Type of Action:	Research and Innovation Action (RIA)

Project Information

Project Proposal's Title (if available)**:** ------

Project Proposal's Description (brief description of project idea, max 500 words):

This project develops a comprehensive digital twin model for wind turbines, addressing three key aspects. First, the digital twin models the structural stresses on the turbine blades, as well as the thermal and electrical behavior of the power electronics. Second, we use AI algorithms and topological analysis to opt
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This will enhance wind energy forecasting, optimize the placement of new turbines, and ensure reliable operation within a smart grid environment.

Key-words: Wind energy; wind turbine reliability; digital twin; blade stress/fatigue; power electronics; thermal modelling; condition monitoring; predictive maintenance; O&M optimisation; wind-farm layout; topology optimisation; smart grid; pandapower; reinforcement learning; reliability prediction; interoperability; cybersecurity; FAIR data

Project Consortium

Coordinator (short description of the coordinating organisation, including its related experience and role in the implementation of the project)**:**

KYAMOS Ltd (Cyprus) (https://www.kyamosmultiphysics.com) is a technology SME startup, with considerable funding of €2.3 m and 13 full time employees, coordinating 14 funded research projects. KYAMOS is the project coordinator and the technical integrator of the proposed digital toolchain for wind energy reliability and smart-grid integration. KYAMOS brings strong expertise in high-performance computing (HPC), GPU-accelerated physics simulations, and applied AI/ML for engineering systems. In this project, KYAMOS will lead overall project governance (planning, reporting, risk and quality management), and will be responsible for the core wind-turbine digital twin development, including multi-physics modelling of blade structural stresses/fatigue indicators and thermal–electrical behaviour of nacelle power-conversion subsystems (generator, converter/inverter and thermal management). KYAMOS will also implement the simulation-to-AI pipeline, manage the GPU/HPC execution of high-fidelity workloads (budgeted as GPU-hours), and deliver the integrated software stack (data ingestion, model orchestration, APIs, and reproducible workflows). In addition, KYAMOS will coordinate real-data acquisition (via paid datasets/validation arrangements where partners are not yet secured), ensure cybersecurity-by-design and interoperability of the platform, and contribute to deployment-ready tooling and exploitation planning in collaboration with the consortium.

Consortium (short description of the partners already identified, including their role in the implementation of the project):

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overall software toolchain (data ingestion, APIs, dashboards), and manages real-data acquisition where required

• Frederick University (Cyprus) – Research partner supporting model verification/validation methodology, dataset quality control (QC), statistical testing and performance evaluation, and contribution to dissemination/standardisation-related outputs. Supports the definition of KPIs and assessment protocols for simulated-to-real transfer.

• London School of Economics (United Kingdom) – Impact and exploitation partner. Leads the techno-economic and adoption assessment: O&M cost-benefit modelling, business/exploitation strategy, stakeholder engagement, and market/policy framing for uptake of the proposed digital toolchain.

Real-world operational datasets (turbine and grid) will be secured via paid data acquisition and/or an external validation entity (operator/O&M provider), targeted to join for later-stage validation activities and demonstration, ensuring credible real-data quality assurance and relevance to end-user needs.

Partners Sought

Type of Partner(s) sought:

X	Higher Education / University	X	Industry / SME
X	Research Institution	X	International Organisations
X	Public or Governmental Body	☐	Individual Partner
☐	NGOs / Voluntary Civil Society Organisations	☐	Other (specify)

Description of the role(s) of the partner(s) sought (please specify the number and the required expertise of the partners sought and provide short description of their role in the implementation of the project)**:**

a) Wind Farms operators that can provide real data that will also act as end-users for our product. (b) operator/Operations & Maintenance service provider, c) Partners working on artificial intelligence, wind turbine simulations, real data acquisition of wind farms, power electronics of wind turbines, smart grids and digital twins, etc. d) We are generally open to any partners that feel they can contribute significantly or can alter the projects scope with their strong expertise.

Collection and processing of personal data is carried out according to the Processing of Personal Data (Protection of the Individual) Law of 2001 and RIF's regulation on Collection, Processing and Use of Personal Data. RIF's regulation is posted on the Foundation's website.