



GIFT



DECARBONISING THE ENERGY SYSTEMS OF EUROPEAN ISLANDS



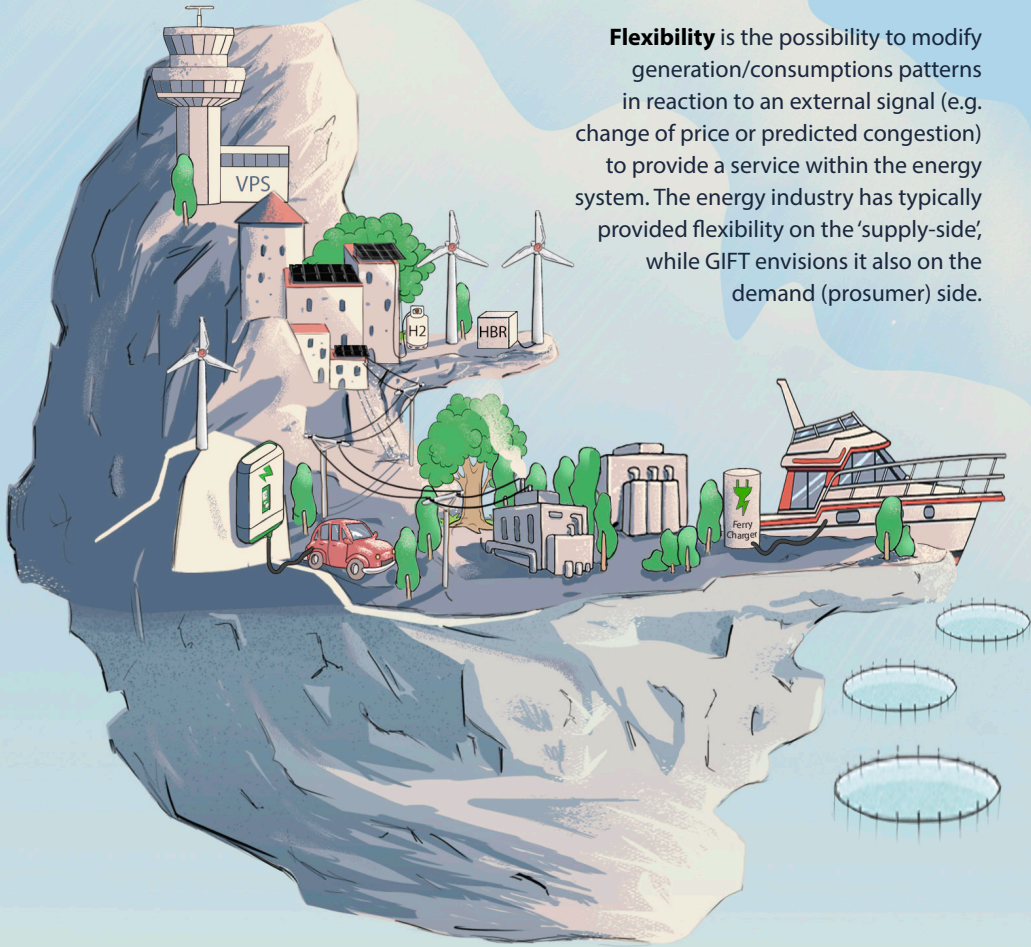
This project has recieved European funding from the European Union's H2020 Research and Innovation Programme under grant agreement n°824410



GIFT (Geographical Islands Flexibility) aims to increase the penetration rate of renewable energy sources into the islands' grid, reducing the need for diesel generation and thus decreasing the greenhouse gas emissions directly related to it. This will be achieved through the development of several flexibility solutions, such as:

- Virtual Power System (VPS) for trading flexibility using FlexOffer protocol
- Better prediction of supply and demand and visualisation through a GIS platform
- Energy management systems for harbours, factories, homes
- Innovative storage systems allowing synergy between electrical, heating and transportation networks

Flexibility is the possibility to modify generation/consumptions patterns in reaction to an external signal (e.g. change of price or predicted congestion) to provide a service within the energy system. The energy industry has typically provided flexibility on the 'supply-side', while GIFT envisions it also on the demand (prosumer) side.





Renewable energy system (incl. heating, cooling, storage) cheaper than diesel generation

Real-time flexibility trading, which is the core part of VPS technology, includes price information as a main component based on the local techno-economic optimization.



Enhance autonomy for islands that are connected to the mainland grid

Our approach allows easy access to energy flexibility services for the DSO, who can therefore exploit demand response in order to improve stability and adaptation capacity of the network.



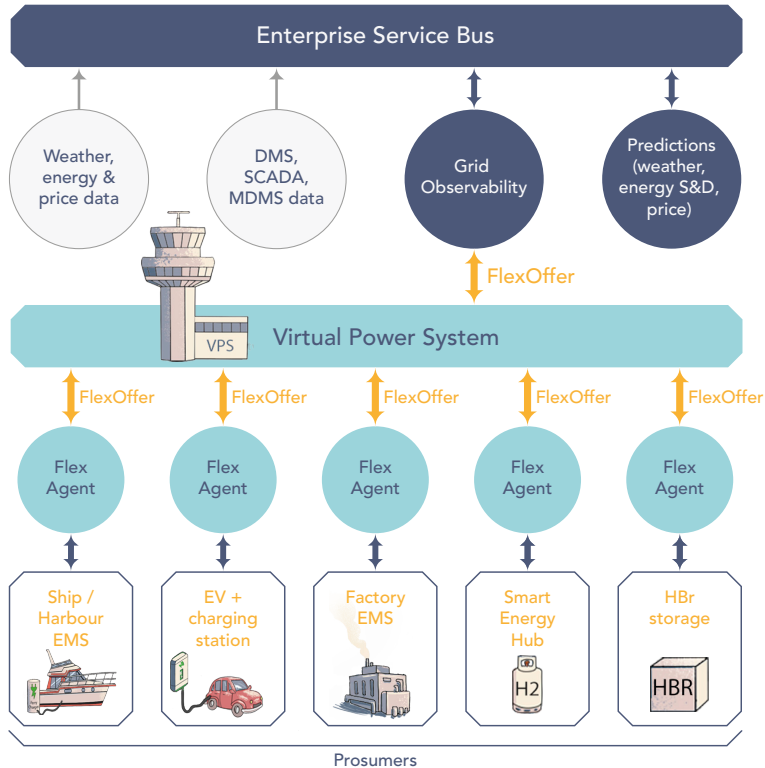
Significant reduction of fossil fuel consumption

Introduced technologies will allow efficient storage (HBr flow battery), cogeneration capabilities (H_2 -based CHP), cost-based optimisation, considering equilibrium of a complete system.



Increase of energy grid visibility (digitalised smart grid)

The GIS platform will offer the DSO a better visibility of the grid at each moment and the available flexibility as well as the possibility to postpone investments on the grid thanks to smart management.



FlexOffer is a universal format and a trading mechanism to describe, buy and sell energy flexibilities. The concept works bottom-up, managing flexibilities provided by any source: generation plants, households, small and medium-sized industry, office buildings, or electrical vehicle charging stations. GIFT is one of the major players in the FlexOffer community, which aims to promote and standardize this open and scalable protocol.



PROCIDA, ITALY

LIGHTHOUSE #1

BACKGROUND

Procida is a small Italian island of the Tyrrhenian Sea with about 10.500 inhabitants. It is connected by a 30kV submarine cable to the nearby Ischia Island, and it is the only source of the electricity for the island and covers the needs of the entire Procida population.

CHALLENGE

There are only a few local renewable production units available on the island, mostly photovoltaic systems. Consumption on the island includes 4 harbours, 15 factories, around 7000 private houses and 3 EVs. The most energy intensive loads are registered by homes and hotels. The island has a very strong seasonal factor, which is also reflected in energy use patterns. They are experiencing blackouts during the summer season due to intensive load and grid congestion.

SOLUTION

GIFT solution for Procida will include tertiary buildings as part of flexibility portfolio, mainly hotels and municipality facilities, EVs and relevant factories. As part of deployment, GIFT will install an innovative H₂ cogeneration unit - Smart Energy Hub, which will enable sector coupling and therefore increase the overall efficiency.

The background of the slide features a dark, atmospheric photograph of the Grytøya island in Norway. Several wind turbines are visible against a twilight sky. A semi-transparent map of the island is overlaid in the upper center. The text is presented in a clean, sans-serif font, with orange accents for section headers and a vertical line on the left side.

GRYTØYA, NORWAY

L I G H T H O U S E # 2

BACKGROUND

Grytøya is an island in Harstad Municipality, Norway. This 108-square-kilometre island lies just north of the large island of Hinnøya. The electricity supply in Harstad is mainly from hydropower with similar prices as mainland, but the energy supply for transport is mostly based on fossil fuel. Especially in winter time, the increasing energy demand requires more imported coal-based electricity.

CHALLENGE

Grytøya is connected to the mainland electricity grid via submarine cable that has already reached its full capacity so DSO has to reject new applications. A major consumer of energy on the island are fish farms. Those that are not connected to the grid are currently using diesel generators, which are polluting the air. New means of transportation, such as electric ferries are being considered, but without flexibility solutions such as GIFT, those vessels would put additional strain on the grid.

SOLUTION

GIFT project will provide a holistic energy management for the Grytøya island, by integrating all relevant sources of energy flexibility (prosumers): fish farms, e-ferries, e-vehicles, harbor, stationary batteries, innovative HBr storage and other RES-based production available locally. GIFT solution will enable DSO to postpone the expensive investment into stronger submarine cable for a several years.

INNOVATIVE TECHNOLOGIES APPLIED

WITH A FOCUS ON INTEGRATION

Virtual Power System (VPS)

Automated flexibility exchange platform connects all relevant prosumers and buyers of flexibility. It is market oriented, meaning it enables non-invasive operation instead of curtailment.

Forecasting

Forecasting algorithms and tools for online forecasting of processes in energy systems, using external (weather, energy consumption and production, energy prices) and internal process observability data.

Visualisation

GIS-based digital twin of the network will allow DSO to better understand the relationships between network components and therefore plan its grid expansion in a more structured way.

Enter Service

Solution that
interaction in the
of data and use o
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algorithms, an
systems, p
interop

Long-term Assessment

Holistic model to assess and visualise the different solutions for island energy system development with sustainability perspective under different spatial and temporal scenarios.

Storage Solutions

GIFT project will introduce several storage technologies, being either virtual (storage created by changing the dynamics of the process) or explicit (H_2 based CHP and HBr battery).

Grid Observability

Algorithms and models to observe the grid for better understanding of supply and demand and short-term online forecasting.

Enterprise Bus

facilitates the form of exchange of services among components, and external IT providing verability.

WIDER IMPACT

OF THE PROJECT

Socio-economics

The project will enable the electricity users to become active players in optimization of electricity system. With reducing the stress on the grid, as well as solving congestion, we will help ensuring stable and reliable supply to end users.

Market Transformation

We are promoting new business models through our roles and players model, which is based on European harmonized role model. We advocate local, bottom-up approach.

Environment

All technologies are low or zero carbon. Furthermore, the whole GIFT system allows for high level penetration of renewables that would otherwise endanger the normal grid operation.

Replicability

GIFT project has started to build a replication board with associations that already gather 1640 European islands that will study replication for their territories. The consortium aims to provide sustainable solutions with a strong market uptake and plans to replicate it on all relevant islands in the EU and beyond.

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SAPIENZA
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Sylfen

TRIALOG

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The ultimate proof of technology robustness and interoperability is making it run in complex, challenging environments. So, if it works on an island, it will work anywhere.

- SAŠO BRUS, INEA -