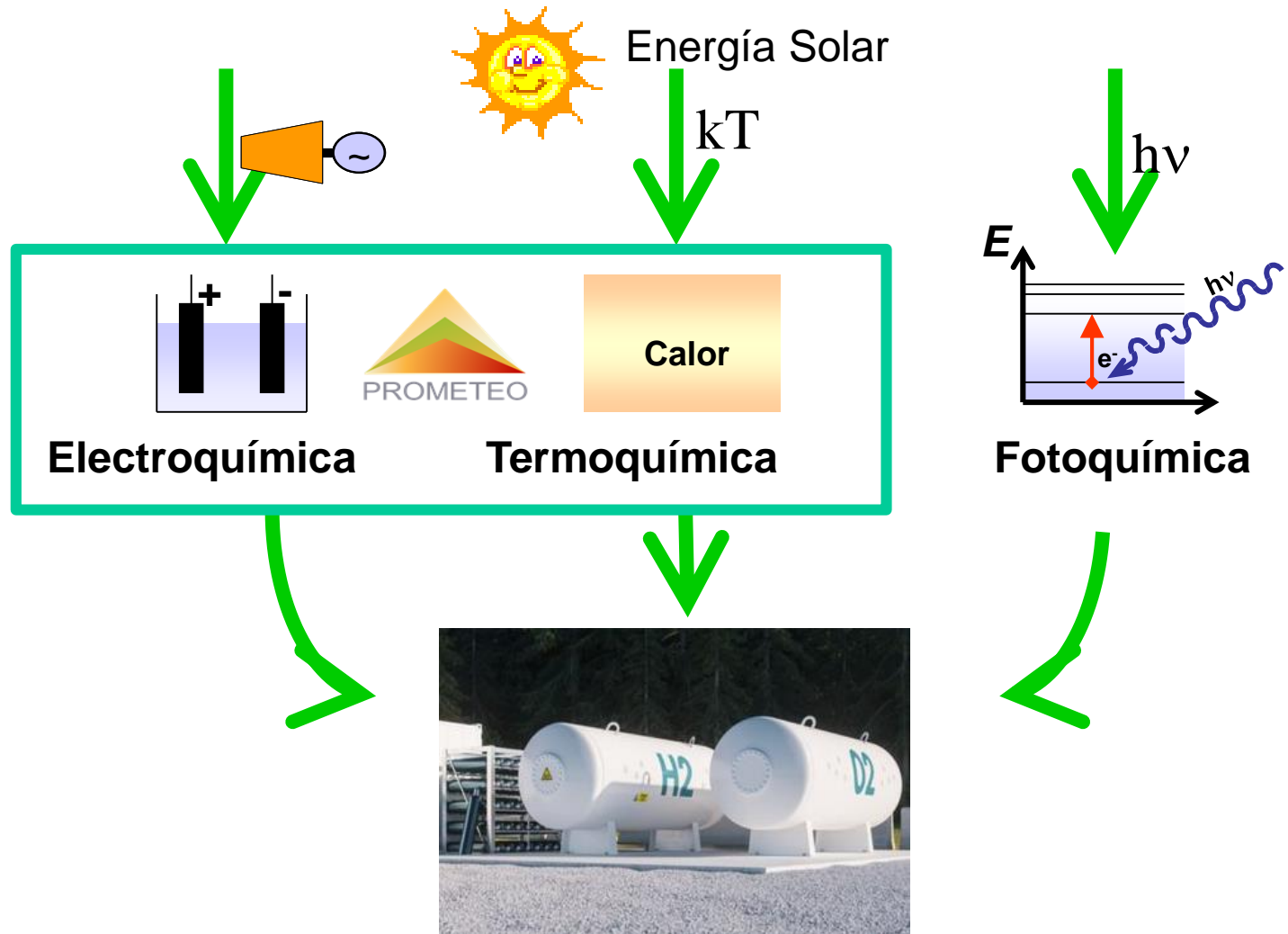


**HYDROGEN
PRODUCTION BY
MEANS OF SOLAR
HEAT AND POWER
IN HIGH
TEMPERATURE
SOLID OXIDE
ELECTROLYSERS**

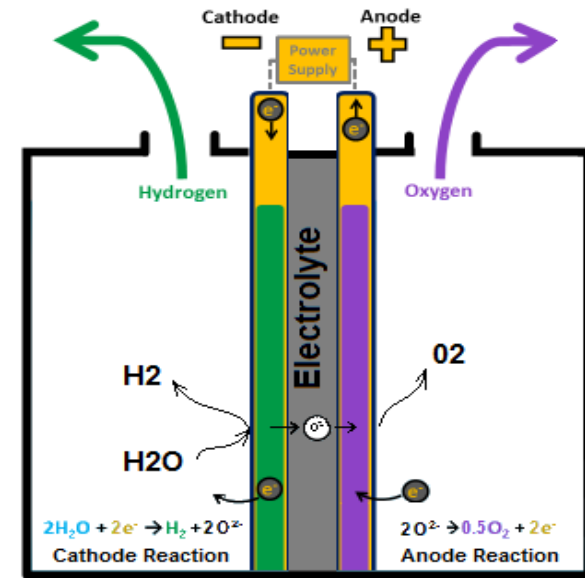
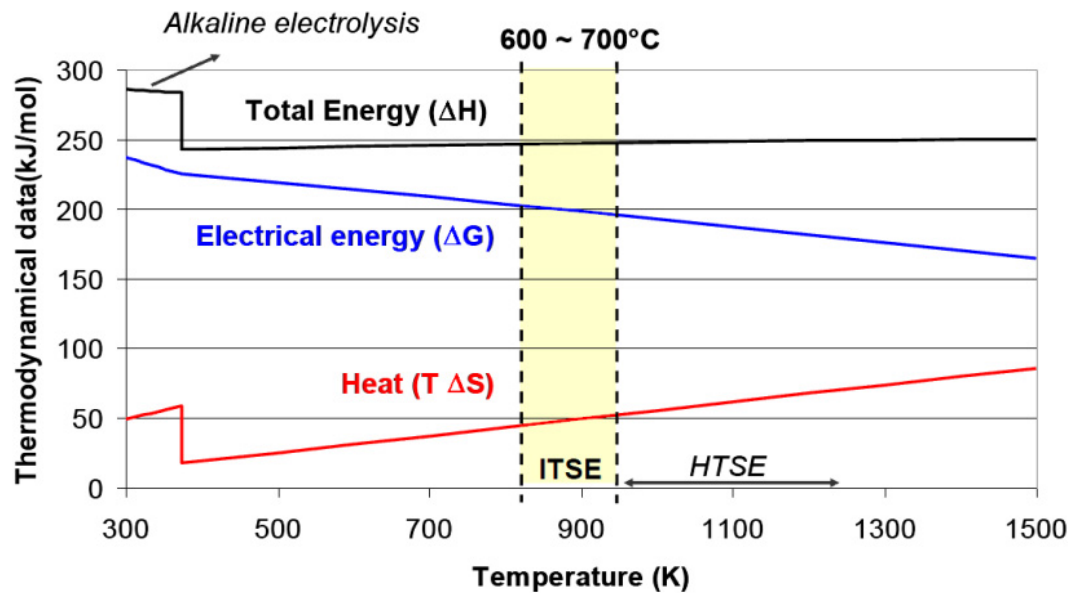
**JANUARY 2021 –
JUNE 2024**

FUNDING 2.5 M€

PROMETEO: Ruta híbrida

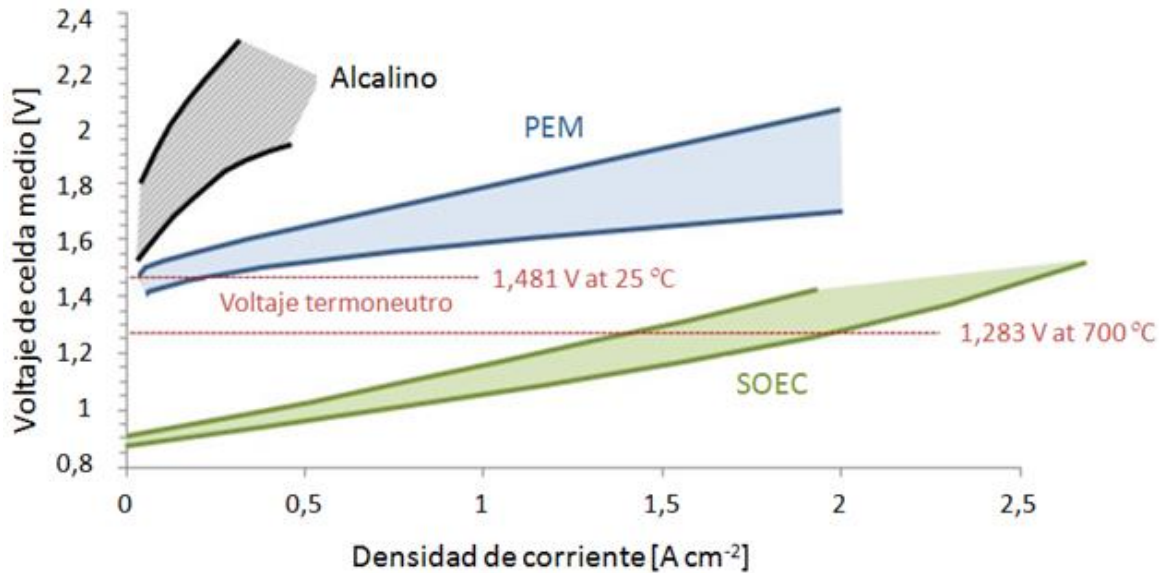


PRODUCCIÓN DE HIDRÓGENO CON GRAN EFICIENCIA: ELECTRÓLISIS A ALTA TEMPERATURA (600-700 °C)



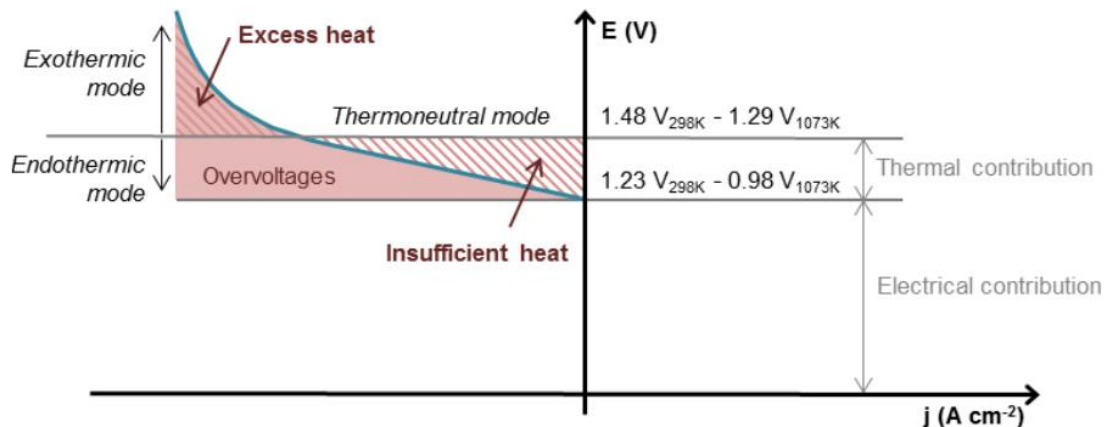
Celda de Óxido Sólido (SOEC),
operando en modo electrólisis

Operación en modo termoneutro

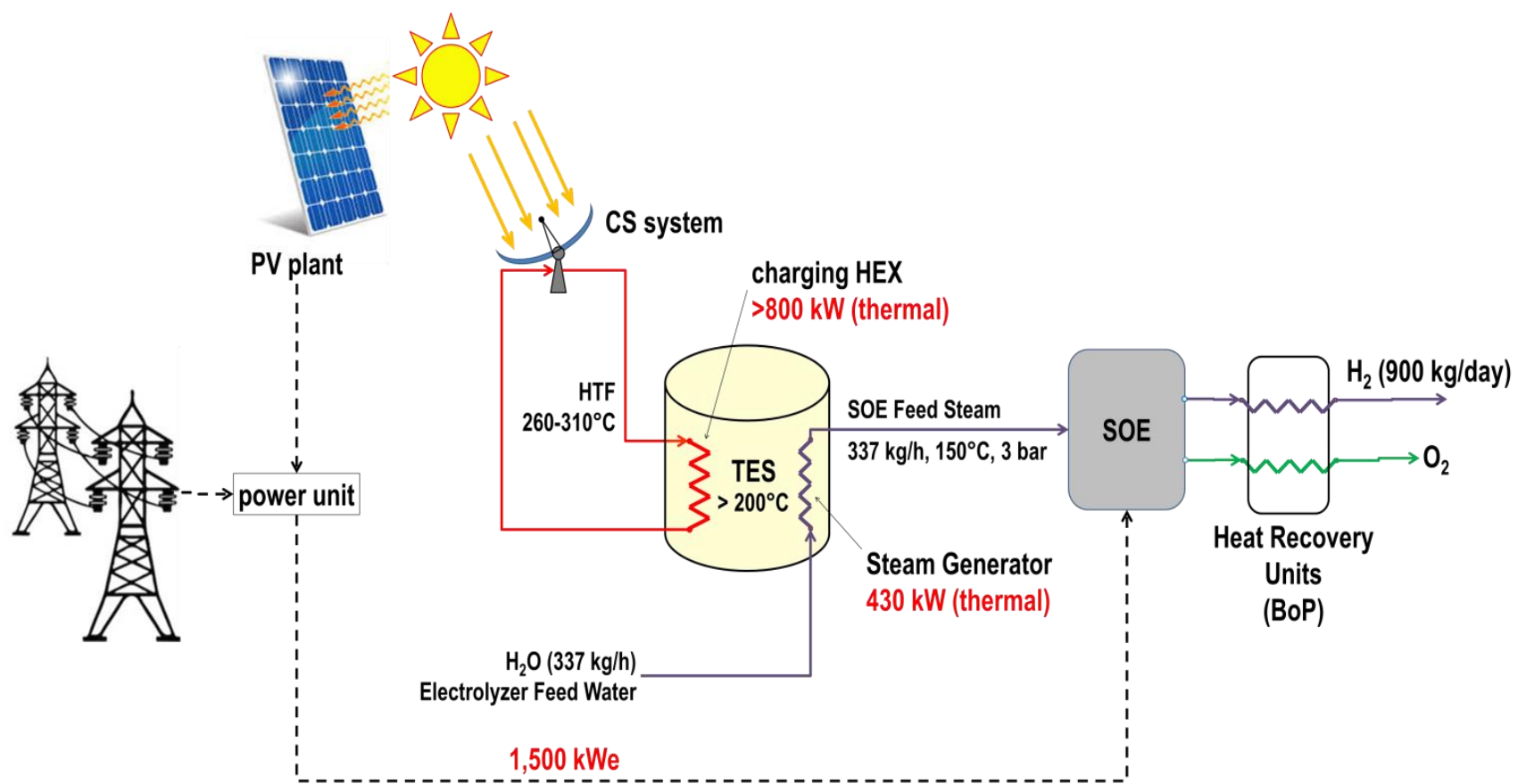


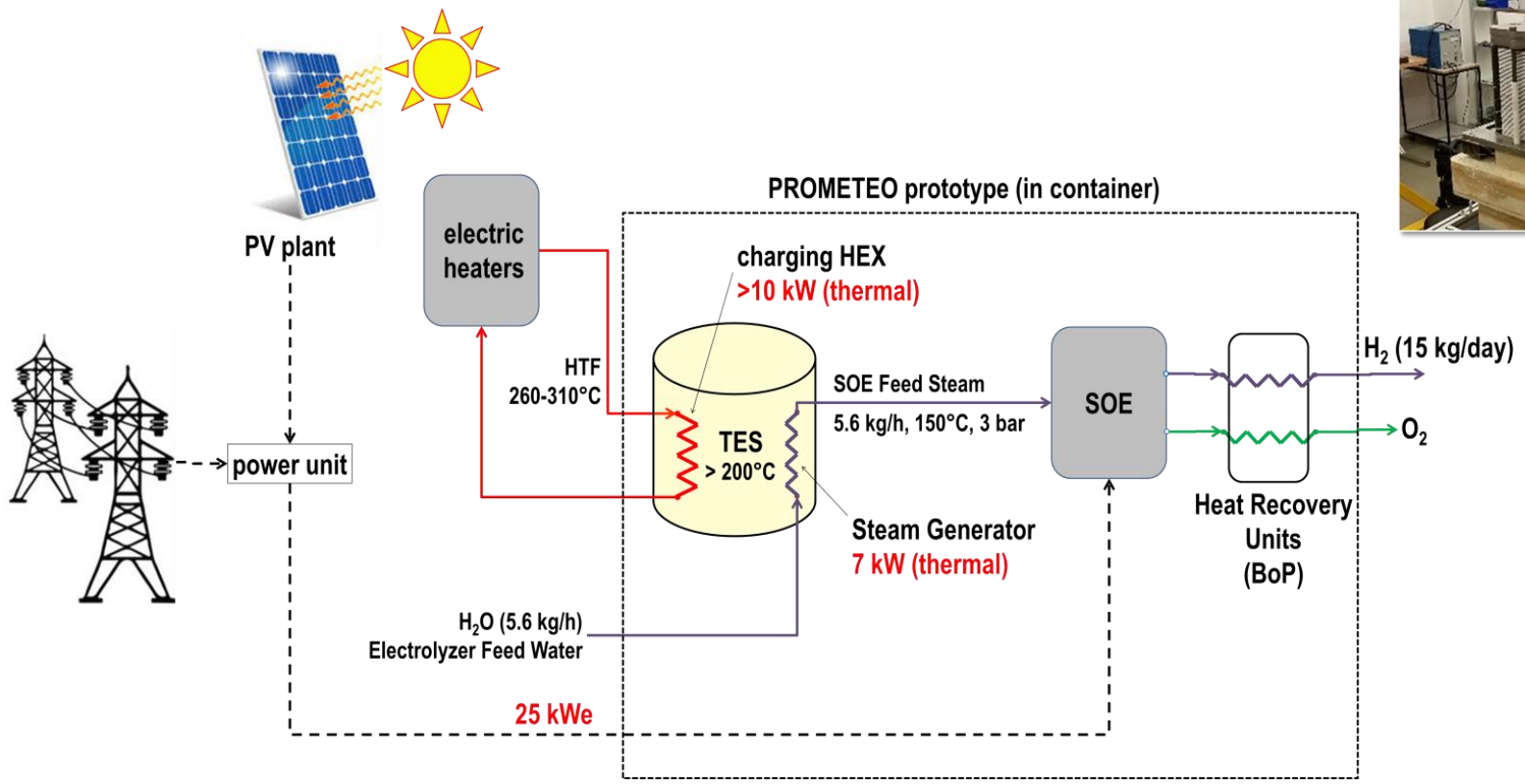
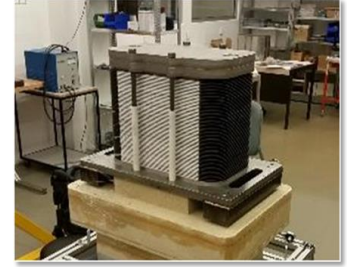
Curvas típicas de polarización para electrolizadores alcalinos, PEM y SOEC

Consumo eléctrico específico de 3,5 kWh/ Nm^3 (SOEC) comparado con 4,8-5,5 (alcalino) y 5-7 kWh/ Nm^3 PEM.



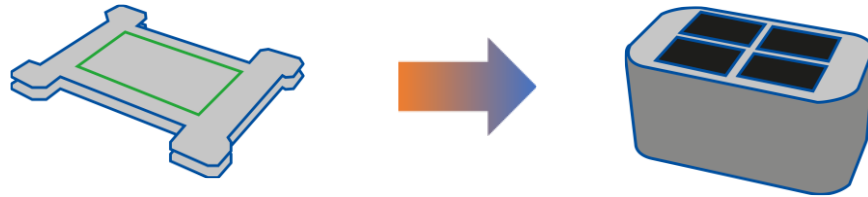
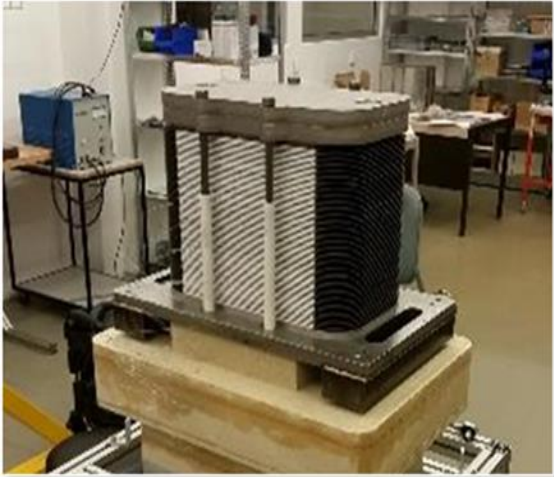
Process concept scheme





Experimental setup to be tested at Capital Energy's PV plant premises in Spain

Especificaciones del SOE StackBox usado en el Proyecto PROMETEO.



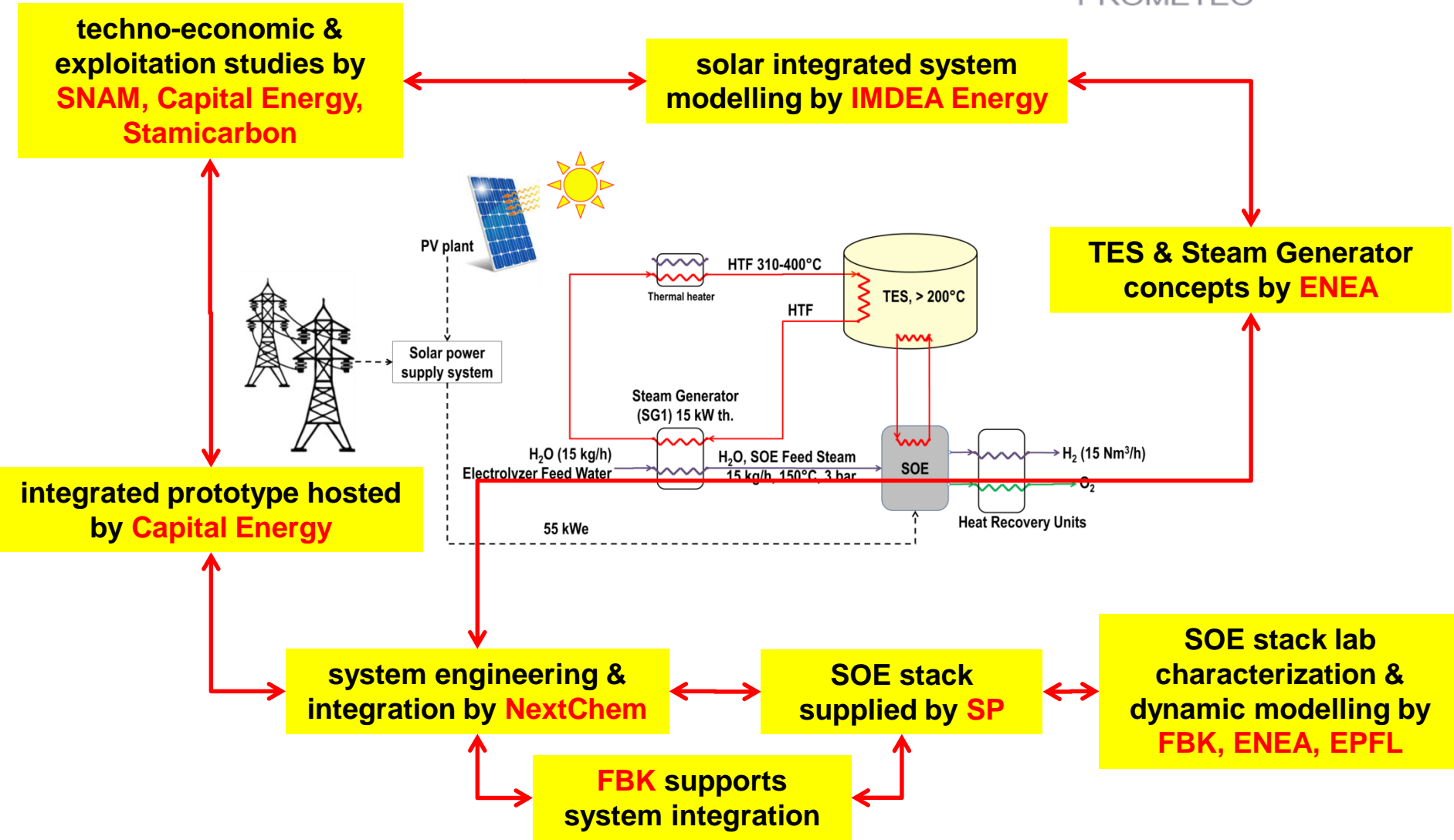
Cambio de escala del stack SOE desde el actual estado del arte (80 cm²) hasta 320 cm² usando cuatro celdas por capa.

DC consume eléctrico [kWe]	25
Producción neta H₂ [kg/day]	15
Temperatura gas entrada	700-750° C
Temperatura gas salida	680-800° C
Alimentación vapor [NI/min]	200
Entrada H₂ [NI/min]	20
Gas de arrastre [NI/min]	400

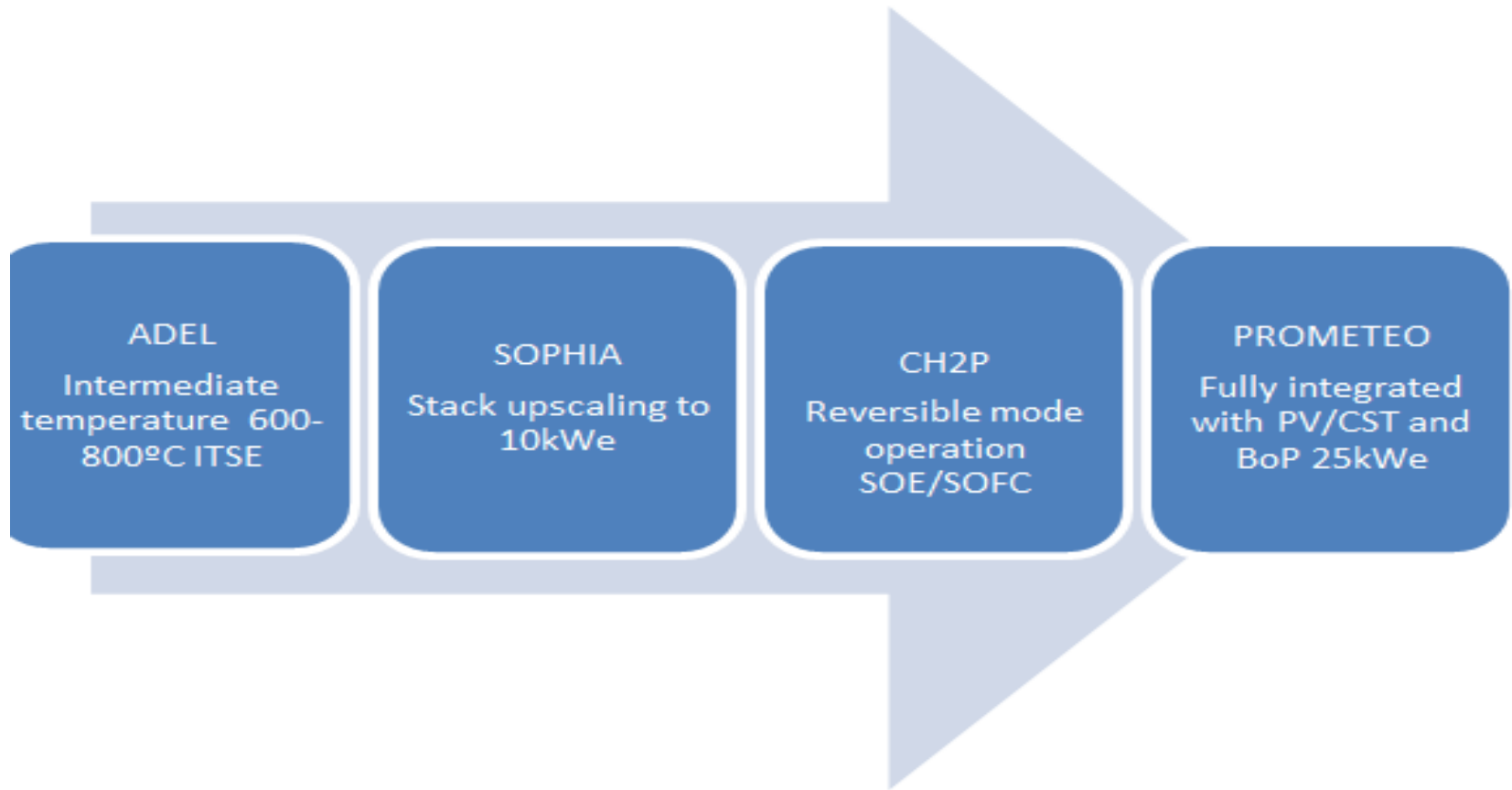


- The project will develop an innovative prototype based on high-temperature solid oxide electrolysis (SOE) for the production of green hydrogen by making the most efficient use of heat (CS+storage) and power (PV) generated from solar energy.
- PROMETEO will use the solid oxide technology to build a 25 kWe prototype electrolyser capable of producing 15 kg of hydrogen per day (85% LHV efficiency), that will be validated on a PV plant site more than 1,000 hours.
- PROMETEO will address the intermittent supply of solar energy by developing re-generation phases and the use of TES supplied by concentrating solar systems.
- Industrial end-users will steer the R&D activities to meet end-users' needs for green hydrogen in industrial applications: injection of hydrogen into the gas grid (SNAM, Italy), chemical storage of renewable electricity (Capital Energy, Spain) and use of hydrogen for ammonia and fertiliser production (Stamicarbon, the Netherlands).
- PROMETEO's consortium includes 1 SME technology manufacturer (SOLIDpower), 1 engineering firm (NextChem), 3 large companies in the energy and chemical sectors, and 4 leading academic/research organisations (ENEA, IMDEA Energy, FBK and EPFL).

Partners' main roles in project PROMETEO.

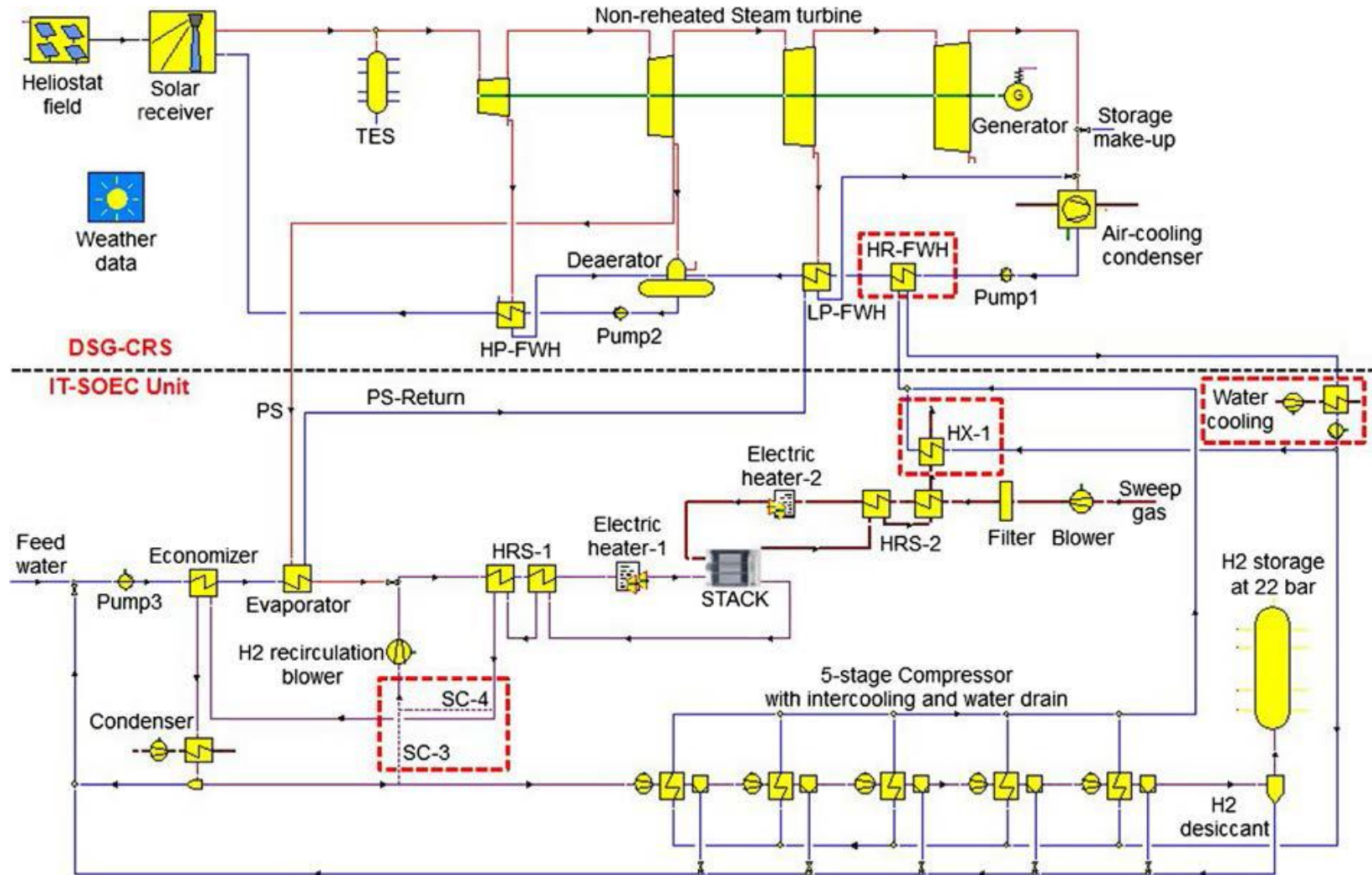


Innovation path reflecting the specific position of PROMETEO against previous projects

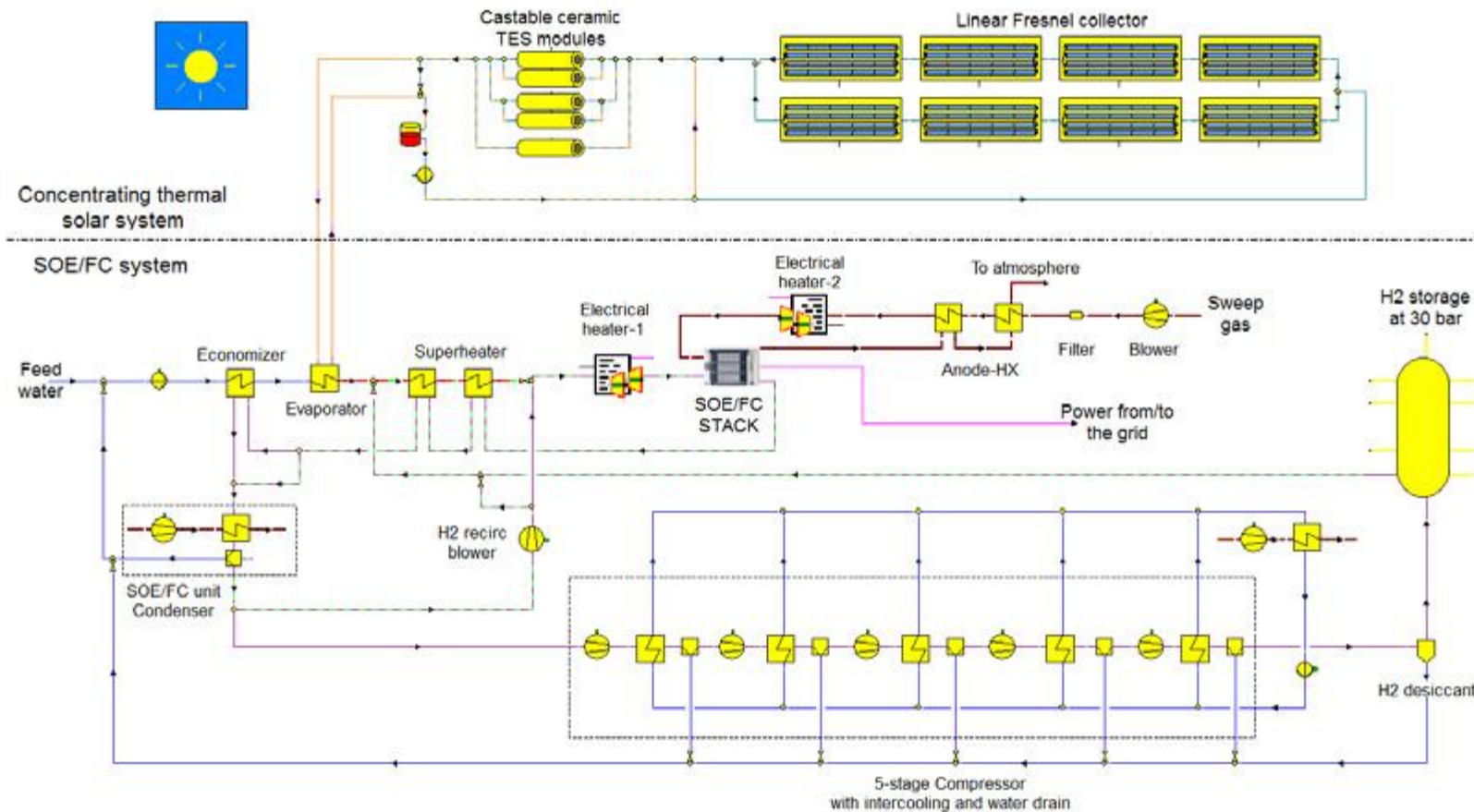


IMDEA Energía aporta al Proyecto PROMETEO, a través de su Unidad de Procesos de Alta Temperatura (UPAT), su experiencia y capacidades en sistemas de concentración solar y en hidrógeno solar:

- Selección de la solución óptima de instalación termosolar
- Selección del sistema de almacenamiento térmico para la generación del vapor.
- Simulación y análisis de integración de la electricidad y calor solar y de la recuperación de calor en el electrolizador SOE



10 MWe DSG-CRS flow sheet





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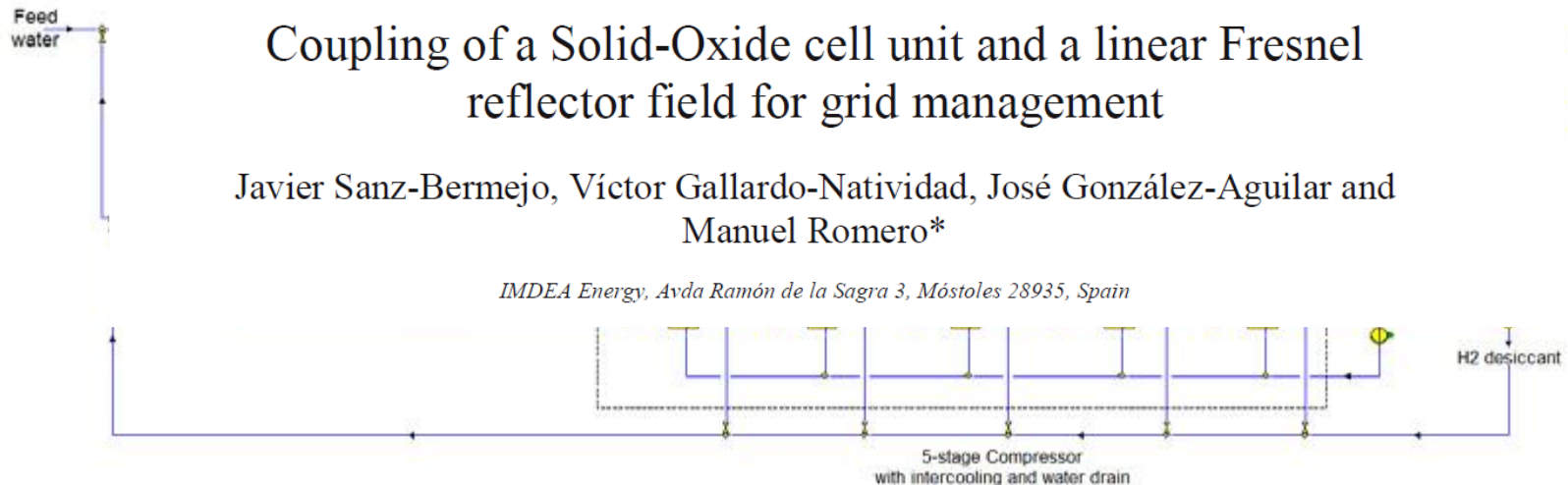
SOE/FC

2013 ISES Solar World Congress

Coupling of a Solid-Oxide cell unit and a linear Fresnel reflector field for grid management

Javier Sanz-Bermejo, Víctor Gallardo-Natividad, José González-Aguilar and Manuel Romero*

IMDEA Energy, Avda Ramón de la Sagra 3, Móstoles 28935, Spain

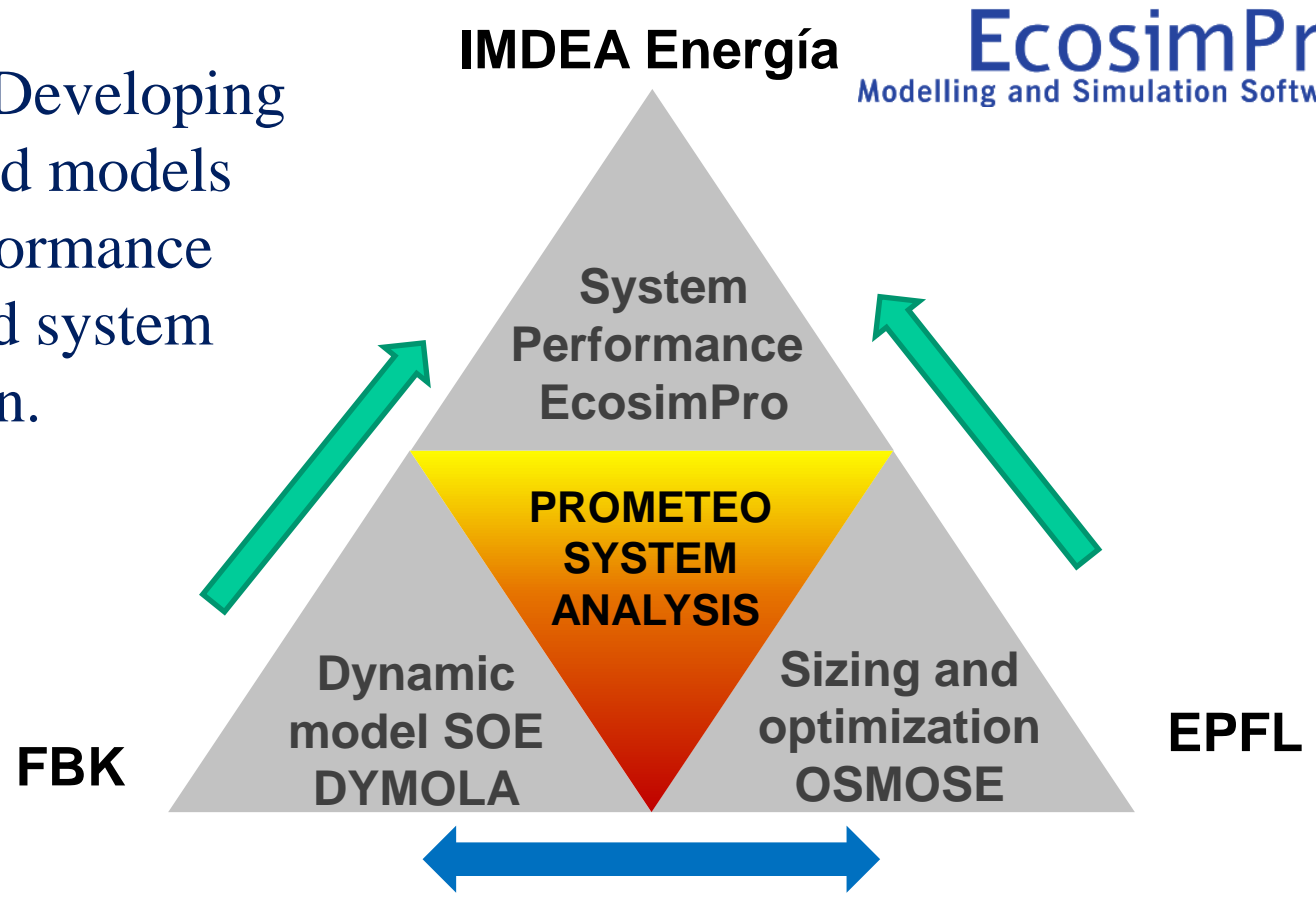




WP4 System Modelling: Leader IMDEA Energy

Objective: Developing the tools and models for the performance analysis and system optimisation.

IMDEA Energía



¡Muchas gracias por su atención!



UPAT: Unidad de Procesos de Alta Temperatura