

**Gamesa**



# Der polnische Windenergiemarkt Projekte, Probleme, Chancen

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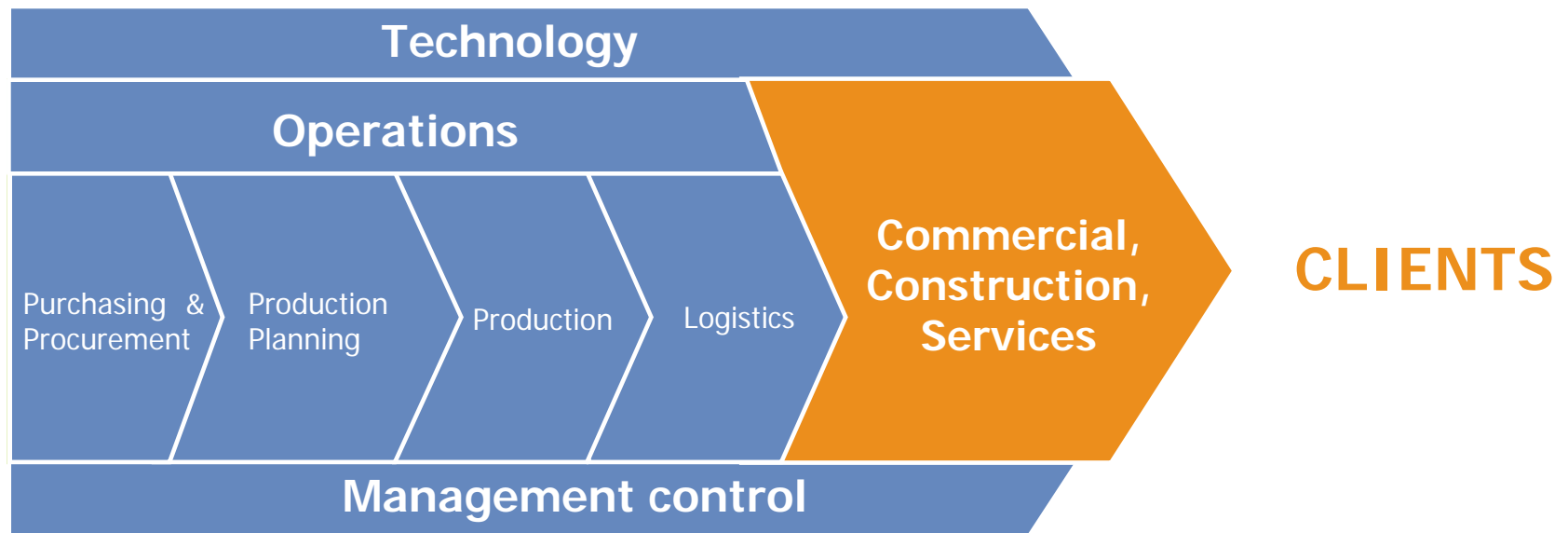
14 Mai 2009

# Mission and Vision



Our Vision is to be a leader in the development of technologies for the energy sustainability

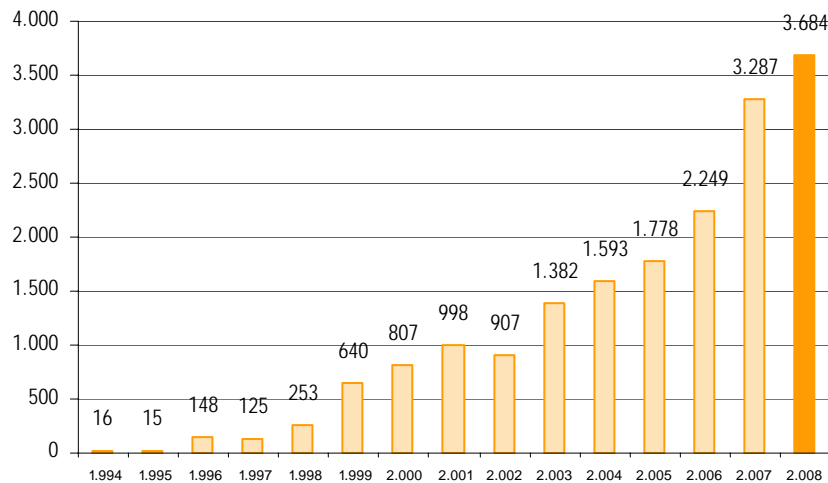
# Operational Units



# Leadership - Business

MW sold

17, 883 MW



- 3,684 MW sold in 2.008 (target: 3,600 MW).
- # 3 worldwide supplier in 2.008 (\*)
- 50.2% market share in Spain in 2.008 (\*\*).
- 11% market share worldwide in 2.008 (\*).
- 7,187 employees (31/12/08)

\* Source: EER Feb 2009

\*\* AEE Report Feb 2009

Leadership position in the main global wind energy markets

# Key Facts



- Team of 7,187 people in 16 countries spread over 4 continents.
- Healthy financial position.

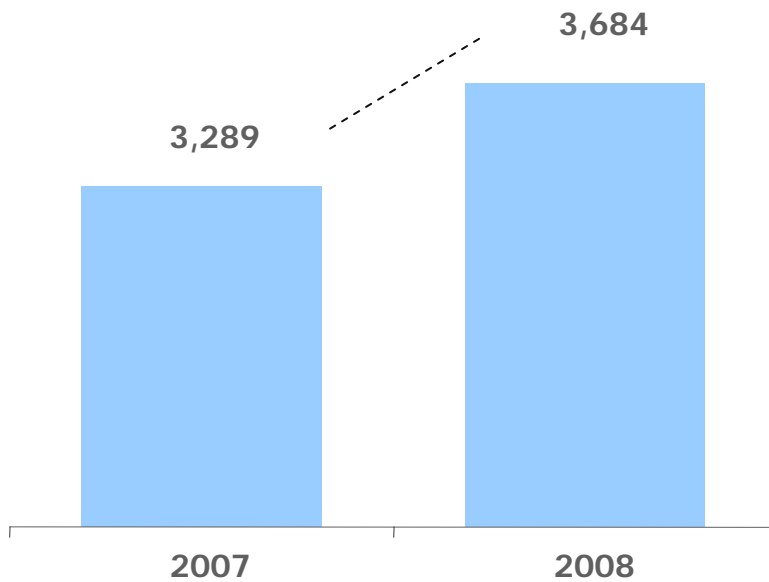
(Mill. €)	2007	2008	Var. 07/08
Sales	2.877	3.651	+27%
EBITDA	353	495	+40%
EBITDA/Sales	12%	14%	+57%
EBIT	133	208	+27%
EBIT/Sales	5%	6%	+45%
Net Profit	122	155	
Net Profit/Sales	4%	4%	
Net Profit (with discount. op.)	220	320	
Net Profit/Sales	8%	9%	

Record

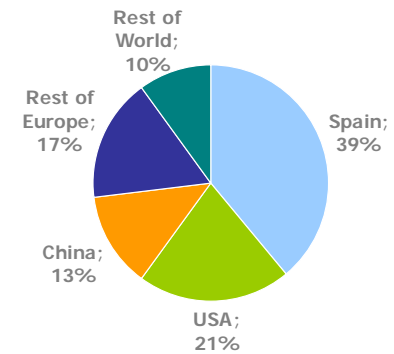
*Note: WTG Manufacturing + Holding. The Wind Farm business' contribution (operating result in 2007 and 2008), along with the Solar Division's contribution (operating result in 2007 and capital gain in 2008) are booked under discontinued operations.*

# Leadership - Business

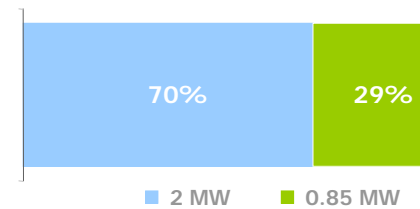
MW sold



Geographic mix MW sold 2.008



Product mix MW sold 2.008



More than 3,600 MW sold, 61% in the main wind energy markets

# Leadership - Industrial

## USA

**Production Centres:**

3 in Pennsylvania

**Components:**

Nacelle Assembly  
Blades  
Towers

**Production capacity:**

> 900 MW

## EUROPE

Headquarter in Spain

**Production Centres:**

24 in Spain

**Components:**

Nacelle Assembly  
Blades  
Gearboxes  
Generators  
Electric  
Control Software  
Towers

**Production capacity:**

> 2.200 MW

## CHINA

**Production Centres:**

4 in Tianjin

**Components:**

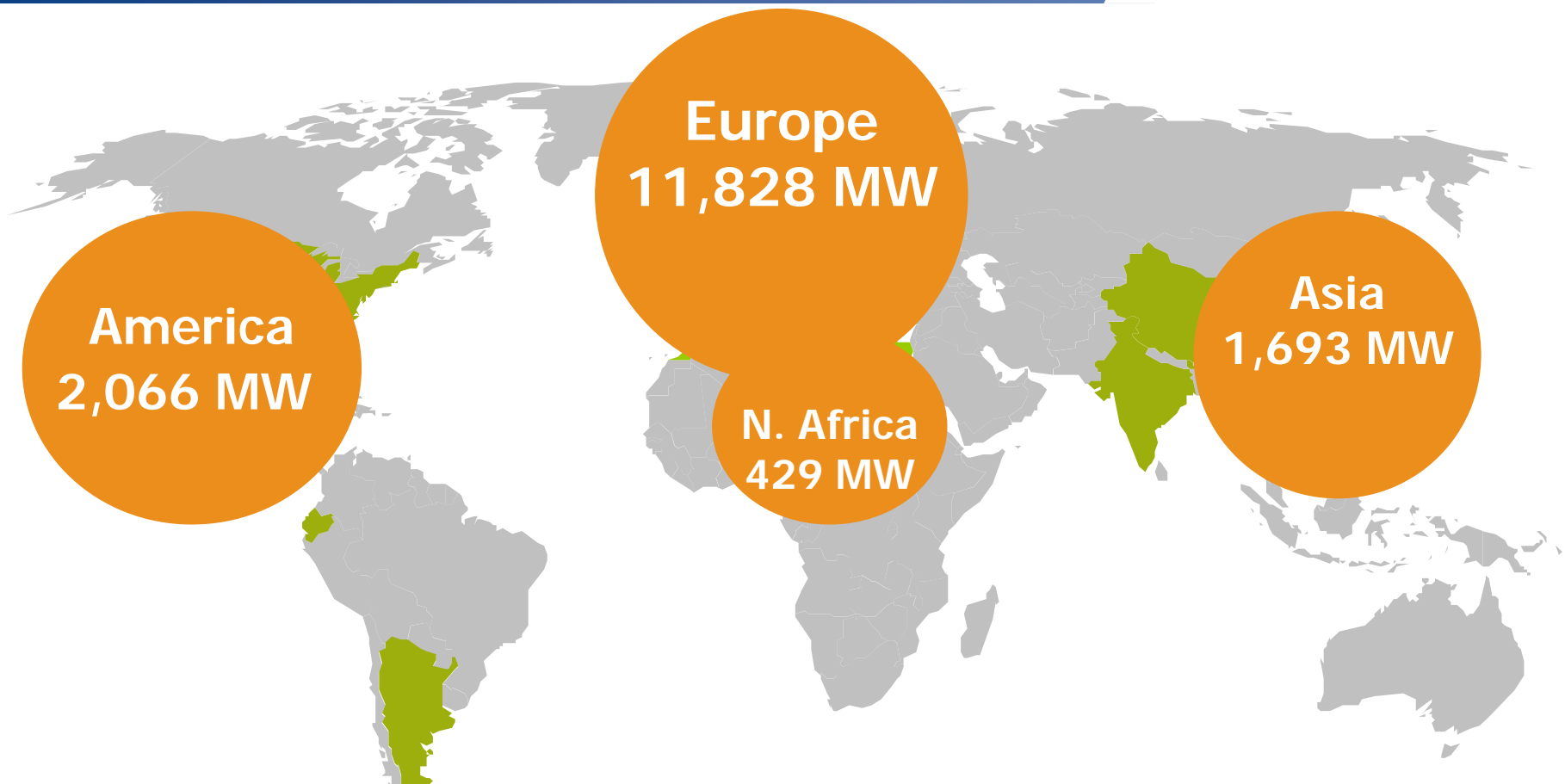
Nacelle Assembly  
Blades  
Gearboxes  
Generators

**Production capacity:**

> 500 MW

Production capacity: from 1,800 MW in 2005 to >3,600 MW in 2008

## Growth – International Presence



More than 16,000 MW installed worldwide

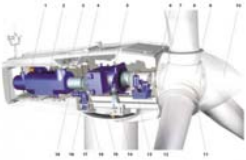
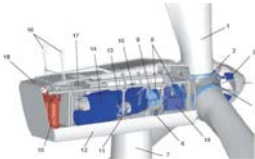
# Technology – Product Portfolio (I)

PLATFORM	RATED POWER	MODELS	CHARACTERISTICS
<b>Gamesa G5X</b> 850 KW	850 kW	G52, G58	<b>Experience and performance</b>
<b>Gamesa G8X</b> 2.0 MW	2 MW	G80, G87, G90	<b>Versatility and production</b>
<b>Gamesa G10X</b> (underdevelopment)	4,5 MW	G128	<b>Minimal CoE and logistics complexity of the 2 MW machine</b>

**Modular production strategy of components by platform which allows for greater flexibility and versatility**

# Technology – Product Portfolio (II)

## Models and options

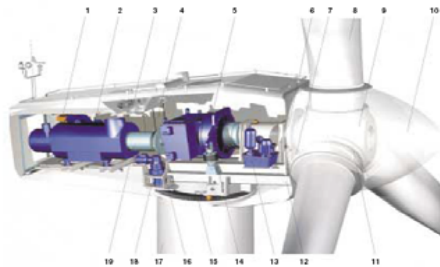
		MODEL	IEC	DIBT	POWER	GRID CODE	TOWER HEIGHTS	ENV. OPTIONS (1)	50 Hz	60Hz
Gamesa G5X 850 kW		G52	IA	-	850 kW	✓	44, 49, 55, 65	✓	✓	✓
		G58	IIIB	-	850 kW	✓	44, 55, 65, 71	✓	✓	X
Gamesa G8X 2.0 MW		G80	IA	WZII-III	2.000 kW	✓	60, 67, 78, 100	✓	✓	✓
		G87	IIA	WZII	2.000 kW	✓	67, 78, 100	✓	✓	✓
		G90	IIIA	WZII	2.000 kW	✓	67, 78, 100	✓	✓	✓

(1) Different versions and optional kits to adapt the wind turbine to High or Low Temperatures and environments with a high level of salt or dust.

**Complete product range of the multi-MW market available through models with rotors adapted to site conditions to maximize Value and Profitability**

# Technology - Gamesa G5X-850 kW

## G5X-850 kW



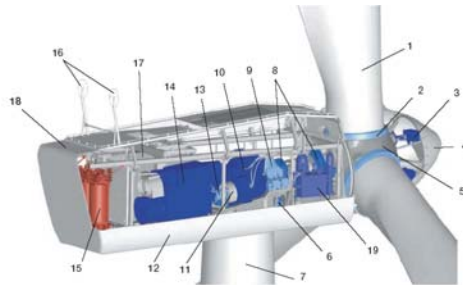
<b>Rotor diameter</b>	52 m and 58 m
<b>Rated Power</b>	850 kW
<b>Technology</b>	Variable Pitch and speed Gen. asynchronous DA
<b>Tower Height(m)</b>	G52: 44,49,55,65 G58: 44,55,65,71
<b>IEC Class</b>	G52: IA G58: IIIB

- Maximum performance in low (G58) and medium and high (G52) wind sites even in complex terrain.
- Blade using state-of-the-art manufacturing technology based on fiberglass and pre-preg method.
- Extensive experience in complex terrain.
- Reduced sound level and Gamesa NRS® for maximizing production while complying with specific noise restrictions. <sup>(1)</sup>
- Grid connection technology that assures full national grid code compliance. <sup>(1)</sup>
- Gamesa SMP for predictive maintenance and Gamesa SGIPE and its new generation Gamesa WindNet® for remote operation.
- 6,975 WTG installed by Dec. 2008.

(1)See technicals specifications.

# Technology - Gamesa G8X-2.0 MW

## G8X-2.0 MW

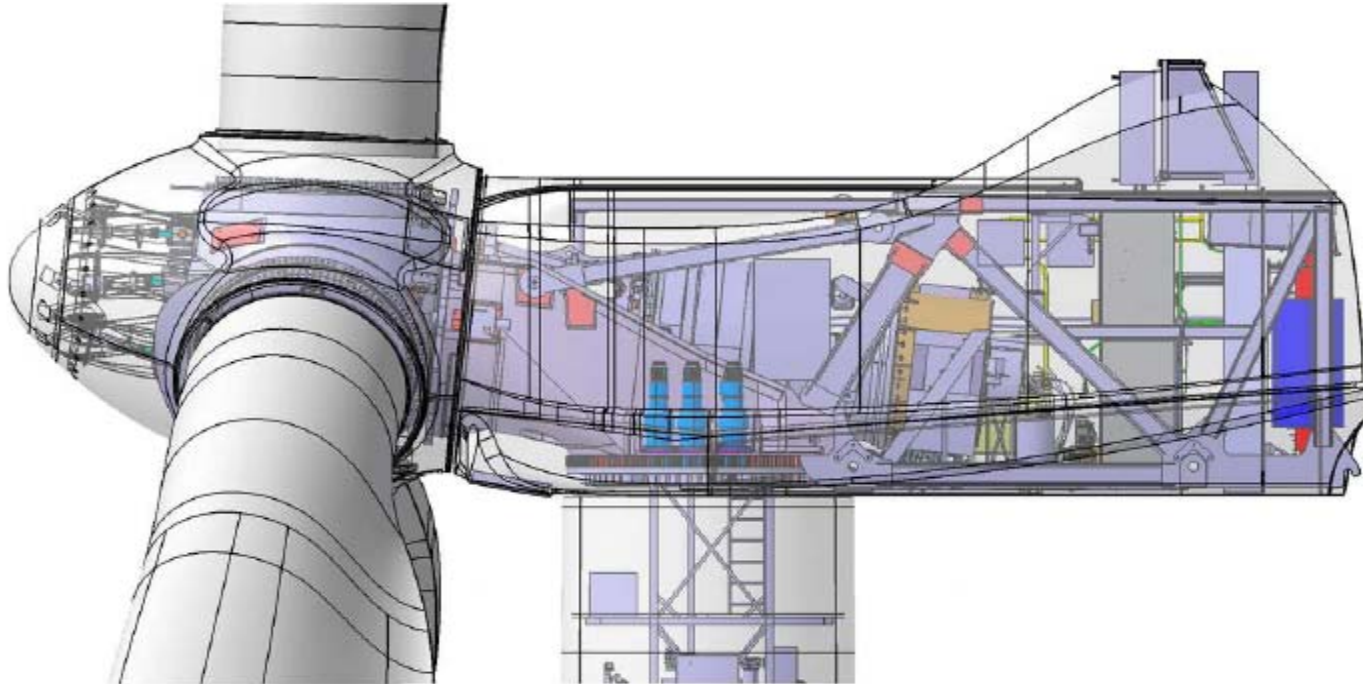


<b>Rotor diameter</b>	80, 87 and 90 m.
<b>Rated power</b>	2.000 kW
<b>Technology</b>	Variable Pitch and speed Gen. asynchronous DA
<b>Tower Height</b>	G80: 60,67,78,100 G87: 67,78,100 G90: 67*,78,100
<b>Clase IEC</b>	G80: IA/ G87: IIA G90: IIIA

- Maximizing cost efficiency per kWh by maximizing production in extreme (G80), medium (G87) and low (G90) wind speed conditions.
- Blade using state-of-the-art manufacturing technology based on carbon fiber (G87-G90), fiberglass and pre-preg method.
- Reduced sound level and Gamesa NRS<sup>®</sup> for maximizing production while complying with specific noise restrictions. <sup>(1)</sup>
- Grid connection technology that assures full national grid code compliance. <sup>(1)</sup>
- Gamesa SMP for predictive maintenance and Gamesa SGIPE and its new generation Gamesa WindNet<sup>®</sup> for remote operation.
- 3,354 WTG installed by Dec 2008.

<sup>(1)</sup> See technical specifications \* Availability depending on the site

## Technology-New developments: Gamesa G10X-4.5 MW (I)



- Gamesa G10X is Gamesa's new platform with a unit power capacity of 4.5 MW. The criteria of design are:
- Minimal Cost of Energy (CoE).
  - Logistics and construction requirements to those of G8X-2.0 MW platform.

# Technology-New developments: Gamesa G10X-4.5 MW (II)

## Models

- G128 4.5 MW Class IEC IIA & WZII.

## Tower heights

- 120 m Class IEC IIA.
- Other heights still to be defined.







## Temperature range

- Standard version:  $-20^{\circ}\text{C}$ ,  $+40^{\circ}\text{C}$ .
- High temperature version:  $-20^{\circ}\text{C}$ ,  $+45^{\circ}\text{C}$ .
- Low temperature version:  $-30^{\circ}\text{C}$ ,  $+40^{\circ}\text{C}$ .

## Electrical features

- Fulfilling of the most demanding grid codes requirements.
- Power factor: 0.9 inductive to 0.9 capacitive.

# Technology-New developments: Gamesa G10X-4.5 MW (III)

TECHNOLOGY		FEATURES
<b>Gamesa MultiSmart®</b>		New multivariable control system that minimizes blade vibration and reduces blade loads up to 30%. This control system incorporates the most advanced technologies oriented to noise reduction, based on aerodynamic, control and efficiency optimization.
<b>Gamesa Innoblade®</b>		Sectional blade that allows same accessibility and to use same transport equipment as per current 2MW machines.
<b>Gamesa CompacTrain®</b>		Two-stage planetary integrated gearbox with two bearing design. Use of less parts, avoidance of high speed bearings and cost reduction is achieved with this compact design.
<b>Gamesa ConcreTower®</b>		Hybrid tower (concrete + metallic structure) to achieve the lowest cost at important heights.
<b>Gamesa GridMate®</b>		Full Converter technology for fulfilling most demanding grid codes.
<b>Gamesa FlexiFit®</b>		Add-on crane for minimizing the use of big cranes and for easy assembly and disassembly.

# Production – Vertical Integration (I)

	% IN HOUSE	PRODUCCIÓN IN HOUSE (MW)	Var. 07 / 08
NACELLES	100%	>3.600	+12%
BLADES	80%	>3.500	+25%
GEARBOXES	>60%	>2.300	+20%
GENERATORS	>50%	>1.900	+15%
ELECTRICS	>50%	>4.700 control cabinets	+10%
TOWERS	>50%	>1.500	+15%

In-house production does not include strategic partners.

Operating capacity at a production pace of 6,000 MW in 2011

# Production- Vertical integration (II)

## Production centres in Europe, America and Asia

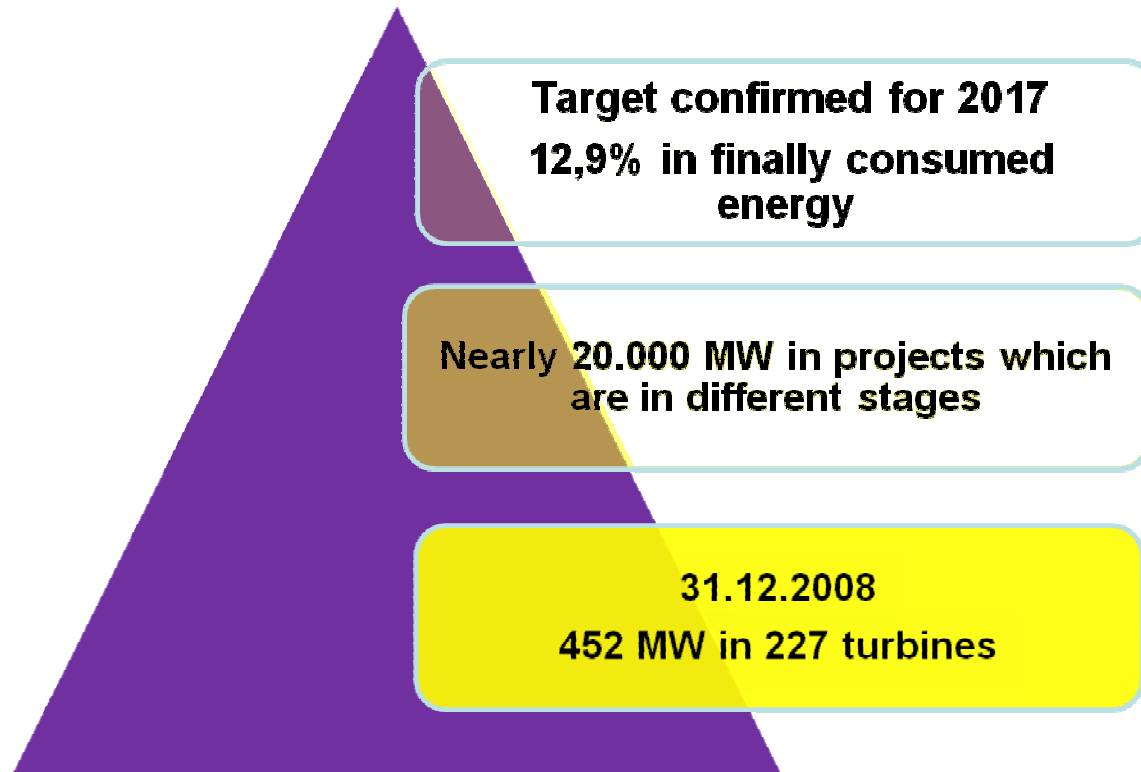
						
<b>Nacelles</b>	<b>Towers</b>	<b>Blades</b>	<b>Root joints</b>	<b>Blade moulds</b>	<b>Electrical equipment (Generators &amp; Cabinets)</b>	<b>Gearboxes</b>
<b>6 FACTORIES &gt;3.600 MW</b>	<b>6 FACTORIES &gt;1.500 MW</b>	<b>7 FACTORIES &gt;3.500 MW</b>	<b>1 FACTORY 5.000 un.</b>	<b>1 FACTORY 6 moulds G8X**</b>	<b>4 FACTORIES &gt;1.900 MW</b>	<b>6 FACTORIES &gt;2.300 MW</b>

\*Joint Venture with Grupo Daniel Alonso

\*\*Possibility of manufacturing G5X moulds

Large industrial capacity. Opening of 11 new production centres since 2.006.

# The Status of Wind Energy in Poland



Source:



**Polskie Stowarzyszenie Energetyki Wiatrowej**  
Polish Wind Energy Association

## Installed Wind Energy Capacity in Poland

- According to The Energy Regulatory Office the total capacity installed onshore in Poland is **451,09 MW** for 31.12.2008.
- This installed capacity comes from 227 sources (wind turbines) of electric energy.
- In 2008 President of the Energy Regulatory Office issued 1107 certificates of origin for 722 598,940 MWh of energy produced in wind energy sources.

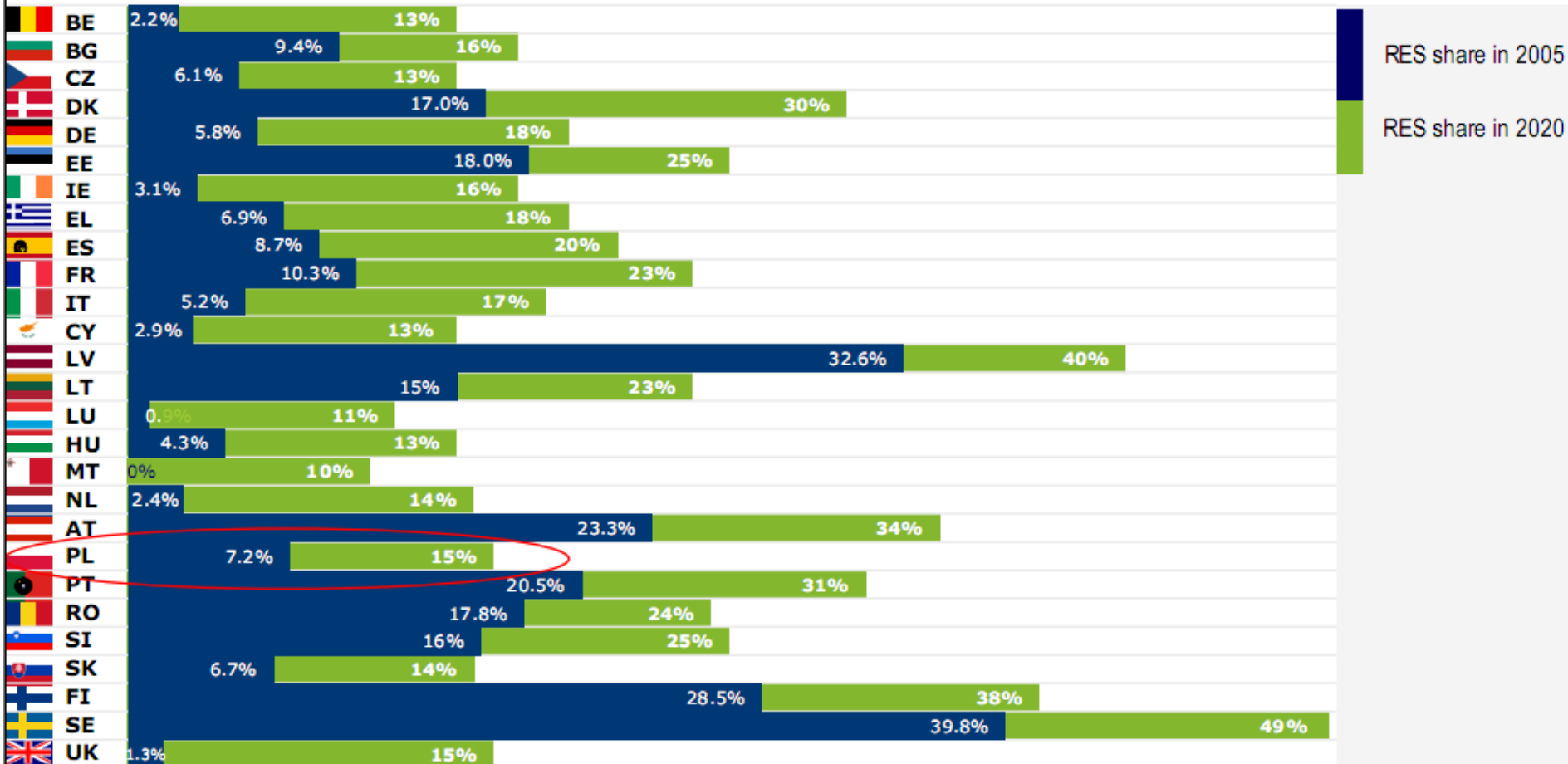
Source:



Polskie Stowarzyszenie Energetyki Wiatrowej  
Polish Wind Energy Association

# EU Member States' targets for 2020

## EU Renewable Energy Directive



## Installed Wind Energy Capacity in Poland

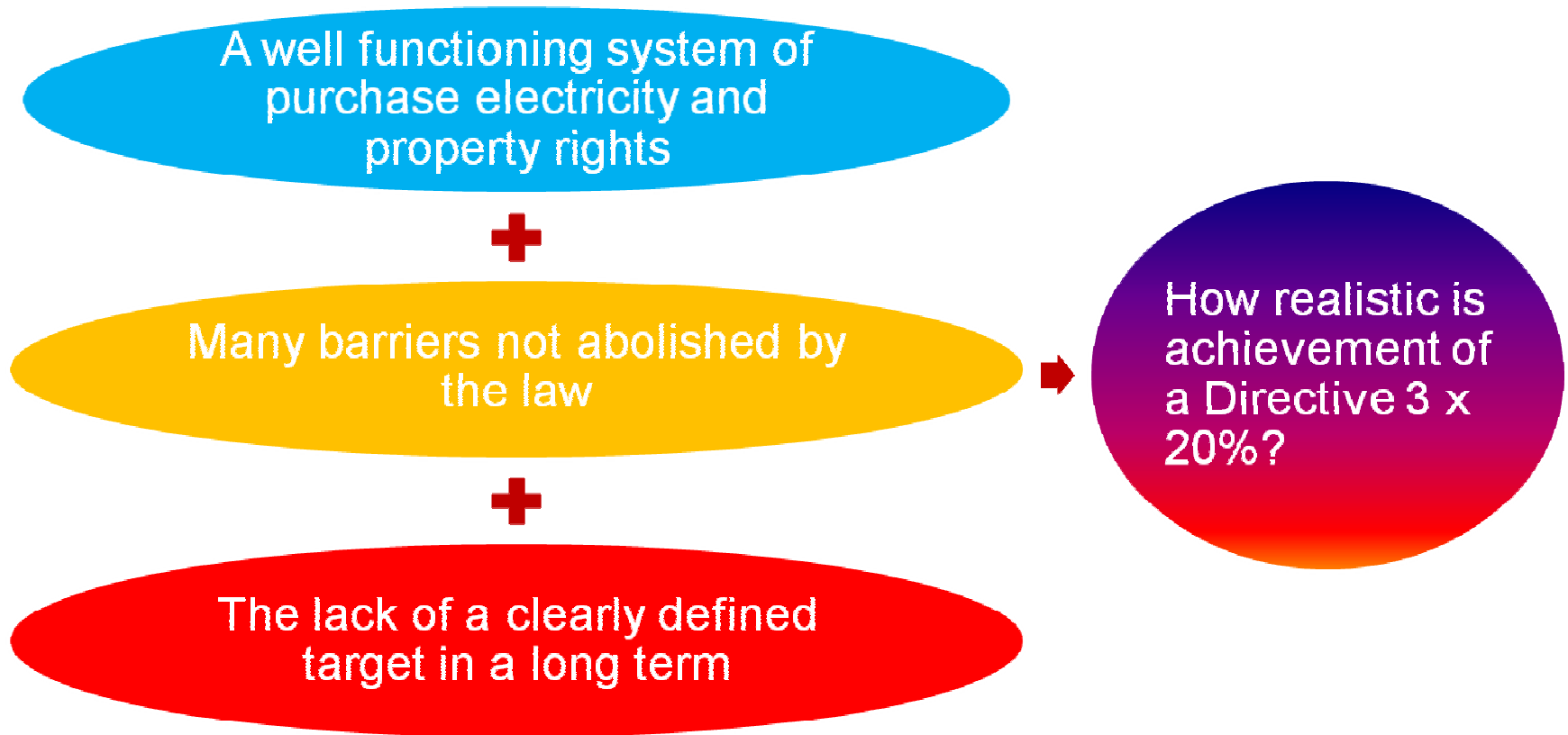
- The Polish Wind Energy Association (PWEA) estimates that the development for onshore energy capacity will reach:
  - 2000 MW by 2010
  - 5000 MW by 2015 and
  - 12000 MW by 2020
- According to PWEA, taking into consideration present technical and technological status of the grid, installation of 11 - 14 GW and achieving energy production from wind turbines at a level of 24 - 31 TWh is highly possible and realistic level of wind energy development in Poland.
- This means that wind energy can easily cover 12% demand for energy in 2020.

Source:



Polskie Stowarzyszenie Energetyki Wiatrowej  
Polish Wind Energy Association

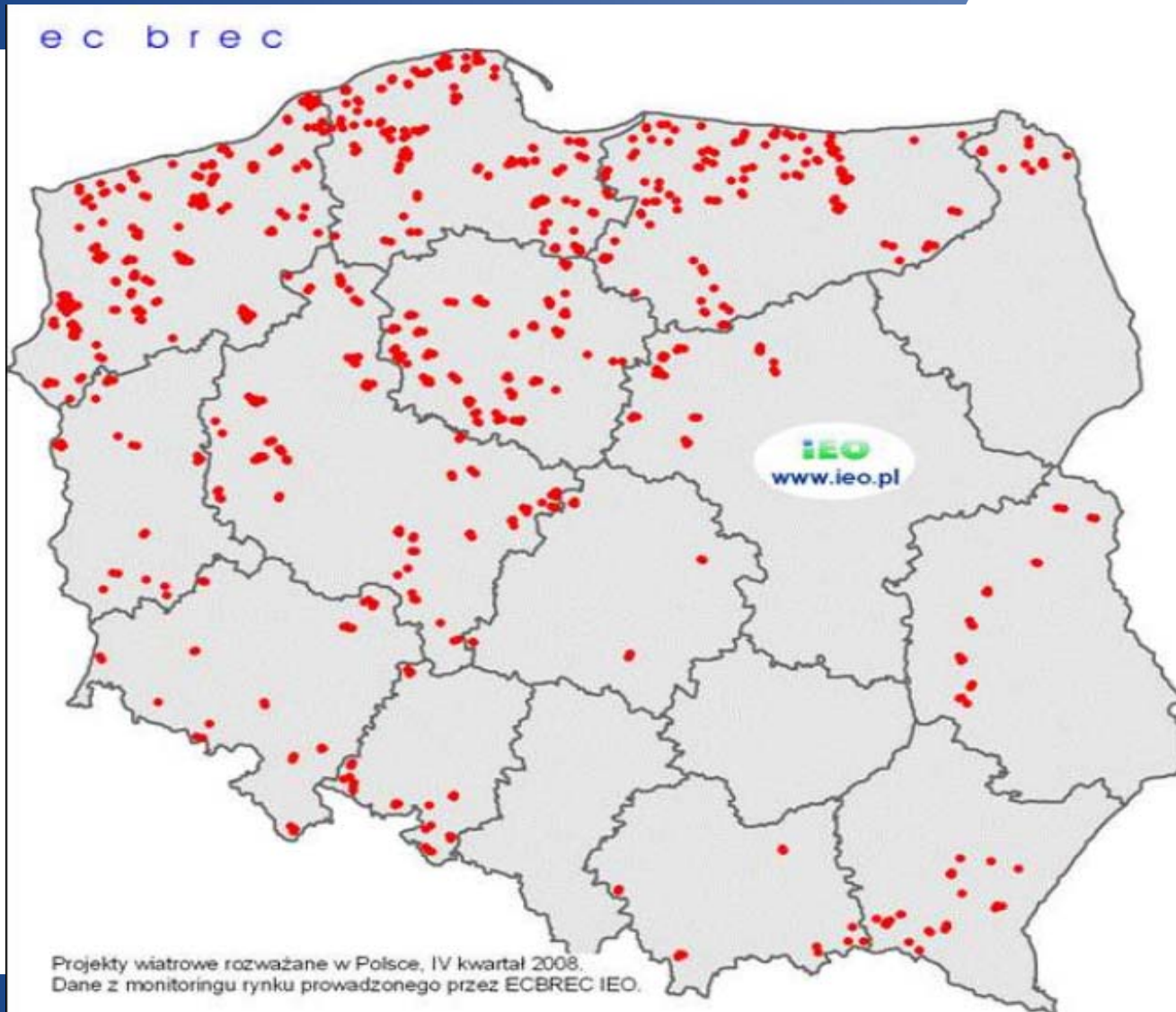
# The Status of Wind Energy in Poland



# Polish Grid System



# Wind Projects in Poland, 2008




## Major Wind Farms in Poland

<b>Project</b>	<b>Installed Capacity</b>	<b>WTG</b>	<b>Year of Inst.</b>
<i>Cisowo</i>	18 MW	9 x V 80	2001
<i>Zagórze</i>	30 MW	15 x V 80	2002
<i>Tymień</i>	50 MW	25 x V 80	2006
<i>Puck</i>	11 MW	11 x G 80	2006
<i>Kisielice</i>	40,5 MW	27 x GE 1,5	2007
<i>Jagniątkowo</i>	30,6 MW	17 x V 90-1,8	2007
<i>Kamieńsk</i>	30 MW	15 x E-70	2007
<i>Zajaczkowo</i>	48 MW	24 x V 80	2008
<i>Karścino</i>	90 MW	60 x FL 1,5	2008
<i>Sniatowo</i>	30 MW	16 x V 90	2008
<i>Malbork</i>	18 MW	12 x GE 1,5	2008
<i>Przemysl</i>	12 MW	6 x G 87	2008

Puck Wind Farm 22 MW / 11 x Gamesa G80




# Gamesa Windfarms in Poland


 Contracts signed:  
 196 WTG 392 MW  
 179 x G90  
 6 x G87  
 11 x G80

 Projects built or  
 under  
 construction



# Gamesa Windfarms in Poland

 Contracts signed:  
 196 WTG 392 MW  
 179 x G90  
 6 x G87  
 11 x G80

 Projects under negotiation,  
 to be realized  
 from 2010 onwards



# Wind Farm Margonin 120 MW WTG No.2

