



INNOMAG® TB-MAG™ Pump Cools Hard-to-Reach Wind Turbines



Experience In Motion



Keeping turbines cool as renewable energy generation heats up

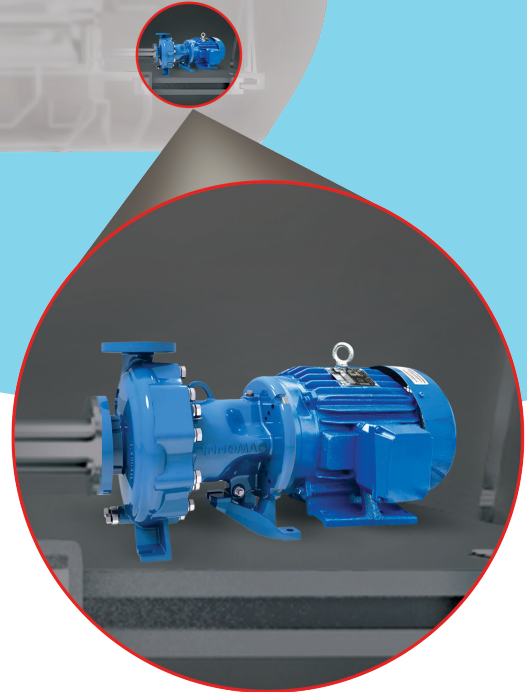
Expanding renewable power sources can enable industrial companies to achieve their sustainability goals and also ensure access to clean but affordable, reliable and secure energy.

There's an increasing worldwide focus on minimizing environmental impact. Governments and global organizations alike are establishing more stringent regulations in an effort to reduce emissions that contribute to the greenhouse gases (GHG) which warm the atmosphere and cause climatic change. In addition, businesses of all sizes and across industries are taking more steps to minimize or eliminate their carbon footprints and consume resources more efficiently.

INNOMAG TB-MAG pumps support the energy transition

These efforts raise the urgency to build out alternative power sourcesⁱⁱⁱ and environmentally friendly industrial facilities. Among the most promising renewable energy options is wind power generated by turbines on land and offshore.

And Flowserve is fully prepared to support the transition to wind power with the INNOMAG[®] TB-MAG[™] thrust-balanced, sealless process pump. In wind turbine applications, INNOMAG TB-MAG pumps can operate maintenance-free in cooling systems that dissipate the heat generated by power converters.



10X

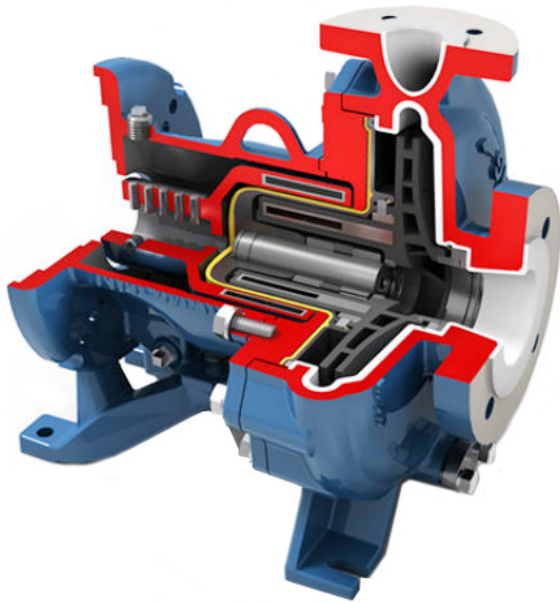
Wind to grow by a factor of 10

The new industrial process and business opportunities to generate and utilize power from wind sources will be significant.

- Global wind energy capacity surged from 180,846 MW in 2010 to 622,408 MW in 2019.ⁱ
- **Global wind energy is expected to rise ten-fold,** reaching over 6,000 GW by 2050.ⁱⁱ

Leak- and maintenance-free

Wind turbine towers are topped by tightly packed cabins or housings containing a gearbox, generator, transformer, drives that orient the turbine blades, plus firefighting and control systems. There's also a liquid-cooled system to dissipate heat from the power converter — and the INNOMAG TB-MAG pump from Flowserve is ideal for this hard-to-access application.



The INNOMAG TB-MAG pump all but eliminates the need for maintenance. There are no mechanical seal or ball bearings to fail, no shaft alignment or impeller adjustment needed, no emissions testing required, and no lube or oil to be changed.

By eliminating the two components responsible for nearly 80% of all pump breakdowns — mechanical seals and conventional ball bearings — Flowserve enhanced the reliability of the INNOMAG TB-MAG pump. A magnetic coupling and thrust-balanced design provide a mean time between failure (MTBF) of 150,000 hours — 20,000 hours longer than pump offerings from competitors. A modified motor needs regreasing once every five years.



295 FEET

Cooling ever-more powerful wind turbines

Wind power plants keep getting bigger, more powerful and increasingly challenging to reach for maintenance and repairs.

The towers average 89.9 m (295 ft) in height.^{iv}

When sited off-shore, fixed-bottom wind turbines can sit on the ocean floor in water up to 60 m (180 ft) deep.^v

And locations are becoming more remote. About 80% of Europe's potential offshore wind resources are located in water more than 60 m (180 ft)^{vi} deep; so floating turbine towers are being deployed.



- i Research and Markets, "Global Wind Turbine Market - Forecasts from 2020 to 2025," September 2020, <https://www.researchandmarkets.com/reports/5174309/global-wind-turbine-market-forecasts-from-2020> (accessed July 22, 2021).
- ii Research and Markets, "Global Wind Turbine Market - Forecasts from 2020 to 2025," September 2020, <https://www.researchandmarkets.com/reports/5174309/global-wind-turbine-market-forecasts-from-2020> (accessed July 22, 2021).
- iii Research and Markets, "Global Wind Turbine Market - Forecasts from 2020 to 2025," September 2020, <https://www.researchandmarkets.com/reports/5174309/global-wind-turbine-market-forecasts-from-2020> (accessed July 22, 2021).
- iv Wind Energy Technologies Office, "Top 10 Things You Didn't Know About Wind Power," Office of Energy Efficiency and Renewable Energy, October 8, 2020, <https://www.energy.gov/eere/wind/articles/top-10-things-you-didnt-know-about-wind-power> (accessed July 22, 2021).
- v Michelle Froese, "Offshore wind industry heading out to deeper water," Windpower Engineering and Development, July 17, 2018, <https://www.windpowerengineering.com/offshore-wind-industry-heading-out-to-deeper-water> (accessed July 22, 2021).
- vi Michelle Froese, "Offshore wind industry heading out to deeper water," Windpower Engineering and Development, July 17, 2018, <https://www.windpowerengineering.com/offshore-wind-industry-heading-out-to-deeper-water> (accessed July 22, 2021).

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