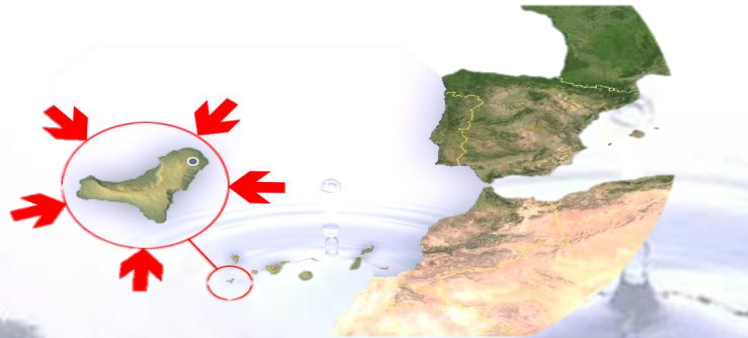




EL HIERRO WIND-PUMPED HYDRO POWER STATION

Island self-sufficient in water and energy



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cmorales@goronadelviento.es



1. Who we are?

2. What have we done?

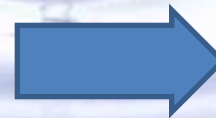
3. What can we contribute?

4. How can we work together?

Fortunate Islands



Problem



An Opportunity



El Hierro, the smallest of the Canary Islands



Outermost region and double insularity.



Total external energy Dependence

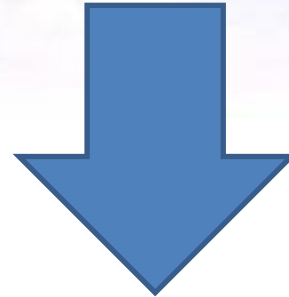
278 Km2. 10.000 inhabitants.

**Electric load (2014): 38.688
MWh/y**





Socioeconomic conditions



Wind-Pumped Hydro Power Station



Socio-economic benefits



Canary Islands





El Hierro





World Biosphere Reserve (since 2000)





Sustainable Development Program (1997)



2. What have we done?



Sustainability Plan

- Sustainable tourism.
- Agriculture, Livestock and Fisheries.
- Job creation.
- Waste management.
- Trade and Industry.
- Sustainability Laboratory.
- El Hierro 100% RES.



WATER

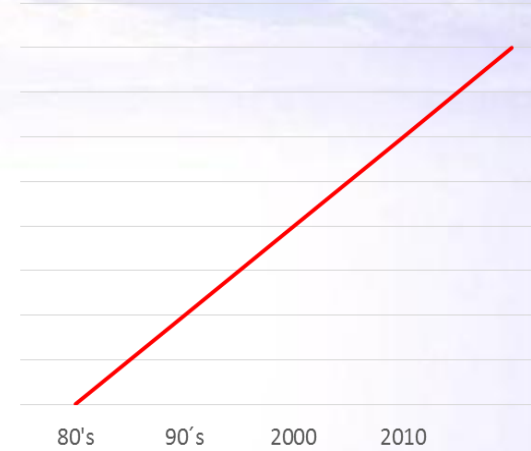
CONNECTION

ENERGY

El Hierro 100% RES.



ENERGY DEMAND



45%

700 million people lack access to safe drinking water





WATER

ENERGY

INDUSTRY

**SUSTAINABLE
MOBILITY**

EL HIERRO 100% RES

3. What can we contribute?

Island Strategy for Energy Self-Sufficiency.

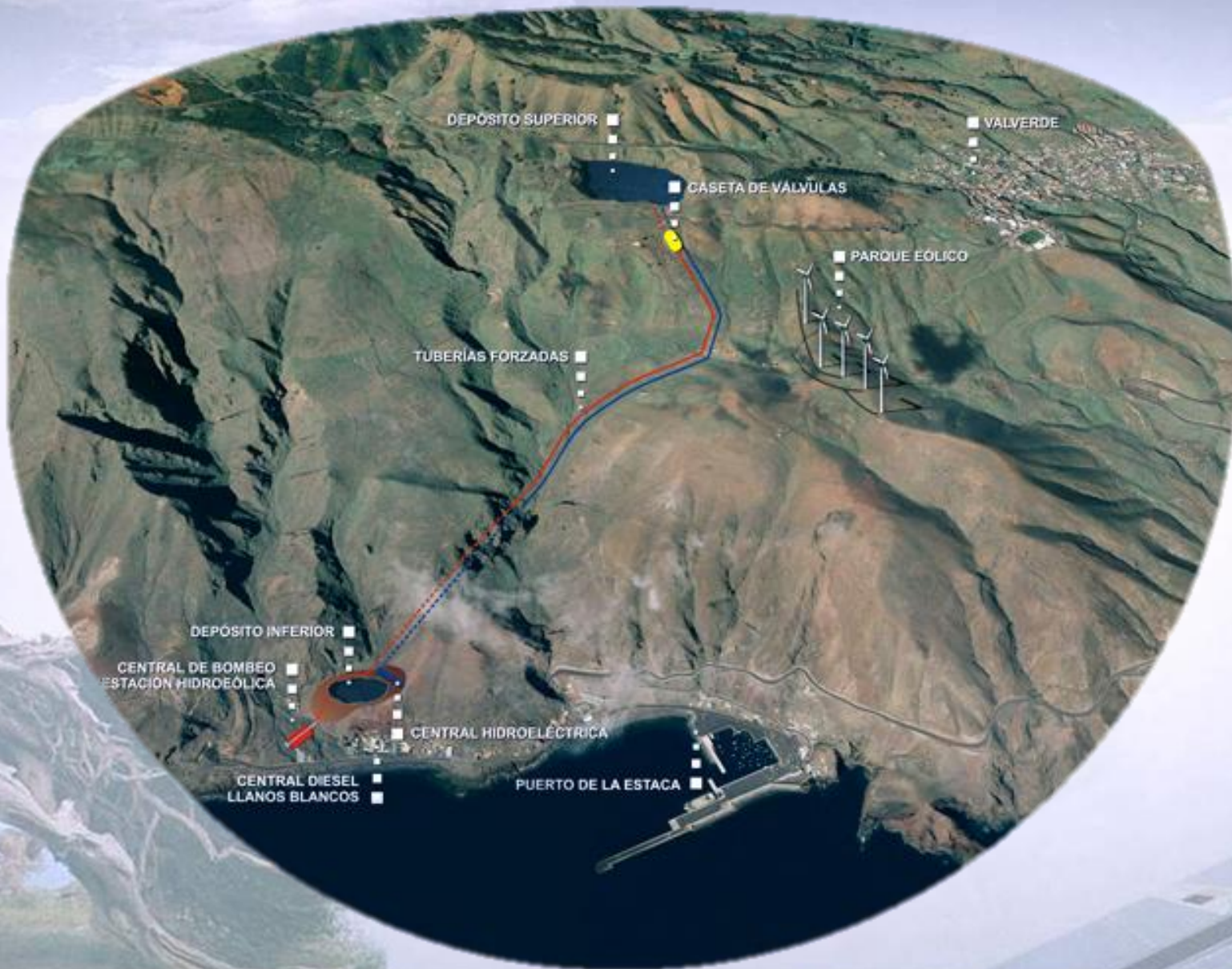


Gorona del Viento El Hierro, S.A.



The Wind-Pumped Hydro Power Station

An innovative Project for island's energy self-efficiency



Wind Farm

Potencia del parque :
11,5 MW



Enercon E-70 2,3 MW.

Upper Reservoir



Lower Reservoir



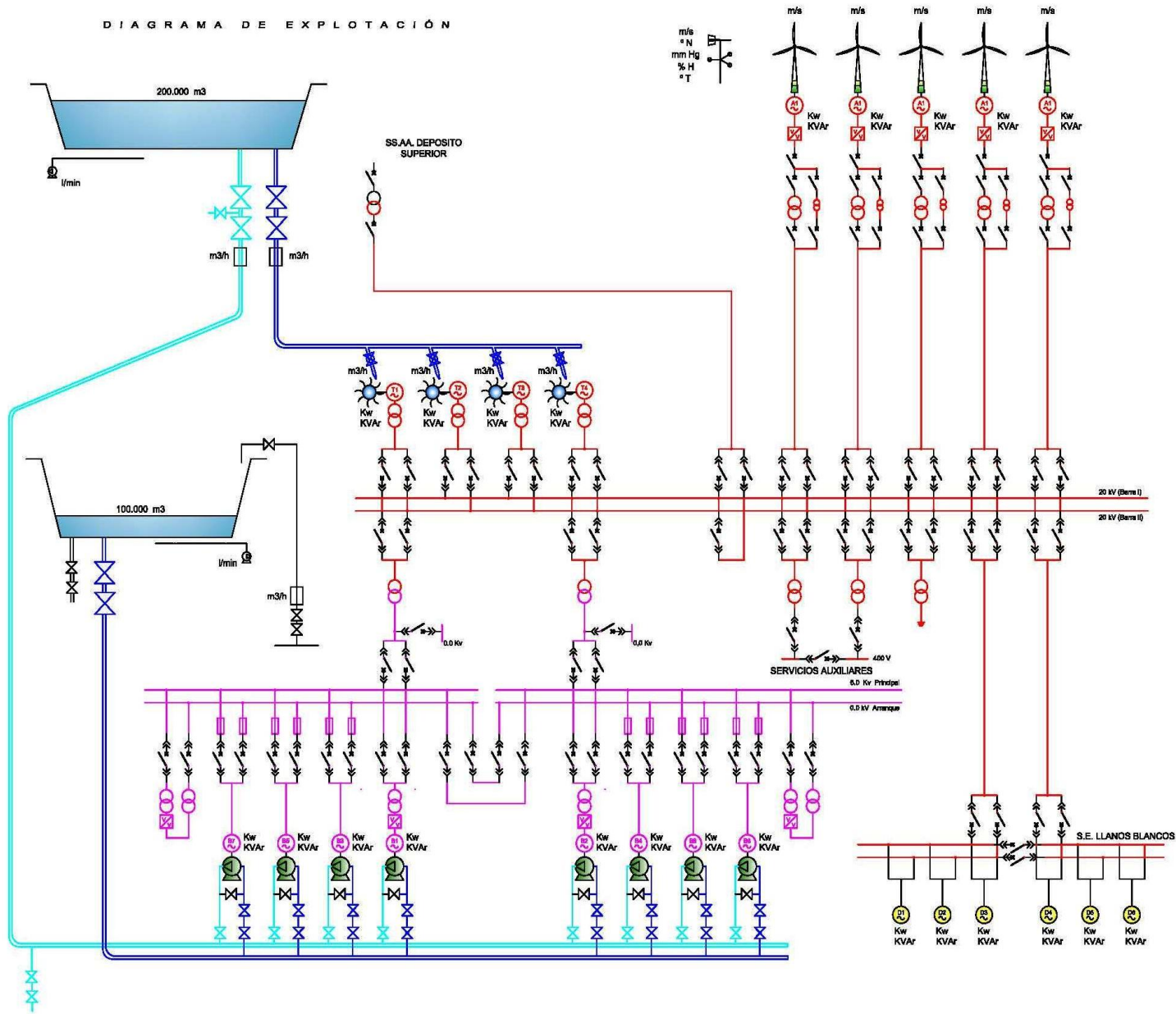
Hydraulic Station



Pump Station



DIAGRAMA DE EXPLOTACIÓN

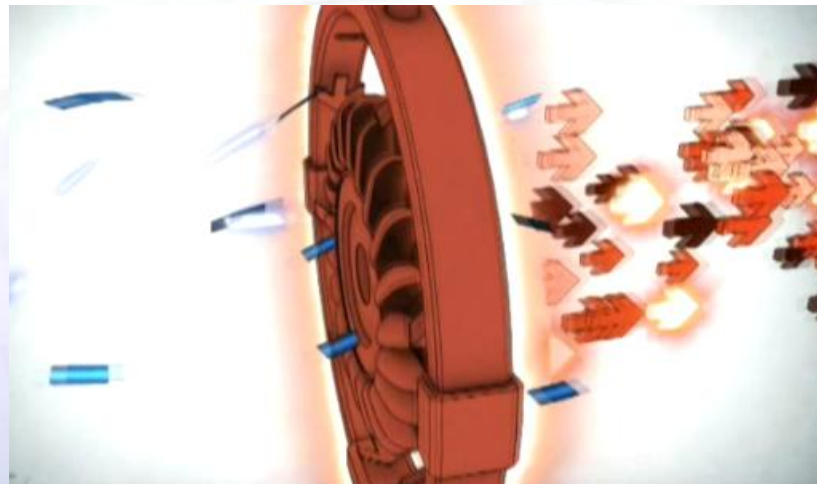


m/s
° N
mm Hg
% H
° T



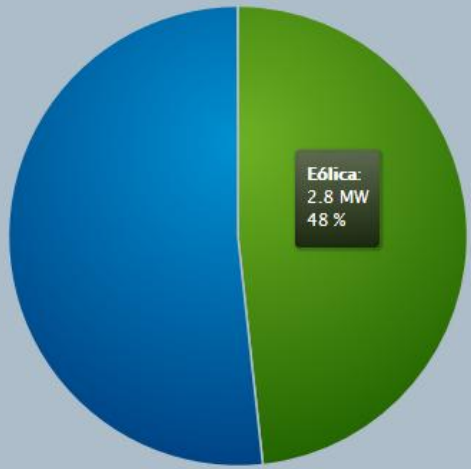
PROJECT REQUIREMENTS

- **Small electrical grid with greater stability risk.** Need to scale the facilities in order to guarantee running stability and security.
- **Need to develop a reliable wind prediction system to harness this highly variable resource.**
- **Need to integrate different types of wind-hydraulic-diesel generation** and to develop innovating management and control systems. In prolonged low wind conditions or during serious breakdowns of the hydro-wind system, need for emergency diesel generators.
- **Additional investment** is necessary for the construction of storage and pipeline depots.

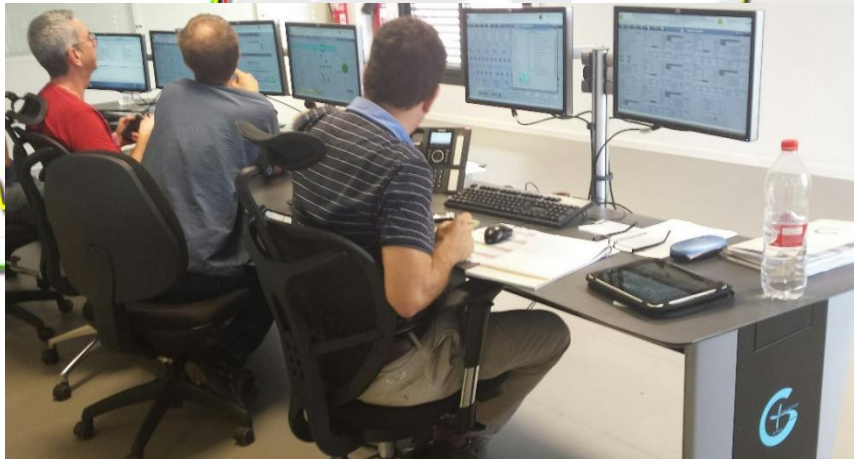




Estructura de generación



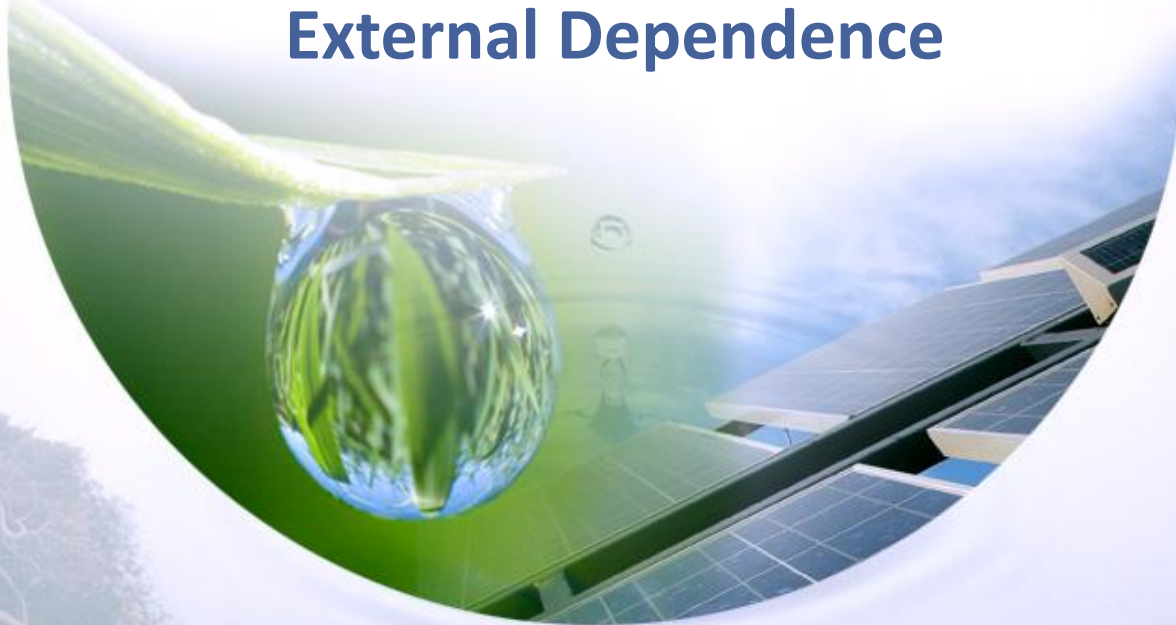
RED
ELÉCTRICA
DE ESPAÑA



Operating Outline

Objectives

To Obtain Environmental Benefits and Reduced External Dependence



Operating Outline

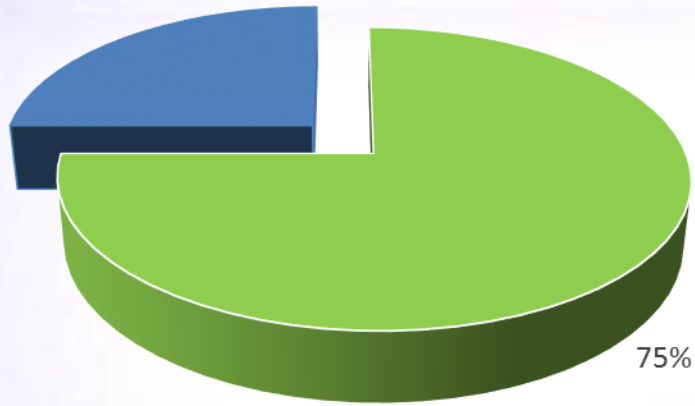
Objectives

**To supply the island with
power and water**



PROJECT STRENGTHS

- **Electricity and water self-sufficiency on the island. Reduction of power vulnerability.**
- **Power generation with greater dependency on renewable energy sources. Greater implementation of wind power.**
- **Reduction of CO2 and contaminant emissions.**
- **Use of facilities to dispose of elevated water resources (supply, irrigation, fire extinguishment).**
- **Reduction of costs with respect to diesel generation on El Hierro.**



■ Hidroeléctrica ■ Diesel



3.048 h. equivalentes
13Gwh Excedente eólico

FUTURE



FUTURE



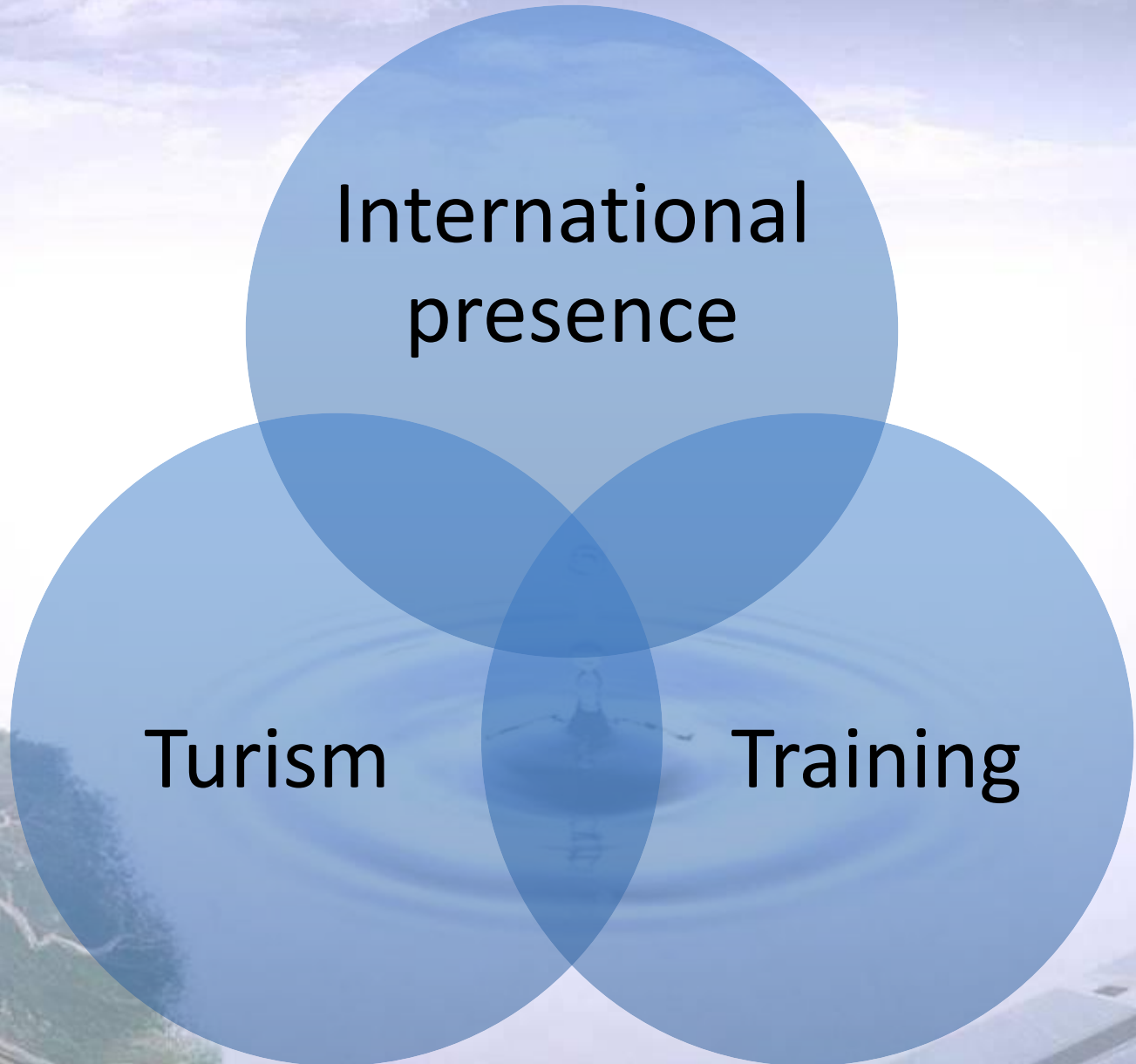
STORED WATER AT HIGH ALTITUDES



El Hierro, the perfect setting.
A project that can be
**extrapolated to other
territories**



- other opportunities



NOW...

Scientific tourism



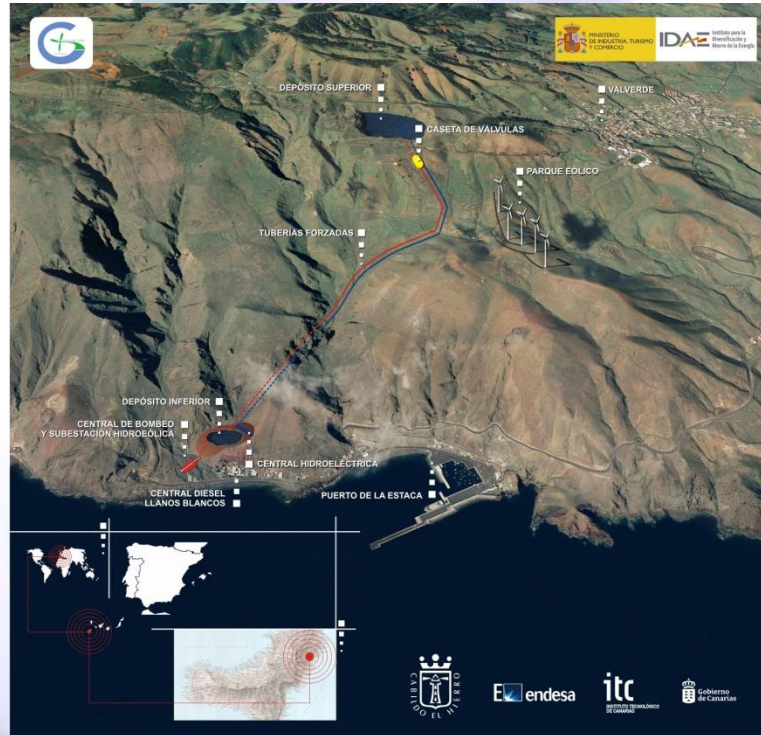
Training

Media broadcast





Corona del Viento
El Hierro S.A.





4. How can we work together?

OBRIGADO

THANK YOU
VERY MUCH

