



***8<sup>th</sup> South East Europe Energy Dialogue***  
***The New Energy Mix***  
**Macedonia Palace Hotel**  
*Thessaloniki, June 11<sup>th</sup> & 12<sup>th</sup>, 2014*

**Panagiotis Papastamatiou**

**WIND ENERGY DEVELOPMENT  
IN GREECE AND ABROAD**



## RES investments in Greece, within the period of crisis

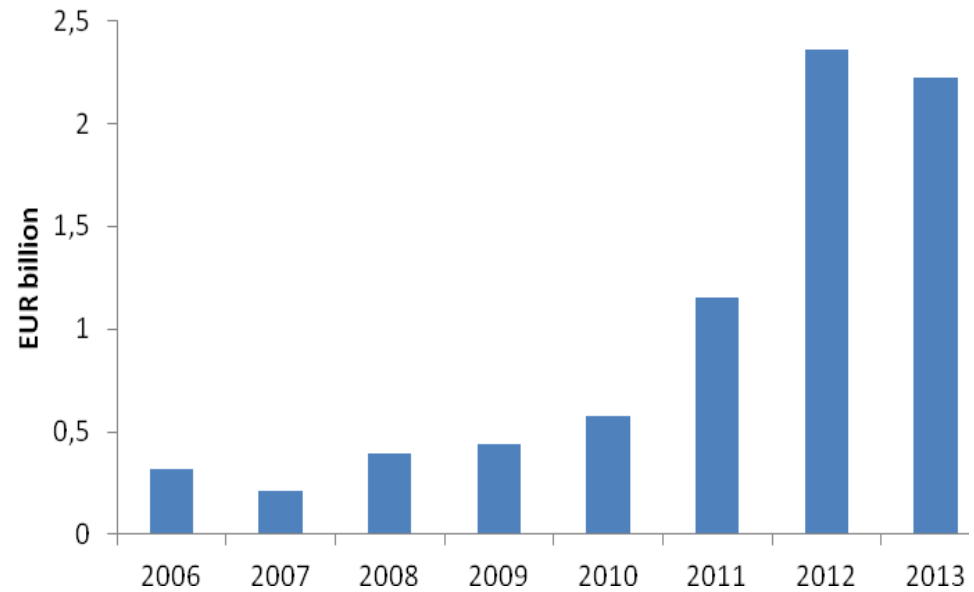
*Crisis? Which crisis?*

2011: Record year for  
wind energy

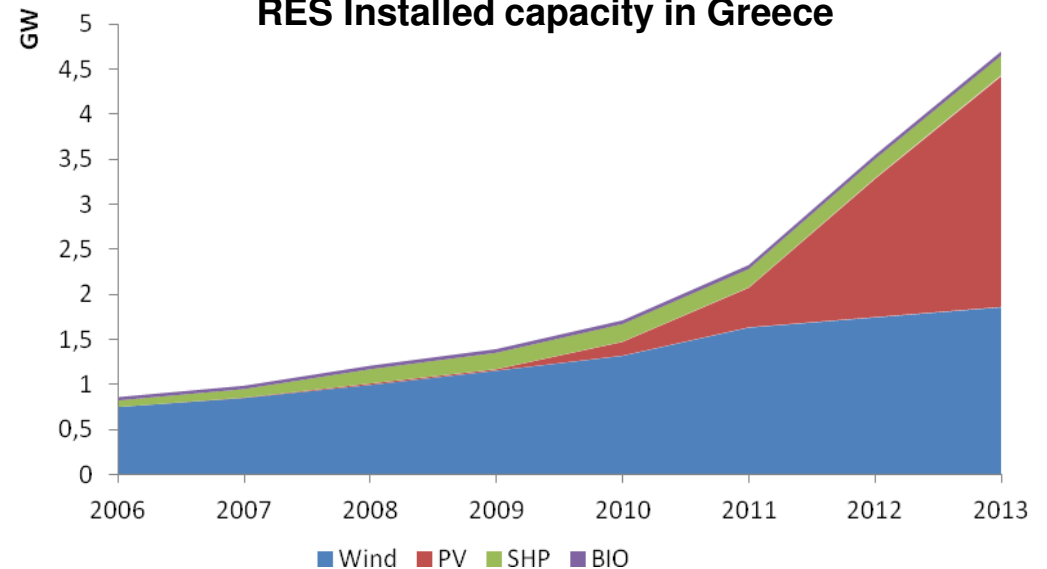
2012-2013: Two record years  
for PVs

Investments of more than 6,5  
bn€ in RES within the period  
of crisis

### Annual investment in RES in Greece



### RES Installed capacity in Greece

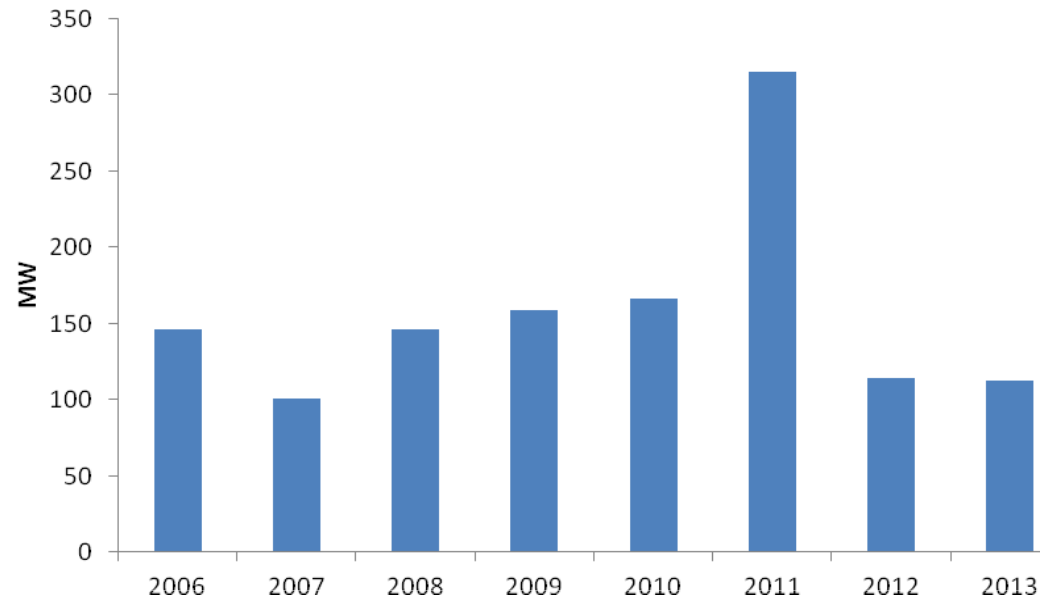


## .... what about Wind Energy?

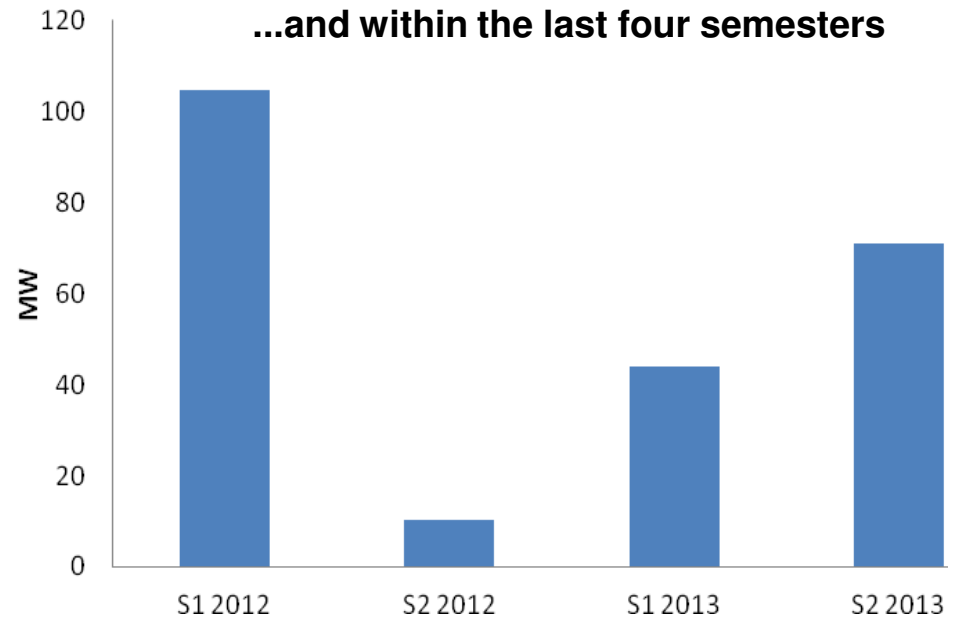
After the 2011 record year....

2012 and 2013 wind energy returned to its 10-year average....

### New wind capacity in Greece (2006-2013)



### ...and within the last four semesters

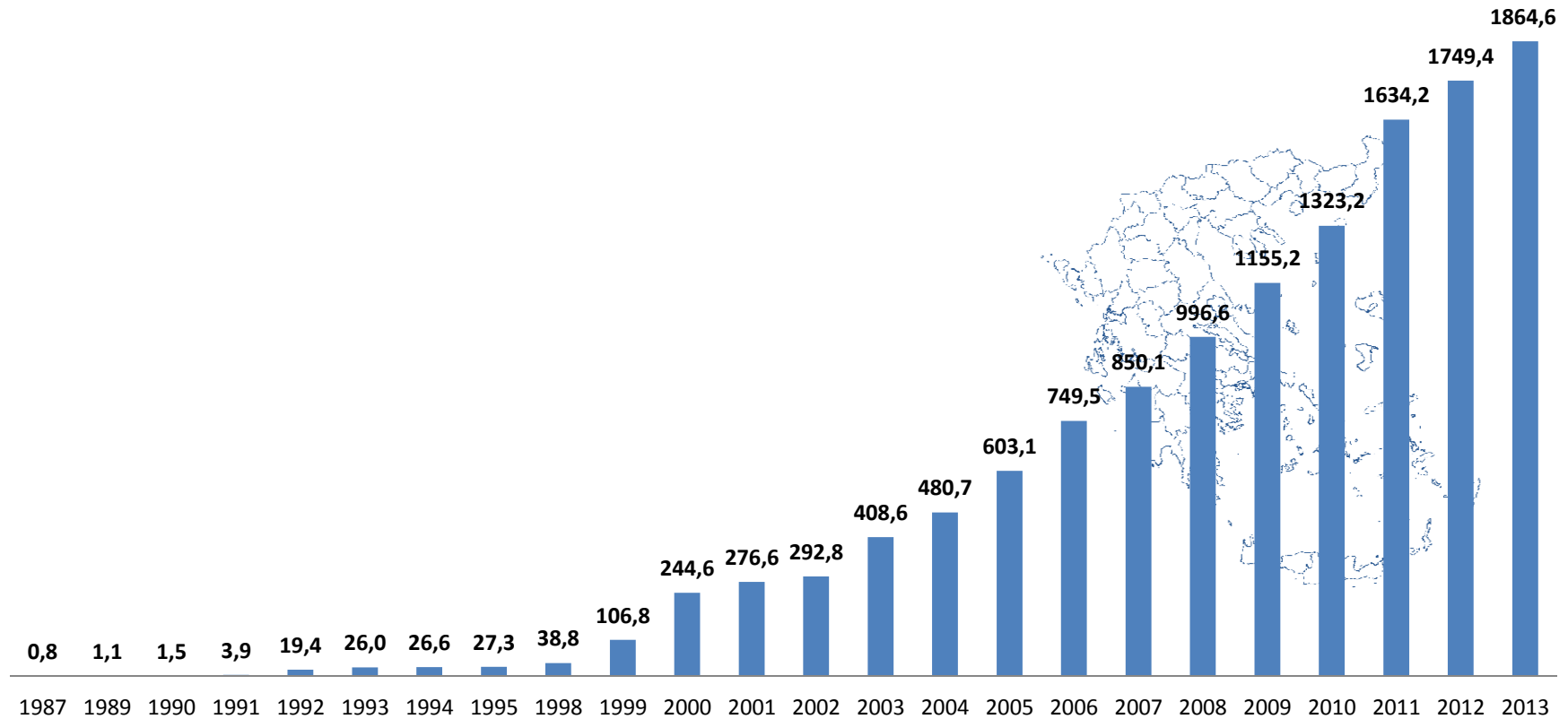




## HWEA Wind Energy Statistics 2013



### Total installed MW per year



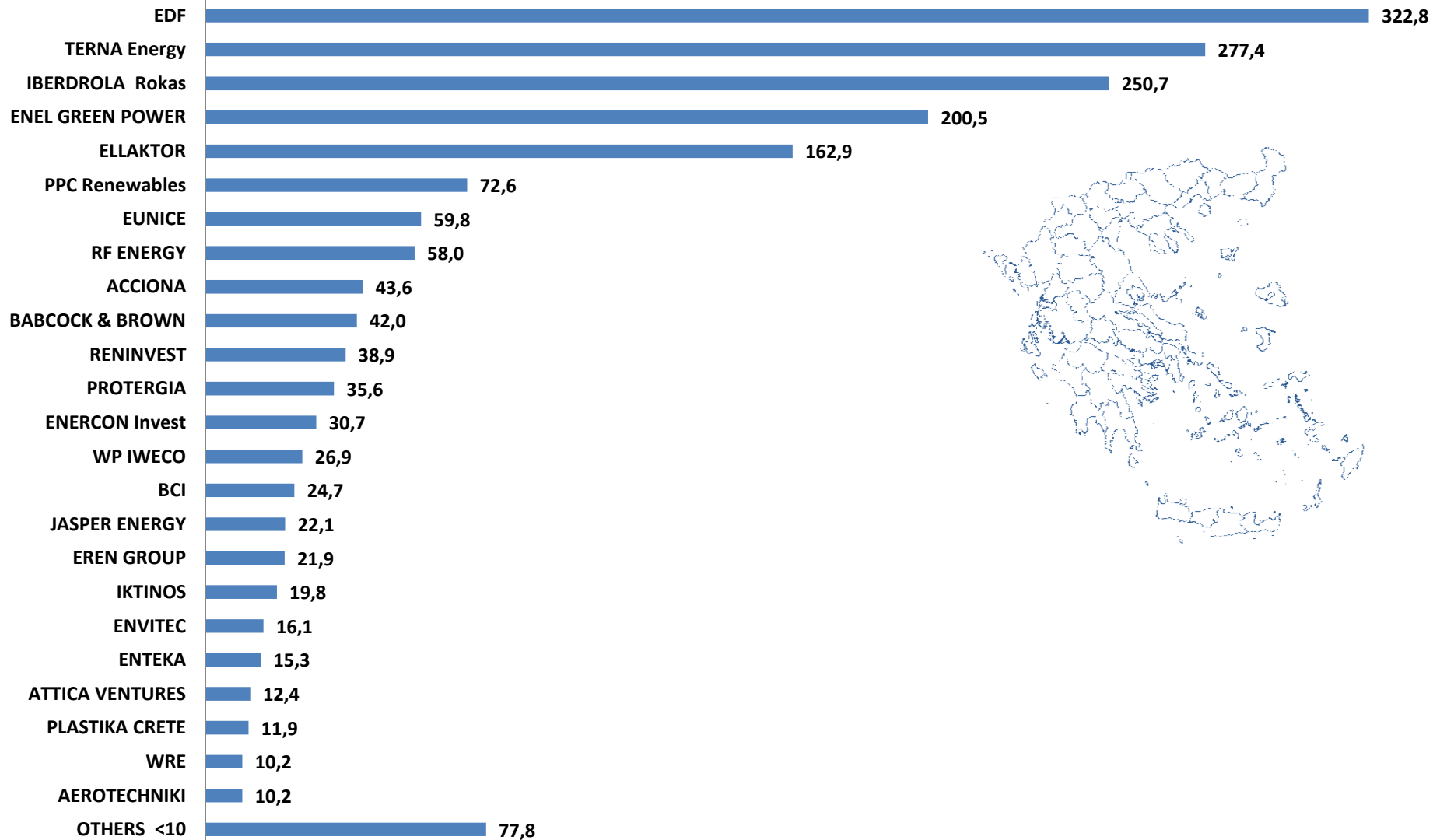
*The HWEA Wind Energy Statistics take into account the wind capacity which is in commercial or test operation in Greece and it is based on sources from the market actors.*



# HWEA Wind Energy Statistics 2013



## Installed MW per wind energy producer

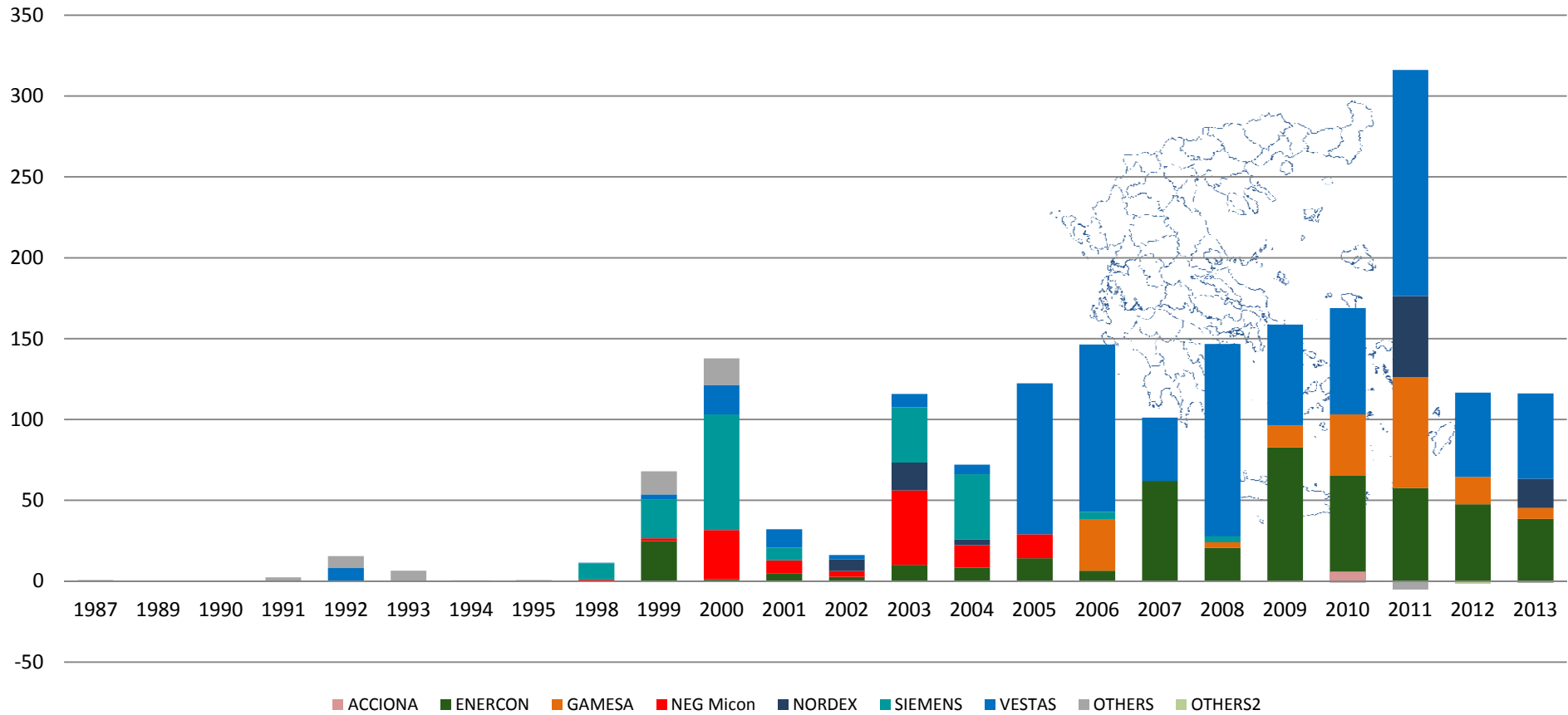




# HWEA Wind Energy Statistics 2013



## Installed MW per year per manufacturer

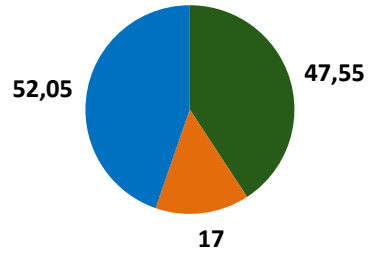




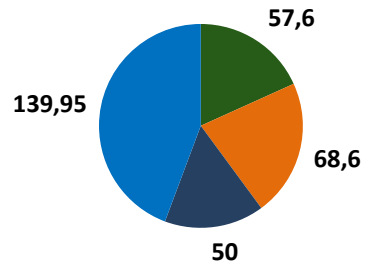
# HWEA Wind Energy Statistics 2013



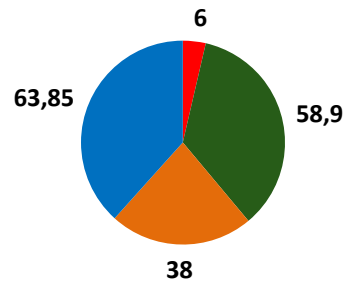
2012 : 116,6MW



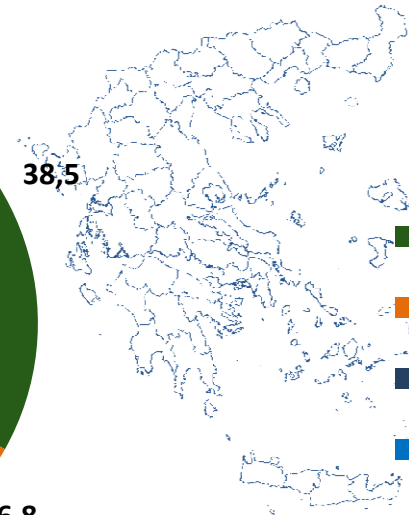
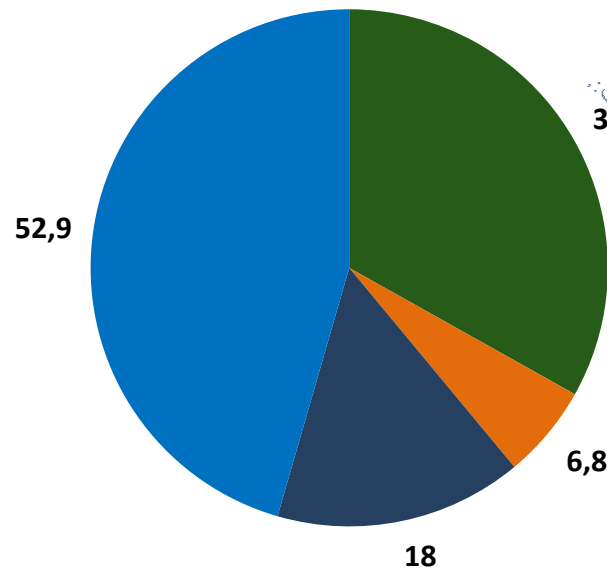
2011 : 316,15MW



2010 : 168,85MW



2013 Installed MW per manufacturer  
(total new capacity 116,2 MW)

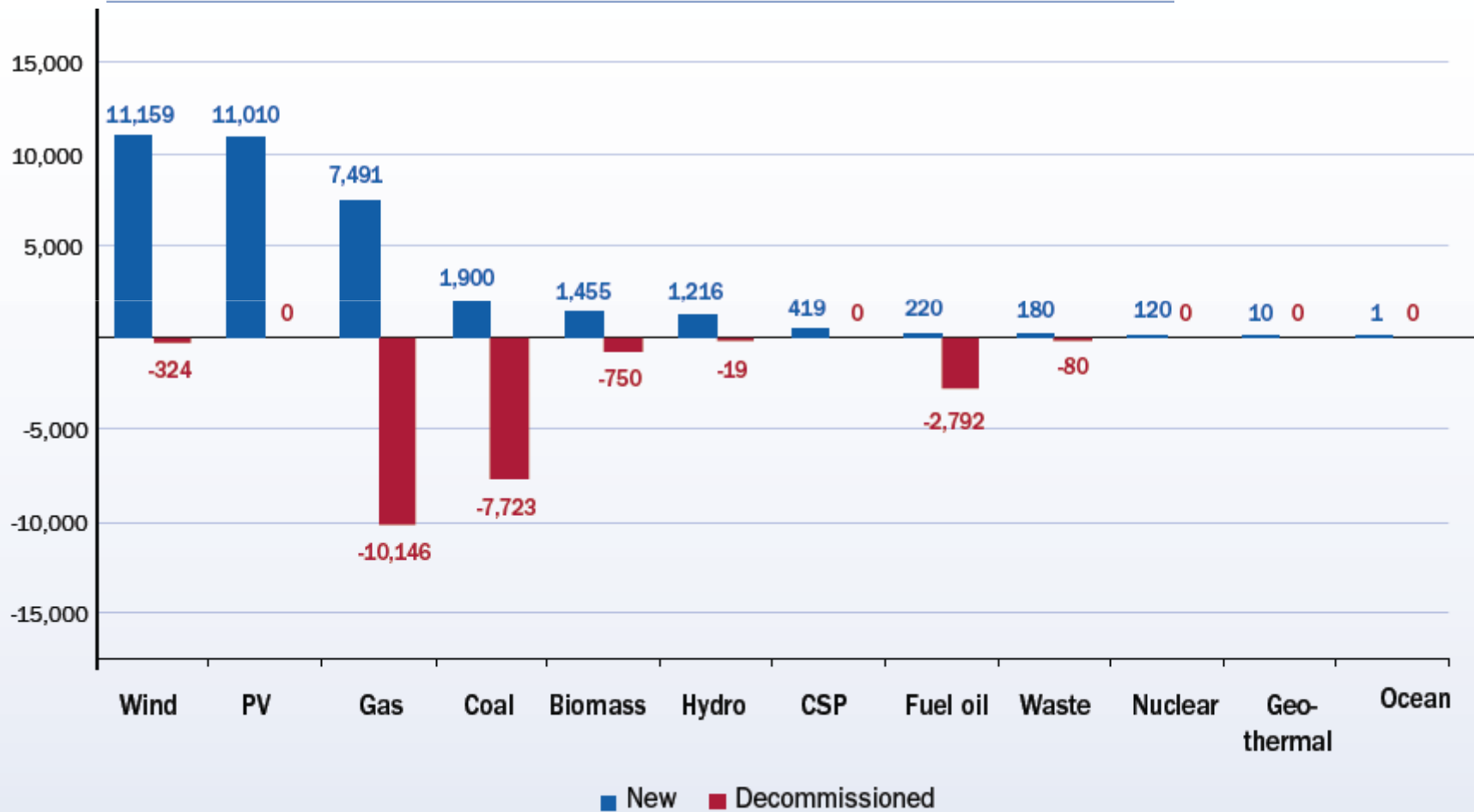


- ENERCON
- GAMESA
- NORDEX
- VESTAS



## In Europe, Renewable continued substituting fossil fuels by 2013

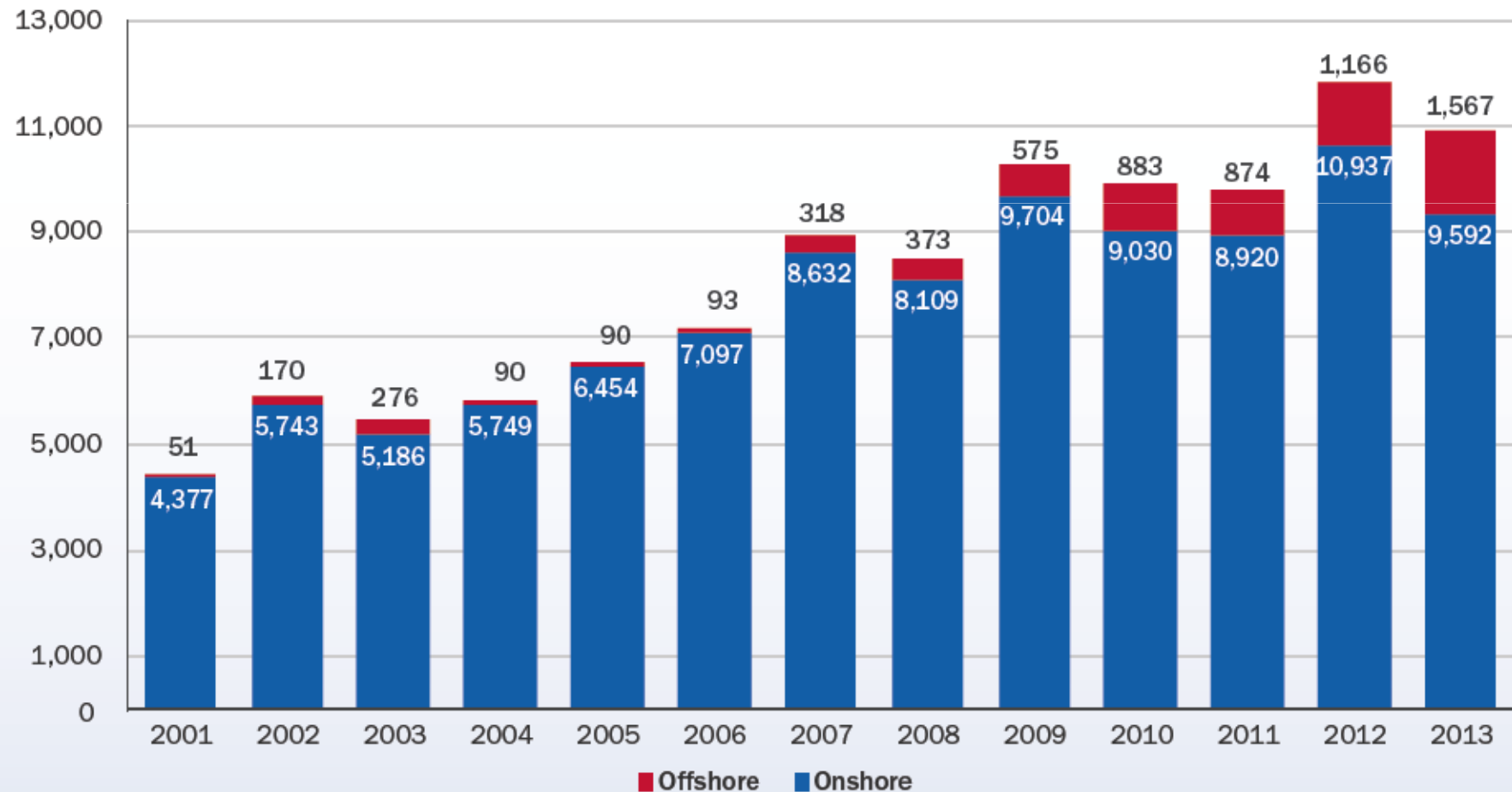
2013: NEW INSTALLED POWER CAPACITY AND DECOMMISSIONED POWER CAPACITY IN MW





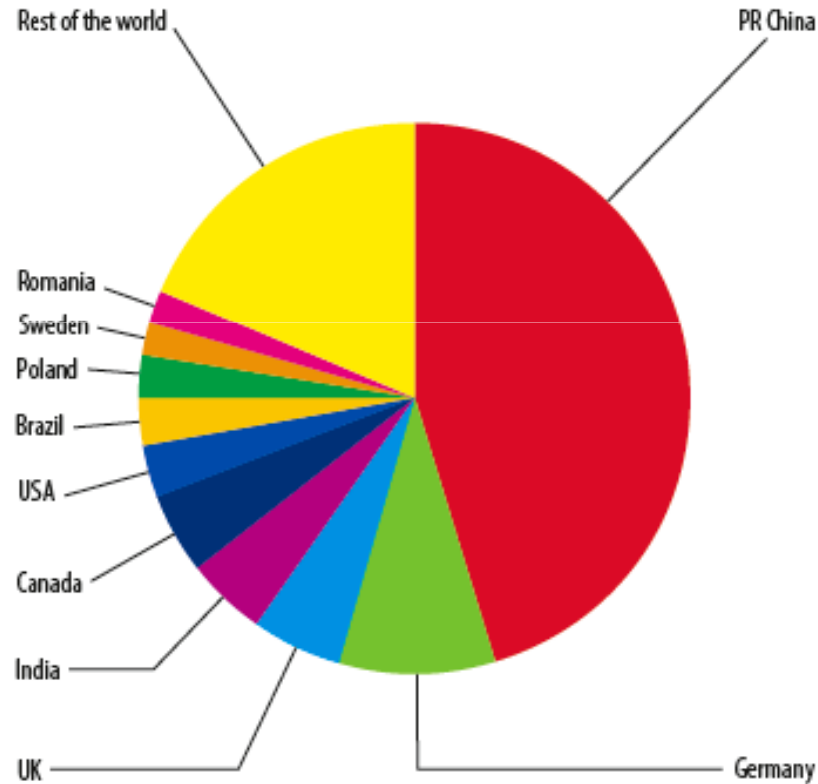
Offshore wind parks have been the 15% of the onshore ones, by 2013

ANNUAL ONSHORE AND OFFSHORE INSTALLATIONS (MW)



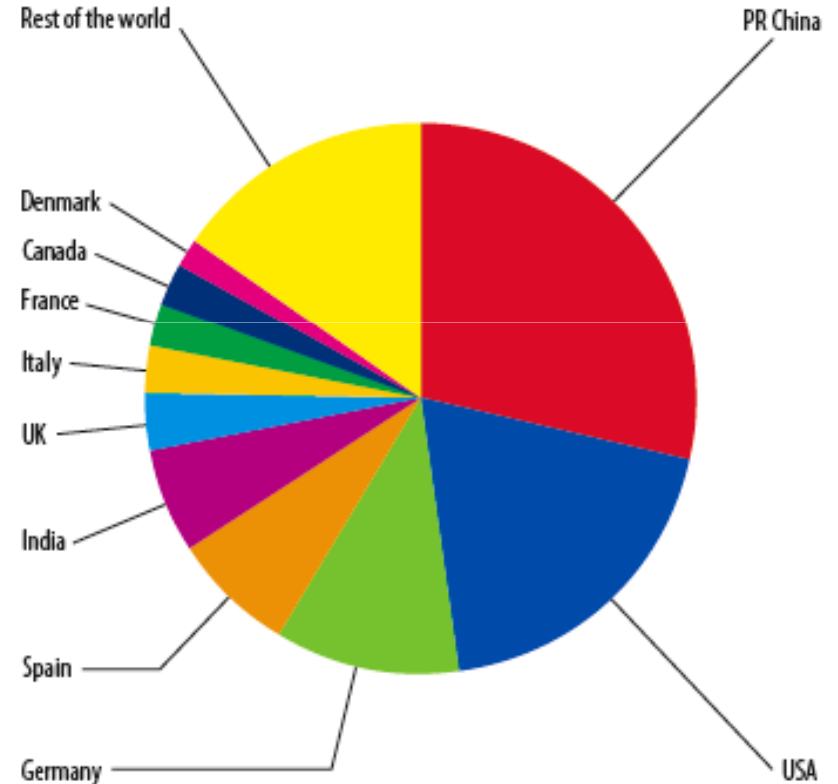
Worldwide, China is the pioneer in wind energy with the 45,4% of the installations by 2013

TOP 10 NEW INSTALLED CAPACITY JAN-DEC 2013



Country	MW	% SHARE
**PR China	16,100	45.4
Germany	3,238	9.1
UK	1,883	5.3
India	1,729	4.9

TOP 10 CUMULATIVE CAPACITY DEC 2013



Country	MW	% SHARE
** PR China	91,424	28.7
USA	61,091	19.2
Germany	34,250	10.8
Spain	22,959	7.2

**THE ECONOMIC  
COMPETITIVENESS OF WIND  
ENERGY**

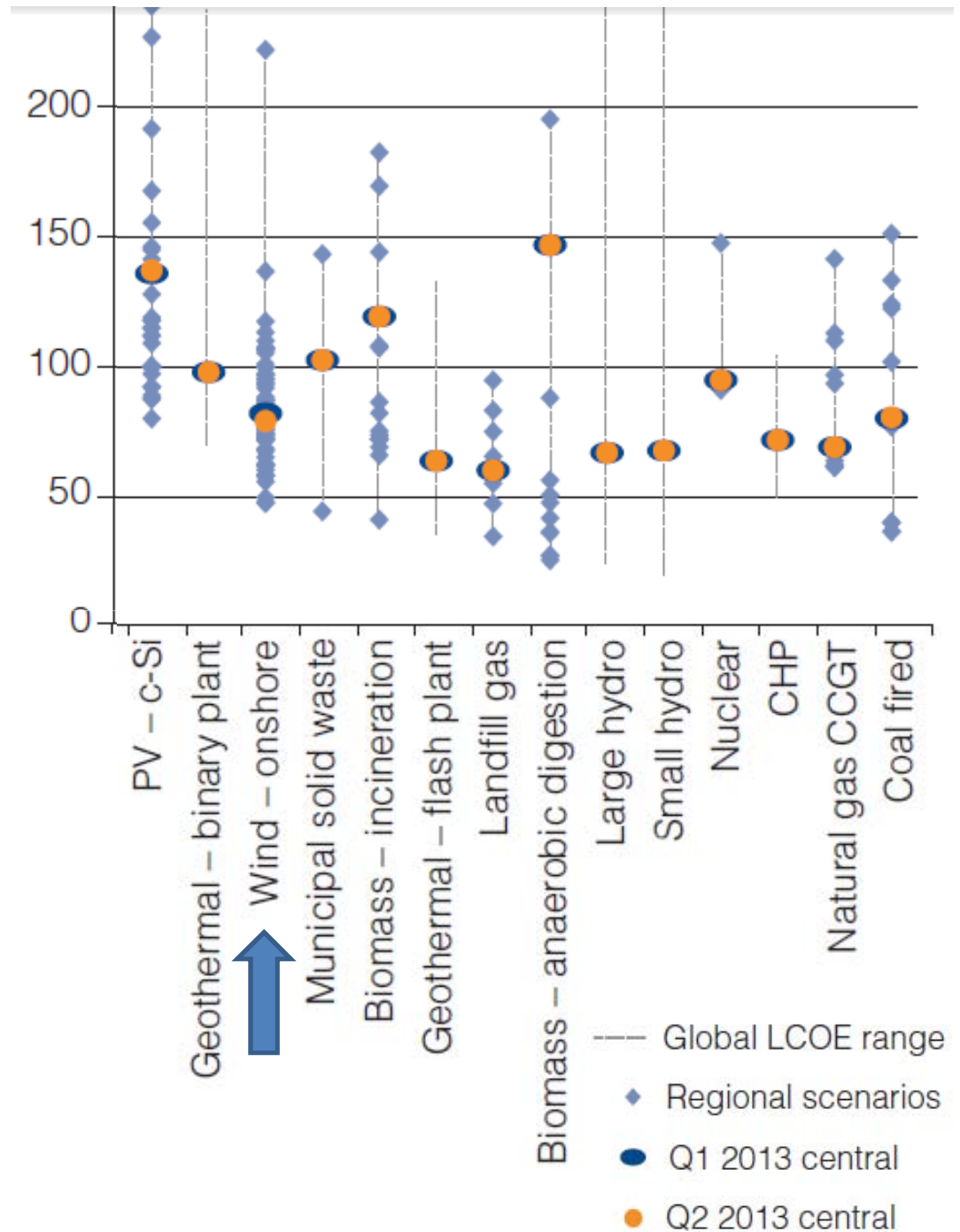
**CURRENT SITUATION AND  
TRENDS**

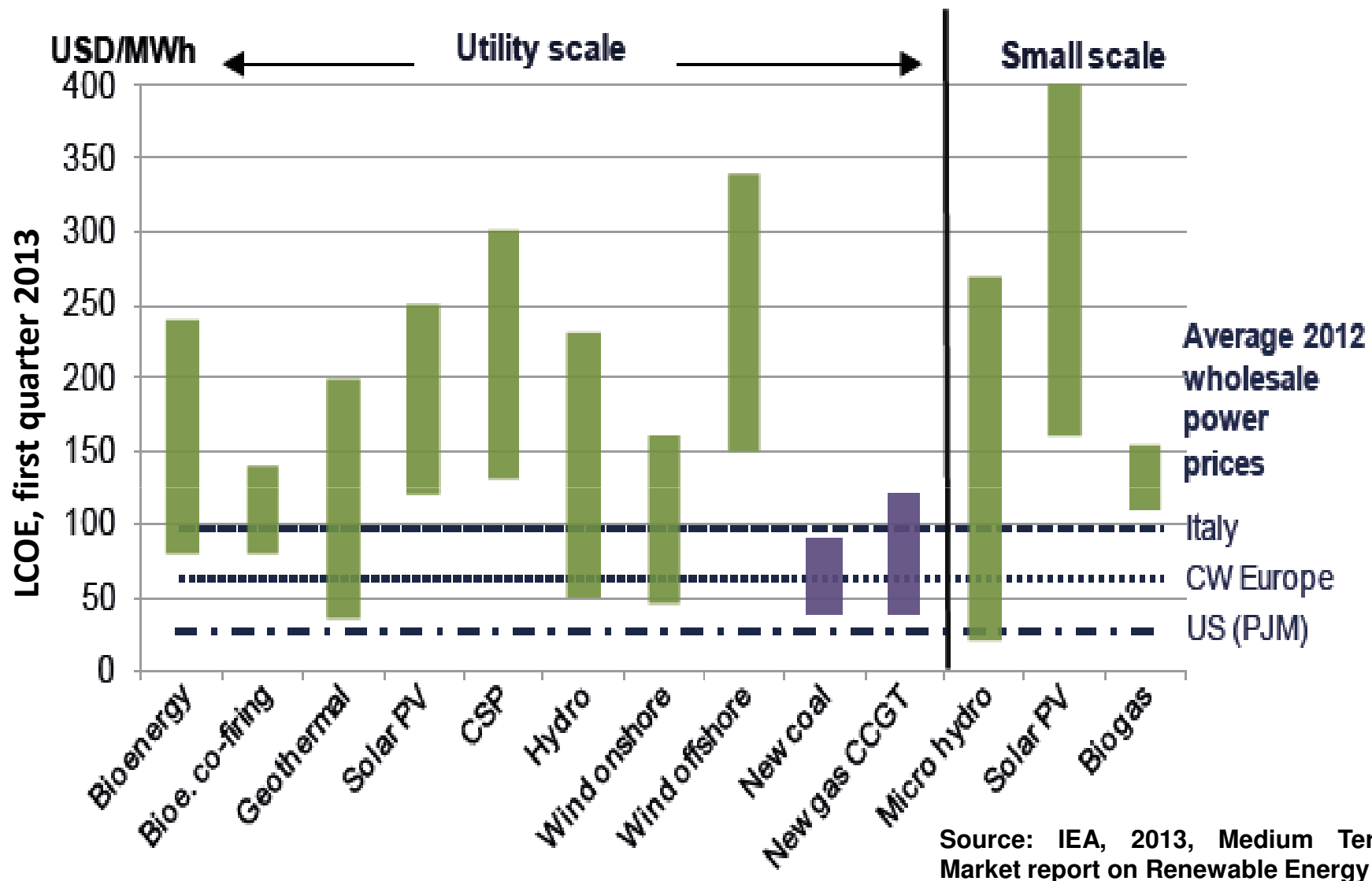


Worldwide, wind energy is cheap and competitive

In the sites with excellent wind potential, LCOE reached 50 USD/MWh by 2<sup>nd</sup> semester of 2013

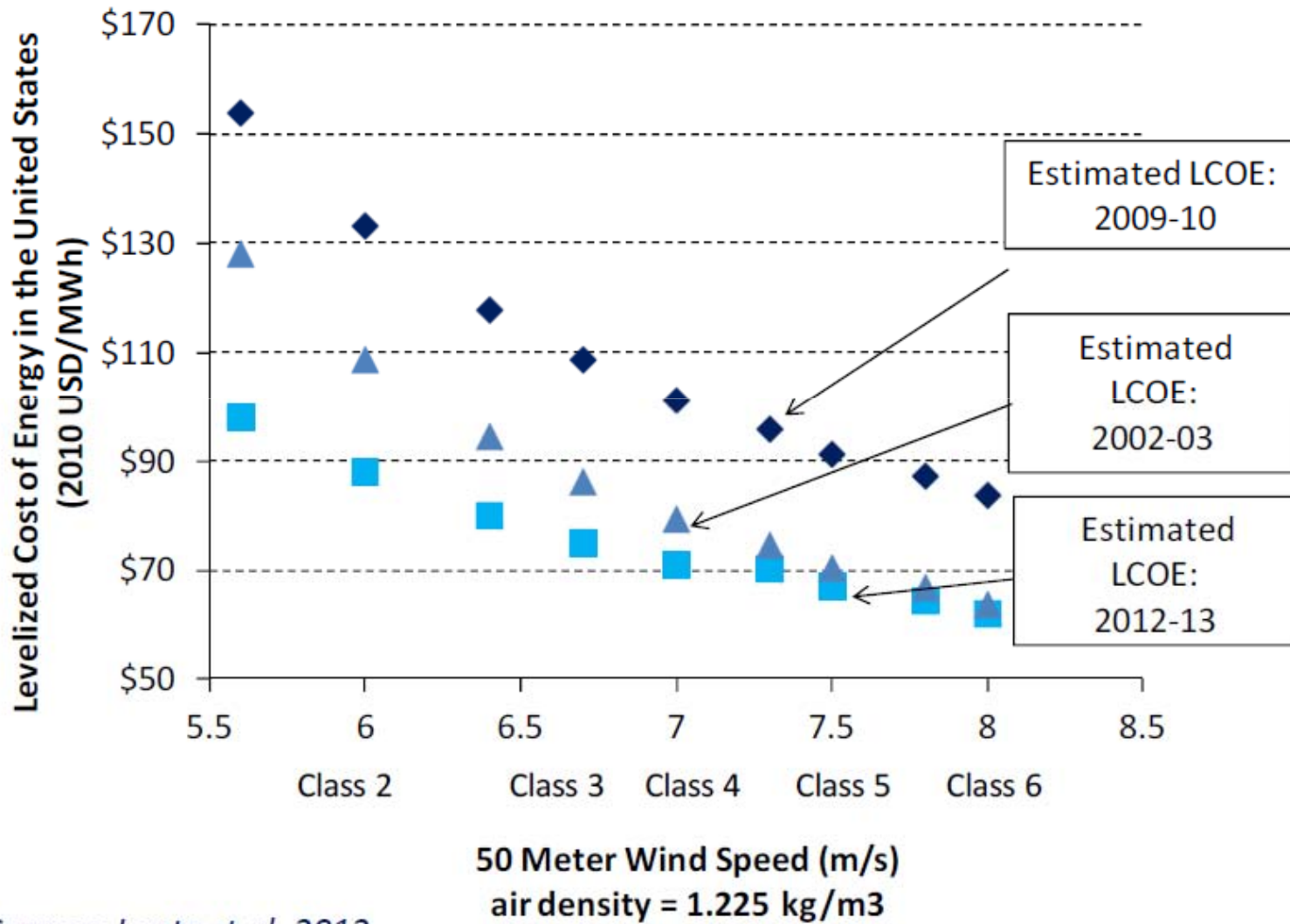
Source: Bloomberg New Energy Finance





Notes: MWh = megawatt hour; CCGT = combined cycle gasification turbine. Costs are indicative and ranges reflect differences in resources, local conditions and the choice of sub-technology. Wholesale power prices are expressed as the annual average of daily traded, day-ahead base-load power prices. CW Europe refers to annual average of power prices in France, Germany, Austria and Switzerland. United States (US) PJM refers to the regional transmission organisation covering parts of 13 states in the mid-Atlantic and mid-west portion of the United States.

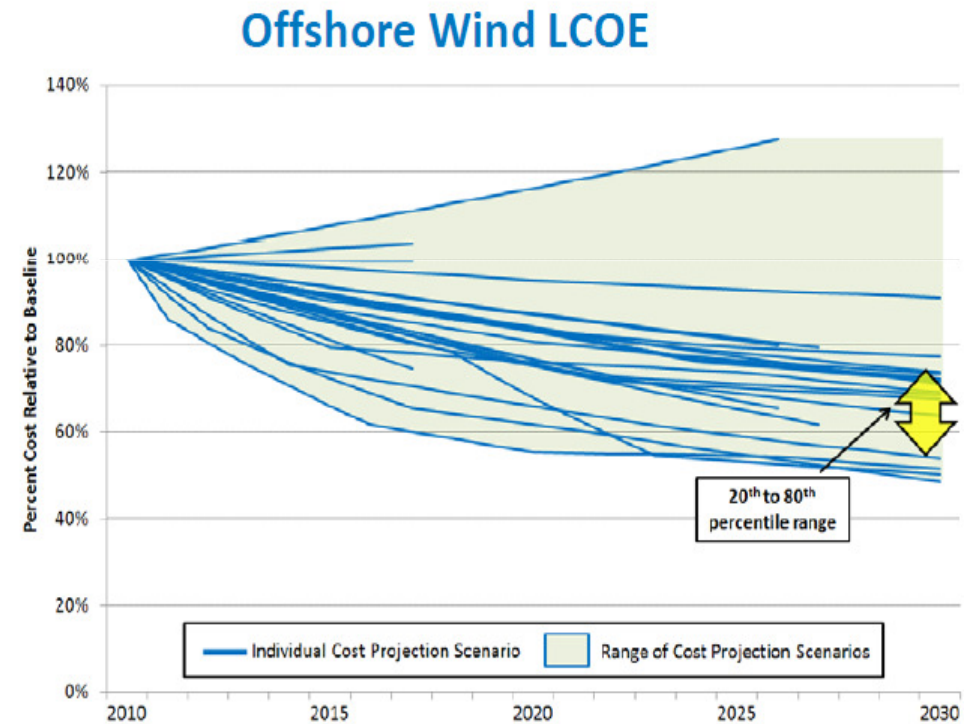
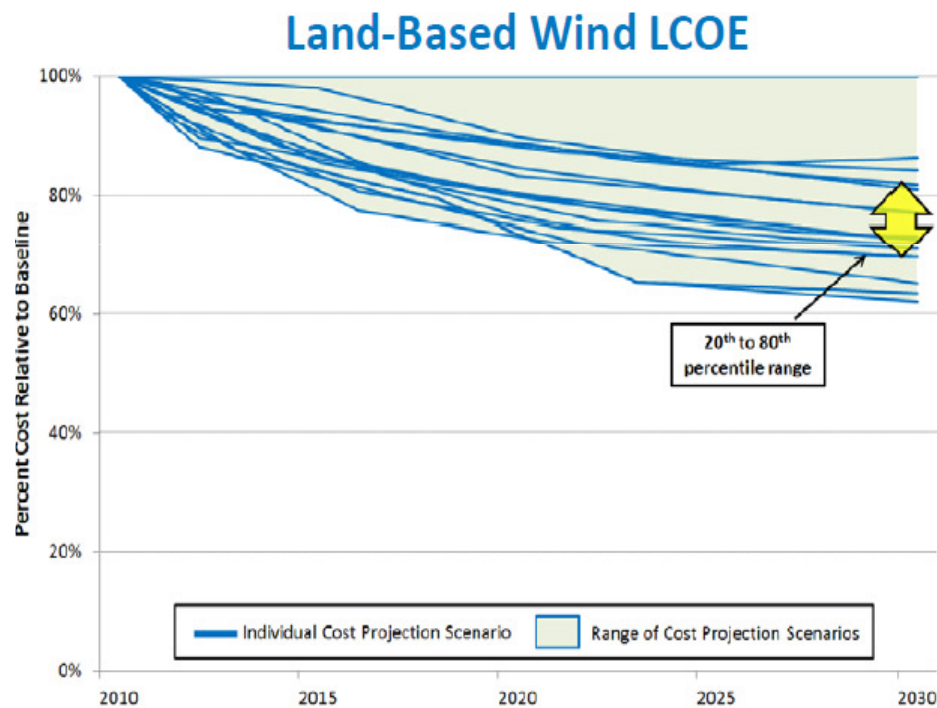
...the cost fall continues



Source: Lantz et al. 2012



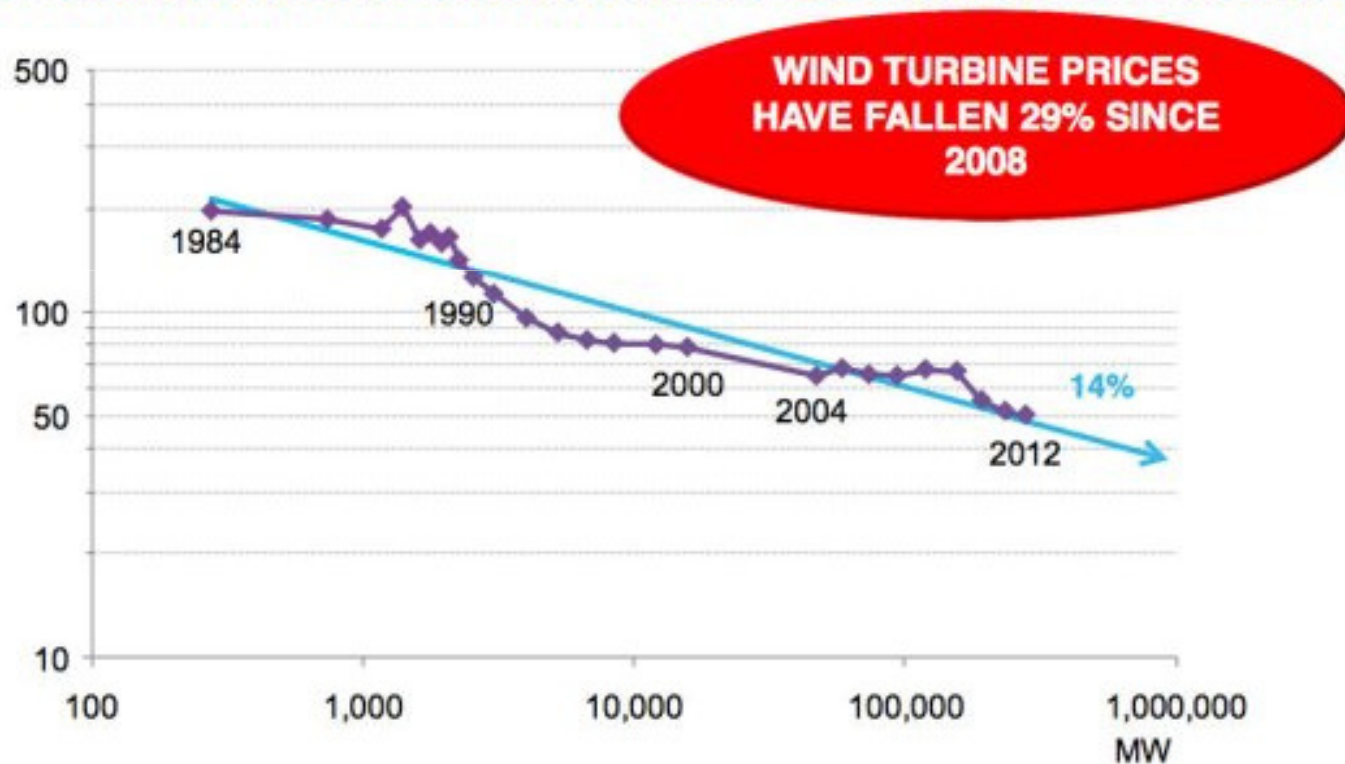
Most of the studies forecast further fall of the LCOE for wind energy, with prospects for bigger reduction at offshore wind parks at 55%-75% of their 2010 cost...



Source: Tegen et al. 2012

...following the learning curve for wind energy!

## AVERAGE LEVELISED COST OF ONSHORE WIND, 1984-2012 (€/MWH)

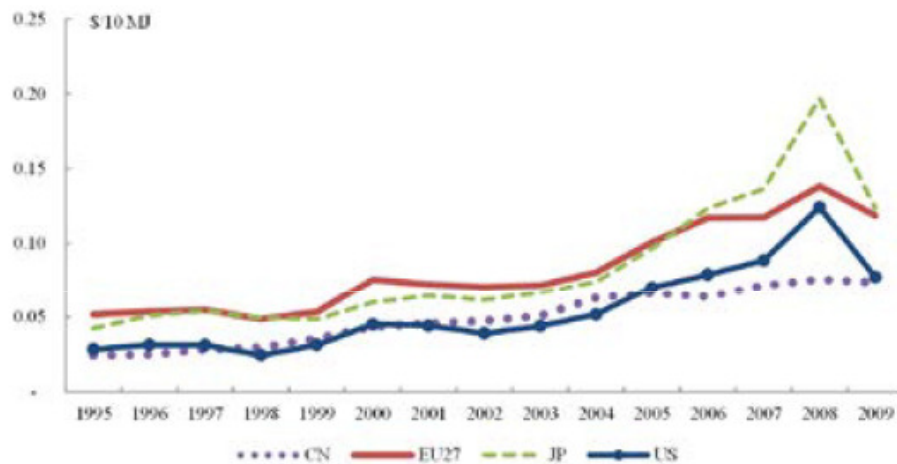


Note: Learning curve (blue line) is least square regression:  $R^2 = 0.88$  and 14% learning rate.

Source: Bloomberg New Energy Finance, ExTool

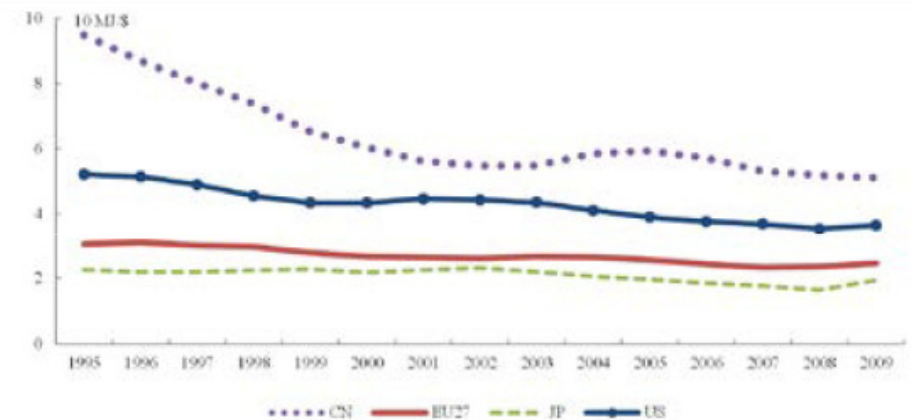
## Is Europe more expensive than US and China?

Graph I.1.3: Real Energy Price levels - Manufacturing



Note: Energy prices deflated with value added deflator of the manufacturing sector (in 2005 USD)

Graph I.1.4: Energy Intensity levels - Manufacturing

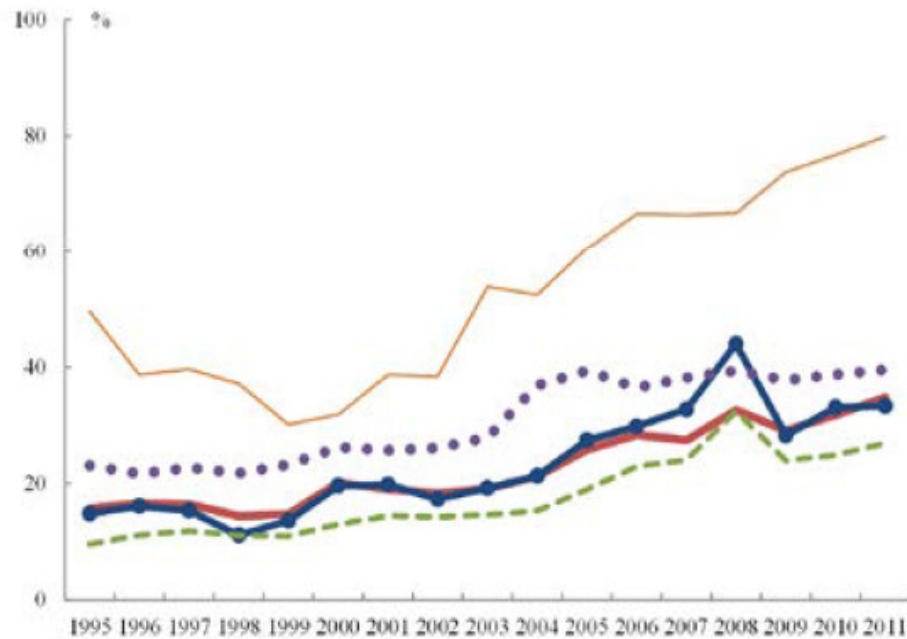


.....CN    ———EU27    - - - -JP    —■—US

Source: European Commission, Energy Economic Developments in Europe 2014

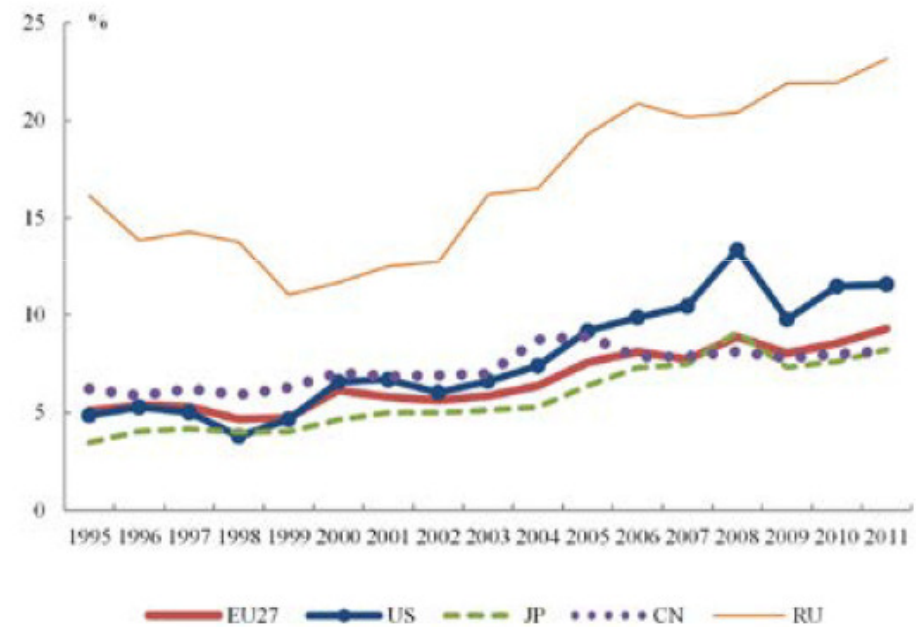
## Europe is not more expensive because it is more efficient

Graph I.1.1: Real Unit Energy Costs as % of value added, manufacturing sector



.....CN    — EU27    - - - JP    —■— US    — RU

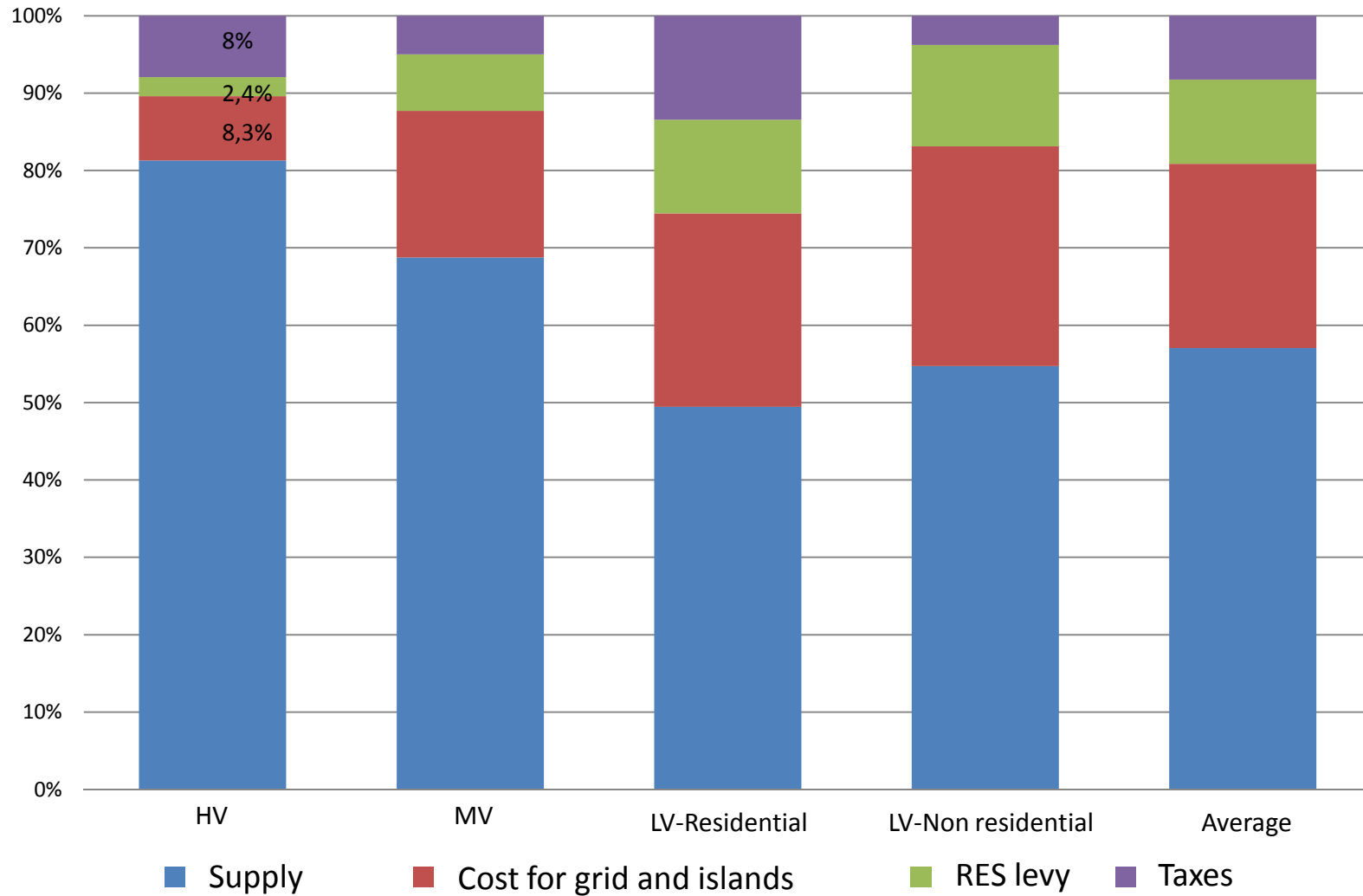
Graph I.1.2: Real Unit Energy Costs as % of gross output, manufacturing sector



— EU27    —■— US    - - - JP    .....CN    — RU

Source: European Commission, *Energy Economic Developments in Europe 2014*

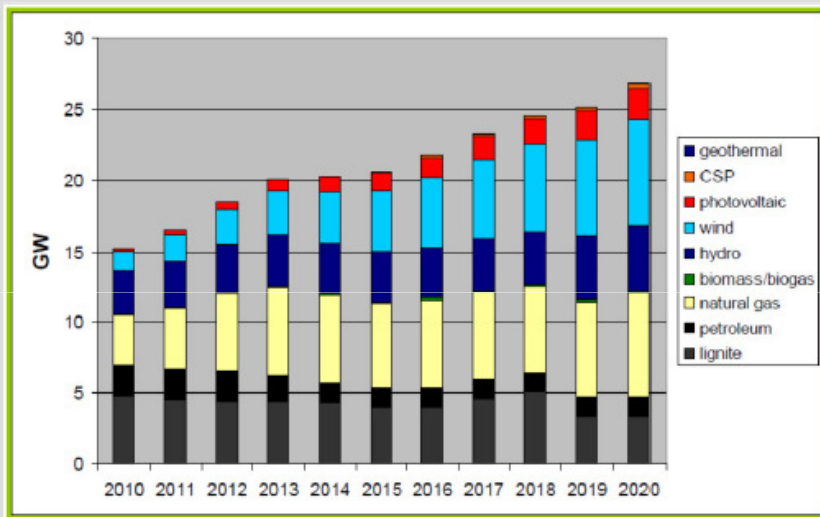
## The retail prices in Greece, February 2014



**THE ROAD OF EUROPE TO 2050  
THROUGH 2030**



## The Greek National Action Plan foresees 7.500 MW of wind parks by 2020



*Estimated installed capacity of the different technologies for electricity production*

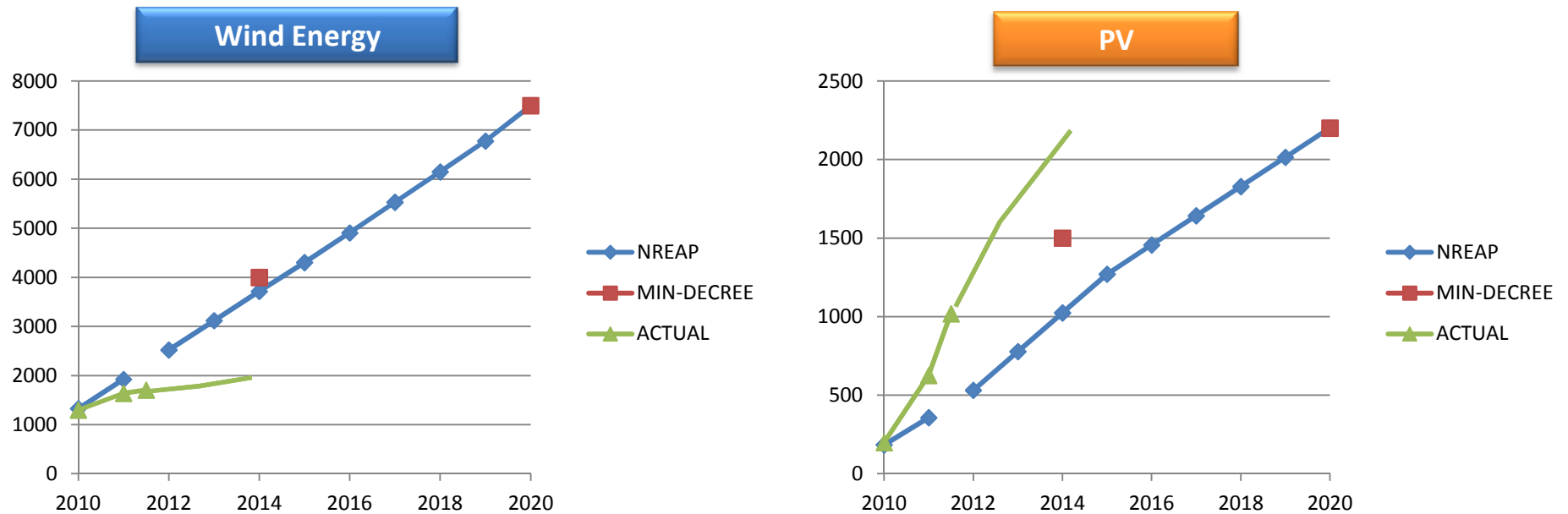
In 2010 Greece endorsed its National Action Plan for Renewable Energy Sources (time frame 2010-2020)

It is an ambitious plan aiming to reform the country's energy sector so that 20% of the primary energy use is coming from RES by 2020 (penetration level: 40% electricity, 20% heat and 10% transport)

In the electricity sector, major RES players are going to be Wind and PV (7.5 and 2.2 GW target values for 2020) and, evidently, the existing large hydro.

This does not exclude additional contributions from other RES e.g. biomass, geothermal energy and concentrated solar power.

## The NAP and in general the Long Term Energy Plan, are under revision

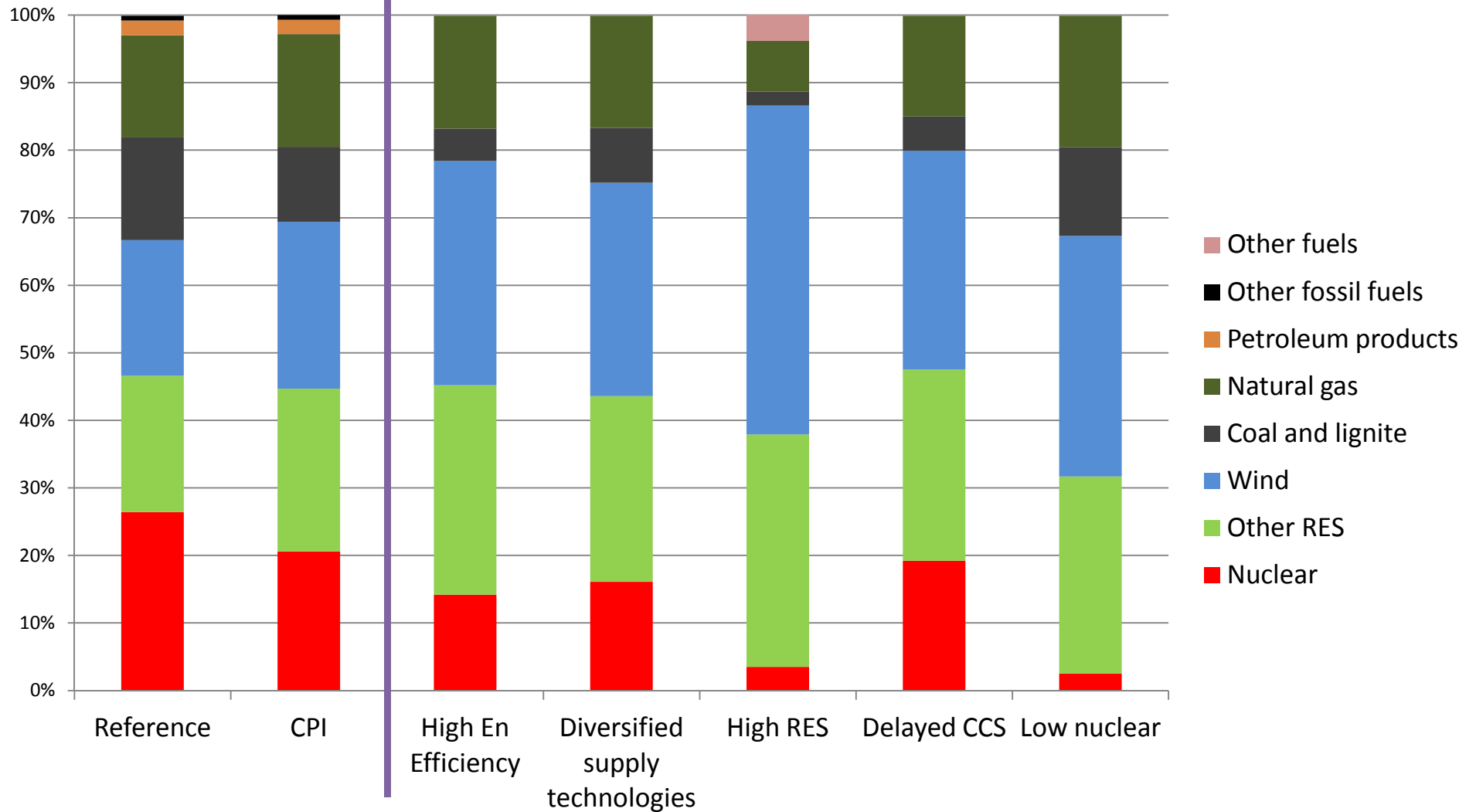


However, the Government passed from the parliament, a part of the Energy Plan before the results of the Committee it has established



# EU Energy Roadmap 2050, December 2011

## Energy type as % of Electricity generation

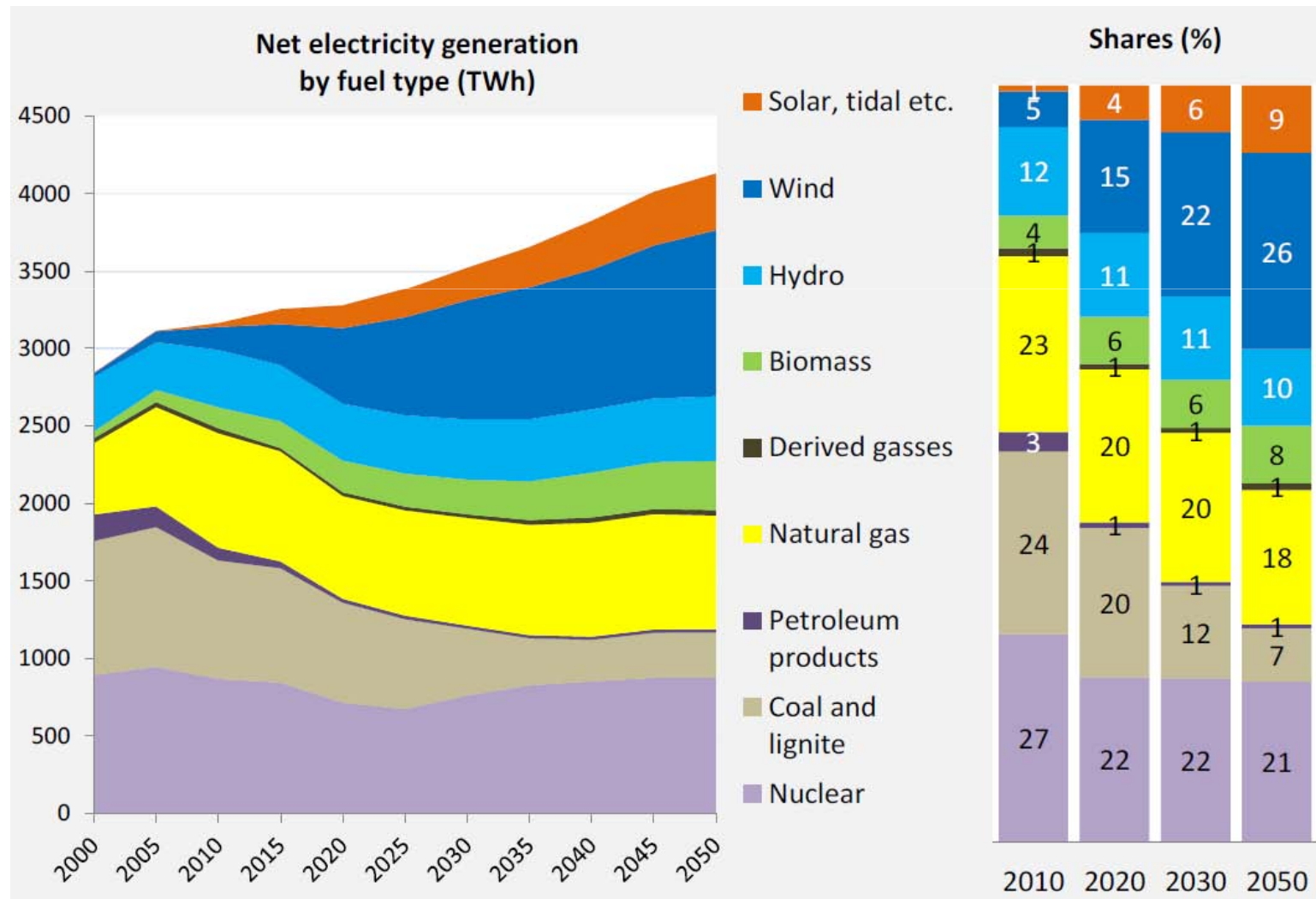


## EU Energy Roadmap 2050, December 2011

	Reference	CPI	High En Efficiency	Diversified supply technologies	High RES	Delayed CCS	Low nuclear
Electricity generation (TWh)	4931	4620	4281	4912	5141	4872	4853
Nuclear	26%	21%	14%	16%	4%	19%	3%
<b>Renewables</b>	<b>40%</b>	<b>49%</b>	<b>64%</b>	<b>59%</b>	<b>83%</b>	<b>61%</b>	<b>65%</b>
<i>Wind</i>	<i>20%</i>	<i>25%</i>	<i>33%</i>	<i>32%</i>	<i>49%</i>	<i>32%</i>	<i>36%</i>
<i>Other RES</i>	<i>20%</i>	<i>24%</i>	<i>31%</i>	<i>28%</i>	<i>34%</i>	<i>28%</i>	<i>29%</i>
Coal and lignite	15%	11%	5%	8%	2%	5%	13%
Natural gas	15%	17%	17%	17%	8%	15%	20%
Petroleum products	2%	2%	0%	0%	0%	0%	0%
Other fossil fuels	1%	1%	0%	0%	0%	0%	0%
Other fuels	0%	0%	0%	0%	4%	0%	0%
RES generation (TWh)	996	1113	1327	1351	1769	1379	1417
RES in gross final electricity consumption					97%		

## EU Energy Roadmap 2050, December 2011

Update of the Reference Scenario by December 2013 with higher penetration levels for RES (53% from 40%) and particular for wind energy (26% από 20%) in electricity generation

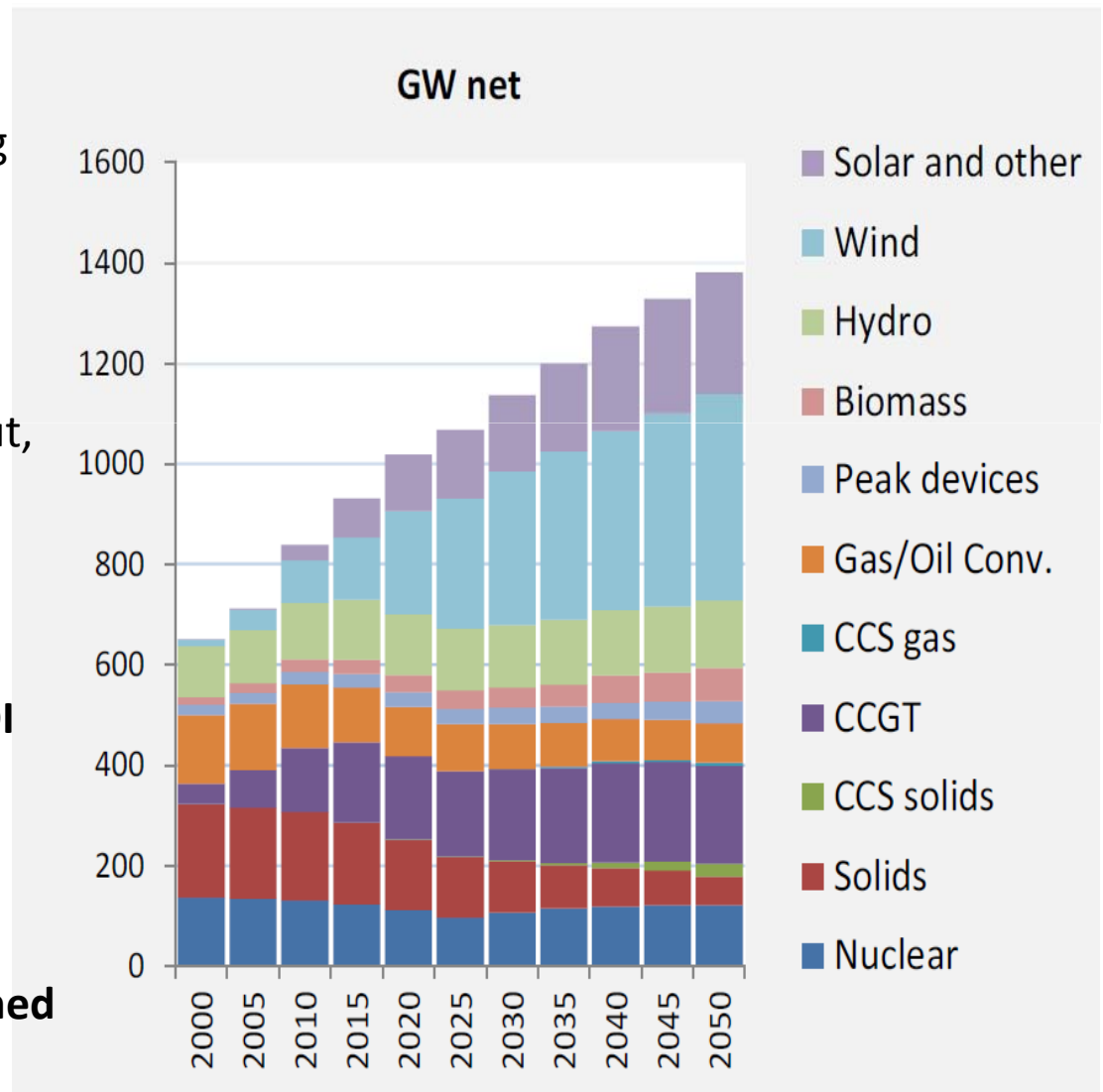


... and this despite the assumption for no additional RES targets after 2020 and phase out of direct subsidies

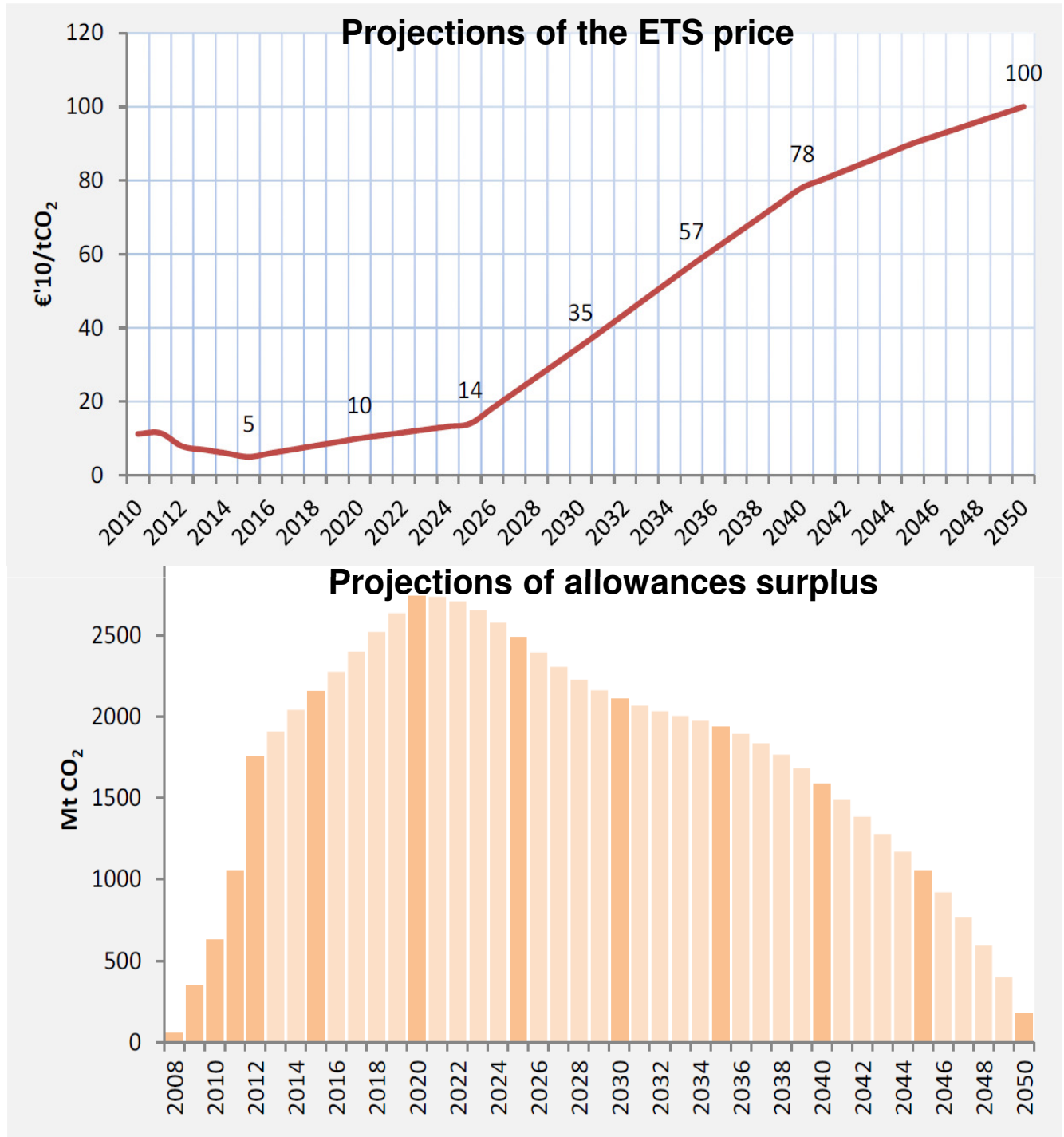
Beyond 2020, **no additional RES targets are set**. However, RES enabling policies, the ETS and some direct aids (depending on technologies and Member State) continue; the direct aids are assumed to phase out at a pace depending on RES technology.

Although direct incentives are phased out, in power generation the investments in RES continue beyond 2020 due to three main factors:

- (1) continued learning by doing of technologies including continued RDI especially for innovative RES,**
- (2) the ETS price and**
- (3) extensions in the grid and improvement in market based balancing of RES as well as streamlined authorization and priority access.**



...mainly due to the projected increase of ETS prices



## The Impact Assessment of the EC proposal for the Energy and Climate Package for 2030, January 2014

Indicator		"Carbon values"	"Concrete EE measures"		
		2030 / 2050	2030 / 2050		
	Reference	GHG40	GHG40EE	GHG40EE RES30	GHG45EE RES35
Total System Costs in bn €'10 <i>(average annual 2011-30 / 2031-50)</i>	2,067 / 2,520	2,069 / 2,727	2,089 / 2,881	2,089 / 2,891	2,102 / 2,925

Total system costs for the entire energy system include capital costs (for energy installations such as power plants and energy infrastructure, energy using equipment, appliances and vehicles), energy purchase costs (fuels + electricity + steam) and direct efficiency investment costs, the latter being also expenditures of capital nature. Capital costs are expressed in annuity payments. Direct efficiency investment costs include costs for house insulation, double/triple glazing, control systems, energy management and for efficiency enhancing changes in production processes not accounted for under energy capital and fuel/electricity purchase costs. They do not include any disutility costs associated with changed behaviour, nor the cost related to auctioning.

### Guidelines on State aid for environmental protection and energy 2014-2020, proposed by European Commission on 9<sup>th</sup> April 2014

*(108)...Notably, it is expected that in the period between 2020 and 2030 established renewable energy sources will become grid-competitive, implying that subsidies and exemptions from balancing responsibilities should be phased out in a degressive way. These Guidelines are consistent with that objective and will ensure the transition to **a cost-effective delivery through market-based mechanisms.***

*(109) Market instruments, such as **auctioning or competitive bidding process open to all generators producing electricity from renewable energy sources competing on equal footing at EEA level**, should normally ensure that subsidies are reduced to a minimum in view of their complete phasing out.*

#### However

a lot of issues still remains open (fossil fuels subsidies, market distortions, public dialogue....)





**Thank you!**