

Aeromine[®] 5000

Wind energy system



Aeromine
technologies

Aeromine[®] 5000 System

Buildings are significant greenhouse gas emitters, and large commercial and industrial asset owners are under pressure to decarbonize their portfolios.

Aeromine's distributed wind energy system proposes a scalable, energy intensive solution that can easily be integrated into local installations on par with solar.

Read more about the technology, preparation and installation on the following pages.



More renewable energy on your roof

An Aeromine system consists of multiple 5kW Aeromine units, spaced 17ft (5 m) apart on the leading edge of a building, facing the predominant wind direction.

An Aeromine system installs along the face of the building, leaving plenty of space for solar panels on the rest of the roof. Such renewable mixes even out temporal variations and increase the resilience of the whole installation.

A meaningful system is generally composed of 10 or more units installed on a larger building, preferably with a long façade.



Complementarity with other renewables



Highly scalable



Ease of integration

Safe, clean, resilient energy

Aeromine units are made out of low grade and generally recyclable materials, comprise very limited wearables and bypass entirely the use of environmentally problematic materials such as silicon or rare earth minerals.

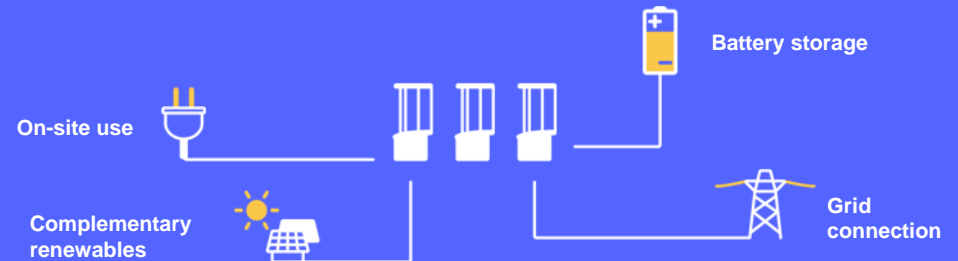
The Aeromine system is running virtually motion-, vibration- and noiseless, resulting in minimal impact on the surrounding environment, including wildlife.

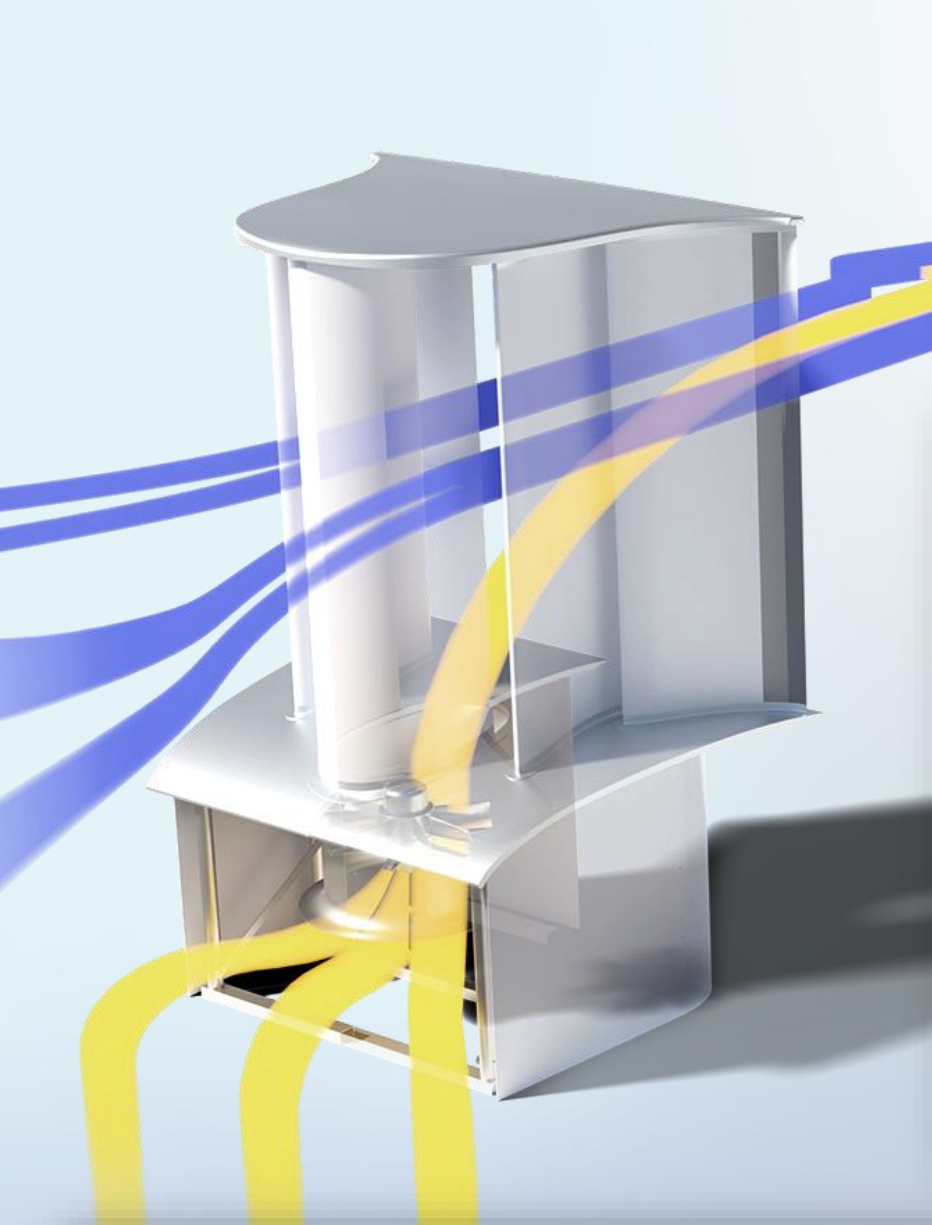
The operation is simple and safe and requires very little attention.

Versatile integration

Aeromine is a versatile and energy intensive addition to on-site energy strategies capable of boosting decarbonization plans for C&I assets and improving building resilience.

The AC output of each Aeromine unit is easily integrated with your building and other energy assets giving you the best possible result for each and every building.



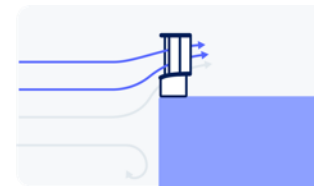


Established principles in a novel usage

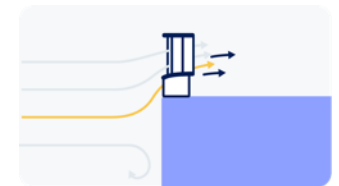
Aeromine is designed to sit on the edge of a building facing the predominant wind direction. The combined wind acceleration provided by the building and the vertical airfoils creates a vacuum behind the propeller. Air is then sucked past the propeller and power is generated.



Buildings accelerate wind as it is pushed up over the edge.



The aerodynamic design accelerates the wind further, creating a low-pressure zone behind the central column.



The low-pressure pulls air through the bottom of the unit, past the propeller. It is this secondary internal flow stream that generates the power.



Motionless design. Renewable energy without noise or vibrations



Wind is a highly effective renewable energy source resulting in high energy output per sqm rooftop



Aeromine's Innovative simplicity, results in **low risk, easy maintenance and inherent safety**

Renewable wind energy is site-specific

Wind is a strong renewable energy resource and regional wind resources have been documented for several decades. Aeromine has developed proprietary tools to forecast Aeromine energy production for buildings across the globe.

These site assessments are important to undertake when reviewing a regional or global portfolio of buildings and planning how to take advantage of the natural resources. Energy profiles from solar and Aeromine often complement each other.

The temporal wind variation of seasons and time of day may be important inputs to match with the load of the building and the energy pricing regime for the region.



Aeromine complements solar as wind energy is often produced at different time of day/year than solar



Wind is a highly effective renewable energy source resulting in high energy output per sqm rooftop



Aeromine's Innovative simplicity, results in **low risk, easy maintenance and inherent safety**

Sun

Solar PV peaks at noon and is not available at night. In certain regions the output can be significantly reduced due to cloud coverage. The further North, the less sun, while Winters can be sunless too.

Solar power peaks every day in the hottest hour of the day with the maximum power current. This is hard on the reliability of the electronics and panels.

UV exposure causes significant inherent degradation of the power output over time. Lightning, rain, snow, and hail can further damage the system.

Wind

Wind is often stronger in the winter, available at night and peaks in the late afternoon, when peak pricing is highest.

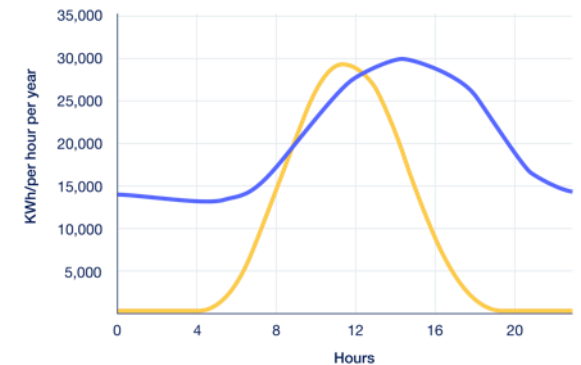
While regional winds are well mapped, a detailed wind analysis is required for site-specific profiles. Aeromine's methods are based on best industry practices to forecast the power performance.

Wind is temperamental, but manageable. It produces peak power when it is cold and windy, so the generator and electronics are not hit as hard as in an equivalent solar system. Aeromine does not degrade over time and thrives in rain and snow.

Daily profile

180 kW-AC
Aeromine

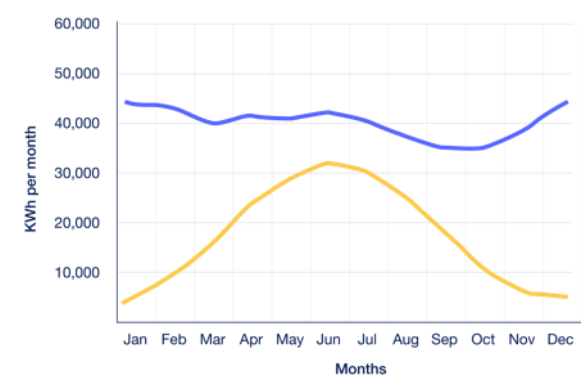
200 kW-AC
(240kW-DC)
Solar



Monthly profile

180 kW-AC
Aeromine

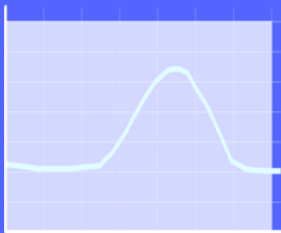
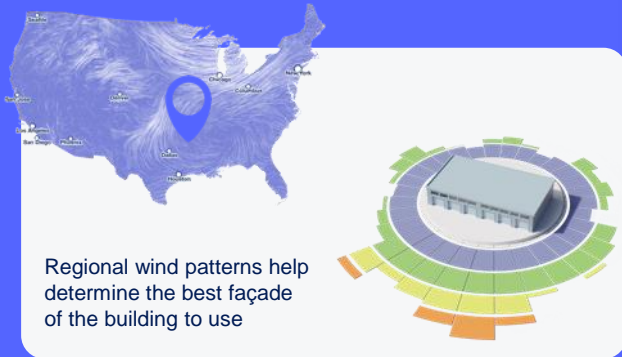
200 kW-AC
(240kW-DC)
Solar



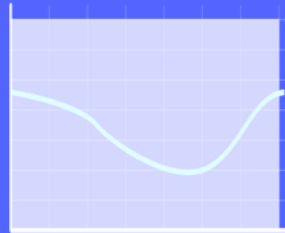
Site qualification & energy impact

1. Preliminary estimates

Using available mean wind speed data, Aeromine Technologies computes building-specific energy roses to identify the facade with the highest wind exposure. Energy generation potential is computed for the year, the month and the hour.



Optimal daily production



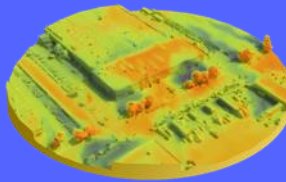
Optimal seasonal production

Input to preliminary energy assessment:

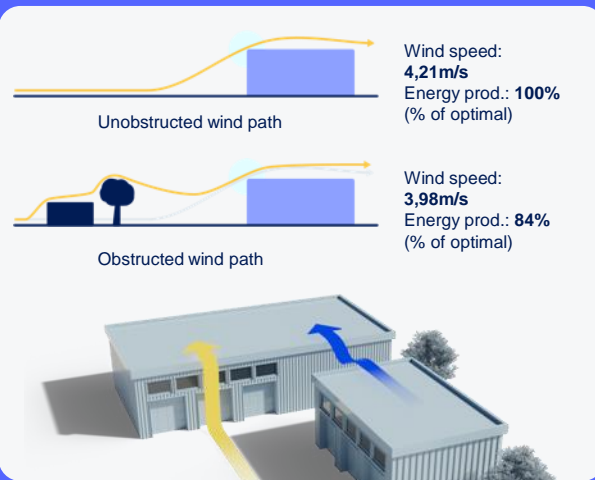
- Building height, orientation, footprint and geo-location
- Long term wind data from climate models corrected with regional airport measurements

2. On-site project design

Incorporating additional site-specific information into the energy assessment increases the business case certainty.



An on-site wind measurement campaign can support higher certainty in some cases

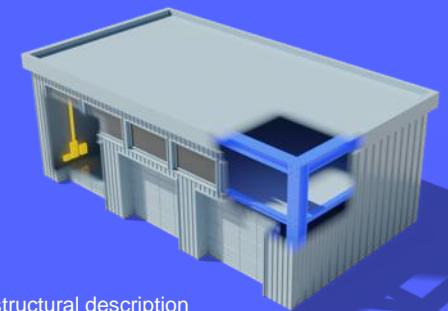


Input for wind shade and refinement modeling:

- Micro-climate mapped by surrounding buildings and vegetation heights
- Supportive photographs from roof view
- Building shape features (parapet, overhang, etc.) with photographs and drawings

3. Project validation

Following the energy analysis, a preliminary structural and electrical documentation of the building is collected, so that a tailored implementation delivery plan can be created.



Electrical and structural description of the building is included to assess potential upgrades

Input to project validation:

- Building structural and electrical description
- Regional building codes (wind load, interconnect requirements, etc.)
- Building energy consumption profile

Energy output

under various conditions

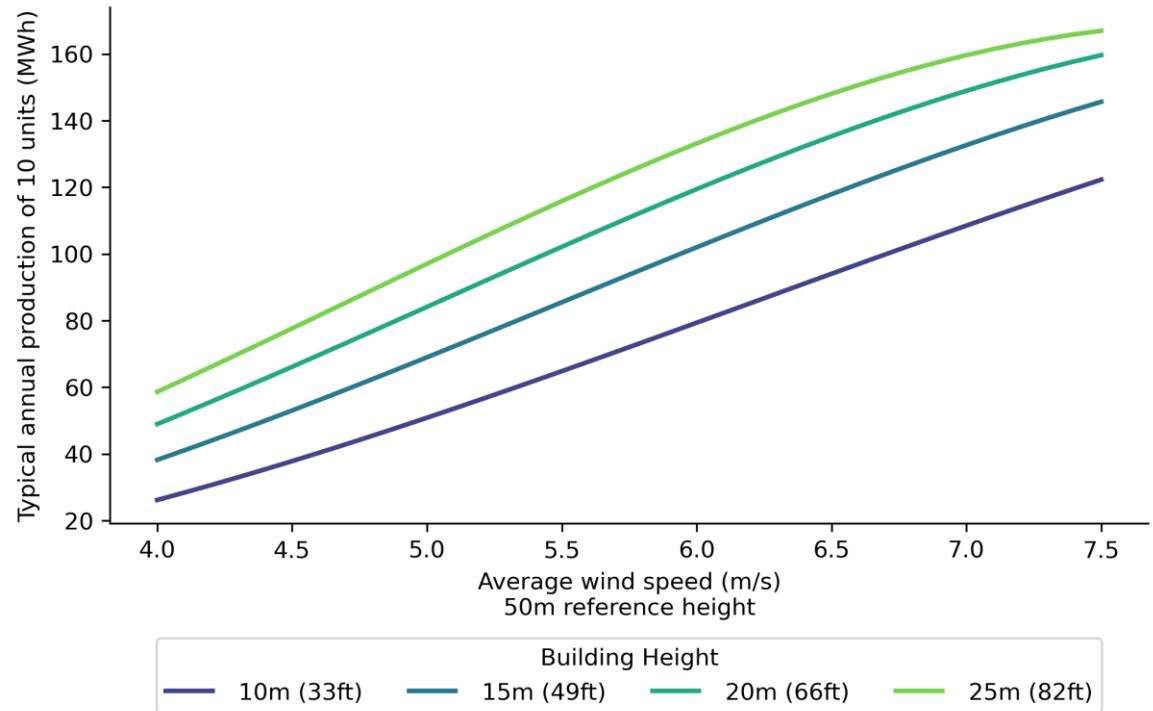
Aeromine® 5000 energy output

Aeromine's energy output depends on many parameters and a detailed assessment is always made by Aeromine Technologies to estimate the expected system performance.

As a rule of thumb, the energy output depends on the building height and the wind resources in the region. The chart to the right shows the *typical* output in a *typical* region based on the average annual wind speed, with reference to 50-meter height (note the wind speed is translated to building height for the calculation).

Hence, a 10 units Aeromine system installed on a 15m (49ft) tall building in an area with 6,0 m/s average yearly wind speeds will generate around 100.000 kWh/year.

The average annual wind speed can be found in wind maps, such as the [global wind atlas](#) or similar regional produced maps.



Calculated for a 50kW system of 10 units occupying 170 ft (50 m) of building face length. The different colors illustrate energy performance at different building heights.

Sea level air density of 1.225 kg/m³ and without building- or vegetation-induced wind shading.

Preparing for

integrating Aeromine

Preparation for the installation of an Aeromine system is comparable to that of a solar PV, although some differences exist.

Aeromine generates AC power and the Windgrabber® controller also outputs AC power. This allows for rather long cable runs, very simple AC collector grids and very flexible placement of the power equipment in the building. Interconnecting an Aeromine system to the grid is no different than a solar PV and must abide by local utility regulations.

From a building permitting perspective and wind load estimation, Aeromine systems are often considered to be rooftop equipment and can be presented that way to regional authorities.



Flexible planning and layout



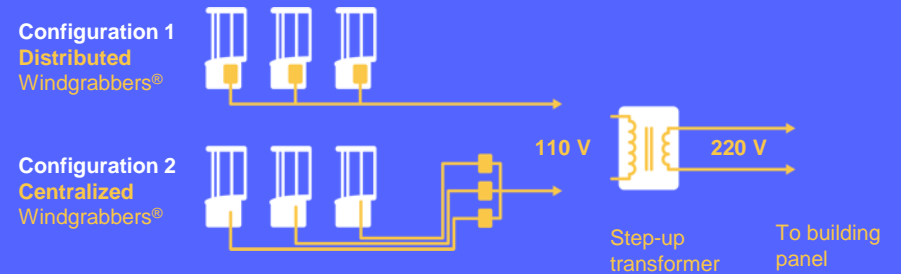
Ease of installation
on a large array of flat roof buildings



Pure AC power,
resilient and safe

Flexible AC-AC electrical system integration

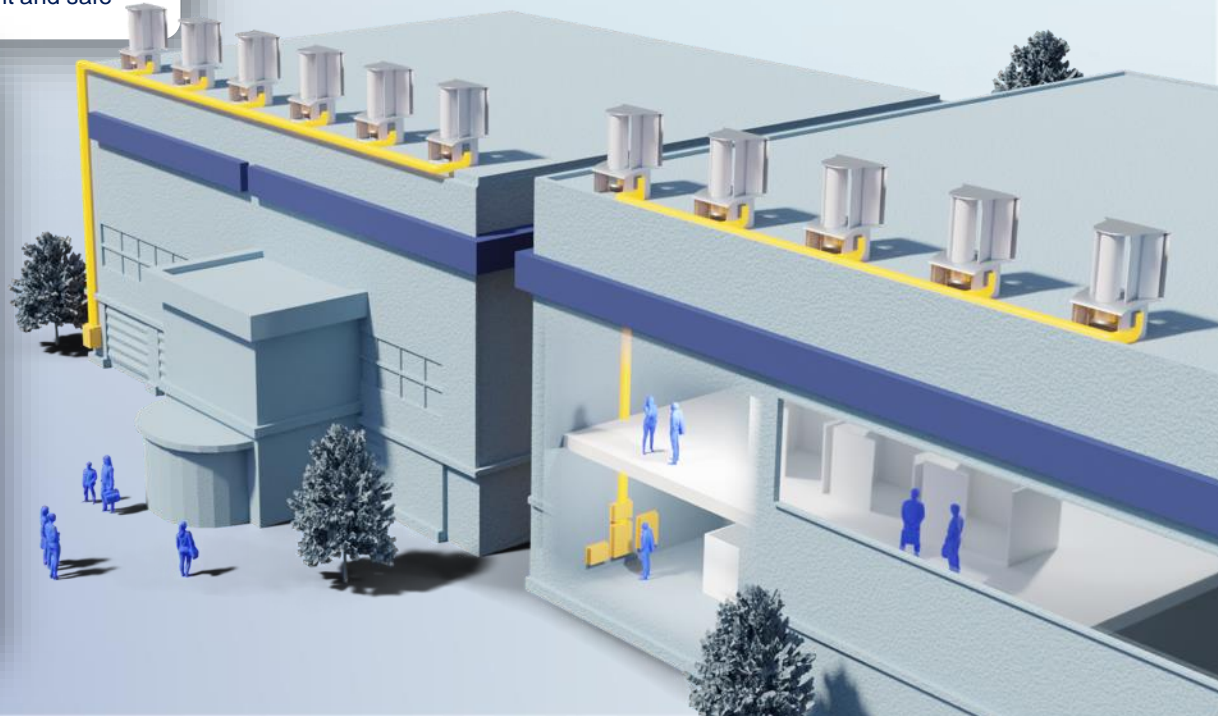
Each Aeromine propeller drives a 220 VAC, 3-phase AC generator and is connected to the AC collector grid via a Windgrabber® controller. The Windgrabber® constantly adjusts the generator's rotational speed for optimizing energy generation in turbulent winds and acts as a fail-safe in case of excessive wind or grid fault. The output of the Windgrabber® is 110 VAC single phase power.



Structural integration

Aeromine is designed to operate in - and resist to - the high gusting wind speeds occurring in many regions of the world, and to behave as a passive rooftop equipment.

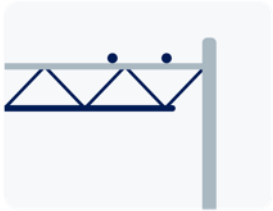
The wind load is distributed into the truss work of the roof, most often through a double railing system onto which the unit is bolted. When parapet heights or truss design do not allow this approach, Aeromine is able to develop specific fixture solutions.



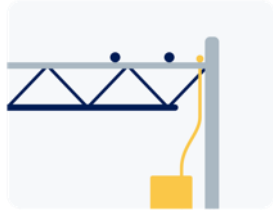
Easy & non-intrusive installation

1. Site preparation

Both the electrical and structural preparation work can be done ahead of delivery and without disturbing the building's operations, ensuring maximum flexibility for our customer.



Anchor points or rails for structural attachment to the building's truss frame



120 VAC collector grid is prepared and connected to main breaker

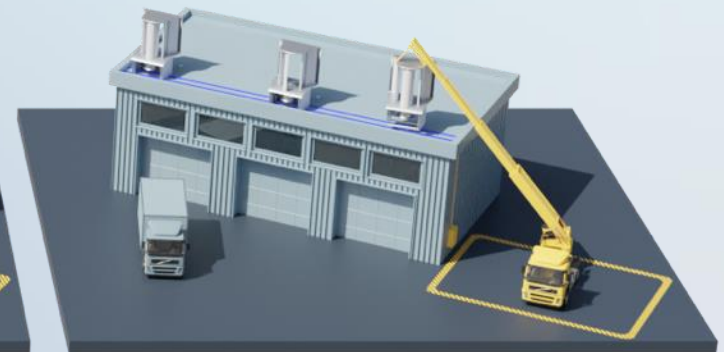
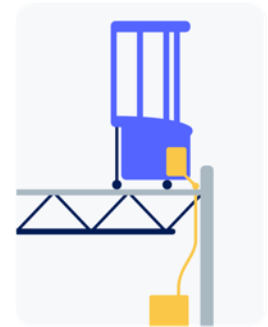
2. Onsite assembly

Aeromine units are delivered in containers to the staging area, where the units are assembled. Individual components can be handled by hand, making preparations easy.

A small telehandler or forklift is required to stand up each unit, so they can be lifted to the roof, with no impact on the building operations

3. Connection

Units are lifted to the roof by an integrated snap lift attachment points and secured to the anchor points on the roof. As the units are connected to the AC collector grid, they can be powered up.



How Aeromine supports

Large scale implementation

Aeromine has the expertise and capabilities to support your decarbonization journey and a large systematic implementation across your portfolio.

Combining best practice wind resource assessment from big wind, local GIS data and expert knowledge on building performances, Aeromine provides robust energy estimates to support energy strategy. We tailor installations to your energetic needs and boost the impact of your decarbonization roadmap, helping you build resiliency across your portfolio, across the globe.

Versatile contexts of implementation

The installation of Aeromine Systems are easily tailored to centralized or distributed setups alike, adapting to your assets and needs.



Distributed (portfolio)

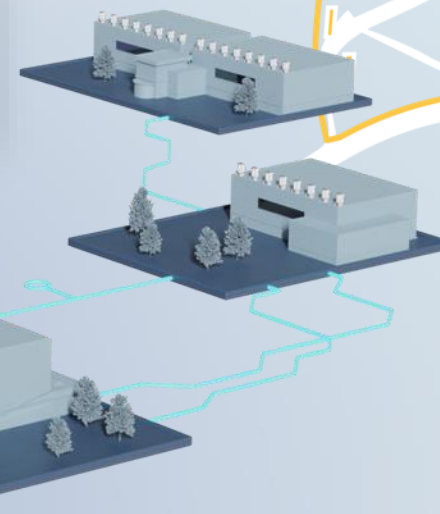
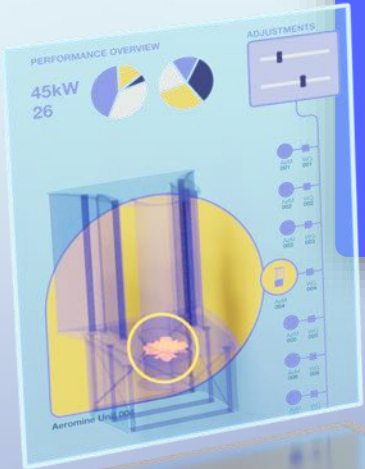


Centralized (campus)

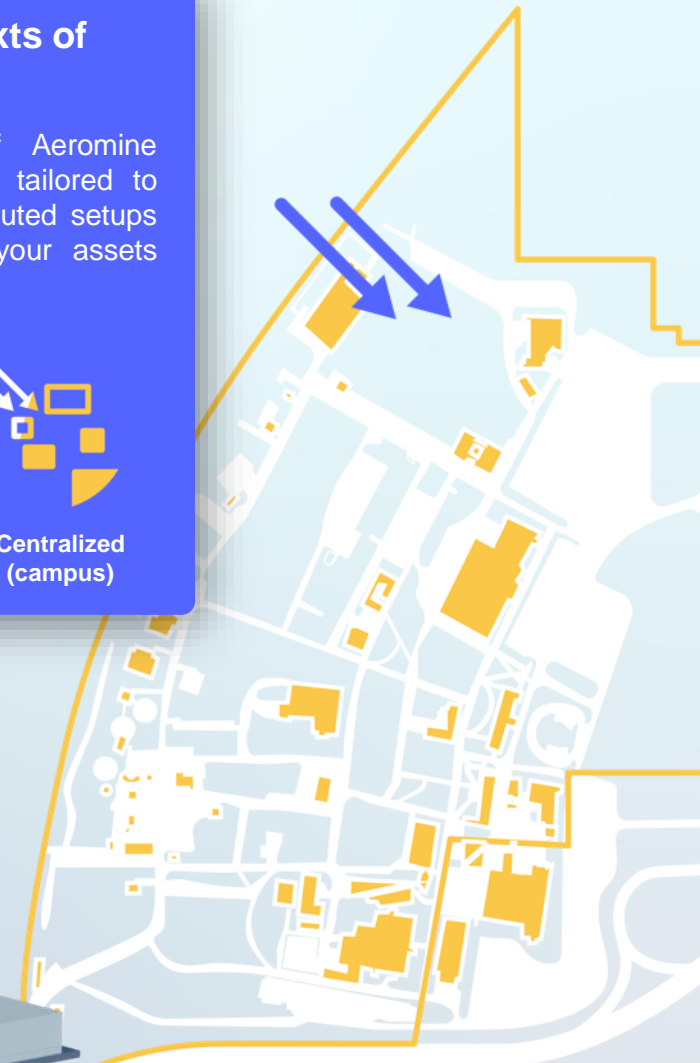
Aeromine cloud services

Aeromine systems can be remotely monitored and controlled, enabling individual units or full system operational changes as well as seamless integration with all your systems.

In the background, the cloud service uses a digital twin and regional weather data to constantly check the installation's reliability and performance.



Distributed assets (left) or condensed layout (top right), Aeromine systems have the specific capabilities required by both configurations.



Contact us!

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A modern building with a glass and metal facade, featuring several white cylindrical structures on the roof. The sky is blue with light clouds.

Aeromine
technologies