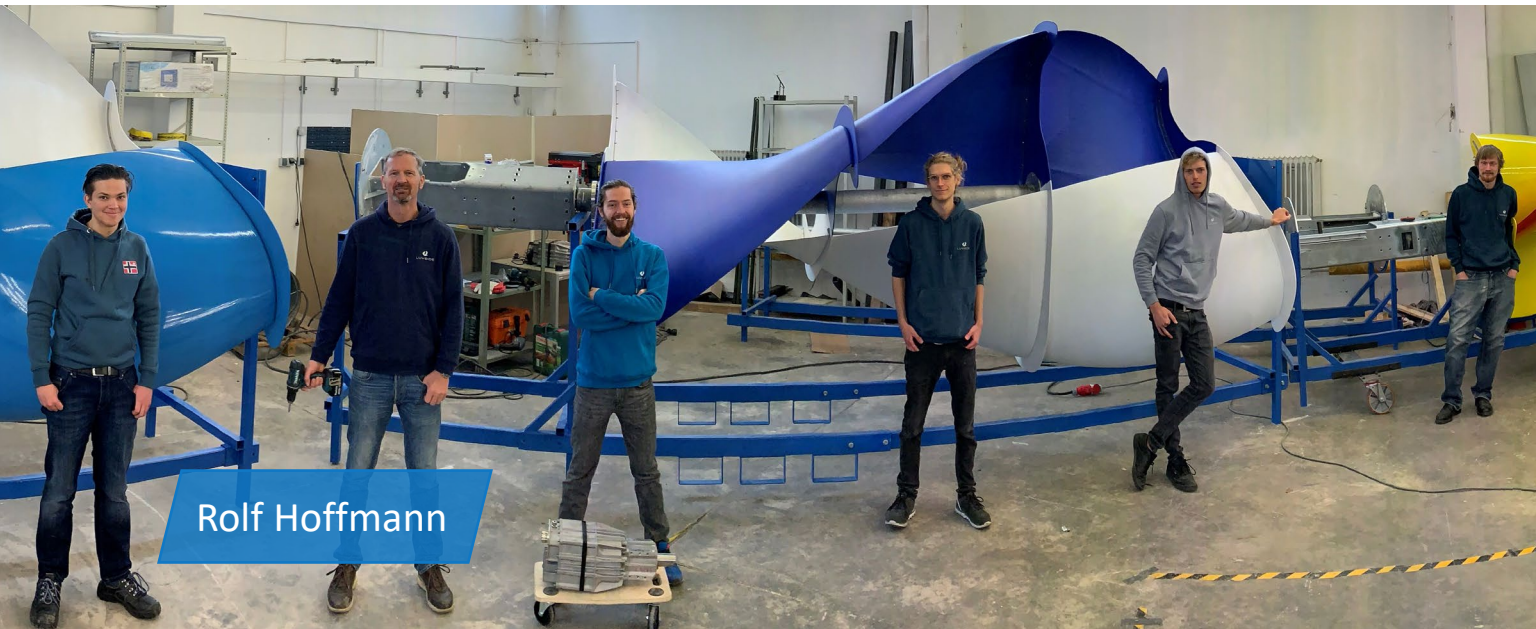




LUVSIDE

LuvSide wind energy –  
“The powerful turn”



- Founded in 2014
- Founder & Managing Director
  - Rolf Hoffmann
  - Mechanical Engineer (FH Munich)
  - Shareholder
- Vision: “The powerful turn”
- Development and production of vertical and horizontal wind turbines from 0.5 up to 10 kW
- R&D, prototyping, production: Ottobrunn/Munich, Germany
- Offices: Singapore / Brisbane (AUS)



Roadmap

LS Double-Helix 1.0

LuvSide Helix 3.0

LuvSide HuraKan 8.0

Double-Helix  
0.5 Marina

Effizienz

2.000

3.000 LHAWT OS-BM

4.000

8.000

15.000

20.000

2015

2020

2022

2023

CAPEX [EUR/kW]



The RES Project South Africa is supported by the German Federal Ministry for Economic Affairs and Climate Action as part of the Renewable Energy Solutions Programme of the German Energy Solutions Initiative.



Supported by

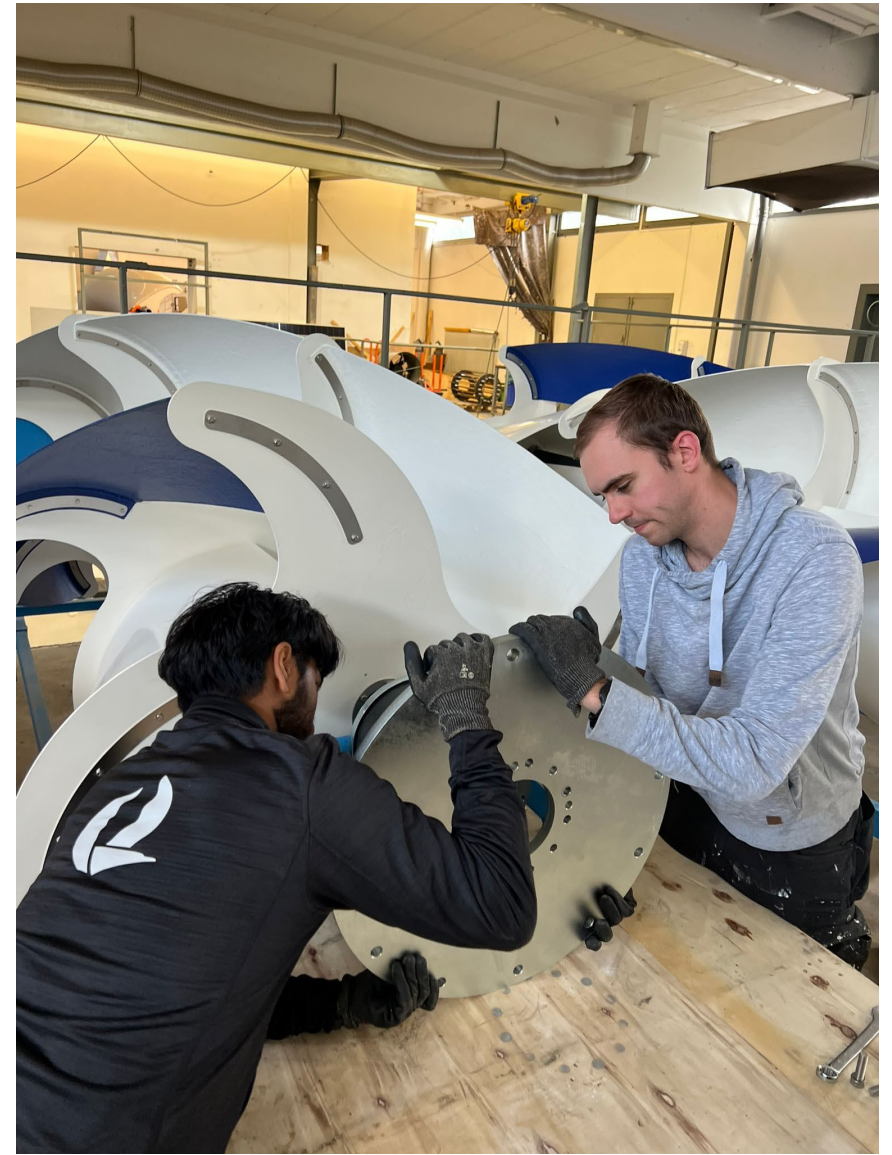


on the basis of a decision  
by the German Bundestag

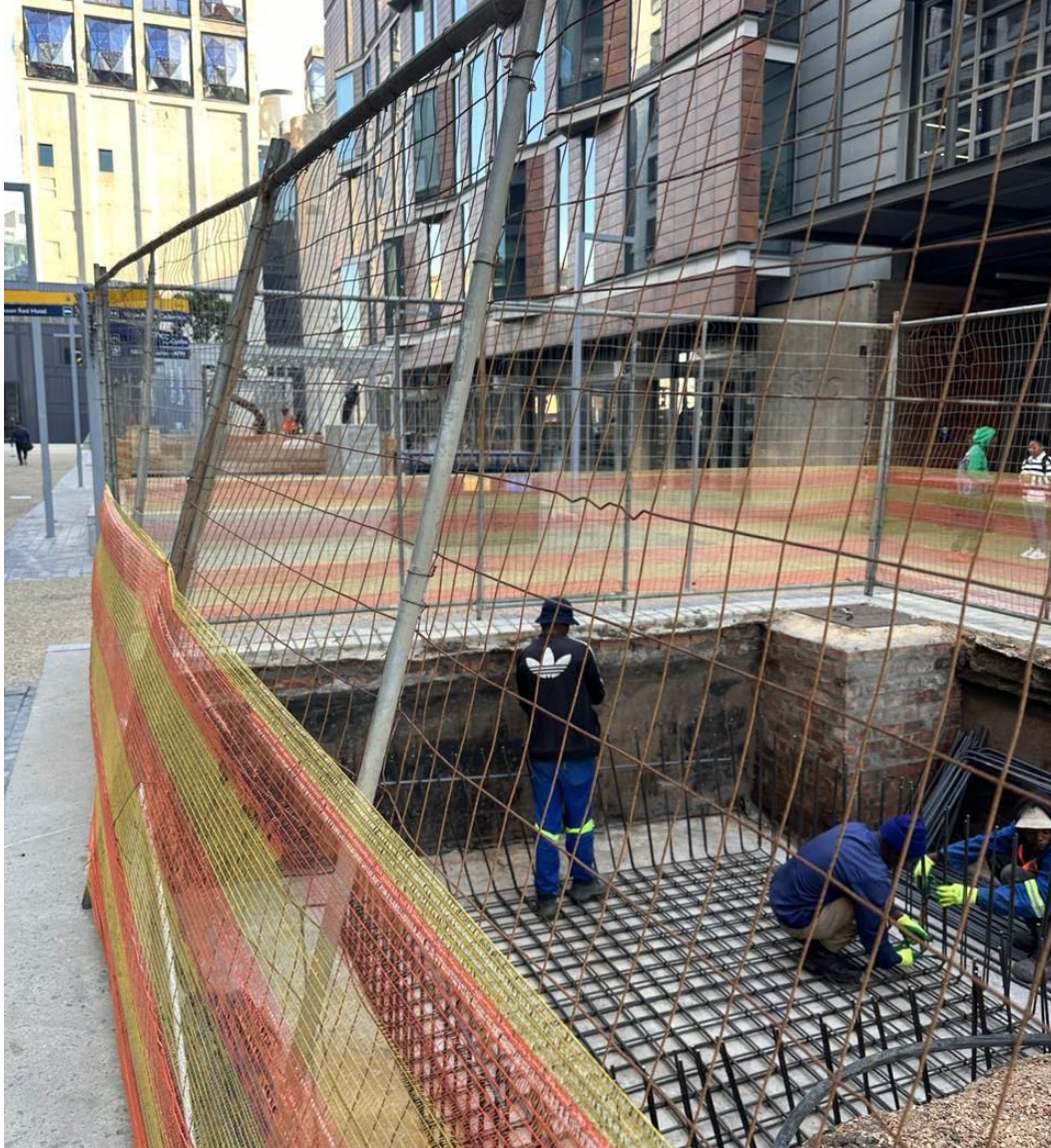
Implemented by



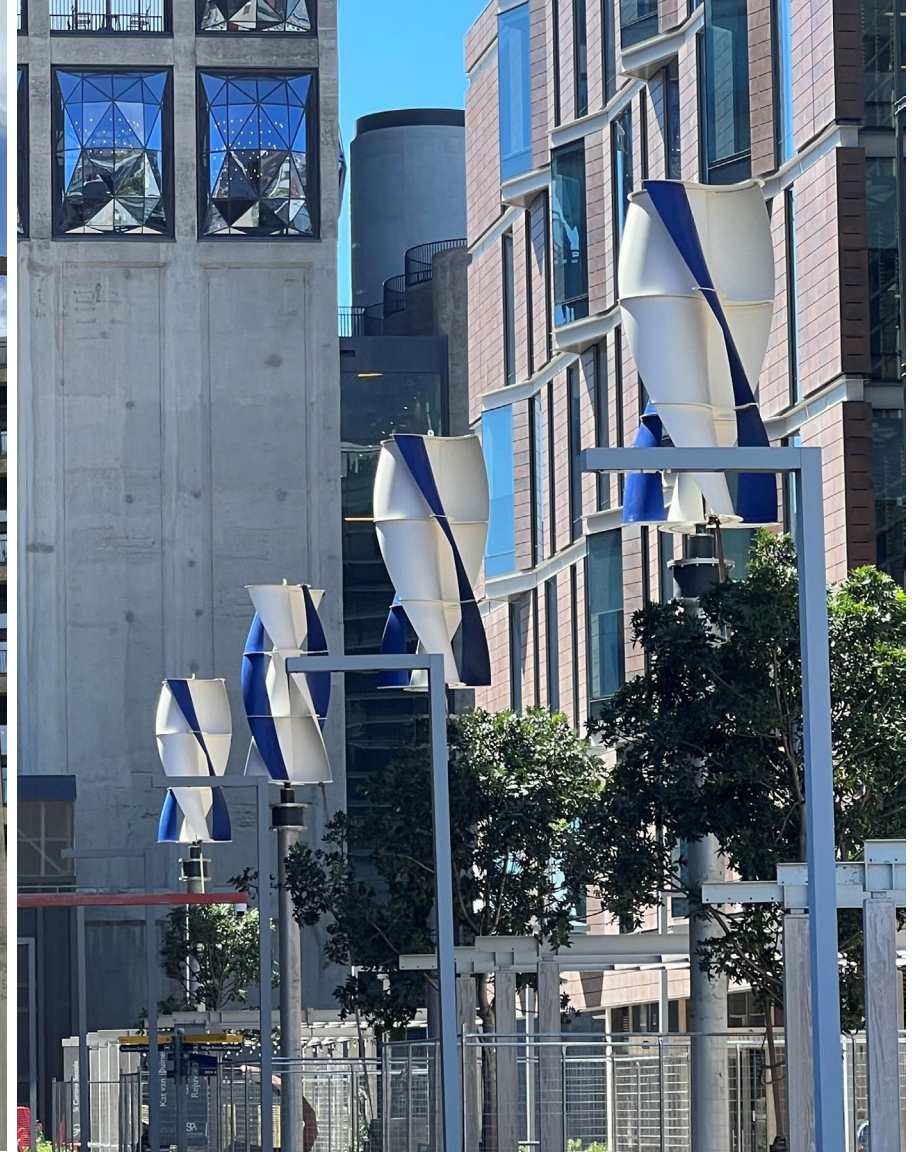


















## 1 Savonius Double Helix

- Robust rotor
- Quiet operation
- Powerful torque



## 2 Bearing housing

- Robust twin roller bearing design



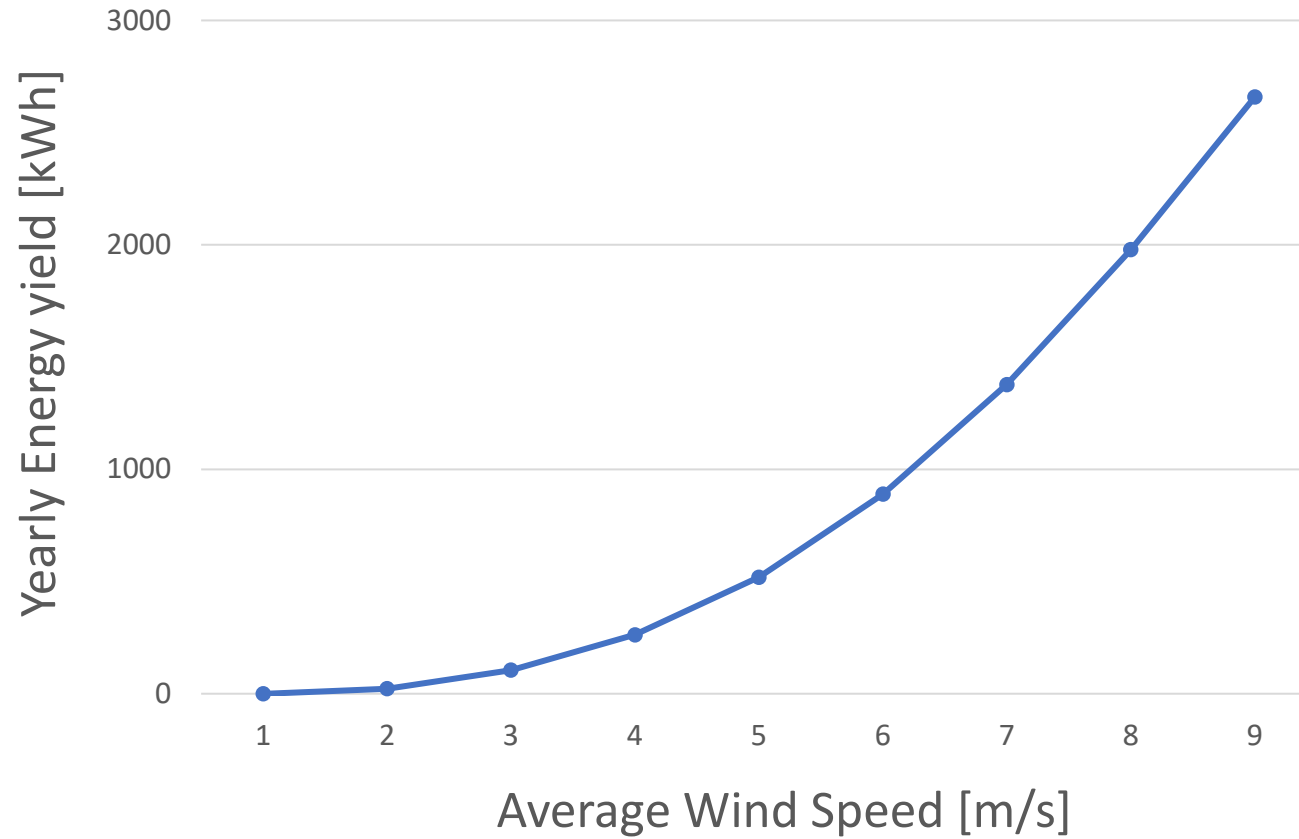
## 3 Generator PMSG

- Direct drive
- IP68

### The smallest model in the serial LuvSide family

Maximum performance	1,5 kW
Start-up speed	2 m/s
Rotor height	3 m
Rotor diameter	1,45 m
Number of rotor blades	4
Weight	305 kg
Rated speed	140 rpm

## Possible annual yield per turbine with increasing average wind speed





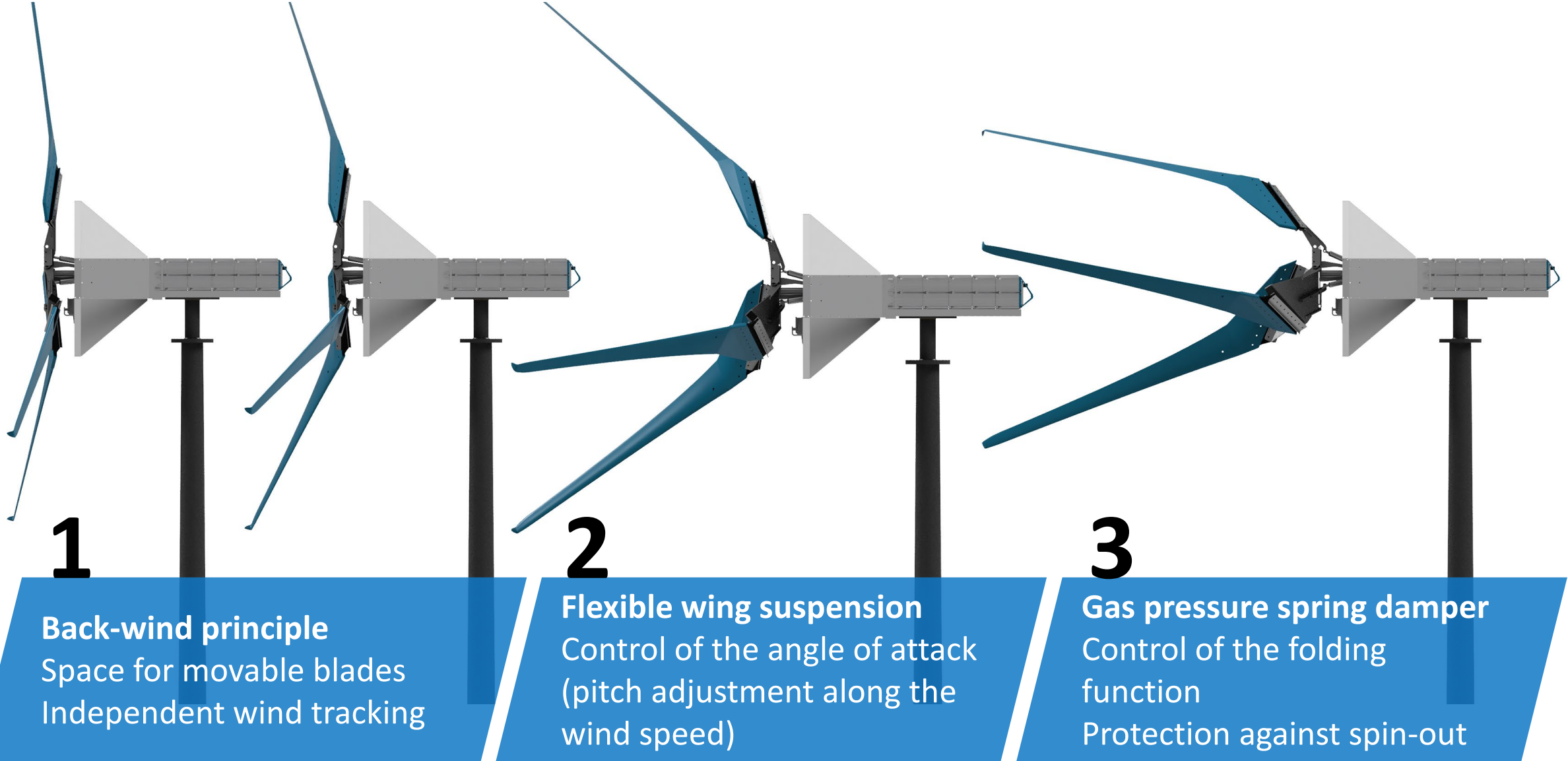


## Main features

- Rated Power 8 kW at 11 m/s Windspeed (Generator from EMF Motors)
- Net Inverter AC, III Phase, 10 kW
- Controller from ABB
- Storm-resistant to 200 km/h (50 m/s) of wind speed
- Back-wind principle, with passive wind tracking
- Quiet operation
- High efficiency (40 - 45 %)
- Full-Power production during storms
- Mechanical pitch control through folding blades (Patent)

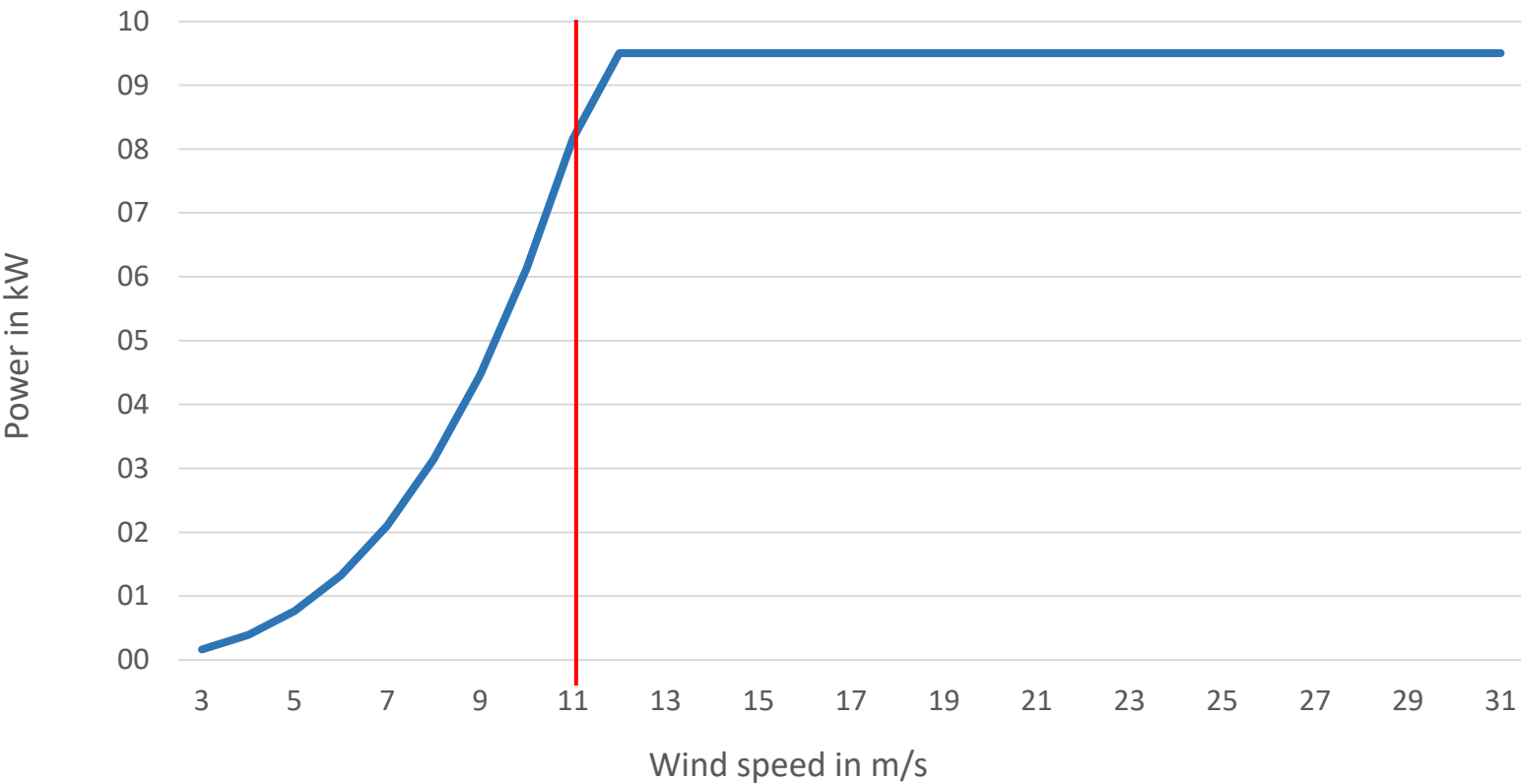


# Folding function to protect against spinning out



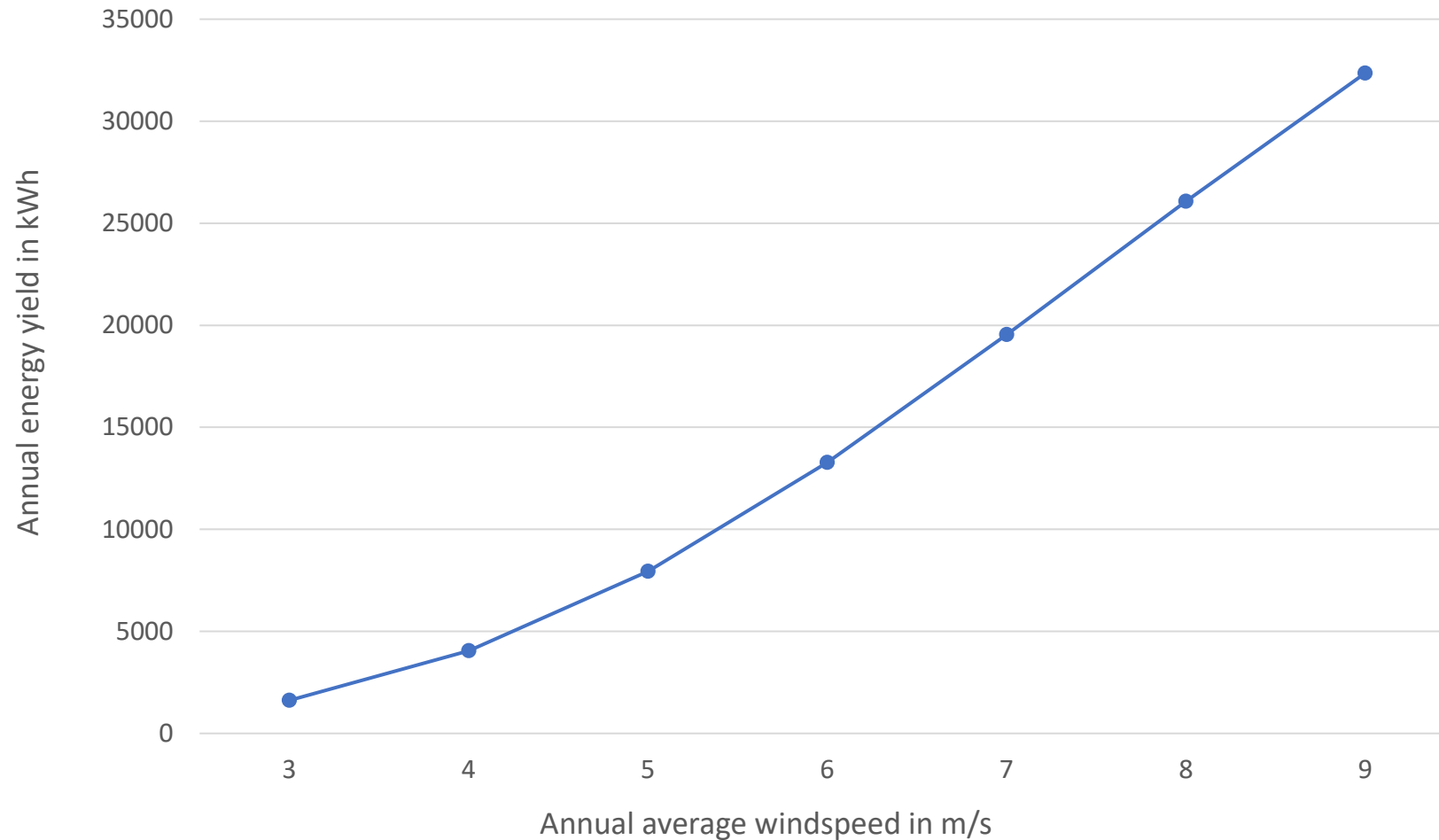



## HuraKan 8.0: Power of the turbine at rising windspeed



Rated Power (11 m/s)	8 kW
Cut-In Windspeed	3 m/s
Recommended minimum tower height	12 m
Rotor Diameter	6 m
Number of blades	3
Maximum rotational speed	250 RPM

## Possible annual energy yield with changing average windspeed





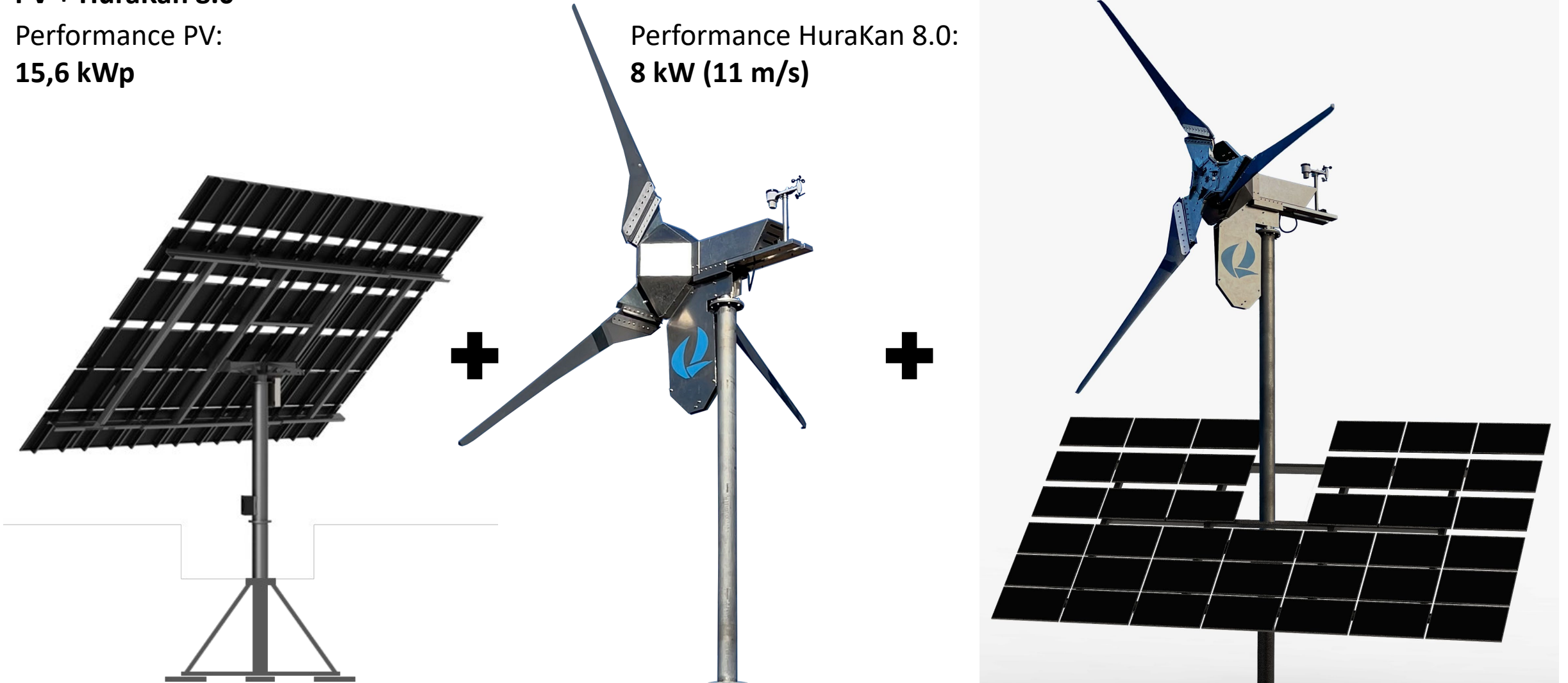
# WindSun Energy – the perfect match between wind and solar energy



















## PV + HuraKan 8.0

Performance PV:  
15,6 kWp

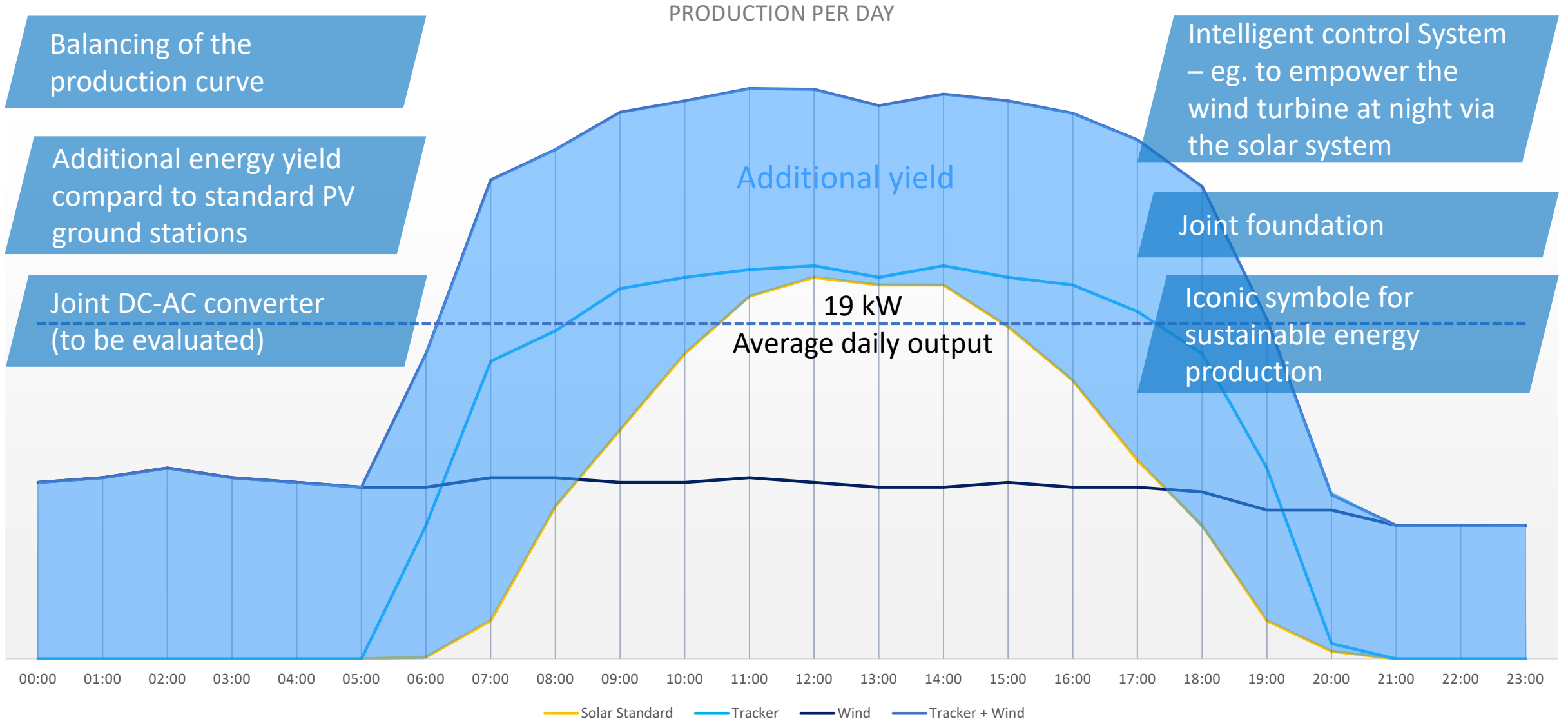
Performance HuraKan 8.0:  
8 kW (11 m/s)





<b>Acceptance</b>		With a height of around 15 meters, the WindSun modules are also accepted in urban areas	
<b>Environmentally friendly land use</b>		The ground under the solar panels placed at a height of 4.5 meters is fully usable (agriculture, wildlife, wild grasses, etc.)	
<b>Water evaporation friendly</b>		In sunny, hot regions, the shade of the panels protects the underlying soil from drying out	
<b>Versatile use</b>		The module can serve as a carport (up to the height of a truck) or as a shade on public places	
<b>Gentle on the ground</b>		No soil sealing (concrete) foundation needed for installation	
<b>Quickly ready for use</b>		The modules are quickly assembled and ready for use within 3-6 months	
<b>Common infrastructure</b>		The solar panel can be used, for example, for the installation of irrigation pipes	
<b>Simple approval process</b>		Due to the smaller size/height, no lengthy building permit process is required in most countries	







(due to the PV+SW combination with higher capacity factors)

KPIs	Small LHAWT (250kW, <50m, 7m/s)	Ground-based PV (400kW, 2000m <sup>2</sup> )	WindSun Module 24.0 (10 units, <20m, 7.5m/s)
SYSTEM CAPEX [EUR/Wp]	3.6	0.6 ... 0.8	3.5 ... 3.8
Energy Yield [kWh/year]	1 GWh	750 MWh	500 ... 600 MWh
LCOE [EUR/kWh]	< 0.05	< 0.03	< 0.07
Implementation Time	1 ... 3 years	3 ... 6 months	3 ... 6 months

With WindSun modules you are one step ahead of your time.

The price-performance ratio (System-CapEx) is in the range of today's large offshore installations.

Very well suitable, elegant, state of the art solution for your customer.

The system produces a rated power of 28 KW, combining the best of solar and wind.



...when harvested in a Smart Application

See following example WindSun Module Predicted Energy Production (PEP) based on 2019-2021 historical Malta data

By down-scaling the renewable energy generation we can achieve the following:



Significantly lower system-CAPEX (1.7M EUR/MW)



Comparable LCOE (LHAWT [5ct] – Conv. PV [3ct] – WindSun Module [7ct])



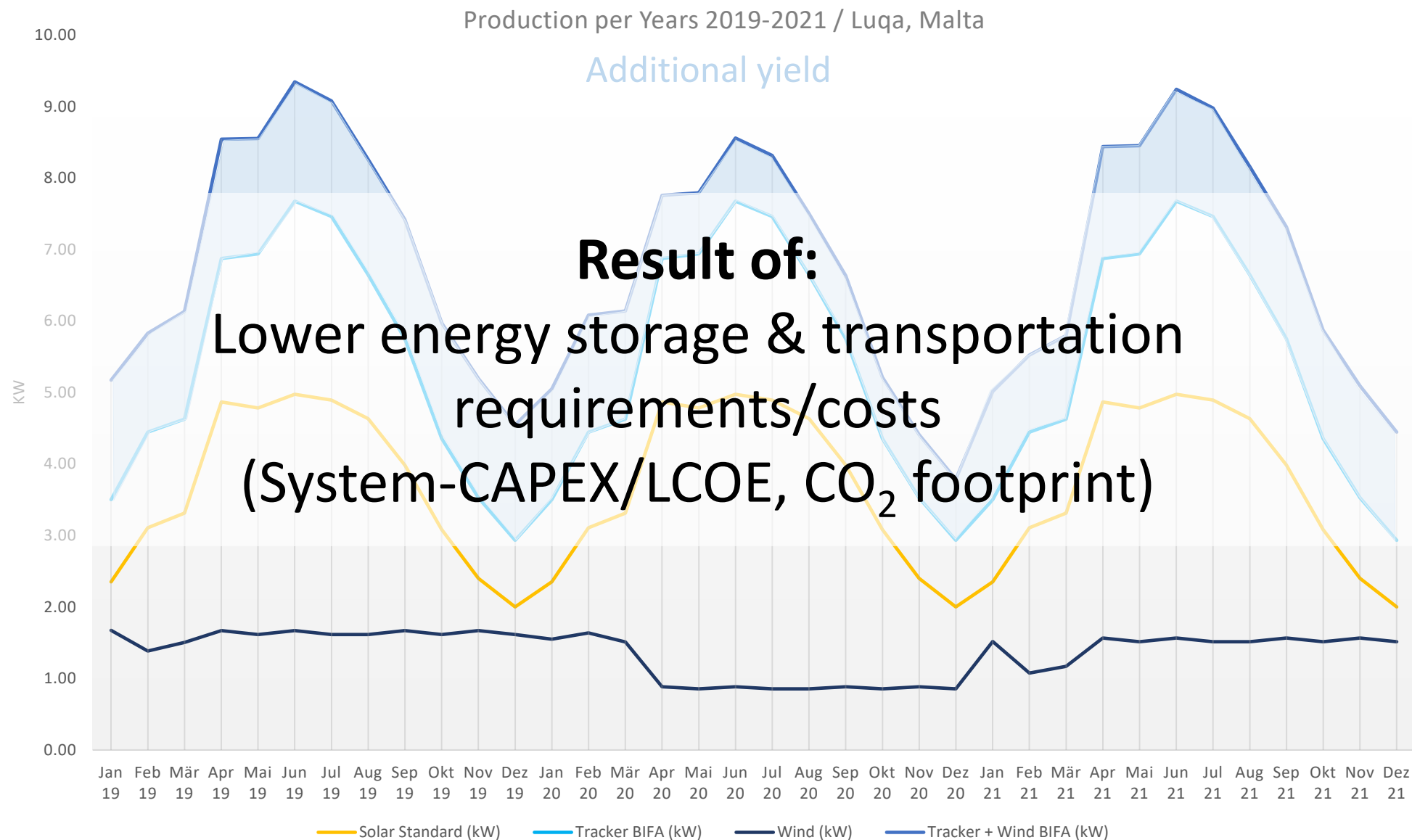
Significantly better harmonized supply-demand profile



Highest Environmental compatibility in current green energy generation applications

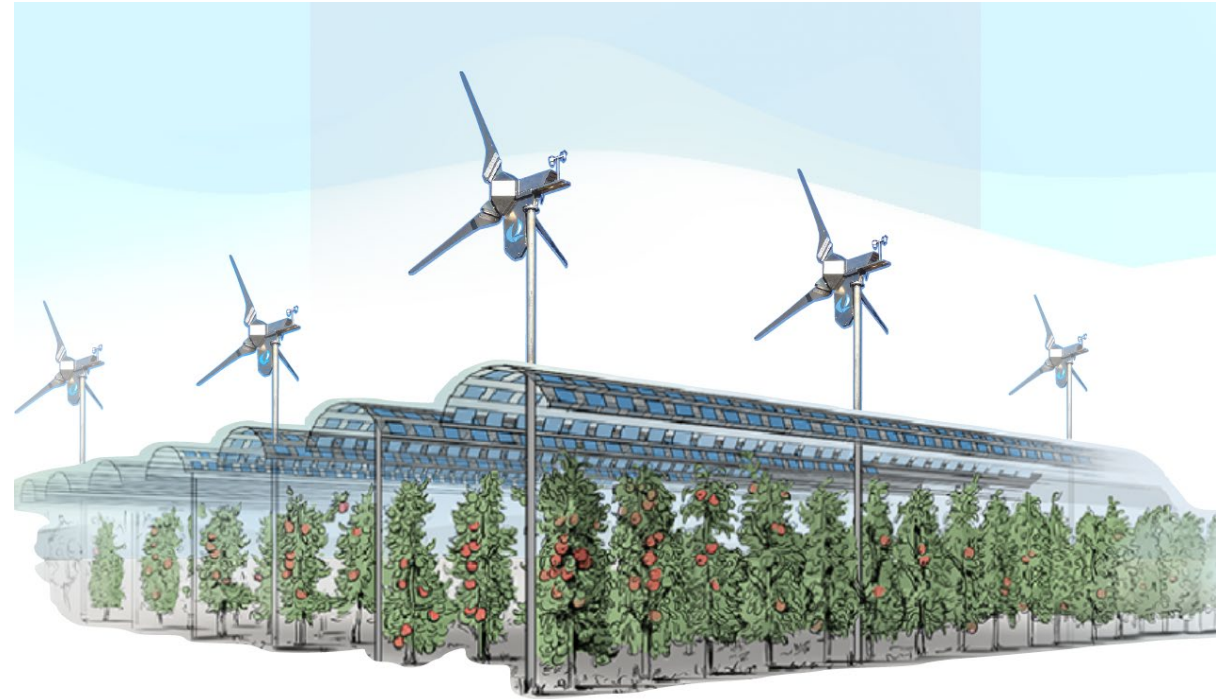
**The solution is conceivable for a wide variety of applications!**





**We see the agricultural sector as the market segment with the greatest potential.**

- Regulatory
- Multiple income streams for the farmer
- Protection of crops
- Use of light and wind



A foundation without concrete enables the use of agricultural land.





- High-quality materials used in Photovoltaic and HuraKan are designed for a service life of 20-25 years
- The materials (steel, aluminum, glass) of both systems are mainly recyclable
- Continuous material developments - e.g. fiberglass resin for the HuraKan's wings - further improve sustainability

**Conclusion:** Taking cost-benefit into account, we always choose the most sensible material.

## Feasibility study

### POC Configuration

- Analyze customer requirements
- Propose the type(s) and number of WindSun modules
- Determine nominal POC value

Payment of 10%  
of the nominal  
order amount

- Location analysis
- Performance Assessment
- Project Costs, Resources, Timeline

Final binding offer as a basis  
for decision-making for the  
POC order

2 Weeks

2 Weeks

4-6 Weeks

2 Weeks



Questions

&

Answers



## Contact

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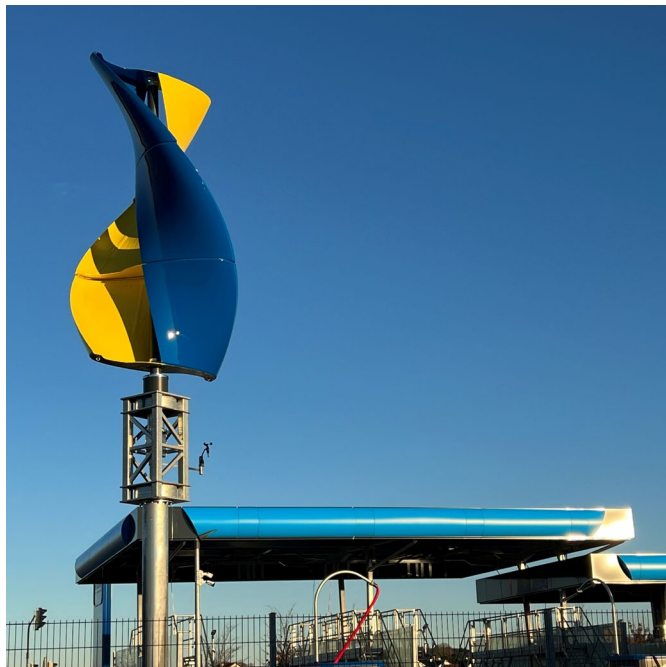
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LUVSIDE

# Our References





Kunststoffbearbeitung  
**EBERT**  
Displaymanufaktur

  
**ENERGIE**  
FORSCHUNGSPARK  
Lichtenegg

 **Fachhochschule Kiel**  
Hochschule für Angewandte Wissenschaften

**A|S|F|I|N|A|G**

Autobahnen- und Schnellstraßen- Finanzierungs-  
Aktiengesellschaft, Österreich

