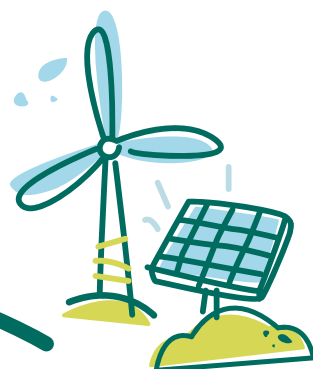
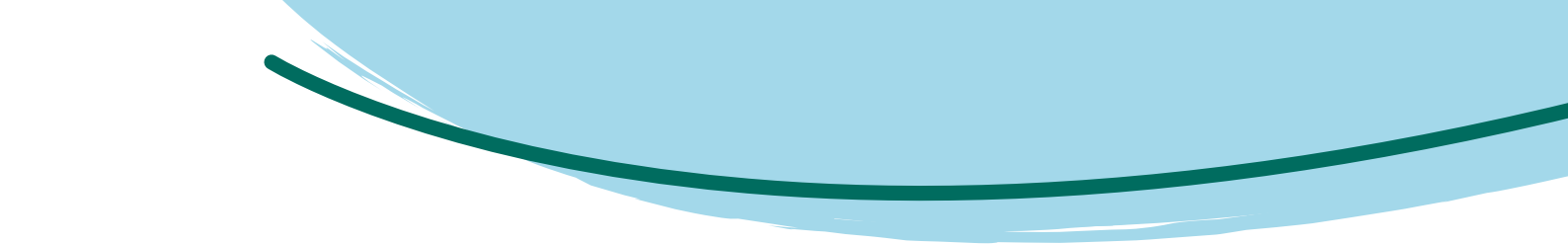




Remote area Energy supply with Multiple Options for  
**integrated hydrogen-based TEchnologies**







In recent years the growth in electricity generated from Renewable Energy Sources (RES) has been dramatic, mainly interesting wind and solar power. In 2019, renewable energy sources accounted for 34% off gross electricity consumption in the EU-27. Wind and hydro power covered two-thirds of the total electricity from RES. The remaining one third came from solar (13%) and solid biofuels (8%) and other minor renewables sources (9%). However, the issue of RES intermittency must be faced to favour further penetration of renewables and pursue the main decarbonization targets. One promising option can consist in the development of bulk energy storage solutions for electricity that are cost-effective, energy dense, reliable. In the case of isolated micro-grid or off-grid remote areas, the business case of energy storage is different, as the network is essentially non-existent or there is the interest of managing the local network in an independent way. Therefore, energy storage is a game changer. Intermittent RES – PV, wind, wave – integrated with an H<sub>2</sub>-based power-to-power (P2P) storage system can provide a viable, reliable, cost-effective, and decarbonized alternative to on-site electricity generation through diesel engines.

## + The Project

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REMOTE has the objective to demonstrate the technical and economic feasibility of H<sub>2</sub>-based energy storage solutions. Three DEMO sites supplied by renewable electricity will be installed in either isolated micro-grids or off-grid remote areas. In the high-renewables EU scenario (60% and more of variable RES penetration by 2050), there will be economic potential for very large amounts (up to 10 times the currently installed capacity, or about 400 GW in the EU) of power-to-power (P2P) storage for the integration of intermittent renewables. Experience gained in isolated and off-grid remote areas will pave the way for the deployment of fuel cell and H<sub>2</sub>-based storage solutions at large scale.

## + Demo Sites

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The three Demo sites have been chosen to obtain a mix of different renewable sources tested in different contexts from the sunny and hot southern Europe up to the windy and cold Scandinavia. The reliable and clean energy to local population is a technical challenge with a strong social impact as cheaper, available and green energy is one of the basic brick for economic development. All the sites will experience an almost complete substitution of fossil fuels (with some of them reaching zero need for fossil fuel).



# Demos' Locations

**Demo Spain**



**Demo Norway**



**Demo Greece**



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## DEMO SPAIN

**Gran Canaria** (Canary Islands, Spain)

- Isolated micro-grid application
- Integration of RES with BESS/H2;
- 24/7 Industrial loads for milking and cooling facilities in a farm;
- P2P system integration: Inycom and ITC.
- End-user: Grupo Capisa



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## DEMO GREECE

**Agkistro** (Greece)

- Isolated micro-grid, outback isolated area;
- RES based on hydro generators;
- Industrial loads available on-site;
- P2P system manufacturer: Engie EPS;
- End-user: Horizon S.A., owner of the hydro plant.

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## DEMO NORWAY

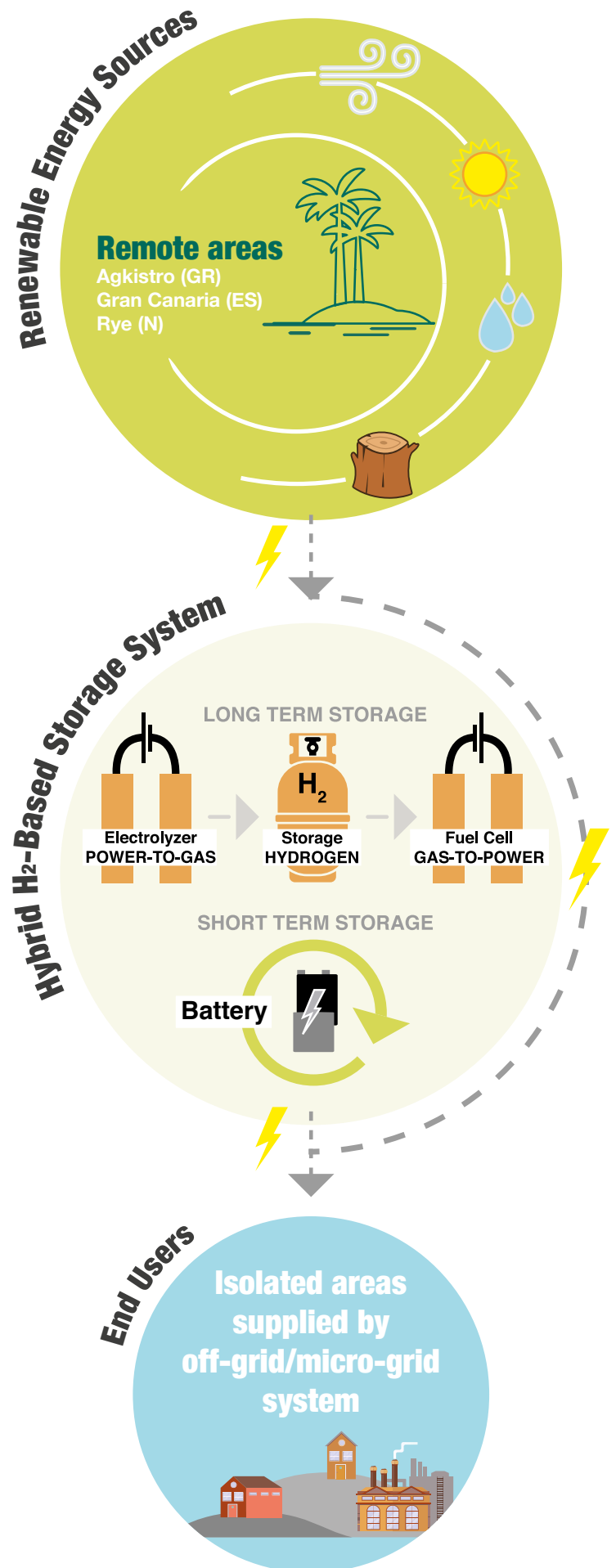
**Rye** (Norway)

- Isolated micro-grid application;
- RES based on hybrid system with PV + Wind generators;
- Residential loads + fish industry available on-site;
- P2P system manufacturer: Ballard Power Systems Europe, Hydrogenics Europe, Powidian
- End-user: Trønder Energi, utility.



## + The process

Remote area Energy supply with Multiple Options for integrated hydrogen-based Technologies - is a 4-year project (2018-2021) with a budget of EUR 6.76 million, granted EUR 4.99 million under the EU's Horizon 2020 programme.





## **+ PARTNERS**

The project coordinated by Politecnico di Torino (IT) has the following partners: Ballard Power Systems Europe (DK), Hydrogenics Europe (BE), Powidian (FR), Orizwn (GR), Tronderenergi (N), SINTEF (N), Engie EPS (IT), CERTH - Ethniko Kentro Erevnas Kai Technologikis Anaptyxis (GR), Inycom (ES), Instituto Tecnológico de Canarias (ES), Grupo Capisa (ES).

## **official website**

<https://www.remote-euproject.eu/>

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