NPS 100C-21

Class II/A

Northern
POWER SYSTEMS

The Next Generation High Output Wind Turbine for Moderate to High Wind Regimes

NPS 100C-21

Class II/A

» Introducing the NPS 100C, the next generation of our industry leading permanent magnet/direct drive distributed wind turbines.

» With its best in class track record and high energy production, the NPS 100C-21 turbine is well suited for agricultural applications, light industry, local authorities and education facilities. By comparison to large utility-scale turbines, its lower tip height makes it more suitable for rural and urban areas.

» As the UK's leading 100 kW Class II wind turbine, the NPS 100C-21 is optimised to generate the highest output in moderate to high wind speeds.

» A new 21-metre rotor features state-of-the-art hub and blade technology with superior aerodynamics providing a larger swept area. This increases the annual energy production (AEP) of the NPS 100C-21 by 11% over the previous model.

» The turbine is a complete redesign of NPS' distributed wind platform that has been deployed around the world since 2008. The nacelle is now 30% smaller with a completely new tower configuration. This results in lower weight and load characteristics reducing foundation and installation costs.

» Further improvements include a new best in class brake system, a new industry leading yaw configuration, an enhanced electrical layout, more efficient generator cooling, and an ultrasonic wind vane and anemometer.

» Over 5 million hours of cumulative run time makes the NPS 100 turbine series one of the most reliable and proven wind turbines in the world. The average availability of Northern Power's global fleet currently stands at 99.5%.

» This is made possible through an engineering advancement in simplicity and precision. Our permanent magnet direct drive (PMDD) technology maximises energy capture, outperforms conventional gearbox designs, and reduces maintenance costs.

Northern
POWER SYSTEMS

Specifications

General Configuration

Model	Northern Power® 100C-21
Design Class	IEC WTGS II/A air density 1.225 Kg/m^3, average annual wind below 8.5 m/s, 50-yr peak gust below 59.5 m/s
Design Life	20 years
Rotor Diameter	20.7 m
Tower Types	Tubular steel monopole
Hub Height	37 m, 29 m
Orientarion	Upwind, 3 blade
Yaw System	Active yaw drive with wind direction/speed sensors and automatic cable unwind
Power Regulation	Variable speed, stall control
Certification	CE compliant, CEI 0-21

Performance

Rated Wind Speed	15 m/s
Cut-in Wind Speed	3 m/s
Cut-out Wind Speed	25 m/s
Extreme Wind Speed	59.5 m/s

Weight

Rotor (21 m) & Nacelle	6,500 kg
Tower (37 m)	12,000 kg

Drive Train

Gearbox Type	No gearbox (direct drive)
Generator Type	Permanent magnet

Braking System

Redundant Braking System (per IEC 61400-1ed3)	Generator dynamic brake and multiple hydraulic calipers

Control System

Controller Type	DSP-based multiprocessor embedded platform
Converter Type	Pulse-width modulated IGBT frequency converter
Monitoring System	SmartView® remote monitoring system, ModBus TCP

Electrical System

Rated Electrical Power	100 kW, 3 Phase, 400 VAC, 50 Hz
Power Factor	Set point adjustable between 0.9 lagging and 0.9 leading
Reactive Power	+/- 45 kVAR
Grid Interconnect	Utility approved protective relay included

Noise

Apparent Noise Level	50 dBa at 50 metres from nacelle

Environmental Specifications

Temperature Range Operational	-20°C to 40°C
Temperature Range Storage	-30°C to 50°C
Lightning Protection	Receptors in blades, nacelle lightning rod and electrical surge protection

Key Benefits

» **High wind leader**
Europe's leading 100 kW Class II wind turbine with exceptional performance in high wind regimes, the NPS 100C-21 can handle gusts up to 59.5 m/s. The NPS 100C-21 is designed and built to withstand the same weather conditions as the 'Hurricane Resistant' NPS 100B-21

» **Reliable**
Reinforced blades, gearless design, industry leading yaw configuration, and best-in-class brake system make Northern Power turbines the most reliable small wind turbines available today

» **Easier planning**
The NPS 100C-21 comes with 29 and 37 metre tower options to meet local tip height restrictions. The low noise profile and new colour minimise the acoustic and visual impact for easier planning applications

» **Generate profitable income**
- Maximise the UK's Feed-in-Tariff (FiT) using the largest allowed turbine (100 kW) within the tariff band
- With low ownership costs over the lifetime of the turbine, the NPS 100C-21 pays for itself quickly

» **Plug and play**
Installation is straightforward as the standard configuration for the NPS 100C-21 is grid ready. Supplied with an approved 400-volt transformer, an RTU data logger and a utility grid protective relay interface (G59/2) all built into the tower of the wind turbine. Our state of the art power converter design provides smooth, clean power to local grids, which simplifies grid connection.

10-Year Performance Guarantee Programme (PGP)

The 10-Year PGP covers 10 years of operation and maintenance costs, including parts, labour and expenses for the NPS 100. This is the only such warranty offered by a manufacturer for a small wind turbine in Britain.

The annual cost is based on the performance of the NPS 100. This is backed by an **availability guarantee** and **performance to power curve guarantee**.

During the programme NPS will be the sole service provider. This gives peace of mind that the wind turbine will produce maximum energy and return on investment while offering the lowest total cost of ownership for the turbine's 20+ year life.

With the 10-Year Performance Guarantee Programme, Northern Power Systems is financially invested in the success of your wind turbine.

Other services in the Northern Power PGP include:
- **24x7 monitoring and reporting:** Operation teams in the UK, Italy and the US oversee the performance and operation of your wind turbine to ensure maximum availability
- **Global Spares Management Programme:** New parts for the NPS 100 dispatched for same-day or next-day delivery

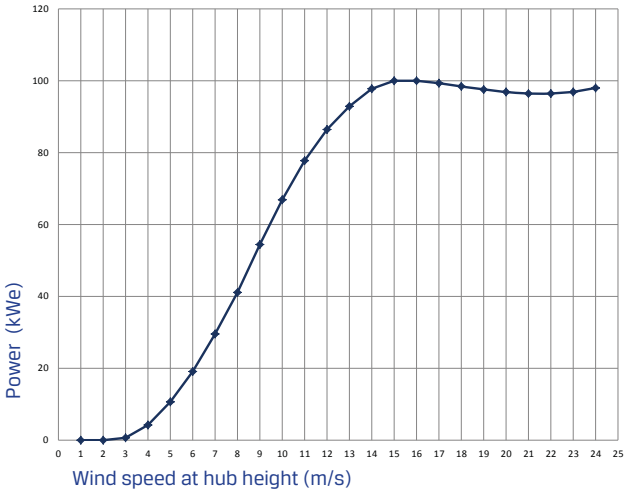
Power Curves

NPS 100C-21 Class II/A Power Curve

21m Rotor, Standard Conditions*

wind speed (m/s)	1	2	3	4	5	6	7	8	9	10
electric power (kWe)	-0.6	-0.6	0.5	4.1	10.5	19.0	29.4	41.0	54.3	66.8

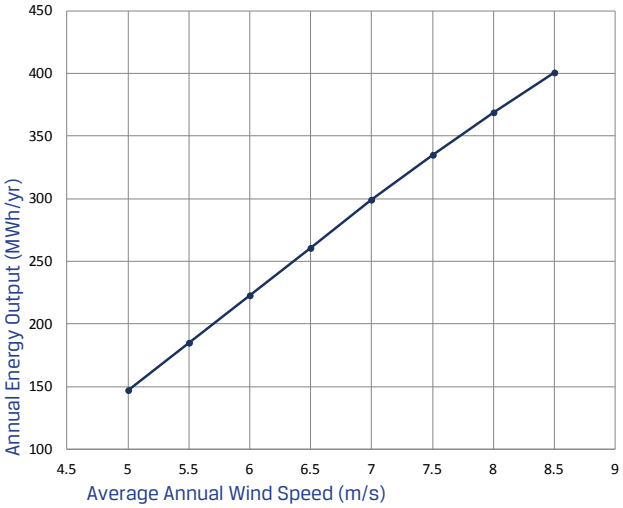
11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
77.7	86.4	92.8	97.8	100	99.9	99.2	98.4	97.5	96.8	96.4	96.3	96.8	98.0	99.2



Annual Energy Production: 21-Metre Rotor

Standard Conditions,* Rayleigh Wind Distribution

	(mph)	11	12	13	14.5	16	17	18	19
Average annual wind speed	(m/s)	5.0	5.5	6.0	6.5	7	7.5	8.0	8.5
Annual energy output	(MWh/yr)	147	185	223	261	299	335	369	401



* Standard conditions: air density of 1.225 kg/m3, equivalent to 15°C (59°F) at sea level

Northern Power Systems
29 Pitman Road
Barre, Vermont, 05641 USA
UK Tel: 0808 234 6788
northernpower.com