

Energy Efficiency Project with renewable energy sources

LNG Terminal in Huelva

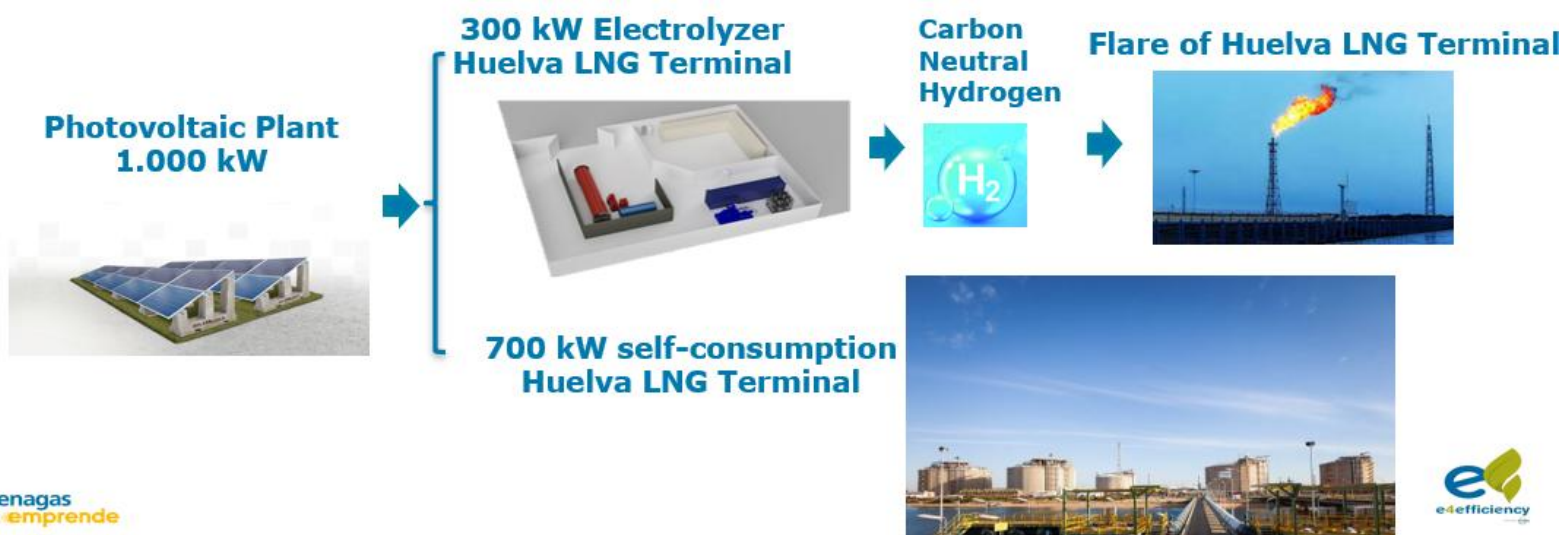


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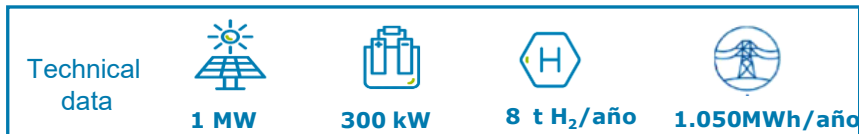
1. Scope and purpose

- The Effisolar facility, owned by Scale Green Energy (SGE), a 100% Enagás subsidiary, is located within the Enagás Huelva Regasification Plant and contributes to energy efficiency and decarbonization of the site through:
 - Photovoltaic energy supply for electrical self-consumption, using 100% renewable energy.
 - Renewable hydrogen production to supply the flare pilot flame, replacing the natural gas traditionally used.



1. Scope and purpose

▪ Main technical features:



○ The photovoltaic plant, built in 2024 by EIDF and already in operation, consists of:

- 1,856 PV panels of 540 Wp each
- Installed peak power: 1 MWp
- Expected annual generation: 1,500 MWh
 - 450 MWh/year consumed by the electrolyser
 - 1,050 MWh/year used as self-consumption in the regasification plant



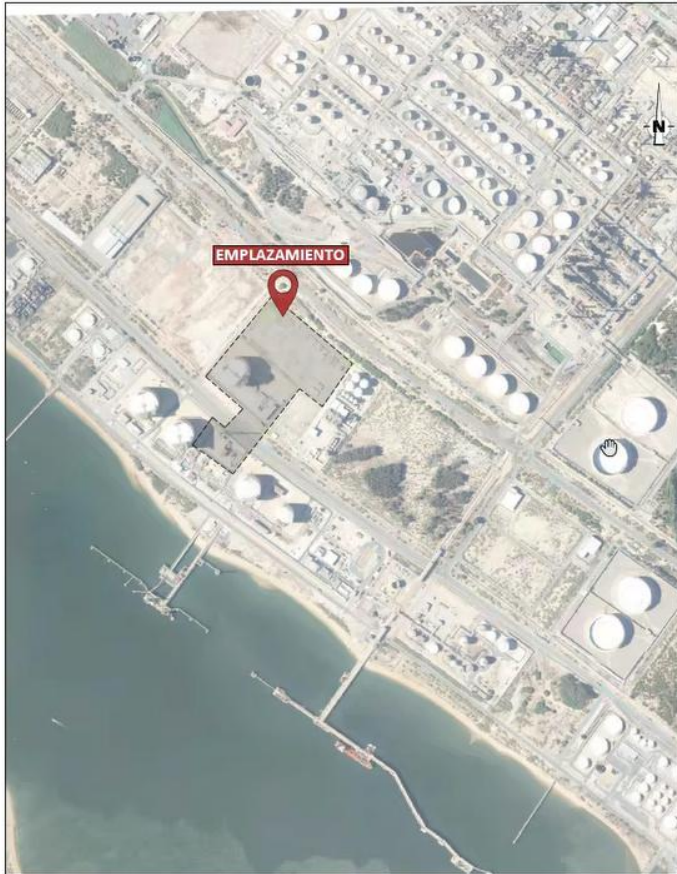
○ The electrolyser, built in 2024 by Ohmium:

- 300 kW nominal power
- Renewable hydrogen production capacity up to 6 kg/h
- Estimated average flow rate: 0.9 kg/h Equivalent to 8 tonnes of H₂ per year
- Estimated CO₂ emissions reduction: 420 tCO₂eq per year, approximately one third of current plant emissions

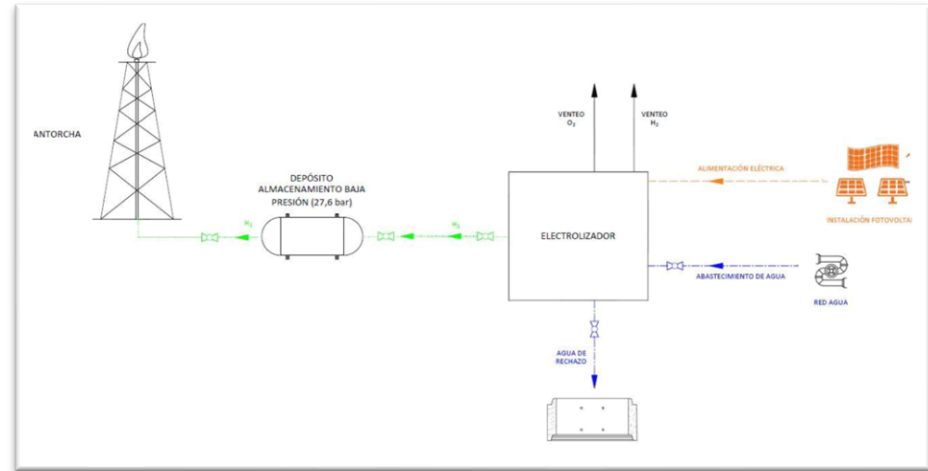


○ In parallel, Enagás has implemented the modification of the flare pilot system to enable operation with hydrogen.

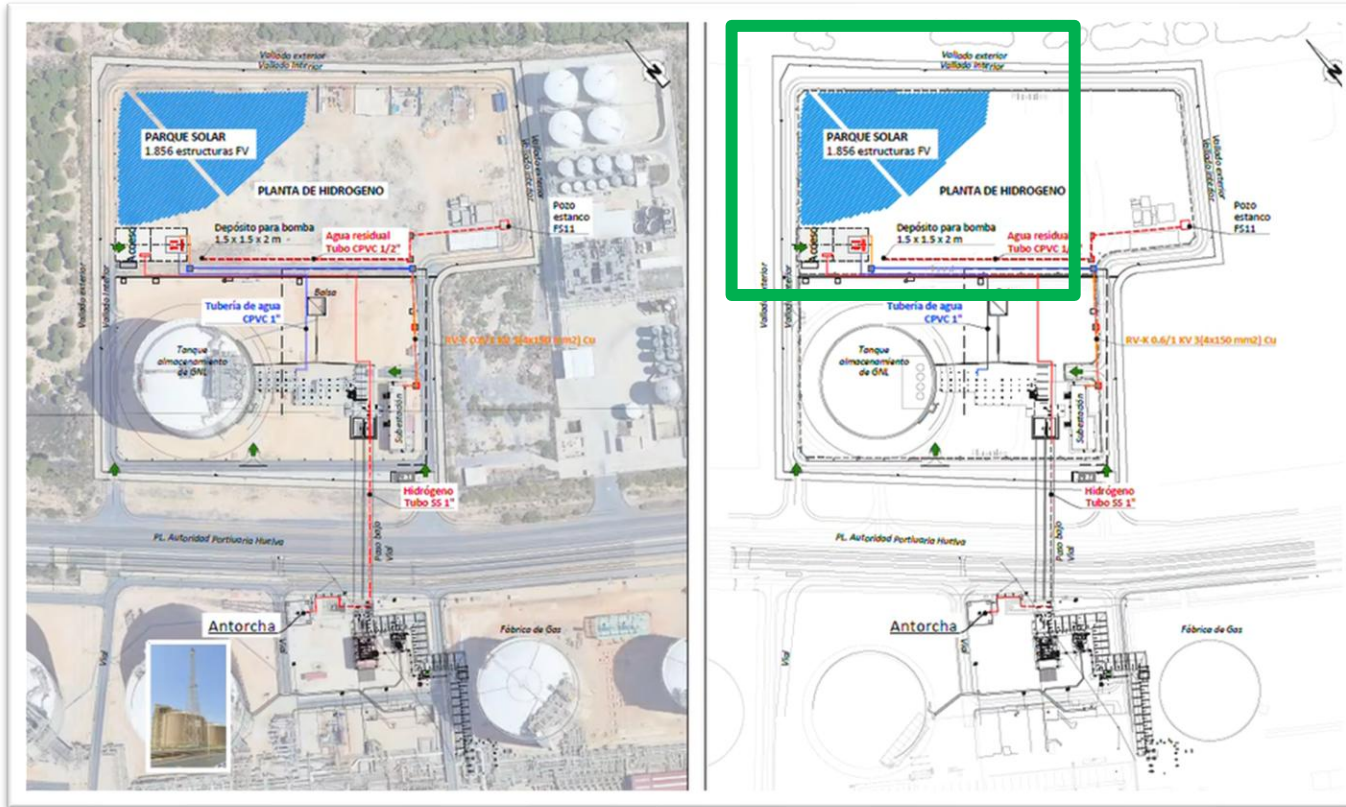
2. Effisolar Plant Location



- **Location:** Northern plot, Zone of the 5th tank, Huelva Regasification Plant.
- **Plot owned by Enagás located outside the port concession area.**



3. Effisolar installation and flare – General view



Instalación
Effisolar

4. Photovoltaic Plant Technical Specifications

▪ Módulos fotovoltaicos:



- ✓ 1856 paneles en total.
- ✓ 540 Wp de Potencia individual.
- ✓ 25° de inclinación.

Especificaciones generales					
Fabricante:		Longi Solar			
Modelo:		LR5-72HBD-540M			
Tipo de célula		Monocristalina			
Rendimiento del módulo		21,3 %			
Especificaciones eléctricas					
Tensión máx. del sistema(V)	1.500,00	Potencia máxima (Wp):	540		
Corriente de cortocircuito (A):	13,85	Tensión a circuito abierto (V):	49,50		
Corriente a máx. potencia (A):	12,97	Tensión a máx. potencia (V):	41,65		
Características constructivas					
Alto (mm):	2.256,00	Ancho (mm):	1.133,00	Espesor (mm):	35,00
Peso (kg)	32,30	Coe. V %/C	-0,284	Coe. I %/C	0,050

▪ Inversores:



- ✓ 8 inversores en total.
- ✓ 110 kW de potencia individual.
- ✓ 1,726,093 kWh de generación anual esperada.

Especificaciones generales			
Fabricante:		SUNGROW	
Modelo:		SG110CX	
Especificaciones eléctricas			
Potencia Nominal (W):	100.000,00	Potencia máxima (W):	110.000,00
Tensión DC mínima (V):	200	Tensión DC máxima (V):	1.100
Tensión AC nominal (V):	400	Factor de potencia	0,80ind...0,80cap
Rendimiento (%)	98,7	Tipo de salida	TRIFÁSICA
Características constructivas			
Largo (mm):	1.051,00	Ancho (mm):	660,00
		Alto (mm):	362,50
Peso (Kg):	85,00		

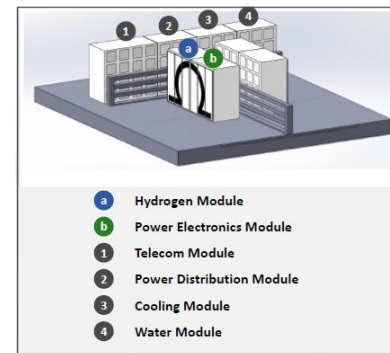
5. Electrolyser Technical Specifications

Lotus Mark I

Proton Exchange Membrane Electrolyzer

Model	Mark I
Technology	PEM
Class (rating) - DC	300kW
Electrolyte	Proton Exchange Membrane
Stack Operating Temperature	max of 85°C
Hydrogen Net Production Rate*	6.00 kg/hr
Inlet Water **	2.7LPM (normal)
Inlet water pressure	30psi
Rejected Water	1.3 LPM
HYDROGEN PRODUCTION	
Efficiency	Project specific *** Media tipo PEM: 50kWh/kg h2
Delivery Pressure	Nominal 27.6 bar (400psi)
Purity of hydrogen	>= 99.99% (with < 5ppm of O2)
Start-Up Time (from Off State)	10mins
Ramp-Up Time (Minimum to Full Load)	5secs
Turn down ratio	10:1
Upgradeability/ Scalability	Upgradeable in 6.00 kg/hr of H2 increments
Moisture Content	-72 C dewpoint at atmospheric pressure
DI WATER REQUIREMENT	
Consumption Rate at Electrolyzer @ Maximum Production	1.1 LPM
Operating Temperature	80°C
Inlet Water Quality	less than 2microSiemens / cm
HEAT LOAD AND COOLANT REQUIREMENT	
Coolant	Liquid cooled (Glycol - Water mixture)
ELECTRICAL SPECIFICATIONS	
Electrical requirements	480 VAC/415 VAC, 60Hz / 50Hz, 3 phase
Power Quality	Compliant to IEC/EN61000
Conducted & Radiated Emission	Compliant to EN55011
Maximum Power Required within Expected System Life	431kVA

INTERFACE CONNECTIONS		
H2 Product Port	0.75in	
O2 & H2 Vent Port	Diluted in Plenum	
Inlet water line diameter	1in	
Drain Port (rejected water)	0.5in	
Electrical	3phase 4wire or 5wire	
Communications	CAN	
Data Acquisition and Control System		
Compatibility	Standard SCADA	
Interface	TCP/IP, RS485	
PHYSICAL CHARACTERISTICS		
System includes Rectifiers, AC Distribution and DC/DC to generate 6Kg/hr hydrogen.		
	Size (LxWxH)	Weight (each)
Water cabinet	72in x 51in x 87in	1790 kg
Cooling cabinet	72in x 51in x 87in	1520 kg
Hydrogen cabinet	72in x 51in x 87in	2078 kg
Power Cabinet	72in x 51in x 87in	1810 kg
Distribution Panel	72n x 33in x 87in	1047 kg
Telemetric Cabinet	32in x 35in x 84in	505 kg
ENVIRONMENTAL CONSIDERATIONS		
Ingress Protection	Equivalent to 33	
Standard Siting Location	Outdoor Depending on soil condition, concrete pad or gravel is recommended	
Storage/Transport Temperature	-30C to +55C	
Ambient Temperature Range	-30C to +55C	
Altitude Range-Sea Level	Up to 2000m (will degrade beyond 2000m)	
SAFETY AND REGULATORY CONFORMITY		
Noise dB(A) at 1 Meter	75 dBA at 1m	
Conformity	Designed to UL 2264A (UL CCN NCBR) Installed per NFPA 2	



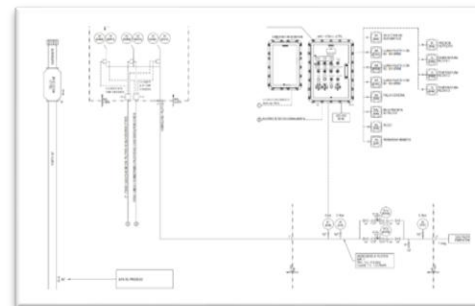
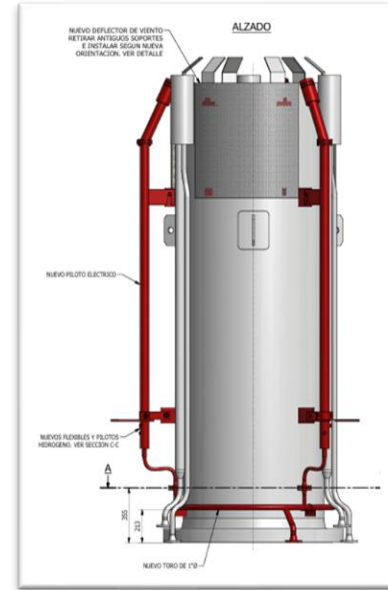
6. Flare System Modification

Modification of the existing flare burner

- Main activities:
 - Installation of a hydrogen supply line from the electrolyser to the flare(2" pipeline, Class 150).
 - Installation of a hydrogen regulation skid and control panel.
 - Flare burner modification:
 - Installation of three hydrogen pilot burners in the existing flare.
 - The natural gas system is retained as a back-up.

Operating conditions

- Hydrogen flow rate: 7.5 – 13.5 Nm³/h
- Hydrogen pressure: 0.2 – 0.5 barg



7. Photographs of the constructed facilities



Thanks

