

DATA SHEET

HYBRID WIND PALM

18A, 24A, 30A

By



THE HYBRID WIND PALM

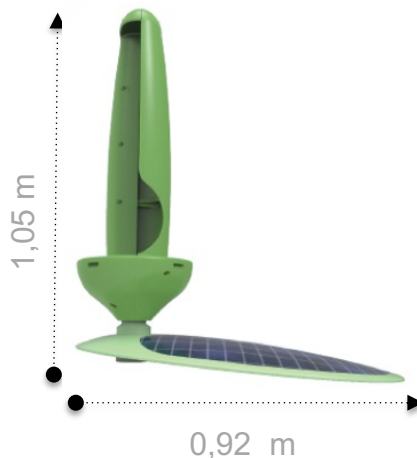
The HYBRID WIND PALM is a Wind Palm equipped with solar petals at the base of the Aeroleaf which provide additional energy while reinforcing its biomorphic aspect.

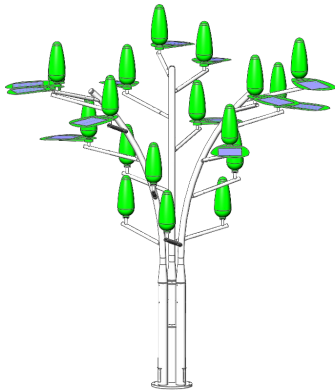
New World Wind has developed a high performance photovoltaic petal which is particularly relevant for windy and/or sunny regions.

As the regular Wind Palm, the HYBRID WIND PALM is composed of 3 to 5 modules carrying 18, 24, or 30 Aeroleaf plus 12, 16, or 20 solar petals.

The Photovoltaic petal is light and thin (less than 800g and 3mm). Besides, it is waterproof and robust. Given its gradient of 5° from horizontal, The solar petal enables an increase of speed of wind when getting close to the edge of the Aeroleaf, improving the efficiency by 5%.

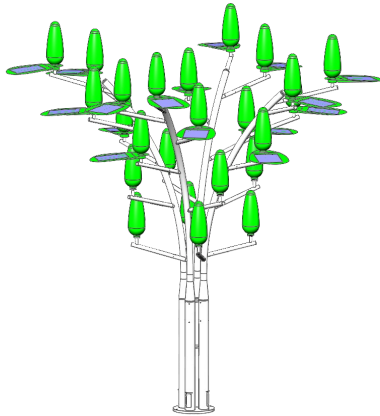
This hybrid system increases the Wind Palm performance while keeping it organic.





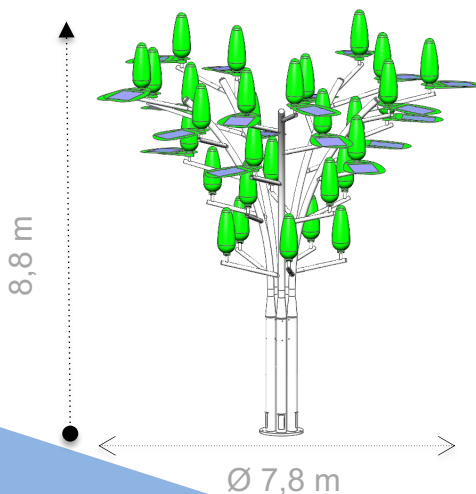
WIND PALM 18 A Hybrid

Max Power	5832 W
Number of solar petals	12
Number of Aeroleaf	18
Power per Aeroleaf	300 W
Power per petal	36 Wc
Weight	1470 Kg



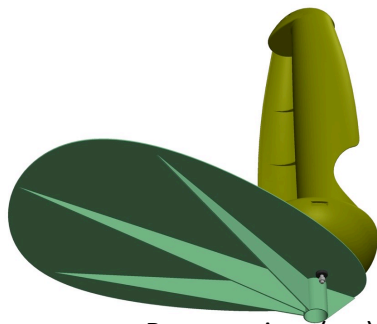
WIND PALM 24 A Hybrid

Max Power	7776 W
Number of solar petals	16
Number of Aeroleaf	24
Power per Aeroleaf	300 W
Power per petal	36 Wc
Weight	1980 Kg

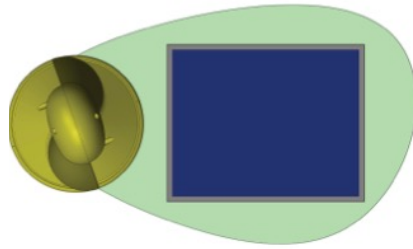


WIND PALM 30 A Hybrid

Max Power	9720 W
Number of solar petals	20
Number of Aeroleaf	30
Power per Aeroleaf	300 W
Power per petal	36 Wc
Weight	2490 Kg



Bottom view (n.c)



Top view (n.c)

The hybrid Aeroleaf maintains the aerodynamic profile of the standard leaf which has been optimized to exploit the weakest winds (production threshold 2.5 m / s of wind) as well as the strongest (up to 43 m / s in continuous, 50 m / s in gusts).

The solar petals are formed from a 2 mm thick semi-flexible photovoltaic film lying on the posterior face of the petal, which is made of aluminum to minimize the load and the efforts to be transmitted.

The solar petals are positioned perpendicular to the leaves at a 5 degree angle to facilitate the flow of the rains.

This slight tilt offers little wind resistance while still allowing airflow to benefit from leading edge acceleration, giving the leaf an energy gain of $\pm 5\%$.

Hybrid Aeroleafs operate perfectly quietly thanks to their small blade radius (little air circulated) and the absence of belts and gears (no mechanical noise).

The solar petals have an optimized photovoltaic surface to take advantage of the best size-weight-cost-energy efficiency compromise.

New World Wind has developed a solar film specially adapted to the petal of the Hybrid Aeroleaf. With 36 Wp per petal for an area of only 28 cm², the petal provides the Aeroleaf with additional energy that is particularly relevant for sunny regions.

Puissance crête: 576 kWc
Surface de modules: 4,25 m²

Résultats de la première année:

Production annuelle (DC) : 1612 kWh
Production annuelle (AC) : 1264 kWh
Productible spécifique AC (P50) : 2 027 kWh/kWp
Productible spécifique AC (P90) : 1 859 kWh/kWp
Ratio de performance : 180,25 %

Valeurs moyennes:

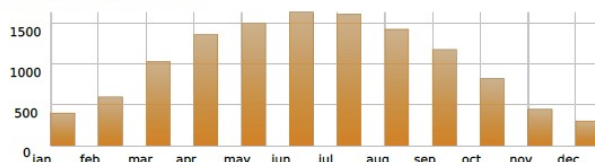
Production annuelle (DC) : 1566 kWh
Production annuelle (AC) : **1229 kWh**
Productible spécifique AC (P50) : 1 970 kWh/kWp
Productible spécifique AC (P90) : 1 807 kWh/kWp
Ratio de performance : 175,14 %

Pertes - Gains (%):

Masques : -0,19
Ombrages partiels : 0,00
IAM (réflexion) : -4,22
LID : 0,00
Encrassement module : -2,00
Température : -3,44
Vieillessement module : -5,09
Tolérance : 1,00
Dispersion caract. : -1,00
Câbles DC : -1,18
Onduleur : -9,30
Ecrêtage : -10,08
Facteur de puissance : 0,00
Câbles AC : -0,71
Indisponibilité : -2,00

Example for a Wind Palm equipped with 16 solar petals

Production mensuelle AC (kWh/mois):

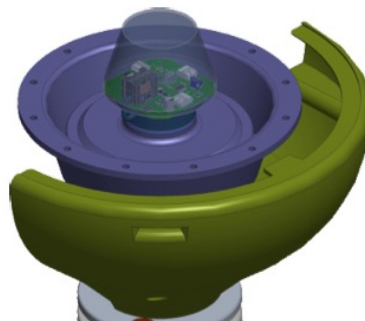
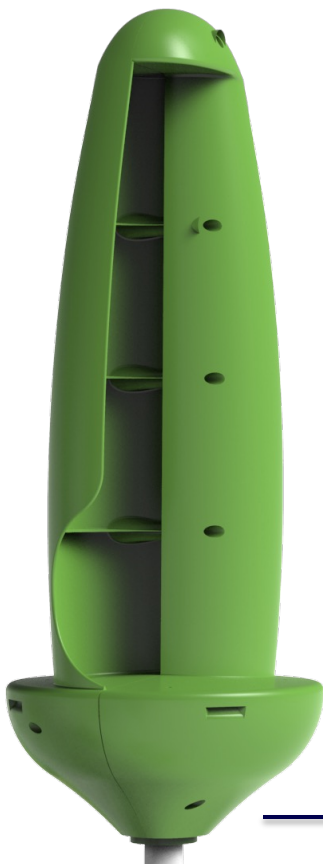


Mois	jan	feb	mar	avr	mai	juin	juil	août	sep	oct	nov	dec
kWh	40	59	103	136	150	163	161	142	117	82	44	30



Aeroleaf characteristics

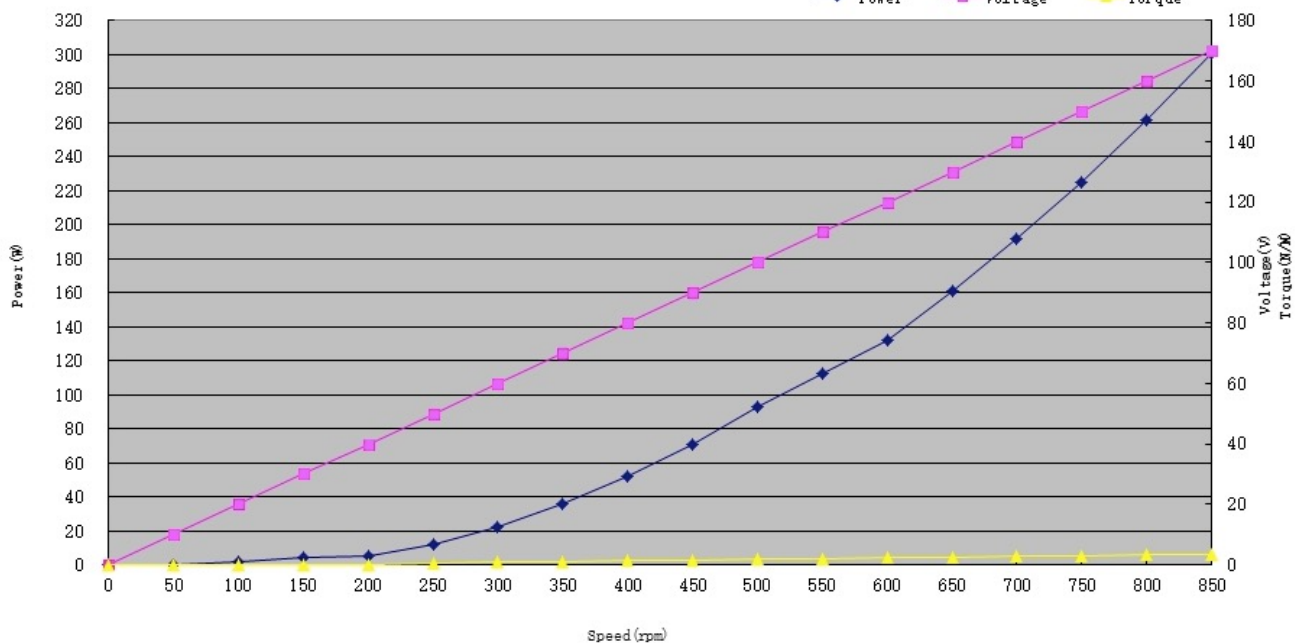
New World Wind has developed a proprietary micro-generator as well as a leaf-shaped blade capable of harnessing the weakest winds and turbulent winds.



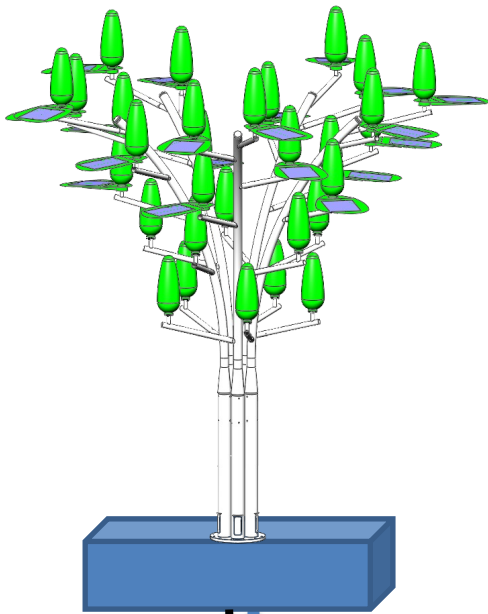
Micro generator NWW

Proprietary technology with electronic card embedded in each Leaf for optimized regulation and maximum efficiency

300W-850RPM-170 VAC

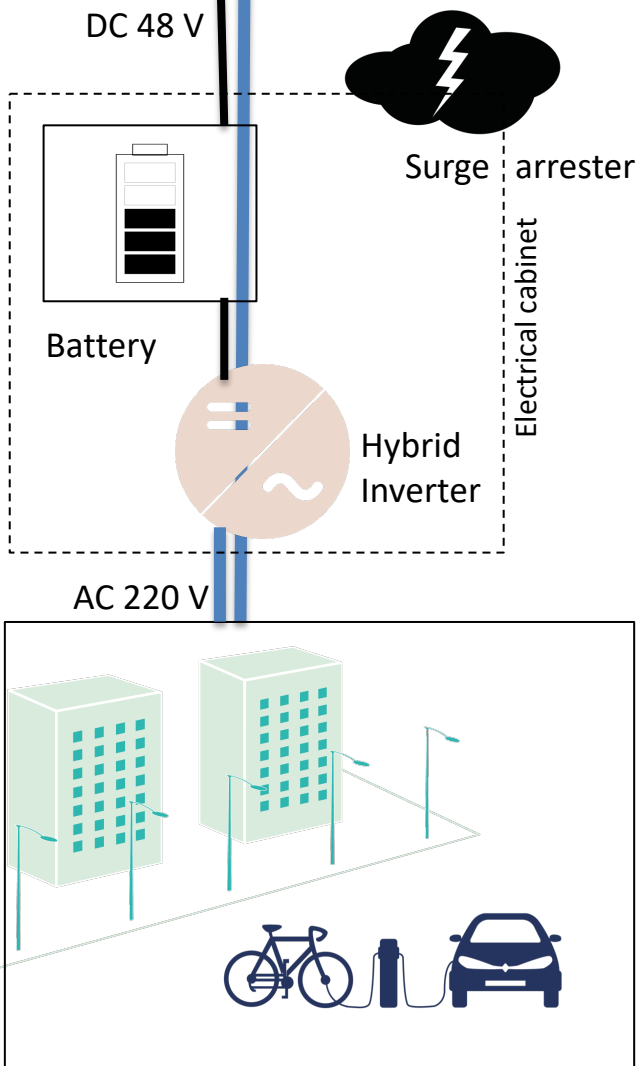


Voltage / Power / Rotation speed by Aeroleaf alone



ELECTRICAL INSTALLATION SCHEMATICS

New World Wind provides an electrical cabinet compliant with the electrical standards in France/Europe. We will comply to your country requirements.



The Electrical cabinet is made of:

- A battery, allowing to temporarily regulate the electricity production to limit peaks and solely for short time needs. It is not for storage.
- An hybrid inverter dedicated to self-consumption that connects directly the leaves and solar petals to the customer's main switchboard (TGBT).
- All the security systems required for commissioning (fuse wire, switchgears, lightning conductor and isolation switch).

As such, the electrical cabinet is readily available for connection to local network.

The Hybrid Wind Palm can be installed in various environments.

New World Wind can help you choose the most suitable configuration for your needs and services, by proportioning the number of leaves and petals according to your budget.

The customer is responsible for the realization of the tree anchorage.
The interface between the anchor and the tree is via a reservation template provided by NewWorldWind

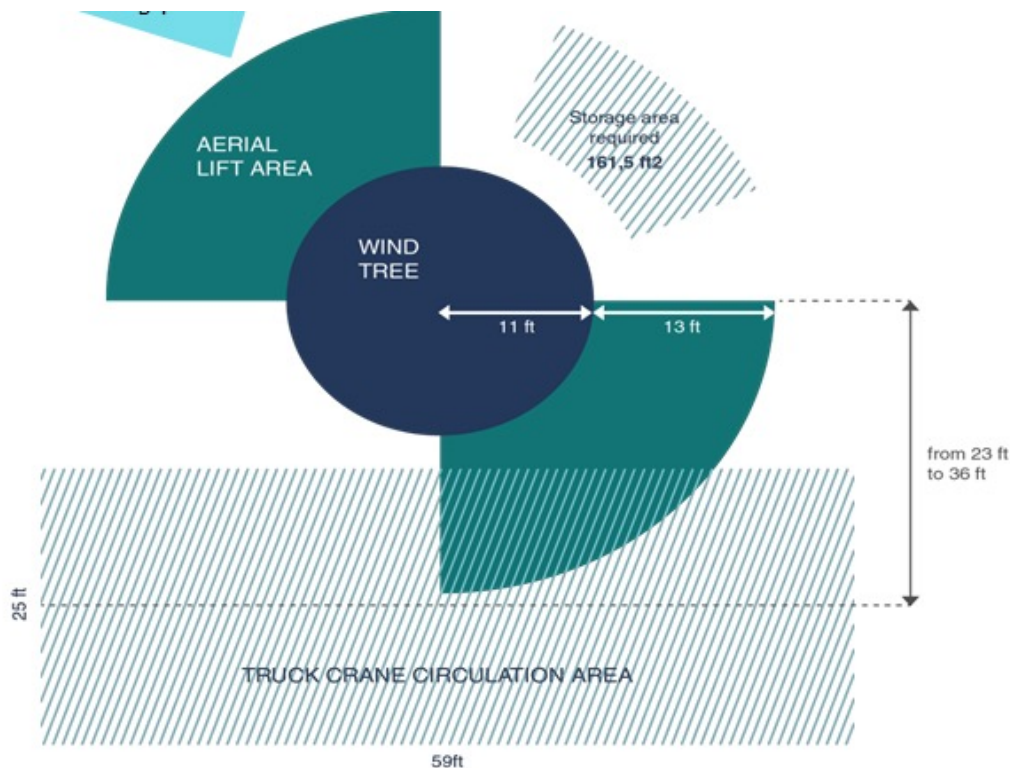
The following responsibilities are excluded from NewWorldWind scope and shall be managed by the Customer:

- Civil work of the Hybrid Wind Palm foundation (solid concrete, including a junction box) based on the schemes provided by NewWorldWind
- Installation of the cable sleeve between the Hybrid Wind Palm and the electrical panel,
- Preparation of the area allocated to the electrical cabinet (if needed),
- Electrical connection to the Customer Low Voltage panel,
- Provision of a secured site and storage area during the installation

The Hybrid Wind Palm doesn't require any administrative approval prior to conduct the work (French requirements, other countries to confirm), because it's a wind system of less 12 meters.

The site works will start upon confirmation the site readiness as per a document to be signed-off by the project owner.

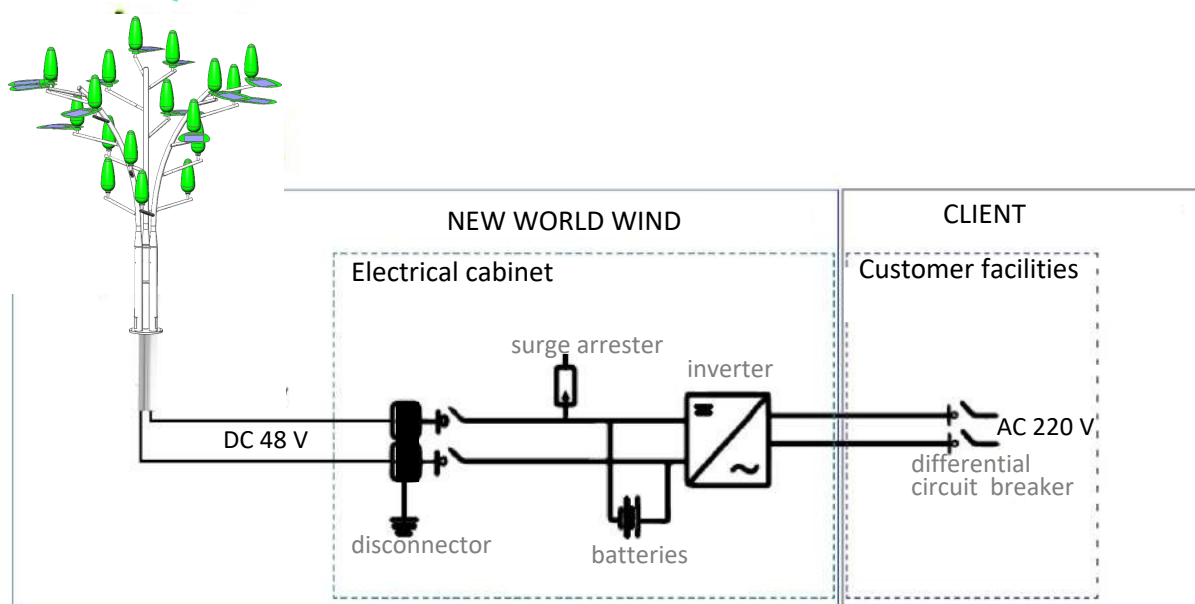
The metallic structure and the Aeroleaf will be delivered and temporary stored on site. the site must be accessible to a crane truck 12 t and 2 telescopic platforms required for handling parts



The client becomes responsible for the Hybrid Wind Palm at delivery. The client becomes the owner of the Hybrid Wind Palm at shipment at factory (ExW incoterm).

D1	D2	D3	D4
Delivery	Installation		Electrical Connection

The Hybrid Wind Palm is based on the concept of on-site generation and selfconsumption of the electricity in the connected building/area.



SCHEMATIC OF ELECTRIC INSTALLATION

The Hybrid Wind Palm is connected to the local grid through the New World Wind electrical cabinet. A dedicated space should be prepared for the cabinet, within a maximum distance of 20 meters. In addition to the Wind Palm and its electrical cabinet, NewWorldWind is also providing the electrical wires between the Hybrid Wind Palm and the Cabinet.

The overall installation is compliant with the current European standards.

In case of specific difficulties, New World Wind can propose adaptations to make the installation possible (on estimate)

The electrical cables sleeves between the Hybrid Wind Palm and the Electrical cabinet is explained in the civil engineering specifications. Similarly, any specific protection and wiring until the Electrical cabinet shall be prepared by the Customer to allow for the connection between the Electrical cabinet and the customer facilities.

MECHANICAL SPECIFICATIONS

Height	8,80 m
Diameter Hybrid Wind Palm	7,80 m
Aeroleaf height	0,97 m
Weight	1470 to 2490 kg
Number of Aeroleaves	18-24-30
Number de solar petals	12-16-20

TURBINE SPECIFICATIONS

Starting speed	2,5 m/s (9 km/h)
nominal wind speed	18 m/s (65 km/h)
Maximum wind	43 m/s continuously, 50 m/s in gusts (180 km/h)

PETAL SPECIFICATIONS

Power per solar petal	36 Wc
Total photovoltaic Power	432-576-720 W
Weight per petal	800 g

ELECTRICAL SPECIFICATIONS

Installed capacity	5832 W to 9720 W
Maximum power per Hybrid Aeroleaf	336 W
Output voltage of the Inverter	110 V - 230 V (50 Hz – 60 Hz)

SITE INSTALLATION

Installation Timeframe	3-4 Days
Storage Area	15 m ²
Max distance between Modular Tree and the electrical Cabinet	20 m

RESPONSIBILITIES

Civil Engineering	Client
Anchoring	Client
Electric sleeves	Client
Hybrid Wind Palm and Aeroleaf installation	New World Wind
Control cabinet installation	New World Wind
Connection of the Tree to the electrical cabinet	New World Wind
Connection to the customer facility (last day of installation)	Client