GWEC
GLOBAL WIND ENERGY COUNCIL

Beijing | Brussels | Washington

Global Offshore Wind Update

BWP 2018

9 August 2018

GWEC
GLOBAL WIND ENERGY COUNCIL

Beijing | Brussels | Washington

C0 Members

C1, C2 and C3 Members

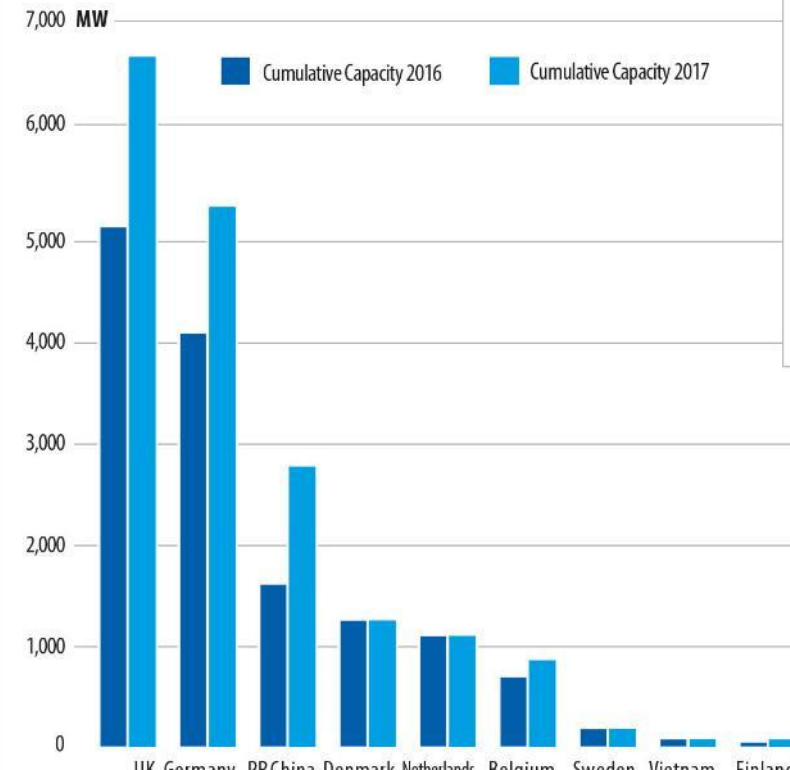
Associations

GWEC – Uniting the global wind industry and its representative associations

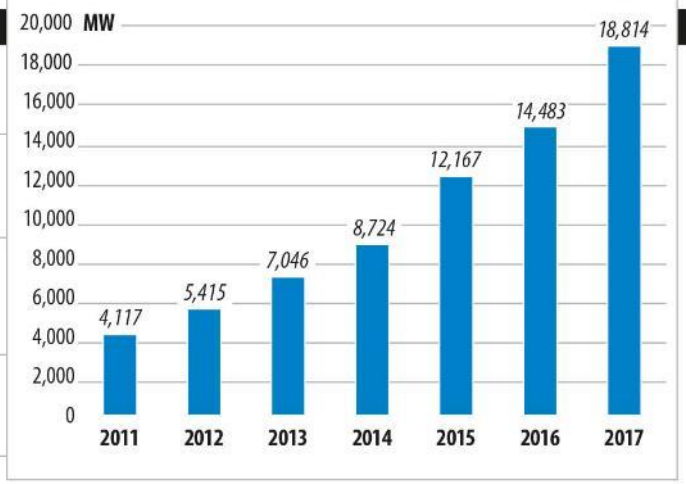
Contents

Thanks to DNV-GL, CWEA, WindEurope, Goldwind, JWPA and BVG Associates for source material

GLOBAL CUMULATIVE OFFSHORE WIND CAPACITY IN 2017



ANNUAL CUMULATIVE CAPACITY (2011-2017)



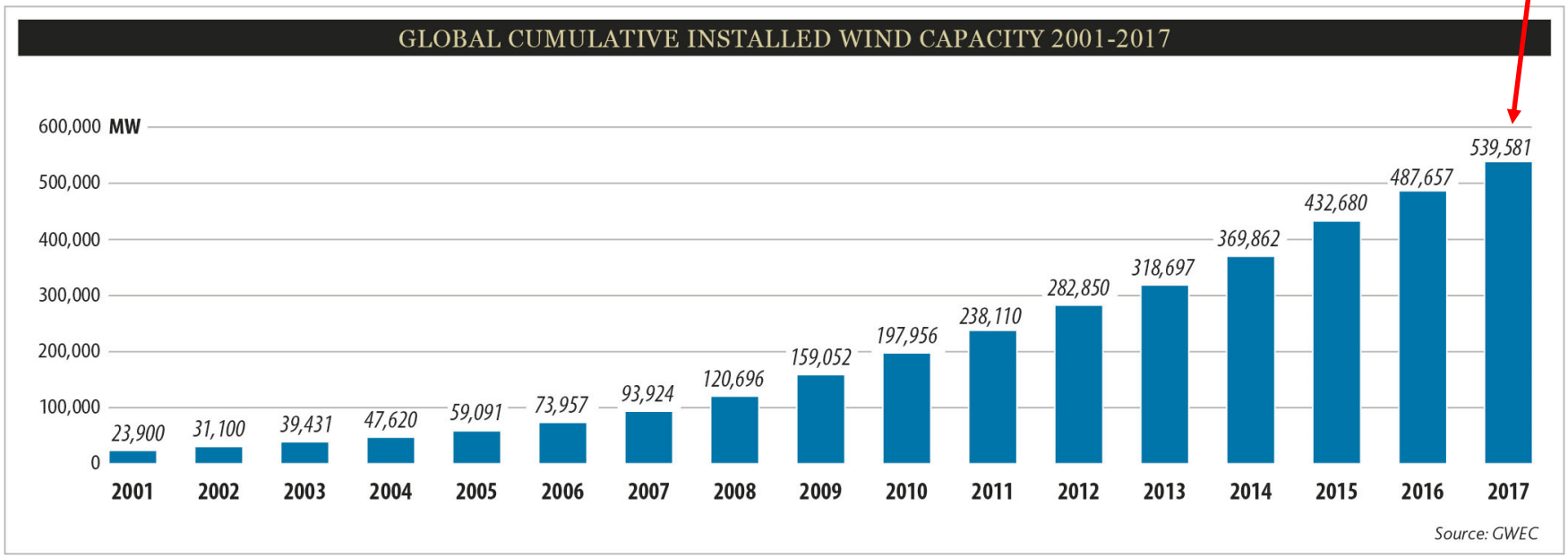
	UK	Germany	PR China	Denmark	Netherlands	Belgium	Sweden	Vietnam	Finland	Japan	S Korea	US	Ireland	Taiwan	Spain	Norway	France	Total
Total 2016	5,156	4,108	1,627	1,271	1,118	712	202	99	32	60	35	30	25	0	5	2	0	**14,483**
New 2017	1,680	1,247	1,161	0	0	165	0	0	60	5	3	0	0	8	0	0	2	**4,331**
Total 2017	6,836	5,355	2,788	1,271	1,118	877	202	99	92	65	38	30	25	8	5	2	2	**18,814**

Source: GWEC

Cumulative Markets

2017 growth: 11%

3.5%

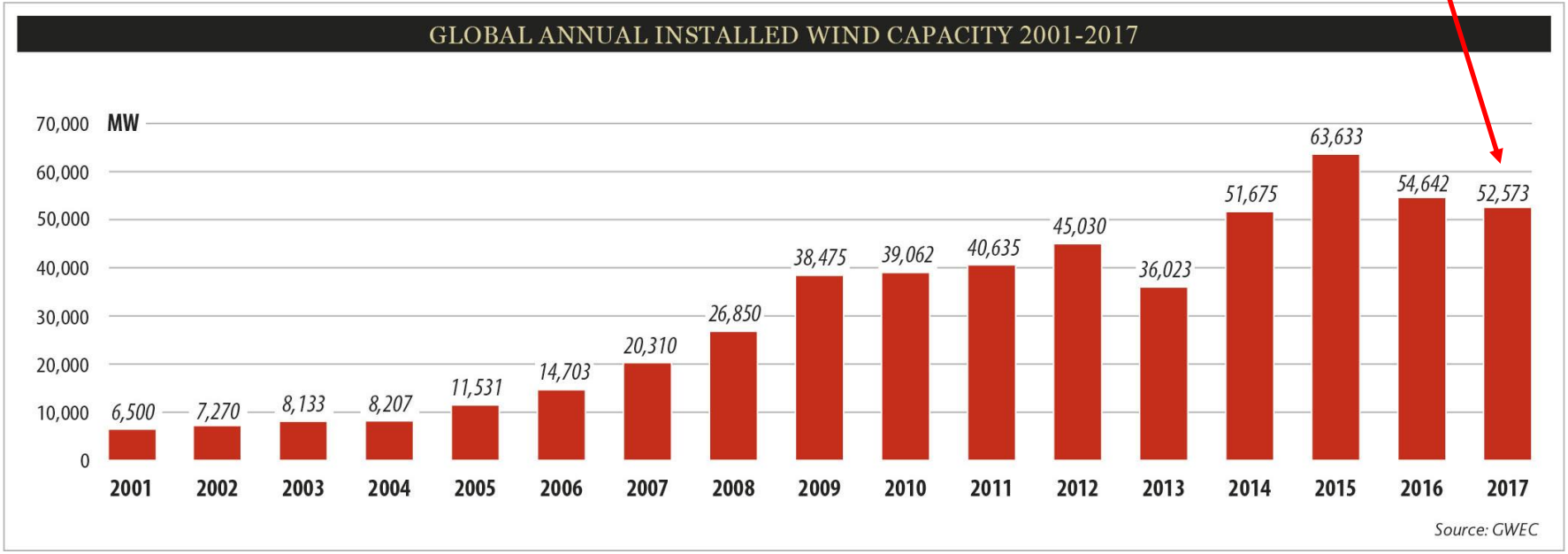


17 yr avg. growth: 22.6%

Annual Markets

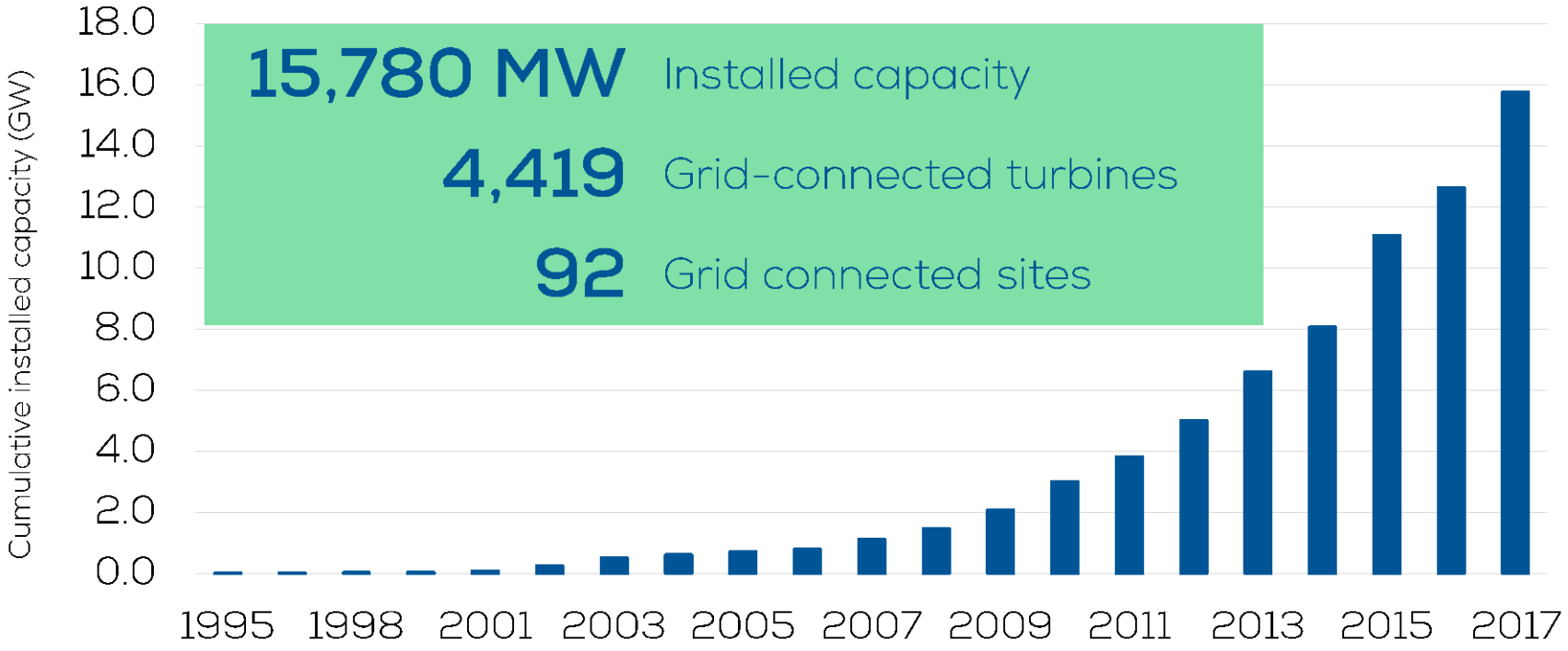
2017 growth: -3.8%

8.2% (20% EU)



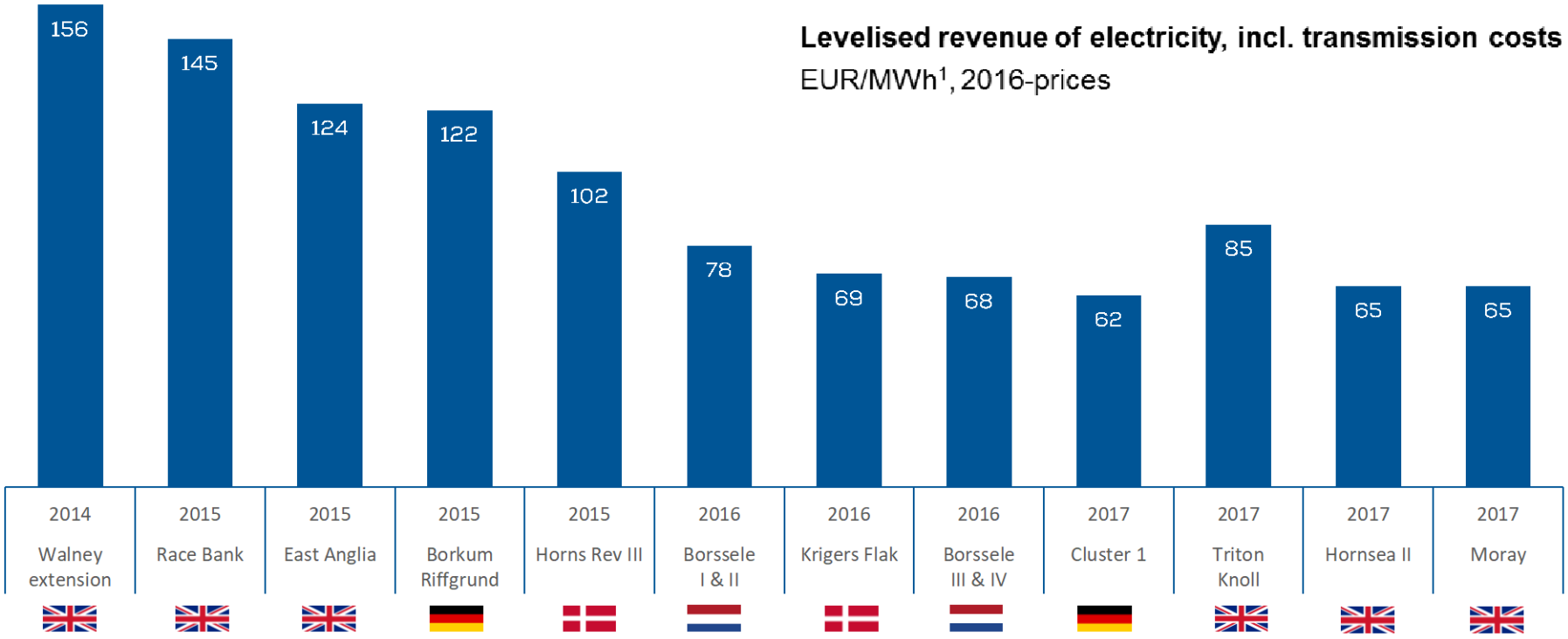
17 yr avg. growth: 19%

Cumulative Installed Offshore Wind Capacity in Europe (MW)



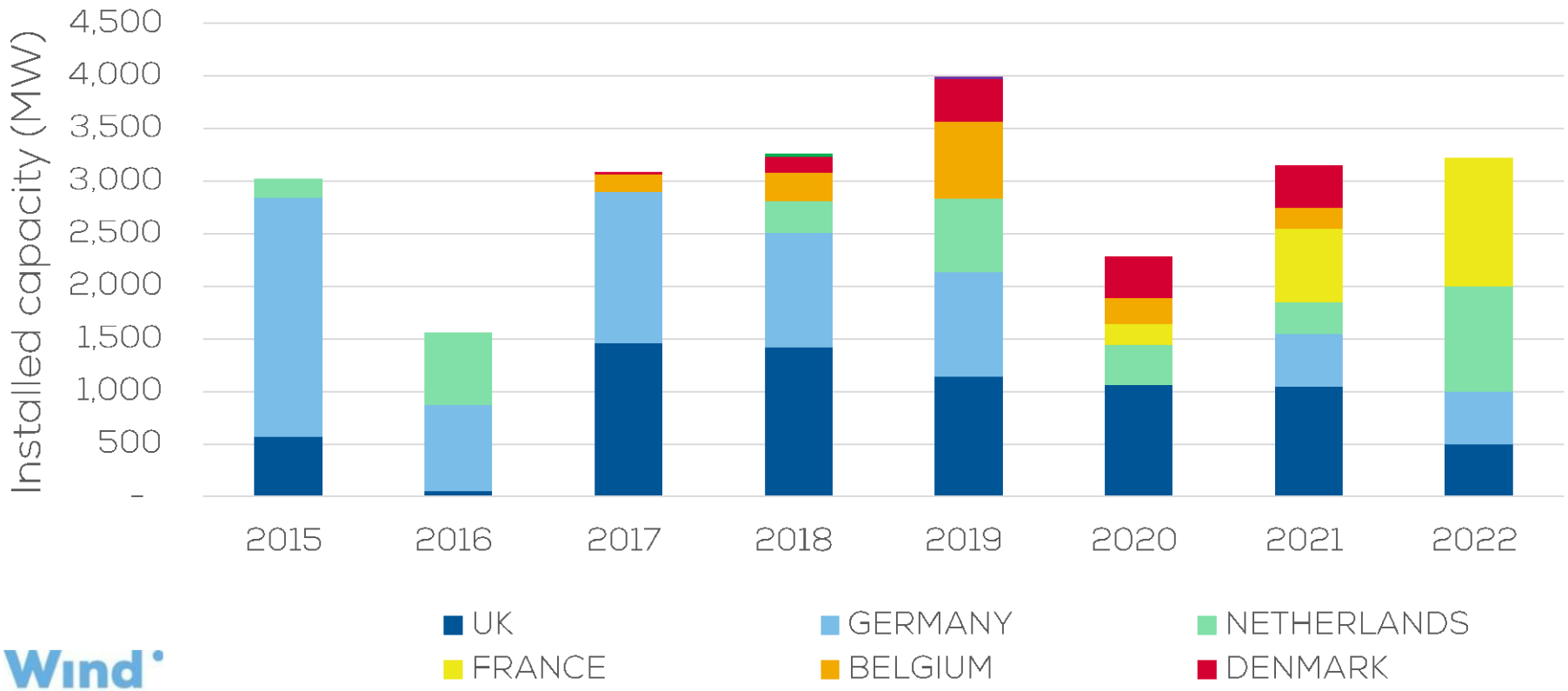
Wind EUROPE

Price reduction: Offshore wind



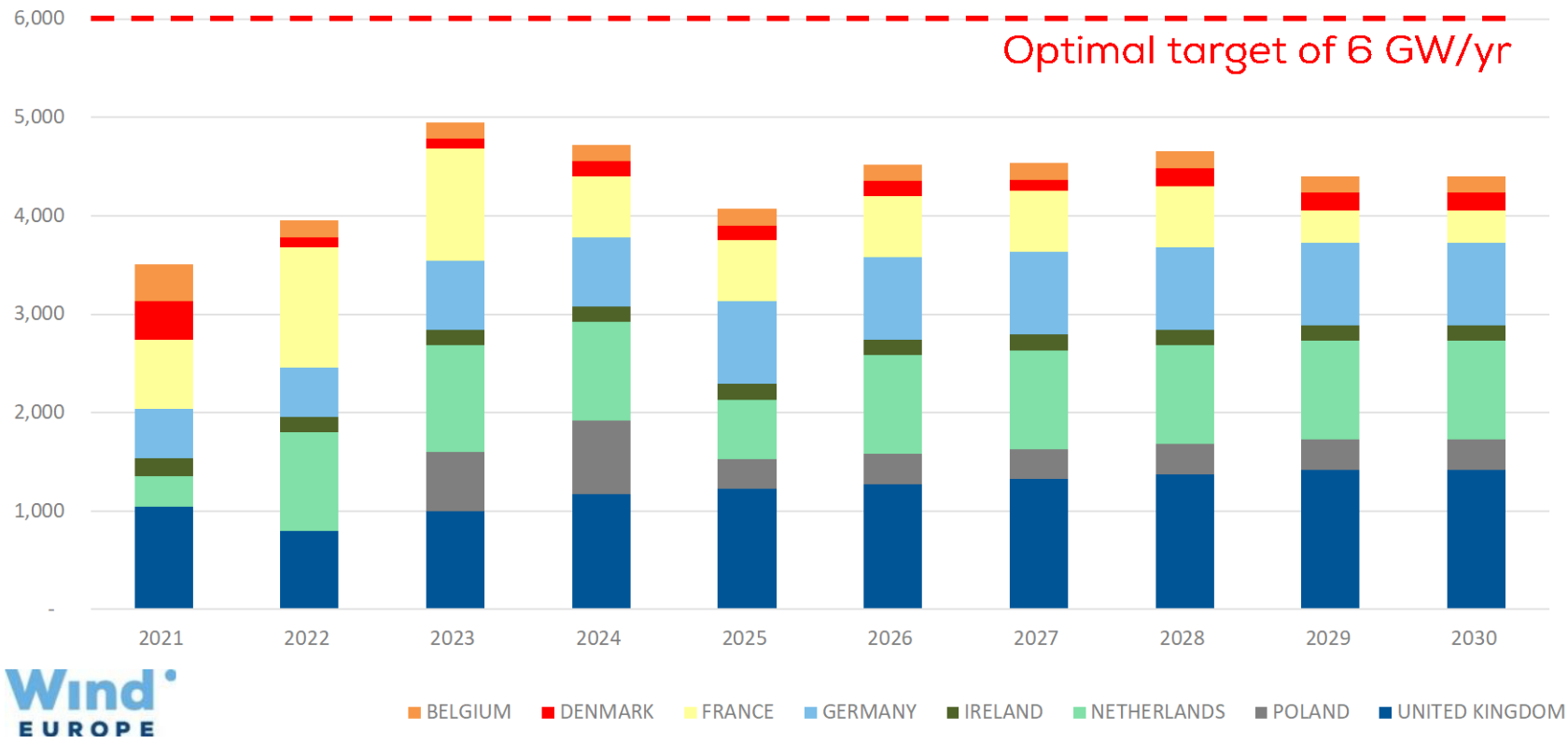
Wind EUROPE

2022 outlook



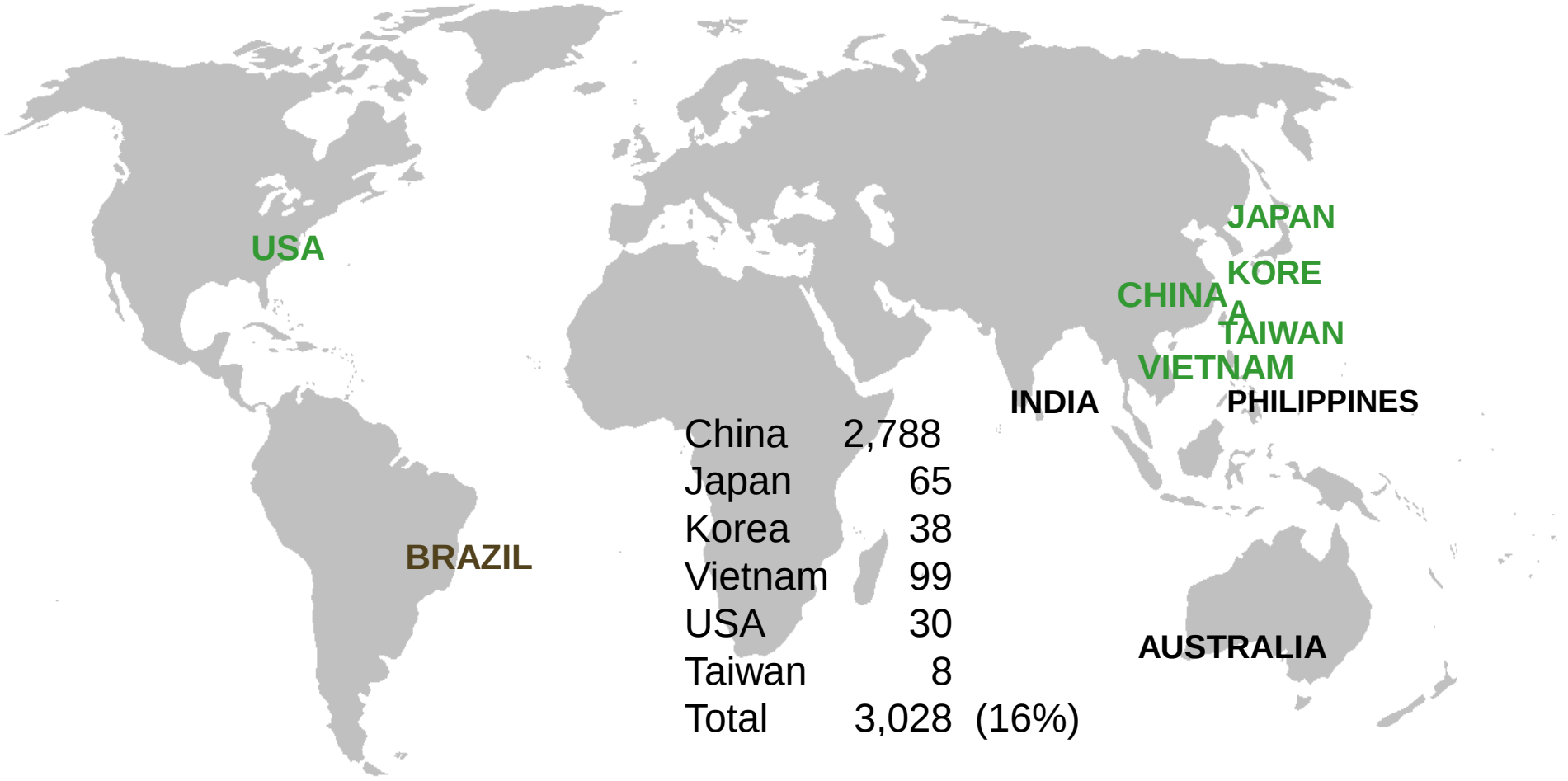
Wind EUROPE

2030 outlook



Wind EUROPE

Non European Offshore Markets today



China	2,788	
Japan	65	
Korea	38	
Vietnam	99	
USA	30	
Taiwan	8	
Total	3,028	(16%)

China Offshore

- First offshore project in 2010 (Donghai Bridge, Shanghai)
- Slow development for the next 5 years or so, many mistakes
- Started to move in 2016; 2017 installations over 1,000 MW
- New national target (5 GW by 2020) will be easily met. Original target was 5GW by 2015, and 30 (later 10) by 2020.
- In addition to national target, there are provincial targets:
  - Jiangsu: 3500 MW by 2020
  - Guangdong: 2000 MW by 2020 (3650 MW project starts in 2018
  - Fujian 2000 by 2020
  - ~60 GW in longer range planning
- OEM Market share: Shanghai Electric 50%; Goldwind 18%; Envision 17%; CSIC 9%

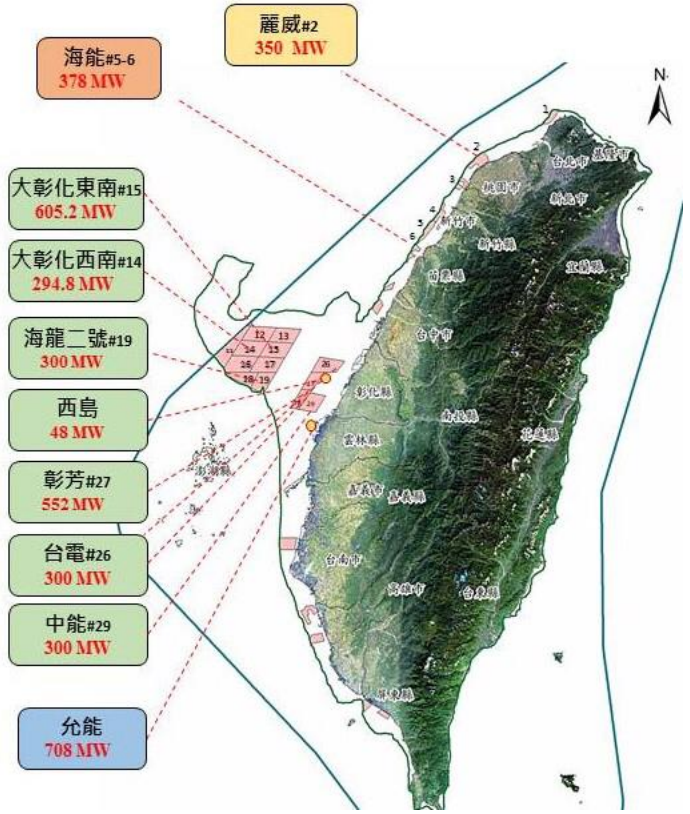
Taiwan Offshore

- Taiwanese government's target of 5.5GW offshore wind by 2025

- Approved online in 2019/2020:
  - 120MW 2nd phase of Formosa 1
    (7 April 2018 reached FID)
  - 110MW 1st phase of Changhua

- April 2018 3,836MW of grid connection capacity awarded

- A further 2 GW will be allocated through a competitive price tender in summer 2018



Offshore Wind Power Experience in Japan (2017)

Type	Location		Distance (km)	Depth (m)	Rated (MW)	No. of WTG	Total (MW)	Start operation
Fixed	Hokkaido	Setana Port	0.7	13	0.6	2	1.2	Dec.2003
	Akita	Akita Port	0.1	-	3.0	1	3.0	Feb.2015
	Yamagata	Sakata port	0.05	4	2.0	5	10.0	Jan.2004
	Ibaraki	Kamisu	0.04	4	2.0	7	14.0	Feb.2010
		Kamisu	~0.05	4	2.0	8	16.0	Feb.2013
	Chiba	Choshi*	3.1	12	2.4	1	2.4	Mar.2013
	Fukuoka	KitaKyushu*	1.4	14	2.0	1	2.0	Jun.2013
Floating	Nagasaki	Fukuejima	5.0	-	2.0	1	2.0	Mar.2016
	Fukushima	Iwaki city	20	120	2.0	1	2.0	Nob.2013
		Naraha*			7.0	1	7.0	Apr.2016
					5.0	1	5.0	Apr.2017
		Total				29	64.6	

*National projects

South Korea Offshore: Yes, No, Maybe?

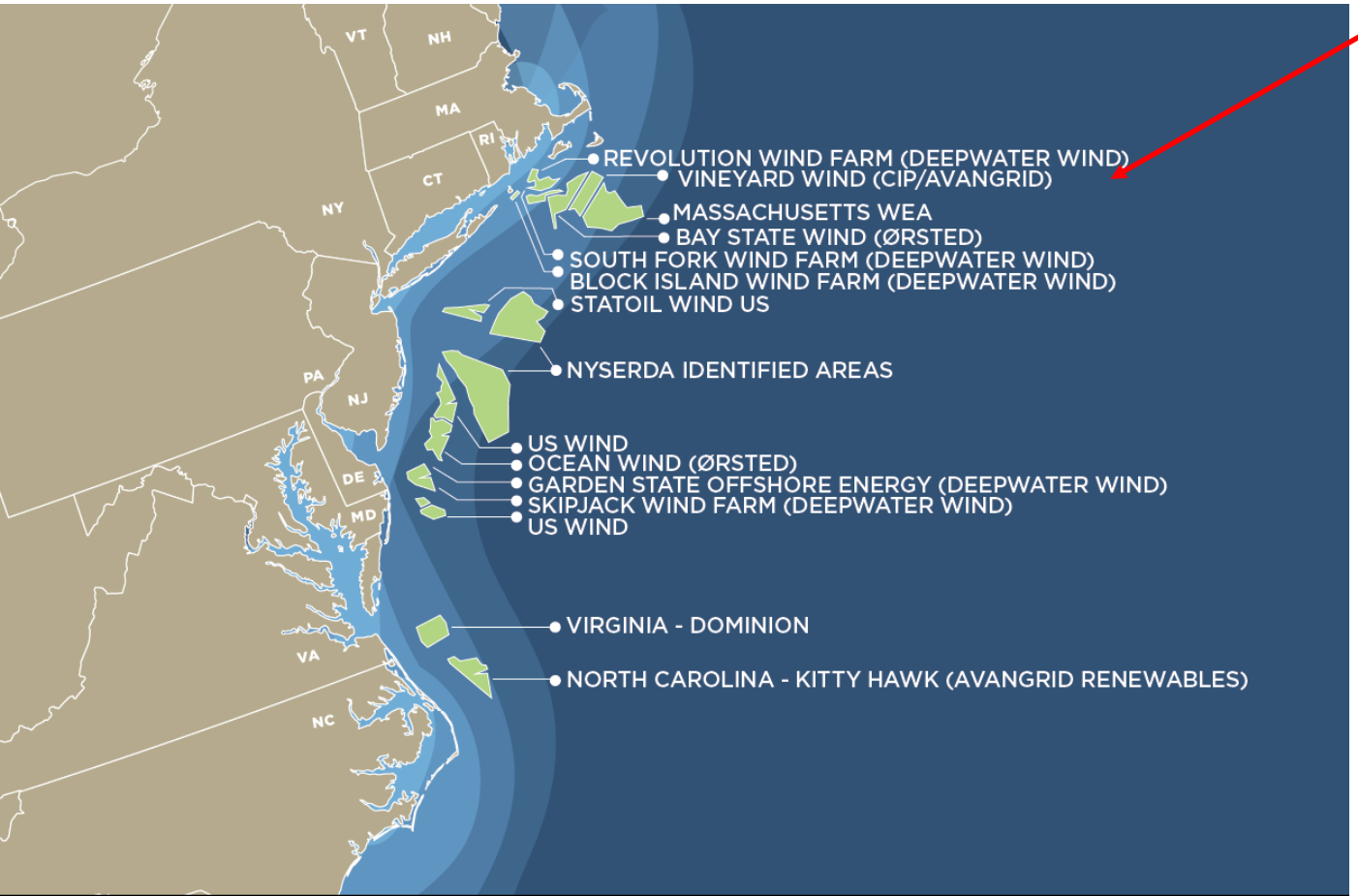
2012 – 2 turbines off JeJu (5MW)
Targets: 900 MW by 2016,
1,500 MW by 2019
Offshore development zones identified; nothing has happened yet

2017 – 30 MW added, Tamra nearshore (<1km) project, also off Jeju

Will be expanded by 60-80 MW by 2019; then by 400 MW by 2022; part of 2.5 GW project, no indication on remaining 2 GW.

US Offshore Wind – prospects improving

Vineyard Wind comes in at $US 0.065/kWh!



NY, MA, NJ, MD& RI committed to 5.5 GW.
MA and RI awarded 1.2 GW in April

Federal leases already conducted should yield about 15 GW

India – next on the list?

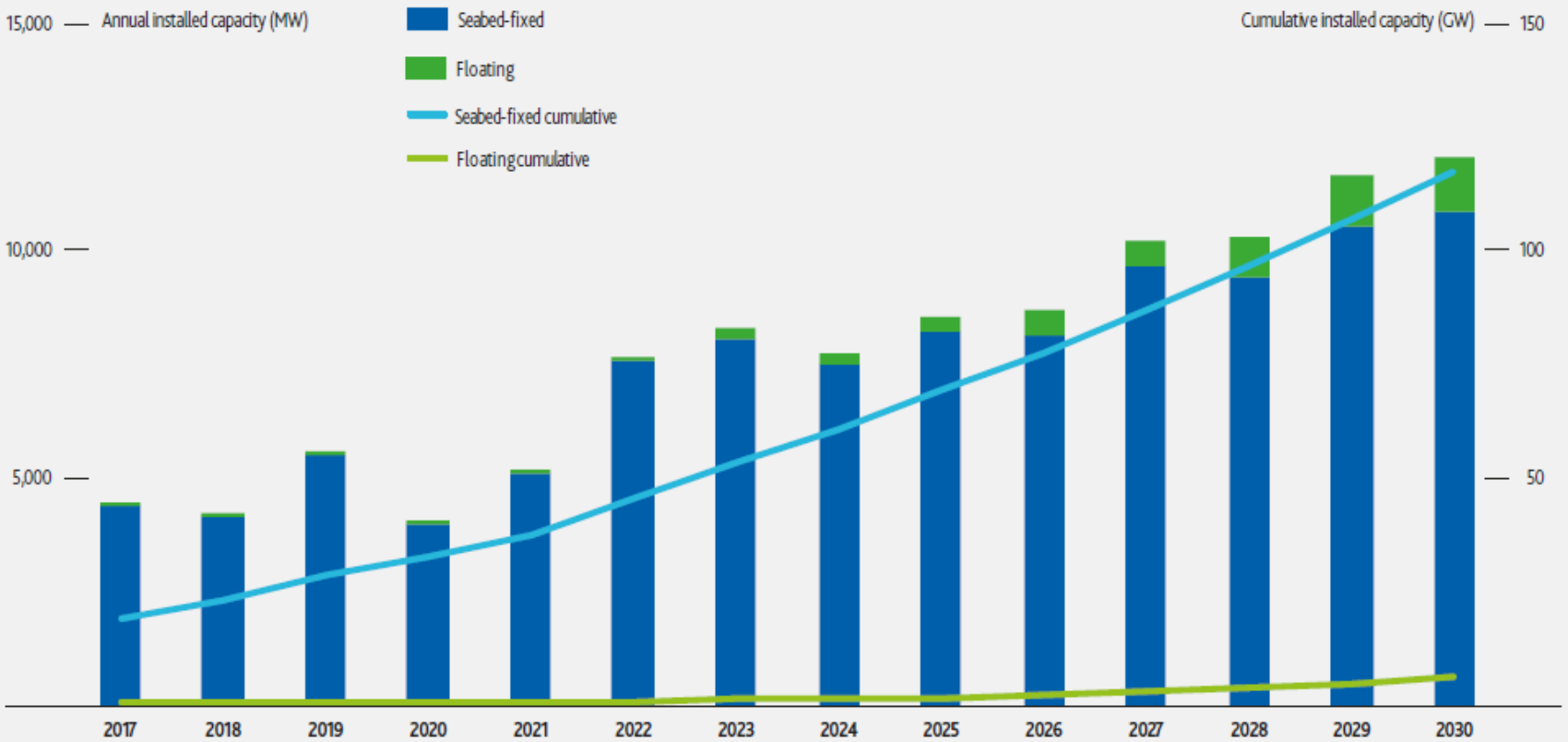
- Four year EU funded study Facilitating Offshore Wind In India (FOWIND)
  - Focus on Tamil Nadu and Gujarat
  - All studies including Roadmap to 2030 and Feasibility studies available at:
    http://gwec.net/publications/topical-report/#
  - LiDAR deployment(s) in Gujarat, one coming soon in Tamil Nadu
- Current plan
  - Test field in Tamil Nadu (Dhanushkodi)
  - RFP for 500-1000 MW in Gujarat Zone A (Autumn 2018)
  - RFP for 500-1000 MW in Tamil Nadu Zone A (Autumn 2019)
  - Tenders to follow

Offshore Development Targets/expectations to 2020 (GW)

	2015*	2017**	2020*	Current
• Europe:	9-10	15.78	24	(25)
• China:	5 (2)	2.788	30 (10)	(5)
• Japan	-	0.065	1-2	(0.2)
• Korea	-	0.038	2-4	(0.4)
• USA	-	0.03	0.5-3.0	(0.03)
• Others		0.008	0.6-2.0	(0.5?)
• Total	~14-15 (12.1)		58-65	(31.13)

* The view from end 2013
** Actual 2017

PROJECTIONS FOR OFFSHORE WIND DEVELOPMENT GLOBALLY OUT TO 2030



Source: BVG Associates

Conclusions

- Everyone wants cheap offshore wind - A global market would facilitate this, although that's not the direction we're moving at the moment.
- New markets *can* learn from the European (and Chinese) experience, and it doesn't have to take 25 years. Tremendous business opportunity, and major contribution to a clean energy economy.
- BUT, it needs a long term vision, a willingness to invest, strong public-private partnerships and cooperation. These are not smart phones or even cars. They are the largest pieces of rotating machinery ever built by humans. Single blades longer than A-380 wingspan. Requires time, serious investment…
- …and patience. Offshore always takes longer than you think. Even in China!

GWEC
GLOBAL WIND ENERGY COUNCIL

Beijing | Brussels | Washington

Thank you!

For more information:

Steve Sawyer, GWEC
Steve.Sawyer@gwec.net
www.gwec.net

Alastair Dutton
adutton@advent.re