Title of best practice: Acquamarin hydrogen production and storage project	
Best practice area	☐ **E-mobility** ☐ **RES supply** ☒ **Green hydrogen**
Location of the practice	Kardoskút, Békés, Hungary Hungarian Gas Storage Ltd.
Description of the practice	The project was based on the study "Sustainable Energy Storage Innovations in Danube Region Countries for the EU-Goals of the Paris Climate Agreement" prepared by the Hungarian Gas Storage Ltd. and was was commissioned by Ministry of Foreign Affairs and Trade of Hungary, coordinated by the Hungarian Coordination of the Energy Priority Area of the EU Strategy for the Danube Region. The Aquamarine project, implemented and operated by the Hungarian Gas Storage Ltd., aims to produce hydrogen via electrolysis that will be mixed with natural gas and 1) used to power gas-powered equipment at the site or 2) be injected into the gas transmission system – in compliance with gas quality and safety regulations – or 3) liquefied and used in transport or industry, thus reducing the CO2 emissions of the facility and the gas grid. The core of the project are the two 1 MW electrolyser units. The project consortium includes international energy companies, research institutes and universities, to study the suitability of the existing infrastructure for hydrogen-mixed natural gas storage. Technical studies have been carried out by international institutions to study the feasibility of the project using the existing infrastructure, including research works on hydrogen-natural gas mixing, harmful effects of hydrogen on steel of pipelines and liquid hydrogen storage. Future milestones for the project include: starting in 2023, the production of hydrogen and use of hydrogen-mixed natural gas in applied industrial research programmes; in 2024, the mixing of hydrogen in the natural gas network; in 2025, a joint research programme to study the reservoir for hydrogen-mixed natural gas storage. In July 2021, the consortium announced that a diaphragm Burckhardt compressor will be used to compress the hydrogen before injection in the underground gas storage.

Precise theme and objectives	*The project is not yet concluded however since this is one of the two main green hydrogen supply project in Hungary, it can be said that they are very important as a demonstrator for the emerging hydrogen market. Not only that, but the National Hydrogen Strategy of Hungary also expects to deploy 240MW of capacity in terms of electrolization, therefore hand-on experience, knowledge of the value chain is very important. The project also deals with two problems at the same time: the technological challenges of feeding in hydrogen to the natural gas network. There already new projects stemming from the AQUAMARIN project that are aiming at more nuanced technological issues, such as the coating of storage tanks and piping, development of hydrogen based energy storage options, and the development of the regulation of the chemical composition of hydrogen in the market.*
Funding	*Total investment cost is roughly 8 million EUR, 5 million EUR is provided by the ERDF, the rest of the funding is provided by the Hungarian Gas Storage Ltd.* *OPEX is not known at the time and revenues can be highly dependent on the type and amount of services the project can offer to the electricity, natural gas and the hydrogen market.*
Implementation period	*2022 february - 2025*
Key factors associated with the regional context	*Considering that Hungary plans to install 240 MW of electrolyser capacity by 2030, the project is a crucial pilot in terms of gathering experience with the production, storage and transport of hydrogen, its integration into the gas grid both technically and legally. There are no detailed provisions regulating the hydrogen sector therefore on-hands experience is required to support future legislative activities. Experience with the injection to the gas grid is required so that hydrogen can play an important role on the future energy mix.*

https://www.youtube.com/watch?v=OtXqQpKJyY8

https://www.youtube.com/watch?v=ixMs0MCn_YI

https://youtu.be/RxvFvnVp990




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