

# FOR RENEWABLE ENERGY

Maximising the potential for a sustainable future







### COPERNICUS DATA IS USED TO THE ENERGY POTENTIAL OF



## Empowering renewable energy: The crucial role of EU Space Data

In the face of energy supply shortages and climate change, the demand for **renewable energy** is rapidly increasing. Driving this demand is the fact that renewables are **reducing greenhouse gas emissions and transitioning the world towards a sustainable future**.

To expedite this transition, having access to timely and accurate data is crucial as data is what enables us to make informed decisions about the deployment and management of renewable energy infrastructure.

The EU Space Programme provides that data.

Through its flagship components Copernicus and Galileo, EU Space provides invaluable data to renewable energy projects, including resource assessment, planning and development, construction, operation and maintenance.



#### GNSS for renewable and smart energy

Galileo, Europe's Global Navigation Satellite System (GNSS), provides enhanced positioning and timing information and offers numerous applications of interest to the renewable energy sector. For example, Galileo can be utilised for time synchronisation in smart energy grids, as well as for mapping sites during planning and for providing positioning during construction, installation and maintenance.

- In the future, smart energy will enable seamless communication among all energy market participants, resulting in more responsive energy supplies. Galileo will play a crucial role by providing a highly accurate and reliable means of synchronising intelligent grid sensors, ensuring the successful and efficient operation of smart grids. This synchronisation infrastructure is essential for achieving such benefits as cost reduction, improved efficiency and the seamless integration of energy sources – including renewable energy.
- Whether using traditional means or navigational drones, Galileo-enabled GNSS receivers are integral to the mapping of sites during the construction phase. They also support such maintenance tasks as inspecting solar panels or wind turbines using drones.

#### Why Choose Galileo?

The freely available <u>Galileo Open Service</u> offers the following advantages:

- **1.** Improved accuracy and availability through multi-GNSS: Augmenting existing systems like GPS with Galileo increases GNSS accuracy and availability.
- 2. Excellent performance: Galileo enables users in the timing and synchronisation domain to access accurate and robust timing signals.
- 3. Enhanced resilience: The <u>Galileo Open Service Navigation</u> <u>Message Authentication (OSNMA)</u> enhances the robustness of GNSS timing and positioning by providing a Navigation Message Authentication to help detect spoofing attacks.

By leveraging the benefits of Galileo, renewable energy projects can optimise their operations and ensure reliable synchronisation.



#### **Copernicus data in action**

Copernicus, the European Union Earth Observation programme offers an extensive range of data and information on the Earth's atmosphere, land and oceans. This wealth of data can be used to support various applications linked to renewable energy sources, including ocean energy, solar energy, wind energy, biomass energy and hydropower throughout their entire lifecycle.



With Copernicus, it becomes possible to forecast or evaluate the potential energy yield of a specific area during the planning, design and operation phase of the project. For example, renewable energy projects can:

- Analyse Copernicus' free and open data on historical solar and wind resource availability to assess the economic viability of a solar or wind power plant.
- Use Copernicus data to monitor and forecast snow, ice and river runoff to help plan the placement of a hydroelectric dam.
- Leverage Copernicus data on wind speed and direction and land use and terrain to optimise the placement and operation of wind turbines.
- Rely on the <u>Copernicus Atmosphere Monitoring Service's</u> (<u>CAMS</u>) daily forecasts on atmospheric conditions like aerosols or dust, both of which can affect energy yield, to better plan for energy trading.

Additionally, Copernicus offers a wide array of products and information to support other activities, including:

- Planning: <u>Copernicus Climate Change Service (C3S)</u> ERA5 data, along with C3S climate projections, can facilitate the planning process for the energy grid extensions and risk assessments needed to adapt to increased renewable energy production and climate change.
- Installation: Copernicus can help assess the level of risk by providing data on natural risks, thereby preventing/mitigating the effects of adverse events during energy asset installation (e.g., <u>Copernicus Marine Service (CMEMS)</u> ocean data for offshore wind platforms installation).
- Monitoring and risk assessment of energy infrastructure: Sentinel images and <u>Copernicus Land Monitoring Service</u> (<u>CLMS</u>) data provide detailed information about land cover, enabling effective monitoring and management of renewable energy infrastructure. Changes in land use, third-party activities and vegetation cover can be tracked to identify potential risks and optimise infrastructure maintenance.
- Maintenance: <u>CAMS'</u> daily forecasts on such atmospheric conditions as dust or pollen can support maintaining and cleaning solar panels or wind turbines.

Copernicus also plays a vital role in conducting **environmental impact assessments** of renewable energy projects. It helps evaluate a project's potential impact on land use change, habitats, ecosystems and biodiversity, as well as on water resources, air quality and climate change. For example:

- Monitoring land use change with Copernicus Sentinels and CLMS data is crucial when producing biofuels on existing agricultural land. It is because such land use changes as converting forests into agricultural land can lead to CO<sub>2</sub> emissions.
- Copernicus-based environmental impact assessments can help EU Member States identify acceleration areas where the deployment of renewable energy will have a minimal impact on the environment while expediting permitting procedures.



#### Why Choose Copernicus?

- 1. Accurate and reliable data: Copernicus provides a range of data products that undergo validation and quality assurance by a team of experts, ensuring their accuracy and reliability.
- Easy access: Copernicus data is freely and openly accessible to everyone, available through various tools and platforms.
- Customisable solutions: Copernicus data can be tailored to meet specific project needs, accommodating both small- and large-scale deployments.

To learn more about how Copernicus can support your renewable energy projects, visit Copernicus.eu and explore the relevant Copernicus services.

## **EU Agency for the Space Programme**

EUSPA provides safe and secure European satellite navigation services and promotes the commercialisation of Galileo, EGNOS, and Copernicus data and services. It also coordinates GOVSATCOM, the EU's governmental satellite communications programme, and is responsible for the Programme's Space Surveillance and Tracking (SST) Front Desk operations service. By fostering the development of an innovative and competitive space sector and engaging with the entire EU Space community, EUSPA contributes to the European Green Deal and digital transition, the safety and security of the Union and its citizens while reinforcing its autonomy and resilience.

#### The EU Space Programme

The <u>EU Space Programme</u>, composed of Galileo, EGNOS, Copernicus, GOVSATCOM, Space Situational Awareness and IRIS<sup>2</sup>, is the first integrated space programme created by the European Union to support its space policy, address societal challenges such as climate change and technological innovation, support the EU internal market – and more.

#### Galileo

<u>Galileo</u> is Europe's Global Navigation Satellite System. It provides accurate, reliable and precise positioning, navigation, timing and safety services. Galileo is designed to provide Europe and European citizens with independence and sovereignty while creating a multitude of services and applications across sectors, ranging from aviation and maritime to agriculture and locationbased services.

#### EGNOS

The European Geostationary Navigation Overlay Service (EGNOS) is Europe's regional satellite-based augmentation system (SBAS) used to improve the performance of global navigation satellite systems like GPS and soon, Galileo. EGNOS uses a set of geostationary satellites and a network of ground stations to increase the accuracy of existing Global Navigation Satellite Systems.

#### Copernicus

<u>Copernicus</u> is the European Union's Earth Observation programme, looking at our planet and its environment to benefit all European citizens. It offers information services that draw from satellite Earth Observation and in-situ (non-space) data.

#### **IRIS**<sup>2</sup>

The <u>IRIS<sup>2</sup></u> Satellite Constellation is the European Union's answer to the pressing challenges of tomorrow, offering enhanced communication capacities to governmental users and businesses while also ensuring high-speed internet broadband to cope with connectivity dead zones.

#### GOVSATCOM

The EU <u>GOVSATCOM</u> initiative will ensure the long-term availability of reliable, secure and cost-effective governmental satellite communications services for EU and national public authorities managing security critical missions and infrastructures.

#### Space Situational Awareness

To mitigate collision risks between EU Space satellites and other spacecraft and debris, the EU established a set of capabilities through the <u>Space Situational Awareness</u> (SSA) component of the EU Space Programme. An integral part of SSA is <u>Space Surveillance and Tracking</u> (SST). SST uses a network of ground-and space-based sensors and other infrastructure to survey, track and protect EU Space assets from artificial space objects orbiting Earth (mostly debris from launchers or satellites).

# Interested in learning more about EU Space for rail?

Download the EUSPA EO and GNSS Market Report here:







Linking space to user needs

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