

# Liquid Energy – a Success Story

## 1. The Liquid Energy project addresses a burning challenge

The Liquid Energy project is a comprehensive initiative that addresses a burning challenge in the global energy landscape – the increasing demand for natural gas. This demand is driven by its versatile applications, including power generation, industrial processes, and transportation fuel. Natural gas, particularly in the form of liquefied natural gas (LNG), is abundant and easily accessible in many regions. Consequently, there has been a surge in LNG and bio-LNG production and export. While mega projects and large-scale LNG markets receive significant attention, the micro- and nano-scale (bio-) LNG market remains relatively underexplored, despite its substantial potential.

To tackle this challenge, the Liquid Energy project, co-financed by the INTERREG South Baltic Program, focuses on micro- and nano-scale solutions for the (bio-) LNG market. This specific market segment demands dedicated products and technologies tailored to its unique requirements. The project serves as a framework for broader future utilization of (bio-) LNG on a smaller scale, such as in decentralized energy supply systems. By engaging various companies and executing four pilot investments, the project demonstrates a remarkable practical orientation, aiming to create significant value and unlock a new market within the energy sector.

## 2. Strong practical character of the project

The primary goal of the Liquid Energy project is to conceive, execute, and assess a pilot system designed for micro and nano-scale LNG applications. This system revolves around the development of technical solutions to cater to these smaller scales, notably featuring a microgrid and a mobile LNG/bio-LNG refuelling station. These elements are strategically positioned to tackle the energy accessibility challenges prevalent in off-grid rural regions. However, it's important to emphasize that the applicability of the project's innovations goes beyond land-based energy needs. In fact, the mobile LNG/bio-LNG refuelling station, in conjunction with small ships, can be collectively harnessed to establish a cohesive system. This versatile approach underscores the project's commitment to addressing energy access issues across diverse scenarios, be it on land or on water. Through this innovative strategy, the project aims to rigorously examine and present the feasibility, effectiveness, and socio-economic ramifications of integrated energy solutions. These solutions are particularly targeted at mitigating the issues linked with unreliable and unsustainable energy access that persist in underserved rural areas.

The project's focus extends beyond technical aspects, encompassing environmental considerations, economic viability, and the local community's needs and engagement. By ensuring the long-term viability and scalability of the proposed solutions, the project aims to create a lasting positive impact on the communities it serves.

## 3. Liquid Energy in the spotlight of the industry and media

One remarkable achievement of the Liquid Energy project is its remarkable presence and engagement at diverse conferences and exhibitions. Notably, the project's active participation in prominent events such as GASTECH 2022 has yielded substantial interest and engagement from key players within the business sector. This enthusiastic response from industry stakeholders underlines

the project's undeniable relevance and significance in tackling critical challenges within the energy sector.

Moreover, the project's impact has been further underscored by its coverage in leading LNG-focused publications. Notably, several pivotal LNG magazines have dedicated articles to the Liquid Energy project. This extensive coverage serves as a testament to the project's profound importance and influence within the LNG community. It's evident that the project's innovative approaches, practical implementations, and potential for transformative change have garnered attention on a wide scale. The fact that prominent industry publications have chosen to spotlight the project reflects its recognition as a pioneering initiative at the forefront of addressing the intricate complexities within the LNG landscape.

In essence, the convergence of both significant interest from industry events and comprehensive coverage within respected LNG publications solidifies the Liquid Energy project's role as a noteworthy force within the energy domain. This recognition not only showcases the project's impact but also underscores its capacity to shape the future of (bio-) LNG utilization, contributing to a cleaner, more sustainable energy paradigm.

#### 4. Pilot investments as highlights with strong positive feedback from the bio-LNG and LNG market

The project's success is underpinned by several pilot investments, each highlighting innovative applications of (bio-) LNG:

1. **Micro- and Nano-Scale (Bio-) LNG Mobile Refuelling Station:** This investment features a compact vehicle-based mobile refuelling station for micro- and nano-scale (bio-) LNG. The introduction of a micro-scale vacuum-less cryo-bulk system represents a breakthrough in efficient refuelling for smaller applications, reducing the need for stationary infrastructure. This concept addresses both cost-efficiency and flexibility, particularly in the context of bio-LNG.
2. **Microgrid with Modern Fuel Cell:** By utilizing (bio-) LNG and modern fuel cell technology, this investment focuses on establishing a scalable energy station for both thermal and electrical energy. The integration of (bio-) LNG with fuel cell technology offers an exciting prospect for sustainable energy generation. The investment explores utilizing byproducts like hydrogen and CO<sub>2</sub>, contributing to the broader circular economy.
3. **(Bio-) LNG Solution for Decentralized Energy Supply System:** This investment is dedicated to implementing a (bio-) LNG solution for decentralized energy supply systems in buildings. By integrating a combined heat and power (CHP) plant, solar energy, and smart home technology, the investment aims to create an efficient and sustainable energy ecosystem. The project aligns with a clean energy future, minimizing greenhouse gas emissions and promoting renewable energy sources.
4. **Adaptation of Marine Engine to (Bio-) LNG:** An innovative undertaking, this investment involves adapting a small marine engine to run on (bio-) LNG, marking a transition from conventional, environmentally harmful residual fuel. Given the current emphasis on eco-friendly alternatives

in maritime transportation, this adaptation demonstrates a practical solution for cleaner marine propulsion.

Therefore, the Liquid Energy project stands as a beacon of innovation and practicality, striving to address the pressing challenges posed by the global demand for natural gas. By focusing on micro- and nano-scale (bio-) LNG solutions and executing pioneering pilot investments, the project not only introduces cutting-edge technologies but also fosters sustainable energy solutions that have the potential to transform various sectors. Its success is exemplified by the interest it has garnered from the market and its contributions to a cleaner, more sustainable energy future.

## 5. Educational aspect of the Liquid Energy project

The Liquid Energy project places significant emphasis on education, enhancing understanding of its innovations and pilot investments. To empower stakeholders with valuable insights, the project has created comprehensive training materials. These resources cater to diverse audiences, from professionals to communities, enabling them to grasp the technical and practical aspects of micro and nano-scale (bio-) LNG applications. By offering clear explanations, visuals, and examples, these materials simplify complex technologies.

The educational approach encompasses detailed explanations of pilot investments. It includes step-by-step guides to the design, execution, and anticipated impacts of innovations such as micro- and nano-scale (bio-) LNG mobile refueling stations, microgrid pilot investments with modern fuel cells, and (bio-) LNG solutions for decentralized energy supply. Using technical schematics, power point presentations, and video materials, learners can understand the technicalities and practical implications of each investment.

This educational effort goes beyond surface-level explanations. It delves into the fundamental principles of (bio-) LNG applications, enabling stakeholders to assess feasibility, effectiveness, and socio-economic impacts. The content highlights the adaptability of these innovations across diverse contexts, from off-grid rural areas to small ships and sustainable energy supply systems. Thus, the Liquid Energy project's educational aspect underscores its dedication to knowledge dissemination. Through comprehensive materials, stakeholders gain the tools to actively contribute to the advancement of sustainable (bio-) LNG solutions.