High Wind Operation **(HWO)**

Enabling extended wind turbine operation to achieve improved output stability, energy production and reliability

Benefits of Vestas' HWO:

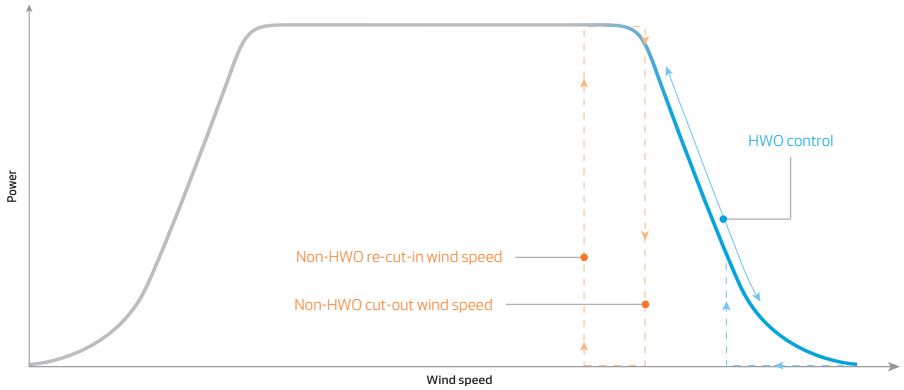
- Enhanced output stability with de-rated energy production beyond standard cut-out wind speeds
- Increased Annual Energy Production (AEP) by up to 0.8 percent*
- Improved component reliability through fewer stop-and-start operations

* Turbine and site dependent

Vestas' High Wind Operation (HWO) is an intelligent control feature allowing the wind turbine to continue operating beyond standard cut-out wind speeds. The result is improved output stability, energy production and reliability.

Output stability

With Vestas' HWO control feature, the wind turbine will continue operating beyond the standard cut-out wind speed by following a gradual de-rating profile. This is done by intelligently adapting the blade pitch, power generation and rotational speed, thereby performing a condition-dependent derating of the turbine in proportion to actual wind conditions. On wind park level, this means a more gradual reduction of generated power, benefiting grid stability.



- The HWO control feature gradually reduces energy production by following a de-rating profile, thereby enabling extended wind turbine operation beyond standard cut-out wind speeds.

Availability of Vestas' HWO:

V80-1.8/2.0 MW® **
V90-1.8/2.0 MW® **
V100-1.8/2.0 MW® **
V110-2.0 MW®
V105-3.45 MW™
V112-3.45 MW®
V117-3.45 MW®
V117-4.2 MW™
V126-3.45 MW®
V136-3.45 MW®
V136-4.2 MW™
V150-4.2 MW™ ***

* Turbine and site dependent
** Aftersales solution. May require controller upgrade to VMP Global.
***High Wind Operation is a standard feature on the turbine

Additional energy production

When the wind speed exceeds the standard cut-out point of a wind turbine, Vestas' HWO enables the turbine to keep producing electricity. This continued energy production beyond the standard cut-out wind speed can improve annual energy production by up to 0.8 percent*.

Improved reliability

The Vestas HWO control feature results in fewer hysteresis-related stop-and-start operations due to the cycle moving to higher wind speeds with fewer expected operating hours. As a result, the frequency of associated hysteresis loops are reduced, which can increase the number of production hours as well as limit the strain on wind turbine components.

For more information

Vestas HWO provides extended wind turbine operation for improved output stability, energy production and reliability. Please contact your local Vestas office for market specific availability and further information.

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03/2019 – EN

Wind. It means the world to us.™