

SkySails
POWER

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**GAME CHANGER
FOR WIND POWER**

**“AIRBORNE WIND IS A POTENTIAL GAME CHANGER,
WITH POTENTIAL TO REDUCE THE COST OF ENERGY
BY UP TO HALF WHILE AT THE SAME TIME OPENING
UP NEW MARKETS.”**

IRENA (International Renewable Energy Agency)

GAME CHANGER FOR WIND POWER

RELIABLE WIND POWER EVERYWHERE

The success of the ongoing energy transition depends on technologies that make reliable renewable energies accessible at low cost. SkySails Power wants to make clean wind power available everywhere, by developing compact and light wind power solutions which are easy to produce, to transport and to operate.

With SkySails Power wind power becomes:



reliable and able to
provide baseload



a competitive low-cost
energy source



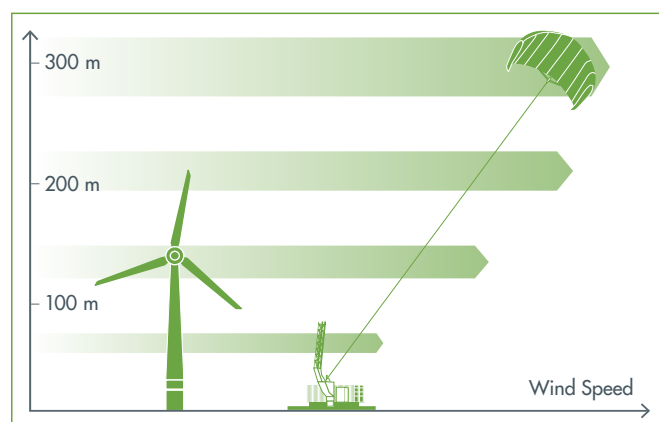
available almost every-
where even mobile

GAME CHANGER FOR WIND POWER

SkySails Power has developed an Airborne Wind Energy System (AWES) revolutionizing the way wind power is harnessed and converted into electricity. Compared to a regular wind turbine the SkySails Power System uses 90 % less material while doubling the amount of energy produced.



CONVINCING TECHNOLOGY



MORE ENERGY

It is a simple fact: Compared to wind at ground level, high altitude winds are stronger and more constant. At altitudes between 200 and 800 m almost twice as much wind power is available.

KEY TECHNOLOGY

The use of large and fully automatic kites is the key technology for the production of wind power by high altitude winds. Based on the known SkySails technology, SkySails Power develops wind power systems able to use the enormous energy potential of high altitude winds on an industrial scale for the first time – so called Airborne Wind Energy Systems (AWES).



COMPONENTS

The SkySails Power System is patented worldwide and consists of five main components: a towing kite with a rope, a launch and recovery mast, an automatic control system, and standard container on a flat rack with a ring mount, housing a system for the generation of electric energy.



Container with system for the generation of electric energy:

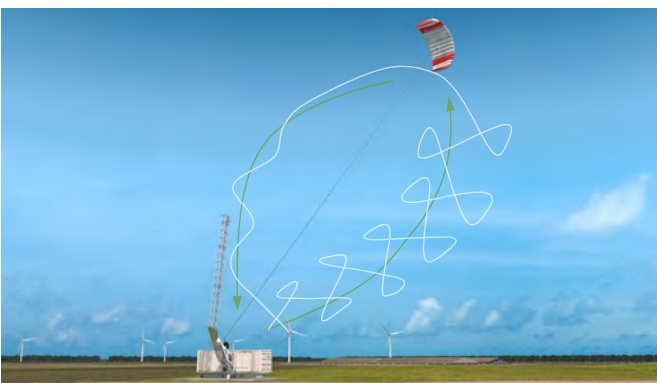
- Winch with generator & gear box
- Converter & grid connection interface
- Control cabinets
- Optional energy storage

HOW IT WORKS



START

The kite is raised out of its stowage and lifted on the launch and recovery mast. With the inflow of air, the kite unfolds to its full size and is launched. The winch releases the towing rope until the operating altitude is reached. The SkySails Power System operates at altitudes between 200 and 800 m.



ENERGY PRODUCTION

For the energy production, the kite pulls the rope from the winch which is connected to a generator. When the towing rope reaches its maximum length, the recovery phase begins: The kite is automatically flown into a position where its tractive force is very low. The generator now works as an engine and rewinds the rope until the length of the rope is short enough for the next power generation phase. This process requires only a fraction of the energy generated during the power phase. The surplus energy is fed into the power grid.



LANDING

For landing the winch retracts the towing rope, and the kite docks on to the launch and recovery mast. Then the kite is reefed and lowered down on the mast into the stowage.



ON-, OFFSHORE AND MOBILE USE

On land the SkySails Power System can be set up as mobile or stationary installation. Offshore it can be set up on conventional or floating foundations. Thus, the systems can be anchored at great water depths up to 700 m, and with proven anchoring technology, they are easily and quickly installed with the aid of available offshore installation vessels.



RELIABLE TECHNOLOGICAL BASIS

The SkySails Power technology is based on the well-known and world-wide patented SkySails propulsion for ships, a technology proven offshore on board of seagoing vessels. In good wind conditions and by means of a 400 m² fully automatic kite, it replaces up to 2 MW propulsion of the main engine.



PATENTED KNOW-HOW

The SkySails Power System is patented worldwide. The company's broad and global IP portfolio includes over 300 patents and patent applications within 20 international patent families. SkySails Power has unique know-how in the use of high-altitude winds.

ADVANTAGES

6 GOOD REASONS FOR SKYSAILS POWER

MORE ENERGY AND BASE-LOAD CAPABILITY WITH HIGH-ALTITUDE WINDS

SkySails Power Systems use winds at altitudes between 200 and 800 m. At the same location they thereby generate considerably more and at the same time more constant energy than conventional wind turbines. Thus for the first time wind energy becomes base-load capable – and can, for example, replace fossil-fuel based energy systems.

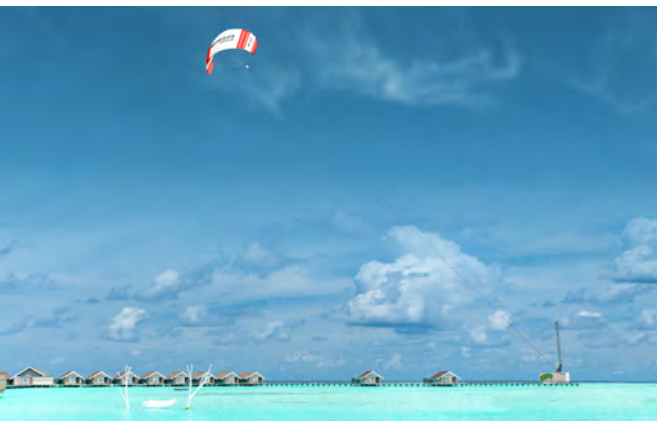


COMPACT AND LIGHT-WEIGHT

SkySails Power Systems consist of less than 10 % of the volume of conventional wind turbines. 99 % of its weight is on the ground. The systems are compact and light, easy to produce, to install and to service. If necessary they can be moved to different locations quickly and at low cost. Compared to other energy production systems, the investment risk for SkySails Power Systems is low.

LOW ENERGY PRODUCTION COSTS

Compared to other renewable energy sources, the low investment costs for the SkySails Power System combined with the high power output lead to very low cost of energy.



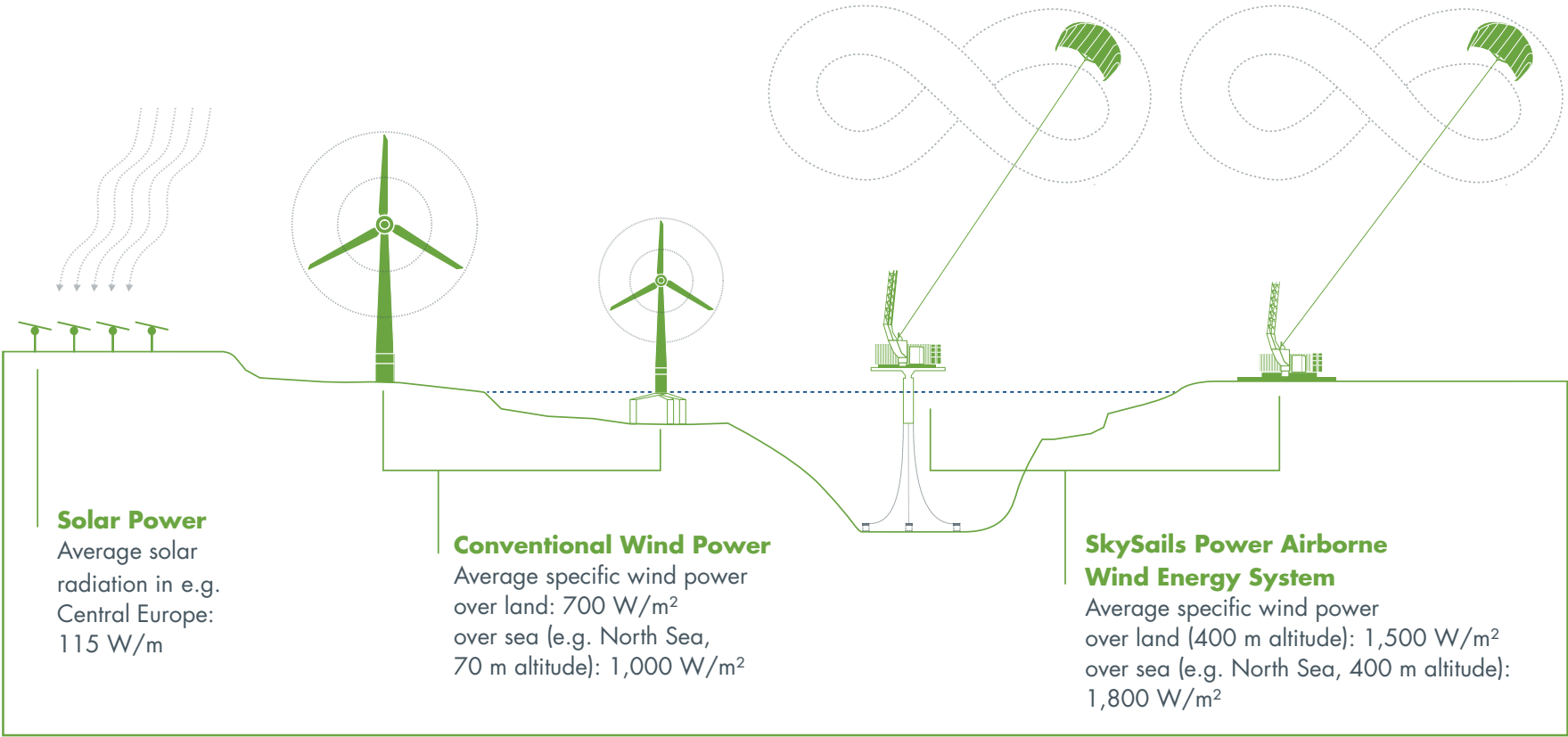
WIND POWER FOR EVERYONE

The novel system concept of SkySails Power enables the opening of markets, which, for technical or economic reasons, cannot be serviced with conventional wind turbines. Due to its virtually unlimited fields of application SkySails Power doubles the global potential of wind power production. Furthermore, it can provide baseload power at sites where other renewable energy sources, like solar, are not an adequate solution. With SkySails Power Systems, clean and reliable wind energy is available almost all over the world.



SIGNIFICANT CONTRIBUTION TO CLIMATE PROTECTION

SkySails Power facilitates a reliable, low-cost and comprehensive provision of renewable energy. Consequently, the energy system transformation can be significantly accelerated, and our climate can be effectively protected.



GENTLE ON PEOPLE AND THE ENVIRONMENT

SkySails Power Systems cause only low noise and shadow emissions and represent a minor visual impact for humans and animals. Because of its new technology concept, its installation is minimally-invasive (no piling work necessary). Furthermore, a simple low-cost dismantling is guaranteed.

PRODUCTS



Now available!

FLEXPOWER MOBILE UNITS 200-500KW

- For low-cost, baseload-capable energy production also in weak-wind regions
- Up to 75 % reduced energy production costs
- Increased yield – up to 6,500 full load hours
- Compact, light-weight containerized solution
- Fast, easy and low-cost installation – very low infrastructure requirements, truck and simple crane are sufficient
- Optional energy storage
- Fits almost every site

Applications:

- Private wind farms
- Independent power production for industry & agriculture
- Hybridization of existing infrastructure such as solar farms or island grids
- Off-grid energy supply, e.g. for islands
- Telecommunication infrastructure
- Remote locations/industries such as humanitarian missions, mining



Now available!

WPAG – WIND POWERED AUXILIARY GENERATOR FOR VESSELS 200 KW – 1 MW

- Saves 50 % in auxiliary generator fuel consumption & emissions
- Delivers clean wind power to relieve diesel powered auxiliary generators
- Fast payback
- Comes with optional energy storage, supporting optimization of onboard energy management
- “Plug & Play”: Easy to install, easy to relocate to another vessel

Applications:

- Most types of ocean going vessels

PRODUCT OUTLOOK



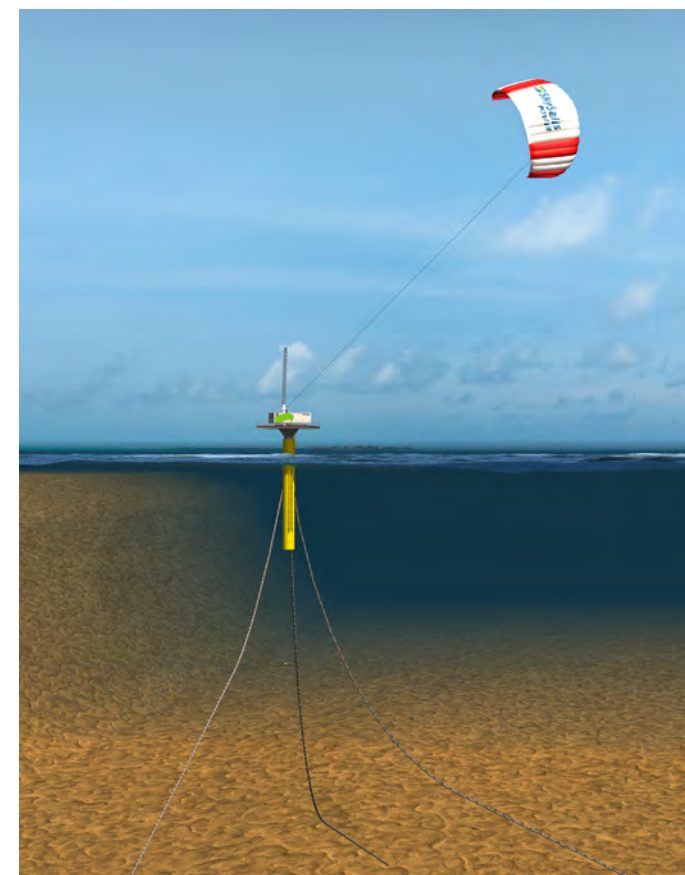
Coming next!

SKYSAILS POWER ONSHORE 1 – 7 MW (STATIONARY UNITS)

- For low-cost, baseload-capable energy production also in weak-wind regions
- Up to 50 % reduced energy production costs
- Increased yield – up to 6,500 full load hours
- Compact ground station & foundation with 90 % less weight
- Fast, easy and low-cost installation – very low infrastructure requirements
- Hurricane & typhoon resistant as kite can be sheltered & relaunched
- Fits almost every site

Applications:

- Onshore wind farms
- Independent power production for industry & agriculture
- Hybridization of existing infrastructure such as solar farms or island grids



Coming next!

SKYSAILS POWER OFFSHORE 1 – 7 MW (STATIONARY/FLOATING UNITS)

- Up to 25 % reduced energy production costs
- Increased yield – up to 6,500 full load hours
- Compact ground station & foundation with 90 % less weight
- Fast, easy and low-cost installation
- Also on floating platforms in water depths up to 700 m
- Hurricane & typhoon resistant as kite can be sheltered & relaunched

Applications:

- Offshore wind farms
- Reuse of decommissioned oil rigs

COMPANY

OUR MISSION: UNLEASHING THE TRUE POTENTIAL OF WIND POWER!

Wind power is the backbone of the global energy transition. Yet, with current technology spreading the use of this powerful source of renewable energy is limited.

GAME CHANGING TECHNOLOGY

Automatic kites are the key technology for capturing the vast potential of high-altitude winds and SkySails is the first company in the world that has succeeded in developing industrial applications for harnessing this enormous energy potential. More than 55 million euros have been invested in developing the SkySails technology since foundation of the company.

WORLD MARKET LEADER

SkySails Power GmbH is part of the SkySails group of companies. SkySails was established in 2001 by graduate industrial engineer Stephan Wrage and is market and technology leader in the field of automatic towing kite systems.

LEADING IN AIRBORNE WIND TECHNOLOGY



Experience

SkySails is the only company in the world that has built and commercialized fully automatic kite systems with a size of up to 400 m² (2 MW).



300+ patents

The company's broad and global IP portfolio includes over 300 patents and patent applications within 20 international patent families.



Unique know-how

SkySails Power has unique experience in the use of high-altitude winds. All major components are developed in house.

TEAM

Our rapidly growing team consists of 60 highly-motivated employees representing a wide range of disciplines and specialties – from aerospace engineers, to software developers, mechanical engineers, technicians and management professionals – all help to develop, manufacture and market the SkySails technology.

EXPERIENCE

The SkySails propulsion for cargo ships has been tested and proven in the tough day-to-day use on board of seagoing vessels. By deploying fully automatic kites of up to 400 m² in size, it can replace up to 2 MW of power from the main engine.

