DYDAS

The DYDAS project involves the creation of a platform capable of handling large volumes of dynamic data, enabling the public sector and industry to benefit from large-scale data analysis.

Emerging technologies are opening a new information age.

Information today is based on the ability to collect and process vast amounts of data, millions of times more than in the last 10 years. This revolution is taking place in terms of quantity and variety. It is happening thanks to the rapid development of IoT devices, sensors, intelligent automation systems and all new M2M data communications. In this context, the ability to handle large amounts of data is related to the need for adequate infrastructure HPC (High Performance Computing) and related implementation techniques.

It is in this context that the DYDAS project was born, funded by the CEF TELECOM 2018.

In line with the objective of the CEF 2018 work programme and the CEF-T-5 call, the project will contribute to the European data infrastructure by improving the sharing and re-use of public and private data. By enabling the use of dynamic data sets such as Earth observation satellite and vehicle data, promoting HPC-based R&D through an integrated research laboratory and scientific knowledge and collaboration system, offering easy-to-use HPC-based services and tools, through specialised interfaces, and designed to provide different user experiences to a wide range of users.

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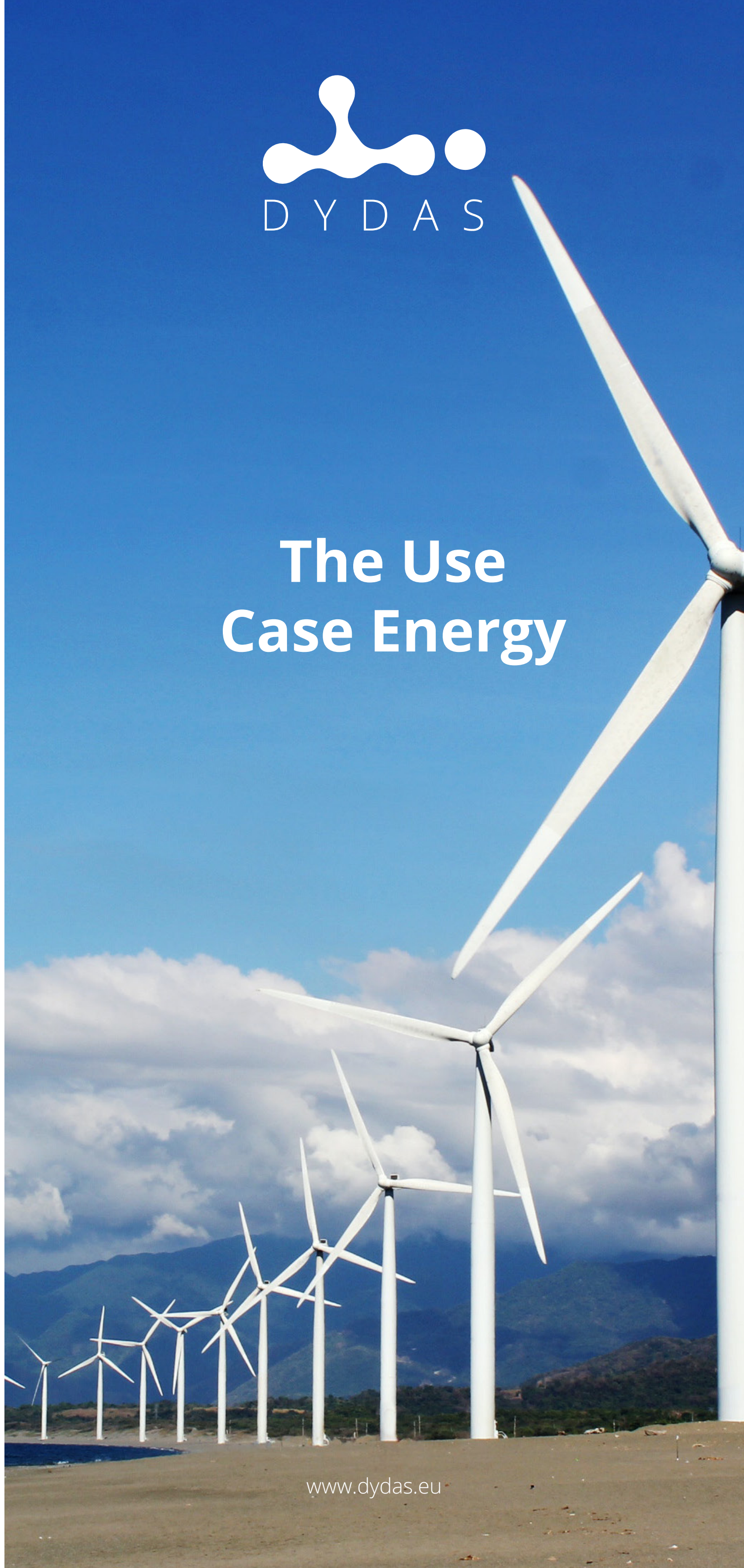
FONDAZIONE links PASSION FOR INNOVATION

GMATICS BIG GEOSPATIAL DATA MADE READY

ENEA

anci lazio

Co-financed by the Connecting Europe Facility of the European Union



DYDAS

The Use Case Energy

www.dydas.eu

What

In the current energy transition, **Renewable Energy Sources** are identified as key enablers for the achievement of the ambitious European target of climate neutrality by 2050; among them, **solar** and **wind** energy play a crucial role.

This use case objective is to test and validate the DYDAS platform by exploiting **meteorological forecast** techniques and using **aerial satellite information imagery** to facilitate and boost up the **assessment of both energy demand and power production**.

Considering the strong dependency on resource availability, the **localization of the resources** and the related infrastructure is essential for an efficient and strategic energy planning. Given the role of electricity in the energy transition, the focus is on power generation from **photovoltaic plants** and on-shore and off-shore **wind farms** located in Italy.

The aim of the use case is to **estimate the potential local power production**, by collecting information about technical features and geo-localization of real plants, and integrating them with georeferenced climatic variables, which can influence the electricity production (e.g., air temperature, solar irradiance, etc.).

Moreover, the resulting information can also be used by governments, environmental agencies and other companies to **track the adoption of renewable sources** or to **optimize the energy distribution** across the grid.

This use case has been carried out in collaboration with Politecnico di Torino's Department of Energy (DENERG) - IEEM Research group.

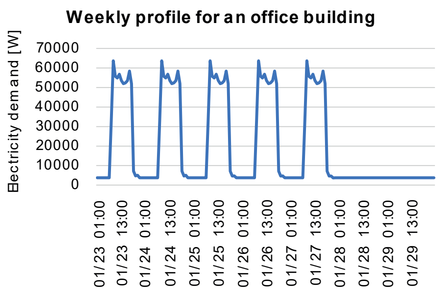
How

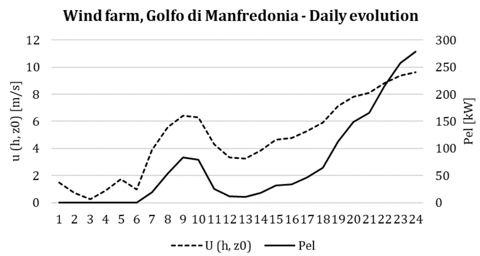
Supply / Demand Forecasts

The computation is based on algorithms that relate, among others, **climatic parameters** of the weather forecast, **characteristics and location of the plants**.

Considering that the objective of the current research is to provide at least a day ahead forecast, a **physical model** has been used since it performs better for short-/medium-term provisions than a statistical or a mixed model, and an hourly step has been selected.

The electric power production from RES has been coupled with the electric power demand by residential and office buildings. A corresponding **building hourly demand profile** has been created from the concept of "**reference buildings**", typical buildings whose characteristics and performances are considered representative of a certain portion of building stock.





U: wind velocity, Pel: electric production

Identification of Photovoltaic Panels

Through the use of **AI** and **deep learning** on aerial images a prototype analysis model has been created for the **identification of photovoltaic panels** for the production of electricity, including domestic installations.

The available data includes, beside 105 largescale aerial images, the data of the Energy Services Manager (GSE) including data characterizing the plants.

The analysis was carried out using joint deep-learning techniques of **Semantic** and **Instance Segmentation**. Our results show that **both segmentation techniques can be very effective** in this task, where instance segmentation techniques represent a good fit when the aim is the localization estimate, while semantic solutions excel when the focus remains the surface delineation.

We also propose a robust and effective post-processing polygonization algorithm specifically designed for PV panels, that transforms the coarse raster predictions into clean and regular polygons for practical use.