



# Global Wind Power Update

*REvision2017*

Tokyo 8 March

C0 Members



C1, C2 and C3 Members



BECKER BÜTTNER HELD



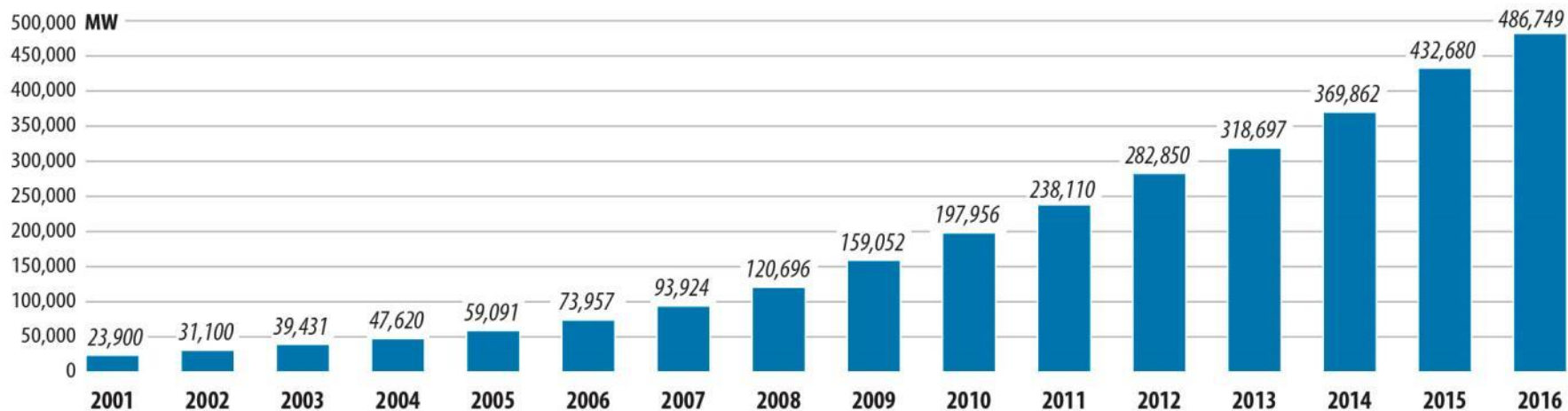
Associations



GWEC – Uniting the global wind industry and its representative associations

2016 growth: 12%

GLOBAL CUMULATIVE INSTALLED WIND CAPACITY 2001-2016

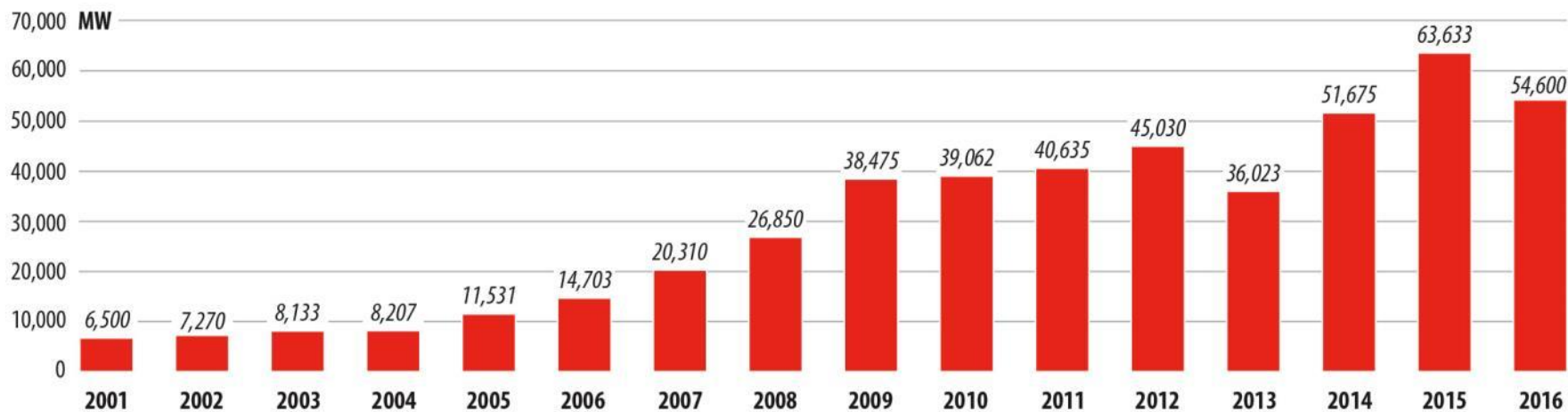


Source: GWEC

17 yr avg. growth: 23.6%

2015 growth: -14%

GLOBAL ANNUAL INSTALLED WIND CAPACITY 2001-2016

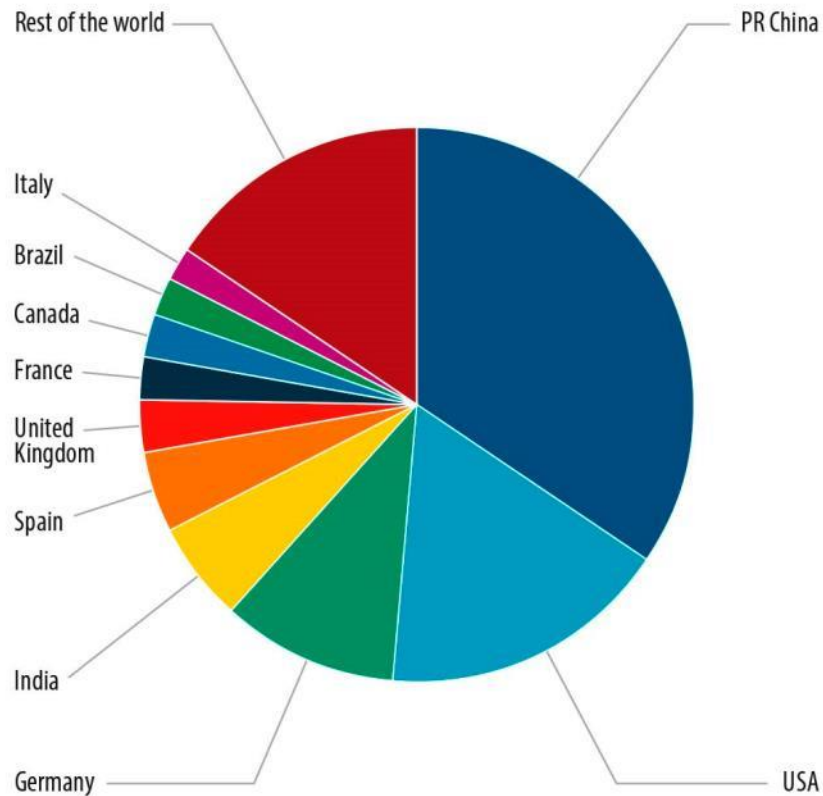


Source: GWEC

17 yr avg. growth: 19.7%



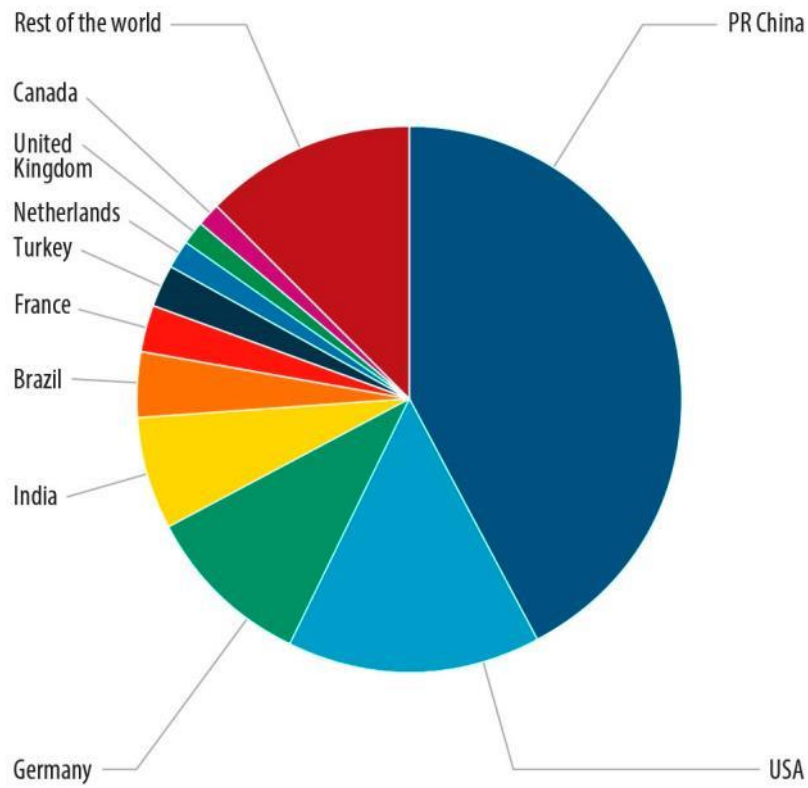
### TOP 10 CUMULATIVE CAPACITY DEC 2016



Country	MW	% Share
PR China*	168,690	34.7
USA	82,184	16.9
Germany	50,018	10.3
India	28,700	5.9
Spain	23,074	4.7
United Kingdom	14,543	3.0
France	12,066	2.5
Canada	11,900	2.4
Brazil**	10,740	2.2
Italy	9,257	1.9
Rest of the world	75,577	15.5
<b>Total TOP 10</b>	<b>411,172</b>	<b>84</b>
<b>World Total</b>	<b>486,749</b>	<b>100</b>

Source: GWEC

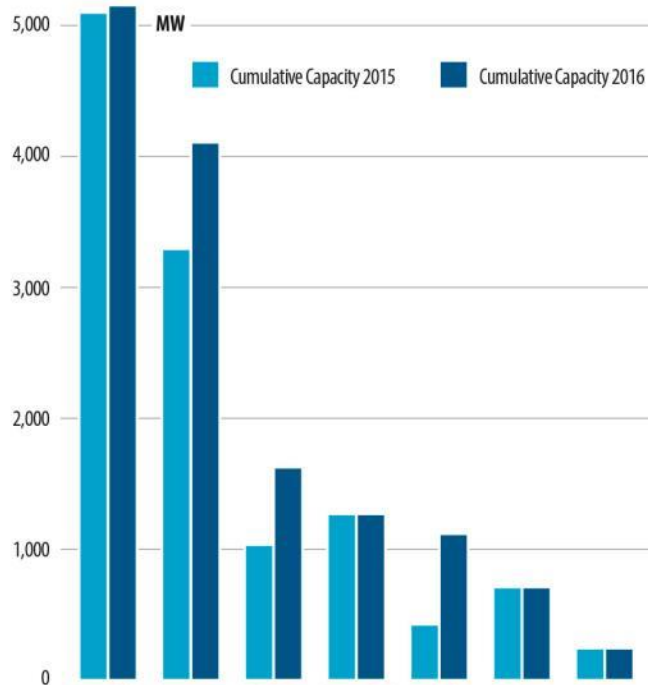
### TOP 10 NEW INSTALLED CAPACITY JAN-DEC 2016



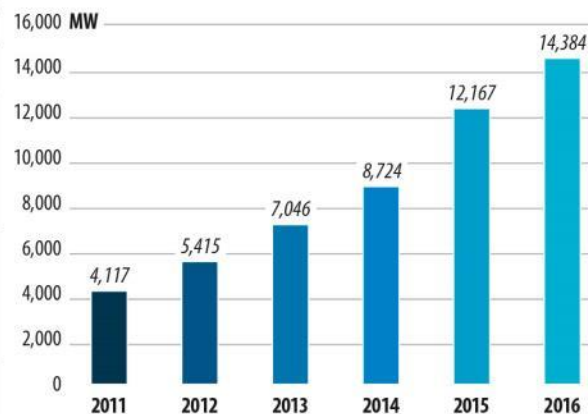
Country	MW	% Share
PR China*	23,328	42.7
USA	8,203	15.0
Germany	5,443	10.0
India	3,612	6.6
Brazil* **	2,014	3.7
France	1,561	2.9
Turkey	1,387	2.5
Netherlands	887	1.6
United Kingdom	736	1.3
Canada	702	1.3
Rest of the world	6,727	12.3
<b>Total TOP 10</b>	<b>47,873</b>	<b>88</b>
<b>World Total</b>	<b>54,600</b>	<b>100</b>

Source: GWEC

**GLOBAL CUMULATIVE OFFSHORE WIND CAPACITY IN 2016**



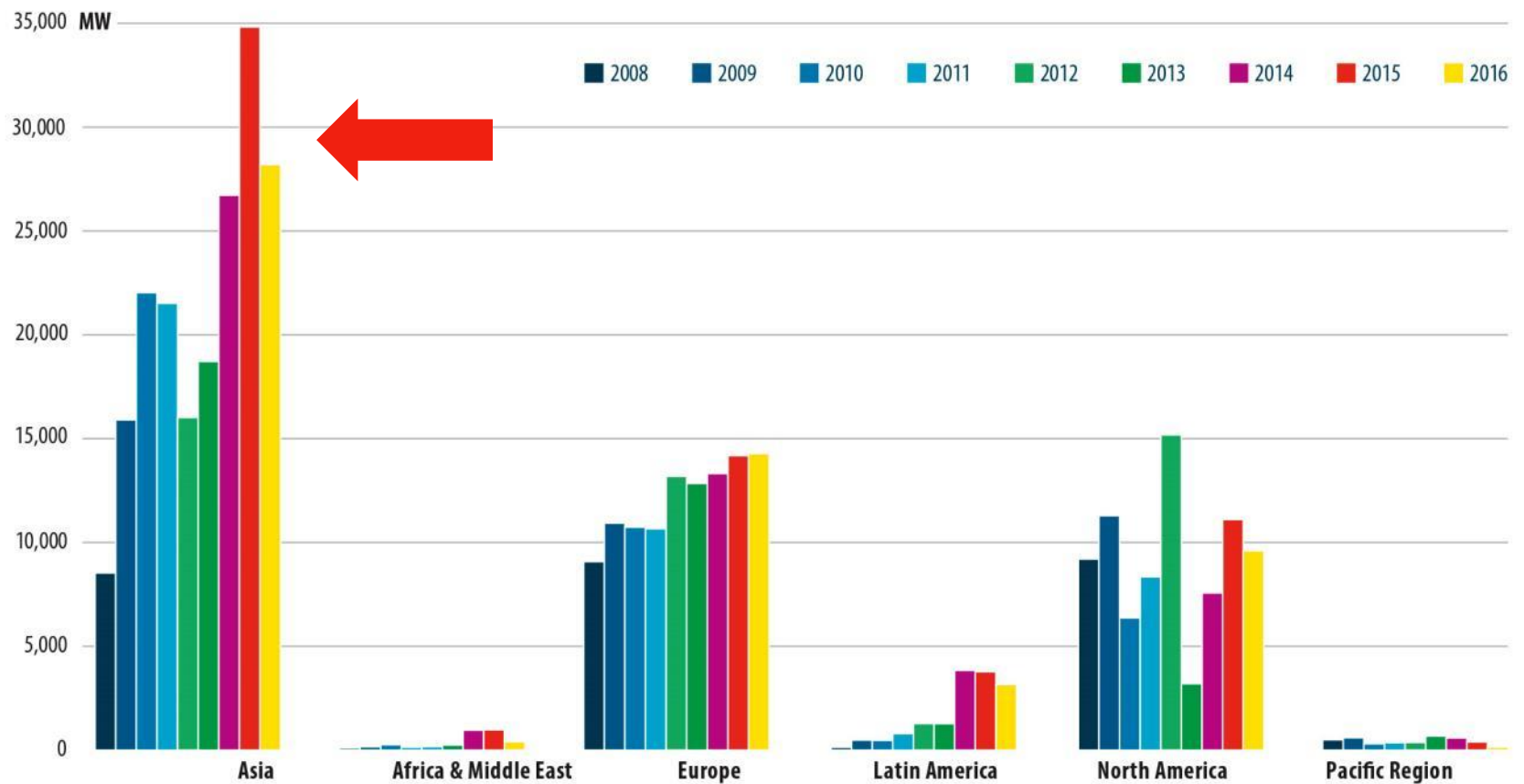
**ANNUAL CUMULATIVE CAPACITY (2011-2016)**



	UK	Germany	PR China	Denmark	Netherlands	Belgium	Sweden	Japan	S Korea	Finland	US	Ireland	Spain	Norway	Portugal	Total
<b>Total 2015</b>	5,100	3,295	1,035	1,271	427	712	202	53	5	32	0.02	25	5	2	2	<b>12,167</b>
<b>New 2016</b>	56	813	592	0	691	0	0	7	30	0	30	0	0	0	-2	<b>2,219</b>
<b>Total 2016</b>	5,156	4,108	1,627	1,271	1,118	712	202	60	35	32	30	25	5	2	0	<b>14,384</b>

Source: GWEC

### ANNUAL INSTALLED CAPACITY BY REGION 2008-2016



Source: GWEC



## Global Wind Energy Outlook 2016 Scenarios - Main Assumptions

### *IEA New Policies* scenario:

- based on International Energy Agency (IEA) 2015 World Energy Outlook
- IEA assessment has then been extended up to 2050 from UTS-ISF

### *IEA 450* scenario:

- based on International Energy Agency (IEA) 2015 World Energy Outlook: sets out an energy pathway consistent with the goal of having about a 50% chance of limiting the global increase in average temperature to 2 ° C / 450 parts per million of carbon-dioxide equivalent (ppm CO<sub>2</sub>-eq
- IEA assessment has then been extended up to 2050 from UTS-ISF

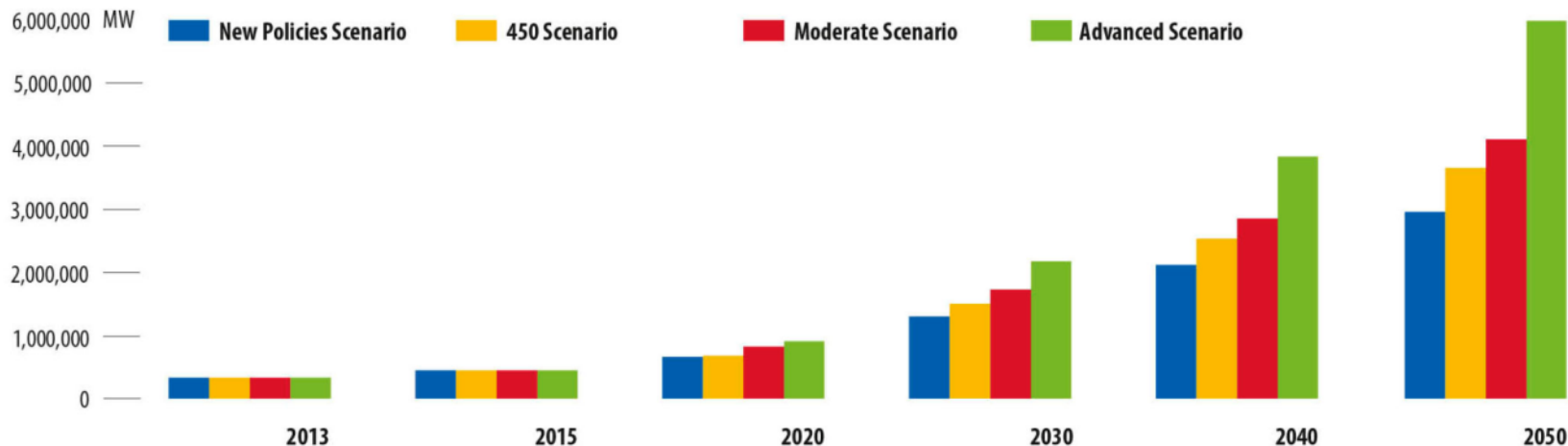
### *GWEC Moderate* scenario:

- takes into account all policy measures to support renewable energy either under way or planned around the world
- assumes that renewables or wind targets set by many countries are successfully implemented

### *GWEC Advanced* scenario:

- assumption is that all policy options in favour of renewable energy are selected and the political will is there to carry them out

## GLOBAL CUMULATIVE WIND POWER CAPACITY



### New Policies Scenario

MW	318,354	432,656	639,478	1,259,974	2,052,583	2,869,611
TWh/a	714	868	1,569	3,311	5,394	7,541

### 450 Scenario

MW	318,354	432,656	658,009	1,454,395	2,458,757	3,545,595
TWh/a	714	868	1,614	3,822	6,462	9,318

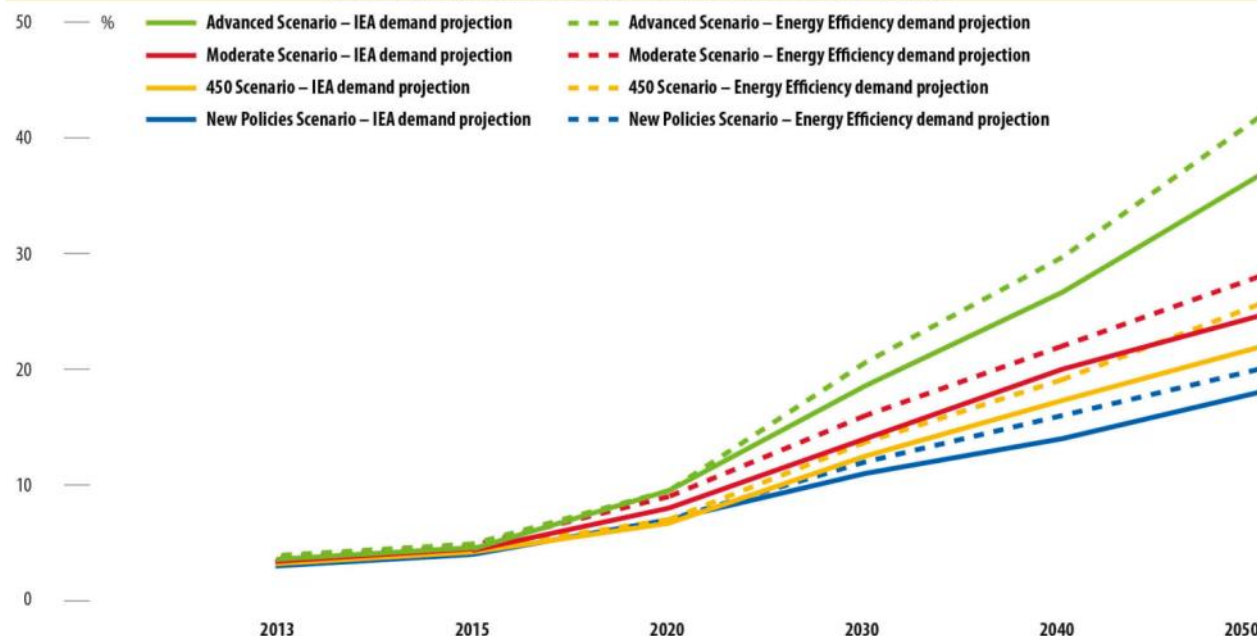
### Moderate Scenario

MW	318,354	432,656	797,028	1,675,624	2,767,351	3,983,995
TWh/a	714	868	1,955	4,404	7,273	10,470

### Advanced Scenario

MW	318,354	432,656	879,446	2,110,161	3,720,919	5,805,882
TWh/a	714	868	2,157	5,546	9,779	15,258

# WIND POWER SHARE OF GLOBAL ELECTRICITY DEMAND



	2013	2015	2020	2030	2040	2050
<b>New Policies Scenario</b>						
IEA demand projection	3%	4%	7%	11%	14%	18%
Energy Efficiency demand projection	3%	4%	7%	12%	16%	20%
<b>450 Scenario</b>						
IEA demand projection	3%	4%	7%	13%	17%	22%
Energy Efficiency demand projection	3%	4%	7%	14%	19%	25%
<b>Moderate Scenario</b>						
IEA demand projection	3%	4%	8%	14%	20%	25%
Energy Efficiency demand projection	3%	4%	9%	16%	22%	28%
<b>Advanced Scenario</b>						
IEA demand projection	3%	4%	9%	18%	26%	36%
Energy Efficiency demand projection	3%	4%	9%	20%	29%	41%

## New Markets



## Conclusions

- China 'only' installed 23 GW; record installations in India; Europe surprisingly strong; strong year in the US. Latin America down a bit; Africa and Pacific quiet - will change in 2017.
- 29 markets with more than 1,000 MW; 9 with more than 10,000 MW; Proliferation of new markets in Africa, Asia, and Latin America.
- Technology evolution continues, but incrementally, not spectacularly, except perhaps in offshore, where we now have 9 MW machines... 'double digit' turbines soon.
- Costs continue to come down and wind is the cheapest way to add capacity in a growing number of markets in Africa, Asia and Latin America, as well as the in US and Canada. Offshore costs dropped spectacularly in 2016.
- ~4% of global electricity supply now, should be 6-8% by 2020, 18-20% by 2030 around 1/3 by 2050 if we are to get to grips with the





# Thank you!

For more information:

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