FINNWIND

HYBRID SYSTEMS

self-sufficient power systems for remote areas

OFF-GRID ELECTRICITY SYSTEMS

The Finnwind Hybrid System is a line of off-grid electricity systems for destinations outside the power grid. With these systems no on-going maintenance is needed.

The Finnwind Hybrid System enables the construction of your own, independent 230V/50Hz power system which utilises renewable energy sources.

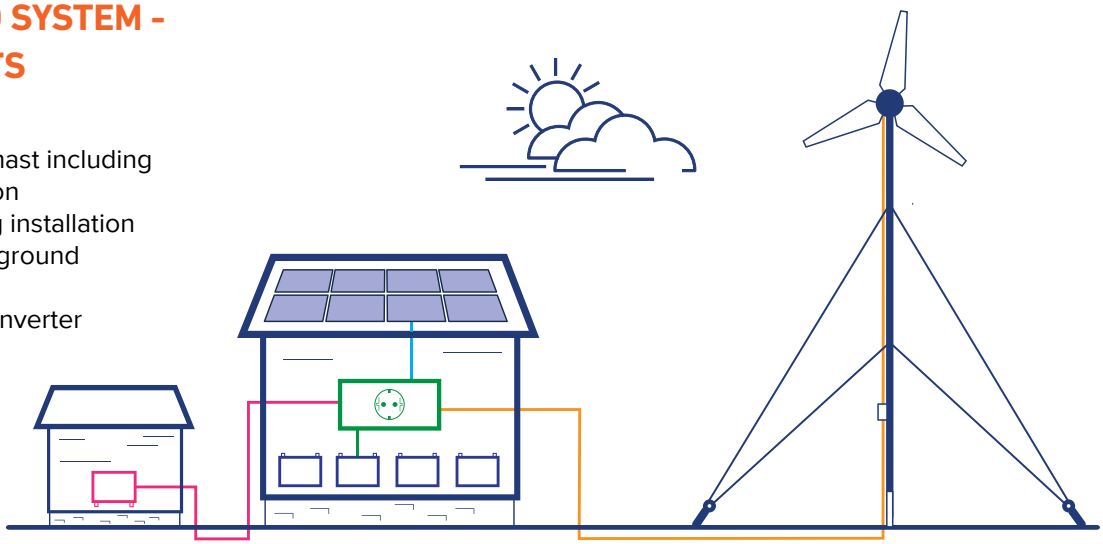
The self-sufficient power system is built on a battery balancing the difference between the production and consumption of power. Depending on the destination and its need for power, the system may include a solar power system, a wind turbine and/or portable generator.

Typical applications for Finnwind Hybrid Systems include destination sites with an annual electricity consumption of up to 30 000 kWh.

Further information:
www.finnwind.fi

FINNWIND HYBRID SYSTEM - MAIN COMPONENTS

- small wind turbine
- guyed 12 or 18 metre mast including supports and foundation
- photovoltaics including installation system to roof, wall or ground
- generator with setups
- battery, charging unit, inverter
- remote control and monitoring system



BENEFITS OF FINNWIND HYBRID SYSTEM

- easy construction of your own, independent 230V/50Hz power system
- low maintenance need
- the system can be remote controlled and monitored
- high small wind turbine masts of 12 and 18 metres ensuring an improved energy output.
- the modular mounting systems for phtovoltaics, are suitable for either flat or ridge roofs, or installation on a wall or on the ground.
- quality, safety and ease of use; safety features as standard
- ease of installation: cement trucks and cranes are not required

GENERAL DESCRIPTION - FINNWIND HYBRID SYSTEM

- Solar power is produced using solar panels. The production of solar power happens in the daytime and mainly during the sunny part of the year.
- Wind power is available 24/7 throughout the year.
- When you need to ensure a constant flow of electricity, reserve power will have to be added to your system.
- When wind and solar power are not available, and the battery charge is low, electricity will be obtained by the use of a portable generator. With the Finnwind Hybrid System, there is a very limited need to start up the generator.
- With self-sufficient electricity systems, you will need a battery to balance the difference between the production and generation of power. A sizable battery functions as an electricity collector.

Wind turbine model, manufacturer	Tuule, Finnwind, Finland
Maximum wind charging power	1500 / 3000W
Rotor diameter and swept area	5 m, 20 m^2
Solar panel model, manufacturer	Ultima / Grand Ultima, Vikram Solar
Nominal output of solar panel	270 Wp or 320 Wp
The total surface area of one solar panel	1.7 m2 or 2 m2
Solar mounting system	Ground, Roof, Wall, Finnwind
Nominal current of the battery control box	according to the number of panels
Battery nominal voltage	48V
Battery weight	60 kg

> “ Easy to install 230V off-grid system

THE ENERGY PRODUCTION AND THE SIZE OF THE SYSTEM?

Energy generation systems for off-grid sites must be particularly carefully planned and designed. The size and the components of a system need to be chosen based on the energy consumption of the destination.

To estimate the solar energy production and thus plan the size of the solar system is easy. The power and energy produced by a wind turbine is proportional to the rotor's swept area and the wind's speed. As even minor increases in wind speed have a significant effect on the production of energy, the choice of location is crucial to the success of the project.

As energy production and use at the site may fluctuate greatly at different times, the planning of a hybrid system should take into consideration the battery capacity required. Batteries enable the later use of surplus energy.

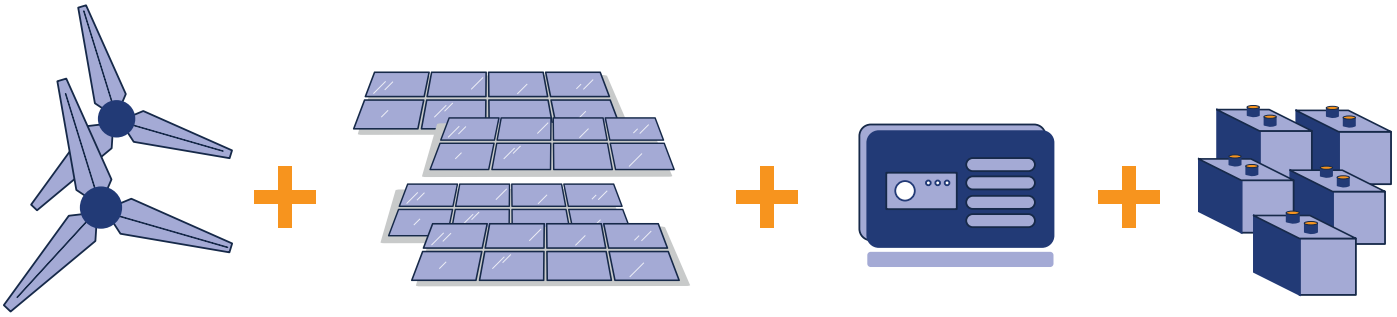
ESTIMATED ENERGY PRODUCTION

Estimated available power [kWh]	System components
5 000 - 10 000	photovoltaics 5 - 10 kWp battery generator small wind turbine 3 kW
10 000 - 20 000	small wind turbine 3 - 6 kW photovoltaics 10 - 15 kWp battery generator

Total annual production depends on and is affected by factors such as geographic situation and/or the weather conditions at the destination.

TYPICAL APPLICATIONS

- lighting
- cooling
- water pumping
- telecom towers



Energy generation systems for off-grid sites are typically comprised of the following parts and equipment; wind generator, photovoltaics, diesel generator and batteries.

With Finnwind's Hybrid Systems You can build isolated electrical networks for destinations outside the electrical grid.

Wind and solar energy are ecological choices which maintenance need is low and the production of energy does not result in emissions.

An automatic and reliable storm protection mechanism. The wind generator's storm protection is based on the wind pressure targeted at the rotor.

The delivery includes a mounting system suitable for ridged roofs, flat roofs, walls and ground installation

As energy production and use at the site may fluctuate greatly at different times, the battery balances the difference between the production and generation of power.

REMOTE CONTROL AND MONITORING BY VALVOMO

A hybrid system is a long-term-investment and it is therefore important that the system works reliably.

With Valvomo control, the monitoring of various off-grid destinations in different parts of the world is simple from one user interface. Delivered standard information includes the operational status of various off-grid systems and electricity production.

The system produces alarm signals for maintenance and service needs, e.g. a low level of petrol of the back up diesel generator. Local weather reports can be integrated into the system, creating the basis for both forecasting and monitoring of the system's performance.

EASE OF INSTALLATION

Small wind turbine installation

- With a soil-anchored foundation, 1.7 meter holes are dug into the ground, into which the base of the mast and the anchors are lowered.
- The wind turbine is erected using a mast raising pole.
- After adjusting the mast, the mast is lowered, and the machinery, rotor and rudder are attached to the mast. After this, the wind turbine is raised permanently.

Photovoltaic

- The modular mounting systems are available for ridge roofs, flat roofs, wall and ground installation.

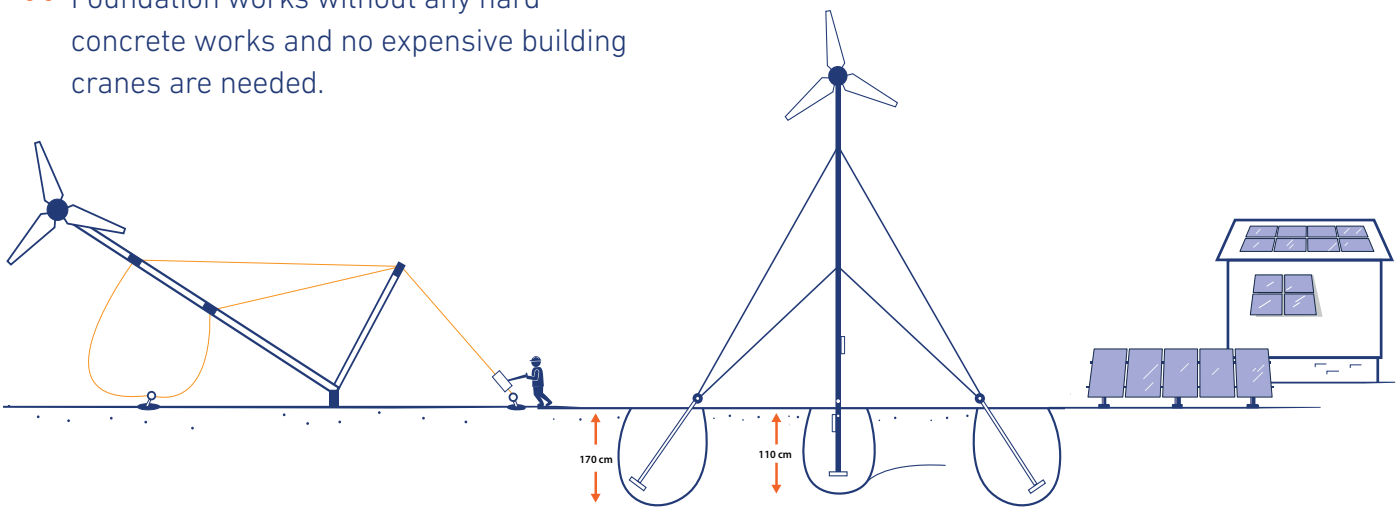
Generator and batteries

- By combining a diesel generator with batteries there is no fear of running out of electricity. A PV system together with a small wind turbine keep the diesel consumption on a low level.

Electrical work at the destination

- The internal electrical work at the destination means wiring and connections that need to be done. This includes e.g. the wiring from the wall of the building to the control unit, installing the control unit on the wall and wiring and connections to the battery and generator.

> "Foundation works without any hard concrete works and no expensive building cranes are needed.



Finnwind Ltd. manufactures and markets distributed power production systems. The company's main products are small wind turbines, solar power systems, self-sufficient electricity systems as well as installation and service operations related to the above products. Our clients and projects include family and vacation homes, companies, public spaces and the construction industry.

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