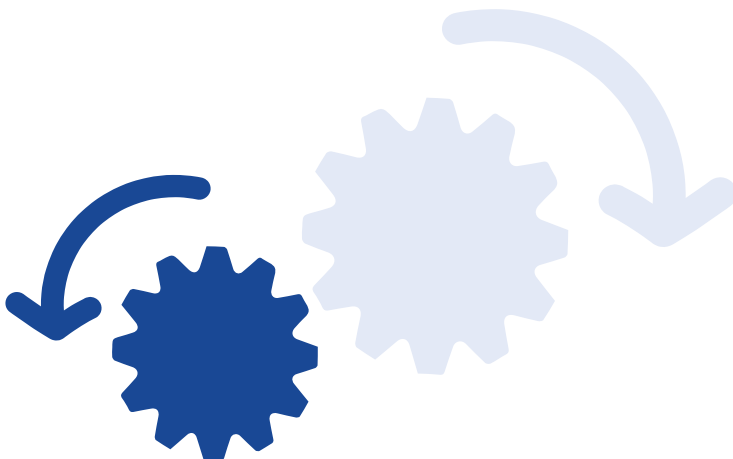
The Transnational Renewable Energy Atlas also serves as the interface for users to work with the infrastructure and biomass data added, during DanuP-2-Gas. The tool is now publicly accessible and it is envisioned to be used by energy planners, energy providers, grid operators, engineering companies or investors to visualize the provided data and process it in an intelligible way (e.g. showing only certain parameters of interest for specific companies). The Atlas thus enables better exploitation of the bioenergy potential present in the Danube Region, supporting the interconnection of transnational energy networks and the diversification of renewables.



TOOL FOR OPTIMIZING SECTOR COUPLING HUBS

The Tool for Optimizing Sector Coupling Hubs is the actual instrument that is used for the process to define the sustainable economic operation of a sector coupling hub storing surplus renewable electricity with help of biogenic residue in renewable natural gas. For this it relies on a given location and its attributes like present fluctuating renewables, biomass and its costs, local access to the gas-grid and given requirements to optimize features of the hub like size and operation mode.

The optimization tool is based on simplified models for the operation of such hub, including also environmental factors that come into play. For the given location it offers an optimized hub concept. The optimization tool is used to assess the Danube Region potentials during the pre-feasibility study and is available to the public via the Danube Energy Platform to gain additional benefit. It can be used by anyone with the provided data for the Danube Region or beyond, given the specific parameters are available. The tool was intensively used in the Workshops for Future Projects and Funding, which were also focused on propagating and exploiting of this tool and its benefits. The optimization tool advance the diversification of energy sources and the inter-connection of transnational energy networks by supporting investors with the necessary information on locations with favourable conditions for coupling hubs. Which facilitate the initial analysis for stakeholders interested in realizing the hub concept and strongly contribute to secure energy supply and to advanced energy efficiency.





How to use it?

The “DanuP-2-Gas Optimization Tool” is located on the web page of the DanuP2Gas Transnational Renewable Energy Atlas (GIS).

The User's first step is a simple mouse click to select the P2G hub location. Then, biomass sources shown on the Atlas are to be selected. All available bio-char sources in the Danube region are automatically selected. The Atlas will give feedback on possible renewable energy plant (REP) and industrial plant (IP) that could be merged with the planned P2G hub. The User has the option to select the offered REP or IP or not. Afterwards the Atlas will automatically find the rest of needed utility grids connection points and generate a file with the description of sources and infrastructure for the optimization tool. The User's next step is to open the Excel user interface of the optimization tool and click on the Import data from Atlas located in the Excel file tab Plant and sources. User can then change any of changeable fields of the Excel file, and finally has to click on Start optimization located in the Optimization Tool tab. After that the User waits for OT computation to be finished and analyses the obtained results - both the P2G hub configuration in terms of components sizing and the operation policy. Performance in terms of energy/materials exchange of the P2G hub system is also shown, together with key financial figures like the investment size and the return on investment period.



SUBSIDIES CATALOGUE

The subsidies catalogue targeted on DanuP-2-Gas is a comprehensive overview on potential national and European funding instruments, foremost subsidies, that can provide a financial support to project ideas and investments related to the DanuP-2-Gas concept of sector coupling in the participating countries and beyond.

The associated funding priorities where funding can be sought are manifold, e.g. energy security, efficiency, bioenergy, sector coupling, circular economy and renewables in general. Due to the fact that many national and European programs from various backgrounds e.g. agriculture, research, (regional) development, circular-/bioeconomy or infrastructure can be explored for their potential funding opportunities, as all of these areas are immediately related to the described concept, this catalogue has great value for many stakeholders. As there is no existing instrument for easy centralized search that includes information on national and international funding instruments in the named different areas in whose intersection the sectors coupling hubs are situated, the catalogue is a useful tool for a broad set of interested stakeholders, but foremost as a first stop for future promoters and investors in the coupling hubs. A wide overview describing the context of the subsidy, its geographic scope and a summarized program overview that includes eligibility criteria, co-financing rate, volume and duration of fundable activities are of great help for any consortium especially transnational ones trying to realize an idea and are in need of support.

To suit its purpose the Catalogue has categorized information that are easily searchable. The main search criteria of the funding instruments are the DanuP-2-Gas implementing countries and the thematic scopes. Thematic scopes cover different relevant areas in whose intersection the sectors coupling hubs are found. Besides the categorization, this output also defines the required information and descriptions for different listed funding mechanisms. The countries covered are the 10 countries implementing the DanuP-2-Gas project: Austria, Bulgaria, Czech Republic, Croatia, Germany, Hungary, Romania, Slovakia, Slovenia and Serbia, and in addition also transnationally available subsidies are listed.

The information collected in the Subsidies Catalogue are available via the Danube Energy Platform to allow an effective search of a plethora of national and international funding instruments and to be easily available for developing future investment projects in electricity-gas-biomass sectors coupling.



<https://danup2gas.eu/subsidies>

Project co-funded by European Union funds (ERDF, IPA)

TRANSNATIONAL STRATEGY FOR EFFECTIVE SECTOR COUPLING

The basis for the Transnational Strategy for Effective Sector Coupling were the national legal and regulatory framework conditions for gas-electricity sector coupling and chemical energy storage assessed in every participating country. The range of legal limitations for the concept were manifold and has also indicated opportunities for future improvements. The collected data were processed into a strategy that included individual country-specific political roadmaps based on the national obstacles. These in turn has covered concrete recommendations for decision-makers and political actors and allow a sustainable economic operation of sector coupling hubs in order to reach the long-term climate goals of the EU on one side but also to resolve energy security issues for individual countries and in the whole Danube Region on the other side.

In essence the strategy contains recommendations for actions designed to foster entrepreneurial innovation along the sector coupling concept including e.g. feed-in tariffs or tax benefits. In any case these suggestions do not interfere with current economic structures within the energy, waste or biomass segment. To assist the transfer of the developed knowledge included in this strategy the document is available to all gathered stakeholders and the general public through the Danube Energy Platform.

This strategy is supporting the development towards increased energy security and efficiency in the Danube Region via storage of surplus renewable energy in the gas-grid. Given that this project consortium has covered most of the region with 10 countries including a non-EU member state, a comprehensible common concept that is transnationally employed allows for efficient uptake that leads to the desired Danube Region-wide improvements.

PROJECT PARTNERS

TECHNOLOGY CENTRE FOR ENERGY (TZE)

Germany, www.tz-energie.de

The TZE as an external technology transfer centre located in Ruhstorf a.d. Rott (near Passau) bundles the expertise of the University of Applied Sciences Landshut in energy research. Our scientists develop technical solutions for the future of energy by working on energy storage, smart energy grids, energy efficiency and energy systems. One focus is on energy storage topics in the context of batteries or hybrid systems for short-term storage. In the laboratory and pilot plant for microbiological methanation (LTM), power-to-gas topics and transformation processes for the seasonal storage of renewable energy are addressed.

ENERGY AGENCY OF SAVINJSKA, ŠALEŠKA AND KOROŠKA REGION (KSENA)

Slovenia, www.kssena.si

KSENA is a non-governmental and non-profit energy agency based in Velenje, Slovenia. The agency was established in 2006 within the framework of the IEE programme and has been gaining vast experience in the fields of energy efficiency, exploitation of RES and energy management ever since. We are accomplished in the management and coordination of actions aiming at reducing energy consumption, GHG emissions, costs in public buildings and infrastructure as well as seasoned in the development of local energy concepts, SECAPs and providing feedback on proposed national energy strategies. KSENA has managed to secure impressive exposure to regional and transnational projects and is also highly experienced in the role of the project coordinator.

PROJECT PARTNERS

TOLNA COUNTY DEVELOPMENT AGENCY (TCDA)

Hungary, www.tmfu.hu

TCDA Tolna County Development Agency was established in early 2017 as a subsidiary of the Tolna County Council. Our mission is the representation of the county, its civic organizations and institutions as well as key economic sectors in the international community. Our main goal is to transfer knowledge, good practices from and to European partners in order to develop the local community in several key topics, such as environment, energy efficiency, alternative energy, smart grids food industry, local products, etc.

ENERGY INSTITUTE AT THE JOHANNES KEPLER UNIVERSITY LINZ (EI-JKU)

Austria, www.energieinstitut-linz.at

EI-JKU is a non-profit research organisation, whose multidisciplinary knowledge of more than one scientific field is essential for energy-related research topics. Our three departments cover Energy Economics, Energy Law and Energy Technologies. This combination of core disciplines allows comprehensive analyses and accounts for all aspects of future-oriented renewable energy and product topics. The institute's analyses range from feasibility studies of PtG and energy storage applications to economic quantifications of possible substituted system costs and the analysis of legal barriers regarding development of innovative energy technologies.

BLACK SEA ENERGY RESEARCH CENTRE (BSERC)

Bulgaria, www.bserc.eu

BSERC is an association of energy experts, established in 2007 in Sofia, Bulgaria, with the aim to support the transition of Bulgaria and the other countries in the Black Sea region to sustainable energy. BSERC's main activities include: development of local and national strategies, programmes and plans; data collection and analysis; development and evaluation of energy scenarios; cost-benefit analyses of policies, feasibility studies of projects, evaluation of financial sources and schemes; networking of research, policy and market actors; training and dissemination of information.

URBASOFIA

Romania, www.urbasofia.eu

URBASOFIA is a town and regional planning company created in 2011 which provides European-wide expertise for urban development, policy design and territorial cohesion. We conduct high-level academic research, applied studies and the implementation of concrete solutions aiming at a more integrated, participatory, realistic and smart-oriented approach to pressing urban problems, both socio-economic, as well as environmental.

PROJECT PARTNERS

DEGGENDORF INSTITUTE OF TECHNOLOGY (THD)

Germany, www.th-deg.de

Together with its eleven research institutions in the Bavarian Forest, THD offers a broad spectrum of knowledge in a wide variety of areas. It bundles competencies in the four overarching areas of Digital Economy & Society, Sustainable Materials, Processes & Energy Technologies, Intelligent Mobility and Innovative Work Environment & Healthy Lifestyle. This can help to support partners in research, development and consulting and thus create new perspectives.

NATIONAL RECYCLING AGENCY OF SLOVAKIA (NARA-SK)

Slovakia, www.narask.sk

The National Recycling Agency of Slovakia is a network organization uniting representatives of public administration and self-government, educational institutions, the business sector and the public according to the QUADRUPLE HELIX principle. We create proposals for a systemic transition to a circular economy that emphasizes product sustainability throughout the life cycle. We support a collaborative economy that creates new business opportunities for the creation of socially just jobs and a habitable environment.

INSTITUTE OF TECHNOLOGY AND BUSINESS IN ČESKÉ BUDĚJOVICE (VŠTE)

Czech Republic, www.vstecb.cz

There are only two public institutes in the Czech Republic where the programmes focus on the applicability of knowledge rather than just theory. VŠTE is one of them. The primary focus of VŠTE activities is the implementation of full-time and part-time studies for professional bachelor's and master's degree programmes. The professional study programmes are supported by cooperation with regional entrepreneurs. VŠTE's other priorities include applied research, the implementation of innovative technologies and knowledge transfer into areas that are current and crucial with regards to the regions needs.

MAHART-FREEPORT CO. LTD.

Hungary, www.mahartfreeport.hu

MAHART is a 100% state owned company established in 2005. It is the owner of the 153 hectares of land, main infrastructure and some of the buildings of the Freeport of Budapest, which is the largest core inland port and trimodal logistical centre in Hungary on the Danube. The port can technically load and store all kinds of cargo, its hinterland covers the whole country. Turnover of 2019 was 1.168m tons on the waterside (1301 barges), 29,355 rail wagoons (incl 24,744 containers), 416,046 trucks and 393,773 TEU containers. There are appr. 60 companies operating in the port providing a wide range of logistical services

PROJECT PARTNERS

INTERNATIONAL CENTRE FOR SUSTAINABLE DEVELOPMENT OF ENERGY, WATER AND ENVIRONMENT SYSTEMS (SDEWES)

Croatia, www.sdewes.org

The International Centre for Sustainable Development of Energy, Water and Environment Systems (SDEWES Centre) is a non-governmental and a non-profit scientific organization based in Zagreb, Croatia. It engages in specific R&D activities that address the problems common for the countries of the East and Southeast European and Mediterranean regions. It aims to create multidisciplinary research and development innovation teams, providing comprehensive R&D activities, assessment and consultation on the research subjects that represent the most important challenges of sustainable development.

ENERGY INSTITUTE HRVOJE POŽAR (EIHP)

Croatia, www.eihp.hr

EIHP is a wholly state-owned, non-profit scientific institution, financed on a per-project basis through execution of international and national project development contracts. Today, the Institute has 81 employees. The Institute's areas of activity include: Strategic planning in the energy sector; Development of electric-power, gas, petroleum and heating systems; Market, legal framework and restructuring of the energy sector; Energy efficiency; Renewable energy sources, environmental and climate protection (incl. Bioeconomy, Hydrogen and Circular Economy topics); Energy audits and certification of buildings; Energy balances and statistics; In-service training and promotional activities.

UNIVERSITY OF ZAGREB FACULTY OF ELECTRICAL ENGINEERING AND COMPUTING (UNIZGFER)

Croatia, www.fer.unizg.hr

UNIZGFER is a higher education and research institution covering the broad field of electrical engineering, computing and information-communication technology.

The UNIZGFER's research laboratory covering the area of automatic control within low-carbon energy systems – Laboratory for Renewable Energy Systems (LARES) participates in DanuP-2-Gas. LARES's major competence is the application of predictive control and mathematical optimization in systems control and planning in order to maximize benefits in their operation. Within DanuP-2-Gas UNIZGFER is in charge for the development of the parametrization tool for power-2-gas hubs.

REGIONAL AGENCY FOR SOCIO – ECONOMIC DEVELOPMENT – BANAT LTD (RDA BANAT)

Republic of Serbia, www.banat.rs

RDA Banat is a regional development institution with a leading role in coordinating development activities in Banat region, and it's recognized as creator of regional initiatives and inter-municipal connections, by bringing together partners from all sectors. In line with key priorities and available resources, RDA finds solutions that are economically and socially sustainable, in compliance with the provisions of environmental protection, taking care that all social groups benefit from the economic development of Banat. As a Regional Development Agency, RDA Banat has implemented numerous projects in regional development field.

ASSOCIATED PARTNERS

**Ministry of Infrastructure, Directorate for Energy I
Slovenia**

**Ministry of the Environment and Spatial Planning I
Slovenia**

Municipality of Celje I Slovenia

The Ministry of Agriculture of the Czech Republic I Czech Republic

Hungarian Biogas Association I Hungary

**JP Elektroprivreda Hrvatske Zajednice Herceg Bosne
d.d. Mostar I Bosnia and Herzegovina**

Government of Lower Bavaria I Germany

**Ministry of Foreign Affairs and Trade of Hungary I
Hungary**

Bioenergetica Association I Moldova

**Bavarian Ministry of Economic Affairs,
Regional Development and
Energy I Germany**

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DanuP2GasProject



DANUP2GAS



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