



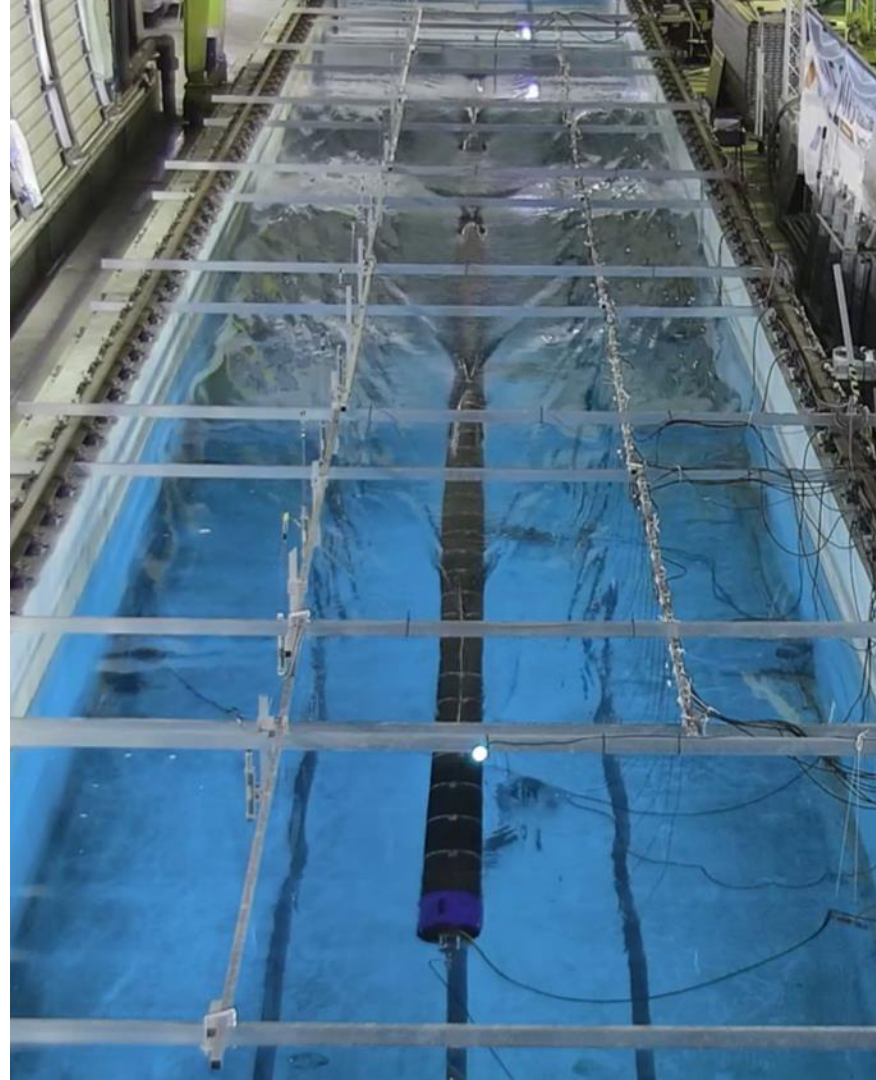
© SBM Offshore. All rights reserved. [www.sbmoffshore.com](http://www.sbmoffshore.com)



# The future of WEC is flexible with distributed PTO

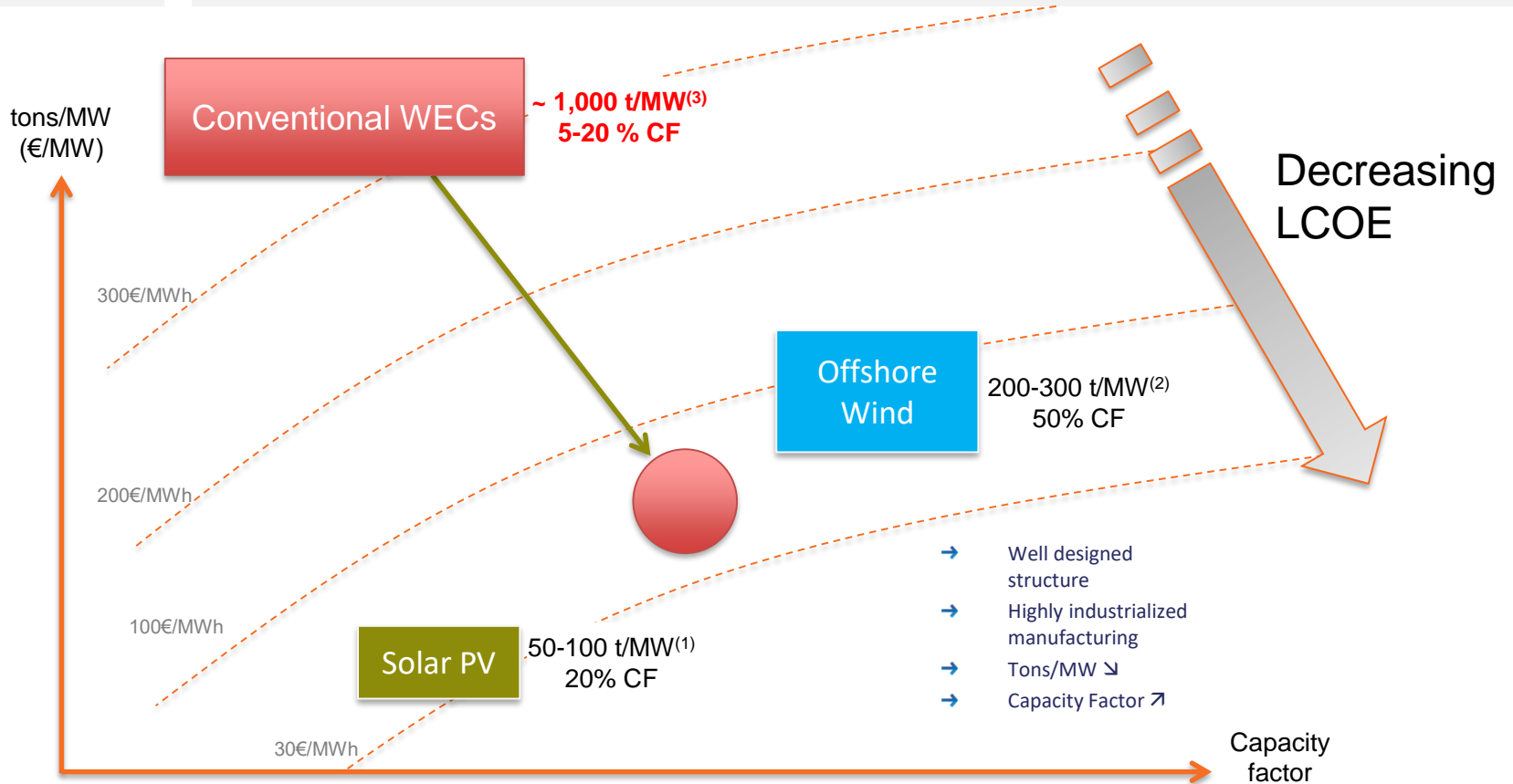
Ambroise WATTEZ – 01 Feb 2019, Dublin

© SBM Offshore. All rights reserved. [www.sbmoffshore.com](http://www.sbmoffshore.com)





# How to escape the production-survivability paradox? Why conventional WECs cannot make it



(1): Benchmark Capital Cost Of Solar PV Project 2016-2017, Ezysolare

(3):Energie des vagues: ressource, technologies, performance, Babarit, 2018

(2): A view on steel demand for offshore wind power, Dong Energy

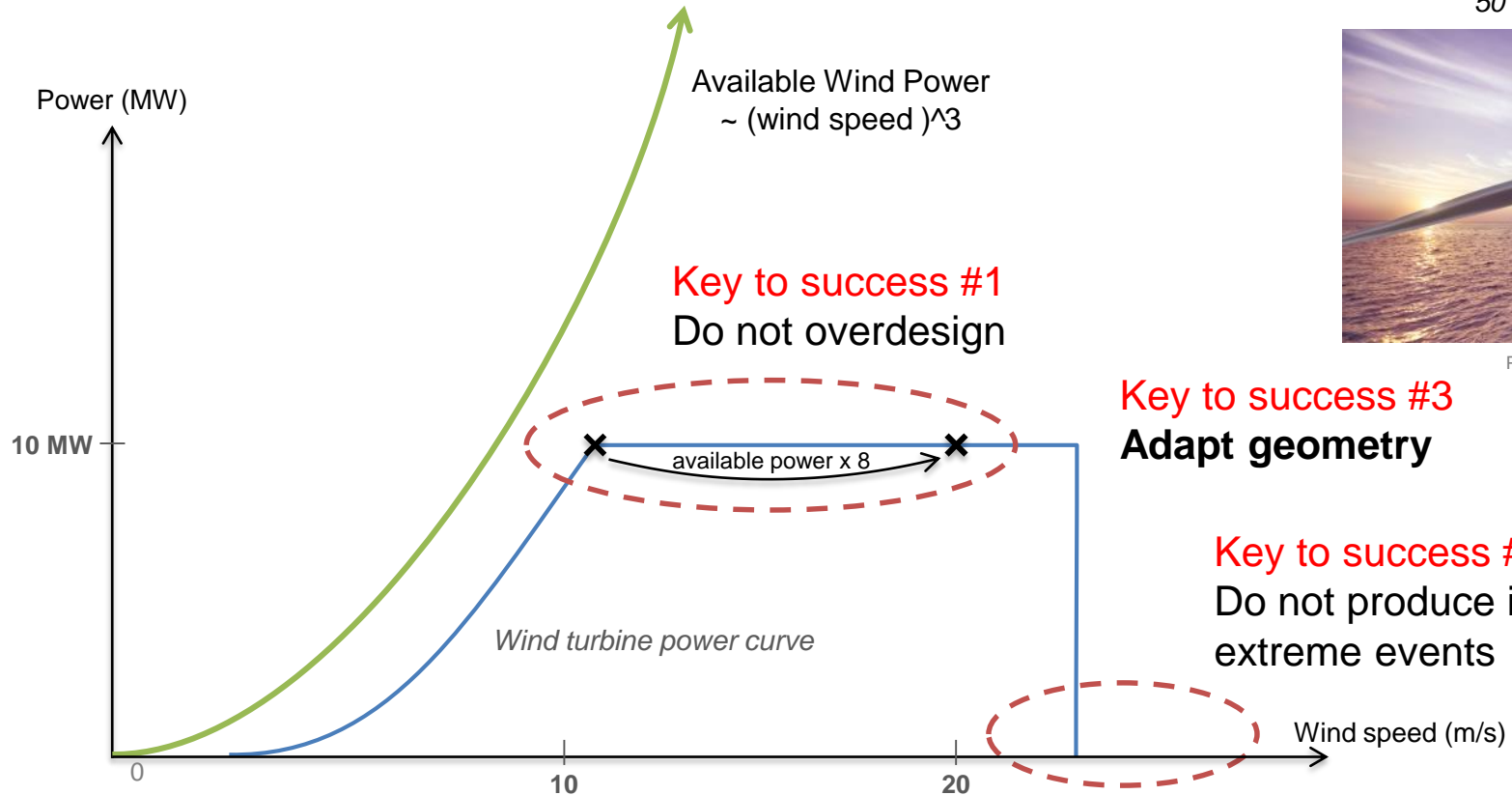
# The keys to success for offshore renewables?

## Do not overdesign, park in extreme, **adapt geometry**

200-300 t/MW incl. foundation  
50 % capacity factor



Picture: Siemens Gamesa

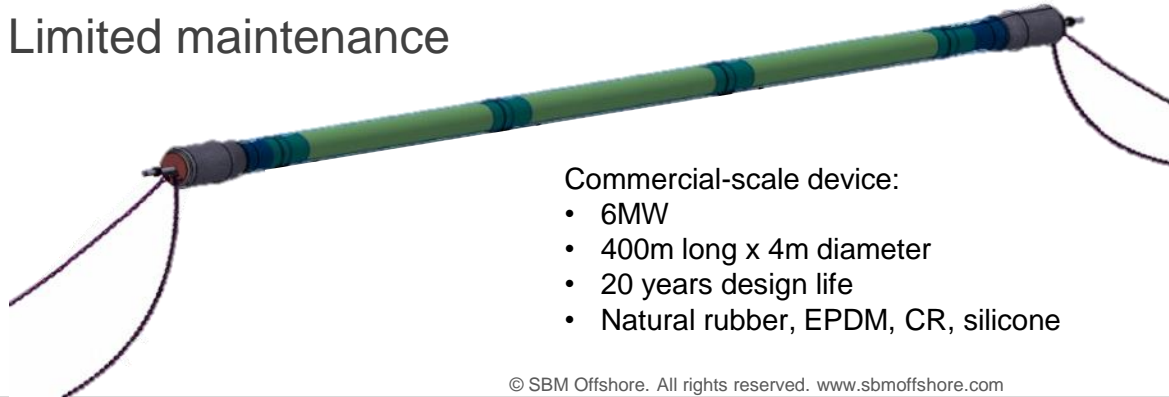




# SBM OFFSHORE S3™ WEC – Flexible with distributed PTO

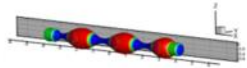
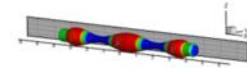
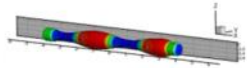
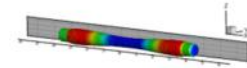
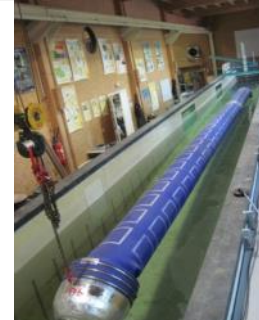
## Key technical features

- ▶ Light structure < 100t/MW
- ▶ 0 mechanical part (no bearing, no hydraulics, no gearbox, no hinge, etc.)
- ▶ Flexible – can be inflated, deflated / folded or reeled
- ▶ Distributed PTO
- ▶ 100% silent
- ▶ Highly automated, factory-based manufacturing
- ▶ Limited maintenance



Commercial-scale device:

- 6MW
- 400m long x 4m diameter
- 20 years design life
- Natural rubber, EPDM, CR, silicone



# S3™ WEC – Flexible with distributed PTO

## The way to a step change reduction of the LCOE

Engineering

Procurement & Construction

Installation

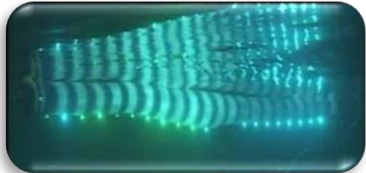
Operations & Maintenance



Rigid Structure & inappropriate PTO



Fatigue Friendly structure  
Frequency indep. distrib. PTO  
Large absorption bandwidth



Reduced CAPEX  
&  
Improved efficiency



Extensive Construction



Factory based manuf.  
Roll to Roll



True Ramp up  
to commercialization



Heavy lift & Installation



Easier load out  
& Installation



Reduced Cost  
of Installation



Periodic maintenance



0 mechanical part  
Run until failure



Reduced OPEX

**Lower Cost Of Electricity**

2017   2018   2019   2020   2021   2022   2023   2024   2025

### Full-scale Demonstrator project

at sea in 2020 (award by the French government)

1. Demonstrate generation 2 WEC: no mechanical part, direct conversion
  2. Set up the industrial network necessary for larger projects (EAP film manufacturer, rubber tube) and initiate next phases
- Supported by French government funding (Ademe, PIA)
  - 1year test campaigns



### Clear the road for pre-commercial projects

- Develop pre-commercial projects
  - Engage with early adopters
  - Engage supply-chain to be ready for large deployments
  - EIA / authorizations / project development

### Pre-commercial project (pilot farm) at sea in 2023-2024

- Island market or FR, UK, US
- 3 to 6 devices x 0.6 MW to 1 MW

### Estimates (commercial stage ~2030):

Total Capex	< 1.5 M€/MW
OPEX	< 0.03 M€/MW/year
LCOE	< 50€/MWh



**THANK YOU**



© SBM Offshore. All rights reserved. [www.sbmoffshore.com](http://www.sbmoffshore.com)