

# NPS 100C-24

Class III/A



## The Next Generation High Output Wind Turbine for Low Wind Regimes

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

» A new 24-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-24 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 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.

# Specifications

## Key Benefits

### General Configuration

|                  |  |
|------------------|--|
| Model            | Northern Power® 100C-24  |
| Design Class     | IEC WTGS III/A air density 1.225 Kg/m <sup>3</sup> , average annual wind below 7.5 m/s, 50-yr peak gust below 52.5 m/s |
| Design Life      | 20 years   |
| Rotor Diameter   | 24.4 m   |
| Tower Types      | Tubular steel monopole   |
| Hub Height       | 37 m, 29 m, 22 m   |
| Oriention        | 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   | 12 m/s   |
| Cut-in Wind Speed  | 3 m/s    |
| Cut-out Wind Speed | 25 m/s   |
| Extreme Wind Speed | 52.5 m/s |

### Weight

|                        |           |
|------------------------|-----------|
| Rotor (24 m) & Nacelle | 6,900 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 | 95 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 |

#### » Optimised for lower wind regimes

The NPS 100C-24 starts making power at wind speeds as low as 3 metres per second and provides maximum generation at 12-15 mps

#### » 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-24 comes with 22, 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-24 pays for itself quickly and will generate a healthy income stream over its 20+ year life

#### » Plug and play

Installation is straightforward as the standard configuration for the NPS 100C-24 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:

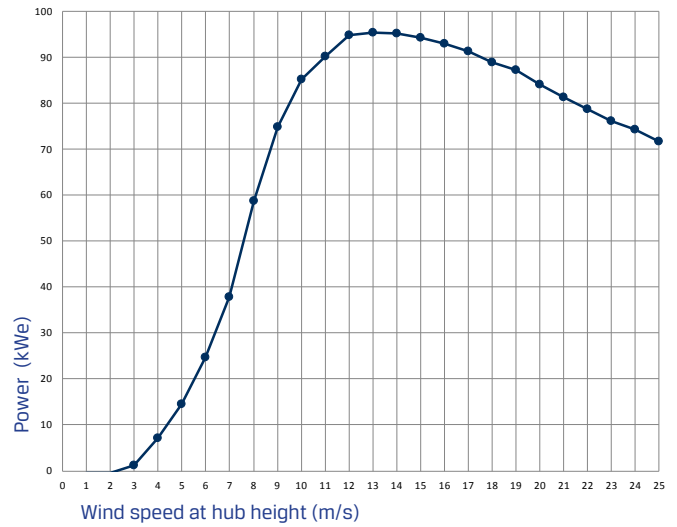
- **24x7 monitoring and reporting:** Operation teams in the UK, Italy and the United States oversee the performance and operation of your wind turbine to ensure maximum availability
- **Global Spares Management Programme:** New parts for the NPS 100 dispatched for same-day or next-day delivery

# Power Curves

## NPS 100C-24 Class III/A Power Curve

24m Rotor, Standard Conditions\*

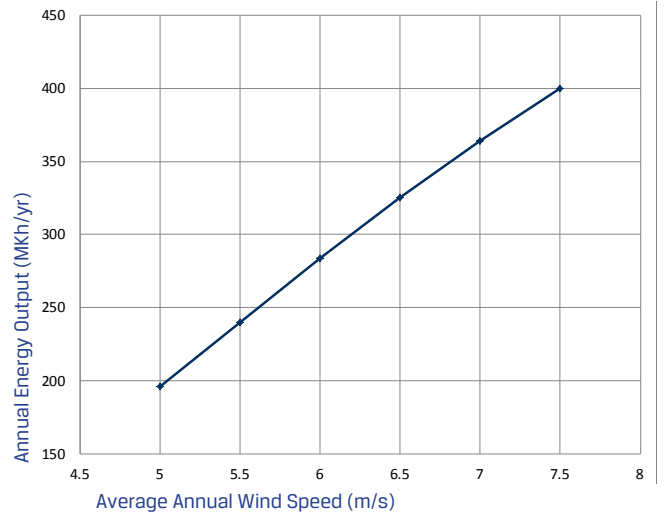
|                      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|----------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| wind speed (m/s)     | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   |      |      |      |      |      |
| electric power (kWe) | -0.5 | -0.5 | 1.2  | 7.2  | 14.5 | 24.7 | 37.9 | 58.7 | 74.8 | 85.1 |      |      |      |      |      |
|                      | 11   | 12   | 13   | 14   | 15   | 16   | 17   | 18   | 19   | 20   | 21   | 22   | 23   | 24   | 25   |
|                      | 90.2 | 94.7 | 95.3 | 95.1 | 94.2 | 92.9 | 91.2 | 88.9 | 87.1 | 84.1 | 81.3 | 78.6 | 76.1 | 74.3 | 71.7 |



## Annual Energy Production: 24-Metre Rotor

Standard Conditions,\* Rayleigh Wind Distribution

|                           |          |     |     |     |      |     |     |
|---------------------------|----------|-----|-----|-----|------|-----|-----|
|                           | (mph)    | 11  | 12  | 13  | 14.5 | 16  | 17  |
| Average annual wind speed | (m/s)    | 5.0 | 5.5 | 6.0 | 6.5  | 7   | 7.5 |
| Annual energy output      | (MWh/yr) | 196 | 240 | 284 | 325  | 364 | 399 |



\* Standard conditions: air density of 1.225 kg/m<sup>3</sup>, equivalent to 15°C (59°F) at sea level  
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