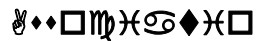




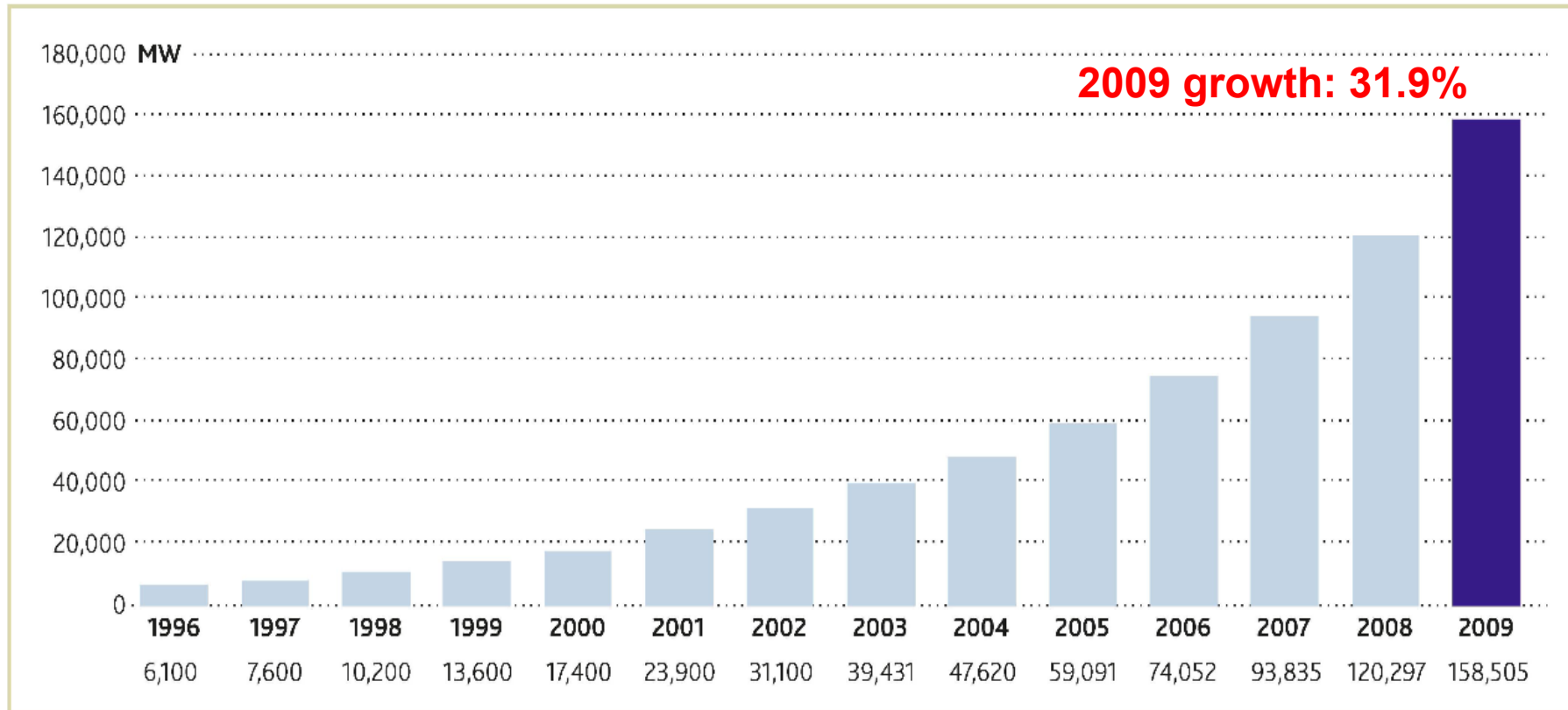
Steve Sawyer
SBs/AWGs Bonn
June 10, 2010



- 1. Global market status**
- 2. Projections 2010-2014; 2020, 2050**
- 3. Investment and employment**
- 4. Climate and Carbon**
- 5. Markets and potentials in Latin America**
- 6. Markets and potentials in Africa**
- 7. Policy Conditions for success**

Cumulative Installed Capacity

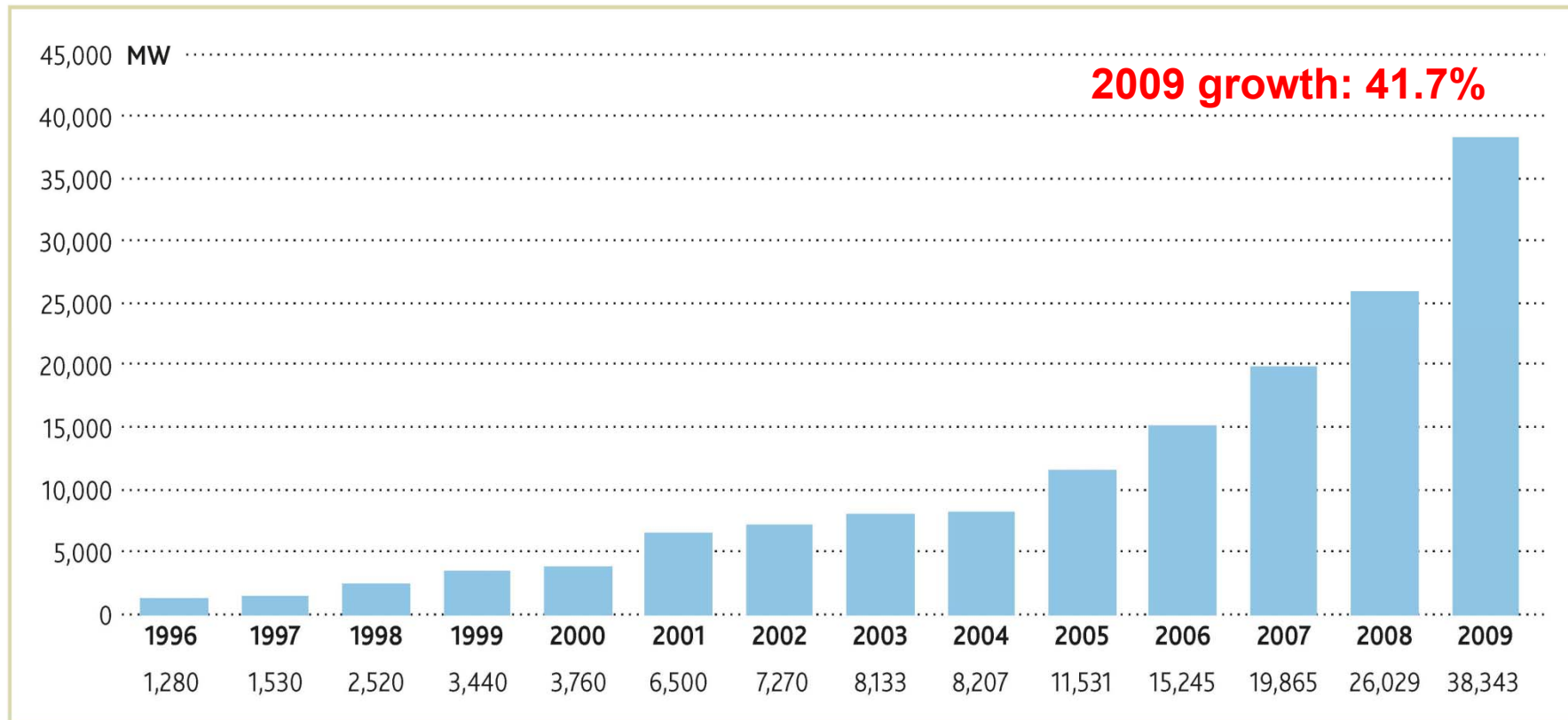
GLOBAL CUMULATIVE INSTALLED CAPACITY 1996-2009



13 yr avg growth: 28.6%

Annual Installed Capacity

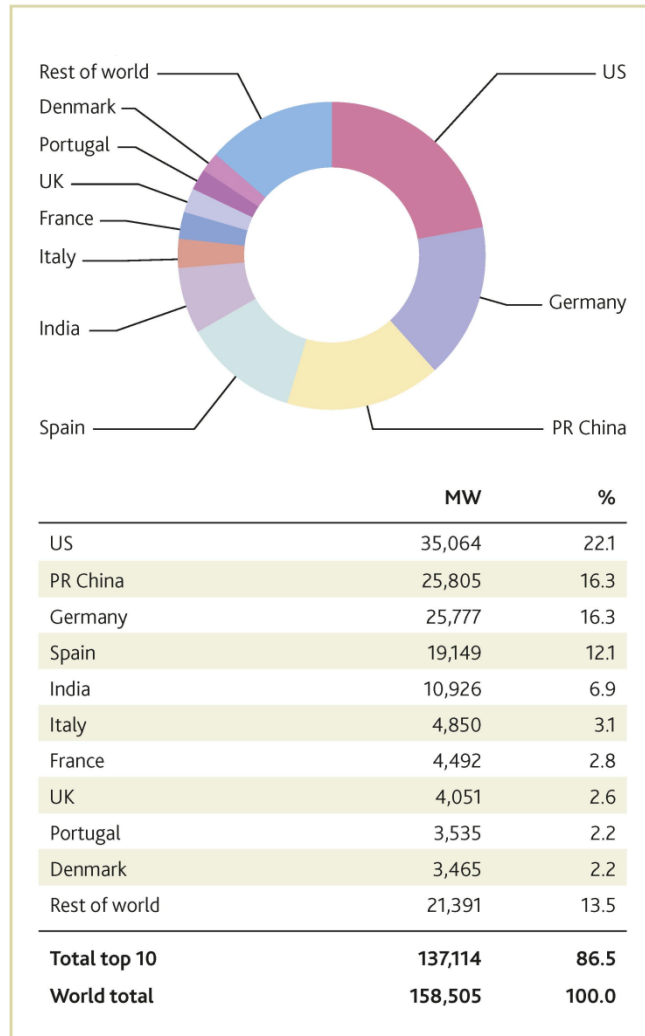
GLOBAL ANNUAL INSTALLED CAPACITY 1996-2009



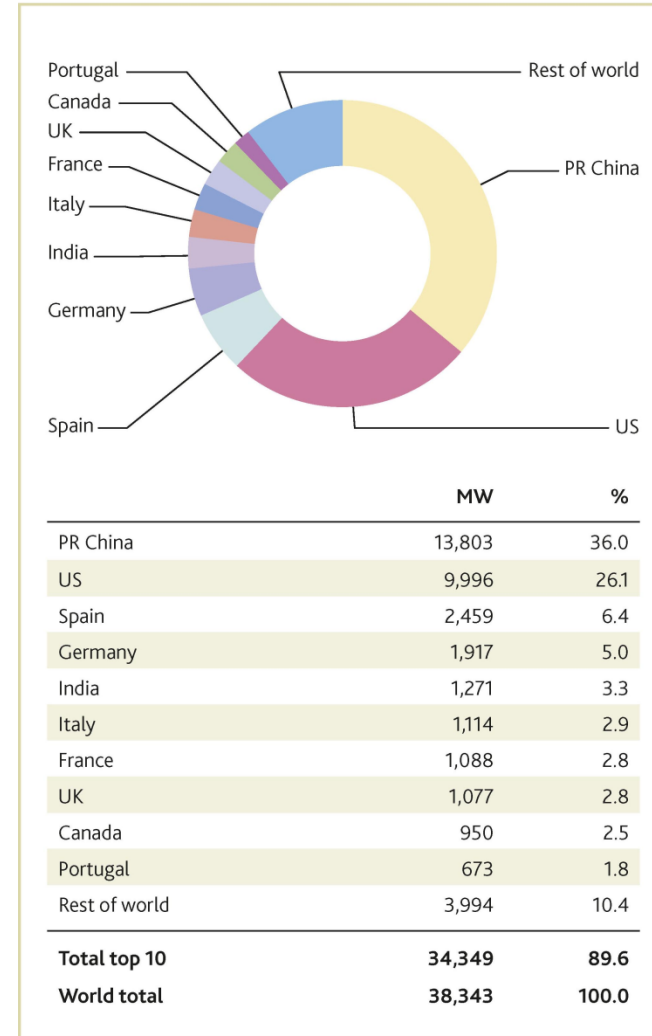
13 yr avg growth: 31.4%

2009 Market Leaders

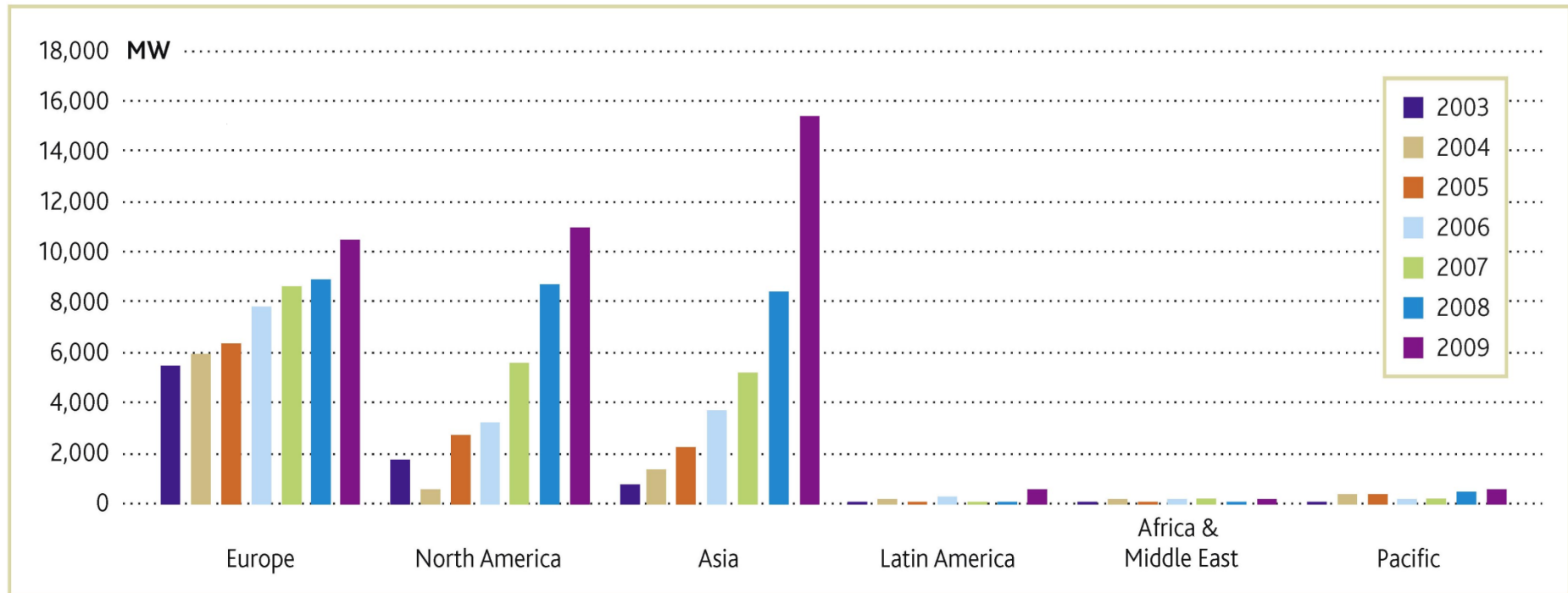
TOP 10 CUMULATIVE INSTALLED CAPACITY 2010



TOP 10 NEW INSTALLED CAPACITY 2010

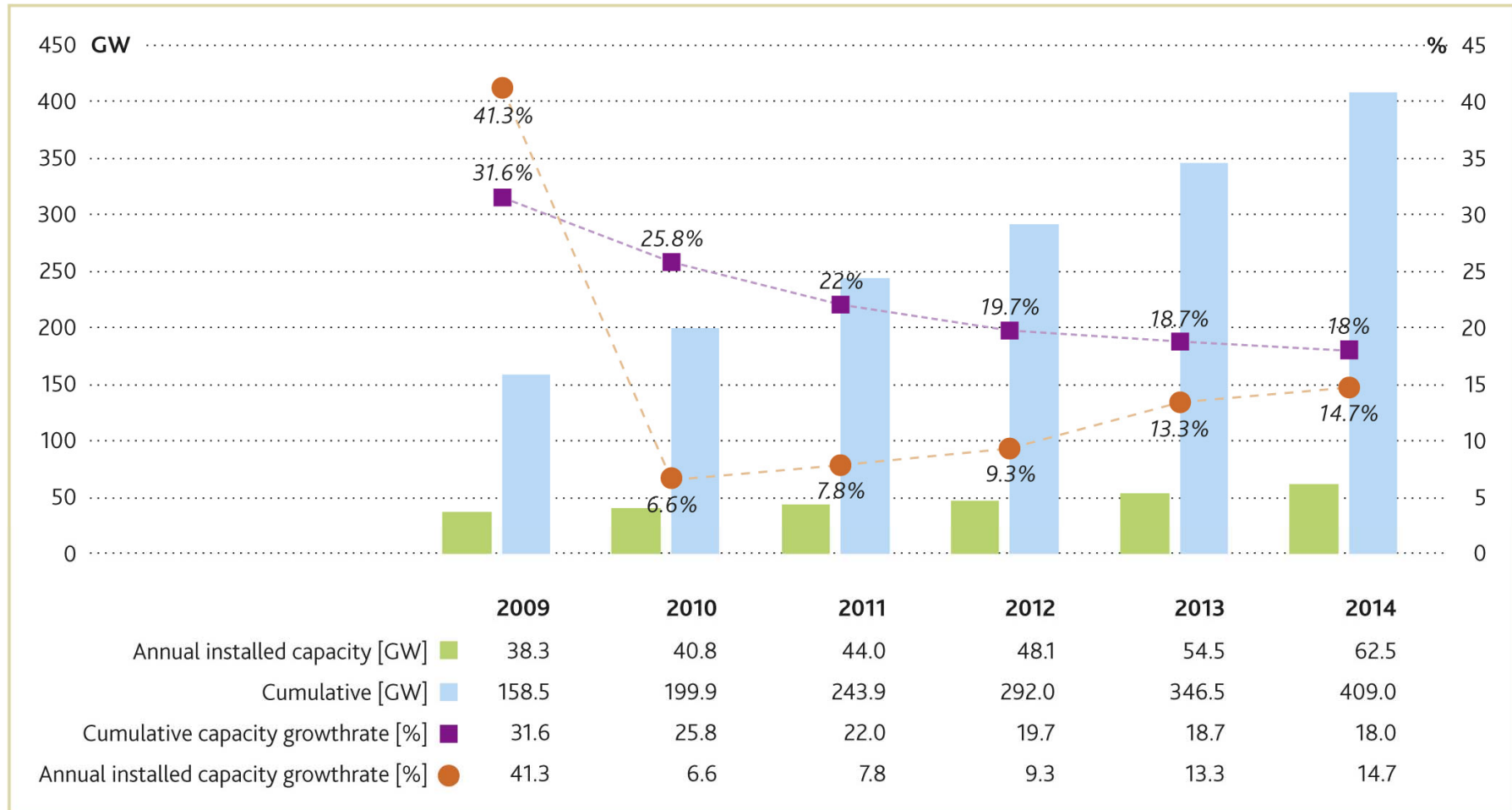


ANNUAL INSTALLED CAPACITY BY REGION 2003-2009



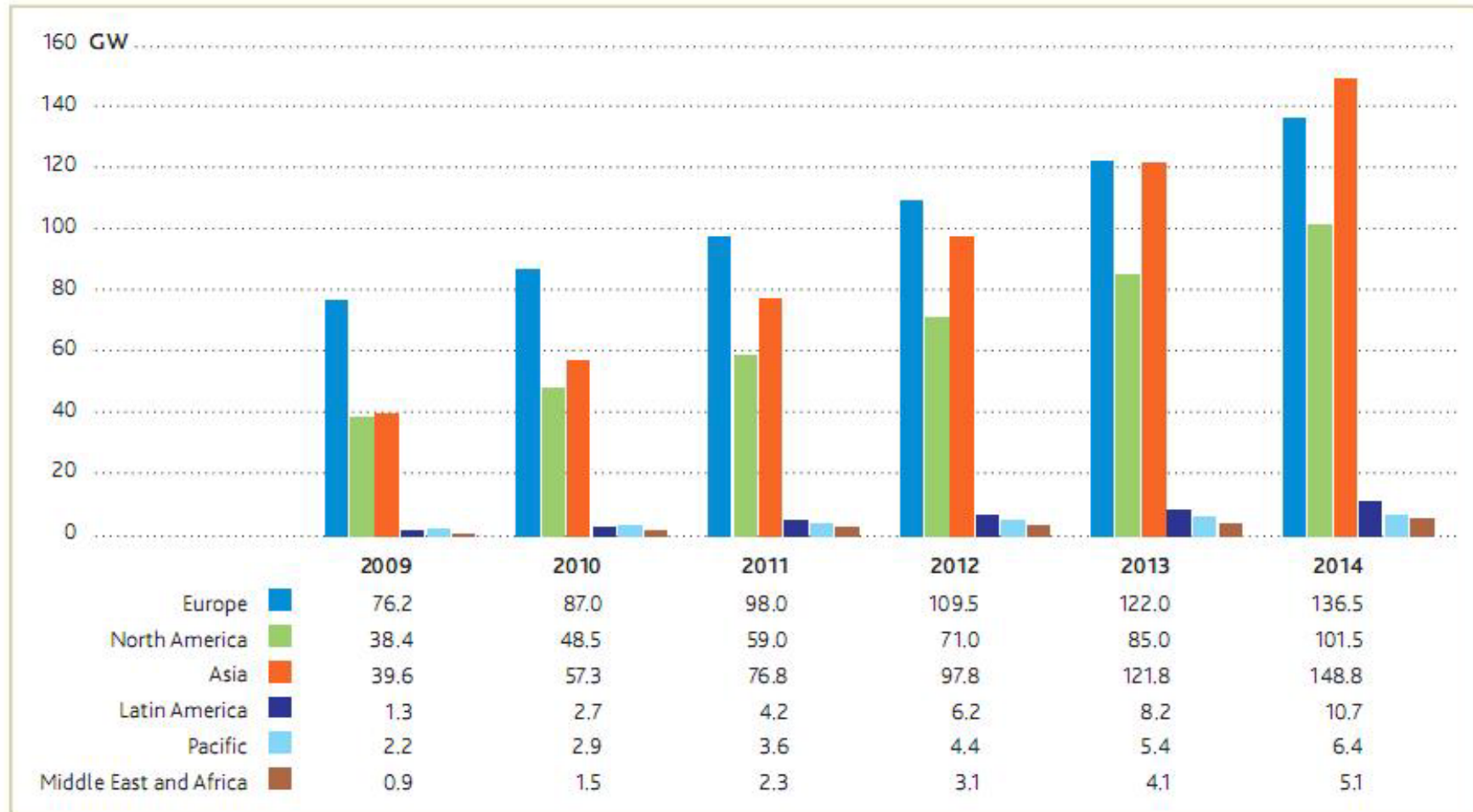
- Three main markets: Europe, North America and China – strong political commitment and framework in EU and China; US and Canada uncertain
- China now home to largest manufacturing industry, largest annual market – and #1 overall 2012 (?)
- European market continues to broaden – new boom with offshore getting underway
- Latin America, Africa and the Pacific continue ‘on the verge of take-off’

MARKET FORECAST 2010-2014

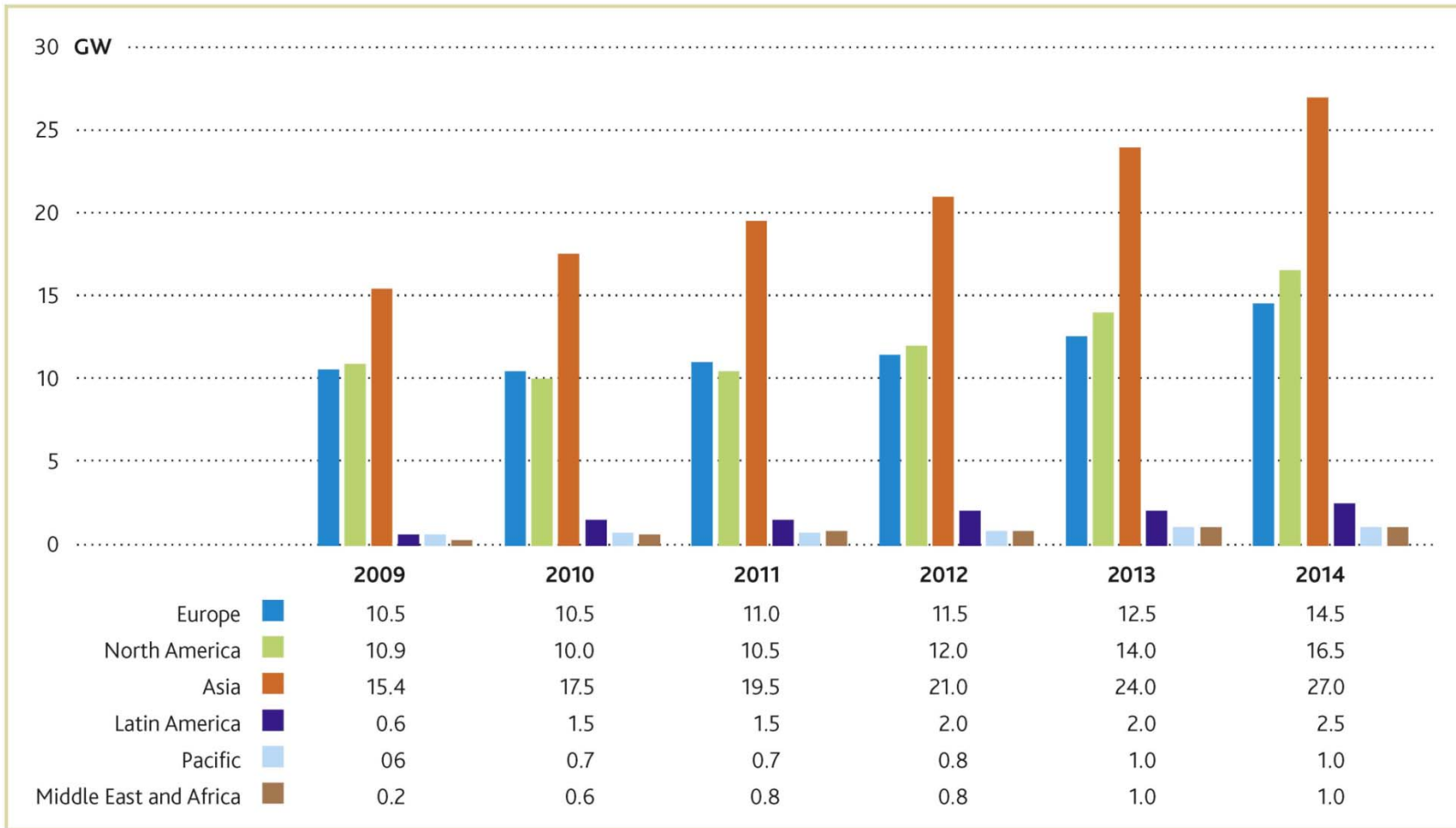


Cumulative by Region 2009-2013

CUMULATIVE MARKET FORECAST BY REGION 2009-2013

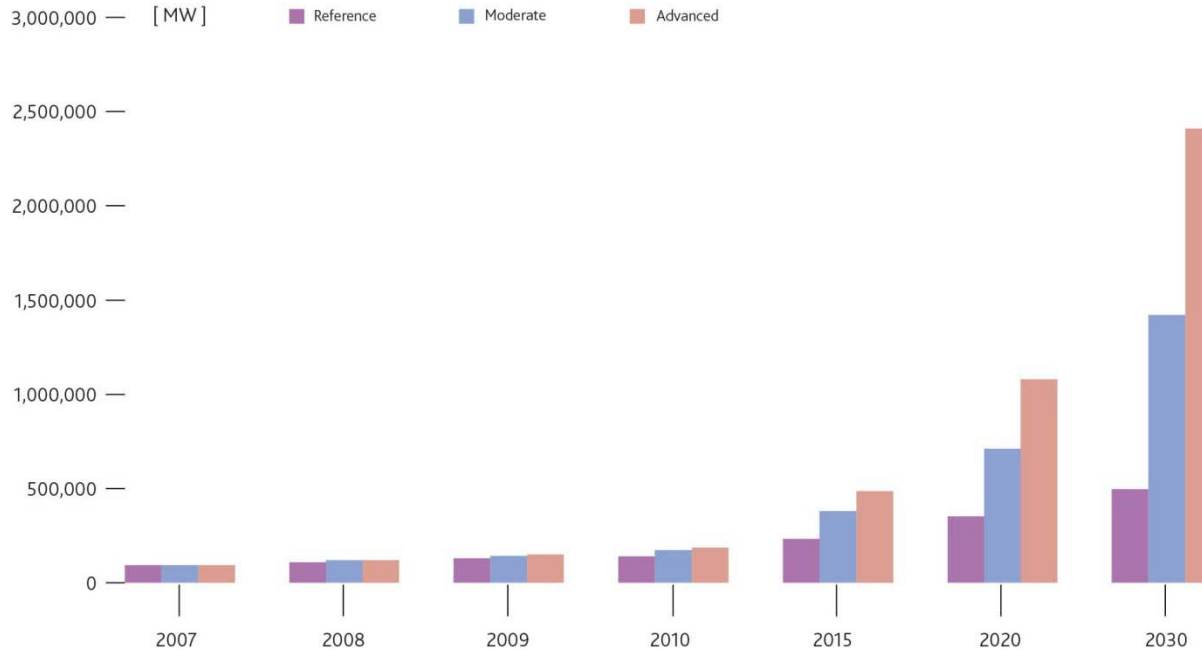


ANNUAL MARKET FORECAST BY REGION 2009-2013



GWEO 2008 - Production

GLOBAL CUMMULATIVE NEW WIND CAPACITY

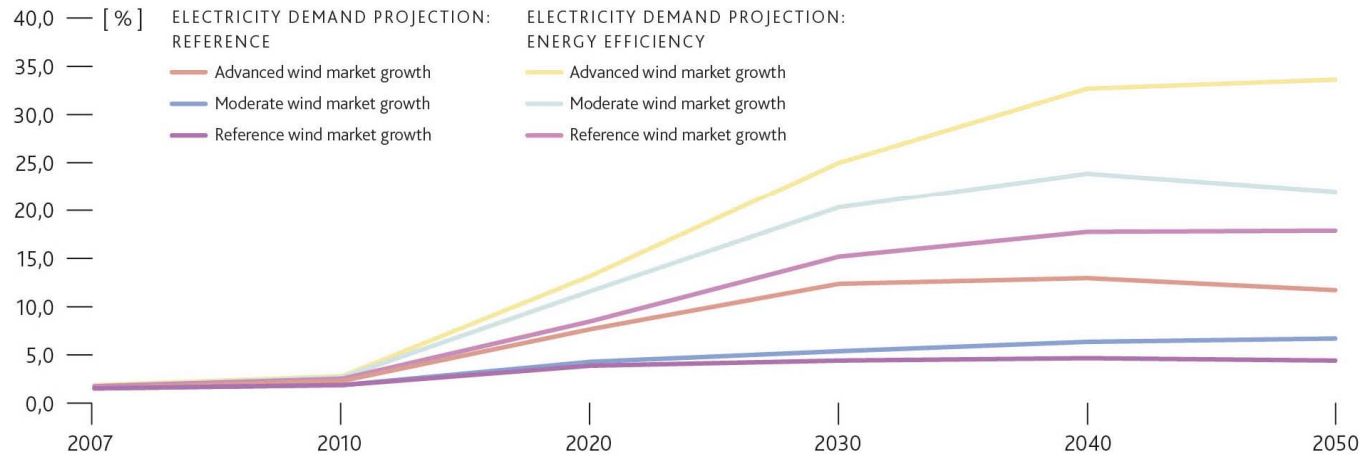


GLOBAL CUMULATIVE CAPACITY [MW] AND ELECTRICITY GENERATION [TWh]

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

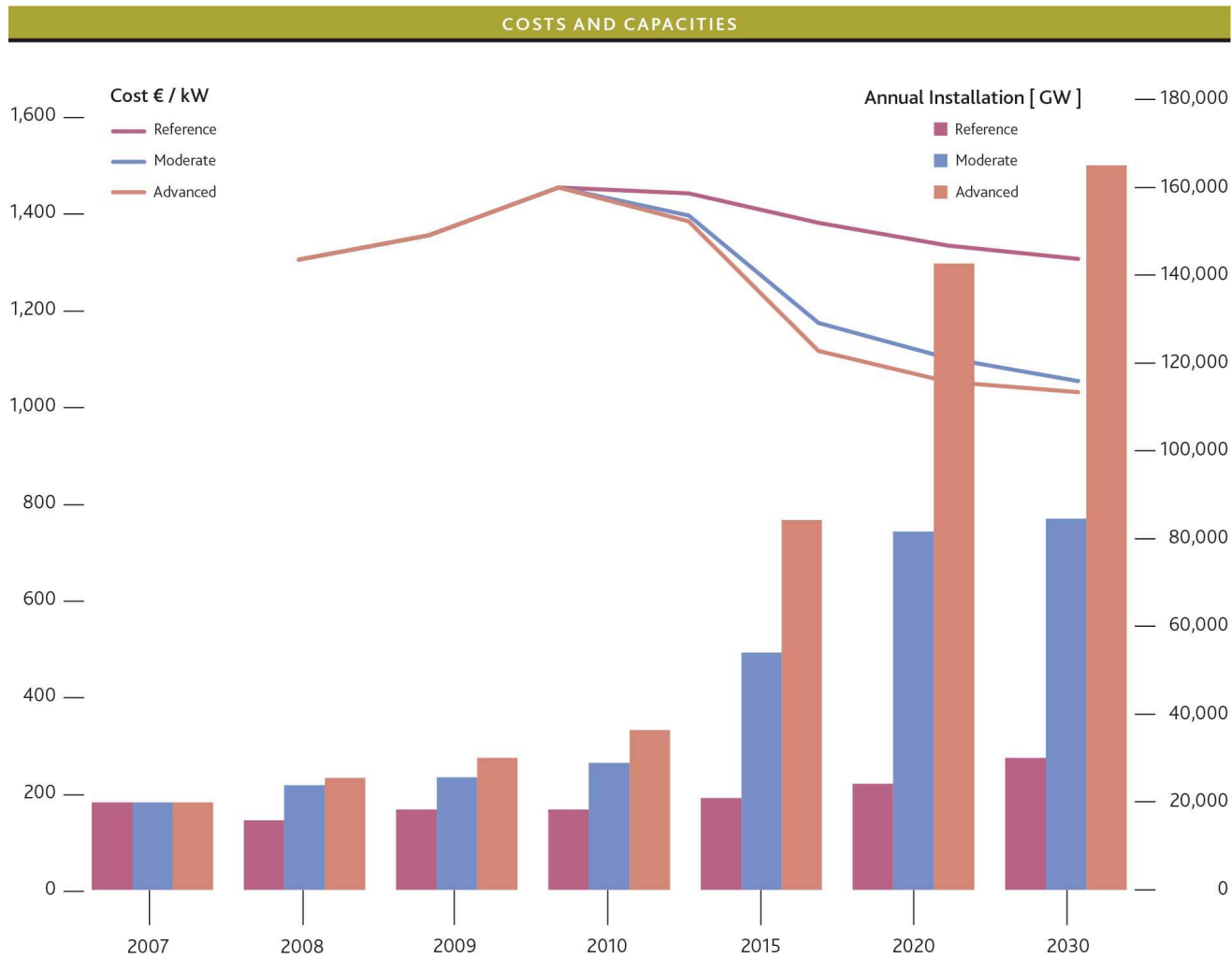
% of global electricity

WIND POWER PENETRATION OF WORLD'S ELECTRICITY SUPPLY

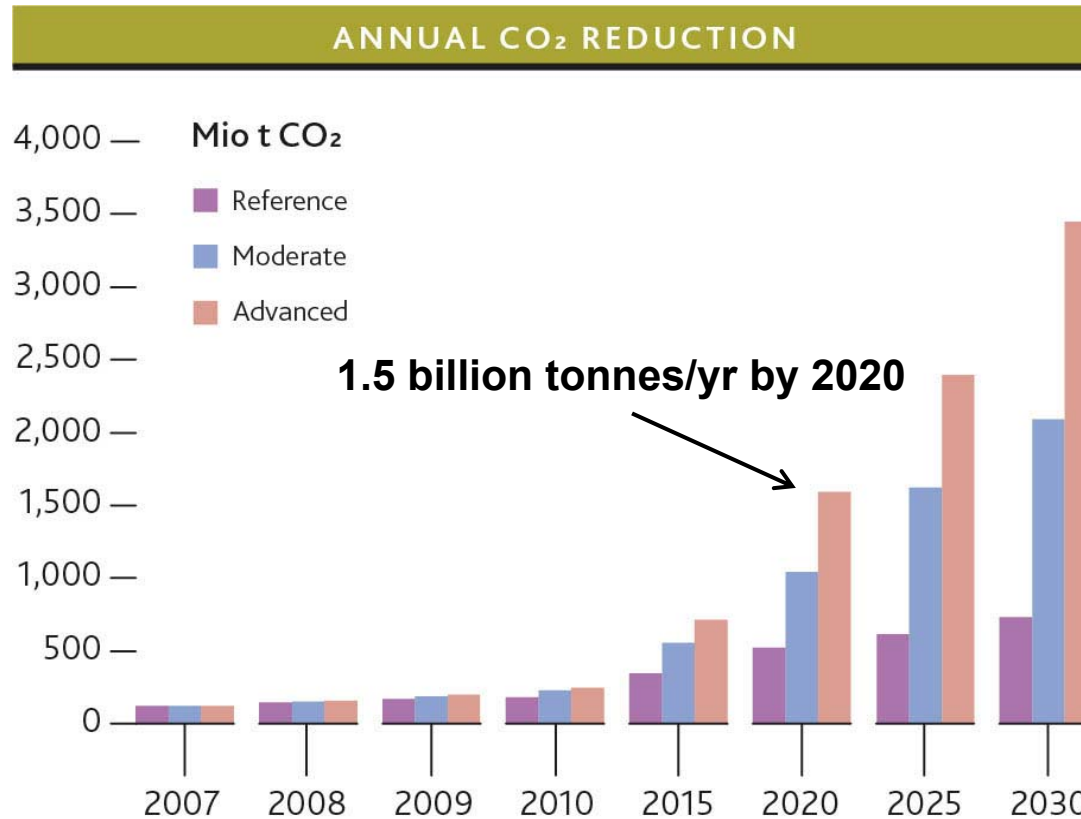


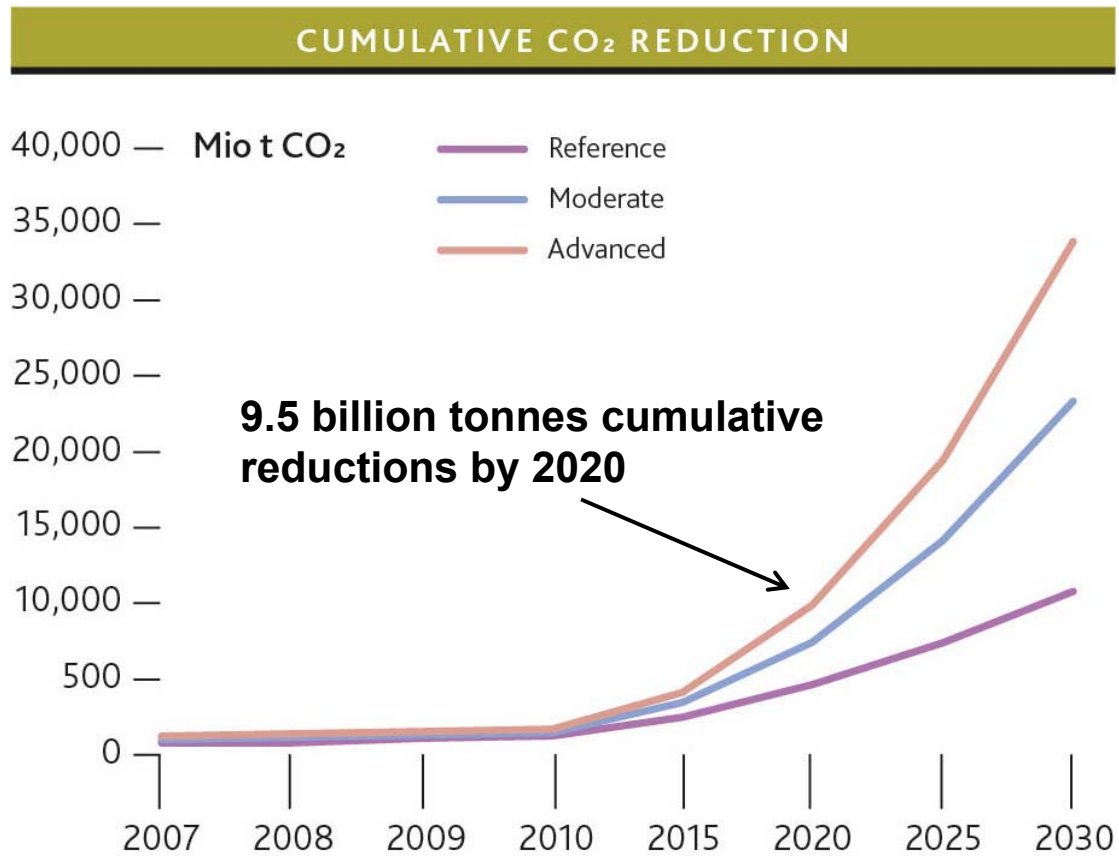
3 DIFFERENT WIND MARKET DEVELOPMENT SCENARIOS - WITH DIFFERENT WORLD ELECTRICITY DEMAND DEVELOPMENTS

		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 world's 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



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





- 1 - Imperative for global emissions peak prior to 2020;
- 2 - Power sector is largest source of emissions - 38% of CO₂, and about 25% of overall emissions;
- 3 - In practical terms, there are 3 options for making major emissions reductions in the power sector out to 2020: Efficiency; Fuel switching from coal to gas; and renewables, mostly windpower and hydro;
- 4 - Wind energy is the most cost-effective and timely option on the supply side out to 2020: 2600 Twh/year and 1.5 billion tonnes/year by 2020.
- 5 - Post 2012 carbon market design will have major impact – carbon market **necessary but not sufficient condition** to achieve rigorous climate protection objectives

Down Side

- No prospect of a more robust or more global carbon price any time soon; market uncertainty increases;
- Aggregate Annex I pledges woefully inadequate; commits us to $>3^{\circ}$ C warming; no substantial new carbon market demand;
- Europe and some developing countries moving forward, but most other major emitters in 'stall' mode;
- No clarity on financing

Bright Side

- Agreed goal of $<2^{\circ}$ C warming
- Agreement in principle for financing and technology mechanisms
- Significant steps towards CDM reform

At global level - Wind's contribution to pledges for Copenhagen

Current UNFCCC pledges

+ USA climate bill:
-17% of 2005 emissions

= aggregated Annex I pledges

12%-19% of 1990 emissions

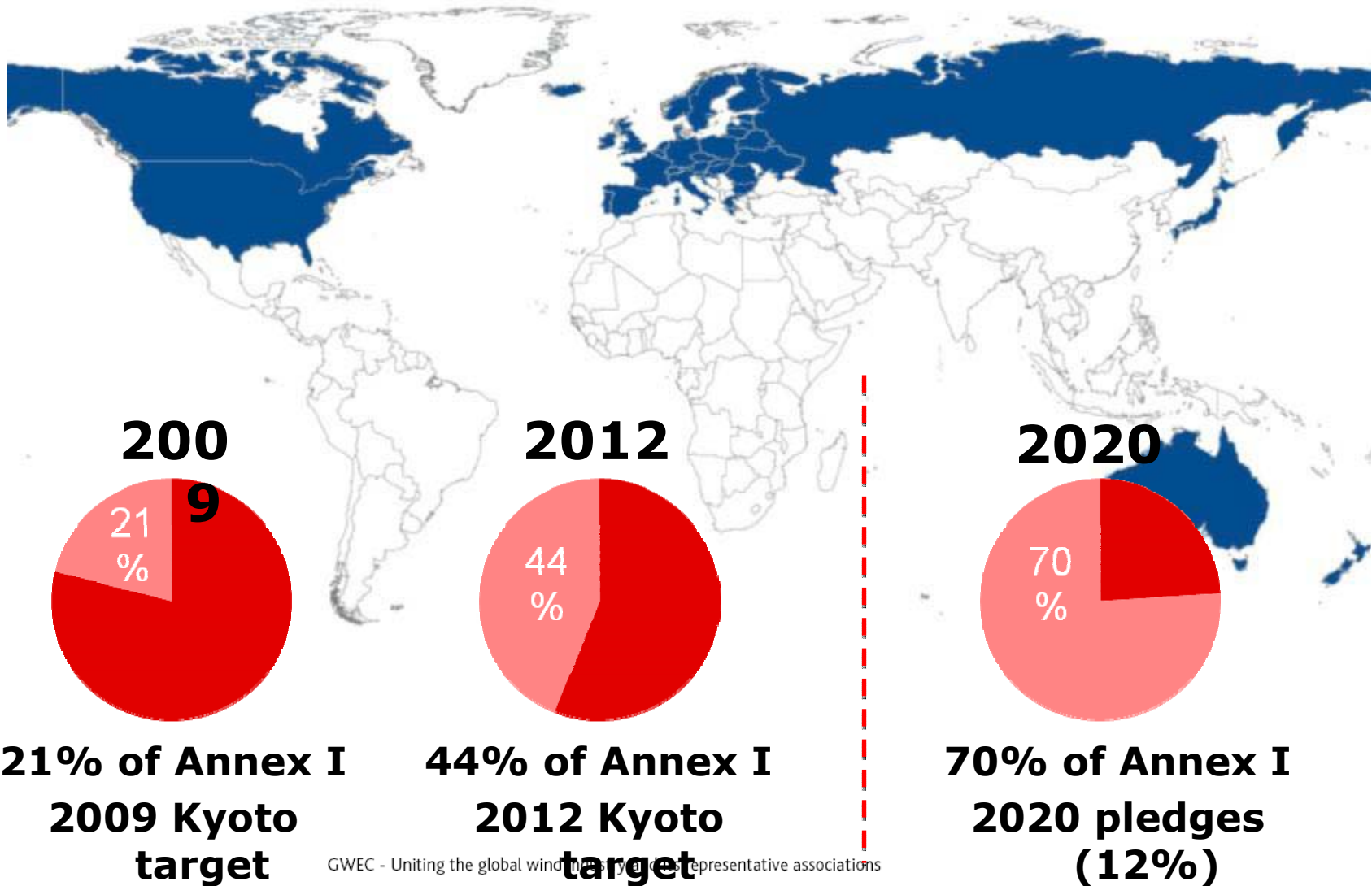
Versus Global Wind in 2020

Source: WRI and UNFCCC Secretariat

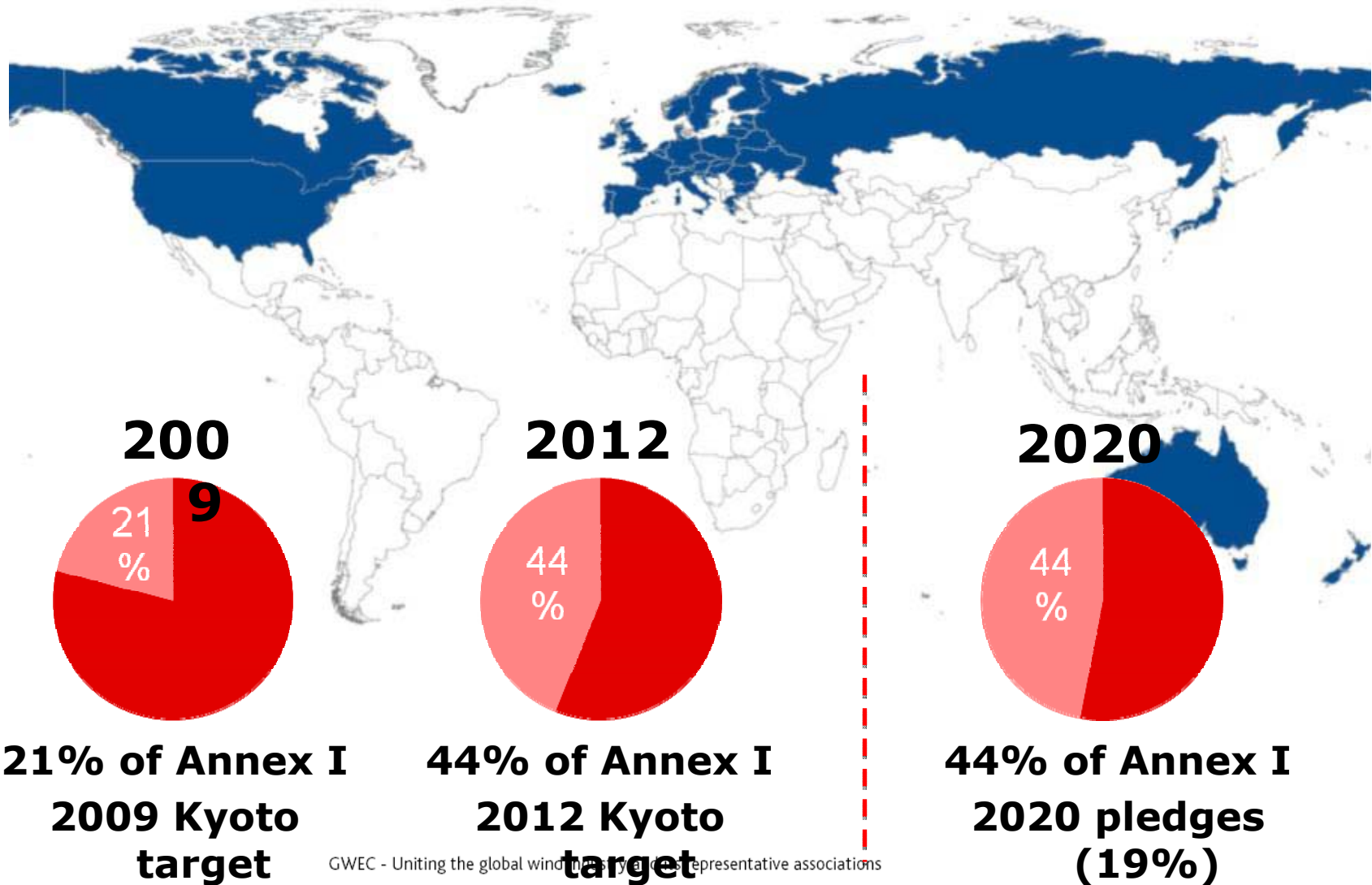
- 1081 GW installed capacity

Party	Information relating to possible QELROs	
	Range or single value by 2020, percentage	Reference year
Australia	-5% up to -15% or -25%	2000
Belarus	-5% to -10% ¹	1990
Canada	-20%	2006
European Union	-20 to -30%	1990
Iceland	-15%	1990
Japan	-15% ²	2005
Liechtenstein	-20 to -30%	1990
Monaco	-20%	1990
New Zealand	-10 to -20%	1990
Norway	-30%	1990
Russian Federation	-10 to -15%	1990
Switzerland	-20 to -30%	1990
Ukraine	-20%	1990

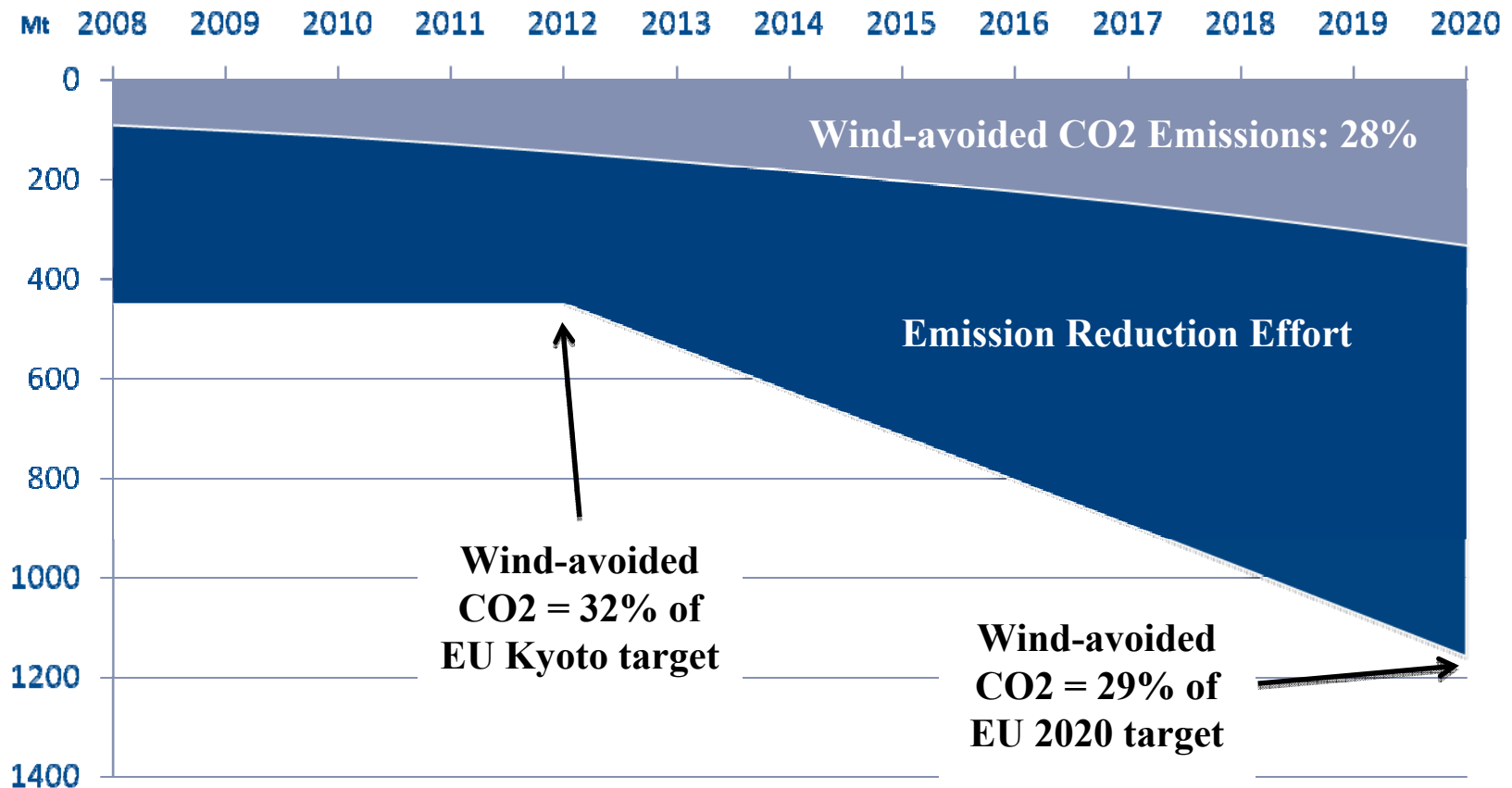
Annex I - Wind in 2020 will avoid...



Annex I countries – Wind will avoid...



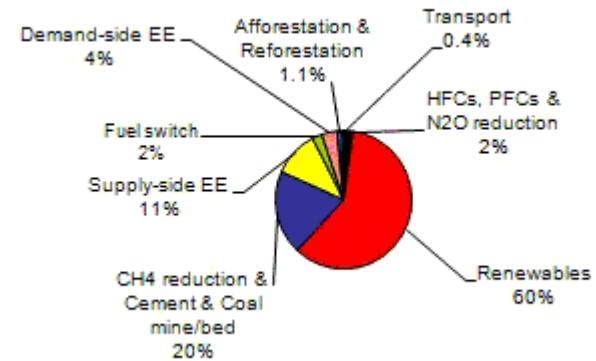
2008-2020: Wind = 28% of the EU emission reduction efforts



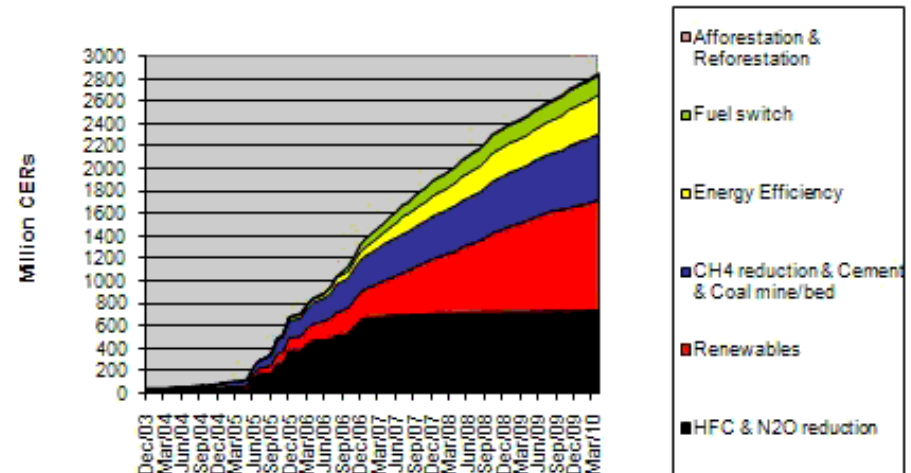
... Kyoto until 2012; and the climate package to

Wind CDM projects		
Country	Projects	MW
India	369	5904
China	470	26687
Mexico	16	1964
Brazil	10	674
South Korea	13	354
Cyprus	6	261
Egypt	4	406
Chile	6	174
Morocco	3	92
Dominican Republic	1	65
Costa Rica	2	69
Nicaragua	2	63
Philippines	1	33
Panama	1	81
Mongolia	1	50
Jamaica	1	21
Colombia	1	20
Israel	2	34
Argentina	1	11
Vietnam	1	30
Uruguay	3	74
Sri Lanka	1	10
Cape Verde	1	28
Thailand	1	3
Ecuador	1	2
Total	918	37107

Number (%) of CDM projects in each category



CERs by Project type



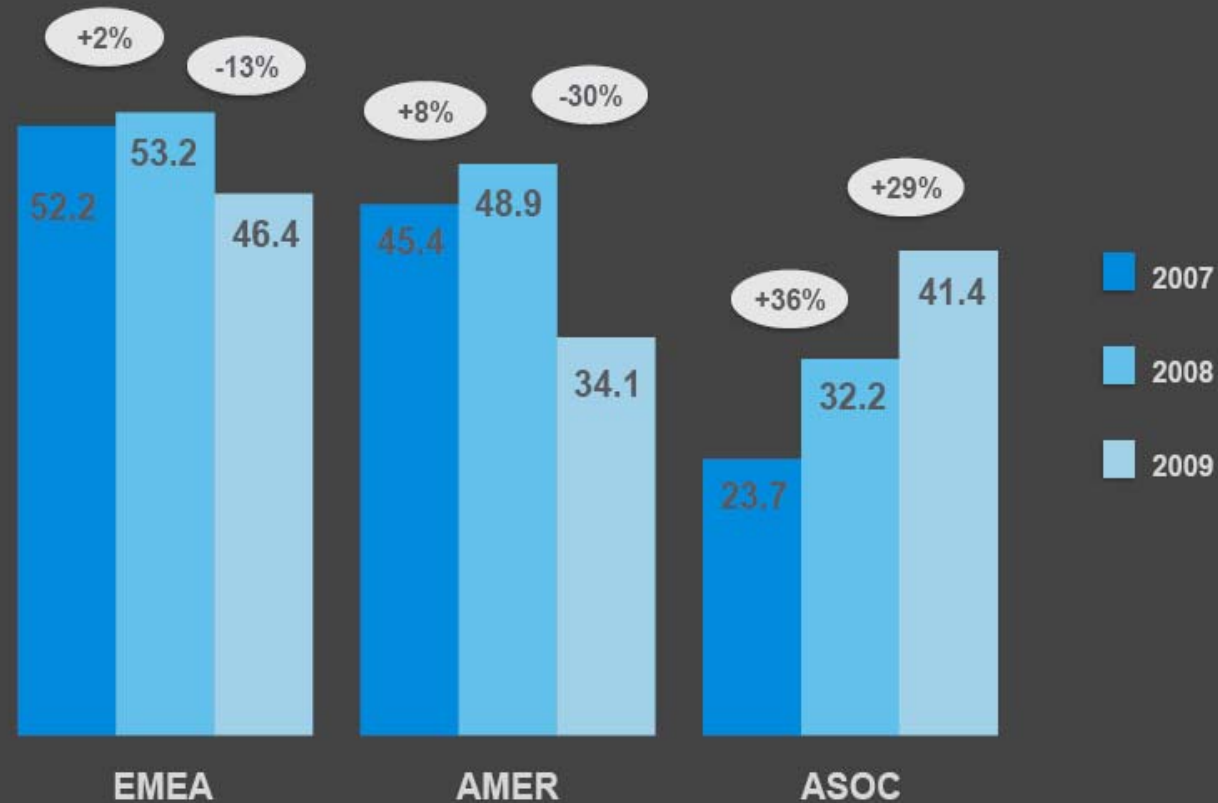
GLOBAL TOTAL NEW INVESTMENT IN CLEAN ENERGY 2004 – 2010 \$bn



Source: Bloomberg New Energy Finance

Note: Total values include estimates for undisclosed deals. Data based on estimates from industry sources.

New financial investment in clean energy by region 2007, 2008 & 2009 \$bn

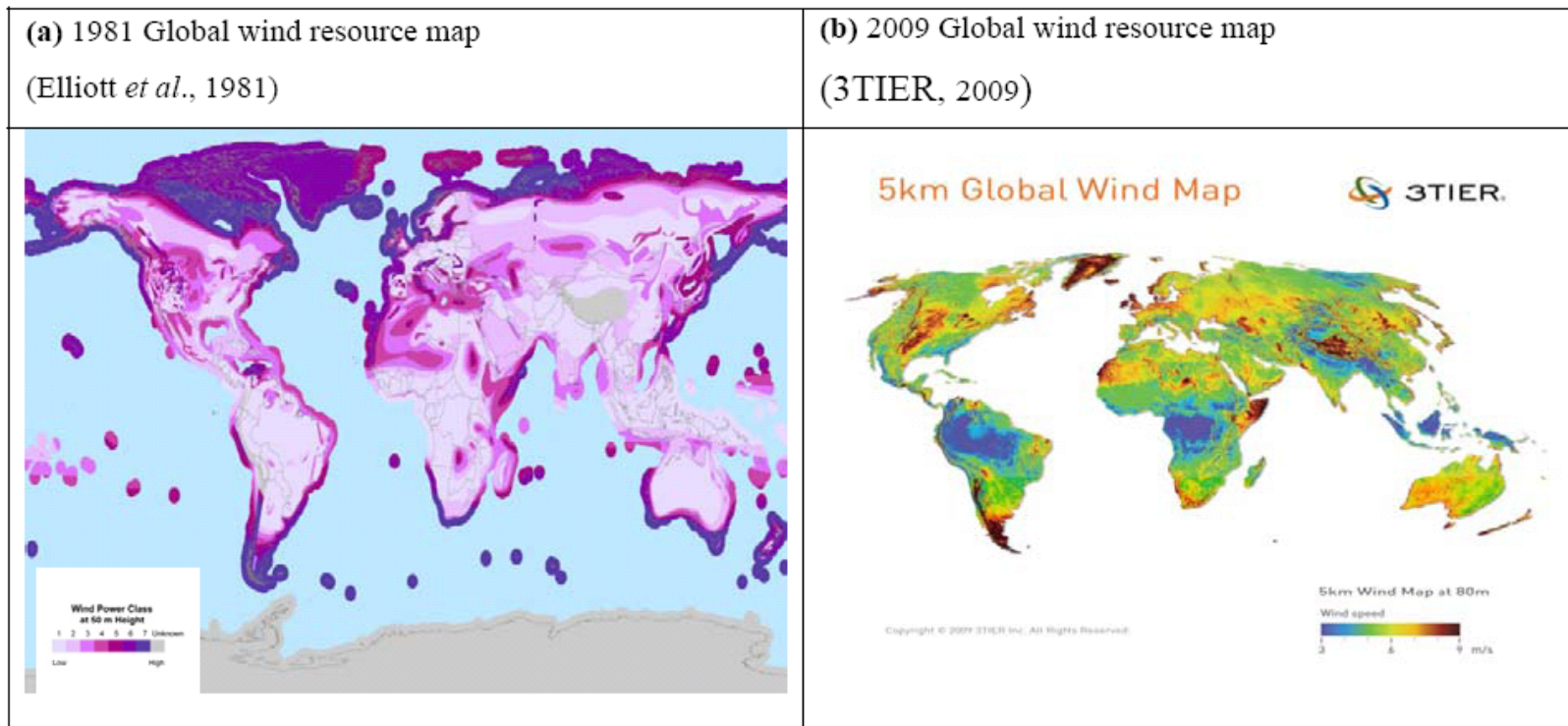


Source: Bloomberg New Energy Finance

Note: Financial sector investment only (i.e. excludes corporate and government R&D, and small distributed capacity). Not adjusted for re-invested equity. Total values include estimates for undisclosed deals.

Global Resource potentials – Resource is not a constraint

Exploitable potential around 15 times current global electricity demand...one recent assessment has it at 50 X



Lu X, McElroy MB, Kiviluoma J. 2009. Global potential for wind-generated electricity. Proceedings of the National Academy of Sciences **106**: 10933.

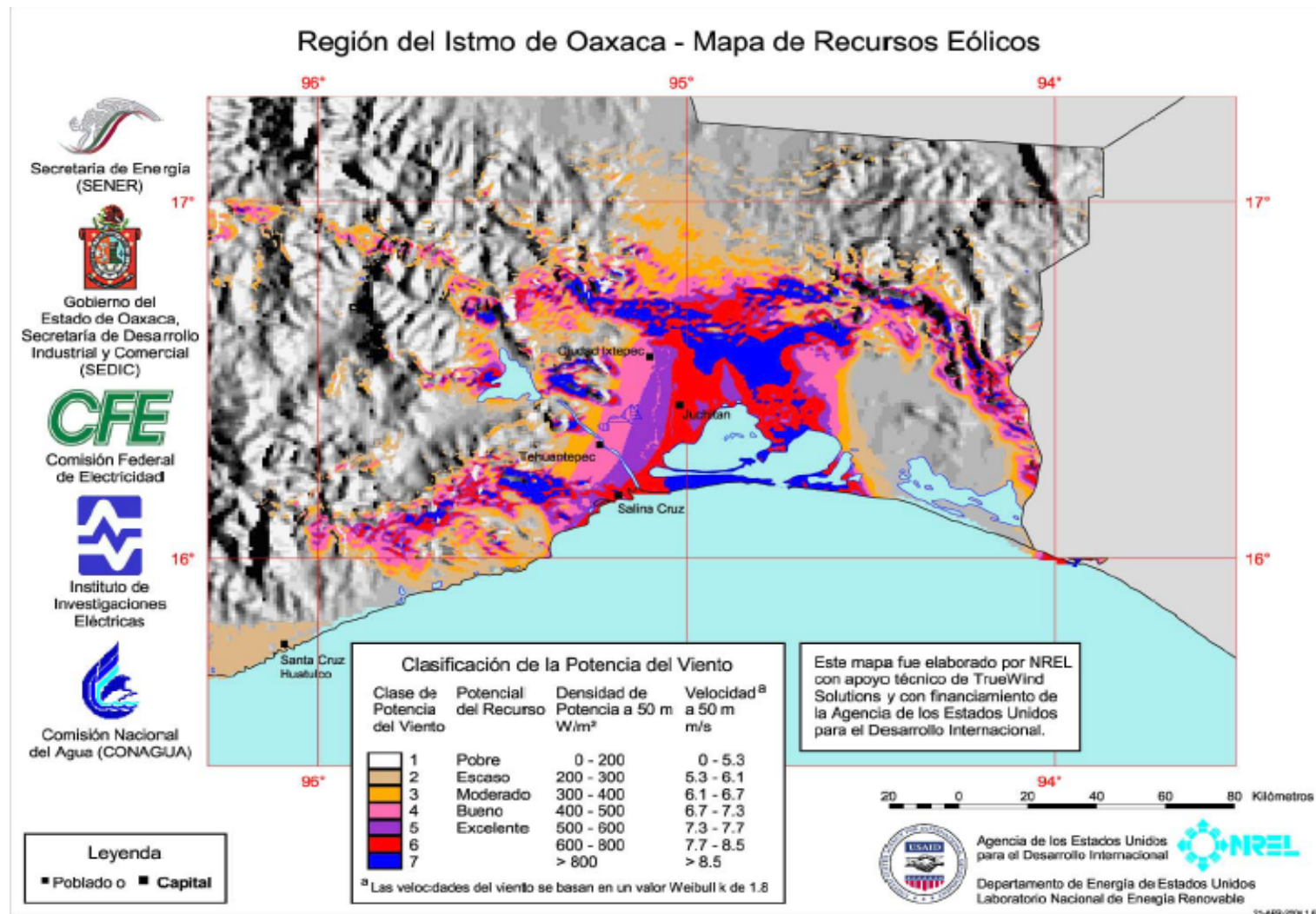
Archer CL, Jacobson MZ. 2005. Evaluation of global wind power. Journal of Geophysical Research **110**: D12110.

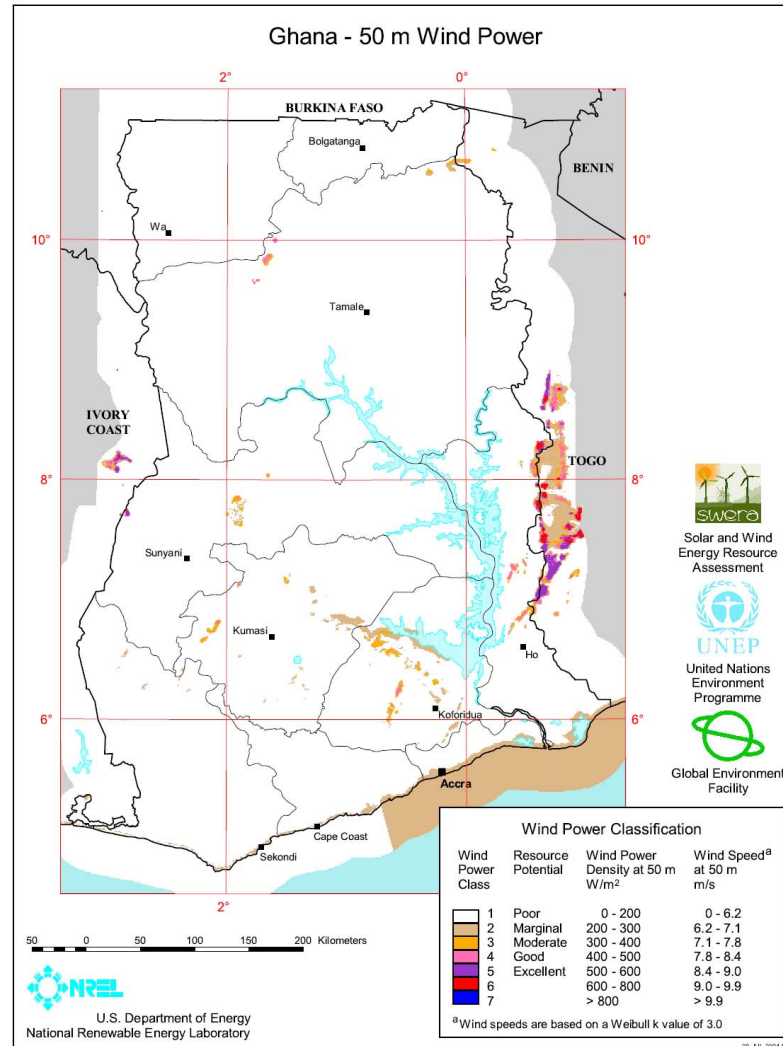
Western Europe	4-9%
North America	22-41%
Latin America	9 – 11 %
Eastern Europe and FSU	20-26%
Africa and Middle East	9-20%
Australia /Oceania	6-13%
Rest of Asia	6-12%

(Not including offshore)

Stages of assessment:

- 1) Macro scale: Based on GCMs and historical meteorological data
- 2) Meso scale – broad area wind met towers
- 3) Detailed regional assessments
- 4) Commercial – 1-2 years specific data from the site
- 5) *The more you look, the more you find***





Latin America – installed today

PAIS	MW <2008	2008	2009	2010	ACTUALES
Argentina	27	2	0	0	29
Brasil	247	97	264.0	186	794
Chile	20	0	38	46	104
Colombia	19.5	0	0	0	19.5
Costa Rica	70	0	49.5	0	119.9
Cuba	7	0	0	4.5	11.5
Ecuador	2.4	0	0	0	2
México	85	0	117.4	316	519
Nicaragua	0	0	39	23	63
Perú	0.7	0	0	0	1
Uruguay	0.7	20	0	0	21
Caribe	53	0			53
Total	533	119	507.9	576	1737

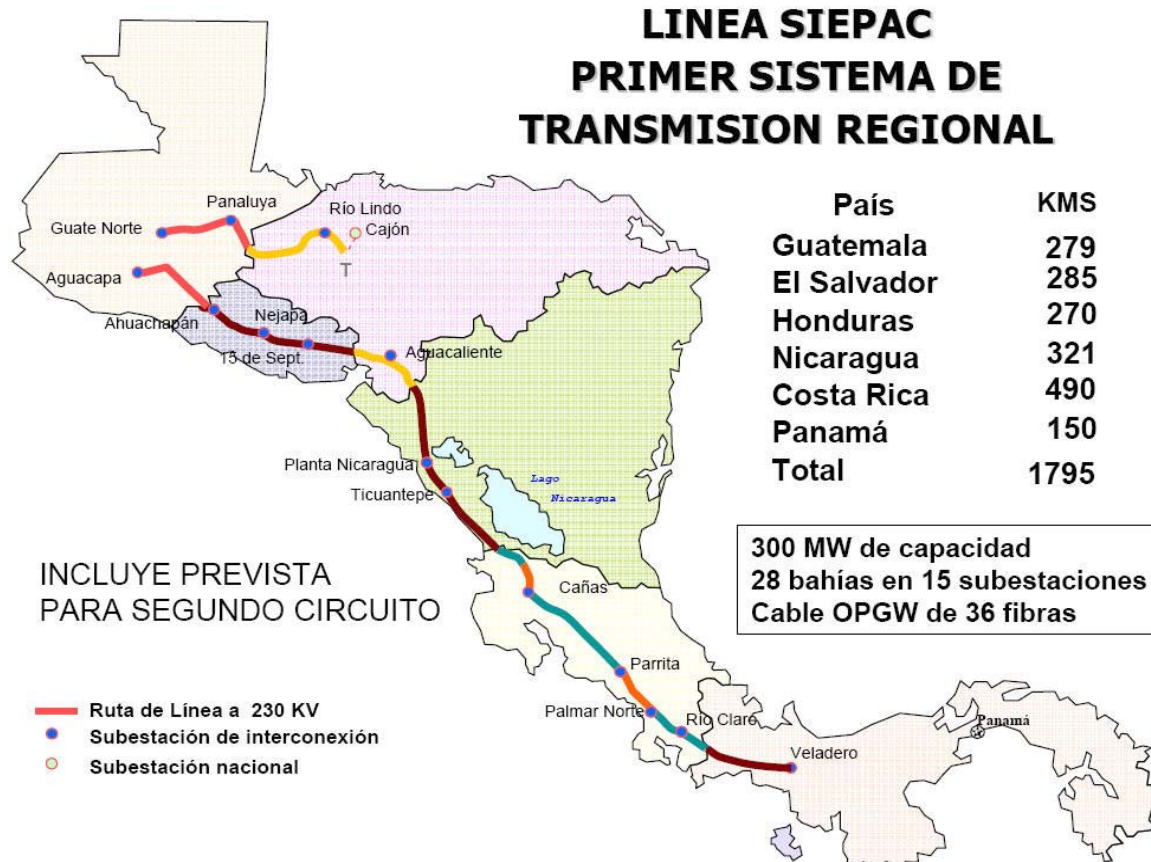
Caribe	Curacao	Guadeloupe	Jamaica		
	12	20.5	20.7		53

Country or area	Area>300w/m at 50 m	%of land area	Potential MW
Oaxaca Mexico	9,859	10.5%	49,295
Honduras	4,591	4.2%	22,955
Guatemala	3,446	3.2%	17,230
El Salvador	2,724	13.4%	13,620
Nicaragua	8,176	6.8%	40,880
Belise	737	3.2%	3,685
Costa Rica	1,647	3.3%	8,235
Cuba	4,792	2.3%	23,960
Brazil	791,697	9.3%	3,958,485
Dominican Republic	1,482	9.0%	7,410

Low system penetration for wind = Immediate Opportunity

	Population (Millions)	2008 approx. Installed Capacity (MW)	Current Wind Capacity Installed (MW)	Wind as % of Current System	New Wind Potential at 5% of System	New Wind Potential at 8% of System
Guatemala	13.0	2,243	0	0%	112	179
El Salvador	7.0	1,444	0	0%	72	116
Honduras	7.0	1,747	0	0%	87	140
Nicaragua	5.9	826	40	5%	1	26
Costa Rica	4.4	2,306	118	5%	-3	66
Panama	3.3	1,740	0	0%	87	139
	40.6	10,306	158	1.5%	357	666

SIEPAC will help to integrate the region



- i 1,795 km of high voltage network
- i From Mexico to Panama
- i Managed and regulated by regional body
- i Ready in 2009/10

Africa – installed today

Africa	<2008	2009 Market	2009 Cumulative
Egypt	365.00	65.00	430.00
Morocco	134.00	119.00	253.00
Tunisia	20.00	34.00	54.00
Nigeria	1.00	0.00	1.00
Cape Verde	12.00	0.00	12.00
South Africa	8.36	0.00	8.36
Kenya	0.00	5.10	5.10
Lebanon	0.50	0.00	0.50
Jordan	2.00	0.00	2.00
Total	542.86	223.10	765.96

Africa - Projects Under Development

Project	Capacity (MW)	Country
Lake Turkana	300	Kenya
Ashegoda	120	Ethiopia
Singida	210	Tanzania
Confidential	~ 200MW	Djibouti
Various	~ 300MW	Kenya
Ngong II	10	Kenya
Sinohydro/EEPCo	102	Ethiopia

Country or area	Area > 300w/m ² at 50 m	% of land area	Potential MW
Ghana	1,135	0.5%	5,675
Ethiopia	80,225	7.0%	401,125
Kenya	41,400	7.3%	207,000

SWERA

RE Target: 25% by 2025 - *The wind energy industry proposes delivering 30,000 MW or 80 TWh by 2025 (equivalent to 20% of the country's forecast energy demand by 2025. **Commercial potential ~70GW;***
6,000 MW of wind by 2015 – *could be accommodated by existing grid infrastructure;*

Government should - *set targets, provide regulatory certainty and ensure grid access - immediately stimulating the growth of the industry, and creating up to 40,000 jobs, 12,000 of which are in rural areas;*

Benefits –

Saving 80 billion litres of water per year

Significant GHG reductions

Stable and predictable price of electricity

Attract tens of billions of dollars of investment in an indigenous energy source, the benefits of which would stay in South Africa

Country or area	Area>300w/m ² at 50 m	%of land area	Potential MW
East Areas of China	650,138	24.3%	3,250,690
Sri Lanka	12,284	18.5%	61,420
Bangladesh	218	0.2%	1,090
Nepal	7,625	5.2%	38,125
Vietnam	128,340	39.5%	641,700
Cambodia	6,500	3.6%	32,500
Laos	45,563	19.8%	227,815
Thailand	38,098	7.4%	190,490
Armenia	2,205	7.8%	11,025
Pakistan	69,862	10.8%	349,310
Afghanistan	76,205	9.8%	381,025
Philippines	11,052	3.7%	55,260
Mongolia	160,641	40.0%	803,205

1 – Targets sending clear signal - MW or %

- a) meet the target;
- b) attract investment;
- c) build an industry;

2 – Clear pricing support - two objectives:

- attract investment
- lower cost of capital

3 – Planning/Administrative Procedures

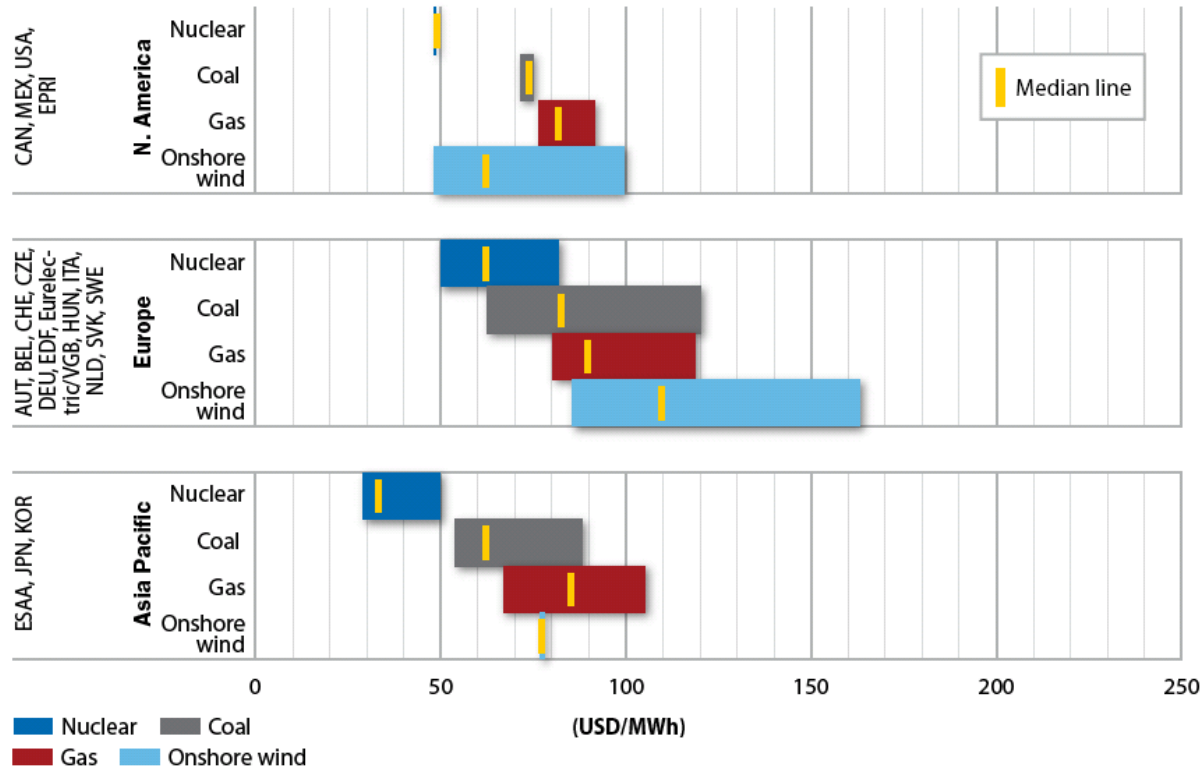
Clarity and transparency most important

4 – Priority Access to Grid – *incentives and penalties for Grid operators*

5 – Social and Environmental issues: *active programme to ensure acceptance and sustainability*

The Mainstream

Figure ES.1: Regional ranges of LCOE for nuclear, coal, gas and onshore wind power plants
(at 5% discount rate)



“If *Projected Costs of Generating Electricity* is any indication, the future is likely to see healthy competition between these different technologies... Environmental policy will also play an increasingly important role that is likely to significantly influence fossil fuel costs in the future and the relative competitiveness of various generation technologies...” – IEA, Mar 2010

Thank you

GWEC
GLOBAL WIND ENERGY COUNCIL

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

Steve Sawyer
Secretary General
Global Wind Energy Council
Tel +32 2 400 1030
steve.sawyer@gwec.net
www.gwec.net