



CROSS BOrder management of variable renewable energies
and storage units enabling a transnational Wholesale market

HIGH LEVEL USE CASES (HLUs) |



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CROSSBOW



- **Products**
- **High Level Use Cases**
 - Demonstrations of system integration with smart grid and storage technologies with increased share of renewables in defined use cases by using the products.
- **Changes in legislation (EU & EnC countries)**
 - Enabling commercial use of the defined use cases in the region and other parts of Europe

CROSSBOW PRODUCTS



CROSSBOW Regional Operation Centre
Balancing Cockpit (ROC-BC)



CROSSBOW RES Regional Coordination
Centre (RES-CC)



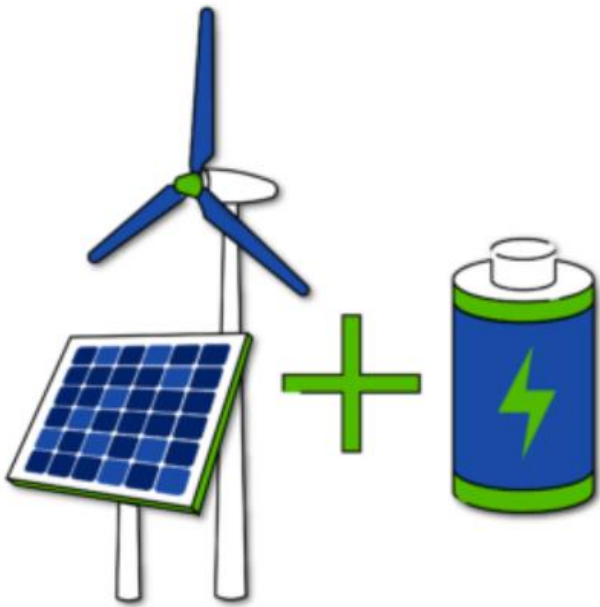
CROSSBOW Regional Storage Coordination
Centre (STO-CC)



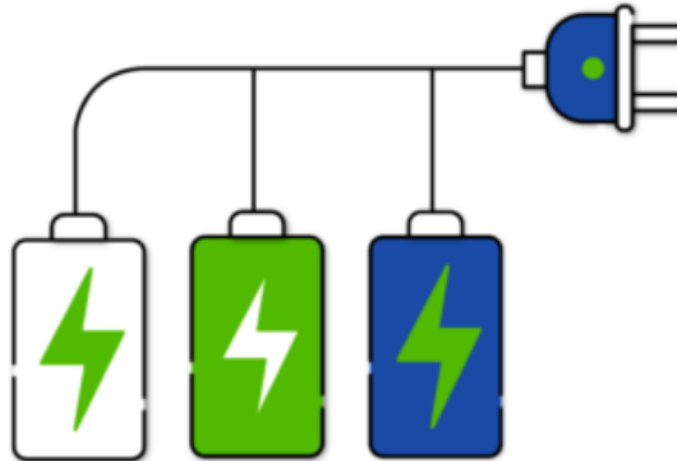
CROSSBOW PRODUCTS



CROSSBOW Hybrid RES Dispatchable Unit (RES-DU)



CROSSBOW Virtual Storage Plants (VSP)



CROSSBOW WAMAS



CROSSBOW PRODUCTS



**CROSSBOW Regional DSM integration
platform (DSM-IP)**



**CROSSBOW Wholesale and Ancillary Market
toolset (AM)**



**COOPERATIVE OWNERSHIP OF FLEXIBILITY
ASSETS PLATFORM (CFP)**



HLU1 REGIONAL OPERATION CENTRE



- Demonstrate an **integrated approach in the management and the operation of the transmission network** in South Eastern Europe.
- Extend the functionalities provided by Regional Security Coordination Centre (RSC) operating in the region – SCC Belgrade
- The ROC balancing cockpit will allow the data and information exchange between TSOs in order to:
 - Develop balancing capabilities of future ROC.
 - Increase reliability and efficiency in the transmission system.

HLU2 CROSS-BORDER RES MANAGEMENT



- Demonstrate how to manage efficiently an scenario where the total share of RES a country can handle cannot be satisfied with the national RES production.
- Instead of activating expensive and highly polluting generation units, **priority will be given to RES generation coming from neighbouring countries.**
- TSOs in the region will **share a common platform RES-CC** – to coordinate the operation of the RES generation units in the region
- **It is necessary to share – at some level – a wholesale market.**

HLU3 CROSS-BORDER STORAGE OF RES PRODUCTION/OUTPUT



- Tackle the interest of RES producers in **storing the excess of production in neighbouring countries** – due to low demand in the country or curtailment rules.
- RES producer will have specific agreements with operators of storage facilities in the destination country to store – and later recover – the stored energy.
- The capability of the network will be considered.
- **Fair and transparent market rules to avoid market abuse for illegitimate gain of parties involved.**

HLU4 DISTRIBUTED STORAGE FOR SYSTEM STABILITY AND ENERGY QUALITY CONTROL



- Demonstrate how a set of **distributed storage units** (in the same country or nor) can be managed by the TSO and DSO in order **to contribute to the quality of electricity supply** whilst reducing operation costs for the entire system.
- This HLU requires the existence of a market to access ancillary services (HLU9) **enabling the trade of storage capability for energy quality control purposes.**

HLU5 VIRTUAL STORAGE PLANTS (VSP)



- Demonstrate how the coordinated use of a set of **smaller geographically dispersed storage units** (VSP) can be considered to absorb the excess of RES production in the same country or in a neighbouring one.
- The project will explore how a VSP can be used by RES producers to **maximise clean energy penetration**, and also how a VSP can be used by system operators to **increase grid stability**.
- Challenge of coordinating a large number of distributed storage units and the need for **close collaboration with DSOs**.

HLU6 TRANSNATIONAL DEMAND SIDE MANAGEMENT



- Tackle a scenario where the **demand of a specific country cannot be covered with cheap and green energy units** – even using units from neighbouring countries.
- Instead of activating expensive and polluting production units, big consumers participating in Demand Side Management (DSM) schemas, will be requested to modulate their consumption.
- **Depends on the existence of a transnational ancillary service market.**

HLU7 HYBRID RES DISPATCHABLE PLANTS



- Hybrid RES plants with storage capability, hybridising with biomass to achieve 100 % renewable and sustainable energy, and providing a **stable and reliable power independently of meteorological circumstances.**
- This solution will meet the requirements imposed by TSOs to be considered as a dispatchable, firm and fully-flexible power plant and will substitute the current role of fossil fuel backup systems while increasing RES power generation.

HLU8 COOPERATIVE OWNERSHIP OF FLEXIBILITY ASSETS



- Demonstrate an innovative business model for Cooperative Ownership of Flexibility Assets.
- Flexibility Assets, are becoming common providers of balancing services in some European markets, they are normally owned and operated only by electricity retailers or independent aggregators which business objectives **might not be aligned with their providers of flexibility.**
- A solution for cooperative ownership will be developed.

HLU9 TRANSNATIONAL ANCILLARY AND WHOLESALE MARKET



- Propose unified types of balancing services, dimensioning, procurement and settlement of balancing reserves and standard products.
- Demonstrate cross-border balancing principles for common usage of balancing reserve and exchange of balancing energy & imbalance.
- A novel orchestrated multi-nodal market platform will be adapted and deployed
 - new innovative concepts, based on blockchain technology, microservices and APIs.
 - **allow market players to integrate and interoperate on the distributed concepts with minimum set of harmonized technical and data requirements.**

THANK YOU!



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