KITEPOWER

PRODUCT SUMMARY

Kitepower - Airborne Wind Energy
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The Kitepower Falcon 100kW


KITEPOWER
We envision a world where Kitepower systems are deployed globally, delivering clean, affordable and sustainable energy to everyone.

Discover the Great Advantages of Kitepower

Integrate Kitepower into your micro-grid with solar PV and batteries to reap the benefits of smart hybrid energy generation.

Avoid idle generators & save diesel off-the-grid

When integrating Kitepower in combination with batteries, diesel generators can be switched off completely. Hybridizing with Kitepower results in less diesel consumption for more clean energy, culminating in considerable financial savings even for areas that don't experience consistent high wind speeds.

Find out more about Kitepower's competitive advantages when compared to solar PV or traditional wind turbines:

	Mass t	Area m^2	Energy throughout 24 hrs		Hurricane Proof	Installation Time
	220	50	√	√	×	weeks
	70	2000	√	×	×	days
KITEPOWER	15	50	√	√	√	hours

Learn more about the energy perks of Kitepower at *thekitepower.com/products/*

Electricity Generation 24/7

Produce electricity during day, night, on cloudy and rainy days

High Energy Production

Higher capacity factor than solar PV and wind turbines

Easy to Transport

All equipment fits in one 20ft container

Deployable in Harsh Environments

Ideal for remote locations

Plug & Play

Install it in less than 24hrs and operate it out-of-the-box

Dual land-use during Falcon's operation - Valkenburg, The Netherlands.

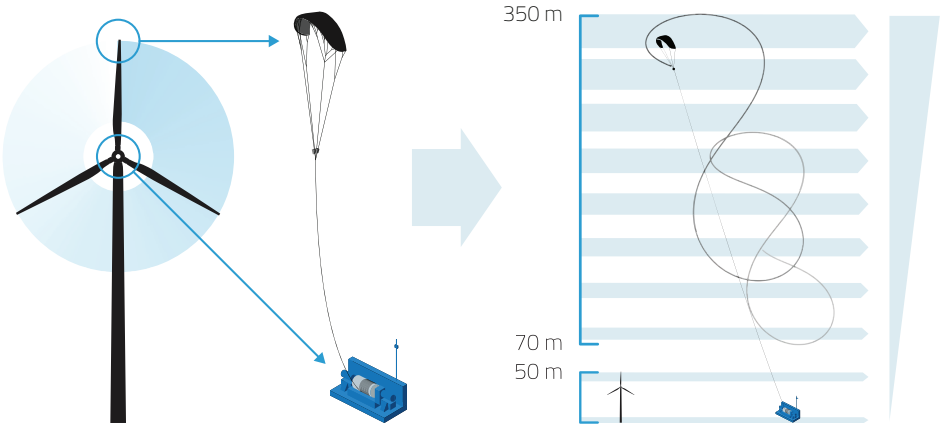
Why Kitepower?

Taking Only the Best from Wind Turbines

Problem

Conventional wind energy systems rely on electricity generation by means of wind turbines installed on the ground. Wind turbines, therefore, require resource -intensive towers and heavy foundations thus imply a demanding transportation and installation process.

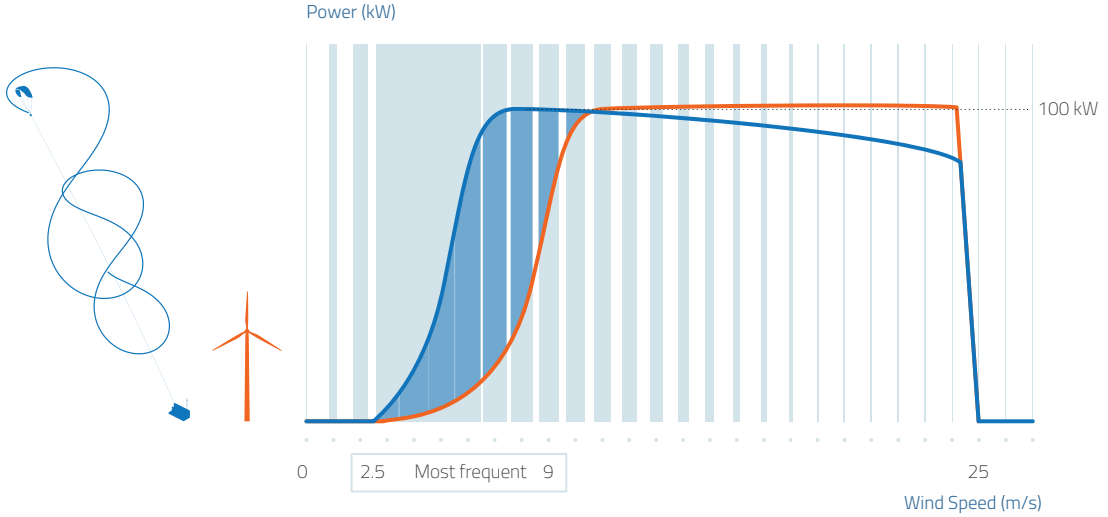
Difficult logistics limit the geographical versatility of wind turbines while their constrained height limit their efficiency. This results in unsustainable diesel supplies needed for most of the remote off- and micro-grid applications across the globe.

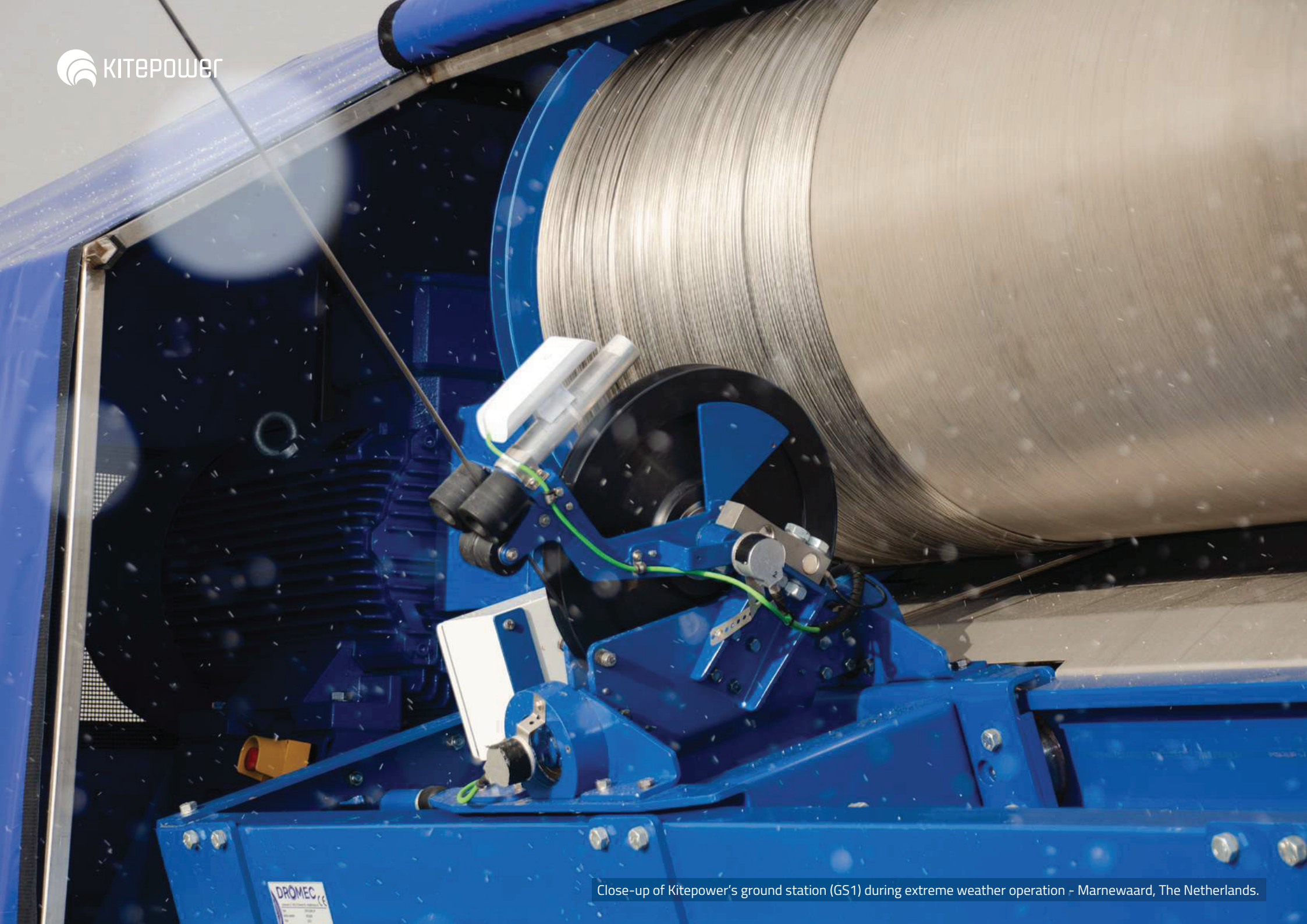


Solution

Kitepower develops cost-effective alternatives to existing wind turbines by using kites to generate electricity.

Kitepower systems do not require resource-intensive towers nor heavy foundations and is thus easy to transport and deploy. The system is able to harness stronger and more persistent winds at higher altitudes, allowing for higher capacity factors than traditional wind turbines and solar PV while being easier to transport, install and maintain. Moreover a Kitepower system is also able to start generating electricity with lower winds speeds than the ones required by windmills.

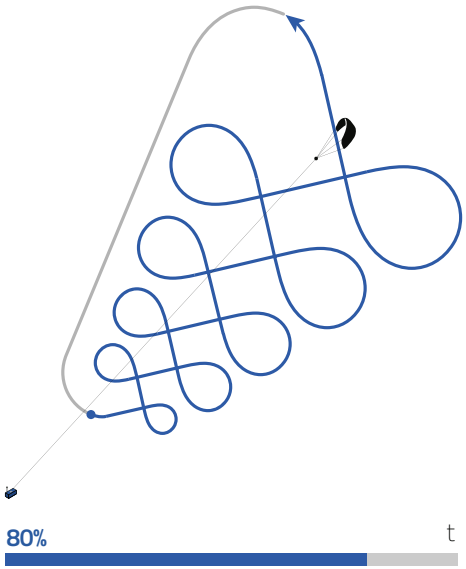


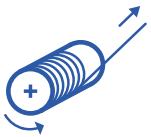


Close-up of Kitepower's ground station (GS1) during extreme weather operation - Marnewaard, The Netherlands.

Continuous Pumping Cycle Operation

The electricity generation works in two phases, which repeated in continuous cycles result in positive net energy output.

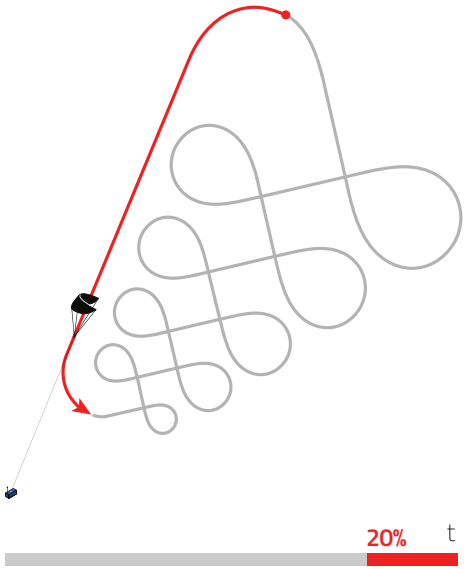


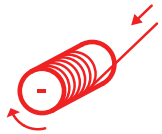


PHASE 1: REEL-OUT

Energy Production

During the first energy production phase the kite is flown in a cross-wind figure of eight pattern to achieve a high pulling force and reel out the tether from the winch in the ground station.

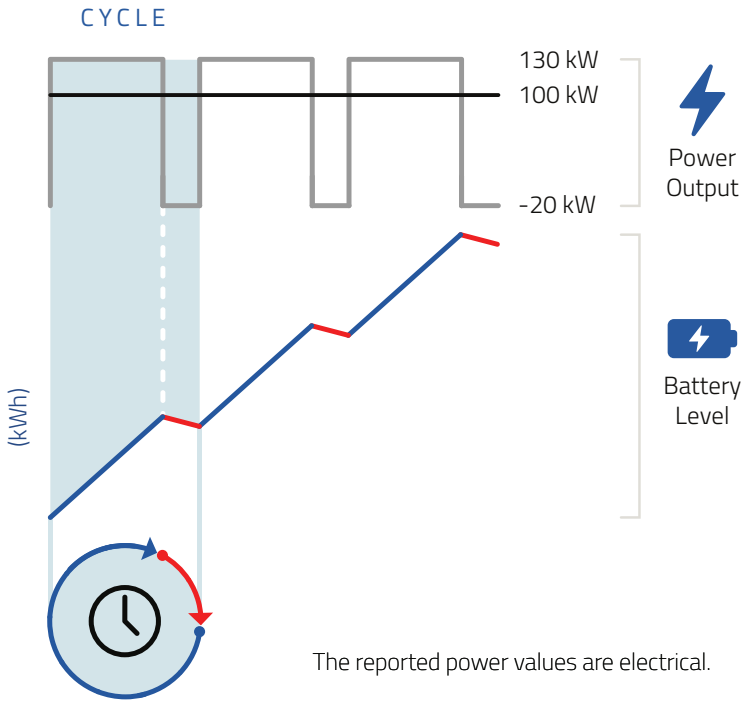




PHASE 2: REEL-IN

Energy Consumption

When the max tether length is reached, the kite's profile is adjusted in order to reel-in the tether with low force, using a small fraction of the energy produced in the previous phase.



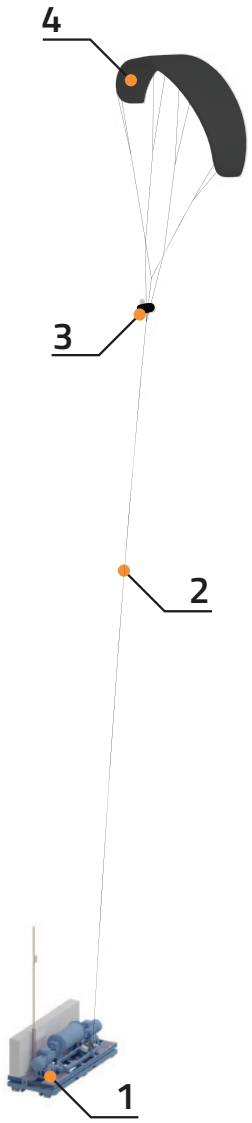
The reported power values are electrical.

The Kitepower Falcon:

- Has a single cycle duration of 100 seconds
- Produces 130 kW 80% of the cycle's time when in Reel-out
- Consumes 20 kW 20% of the cycle's time when in Reel-in

Kitepower Falcon's system operation - Marnewaard, The Netherlands.

System Components & Space Requirements



4. Kite

Consists of a hybrid between an inflatable and a fixed fibre-glass skeleton, forming the best combination for a strong and lightweight wing.

3. Kite Control Unit (KCU)

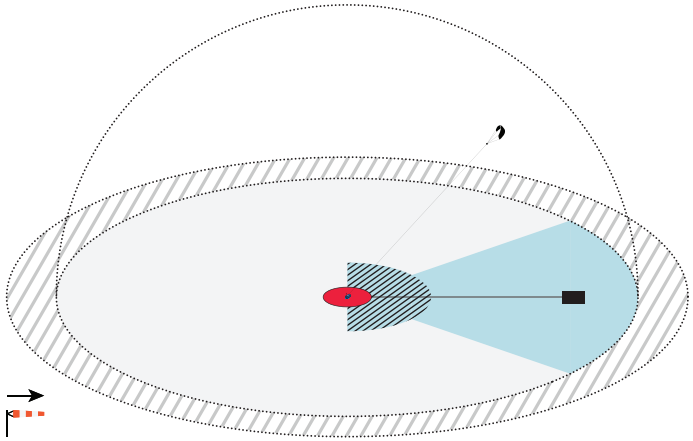
Controls the roll, pitch, and yaw of the kite and takes care of the communications between the sensor unit placed on the kite and the GS.

2. Tether

A Dyneema® line is used for a lightweight and strong connection between the kite and the GS.

1. Ground Station (GS)

Converts the mechanical energy of the kite into electrical power and reels the kite in by using the generator as a motor.



Zone	Dimensions	Dual Land-use[1]
Restricted Zone	30 m (r)	
Flight Zone	350 m (r)	
Potential Flight Zone	350 m (r)	√
Safety Buffer	425 m (r)	√
Landing Zone	100 m (r)	
Launching Corridor	280x1 m	
Launch Pad	20x20 m	

Obstacles' height within operational envelope:
1m allowance every 10m of distance from the GS

[1] Land can be used for alternative activities while Kitepower is deployed.
(r) = Radius

Kitepower's 25-40-60 m² kites - Delft, The Netherlands.

The Kitepower Falcon

Technical Summary

General Information

Nominal Power Output[1]	100 kW
Yearly Power Output	450 MWh/year
Rated Wind Speed	7 m/s
Cut-in wind Speed	2 m/s
Max Operating Wind Speed	15 m/s
Min Launching Speed	5 m/s
Airborne Wind Range	0-25 m/s
Max Flight Altitude	350 m
Ground Space Required[2] **(radius)**	350 m

[1] Power output potential might differ depending on the kite variant
[2] The ground space must be free of obstacles

Kite

Variant	V9
Size flat (m²)	60-80 m²
Size projected (m²)	47-62 m²
Force (t)	3,5 t
Lifetime (hours)	4000h
Avg. Flight Speed (km/h)	110 km/h
Air Traffic Lights	√
Airborne Pump	√
Field Pump	√
Sensor Unit	√
Kite Bags	√
Safety Line	√
Landing Protection	√
Safety Attachment Points	√
Parachute Landing	√

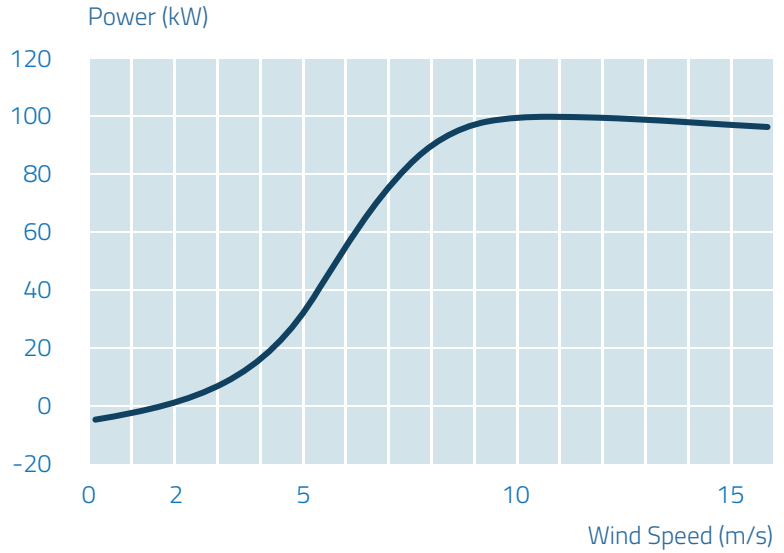
KCU

Weight	23 kg
IP Rating	IP65
Wireless communication link	2 km
Airborne Power Supply	√
Protective Cover	√
Air Traffic Lights	√
Airborne Wind Turbine	√
Protection Cover	√
Safety Release	√
Health Supervisor	√

Tether

Type	UHMWPE Dyneema®
Length (default)	350 m
Passive Safety Release	√

Power Curves



Ground Station

Main Dimensions	W: 2,44 m H: 2,60 m L: 6,06 m
Weight	9.6 t
IP Rating	IP64
Lifetime	25 years
AC Power output	400V AC 3 phase
DC power output	550-700 V
Nominal Power	100kW
Peak Power	120 kW AC / 250 kW DC
Connection mode	Power lock or screw terminals
Launch Unit	√
Safety Emergency Stop	√
Health Supervisor	√

+ More information can be found within *The Kitepower Falcon 100kW Technical Specification Document.*

▲ Long exposure shot of the Falcon's system operation - Valkenburg, The Netherlands.