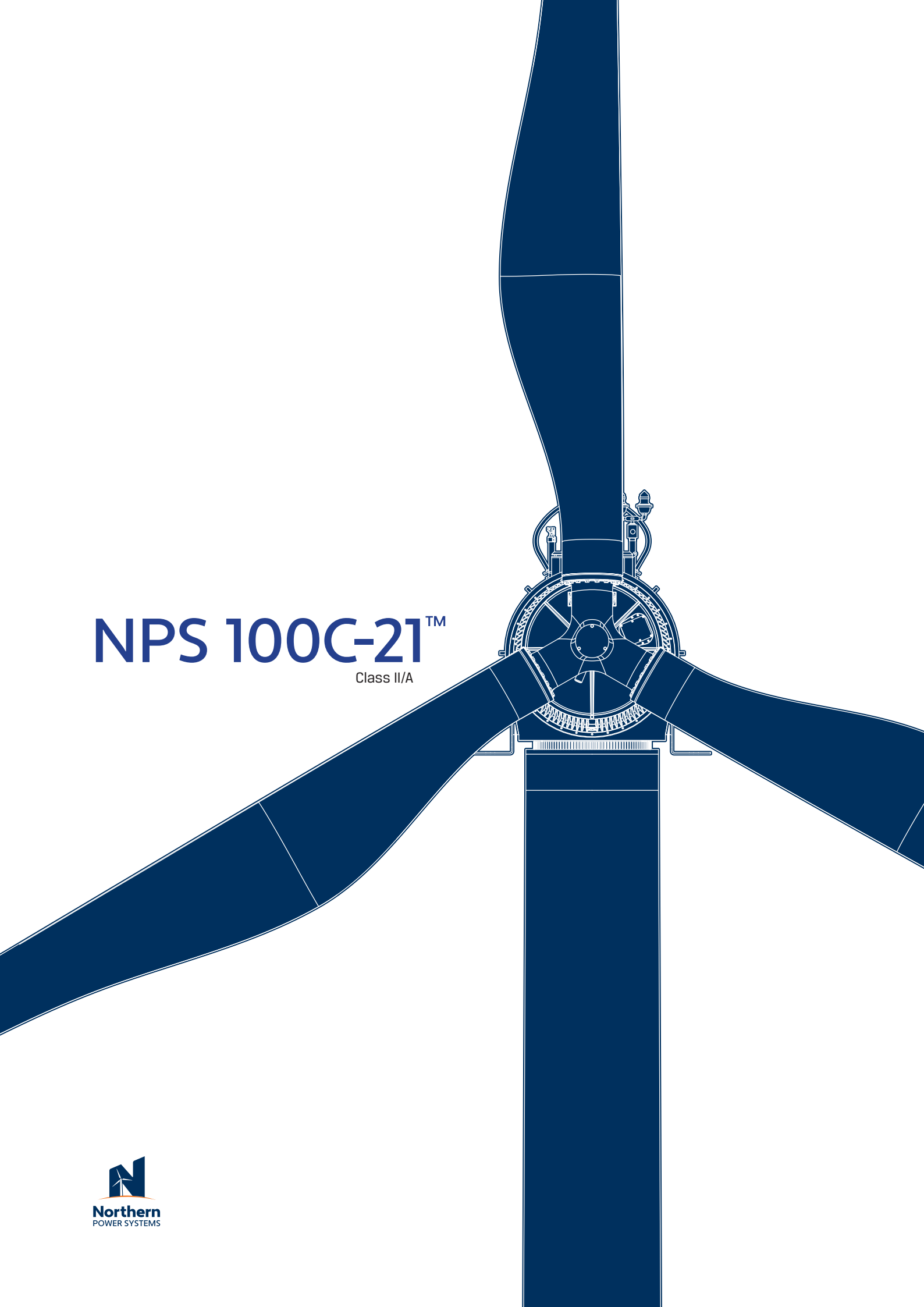
NPS 100C-21™

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, municipalities, schools and universities. By comparison to large utility-scale turbines, the turbine's lower tip height makes it more suitable for rural and urban areas.

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

» A new 21-meter rotor features state of the art hub and blade technology with superior aero-dynamics 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 maximizes 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[1] air density 1.225 Kg/m^3, average annual wind below 8.5 m/s (19 mph), 50-yr peak gust below 59.5 m/s (133 mph)
Design Life	20 years
Rotor Diameter	20.7 m (68 ft)
Tower Types	Tubular steel monopole
Hub Height	37 m (120 ft), 29 m (96 ft)
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 (34 mph)
Cut-in Wind Speed	3 m/s (7 mph)
Cut-out Wind Speed	25 m/s (56 mph)
Extreme Wind Speed	59.5 m/s (133 mph)

Weight

Rotor (21 m) & Nacelle	6,500 kg (14,300 lbs)
Tower (37 m)	12,000 kg (26,500 lbs)

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, 480 VAC, 60 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 meters (164 ft) from nacelle

Environmental Specifications

Temperature Range Operational	-20°C to 40°C (-4°F to 104°F)
Temperature Range Storage	-30°C to 50°C (-22°F to 122°F)
Lightning Protection	Receptors in blades, nacelle lightning rod and electrical surge protection

[1] International Electrotechnical Commission Wind Turbine Generating System, 61400-1 ed3

Key Benefits

» **High wind market leader**
North America'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 (133 mph). It 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 permitting**
The NPS 100C-21 comes with 29 and 37 meter tubular tower options to meet local tip height restrictions. The low noise profile and new color minimize the acoustic and visual impact for easier permitting

» **Low ownership cost**
With low ownership costs over the lifetime of the turbine, the NPS 100C-21 pays for itself quickly and will generate reliable power over its 20+ year life

» **Plug and play**
Installation is straightforward as the standard configuration for the NPS 100C-21 is grid ready. Supplied with an approved 480-volt transformer, an RTU data logger and a utility grid protective relay interface 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

2 Year Warranty

The NPS 100C-21 is covered by a 2-year manufacturer warranty. This covers parts, labor and freight in the unlikely event something were to go wrong. Other services in the Northern Power warranty include:

- **24x7 monitoring and reporting:** Operation teams in the UK, Italy and the United States oversee the performance and operation of your wind turbine to ensure maximum availability
- **Global Spares Management Program:** New parts for the NPS 100C-21 dispatched for same-day or next-day delivery

Extended O&M Contract

Extended operations and maintenance is available direct from Northern Power Systems once the warranty ends. Dependent on the terms agreed our engineers will continue to provide:

- Monitor and reporting
- RTU maintenance
- Remote support
- Preventative maintenance

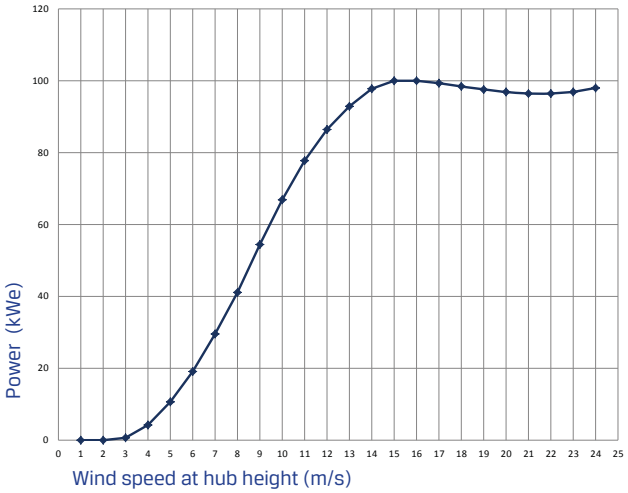
Power Curves

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

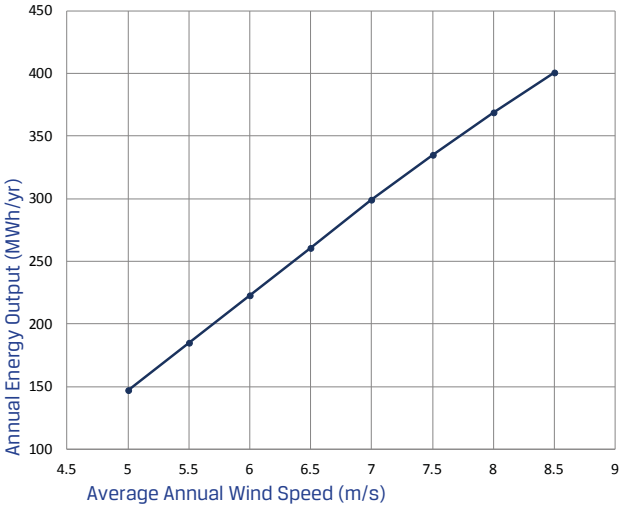
11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
77.7	86.4	92.8	97.8	100	99.9	99.2	98.4	97.5	96.8	96.4	96.3	96.8	98.0	99.2



Annual Energy Production: 21-Meter 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
T: +1 802 461 2903
northernpower.com