

# Development of Renewable Energies at Iberdrola

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**IBERDROLA RENEWABLE ENERGIES**



- 1. Iberdrola in the renewables business**
- 2. Renewable energies as a long-term strategic option**
- 3. Support systems for renewable energies**
- 4. Support systems in Spain: a success story**
- 5. Conclusions**

## Renewable energies are one of the main planks of Iberdrola's growth strategy

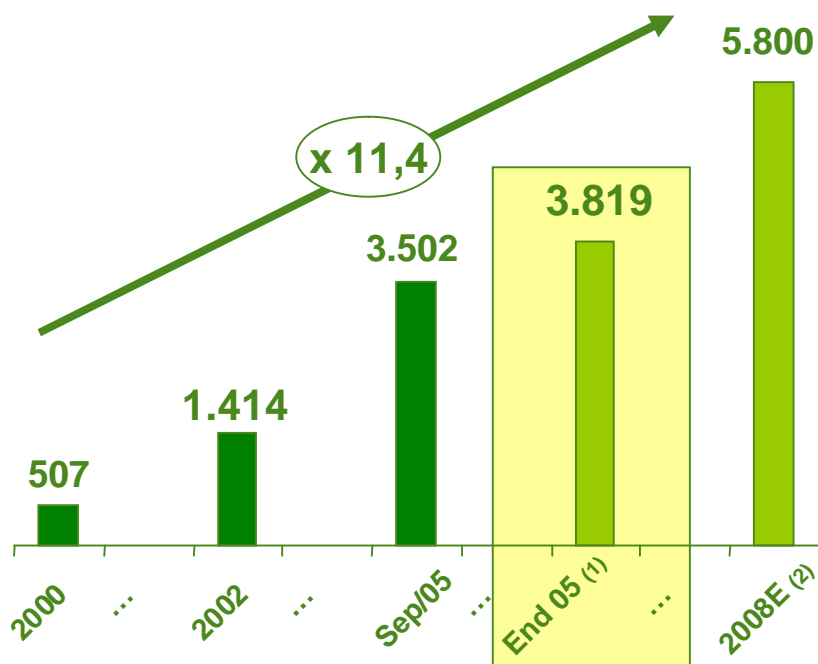


- Iberdrola, the No. 6 power company in the EU, is one of the world's leading companies in renewable energies, and is the global leader in wind energy.
- Iberdrola has a firm commitment to the most developed renewable energies (wind, mini-hydroelectric, biomass, biofuels) as well as to emerging technologies such as wave energy and solar thermoelectric.
- We are currently developing new renewables projects in Spain, Europe, Latin America and in other areas of the world.
- Iberdrola is making efforts to improve these energies' efficiency, integrating them in the energy network; key factors for the sustainable development of the energy industry.

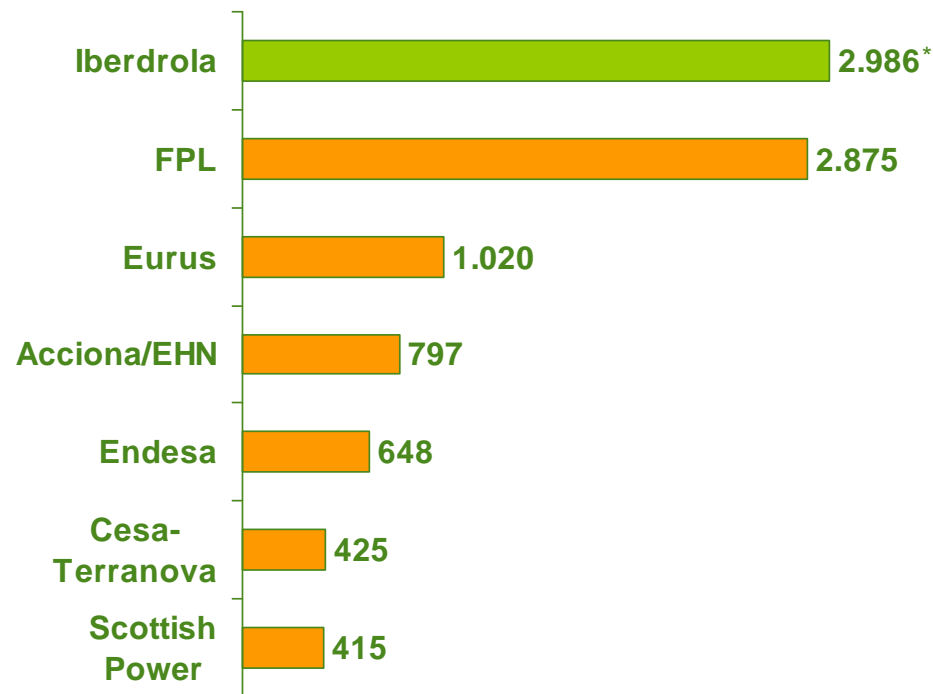
Iberdrola is one of the world's leading operators in renewable energies with almost 4.000MW at the end of 2005, and with a target of 5,800 MW for 2008



### Evolution of installed capacity and target (MW)



### Wind energy world ranking (MW), Dec 2004



(1) Includes stakes in Rokas

(2) Last forecast.

\* Additionally, 316 MW mini-hydroelectric

Iberdrola's Renewable Energies Operations Centre, in Toledo, is designed to help bring these energies onto the electricity grid and to improve their efficiency



- Iberdrola's renewable energy operations centre (CORE) is a pioneer initiative in the industry due to its technology and scope.
- It allows Iberdrola to improve the management and operation of renewable energy installations.
- The centre helps to bring these energies into the system and to eliminate possible obstacles to their development.
- Our operations centre is open to other wind farm operators. We are installing the technology at several of them.



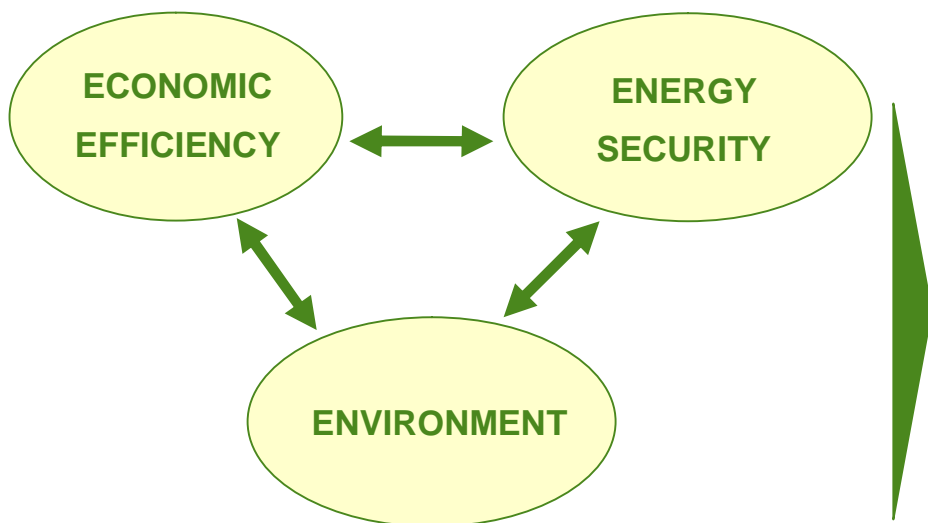
With a clear commitment to international growth, and an increasing presence outside the European Union

- International development is one of the main areas of expansion for renewable energies at Iberdrola.
- Iberdrola has assets in operation and projects under development in Europe, Latin America, and other regions.
- Iberdrola has signed collaboration agreements with a number of international partners to develop business in this industry.
- Iberdrola uses the technical know-how and experience it has acquired in Spain in several areas related to the development and management of renewable energies worldwide.

Acknowledgement of the economic and environmental benefits of renewable energy has led to the definition of development targets throughout the EU



## Main Drivers



## Outcomes and Targets

- **Kyoto Protocol**  
5.2% reduction in CO<sub>2</sub> emissions by 2010 with respect to 1990 total emissions. Fundamental role of wind energy.
- **Renewable Energies EU Directive**  
12% of primary energy needs to come from renewable sources in 2010.  
22.1% of electricity demand to be met by renewable energy sources by 2010 (versus 13.9% in 1997) (large hydro included)
- **EU countries**  
All EU countries have defined public targets for the development of renewable energies and support systems of their development

# Economic support system



## Regulatory framework

- | Renewables Directive (2001) allows member states to define their own support systems.
- | The commission in 2006 may propose a single system (with a transition period of up to seven years for its implementation).

## Types of systems

<i>SYSTEMS</i>	<b>DIRECT</b>	<b>INDIRECT</b>
<b>BASICS</b>	<ul style="list-style-type: none"><li>• Feed-in tariffs</li><li>• Green certificates</li></ul>	<ul style="list-style-type: none"><li>• Emissions trading</li></ul>
<b>COMPLEMENTS</b>	<ul style="list-style-type: none"><li>• Energy labeling</li><li>• CDM and JI (Kyoto)*</li></ul>	<ul style="list-style-type: none"><li>• Energy tax policy</li></ul>

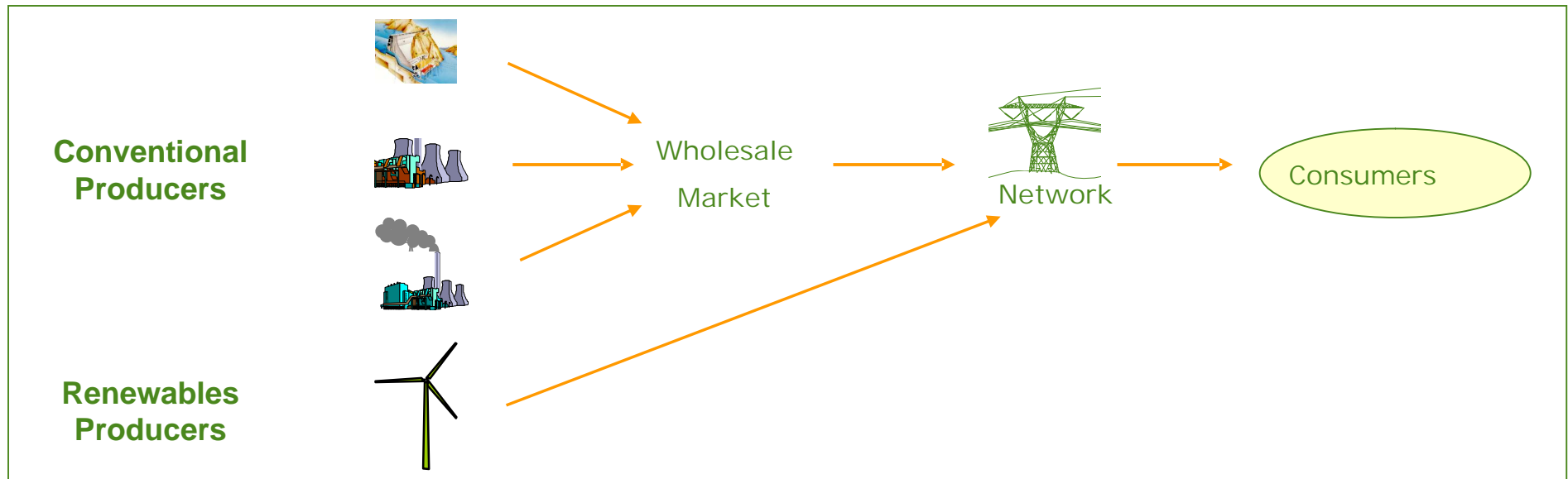
\* CDM.- Clean Development Mechanisms; JI.- Joint Implementation



# Feed-in tariffs system



All production is sold without going to the wholesale market, tariffs are regulated, for a given period of time.



	<b>Price</b>	<b>Premium duration</b>
<b>Variables</b>	<ul style="list-style-type: none"><li>• Fixed (Germany, France, Spain)</li><li>• Pool price + premium (Spain)</li><li>• Fixed or dependent on the hours of functioning of the wind farm</li></ul>	<ul style="list-style-type: none"><li>• 20 years (Germany)</li><li>• 15 years (France)</li><li>• Whole asset's useful life (Spain)</li></ul>

Systems based on feed-in tariffs are the most widely used and effective in the EU

COUNTRY	Installed Capacity (MW)		Support mechanisms	
	In year 2004	End 2004	Feed-in Tariff	Certificates
Germany	2.054	16.649	Ü	
Spain	2.064	8.263	Ü	
Denmark	7	3.083	Ü	
Italy	357	1.261		Ü
Netherlands	199	1.081		Ü
UK	253	889		Ü
Portugal	274	585	Ü	
France	138	386	Ü	
Sweden	50	478		Ü
Austria	192	607		Ü
Greece	61	587	Ü	
Bélgium	28	106	Ü	Ü
	<b>5.677</b>	<b>33.975</b>		

- | 87,3% of total wind capacity in the EU (33.975 MW) has been installed in countries with feed-in tariff systems\*.
- | 81,5% of new wind capacity installed in 2004 (5.667 MW) was in countries with premium mechanisms.
- | No significant examples of successful tradable certificates systems exist.

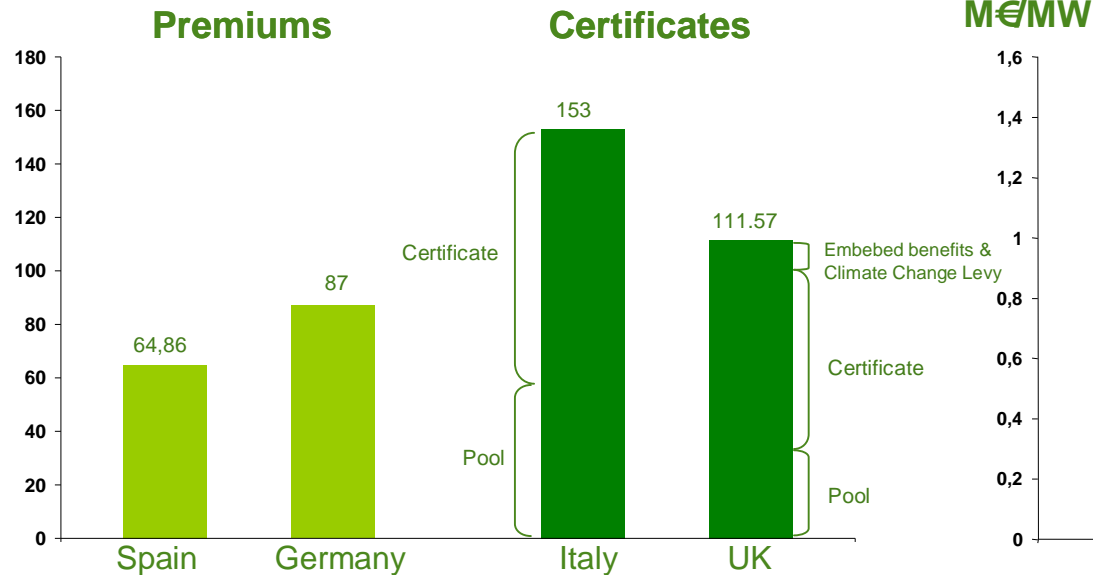
\* By the end of 2004

**PREMIUMS: Successful and effective framework**

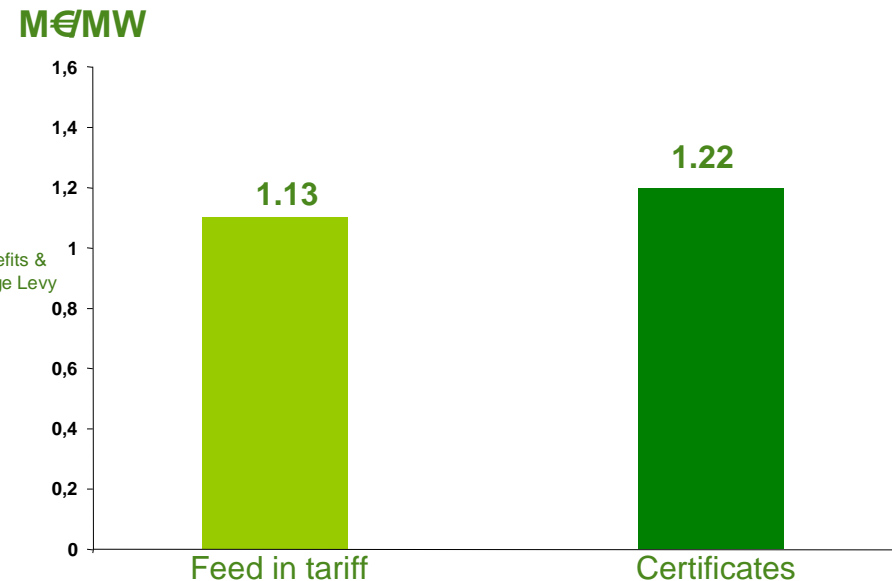
## Feed-in tariffs are also more efficient.

Certificate systems imply higher risks, so investors demand higher profitability and payment

### Remuneration €/MWh



### Wind Energy Sector Average Cost of Transactions 2003-2004



- In 2004, payment per MWh in the certificates system was much higher than with premiums
- In tradable certificates systems, the market price of a MW is higher than premium mechanisms. This implies greater expectations for revenue and higher electricity prices

## Current support framework for wind energy in Spain



- Priority access to the grid.
- The operator may choose between a regulated tariff or market scheme, and must keep the option for at least one year.
- Remuneration is defined for the entire life of the asset.
- There are two additional incentives: reactive energy and voltage dips management, which may solve problems in the system in return to some additional revenues.
- The system can be reviewed every four years, to be applied two years after and only to new assets.



The challenge is to maximize wind production, taking into account power installation and efficient operation, without risking system reliability

- **Wind energy is currently in a mature phase: the sector already is conscious that this energy must change from passive to active, in relation to the system and its necessities.**
- **There is a need for an integrated management of the system, taking into account renewable energies, wind in particular.**
- **The system should treat wind as a conventional energy, but with its particularities, as it does with the rest of technologies.**

## Main Conclusions

- 1. Support systems, rather than wind nor available surface area, are the key factors for renewable energy development.**
- 2. In the EU wind sector, feed-in tariffs systems have proved to be not only more effective, but also more efficient than tradable certificate systems. Certificates imply higher risks, so investors demand higher profitability and payment, which increases the price of the electricity.**
- 3. Investors plan their investments for a period of 20 years, which requires a predictable support system, sustainable in the long term, efficient and easily understandable**
- 4. Renewable energies must be integrated in an effective way into the network. That means that its management must be similar to conventional energies, except for the economic support mechanism**

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