



Policy, Business and Technology: The Virtuous Cycle

Technology to Help Meet Germany's Cleaner Energy Future



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Growth with controlled risk fueled EDP's strategy on renewables



Renewables drivers

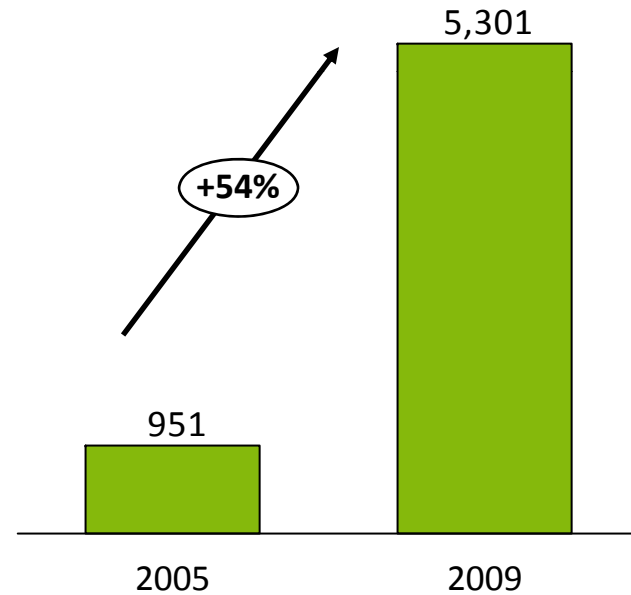
Growth

- Security of supply
- CO2 reduction targets
- Diversified fuel mix
- Fast time-to-market development

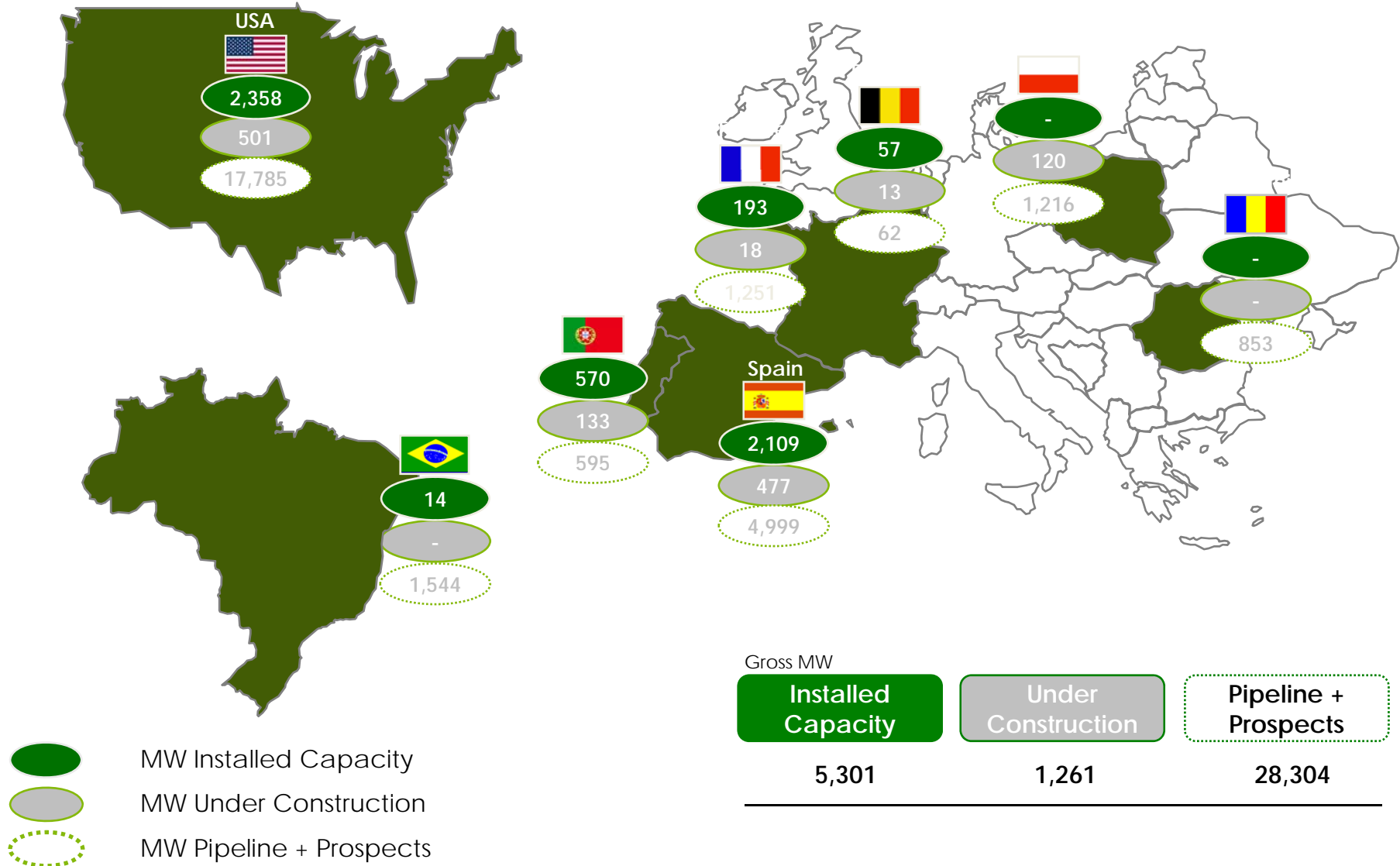
Controlled Risk

- Regulatory support with feed-in-tariffs
- Reduction of emissions factor
- Fuel & CO2 hard hedge

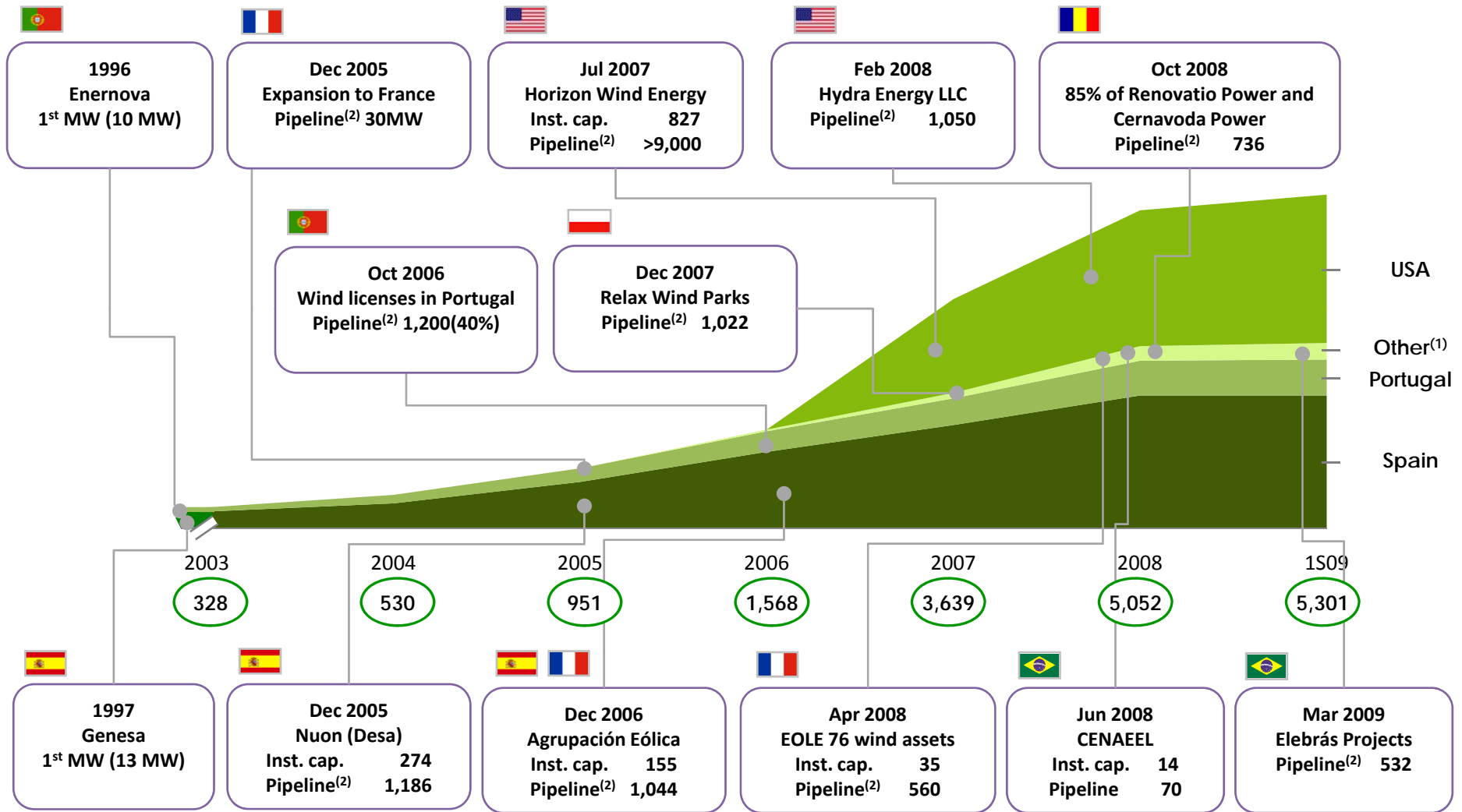
EDPR wind installed capacity (Gross MW)



EDPR expanded its presence in markets that offered growth with a sound supportive regulatory framework



This growth resulted from targeted acquisitions that offered an operational base with good growth prospects



(1) France, Belgium, Brazil, Poland, Romania; (2) Includes pipeline and capacity under construction
 Source: Company information (first half 2009)

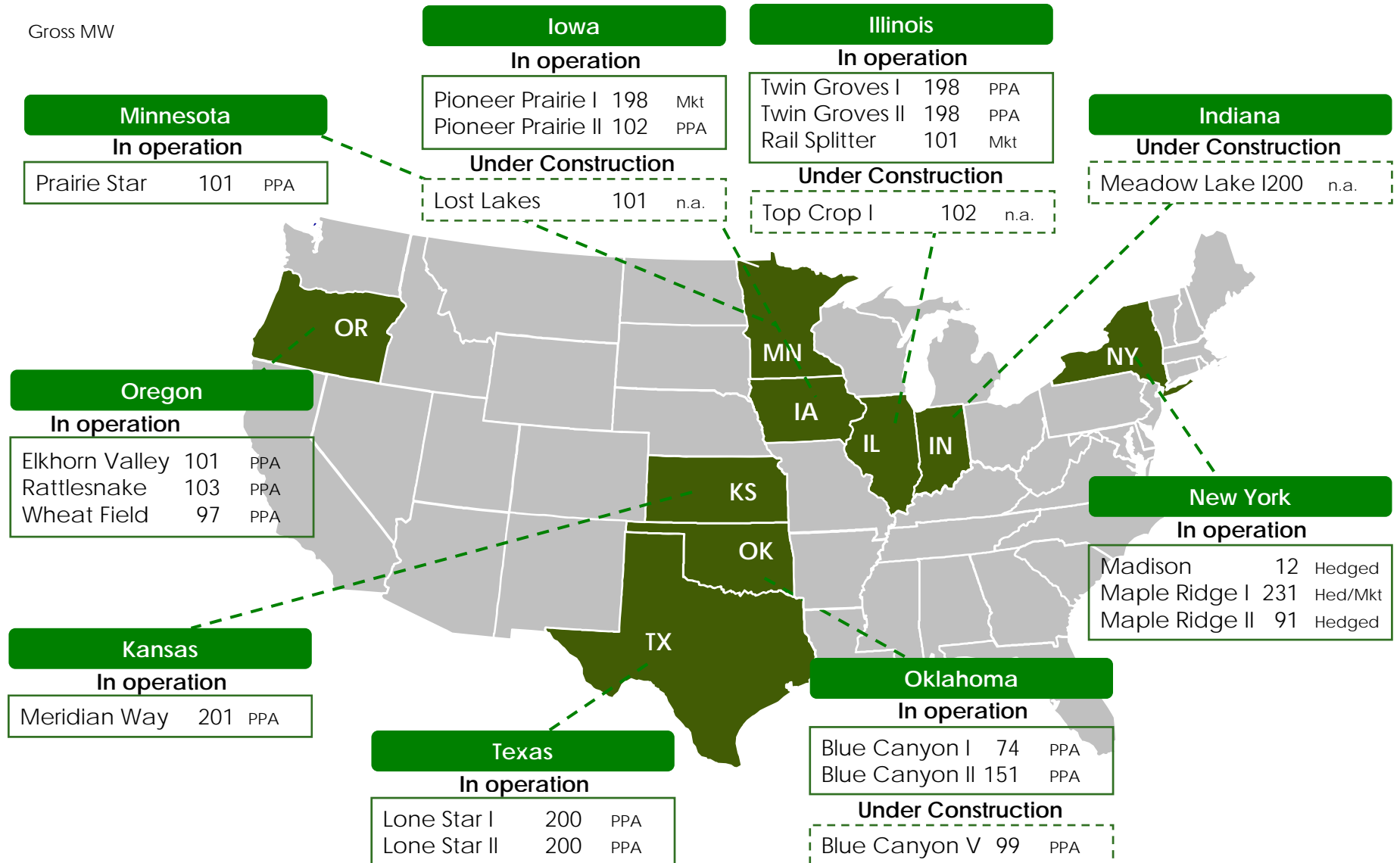
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Gross installed wind capacity (MW)

Horizon operates a diversified portfolio of 18 wind assets (2,257 MW) in 6 different electric markets



Gross MW



Iberian leadership in the renewable spectrum is, to a large extent, a result of Iberian renewable driven policy

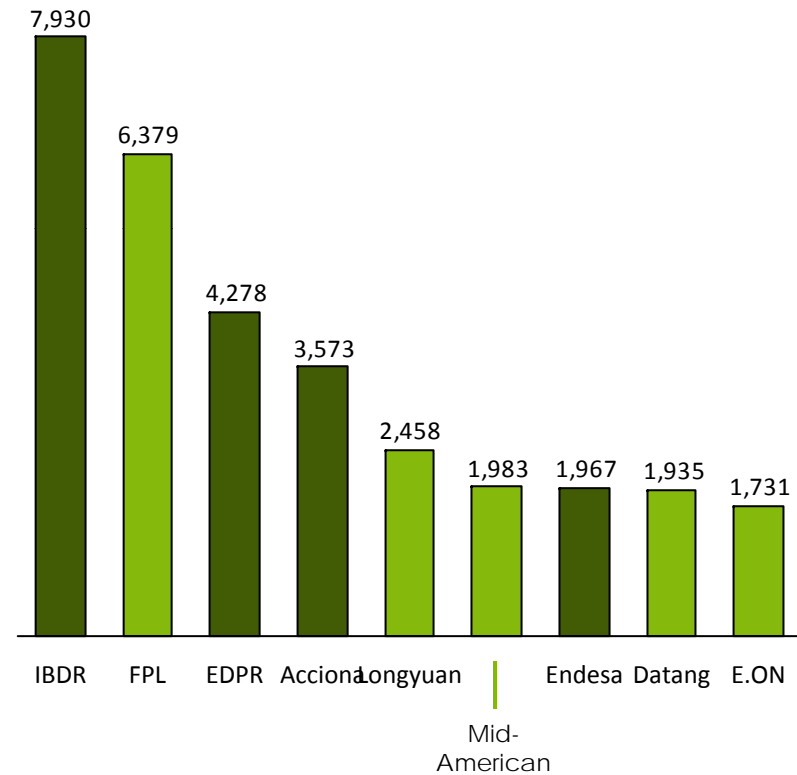


Portugal & Spain policy goals

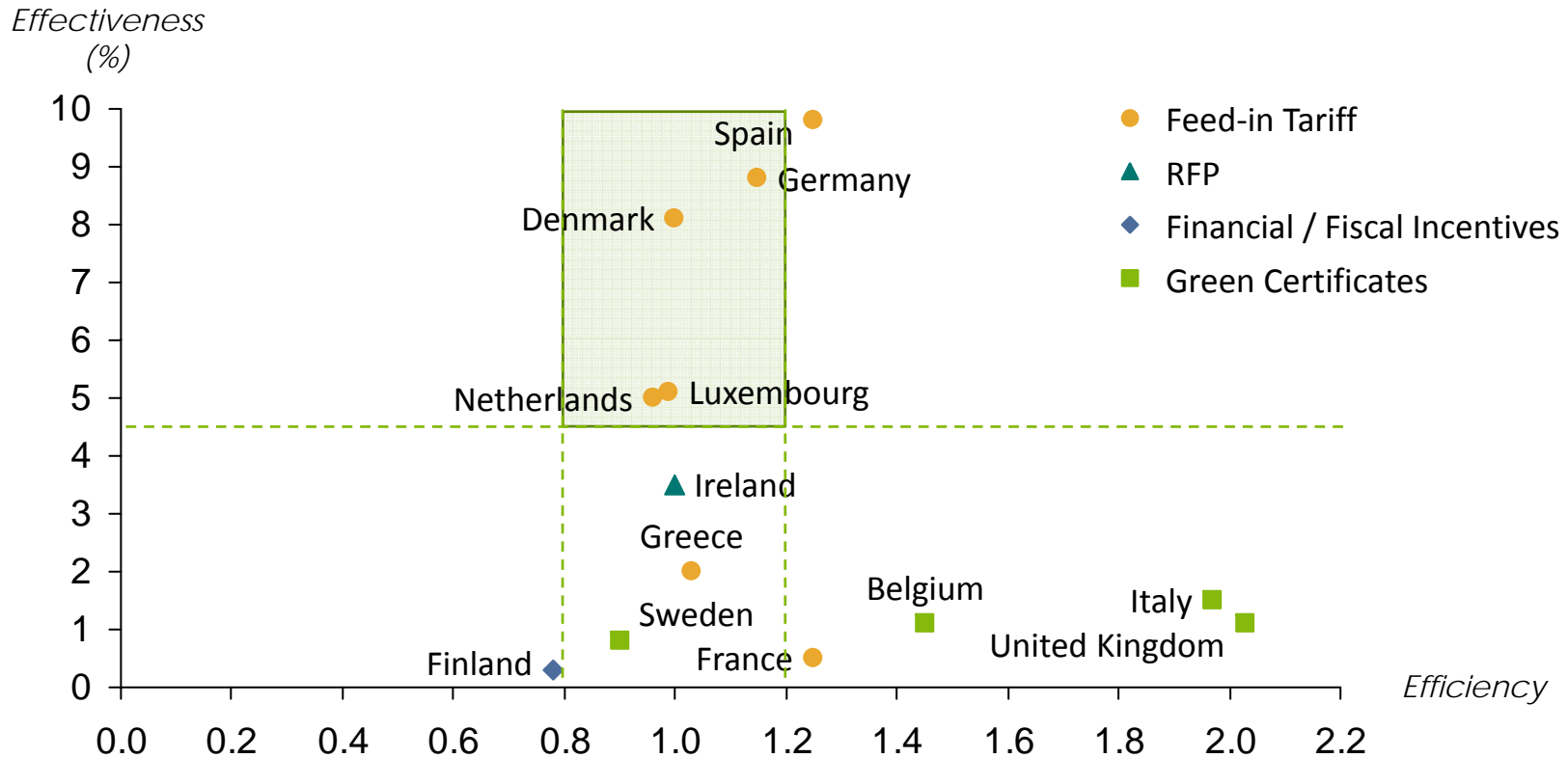
- Energy independence
- Security of supply
- Control of rising and volatile energy costs
- Reduction of emissions
- Development of a new industrial cluster



Global installed renewables rankings



Some types of policies have been more successful than others in spurring growth at the lowest cost



- The majority of the European countries supported the renewable goals through feed-in tariffs
- The European Commission study showed that feed in tariffs spurred growth faster at a lower cost than other supporting regimes

(1) Effectiveness defined as the average generation growth divided by additional potential

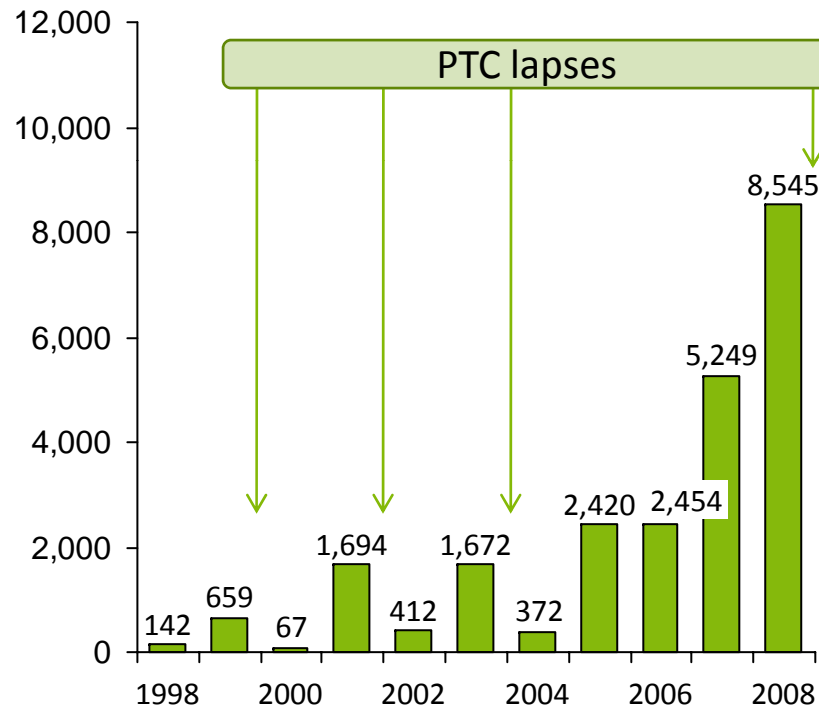
(2) Efficiency defined as the Support level divided by long term costs

Source: COM (2005) 627 final of 7Dec05

In the US, growth has been less steady given instability in policy

Industry growth in US has not been smooth...

Annual Capacity Additions (MW)



...as a consequence of a less clear long term policy

US was the global leader in renewables in the early 90's

PTC was the mechanism to support growth

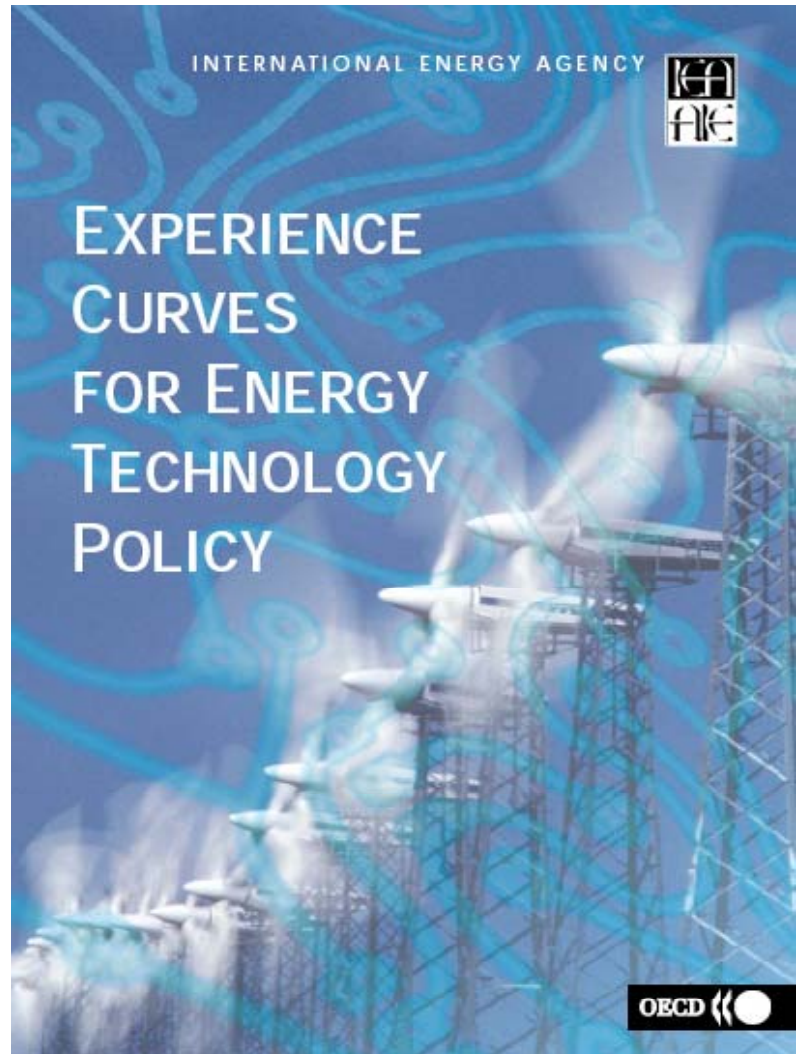
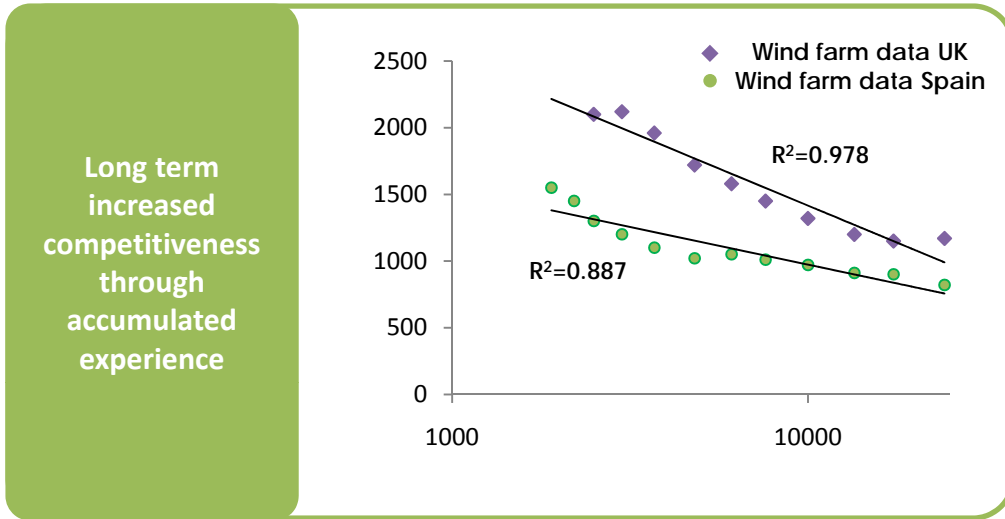
The intermittency and short time frame of extensions prevented companies to plan for long term growth

Business faced waves of growth with uncertain cliffs

The industry has now for the first time a clear incentive framework until 2012

A RES is needed for the continuation of investments and US industry leadership

Well developed policies drive growth that accelerate technology deployment



Wind onshore	Technological advance		
	1990	Today	%change
Turbine capacity (MW)	0.05-0.3	2-3	+1,330%
Rotor diameter (m)	30	120	+300%
Investment cost (2008€MM/MW)	1.6	1.2-1.3	-20%

Source: IEA – Technology Perspectives 2006, Global Energy Decisions – Renewable Generation Technologies (2006)

There is a generation technology dilemma today that favors gas and wind...

Nuclear

- \$4-\$6M/MW (\$4B+ per plant)
- 40-60 yr life and 10 years to build
- Unknown cost and difficult to finance

Coal

- \$2.7M/MW (\$2B per plant)
- 40 yr life and 5-7 years to build
- Technology obsolescence and environment risk

Gas CCGT

- \$1.1M/MW (\$500M per plant)
- 25-30 yr life and 2-3 years to build
- Volatile prices and energy dependence

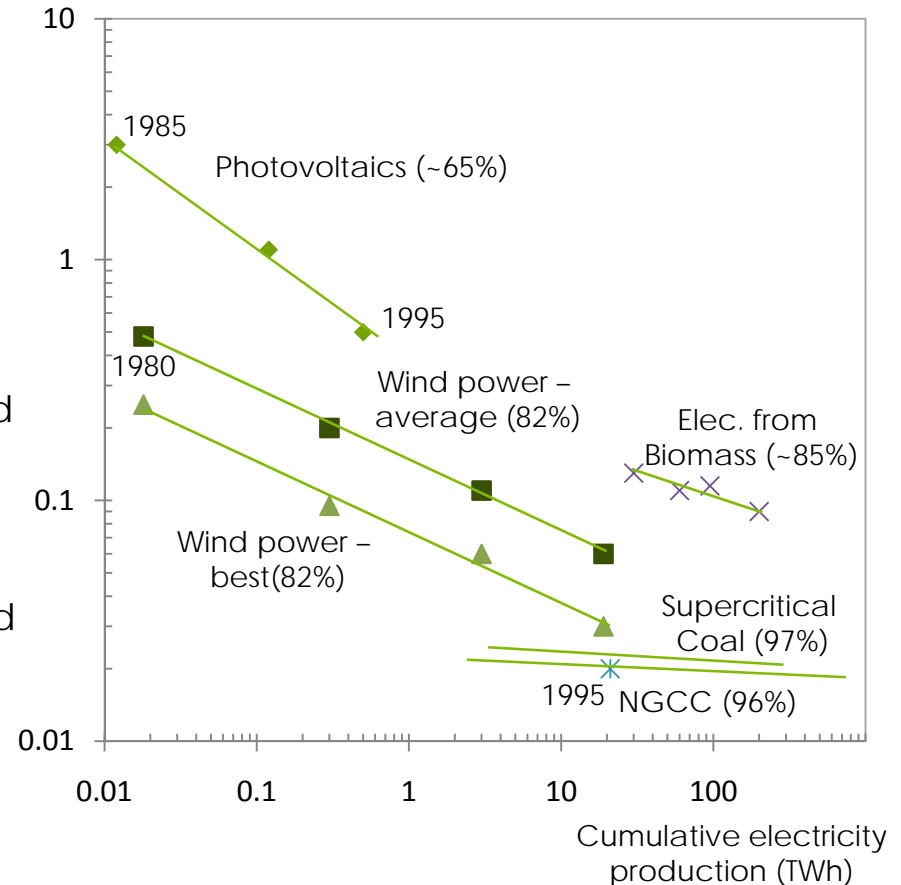
Wind

- \$2M/MW (\$200M per plant)
- 20-25 yr life and 2-3 years to build
- Intermittent and more off-peak based

Solar

- \$4M/MW (mega projects) to \$10M/MW (residential)
- 20+ yr life and 2-3 years to build
- Too costly for now

Cost of electricity (ECU(1990)/kWh)



Notes: Assumes average plant size for new plants of Nuclear – 1,100MW, Coal – 800MW, Gas CCGT – 450MW, Wind – 100MW

...but new technologies are emerging on the demand side that might completely change the landscape

Energy Efficiency

- Breaks the common way of solving through supply the energy equation
- New technologies and standards with negative cost
- Longer time to deploy than the opportunity size hints it
- Direct reductions in emission levels and energy dependence

Smart Grid

- Enables participation of demand in the market
- Better price signaling and cost allocation of behaviors
- Better use of the installed generation and wires capacity
- Lower congestion costs

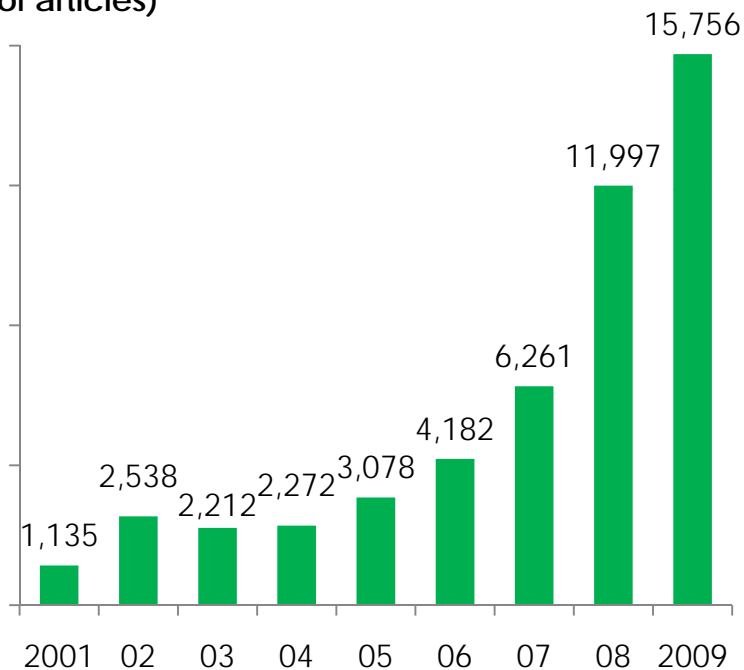
Electric Cars

- Distributed storage as game changer of the just-in-time nature of the power industry
- Significant increase of primary energy efficiency
- Emissions rates are <30% of gasoline, diesel and hybrids
- Enables much higher renewable penetration levels

Electric vehicles have been capturing recently a lot of attention and countries are beginning to make moves

Electric vehicles are in the news...

(# of articles)



... and countries are taking positions



United States

- Over \$5 billion through grants and tax cuts to develop of electric technologies
- Tax credits for EV customers



China

- China set a target of annually producing 500,000 electric and hybrid vehicles between 2009-2011, as part of the US\$600 billion auto industry stimulus package,
- Tax and cash incentives for automakers and tax cuts for customers



Germany

- Car tax exemption for 5 years to EV customers
- Recently, the German government launched a \$700 million campaign to see 1 million electric cars on the roads by 2020

“...electric vehicles provided opportunities for China to "catch up with and exceed developed countries" in the auto industry.”

Wan Gang, Chinese minister of science & technology
Wall Street Journal, Sep 8, 2009

Source: DOE; Factiva; Press search