



Monitoring with drones in the **energy industry**

2021



Drone technology

a game changer

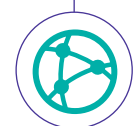
Drone technology can be a game changer for the energy industry. Implementation requires a dedicated road map, linked with an end-to-end strategy, in order to ensure alignment with business vision and needs.

Several market trends are having an impact on the energy industry and make adoption of drones a sound business decision:

01 Innovation management as a core competence for energy players



Innovation is causing major disruption to traditional business models, while at the same time opening up numerous opportunities. Sourcing and enabling innovation is expected to take various forms, such as the establishment of dedicated internal functions, crowdsourcing, employing academics or external specialised providers, as well as implementation of surveillance with drones.



To maintain and improve competitive edge, players in the energy sector need to create a robust process for fostering continuous, sustainable innovation.

03 Minimum effort for maximum results



Close-up imagery with a high level of detail leads to a better understanding of potential defects and brings additional value in determining the best course of action, all while avoiding the safety risks and long man-hours of classic methods.



In this fast-paced environment, with time being one of the most valuable resources, fast deployment and reduced inspection time is critical.

02 Energy sector players to maintain focus on green energy going forward



Recent years have been characterised by a growth in the generation of renewable electricity, enabled by EU-wide decarbonisation targets. As renewable energy generation becomes more popular, the production and maintenance costs of these technologies continues to decrease.

Energy sector players are expected to consider diversification into renewables, both to modernise and to ensure the sustainability of their businesses and profitability.

Who are Skyline Drones?

Skyline Drones is the *#1 Drone Service Provider* in Romania



Flight certified pilots



Compliance with all necessary **regulations and certifications**



Investment of over **€350 k**



Corresponding insurance for **€1.3 M**



Proven experience in the energy sector



Cutting edge technology



National and Eastern European coverage



Multiple teams



All sensor types (**RGB, multispectral, thermal, laser**)



All types of **UAVs (multirotor, fixed-wing, interior, UTM)**

over 5,000 flight hours and over 1,000 missions



Drones can help electricity producers by their use in:



Photovoltaic power stations

Detection of module defects at cell level, diodes and connexions.

Identifying module anomalies, by spotting delamination or other defects of the panels.

Detection of alignment issues of tilt or non-tilt mounted solar panels.

Spotting shadowing, shattering & soiling caused by vegetation, other structures, dust, birds or other debris.

Spotting string issues like warm, offline or having reversed polarity.

Detection of weather damage caused by storms, floods, high winds, snow or other meteorological phenomena.



Wind power stations

Detection of structural defects like delamination or faulty bounding.

Detection of corrosion & erosion marks.

Detection of hidden defects & failures that cannot be observed through human visual inspection.

Infrared scanning of the body and blades for structural defects.

Inspecting and reporting possible problems in hard-to-reach areas.

Reducing safety risks associated with inspections performed by humans.

Performing flights for preventive maintenance & real-time inspections.



Towers and power lines

Visual inspection of towers & power lines.

Identification of rusted, corroded or damaged bolts.

Conducting infrared inspections of structures and equipment.

Inspecting weather damage produced by thunderstorms or other adverse weather conditions.

Easy access to areas which are hard-to-reach for human personnel.

Spotting potential damage from vegetation encroachment or other types of structures.

Network inventory and GIS integration.



Hydroelectric power stations

Assessing structural integrity and highlighting issue areas in hard-to-reach places.

Detection of anomalies, deposits and erosion, in the infrared spectrum.

Generating a point cloud and 3D models for detailed analysis.

Inspection with specialised drones for confined spaces and hard-to-reach places.

Volume calculation using only drone data.

Creating georeferenced RGB & multispectral maps of the surrounding area.

Generating contour lines, 3D surface models and elevation profiles, using DSM & DTM.

HOW Drones can improve efficiency and performance ?

01

Inspection time reduced by up to 90%

02

Costs reduced between 50% and 90%

03

Efficiency improved through detection of 10 times more defects and anomalies compared to manual testing methods

04

Increased safety through limiting human intervention

05

Scalability is ensured through managing more parks with a reduced number of technicians

06

Reduced downtime



Typical surveillance for photovoltaic power stations

Categories	Actions
Module defects	Detection of defects at the level of individual cells, multiple cells, PID, hot modules, diodes, double diodes.
Shadowing	Spot shadowing that can be caused by vegetation, surrounding structures and even adjacent solar rows.
Shattering & soiling	Easy detection of modules that have cracked glass, dust, bird droppings and other debris.
String issues	Spotting strings that are warm, offline, with reversed polarity and those that have completely failed.
Alignment	Easy detection of solar panels that are stuck or have angle discrepancies (including for those mounted on tilt trackers).
Inverter & combiner	Spot off-nominal or offline combiners or inverter anomalies that could pose a serious threat to efficiency.
As-build defects	Easy detection of discrepancies from the as-build documents, shown through missing modules or incorrect builds.
Weather damage	Detection of damage generated by hail-storms, flooding, windstorms, tornados and other natural phenomena.
Module anomalies	Easy spotting of delamination and other defects that are commonly found on both new and old panels.



Typical surveillance for wind power stations

Categories	Actions
Delamination	Detection of common structural defects, such as delamination or bad bounding.
Structure inspection	Finding, recording and highlighting areas that need attention in hard-to-reach places.
Thermal inspection	Checking, in the IR spectrum, a large area of the blade for structural defects.
Erosion & corrosion	Easy detection of any type of erosion or corrosion mark.
Internal damage	Detection of hidden defects and failures that visual inspections might have missed.
Measurements	Inspection that offers the possibility to measure certain areas of defect.
Gearbox & brake	Easily spotting breakdowns in the brake mechanism or in the gearbox.
Real-time inspection	Live streaming all data in real-time for on-the-spot inspections and decisions.
Preventive flights	Regular preventive maintenance to sustain peak turbine performance.

Typical surveillance for towers and power lines

Categories	Actions
Structure issues	Finding, recording and highlighting areas that need attention in hard-to-reach places.
Thermal inspection	High-end thermal inspections and radiometric maps in the IR spectrum.
Corrosion marks	Detecting structure parts that show signs of corrosion and need to be treated against the natural elements.
Assembly check	Detecting assembly errors in hard-to-reach or dangerous areas.
Corridor mapping	Broad coverage and automated flights for long, narrow mapping projects.
Real-time inspection	Live streaming all data in real-time for on-the-spot decisions.
GIS	Network inventory, including grid elements, and GIS integration.
DSM & DTM	Digital representations of the earth's surface, useful for generating contour lines, 3D models and elevation profiles.
Intruding vegetation	Identifying various types of vegetation that could interfere with power lines.

Typical surveillance for hydroelectric power stations

Categories	Actions
Structure inspection	Structural integrity assessment. Finding, recording and highlighting issue areas in hard-to-reach places
Thermal inspection	IR spectrum inspection of surfaces for anomalies, deposits and erosion.
Point cloud & 3D models	Accurate 3D measurements and faithful reconstruction for detailed analysis.
Interior inspections	Done using specialised drones for confined spaces and hard-to-reach places.
Volume calculation	Accurate and fast volume measurements using only drone data.
Digitisation (CAD)	Creating a digital history for evolution and defect monitoring.
RGB & multispectral	Georeferenced maps for a clear view of the environment.
DSM & DTM	Digital representations of the earth's surface, useful for generating contour lines, 3D models and elevation profiles.
Real-time inspection	Live streaming all data in real-time for on-the-spot decisions.



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