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ITEG- Tidal energy integration with hydrogen production: a case study for energy management optimisation

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Objectives:

a) Maximise Hydrogen production ensuring optimal system operations.

b) Investigate different system's configurations to study new possible scenarios.

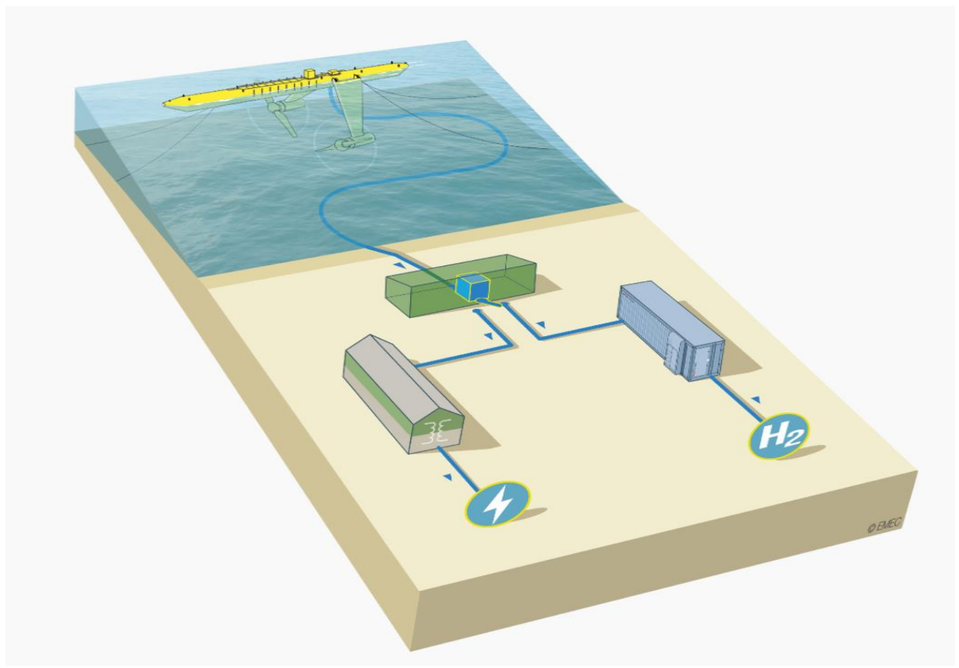

FIG 1: GRAPHICAL REPRESENTATION OF THE PROPOSED SYSTEM.
Picture Courtesy – European Marine Energy Centre.

➢ **Applications**:
- ✓ Study applicable in places with abundant renewable energy sources (RES) with constrained distribution network. e.g. Islands.
- ✓ Can be used as a generic model for different hydrogen production pathway analysis.

➢ **Optimisation is performed for**:
- ✓ Increasing daily system revenue
- ✓ Reducing electrolyser degradation
- ✓ Optimal RES and grid power profiles
- ✓ Priority for green hydrogen production

➢ **Investigated optimisation methods are :**
- ✓ Genetic algorithm
- ✓ Interior Point method
- ✓ Hybrid

Results and conclusions
- ❖ System costs' evaluation and revenues maximisation.
- ❖ Frequent Electrolysers on/off switching modes are avoided to enhance the system lifetime.
- ❖ Hybrid optimisation approach – Most suited solver both in terms of ease of execution and improved efficiency.

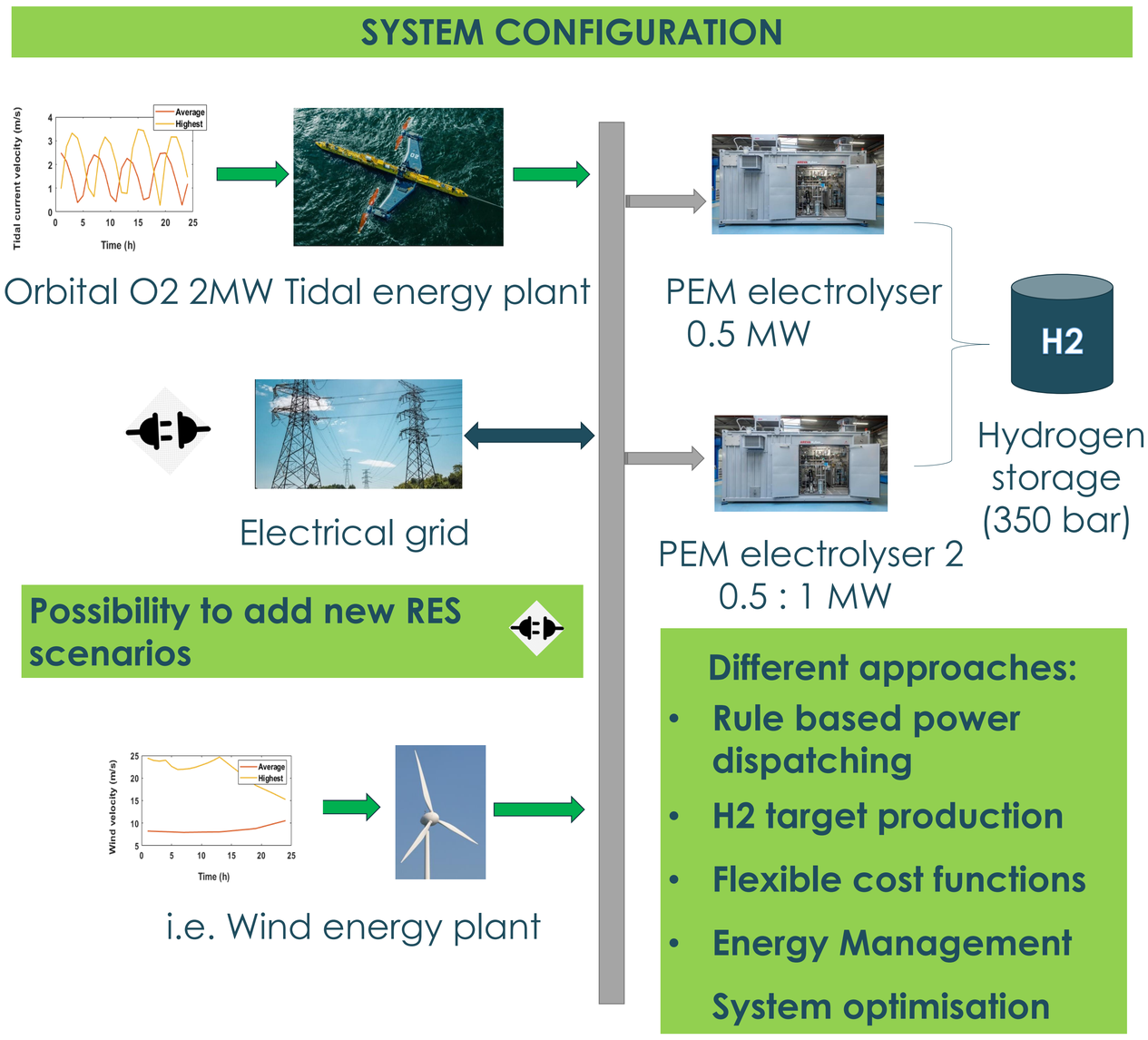

FIG 2: SYSTEM DESCRIPTION AND DIFFERENT STUDY APPROACHES.

SAMPLE RESULTS

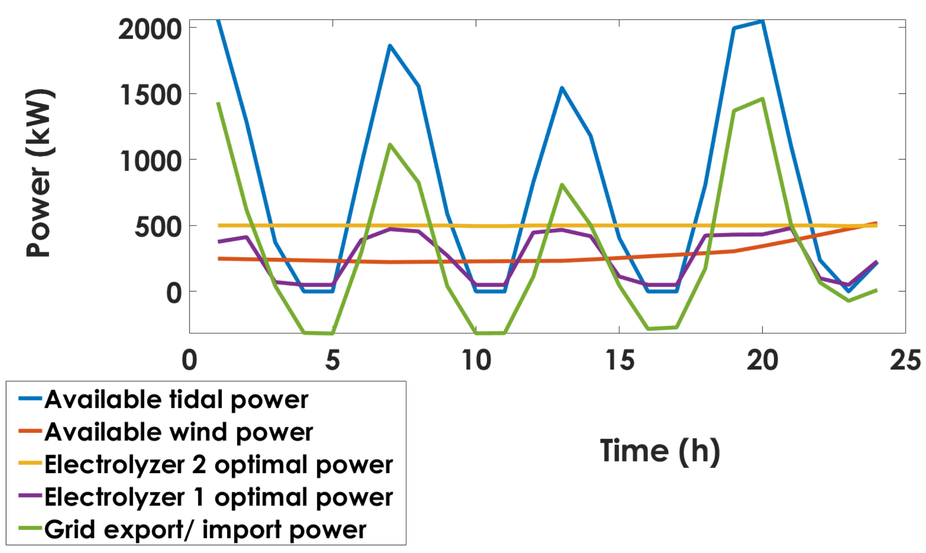

FIG 3: OPTIMAL POWER PROFILES.

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