HYBRIS

Enhanced Hybrid Storage Systems

Overall view of the project

Workshop on energy storage and its crucial role in the energy transition with focus on hybrid solutions

Presented by Mikel Borràs – Innovation PMO Manager at IDP

- 1st HYBRIS Workshop
- Horcynus Orca Foundation, 23rd June 2022

This project has received funding from the H2020 programme under Grant Agreement No. 963652

Project overview, vision and objectives

ACRONYMS

- **HESS:** Hybrid Energy Storage system.
- **ORFB:** Organic red flow battery
- **Li TO/LTO :** Lithium Titanite
- **DER**: Distributed energy resource.
- **BTM;** Behind- the-meter
- **FTM;** In Front the meter.
- **ABMS:** Advanced Battery management system.
- **C&I:** Commercial and Industrial
- **EMS:** Energy Management system
- **PMS:** Power management system
- **FCR:** Frequency Control Regulation

CONSORTIUM

15 partners from 6 countries

- **SPAIN: IDP**, IREC, HESStec, LOMARTOV, COMET
- **ITALY:** CNR, BDES, SAE
- **BELGIUM: ILECO,** QUARES,
- **NETHERLANDS:** 4YEF
- **SERBIA:** TH
- **FRANCE:** CEA, PWP, KEMI

11 SMEs, 1 LE, 3 RTOs.

HYBRIS
Enhanced Hybrid Storage Systems

H2020
G.A. 963652

Project overview, vision and objectives

GENERAL OBJECTIVES

•Development of **novel HESS by system twining approach**, integrating a set of breakthrough technology asserts including: the **optimization at battery level**, specifically based on **LTO** (High Power density component) and **ORFB** (High energy density components**, advanced battery management systems**, and smart and interoperable high level control enabling its integration with a several sets of **DER**, and the deployment of enhanced energy services for 3 use case applications

•Allow the advent of a **new generation of battery based hybrid energy storage system** coupled and integrated with **advanced high level and grid control**, enabling 3 use case applications in the microgrid context with high -impact and replication potential, while targeting **significant reduction on the main economics KPIs**

•Deploy and validate **new HESS enabled services in BTM and grid segments**, with respect 3 main use case applications, namely: individual residential communities and C&I buildings, and further clustering as **DER to deploy new services at microgrid scale (Up to 5 MW)**.

H2020
G.A. 963652

Project overview, vision and objectives

SPECIFIC TECHNICAL OBJECTIVES

•**STO 1: Battery hybridisation :** Develop and deploy a disruptive approach HESS by technical optimization of LTO and ORFB battery technologies towards the hybridisation a by twinning at system level of both (membrane, electrode, thermal management…)

•**STO 2: Advanced battery management and power electronics:** Advanced and robust BMS solution for HESS with diagnostic and prognostic abilities. Optimization of the maintenance by the HESS operator as accurate alarms and early warnings will be established by the ABMS. This will also be used by the EMS for optimal dispatch of the global power solicitation of the HESS as the ABMS will provide an updated performance/ageing model of each BESS

•**STO3: Optimal sizing, system integration and validation via digital twin (TH):** Integration of Digital Twin for HESS (DTH) technology in TH's HIL (Hardware in the Loop) Control center modelling and emulation environment to enable digital testing, verification and validation.

•**STO4: High level control and application deployment:** Power management system for real-time control to improve operation and performance.

•**STO 5 Use case validation and demonstration:** Demonstration and validation of overall HESS concept in 3 different Demo Sites / Use Cases

•**STO6 Business models and exploitation Scalability and Replication:** Development of business models on EaaS enabling specific ones for respective pilot sites, enabling the aggregator business models or ESCO based targeting the DER aggregation according with the user specifications.

Project overview, vision and objectives

HESS CORE CONCEPT AND BATTERY TECHNOLOGIES

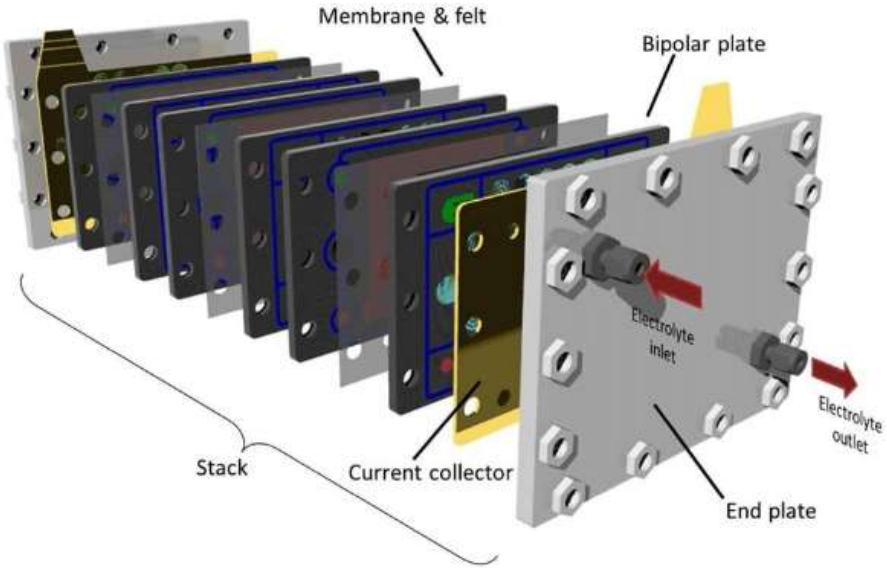
Core technology 1: AORFB (KEMI)

5kW / 15kWh

Core Technology 2: LTO battery (BDES)

50Kw / 15kWh

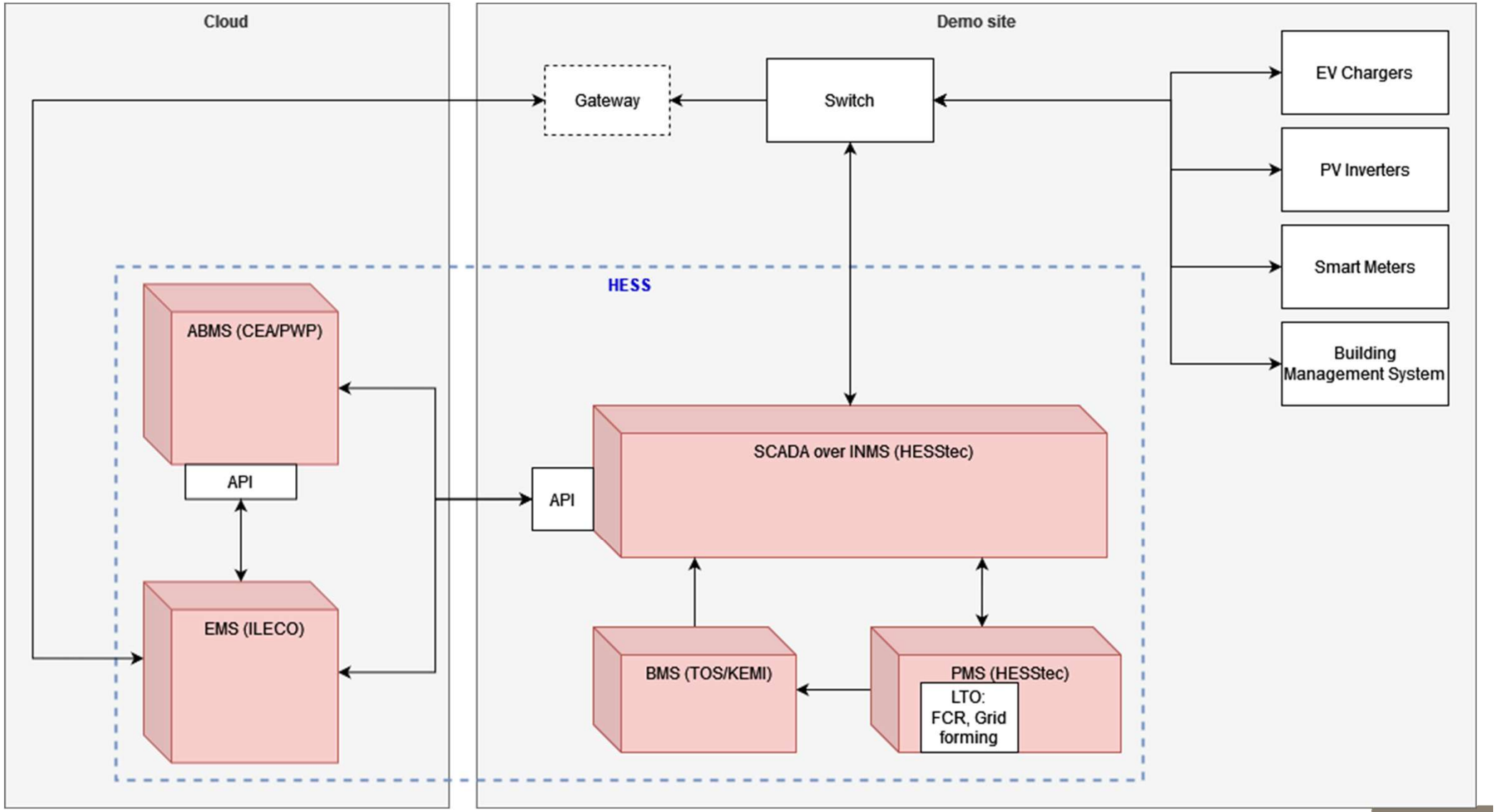
Overall HESS System size: 55kW / 30kWh



SCiB™ Cell	
	**Nominal Voltage:** 2.3V (Range:1.5V-2.7V)
	Nominal capacity: 20Ah
	Energy density: 176Wh/L
	Dimension: 115(W)x22(D)x103(H)
	Weight: 515g

Project overview, vision and objectives

HESS CORE ARCHITECTURE



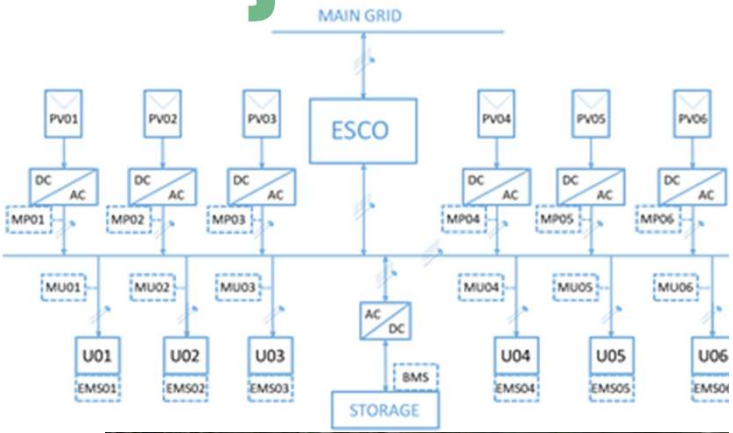
Project overview, vision and objectives

HYBRIS DEMO SITES

1. Demo 1: Messina, Italy

Residential

Island Mode Use Case



2. Demo 2: Brasschaat, Belgium

SME Park

Energy arbitrage, self consumption, peak shaving, FCR…

3. Demo 3: Voorhout, Netherlands

Residential Farmhouse

Energy arbitrage, peak shaving, FCR, Energy community

HYBRIS
Enhanced Hybrid Storage Systems

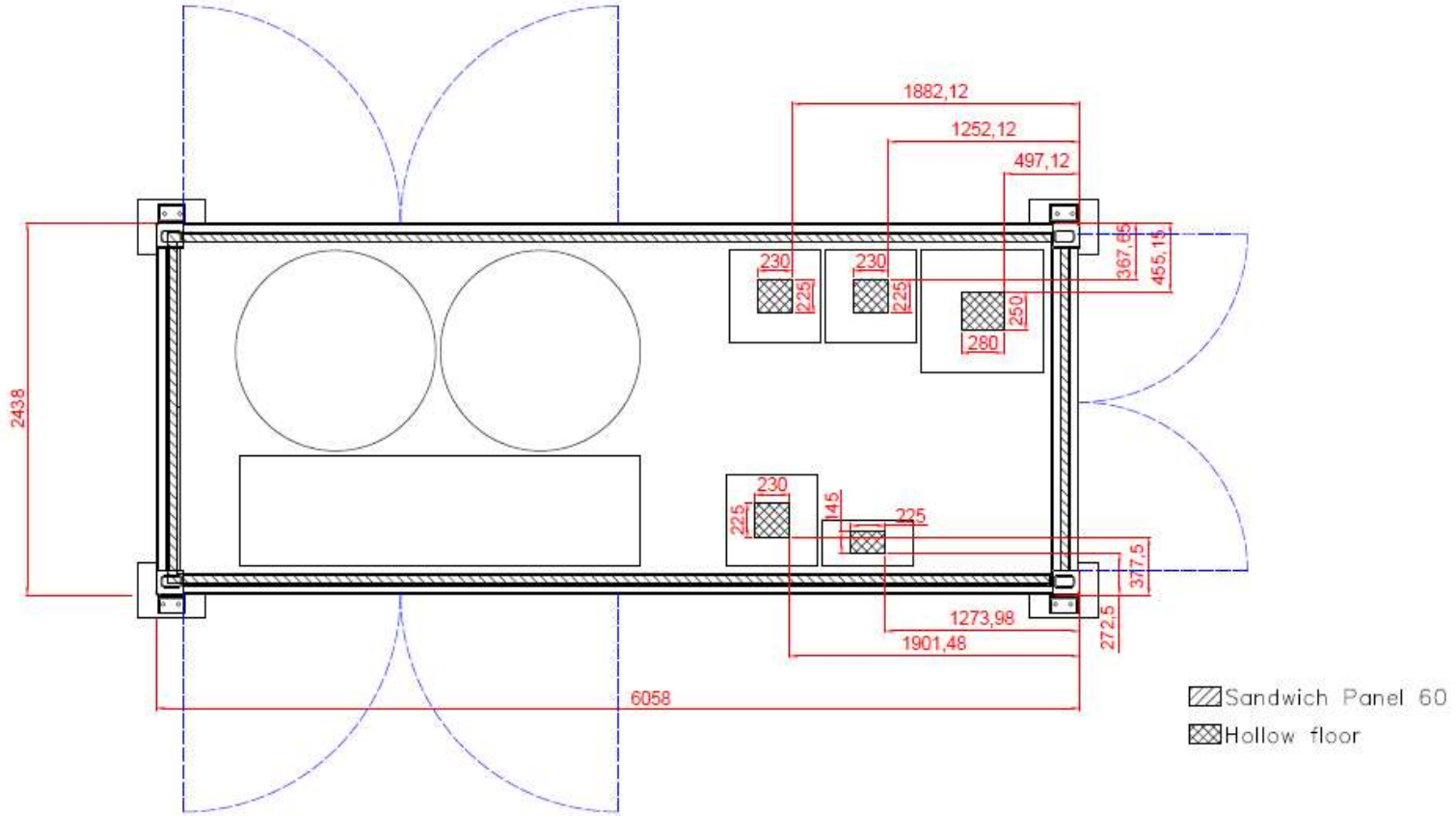
H2020
G.A. 963652

Project overview, vision and objectives

FROM IDEA TO REALITY

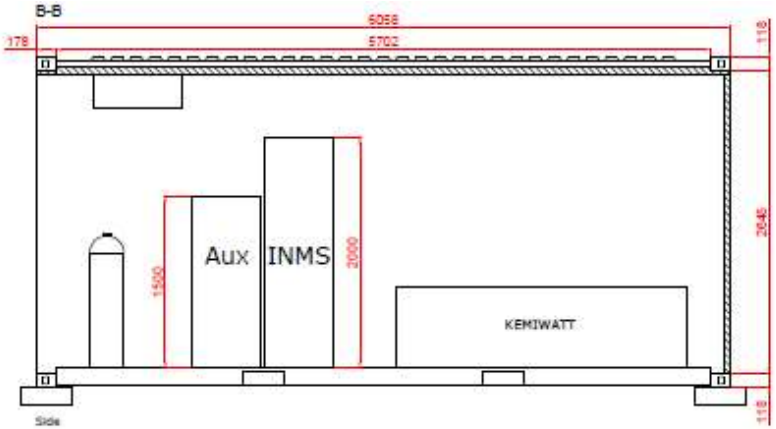
<u>1ST APPROACH:</u> 3 HESS systems -> Small systems, not interesting for Use Cases – Demo Owners.

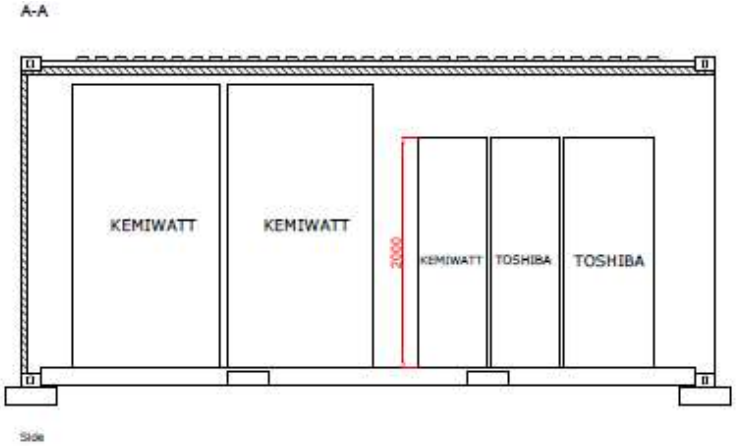
<u>FINAL APPROACH:</u> 1 containerised HESS system.

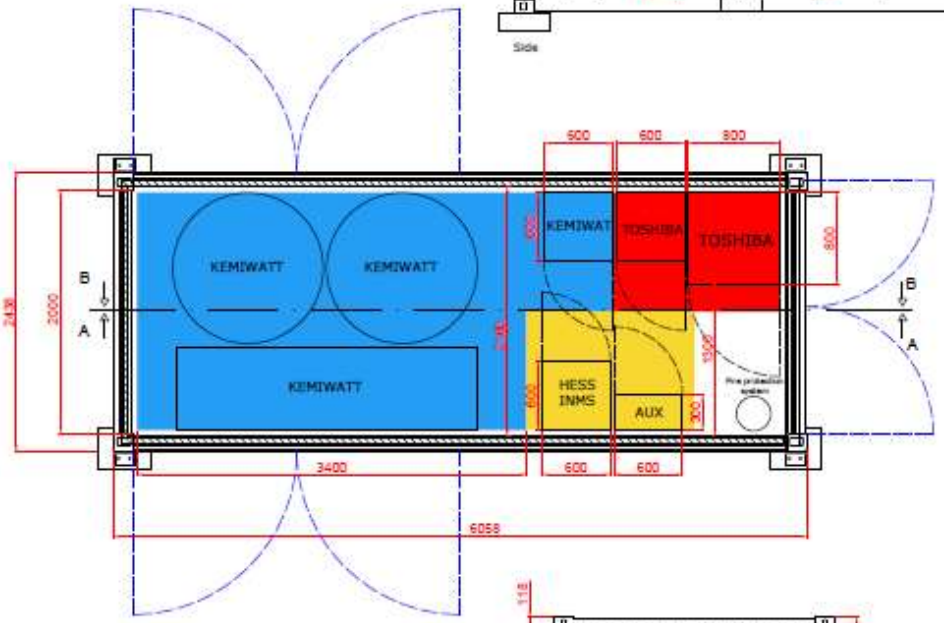


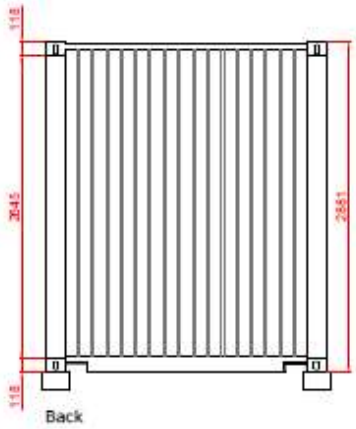
Project overview, vision and objectives

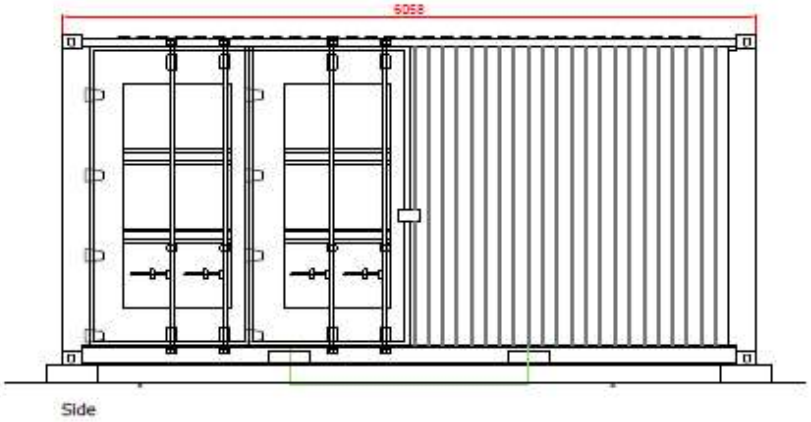
SCALABLE & CONTAINERISED 55kW / 30kWh HESS for multiple Use Cases

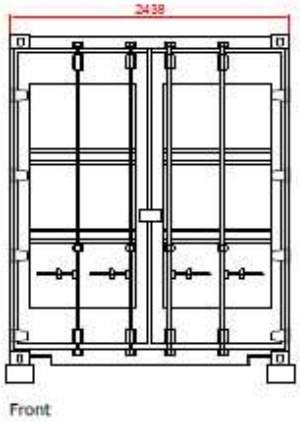












THANK YOU
FOR YOUR ATTENTION

This project has received funding
from the H2020 programme
under Grant Agreement No. 963652