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GLOBAL WIND ENERGY OUTLOOK 2008

Steve Sawyer

Secretary General

Global Wind Energy Council

Greenpeace Seminar

Fortaleza

February 6, 2009

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Uniting the Global Wind Industry

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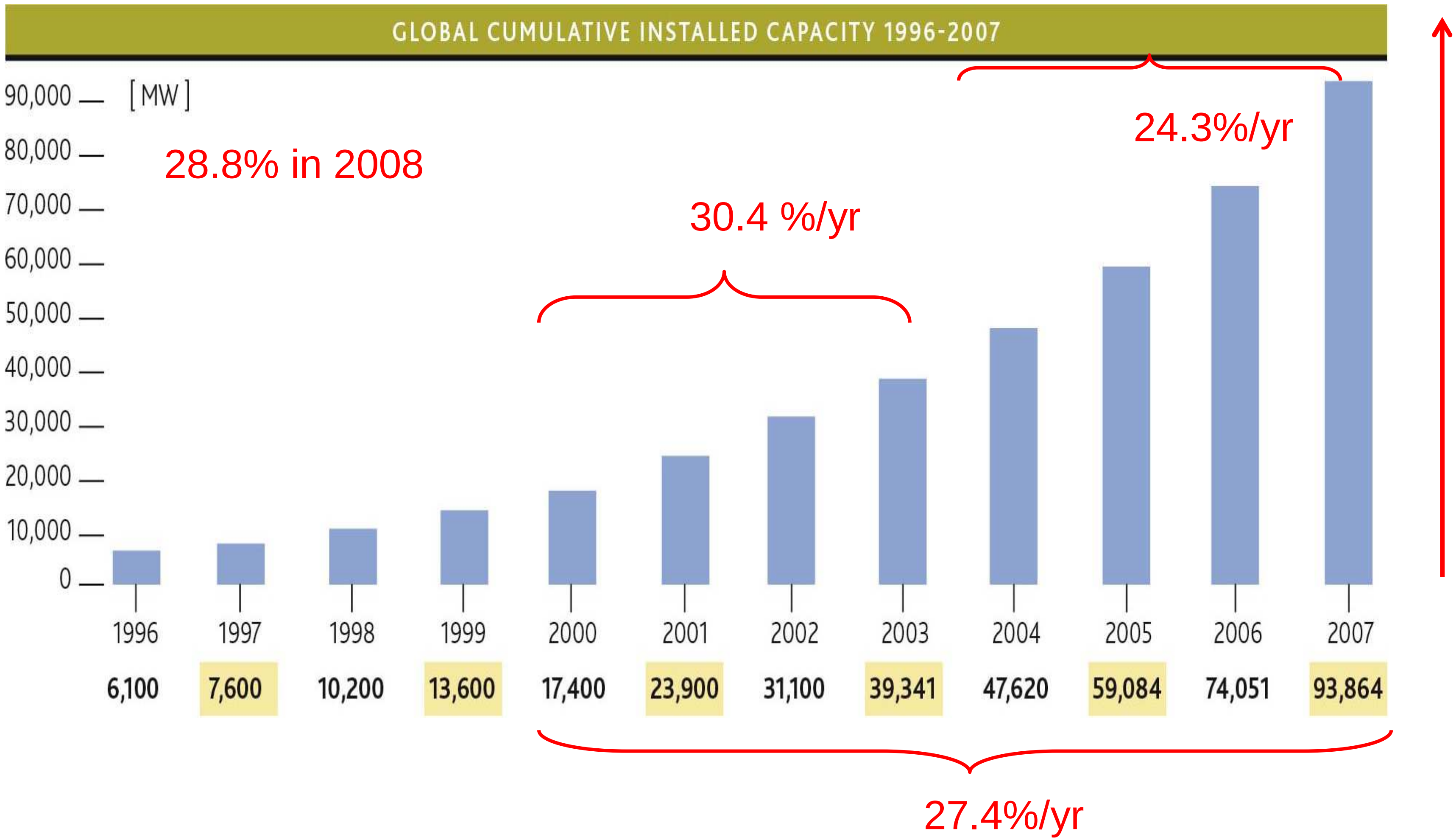
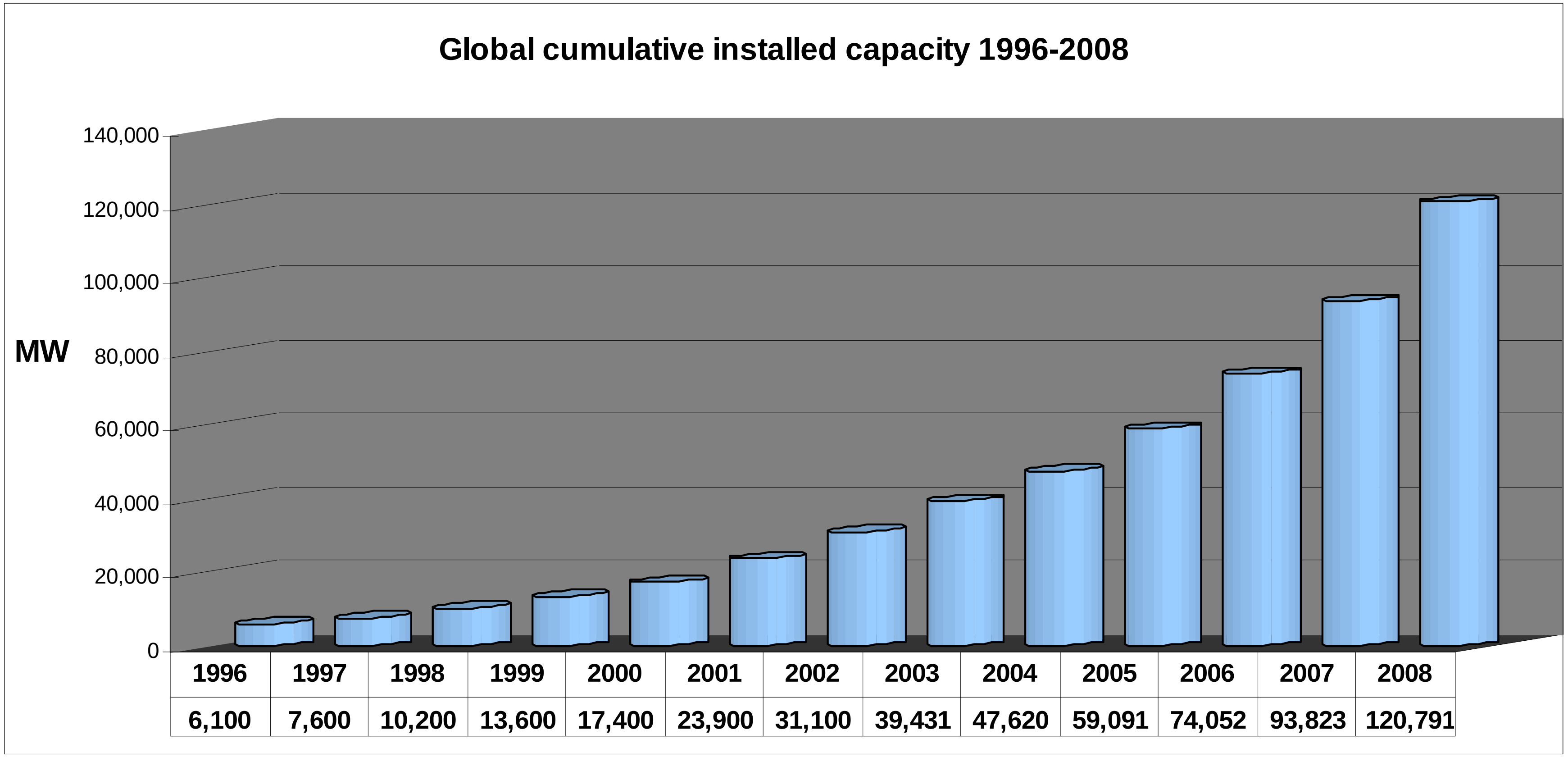
GWEC - Uniting the global wind industry and its representative associations

Cumulative Installed Capacity

2008: ~120,000



2008 another record year



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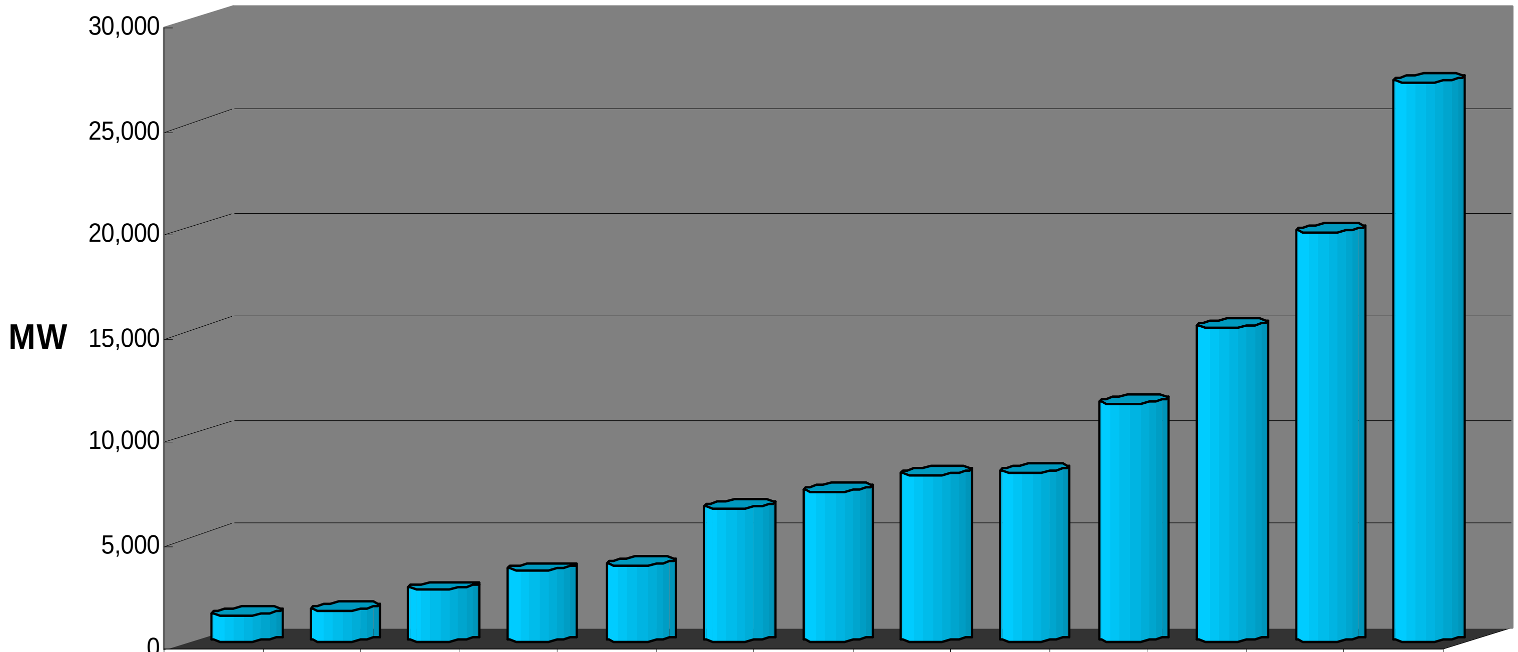
Annual Installed Capacity

2008: >27,000

Annual Market growth rate increases

Global annual installed capacity 1996-2008



1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
1,280	1,530	2,520	3,440	3,760	6,500	7,270	8,133	8,207	11,531	15,245	19,865	27,056

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Top 10 Annual & Cumulative Capacity

Top 10 total installed capacity

	MW	%
US	25,170	20.8
Germany	23,903	19.8
Spain	16,754	13.9
China	12,210	10.1
India	9,645	8.0
Italy	3,736	3.1
France	3,404	2.8
UK	3,241	2.7
Denmark	3,180	2.6
Portugal	2,862	2.4
Rest of the world	16,686	13.8
Total top 10	**104,104**	**86.2**
World total	**120,791**	**100.0**

Source: GWEC

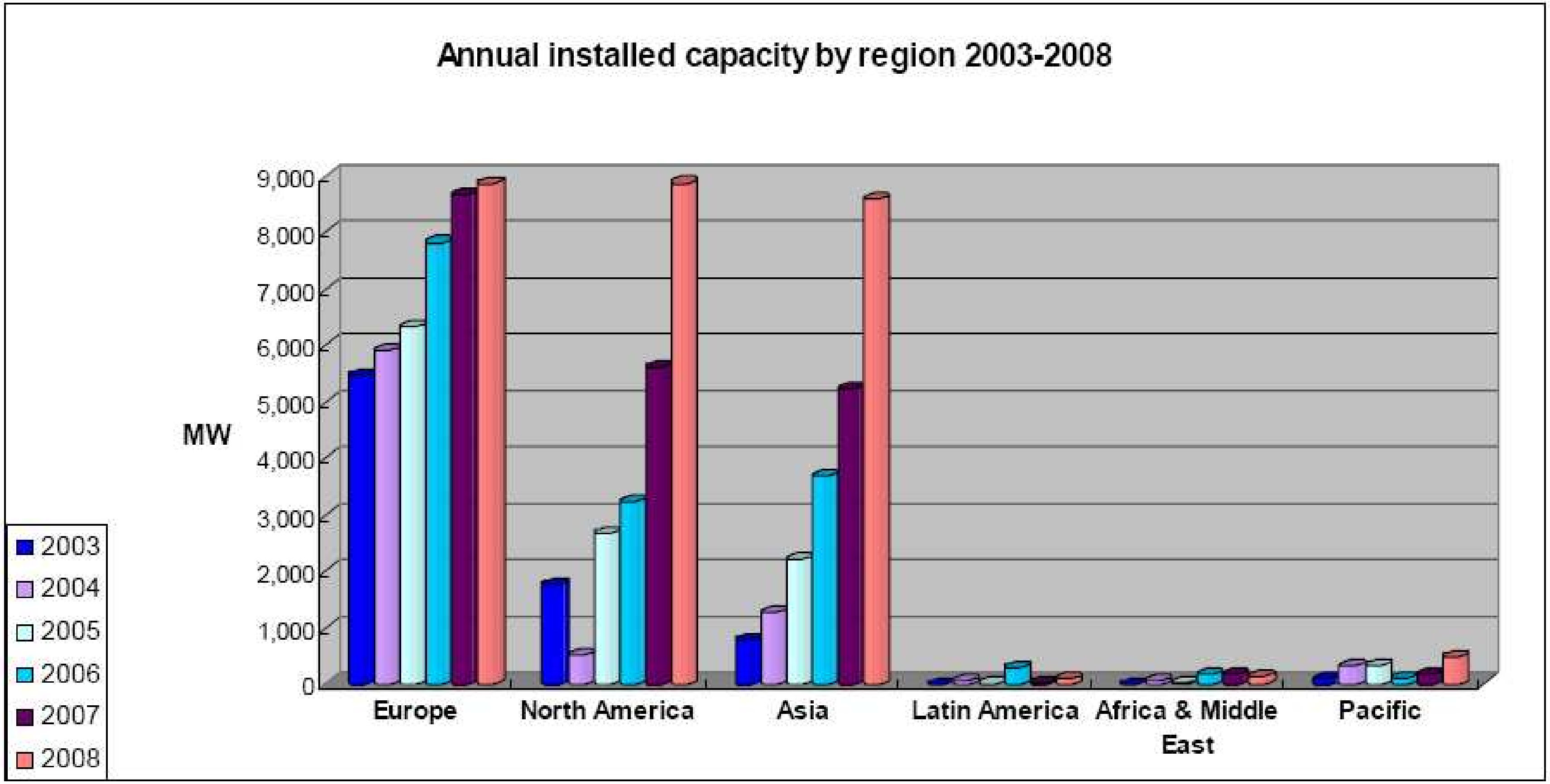
Top 10 new capacity

	MW	%
US	8,358	31
China	6,300	23
India	1,800	7
Germany	1,665	6
Spain	1,609	6
Italy	1,010	4
France	950	4
UK	836	3
Portugal	712	3
Canada	523	2
Rest of the world	3,293	12
Total top 10	**23,763**	**88**
World total	**27,056**	**100**

Source: GWEC

Regional Distribution

Source: GWEC



China: Extraordinary Growth

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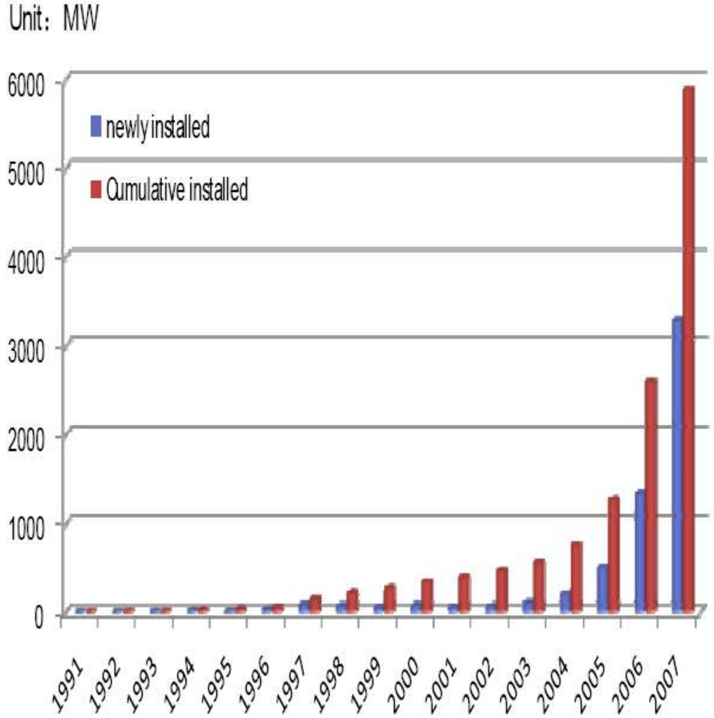
Booming Wind Farm Market

- In 2007 one year newly increased was 3304MW, compare to 1337MW in 2006, the growth rate is 147%.
- The cumulative up to 5906MW, the growth rate is 127%.
- Three years ahead of the national goal of 5000MW by 2010.



+6300

= **12,000!**

2008

Rise of Domestic Manufacturers

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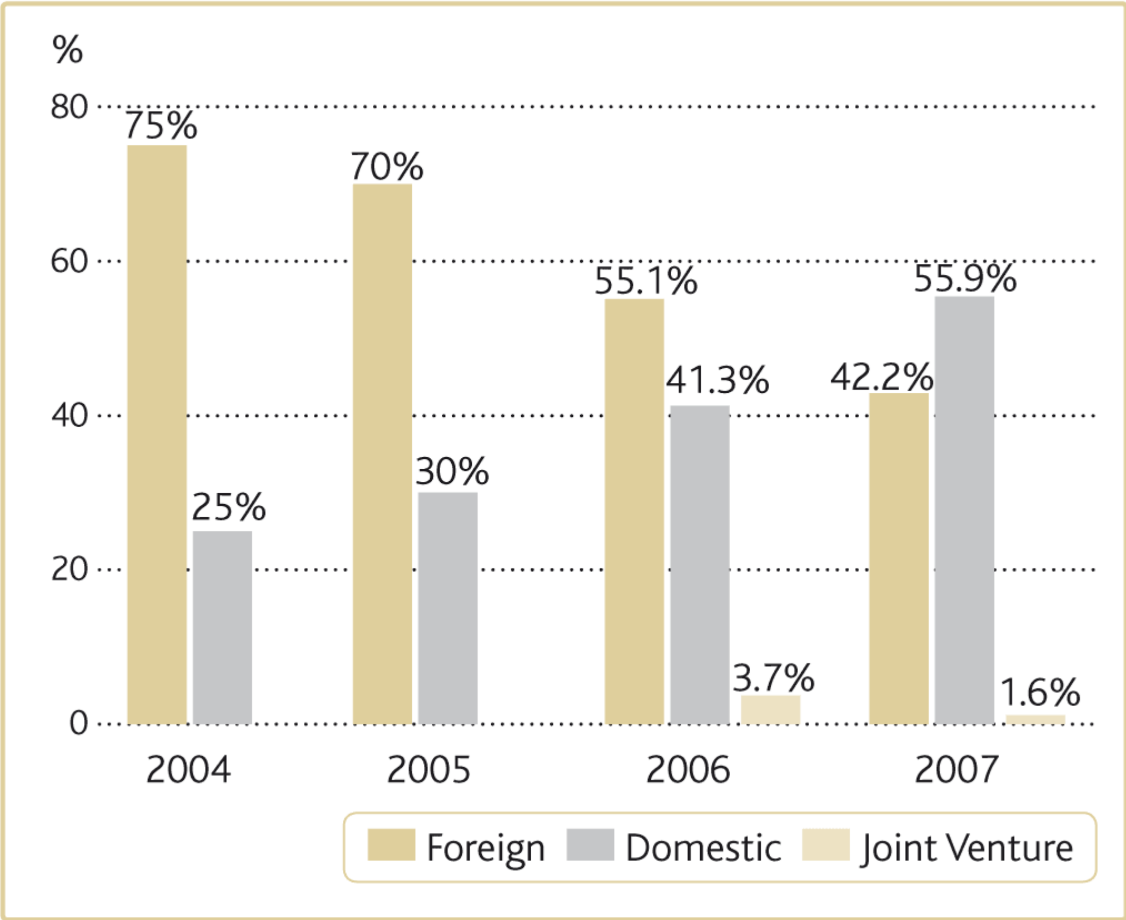
ANNUAL INSTALLED CAPACITY 2004 - 2007



Source: 2007 PR China Wind Power Report (Li Junfeng, Gao Hu); CREIA

Chinese manufacturers and industry having global impact : Near-term output ramping-up

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Supply - buoyant
- Cheaper turbines

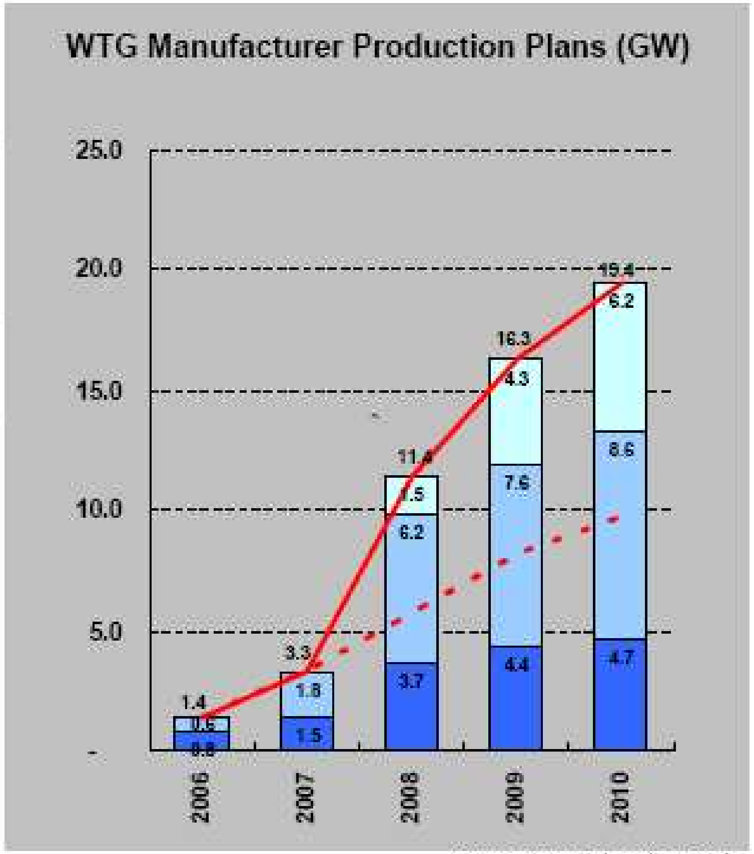
Established international and Established domestic companies each with potential for 2GW by the end of 2007

By 2009 each grouping could represent about 1/3 of the market, but "new entrants" will be challenged in acquiring market share

Expect consolidation within the next 3-years

WTG Manufacturer Company Groupings

- Established International
  Gamesa, GE, NCWA, Nordex, Suzlon, Vestas
- Established Domestic
  Sinovel, Dongfang, Goldwind, Windey, Changzhou, Huayi, Shanghai, Xiangdian
- New entrants
  24+ companies with tech or license agreements and detailed business plans for WTG manufacturing
- Aggregate pdn plans
- Tempered pdn



Source: Azure International data

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Projections (Oct 2007)

Table 7 Projection of wind power development in China

Year	Development Scenario (Low)			Development Scenario (Mid)			Development Scenario (High)			Global Annual Growth estimated byGWEC /%
	Installed Capacity /GW	Yearly Average Newly Installed /GW	Yearly Average Growth Rate /%	Installed Capacity /GW	Yearly Average Newly Installed /GW	Yearly Average Growth Rate /%	Installed Capacity /GW	Yearly Average Newly Installed /GW	Yearly Average Growth Rate /%	
2006	2.6			2.6			2.6			
2010	8	1.35	32.4	10	1.85	40.0	13.16	2.64	55.0	18.0
2015	20	2.4	20.1	30	4	24.6	48.87	7.14	30.0	18.0
2020	40	6.4	14.9	70	8	18.5	122.12	14.65	20.1	14.0
2030	120	8	11.6	180	11	9.9	268.56	14.65	8.2	7.0
2040	250	13	7.6	300	12	5.2	429.20	16.06	4.8	2.0
2050	400	15	4.8	450	15	4.1	611.30	18.21	3.6	0.5

Source: "China Wind Power Report, 2007"

http://www.gwec.net/index.php?id=80

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Scenarios

Main Assumptions – wind power growth

“Reference” scenario:

- most conservative scenario, based on International Energy Agency (IEA) 2007 World Energy Outlook
- IEA assessment has then been extrapolated out to 2050 by DLR

“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

“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; clear commitment to climate protection and a low carbon energy future.

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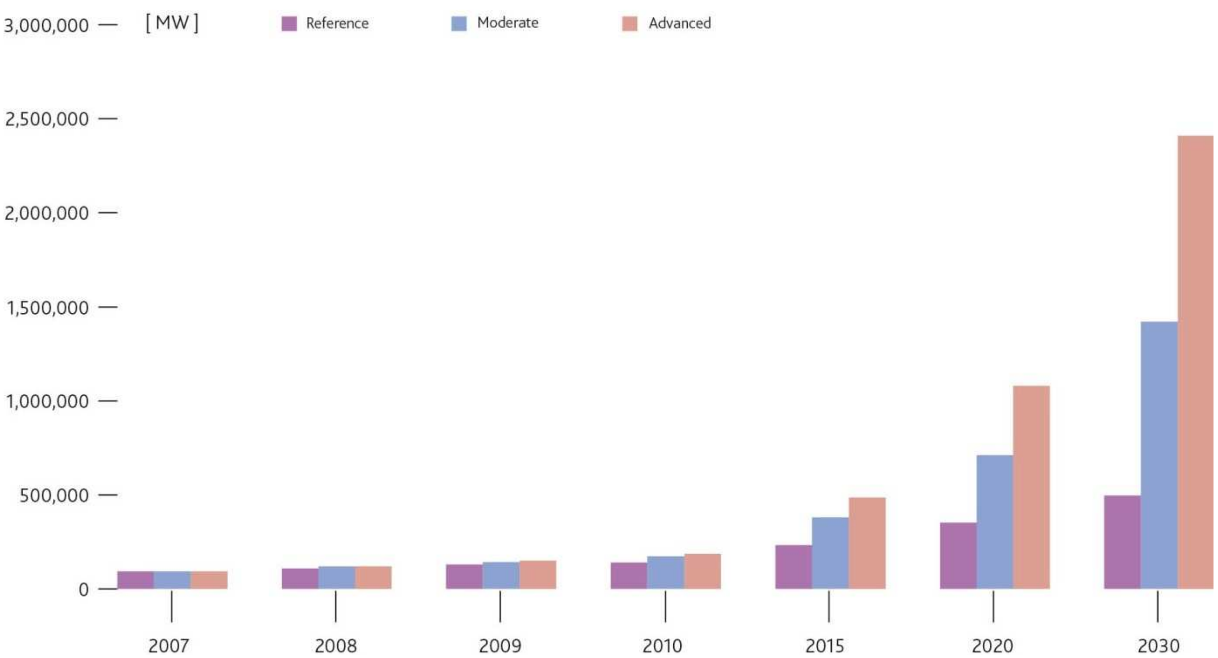
Production

GLOBAL CUMMULATIVE NEW WIND CAPACITY



GLOBAL CUMULATIVE CAPACITY [MW] AND ELECTRICITY GENERATION [TWh]

Year		2007	2008	2009	2010	2015	2020	2030
Reference	[MW]	93,864	109,739	128,046	139,000	232,956	352,300	496,730
	[TWh]	206	240	280	304	571	864	1,218
Moderate	[MW]	93,864	117,735	143,376	172,280	378,954	709,332	1,420,436
	[TWh]	206	258	314	377	929	1,740	3,484
Advanced	[MW]	93,864	119,837	149,841	186,309	485,834	1,080,886	2,375,374
	[TWh]	206	262	328	408	1,192	2,651	5,939

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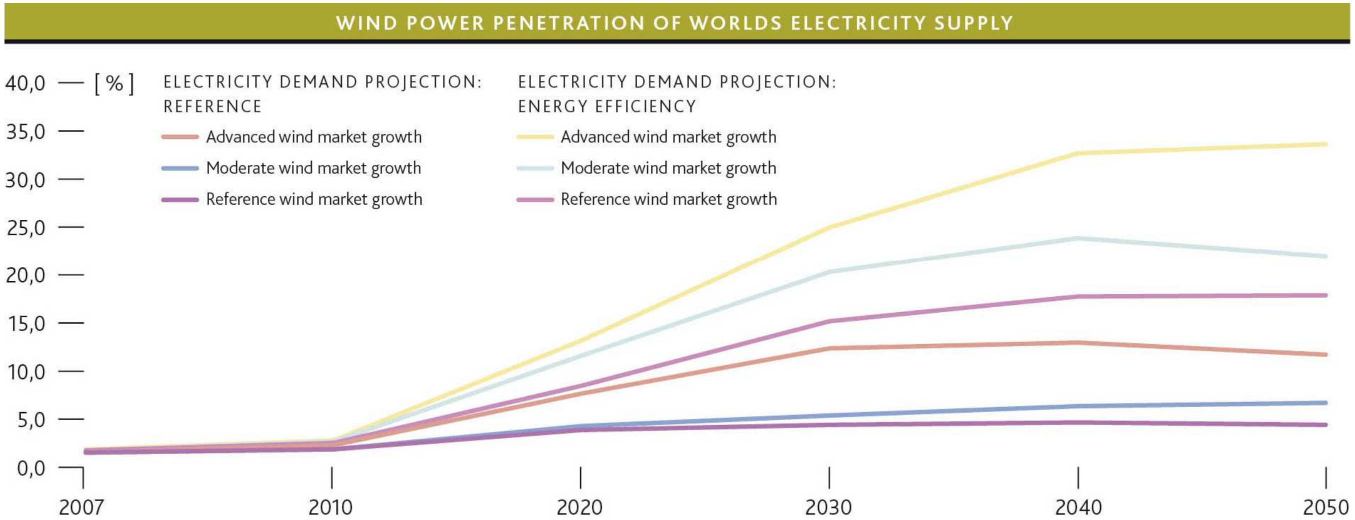
% of global electricity



3 DIFFERENT WIND MARKET DEVELOPMENT SCENARIOS - WITH DIFFERENT WORLD ELECTRICITY DEMAND DEVELOPMENTS

		2007	2010	2020	2030	2040	2050
REFERENCE WIND MARKET GROWTH – IEA PROJECTION							
Wind power penetration of world's electricity in % – Reference (IEA Demand Projection)	%	1.4	1.7	3.6	4.2	4.4	4.2
Wind power penetration of world's electricity in % – Energy Efficiency	%	1.4	1.7	4.1	5.1	5.8	5.8
MODERATE WIND MARKET GROWTH							
Wind power penetration of world's electricity in % – Reference	%	1.4	2.1	7.3	11.9	12.5	11.2
Wind power penetration of world's electricity in % – Energy Efficiency	%	1.4	2.1	8.2	14.6	16.4	15.6
ADVANCED WIND MARKET GROWTH							
Wind power penetration of worlds electricity in % – Reference	%	1.4	2.3	11.2	19.7	23.1	21.2
Wind power penetration of world's electricity in % – Energy Efficiency	%	1.4	2.3	12.6	24.0	30.3	29.5

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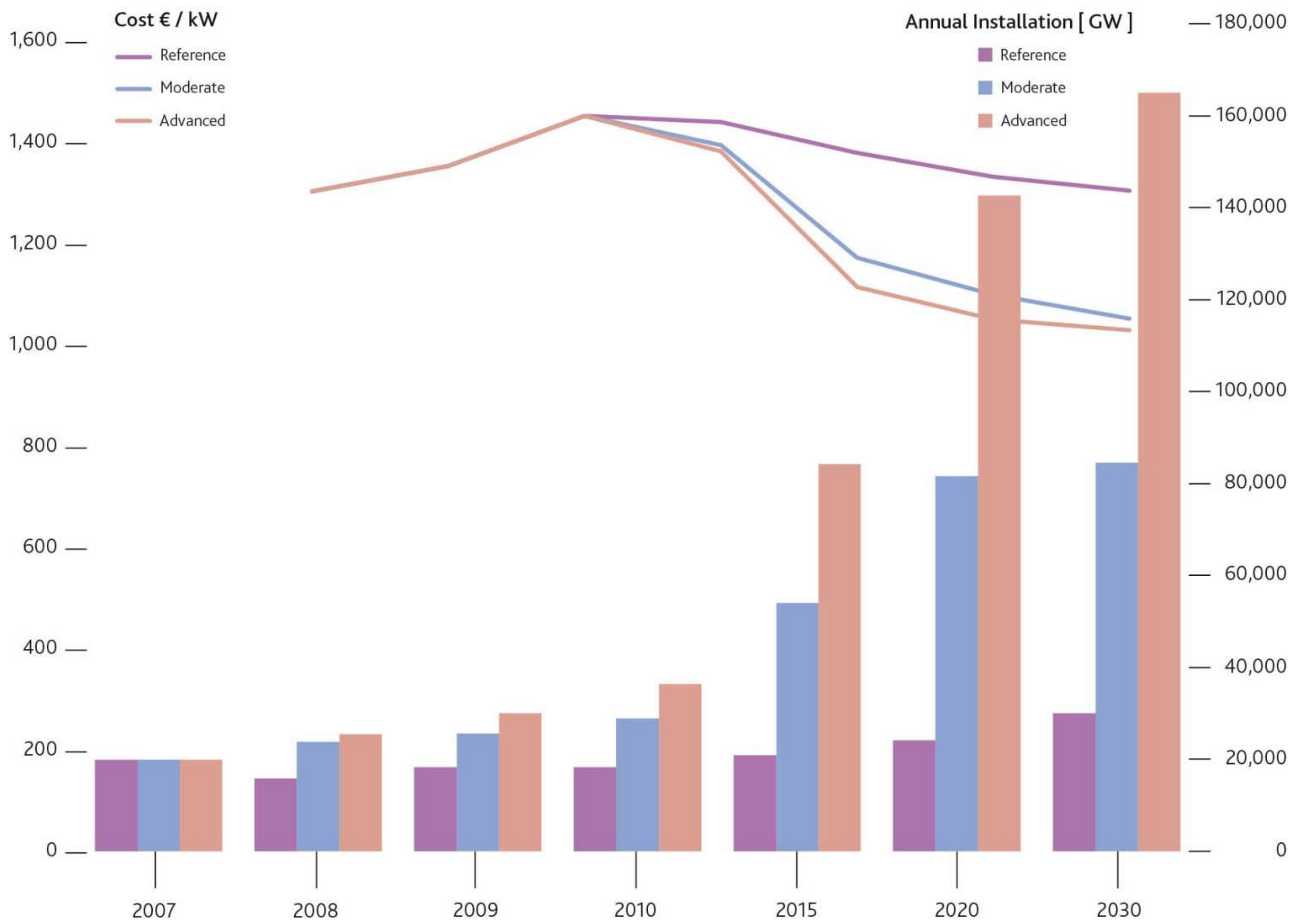
Development of Costs



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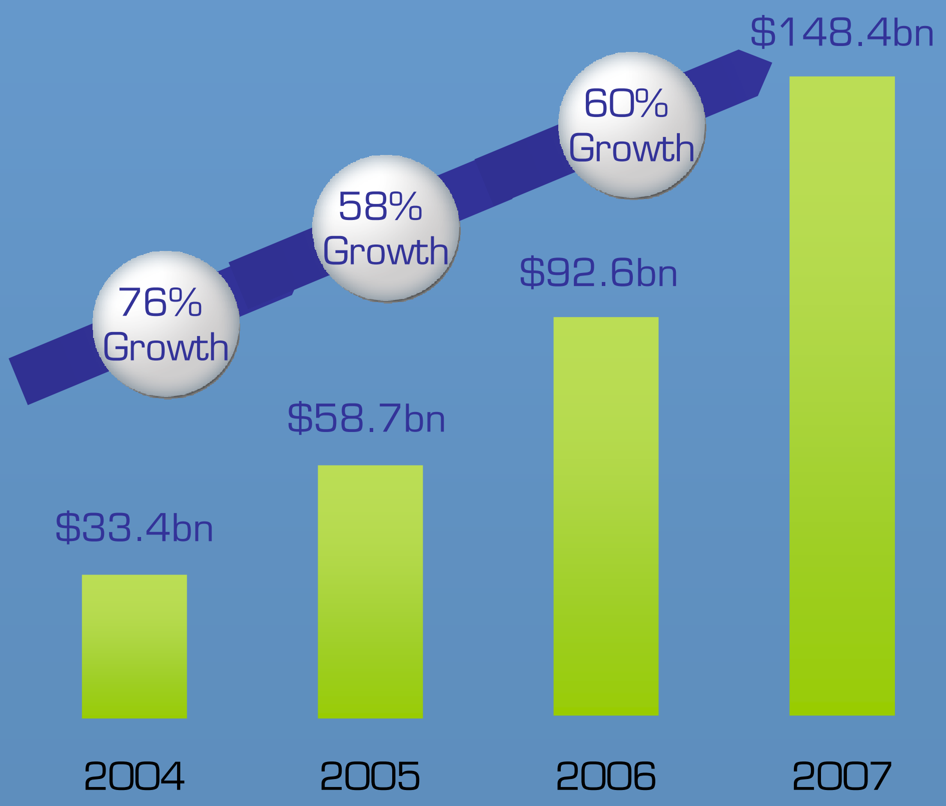
Investment and Employment

INVESTMENT AND EMPLOYMENT

	2007	2008	2009	2010	2015	2020	2030
REFERENCE							
Annual Installation [MW]	19,865	18,016	18,034	18,307	20,887	24,180	30,013
Cost € / kW	1,300	1,350	1,450	1,438	1,376	1,329	1,301
Investment € billion /year	25,824,500	25,873,673	25,910,012	26,545,447	28,736,673	32,135,267	39,058,575
Employment Job-year	329,232	387,368	418,625	424,648	479,888	535,074	634,114
MODERATE							
Annual Installation [MW]	19,865	23,871	25,641	28,904	54,023	81,546	84,465
Cost € / kW	1,300	1,350	1,450	1,392	1,170	1,096	1,050
Investment € billion /year	25,824,500	32,225,716	37,179,828	40,220,810	63,182,874	89,390,391	88,658,740
Employment Job-year	329,232	397,269	432,363	462,023	882,520	1,296,306	1,486,589
ADVANCED							
Annual Installation [MW]	19,865	25,509	30,005	36,468	84,160	142,674	165,000
Cost € / kW	1,300	1,350	1,450	1,379	1,112	1,047	1,026
Investment € billion /year	25,824,500	34,437,535	43,506,723	50,304,975	93,546,253	149,352,592	169,297,423
Employment Job-year	329,232	422,545	499,967	572,596	1,340,016	2,214,699	2,810,395

Total Global New Investment in Clean Energy 2004 – 2007



1% of global fixed asset investment

19% of global energy industry infrastructure investment

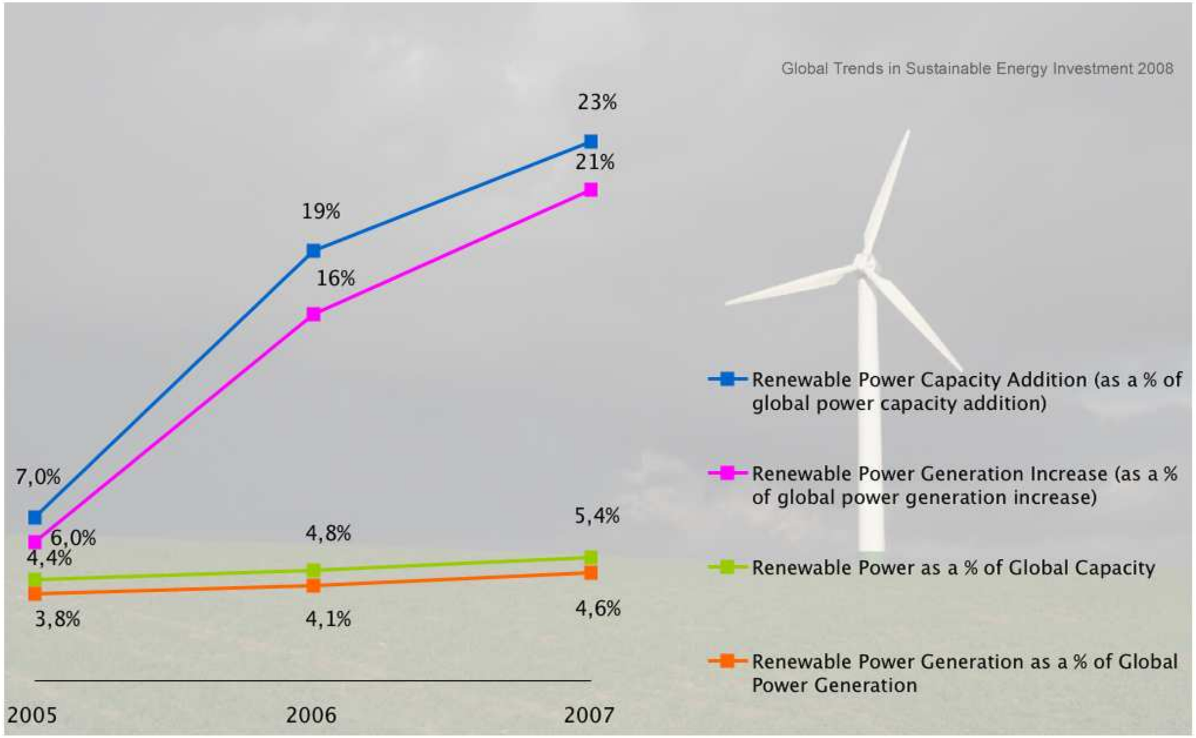
250% of commercial aircraft investment

Adjusted for reinvestment. Geared re-investment assumes a 1 year lag between VC/PE/Public Markets funds raised and re-investment in projects.

Source: New Energy Finance, IMF WEO Database, IEA WEO 2007, Boeing 2006 Annual Report

Growth of Renewables

Renewable Energy Capacity as a proportion of Global Power Generation Capacity, 2005 - 2007 (GW)



Source: SEFI, New Energy Finance

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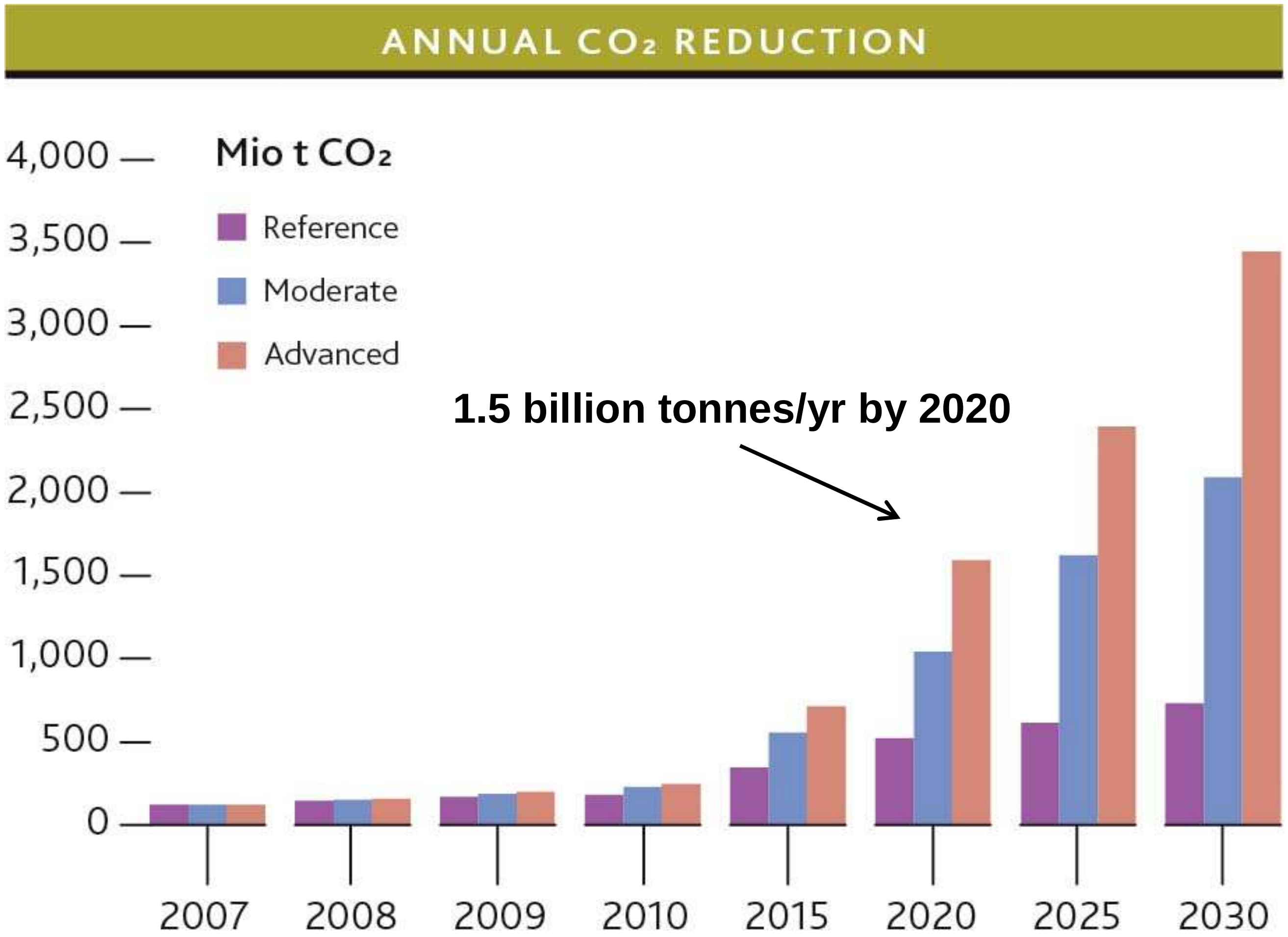
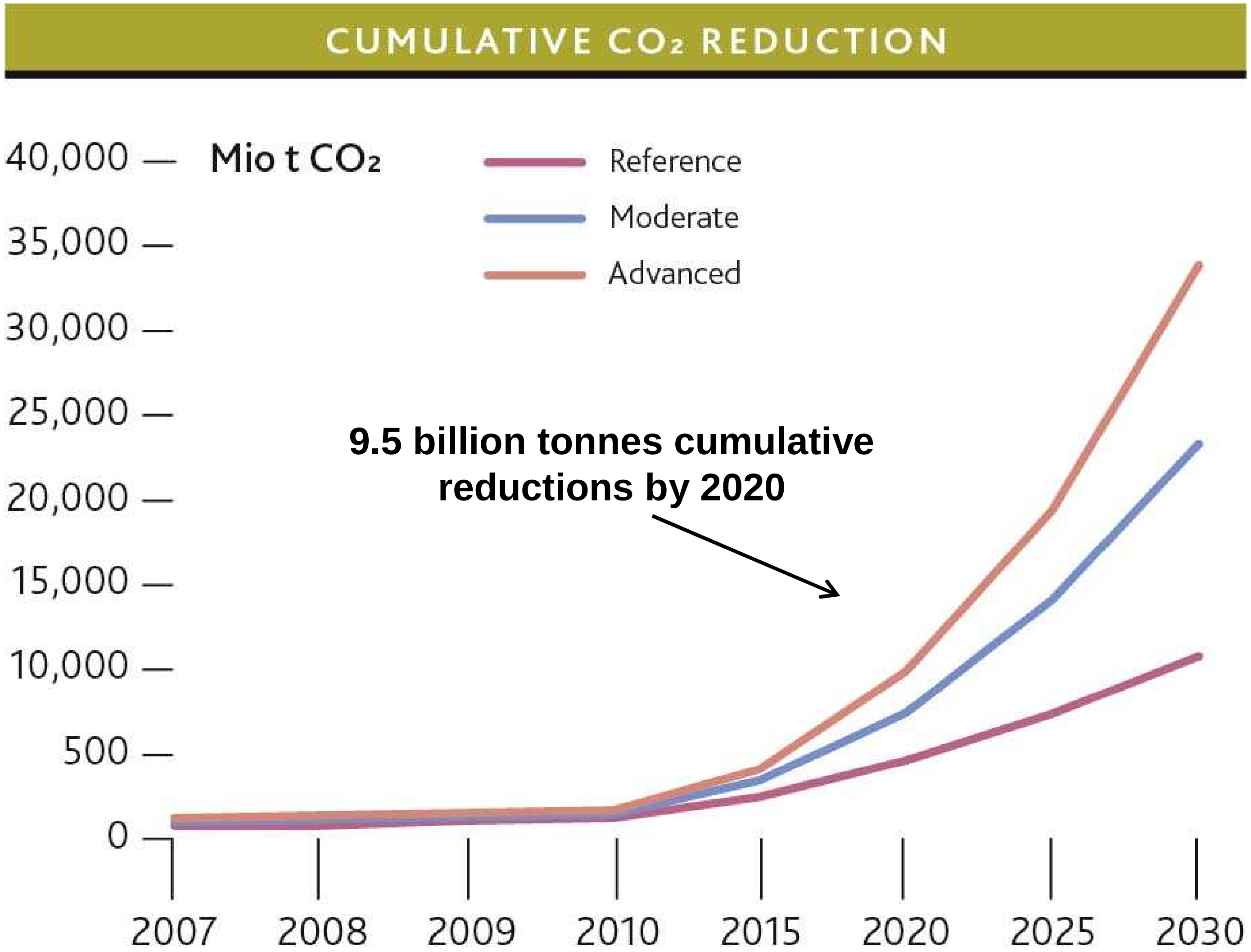
Climate Imperative



Climate Imperative



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Conclusions: Key Factors for Wind Industry development (known unknowns)

1 – Speed of supply chain ramp-up;

2 - US Production tax credit extended for 2009; but what about 2010?

3 – Evolution of credit crisis; stimulus packages

4 – Fossil fuel prices;

5 – Effective implementation of European target;

6 – Chinese manufacturers: how soon to enter the global market?

7 – Climate policy: development of carbon markets. Post 2012 carbon market design will have major impact;

8 – Energy Security: response to energy crises: Chile, Brazil, South Africa, etc?


Thank you
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"WHAT NATURE DELIVERS TO US IS NEVER STALE.
BECAUSE WHAT NATURE CREATES HAS ETERNITY IN IT."