

NABLADOT INTRODUCTION TO THE COMPANY AND ITS SERVICES

ANTONIO GOMEZ (R&D MANAGER)
AGOMEZ@NABLADOT.COM

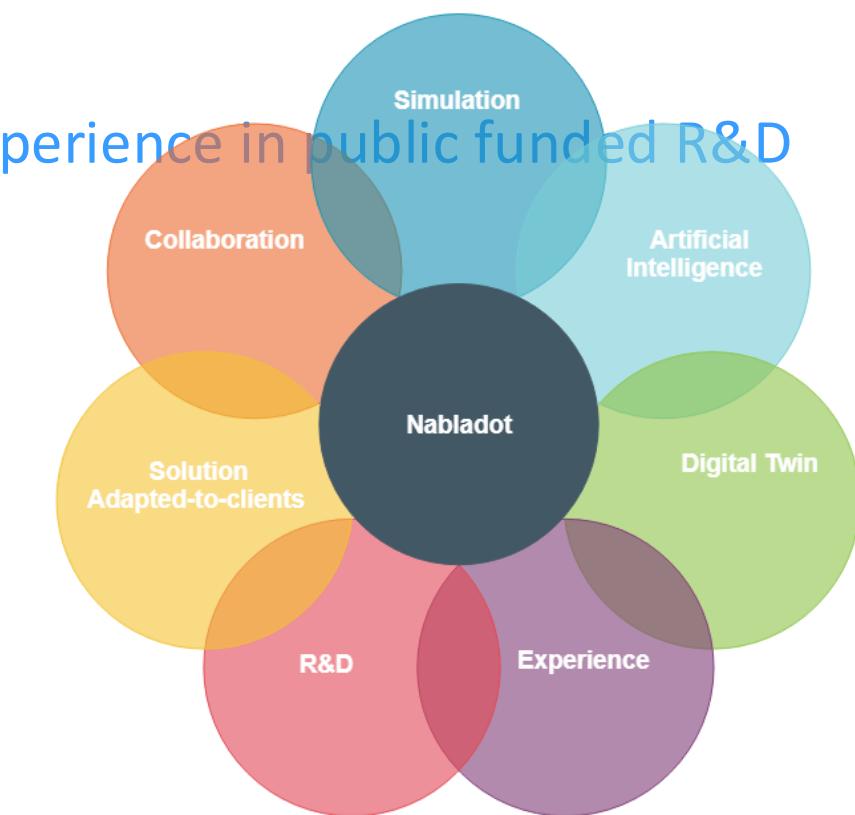
- + Established in 2010 by researchers specializing in Computational Fluid Dynamics (CFD) at the University of Zaragoza (2010). We offer:
 - + Innovative character
 - + We actively engage in research and development projects at both national and European levels
 - + Business focus
 - + We offer solutions tailored to the technical and economic needs of the companies
- + Our team has experience across multiple sectors (see our [Projects](#))

ENERGY SECTOR <ul style="list-style-type: none">- HSGR (combined cycles)- Biomass boilers- Molten salts heat exchangers- Rotary kilns	HVAC AND AIR QUALITY <ul style="list-style-type: none">- Logistic centers- Metro station- Tunnels- Pharmacy clean rooms	WATER SECTOR <ul style="list-style-type: none">- Hydraulic infrastructure- UV water disinfection- Aerobic reactors- Anaerobic reactors	FLUE GAS CLEANING <ul style="list-style-type: none">- Wet flue gas desulfurization- NH₃ stripping- Regenerative thermal oxidizer- Bag filter
INDUSTRY <ul style="list-style-type: none">- Deoil tanks- Valves- Pneumatic transport- Biomass rotary dryer	HYDROGEN SECTOR <ul style="list-style-type: none">- Combustion- Substitution of fossil fuels- Injection in gas pipelines- Leaks / Dispersion	CHEMICAL SECTOR <ul style="list-style-type: none">- Pyrolysis reactor- Fixed bed reactors- Real-time energy audit	SMART CITIES <ul style="list-style-type: none">- Urban wind in real time- Integration BIM & Simulation

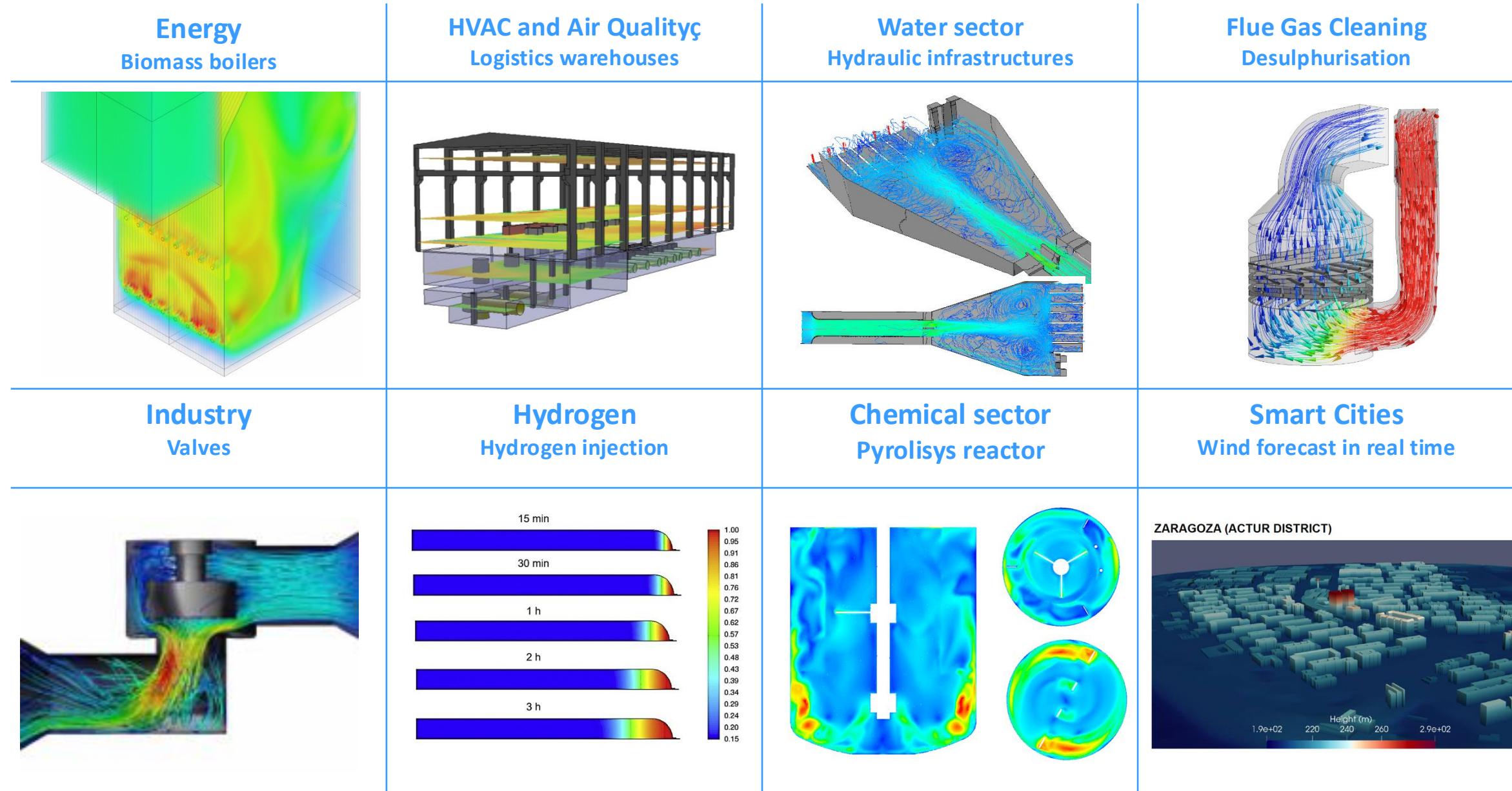
- + Our clients and partners include:
 - + Companies that design and manufacture equipment, processes, and products involving fluids
 - + Engineering companies,
 - + Firms that design, operate, and manage facilities related to energy, water, and air quality and HVAC systems
 - + R&D centres
- + We have extensive international experience, with most of our projects being carried out for exporting companies or companies developing projects abroad



- + We offer a wide range of services:
 - + CFD simulation
 - + Real time models (CFD simulation & Statistical Analysis & AI)
 - + Statistical data analysis
 - + Simulation & IoT (Sensors, Cloud Computing, Edge Computing)
 - + Digital Twins
 - + Collaboration in public funded R&D projects (wide experience in public funded R&D projects at national and European level)



Name	Year	Funding body
CFD Desing of biomass boilers in the Cloud	2016	European Commission
Cloud-based Micrositting of Small Wind Turbines	2017	European Commission
Optimizing solar panel production	2018	European Commission
Digital Twin for Biomass Boilers	2020	European Commission
Development of reduced-order models and machine learning for high-resolution wind prediction	2020	Spanish Ministry of Science, Innovation and Universities
Digital twin of high-efficiency heat recovery units	2021	Spanish Ministry of Industry, Commerce and Tourism
Digital Twin for Rotary Dryers	2021	European Commission
Electrification and digitization of the regenerative thermal oxidizer for the decarbonization of industry (e-RTO)	2022	Spanish Ministry of Industry, Commerce and Tourism
Digital twin for the comprehensive management of ammonia emissions in pig farms.	2022	Spanish Ministry of Industry, Commerce and Tourism
Digital Twin for cost-efficient treatments of wastewater in Anaerobic Reactors	2023	Eureka - Eurostars
New technology to produce hydrogen from renewable energy sources based on AI with optimized costs for environmental applications.	2023	Eranet - Co-funded projects
Integrated Cloud-Edge system for energy and weather AI-based power prediction	2024	European Commission: Cascade funding
HPC-based efficiency optimization of industrial fired preheaters	2024	European Commission
ITWIN-TIS: Intelligent Platform for Rapid Deployment of Scalable Digital Twins in Thermal Industrial Systems	2026	Eureka - Eurostars



- + Real-time model for the calculation of the CH₄-H₂ mix in natural gas pipes
 - + More details at: *C. Montañés et al., Comprehensive assessment of hydrogen injection in natural gas networks: Using dimensional analysis and reduced-order models for mixture quality prediction, International Journal of Hydrogen Energy, <https://doi.org/10.1016/j.ijhydene.2024.09.045>*
- + Combination of CFD & Dimensional Analysis & Statistical Analysis

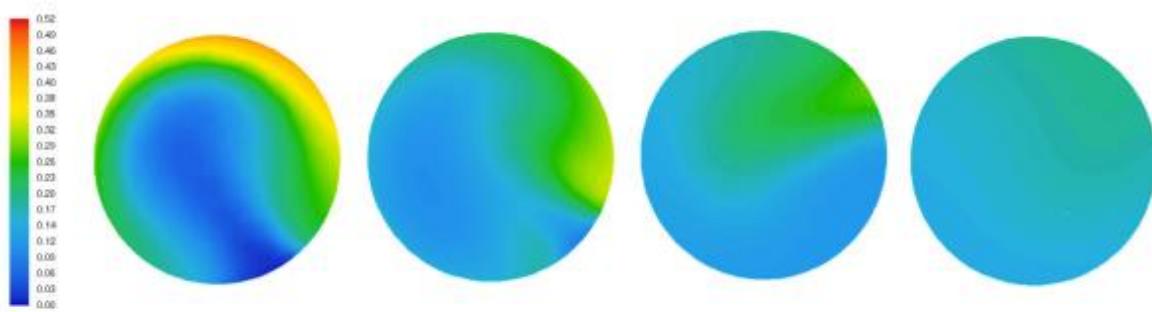


Fig. 3. Contours of H₂ mass fraction in sections of a pipe for L/d_{CH_4} equal to 2, 5, 10 and 50 (from left to right).

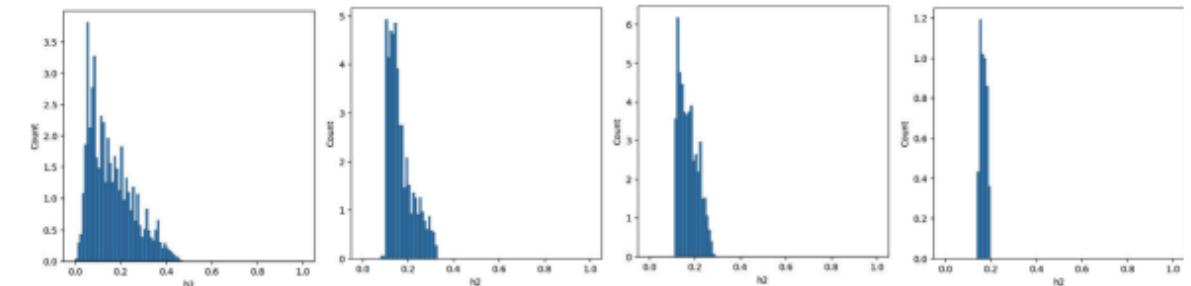


Fig. 4. Histogram of H₂ mass fraction (weighted with cross area) in sections of a pipe for L/d_{CH_4} equal to 2, 5, 10 and 50 (from left to right).

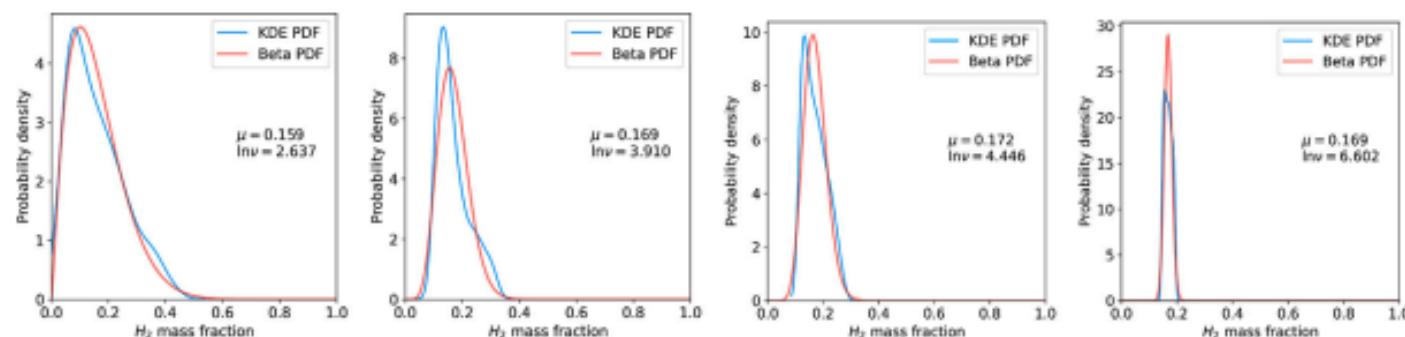
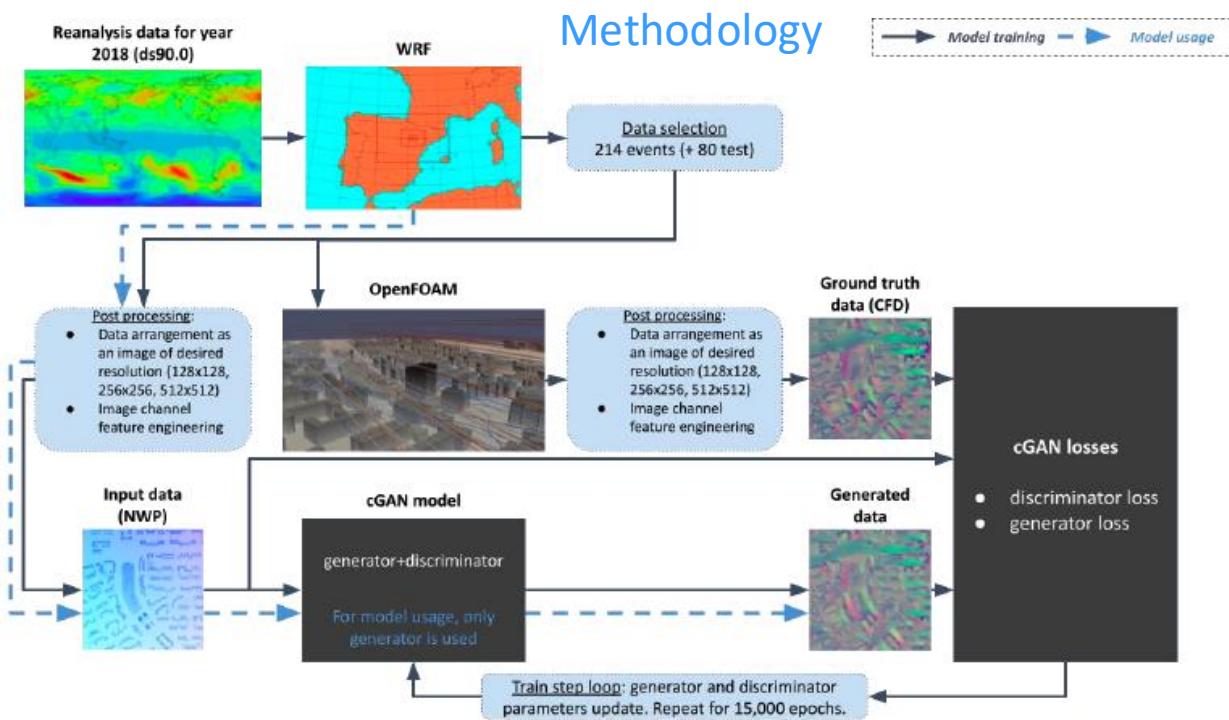
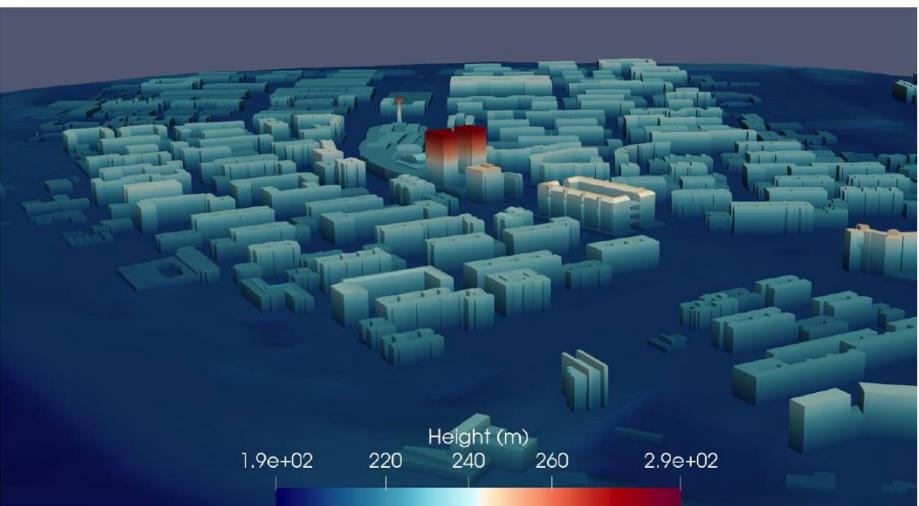


Fig. 5. PDF and beta approximation for H₂ mass fraction in sections of a pipe for L/d_{CH_4} equal to 2, 5, 10 and 50 (from left to right).

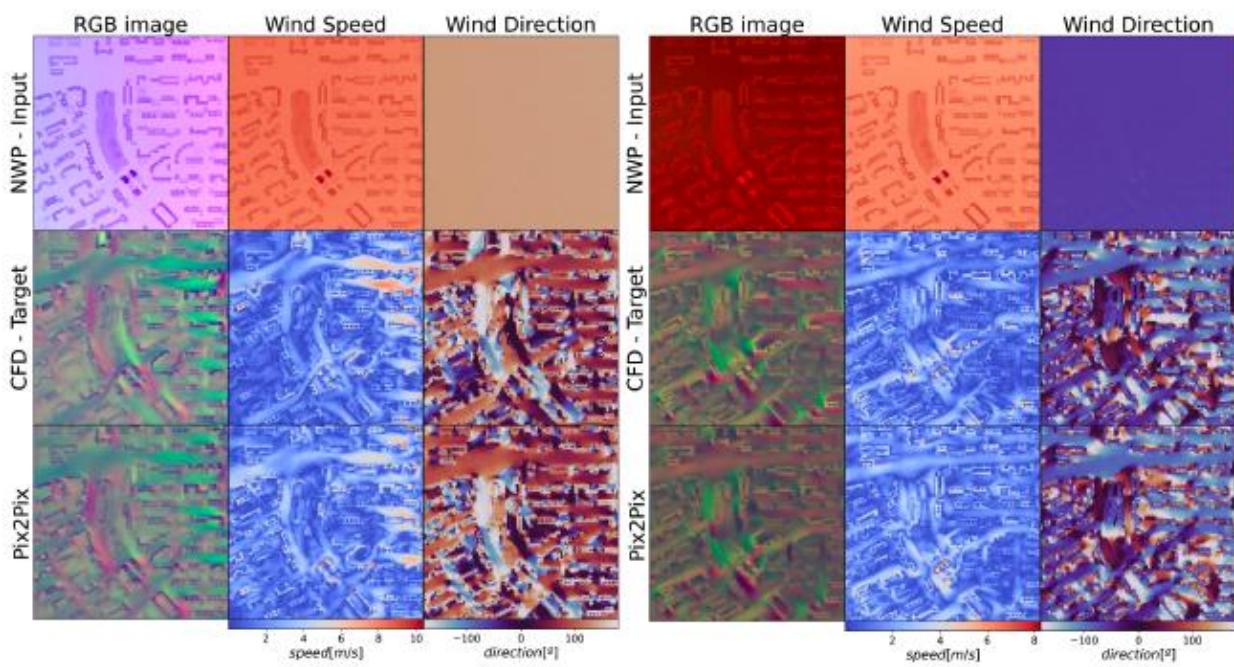
- + High resolution urban wind in real time
 - + Numerical Weather Prediction Models & CFD & AI
 - + Multiple applications
 - + Small wind energy
 - + Air Quality
 - + Forecast of extreme events
 - + References: [here](#)



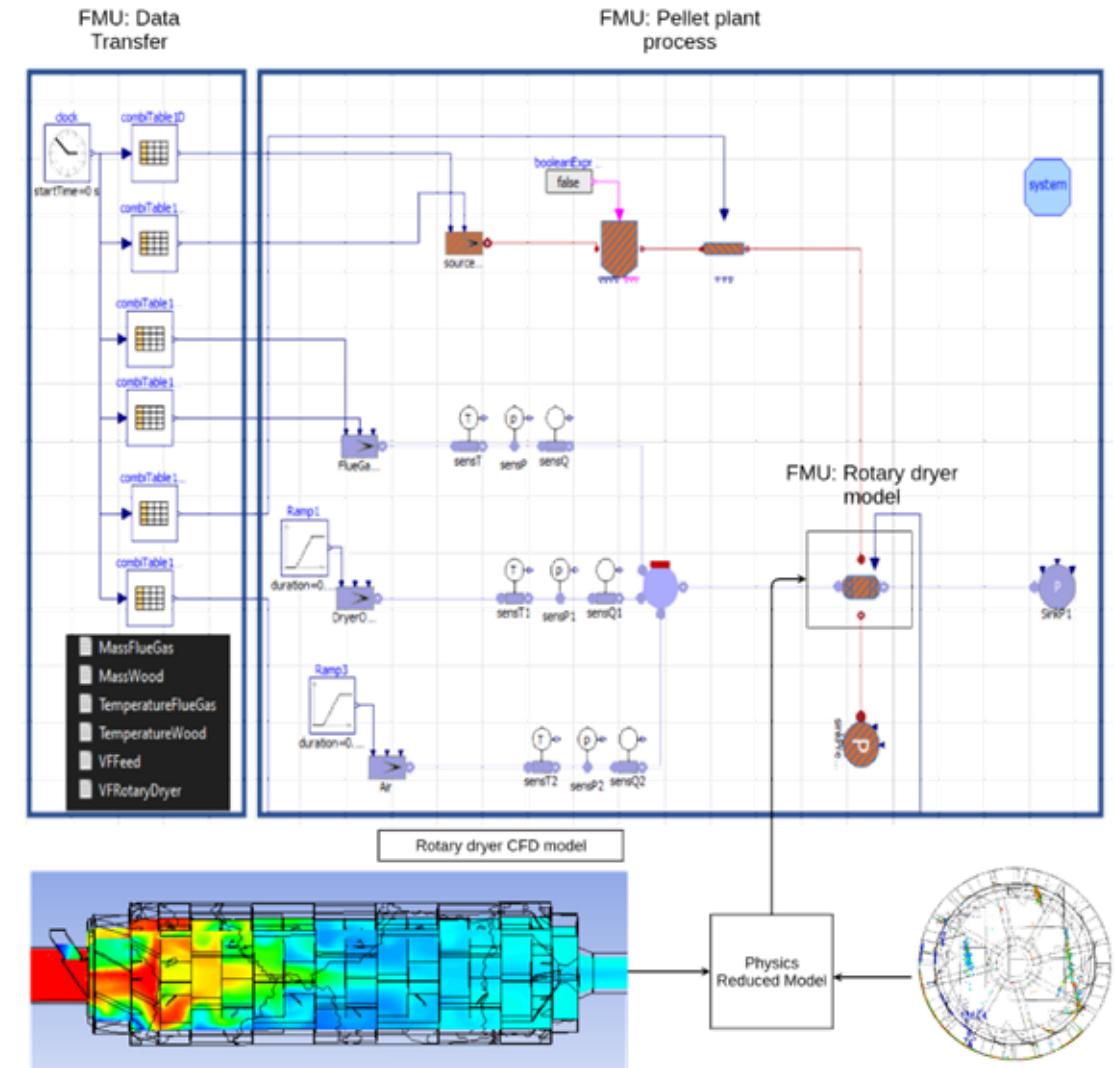
ZARAGOZA (ACTUR DISTRICT)



Results

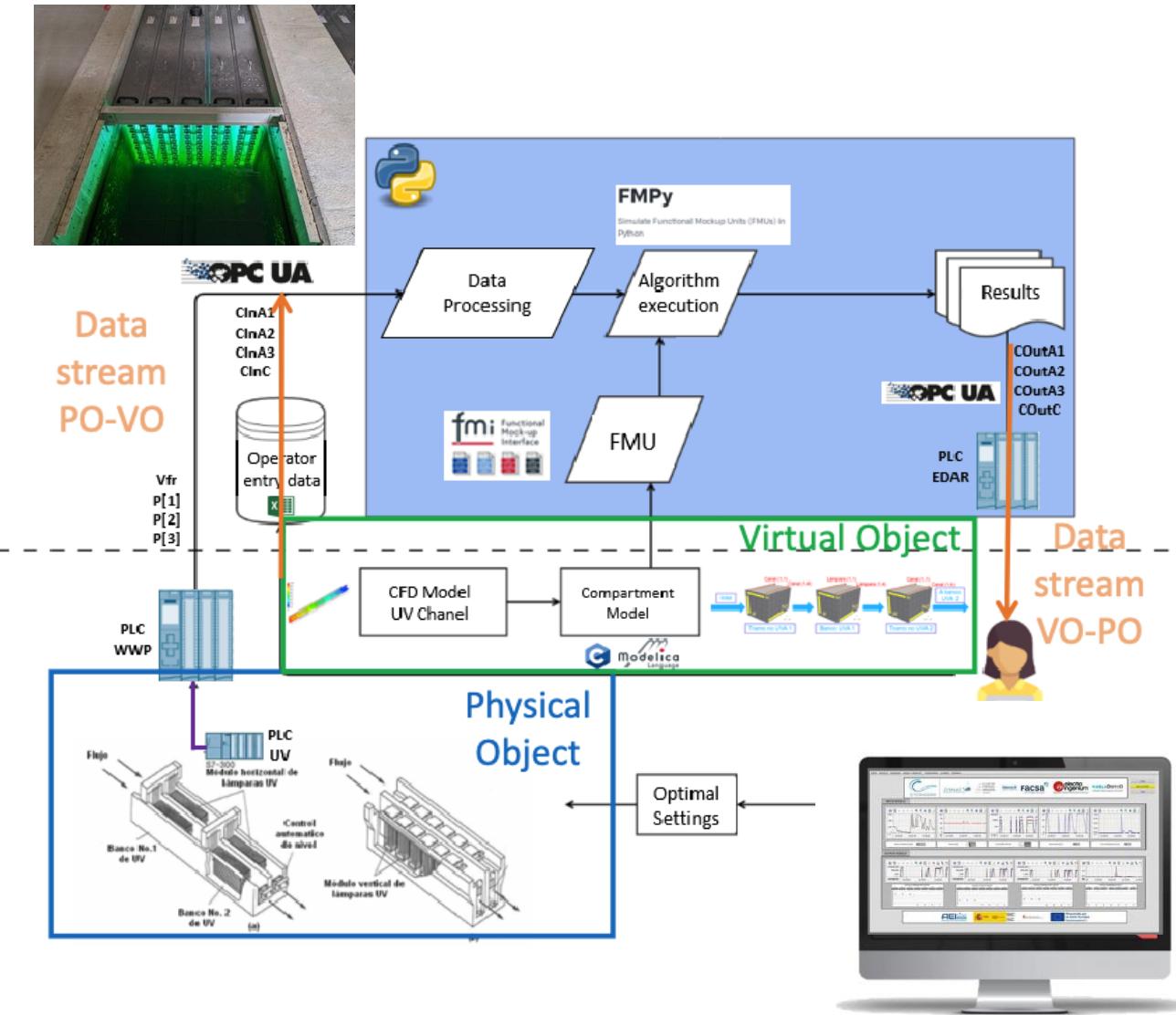


- + Digital twin of a rotary biomass dryer
- + Digital twin features:
 - + Automatic communication with SCADA data
 - + Automatic data processing
 - + Real-time simulations of the operation of the rotary dryer using SCADA data as input
 - + Selection of optimal operation configuration based on simulation results and data analysis
 - + Co-simulation of the process and system control using FMUs
- + The real-time model of the rotary dryer is developed from CFD simulations and Reduced Order Physics techniques



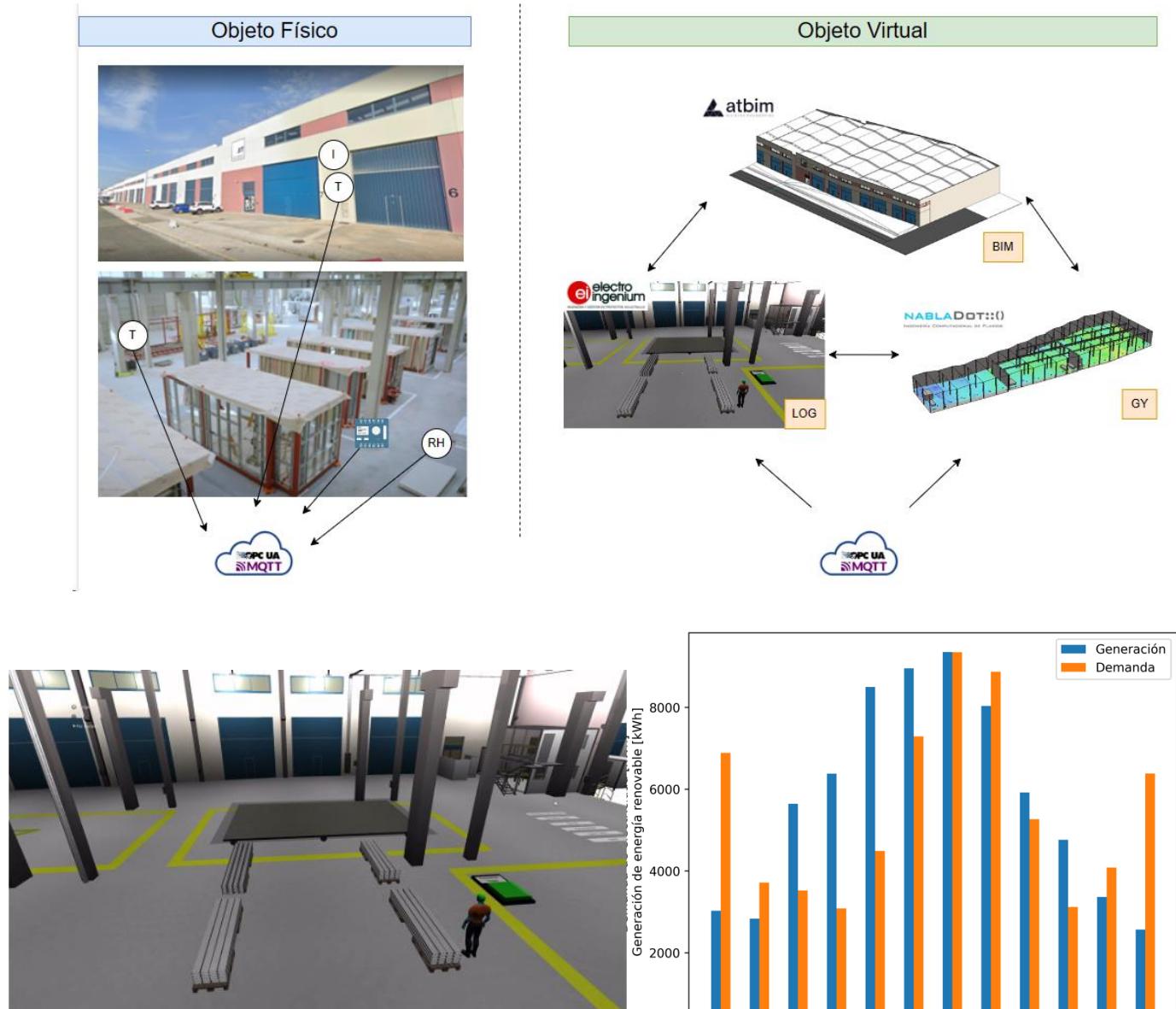
References: [European Biomass Conference](#)
[Digital Twin Performance](#)

- + Digital twin of a UV disinfection equipment for wastewater treatments
- + This equipment accounts for 40% of the plant's electricity consumption
- + Digital twin features:
 - + Automatic communication with SCADA data
 - + Automatic data processing
 - + Real-time simulations of the operation using SCADA data as input
 - + Selection of optimal operation configuration based on simulation results and data analysis
 - + Co-simulation of the process and system control using FMUs
- + The real-time model of the UV disinfection equipment is developed from CFD simulations and Reduced Order Physics techniques



References: [here](#)

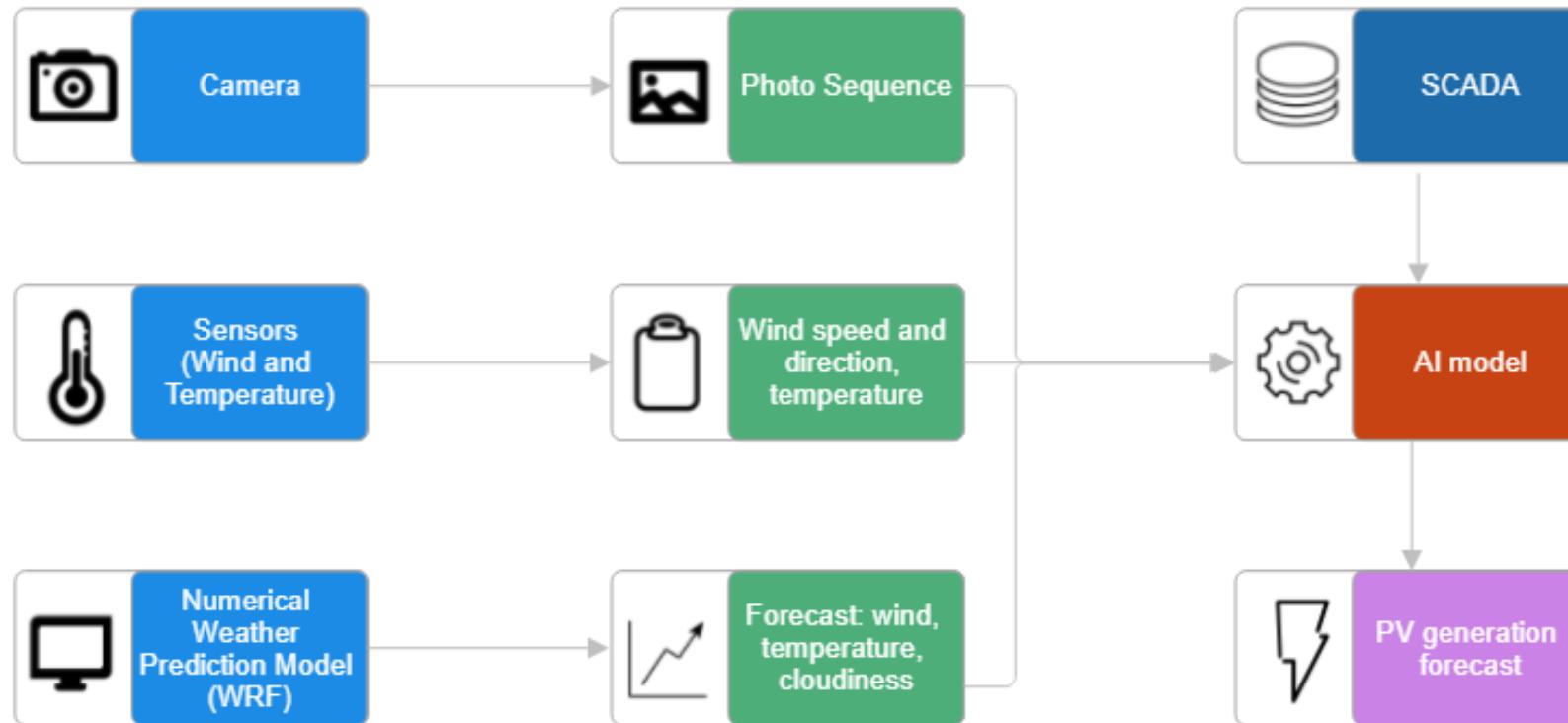
- + Integration of BIM models, logistics models, and simulation
- + Applied to the manufacturing industry (also applicable to other types of buildings).
- + Characteristics:
 - + Detailed geometry
 - + Prediction of energy consumption/production, thermal comfort, and air quality
 - + Simulation, visualization, and analysis of production systems and logistics processes to optimize material flow and resource utilization at all levels of your plant planning, from global facilities and local plants to specific production lines.
 - + Reading real-time data from sensors and automated systems



- + Project for the development of an innovative Digital Twin of Anaerobic Reactors for the Treatment of Industrial Wastewater
- + Main Objectives:
 - + Optimization of the operation (maximize biogas produced)
 - + Avoid unexpected stops
 - + Improve operator training
- + Approach
 - + Hybrid digital twin where data will be combined with real-time models based on synthetic data (from CFD simulations)
- + The project is under development (funded by the Eurostars call)
- + Project leader: Nablidot, S.L.

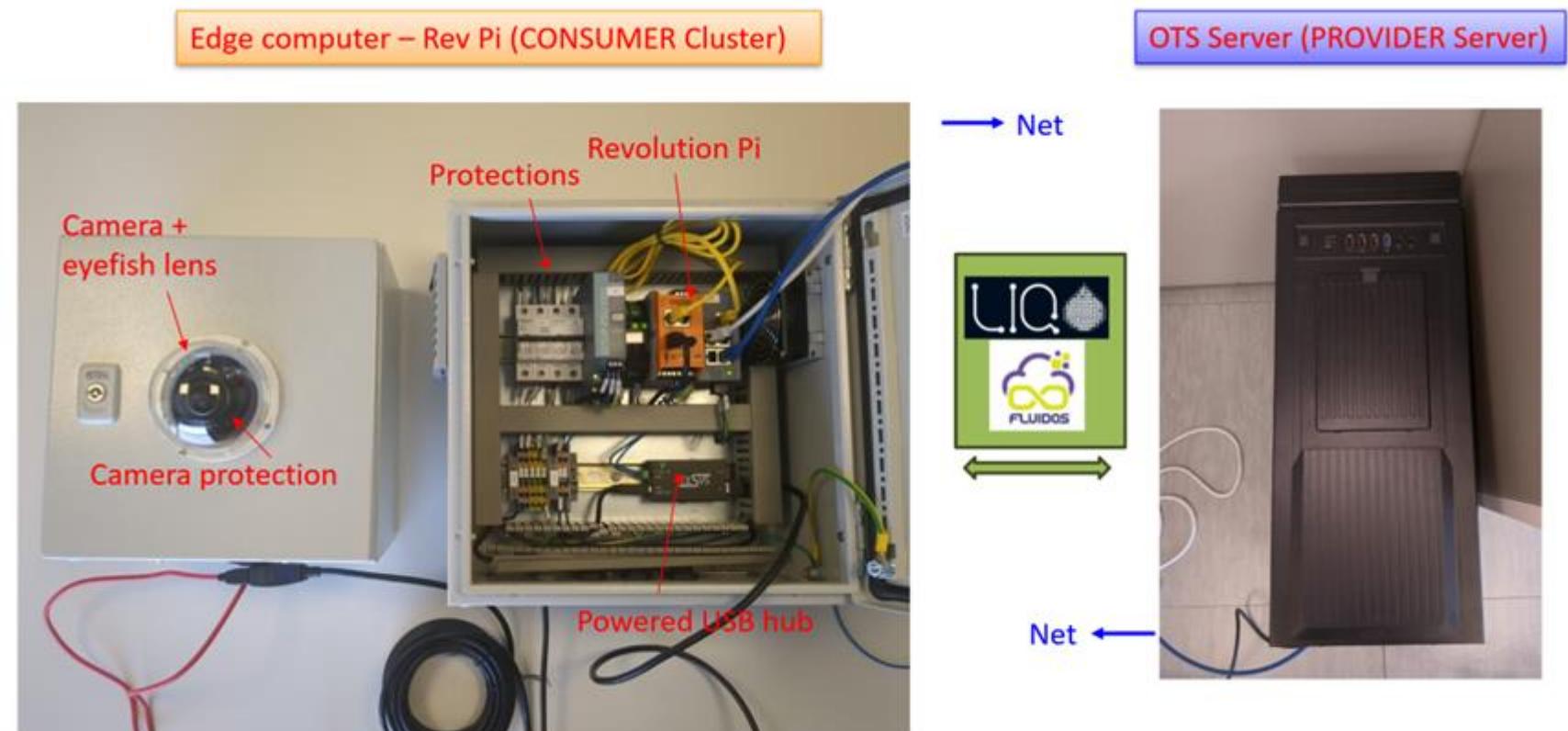
- + Integrated Cloud-Edge System for Energy and Weather AI-based Power Prediction
- + Main Objectives:
 - + Develop a service for short-term prediction (nowcasting) of the energy generation in photovoltaic plants using the FLUIDOS architecture <https://fluidos.eu/>
- + Approach
 - + Combination of sensor data, meteorological simulations, and AI techniques to improve nowcasting accuracy; and the creation of a service that can be easily replicated in any PV power plant.
- + The project is under development (funded by FLUIDOS second open call)
- + Project leader: Nablidot, S.L.

- Short-term prediction of photovoltaic generation will combine:
 - Photos of the sky (camera installation)
 - Sensor data (temperature, wind speed and direction)
 - Weather forecast simulations
 - SCADA data (mainly power generation)
 - Artificial intelligence models
 - Edge-to-Cloud IoT Architecture



- ❑ Hardware installation:

- ❑ Camera
- ❑ Raspberry-Pi
- ❑ Computer



- Two models
 - Based on numerical weather predictions & AI
 - Based on images
 - See video: https://www.youtube.com/watch?v=inTuzMDU_Tw

2025-06-29 04:08:34.681000+00:00



- + Virtual sensors
 - + Air quality in pig farms
 - + Air quality is assessed across the entire farm using a combination of (few) air quality measurements and simulations
 - + <https://www.imasporc.com/proyectos/proyecto-amonia-4-0/>
- + Energy audit in real time
 - + Implemented in the food industry,
 - + Sensors, data processing, and mathematical algorithms are used to determine the efficiency of equipment or processes in real time. This helps to issue alerts when efficiency decreases due to improper operation, equipment deterioration, or maintenance needs and to identify opportunities for energy improvement in equipment or processes.
 - + The calculations can be done using local devices (Edge computing) without the need for cloud computing.
- + Please don't hesitate to contact us if you are interested



Salvador Allende 75, Zaragoza, 50015 (Spain)



<http://www.nabladot.com>



976 076 623



agomez@nabladot.com