



GE Onshore* Wind

Product Update for New Zealand Wind Energy Association

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* With a small plug for offshore too

GE Renewable Energy

Onshore Wind

Offshore Wind

Hydro

LM Wind Power

Grid Solutions

Hybrids



\$15.3B
2019 REVENUE

80+
COUNTRIES

43,000
GLOBAL
EMPLOYEES

400+GW
INSTALLED BASE

25%
OF WORLD'S HYDRO
INSTALLED BASE

45,000
WIND TURBINES
INSTALLED GLOBALLY

90%
OF UTILITIES EQUIPPED
WITH GE GRID SOLUTIONS

Unleashing limitless energy for our customers and the world

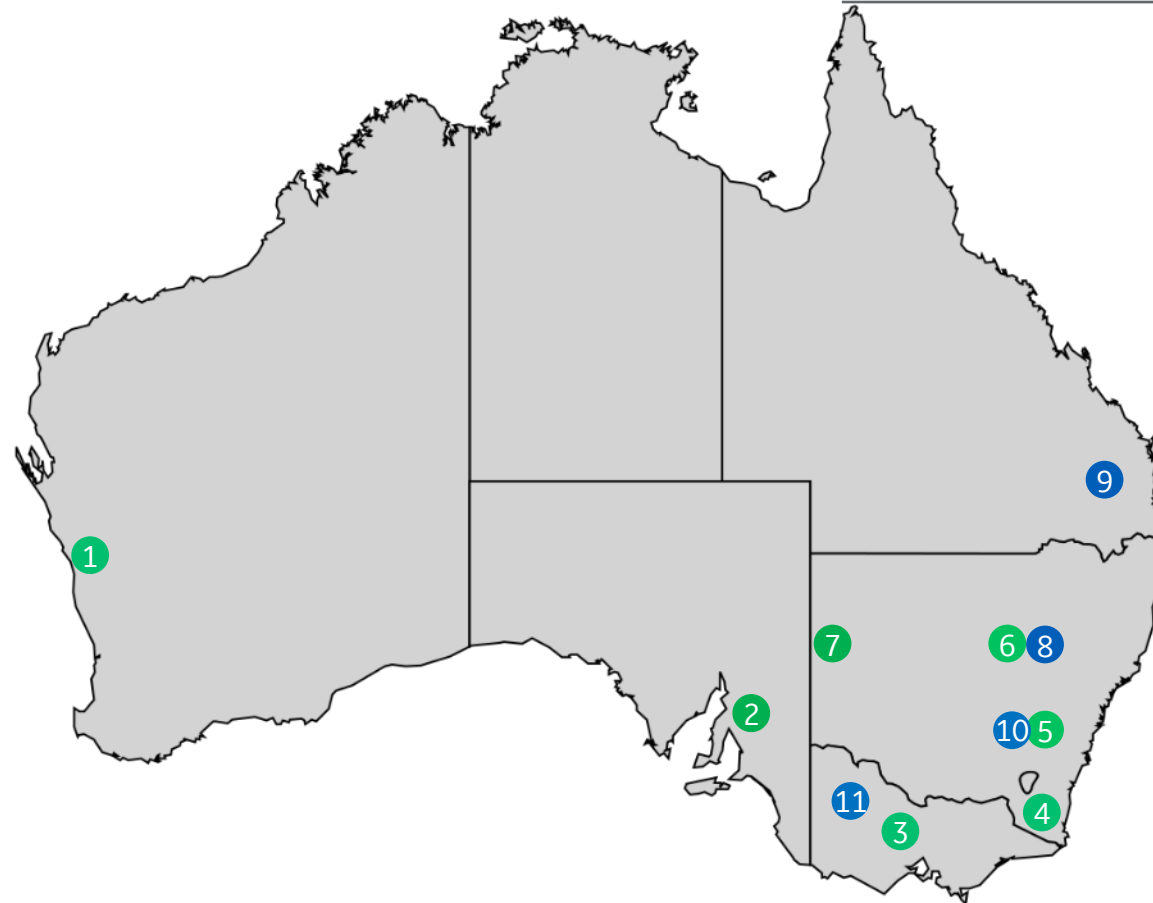


GE Australia Wind Farms – 2GW

1. Mumbida	
Capacity	61MW
Est. COD	2013
Equip.	22 x GE 2.75-100

2. Willogoleche	
Capacity	119MW
Est. COD	2019
Equip.	24 x GE 3.8-130 8 x GE 3.4-130

3. Ararat	
Capacity	242MW
Est. COD	2017
Equip.	75 x GE 3.2-103



11. Murra Warra 2	
Capacity	209MW
Est. COD	2022
Equip.	38 x GE 5.5-158

10. Bango	
Capacity	244MW
Est. COD	2021
Equip.	46 x GE 5.3-158

9. Coopers Gap	
Capacity	453MW
Est. COD	2021
Equip.	91 x GE 3.6-137 32 x 3.8-130

8. Crudine Ridge	
Capacity	134MW
Est. COD	2021
Equip.	37 x GE 3.6-137

7. Silverton	
Capacity	199MW
Est. COD	2019
Equip.	58 x GE 3.4-130

4. Boco Rock	
Capacity	113MW
Est. COD	2015
Equip.	67 x GE 1.7-100

5. Crookwell 2	
Capacity	96MW
Est. COD	2018
Equip.	28 x GE 3.4-130

6. Bodangora	
Capacity	113MW
Est. COD	2019
Equip.	33 x GE 3.4-130

Operational
Under Construction

GE's Onshore Wind Portfolio

Delivering lowest LCOE for a broad range of site conditions

Megawatt Constrained

Land Constrained



1 MW platform

1.x-70 1.x-87
1.x-77 1.x-100
1.x-82.5 1.x-103

Launched in 2002
26000+ Units



2 MW platform

2.x-107 3.2-154
2.x-116 3.x-140*
2.x-127*
2.x-132

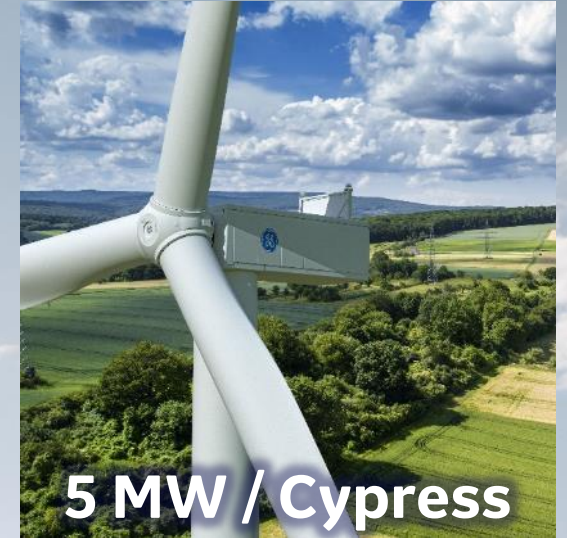
Launched in 2015
6000+ Units



3 MW platform

2.x-100 3.2-103
2.x-103 3.8-130
2.x-120 3.6/3.8/4.0-137
4.2-117

Launched in 2007
4000+ Units



5 MW / Cypress

5.x-158
6.0-164

Launched in 2019
450+ Units COD
by end of 2021



4.2-117

High power & strength ... for high wind and Typhoons

What's
NEW?

Advanced
aero blade + Electrical
upgrades + Typhoon
strengthening
3.2-103 > 3.8-130 > 4.2-117

	4.2-117
IEC Wind Class	1S, 10 m/s
50-yr Vref	57 m/s
Gross AEP	20 GWh+
Gross CF	54%
Hub Height	76.5, 85, & 98m tube
Noise	107 dBA
Technology	<ul style="list-style-type: none">• Typhoon & earthquake strengthening• Enhanced lightning protection• Common components with GE130 & GE137



3 THINGS YOU SHOULD KNOW ABOUT GE's Cypress Platform



1

GE's Cypress: 2 rotors
to better optimize projects
needs

2

By 1st shipment of 164
Fleet of ~1000 units of 158
will be under Operation

3

DRIVES DOWN **LCOE**
WITH **FLEXIBLE**
PLATFORM

5.X-158 6.0-164

GE Renewable Energy's Cypress turbines advance the proven technology of GE's 2 MW and 3 MW fleets. Both share a common architecture and value-increasing innovations first introduced in 2019.

- First in the modern **5MW+ class**
- **20-25 GWh/year** depending on site & machine
- **Innovative two-piece blade** by LM Wind Power.
- Platforming reduces risk with **proven components**



GE's Cypress Platform Onshore Wind Turbines



Pitch System

AC Pitch system with Ultracaps energy storage to provide enhanced reliability

Pitch Bearing

High capacity bearing for long life

Hub

Backwards-facing hatches for easy access.

Blades

High performance airfoils
Small chord and bolt circle for ease of transport
Low noise trailing edge

Nacelle

Larger nacelle platform brings more comfort to service personnel and facilitates up-tower repairs

Gearbox

High-torque density PPH gearbox, advanced bending-isolating mid plate

Generator

Based on a proven doubly-fed induction generator (DFIG) electrical system, available at 50 Hz

Electrical System

High power density electrical system for performance and grid integration

Control System

Fully digitally enabled, 24/7/365 remote control operations, Wind SCADA, cybersecurity

Services

Planned, condition-based and predictive services to ensure more reliability, uptime and production

Tower

Wide range of tower heights from 96m to 167mHH, standard and site specific

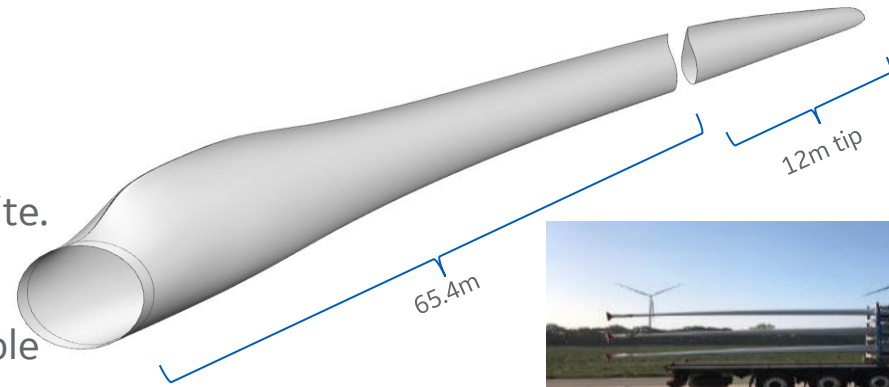
Perfect for low and medium wind speed sites

- 6.0-164: GE's largest, lower-wind onshore wind turbine to date
- 5.5-158: Best for medium wind sites, 450+ units COD by EOY 2021
- Fleet of ~1000 GE158s Operating before 1st shipment of GE164

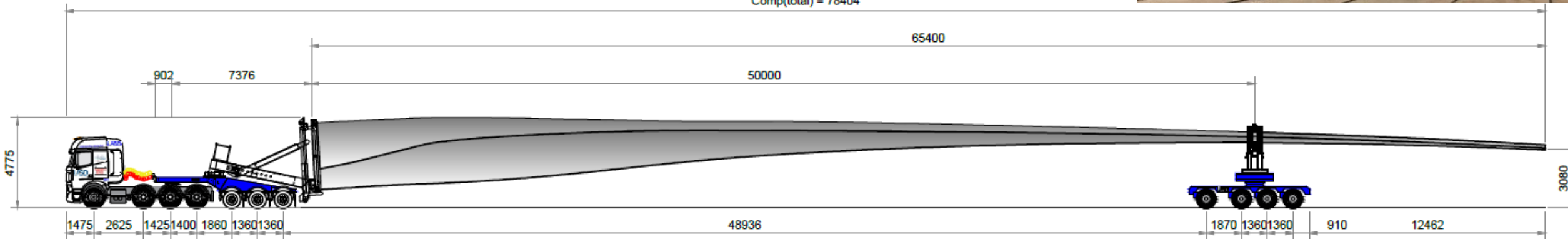


GE Cypress Split Blade

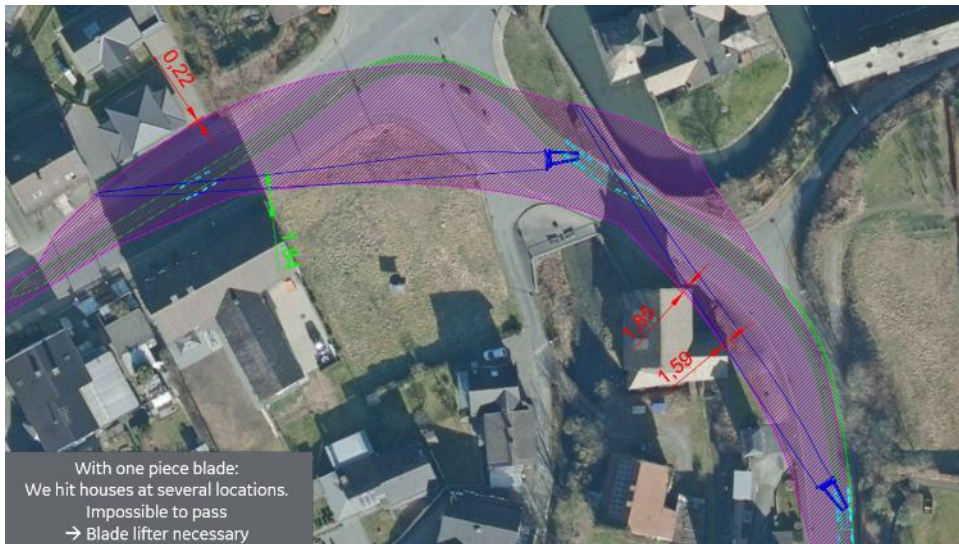
- Root section 65m, tip 12m. Transported separately, assembled on site.
- Total length of blade transport of 78.4m and 3m height at tip side
- Depending on country and project, a super wing carrier is also possible
- Both concepts tried and tested already in first projects



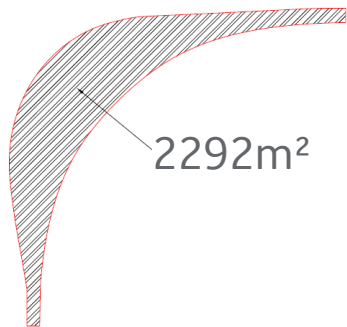
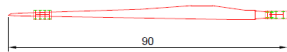
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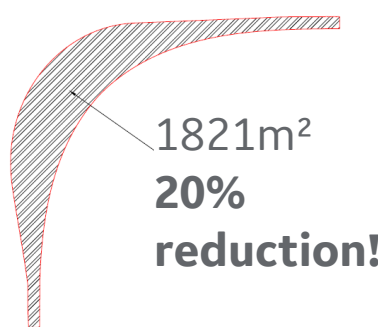
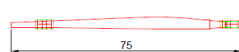
Advantages of split blade



Single-piece blade



split blade



- Sample road **study** for a **project in Germany**
- 65.4m split blade on 78m transporter can pass where longer transports fails
- At **90° curve** the split blade technology is create **significant savings**
- **470m² to be less** prepared for blade transport.
- Clear **advantages** in constraint areas like **villages, forest areas** or public roads.



Views from Oz

Bango wind farm Australia



DT+hub test fit up



First unit complete



Blades fully assembled at pad



Up to **14 MW** capacity

220-meter rotor

107-meter long blades

260 meters high

67 GWh gross AEP

63% capacity factor

38,000 m² swept area

Wind Class IEC: IB

Generates **double the energy**
as previous GE Haliade model

Generates almost **45%**
more energy than most
powerful wind turbine
available on the market today

Will generate enough clean
power for up to **16,000**
European households per
turbine, and up to **1 million**
European households in a
750 MW configuration windfarm



HALIADÉ-X

GE Renewable Energy presents **Haliade-X 12-14 MW**, one of the biggest offshore wind turbines in the world.

220-meter rotor, 107-meter blade, leading capacity factor and digital capabilities that will help our customers find success in an increasingly competitive environment.

Typhoon certification already available from **DNV**.



