



CHALLENGES IN MANUFACTURING LARGE WIND BLADES

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By John Korsgaard, Executive Senior Director

LM WIND
POWER

a GE Renewable Energy business

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LM Wind Power

A leading blade supplier to the wind industry



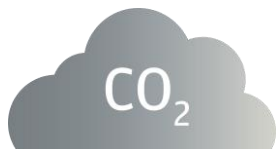
12 blade factories



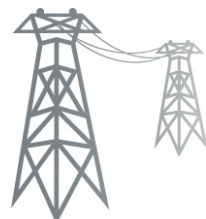
10,859 people worldwide



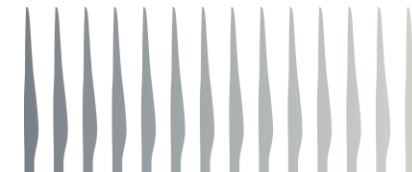
263,000 blades produced for wind turbines since 1978



305 million metric tons of CO₂ mitigated



142 GW installed capacity



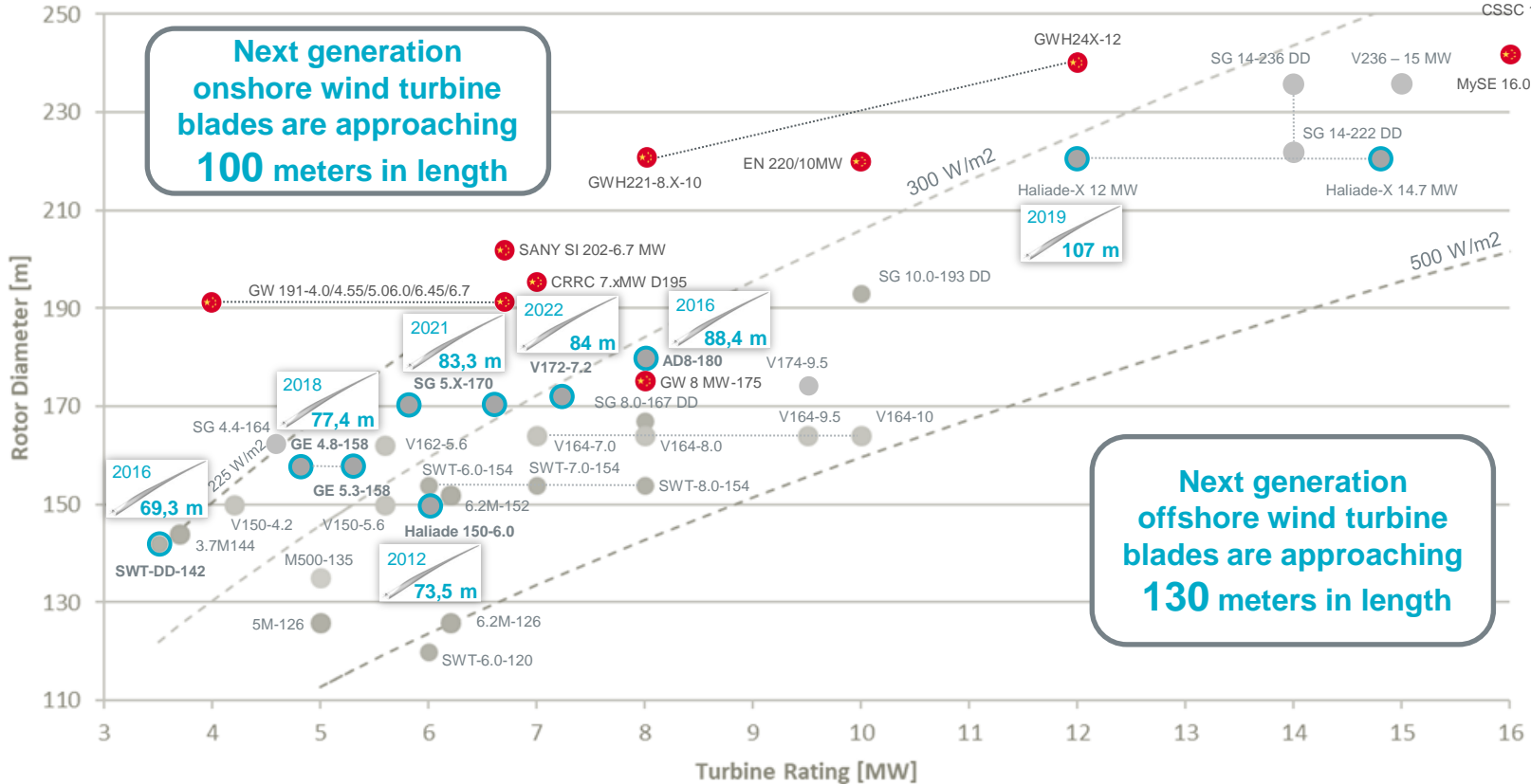
8,725 blades produced in 2022

*Data as of 31 December 2022

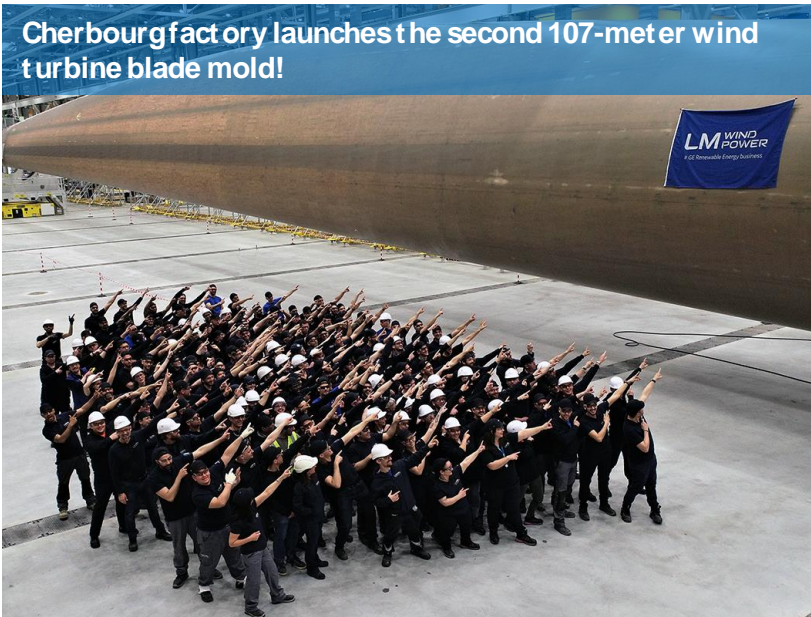
Blade length continues to expand in fast-pace



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Manufacture of ultra-long blade requires significant investments into factory footprint and equipment



Government support and funding are essential

Blade manufacturing is still a manual and people dependent process



1978

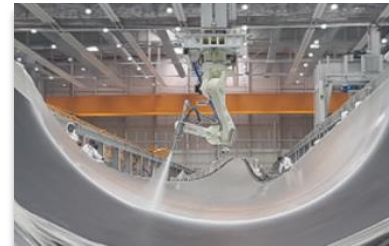
1990

2000

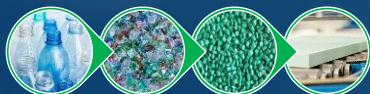
2010

2020

From wet hand layup to dry layup and VARTM



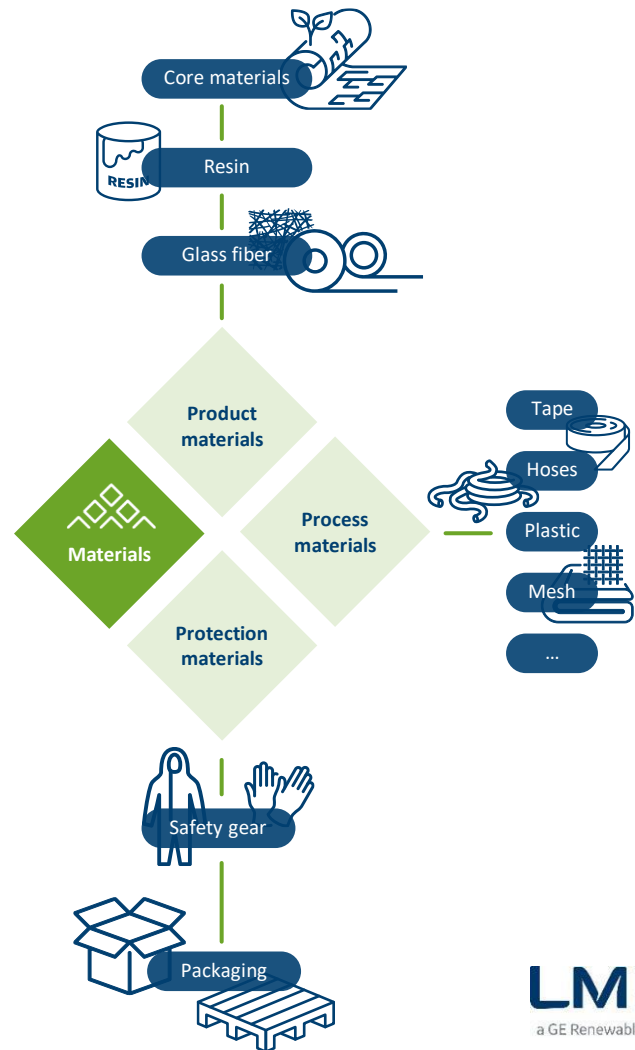
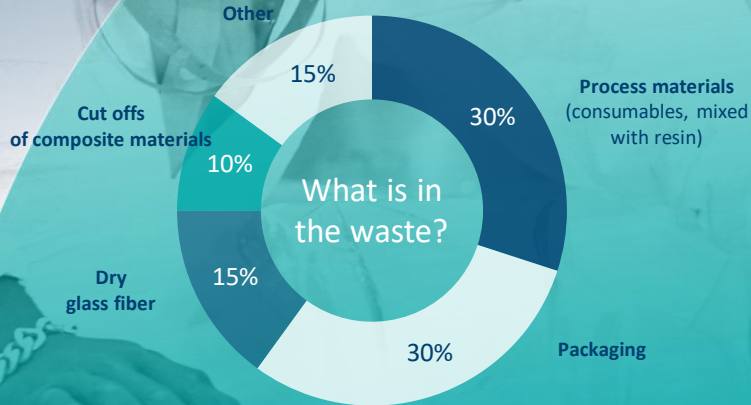
Reducing impacts upstream and downstream



Recycled PET reduces carbon emissions by up to 60% compared to virgin PET

Let's talk about waste

Did you know!
 Manufacturing waste volumes will be larger than end-of-life blades in the coming decade

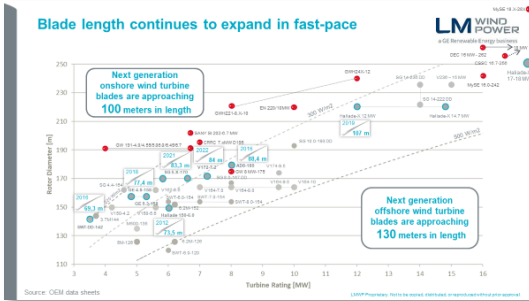


Driving Zero Waste Blades and circularity through bolder partnerships

- LM blade circularity strategy is to introduce recycled or more recyclable friendly materials in a cost-effective manner.
- 60-80% of PET (core material) used in LM blades is recycled PET.
- World largest thermoplastic blade build in 2022 and full-scale testing is on-going.
- Sustainable disposal of manufacturing waste is as challenging as the disposal of end-of-life blades and depends on options close to the manufacturing facility.

ZEBRA 100% Recyclable

Industry challenges



Arms race in new product introductions resulting in poor CAPEX utilization and unsustainable profitability

Significant future growth opportunities in the sector but severe lack of CAPEX

Manufacture of ultra-long blade requires significant investments into factory footprint and equipment

Charbourg factory launches the second 80m wind turbine blade mold!

GE Renewable Energy partners with Governments of Canada and Quebec to invest in expansion of Blade facility in Gaspe

Government support and funding are essential

Blade manufacturing is still a manual and people dependent process

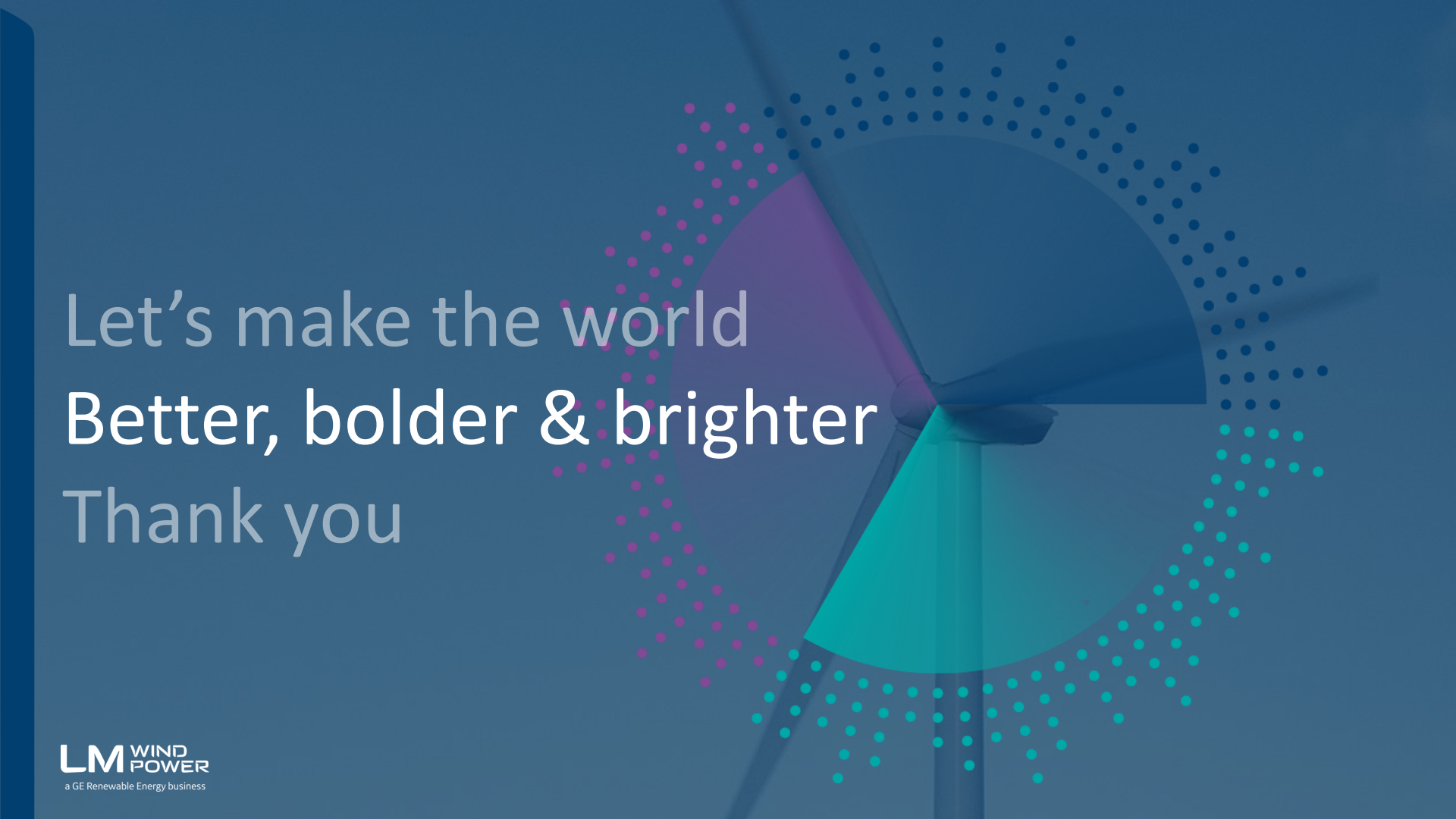
1978	1980	2002	2004	2012	2016	2020
6.7 m	LM 24.0	LM 34.0 P	LM 61.5 P	LM 73.5 P	LM 88.4 P	LM 107 P

Blade manufacturing is largely unchanged and remains a manual process

Pledges of sustainability within industry requires more partnerships across value chain

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Let's make the world
Better, bolder & brighter
Thank you