KLiUX energies

Distributed Energy Solutions

Renewable distributed energy solutions

KLiUX Energies is a U.S. / Spanish company, with an international presence, that specializes in the design, manufacturing and commercialization of distributed energy solutions

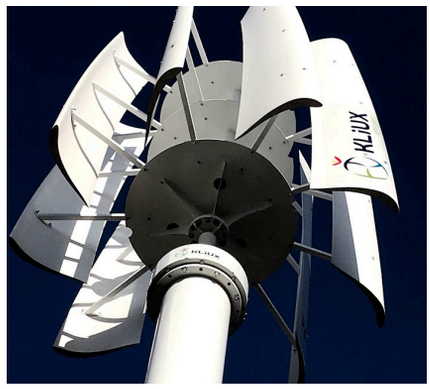
KLiUX Energies International (KLiUX) is a technology based emerging corporate-industrial group with HQ in Chicago, with a global presence as a leading manufacturer of its proprietary technology in Small Wind vertical-axis-wind-turbines (**VAWT**).

KLiUX has an important network of strategic suppliers around the world, and several industrial/technological allies in Spain, where R&D and manufacturing activities takes place.

KLiUX manufactures and sells worldwide the Kliux ***Zebra*** 3kW, Kliux **Zebra-Plus** 4kW, Kliux ***Dragon*** 7kW and Kliux ***Eagle*** 10kW VAWTs.

KLiUX offers **Hybrid Energy Solutions** by integrating any combination of Wind and Solar PV, with advanced energy storage technology systems. Always aimed to providing distributed energy solutions at the lowest possible cost (**lowest LCOE**) to private, industrial and institutional customers.

KLiUX also offers energy efficiency solutions and **LED street lighting** power solutions.



Customer oriented services

KLiUX **Project Management Office**, develops all the necessary studies to analyze, estimate, and optimize the best possible budget/technology proposal according and adjusted to the customer´s distributed energy generation and power loads needed and project installation objectives, from start to finish.

- **Project engeniering and sizing** of installation, based on energy requirements, existing installation, wind and solar available resources at location, objectives and budget.
- **Site Feasibility Study** (SFS) in order to determine the feasibility of a location for installing adistributed energy generation system.
- **Energy efficiency & Monitoring** Energy savings analysis and current power loads covered with optimized hybrid renewable energy mix.
- Maintenance of the installation.
- Training of technicians.
- Monitoring the installation.
- Quality and performance.

Commitment to R&D

The 3rd Industrial Revolution and the smart Micro-Grids

KLiUX supports the 3rd industrial revolution that will transform energy generation and distribution systems in the world, by transferring power to the user as a center for generation. The Internet will be the platform used to enable these advanced intelligent network systems which will optimally control the balance between generation, transmission, in and consumption.

KLiUX has always relied on its own R&D and collaborative innovation activities for any of its distributed energy products and technology solutions development. Since its early days, as a technology-based company, KLiUX has always been committed to invest in Research, Development, and Innovation, and recently, as part of its future commitment to R&D, in 2018 it created a new affiliated laboratory & industrial entity in Spain, **KLiUX Innovation & Manufacturing,** in order centralize all its R&D activities and manufacturing processes.

KLiUX continued **commitment to R&D** over the past several years has allowed the company to build a growing **IP portfolio** of registered and pending patents that protects all its technology developments, industrial designs and trade marks.

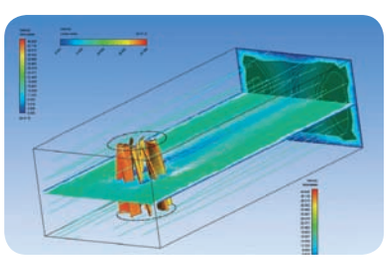
KLiUX has participated in over 22 R&D collaborative projects:: at the national level from the Ministry of Economy and Competitiveness and in several international projects from the Seventh European Framework Program (Capacities), and Horizon 20/20

Certifications

- CE Declaration of Conformity.
- Certifications in progress:
  ISO Certifi cation 9001 and 14001
  IEC 61400 -2/ -11/ -12,
  AWEA 9.1, BWEA Standard 2008

Awards and Recognitions

- **La Caixa XXI Entrepreneur**
- **AJER Innovation**
- **Best New Company, Actualidad Económica Magazine**
- **University-Company Award. Social Council, University of La Rioja**
- **Red emprende-verde**
- **Spain Start-up South Summit finalist**

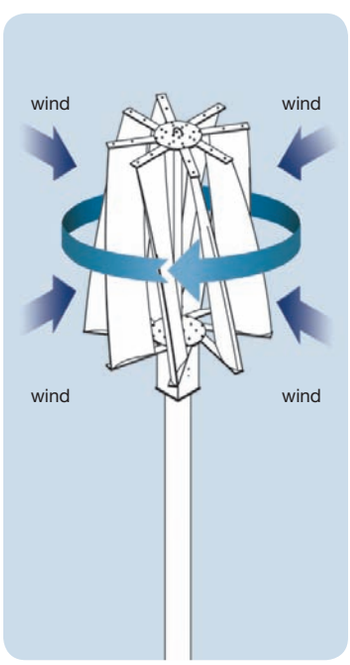


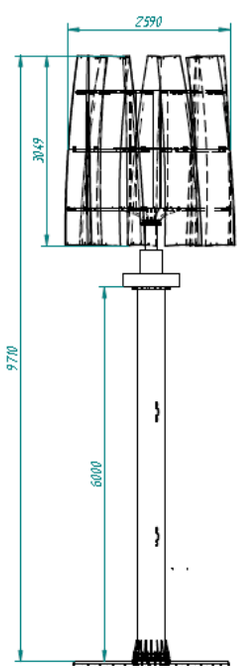
First vertical-axis wind turbine

with Technology 100% made in Spain.

Advantages of KLiUX vawt

- **Always wind oriented**
- **High aerodynamic efficiency in all type of winds:** multi-directional, turbulent, ascendant, very slow and gusty winds.
- Cut in wind speed: 2.5m/s (9km/h)
- At high wind speeds it continues to generate maximum energy output, due to the rotor's unique aerodynamics which **self-regulate the RPMs** through a stalling motion, instead of requiring to be stopped with an external breaking system like most turbines in the market.
- **Simple and easy maintenance.**
- **Completely quiet.** Sound pressure measured at 10 meters distance and 6m/s wind speed is just 32dBA, which makes it ideal for Urban and Residential applications.
- Roof-Top or Ground installation for either Off-Grid or Grid Connected solutions
- Normal relatively **slow rotation speed** (between 10 and 40 rpms) avoids environmental effect on birds and results in a lesser fatigue of its components. Because of the slow rotation motion the rotor blades present an excellent advertising and sponsorship platform.





Real applications
of distributed energy

Bringing Power generation close to where is to be consumed could take place in multiple different type of applications, for either Off-Grid and Grid Connected solutions.

The proposal for a specific installation will be determined by:

1) The user's needs in terms of the quantity and type of electricity consumption.
2) The quantity and quality of existing natural energy resources at the installation site (wind speed, solar radiation).
3) The topography and layout of the site (orientation, shadow, vicinity) as well as useful surface available to locate the generation, electronic, and accumulation equipment.

Private residences
- Partial or total supply of housing needs.
- Community of Property Owners. Common areas (elevator, lighting, pool).
- Picnic areas and wine cellars.

Rural tourism
- Cabins, hostels, and country houses with access to the grid or with a back-up generator.
- Coastal hotels, spas.

Sports facilities
- Yacht clubs and lighthouses.
- Yacht and boats.
- Golf courses.

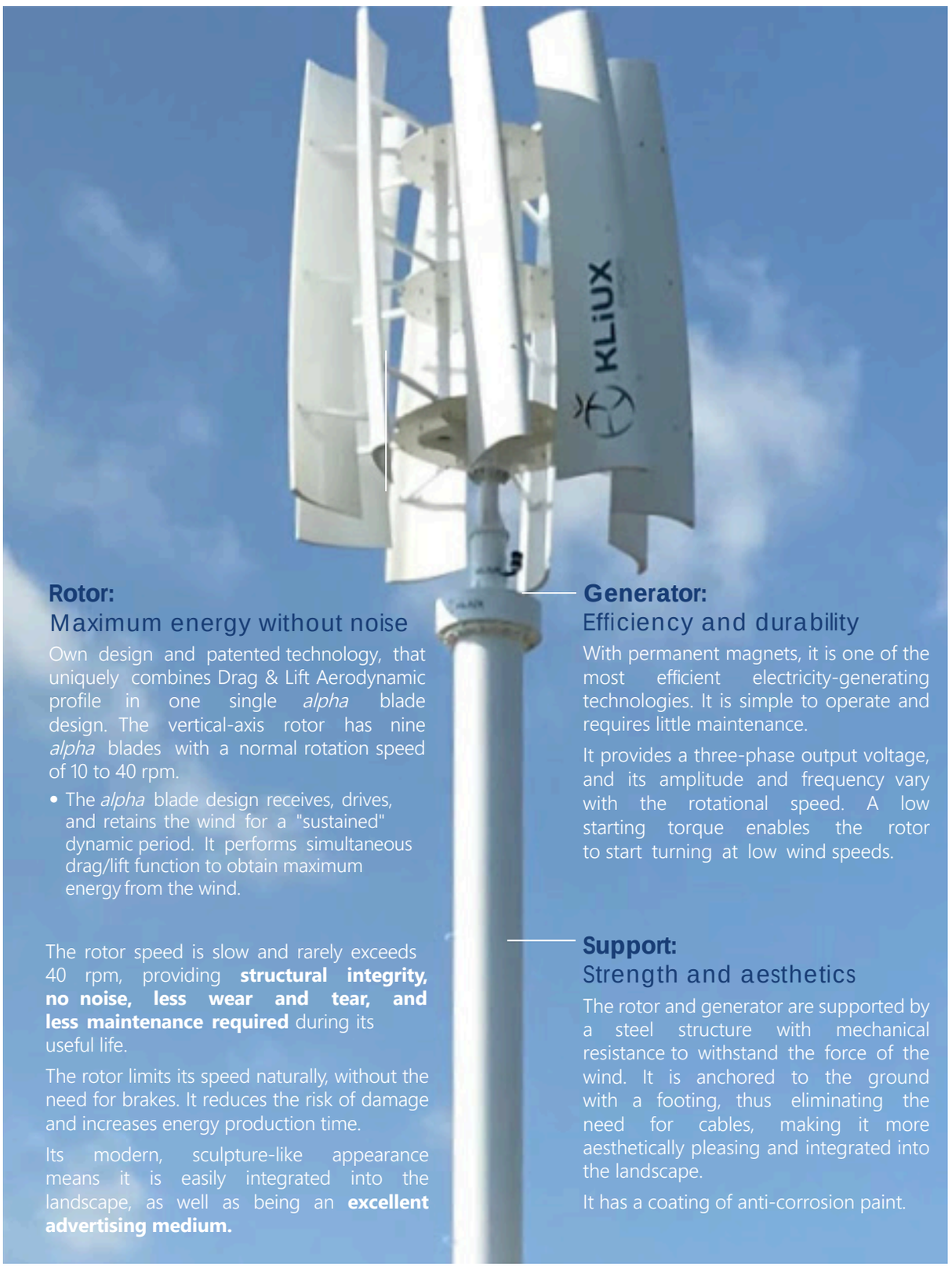
Agriculture and livestock farming
- Wineries.
- Wells. Pumping stations.
- Farms and dairies.

Public sector. Urban planning and environment
- Roads, pedestrianized areas, and bike lanes. 100% electricity supply with renewable energy integrated into the streets lighting systems.
- Squares and parks.
- Intelligent networks for towns, villages, neighborhoods, and districts.
- Public and non-residential buildings.

Mountain and forest
- Mountain lodges.
- Fire watchtowers.
- Ski resorts.

Roof-top mounted
- Residential buildings.
- Industrial warehouse.
- Shopping centers.
- Office buildings.

KLiUX DRAGON vertical-axis wind turbine



Rotor:
Maximum energy without noise

Own design and patented technology, that uniquely combines Drag & Lift Aerodynamic profile in one single *alpha* blade design. The vertical-axis rotor has nine *alpha* blades with a normal rotation speed of 10 to 40 rpm.

- The *alpha* blade design receives, drives, and retains the wind for a "sustained" dynamic period. It performs simultaneous drag/lift function to obtain maximum energy from the wind.

The rotor speed is slow and rarely exceeds 40 rpm, providing **structural integrity, no noise, less wear and tear, and less maintenance required** during its useful life.

The rotor limits its speed naturally, without the need for brakes. It reduces the risk of damage and increases energy production time.

Its modern, sculpture-like appearance means it is easily integrated into the landscape, as well as being an **excellent advertising medium.**

Generator:
Efficiency and durability

With permanent magnets, it is one of the most efficient electricity-generating technologies. It is simple to operate and requires little maintenance.

It provides a three-phase output voltage, and its amplitude and frequency vary with the rotational speed. A low starting torque enables the rotor to start turning at low wind speeds.

Support:
Strength and aesthetics

The rotor and generator are supported by a steel structure with mechanical resistance to withstand the force of the wind. It is anchored to the ground with a footing, thus eliminating the need for cables, making it more aesthetically pleasing and integrated into the landscape.

It has a coating of anti-corrosion paint.

Technical specifications at **www.kliux.com**

KLiUX Hybrid wind and solar system

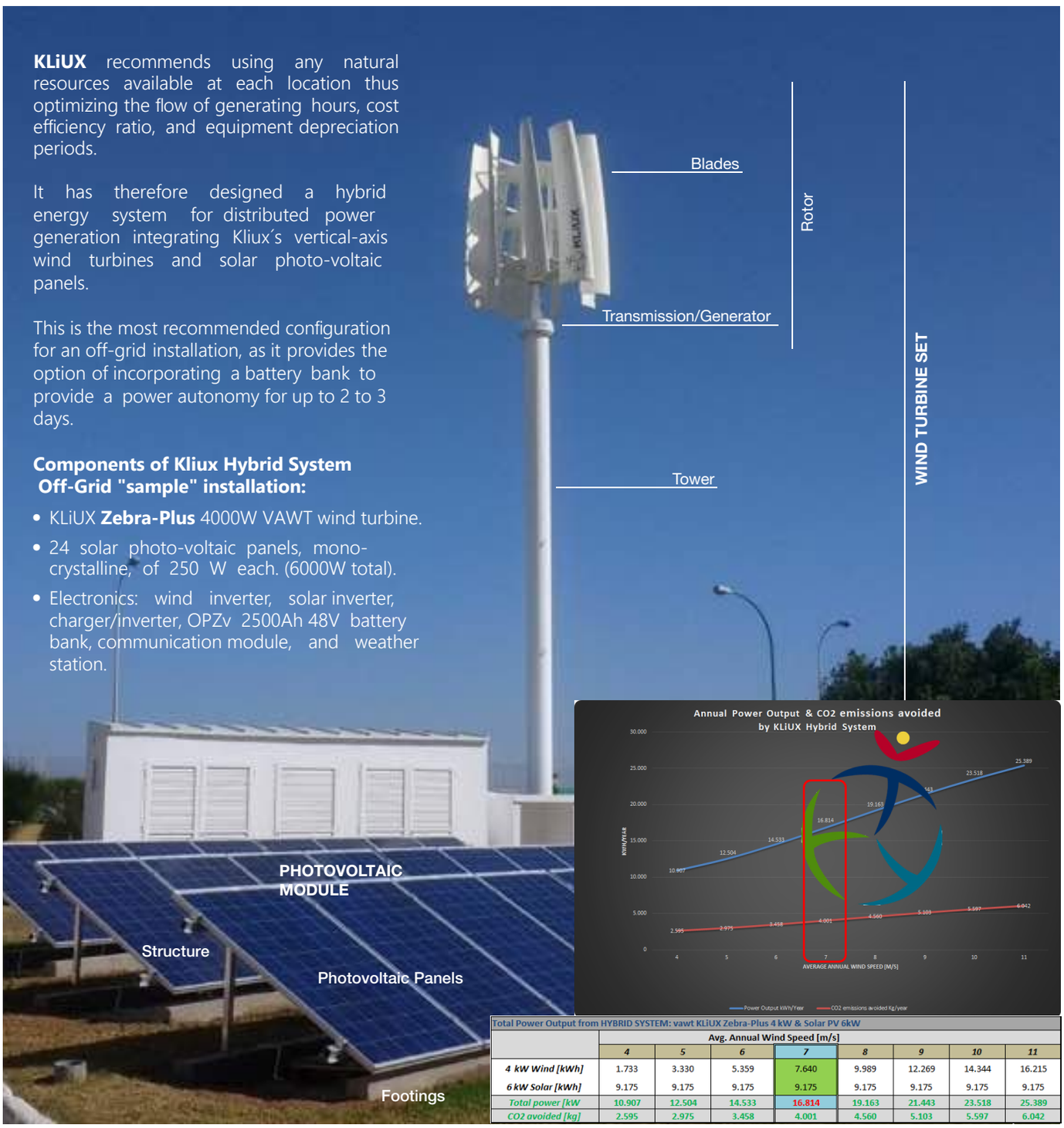
KLiUX recommends using any natural resources available at each location thus optimizing the flow of generating hours, cost efficiency ratio, and equipment depreciation periods.

It has therefore designed a hybrid energy system for distributed power generation integrating Kliux´s vertical-axis wind turbines and solar photo-voltaic panels.

This is the most recommended configuration for an off-grid installation, as it provides the option of incorporating a battery bank to provide a power autonomy for up to 2 to 3 days.

Components of Kliux Hybrid System Off-Grid "sample" installation:

- KLiUX **Zebra-Plus** 4000W VAWT wind turbine.
- 24 solar photo-voltaic panels, mono-crystalline, of 250 W each. (6000W total).
- Electronics: wind inverter, solar inverter, charger/inverter, OPZv 2500Ah 48V battery bank, communication module, and weather station.



Total Power Output from HYBRID SYSTEM: vawt KLiUX Zebra-Plus 4 kW & Solar PV 6kW

	Avg. Annual Wind Speed [m/s]							
	4	5	6	7	8	9	10	11
4 kW Wind [kWh]	1.733	3.330	5.359	7.640	9.989	12.269	14.344	16.215
6 kW Solar [kWh]	9.175	9.175	9.175	9.175	9.175	9.175	9.175	9.175
Total power [kW	10.907	12.504	14.533	16.814	19.163	21.443	23.518	25.389
CO2 avoided [kg]	2.595	2.975	3.458	4.001	4.560	5.103	5.597	6.042

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Clients, Partners and Collaborators

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