



EWEA

THE EUROPEAN WIND ENERGY ASSOCIATION

Wind Energy –The Facts

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Chief Operating Officer
European Wind Energy Association

Riga
22 May 2009



WHAT IS THE EUROPEAN WIND ENERGY ASSOCIATION?



EWEA is the **voice of the wind industry**, actively promoting the utilisation of wind power in Europe and worldwide.

Resources are focussed on **lobbying, communication and policy activities**, and responding to enquiries from our member organisations.



MORE THAN 600 MEMBERS FROM OVER 60 COUNTRIES



Manufacturers covering 90% of the world wind power market

Component suppliers

Research institutes

National wind and renewables associations

Developers

Electricity providers

Installation & logistics

Operation & maintenance

Finance and insurance companies

Consultants

This combined strength makes EWEA the world's largest and most powerful wind energy network

CONTENTS



Wind Energy –The Facts



Benefits of wind energy



Latvian wind market

WIND ENERGY –THE FACTS

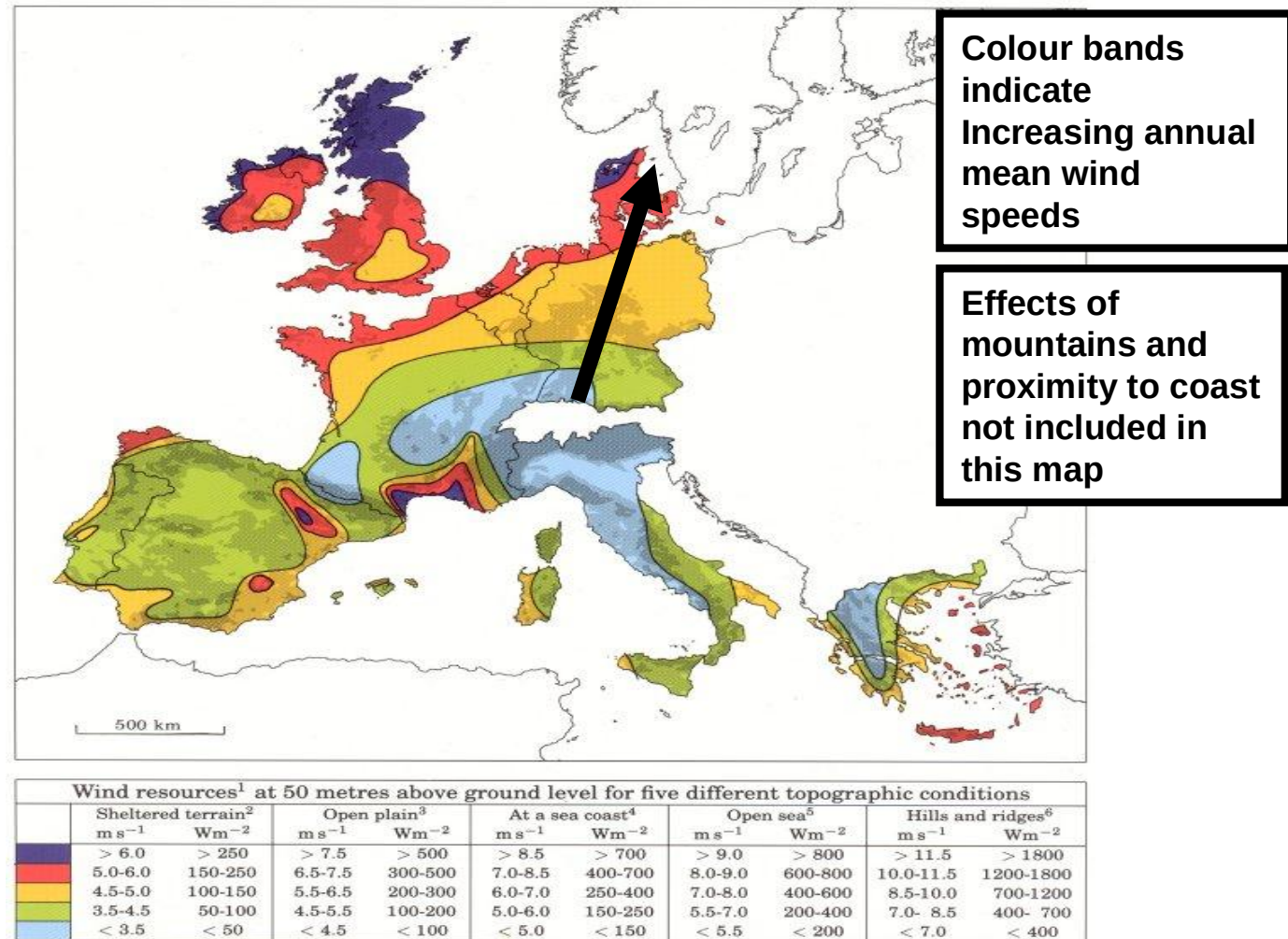


- I. Technology
- II. Grid Integration
- III. The Economics of Wind Power
- IV. Industry and Markets
- V. Environment
- VI. Scenarios and targets

I. TECHNOLOGY: Wind resource estimation 1/2

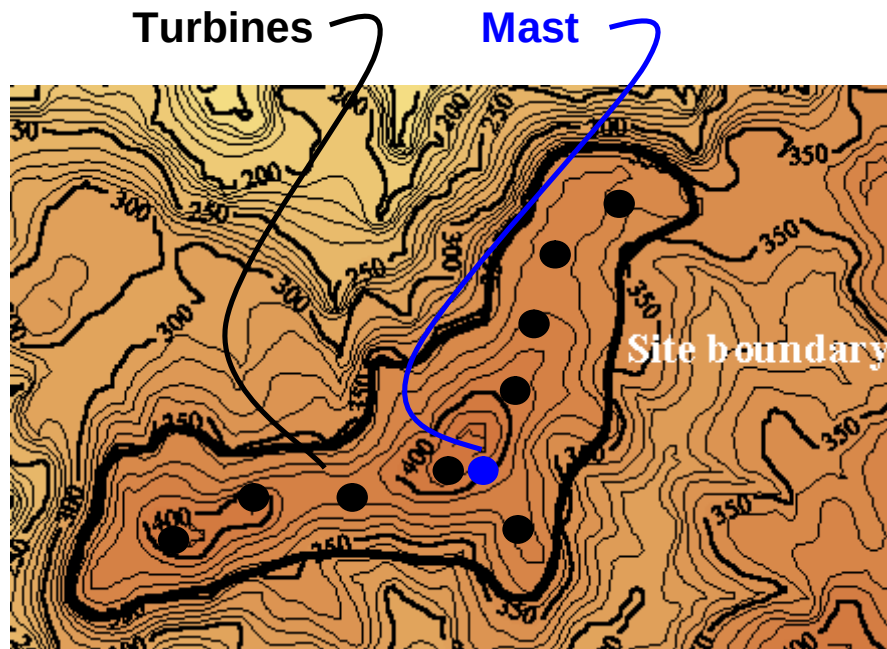
Wind maps are
a good starting
point

But at each site
wind
measurements
and topography
needs to be
taken into
account



Onshore wind energy resource, as computed on a broad
scale for the European Wind Atlas.

I. TECHNOLOGY: Wind resource estimation 2/2

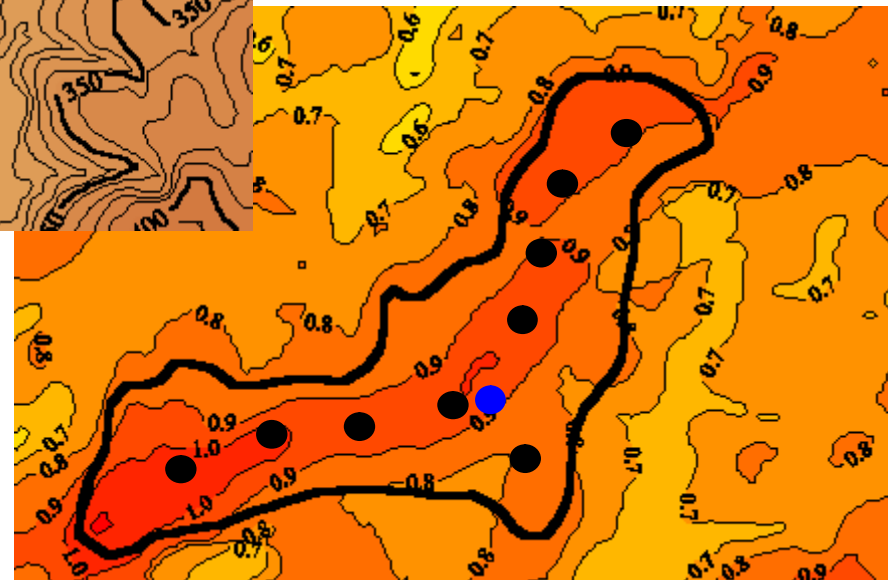


Computational flow modelling
initiated from wind conditions at
mast

Input - topography

Have predicted wind conditions
at each turbine location

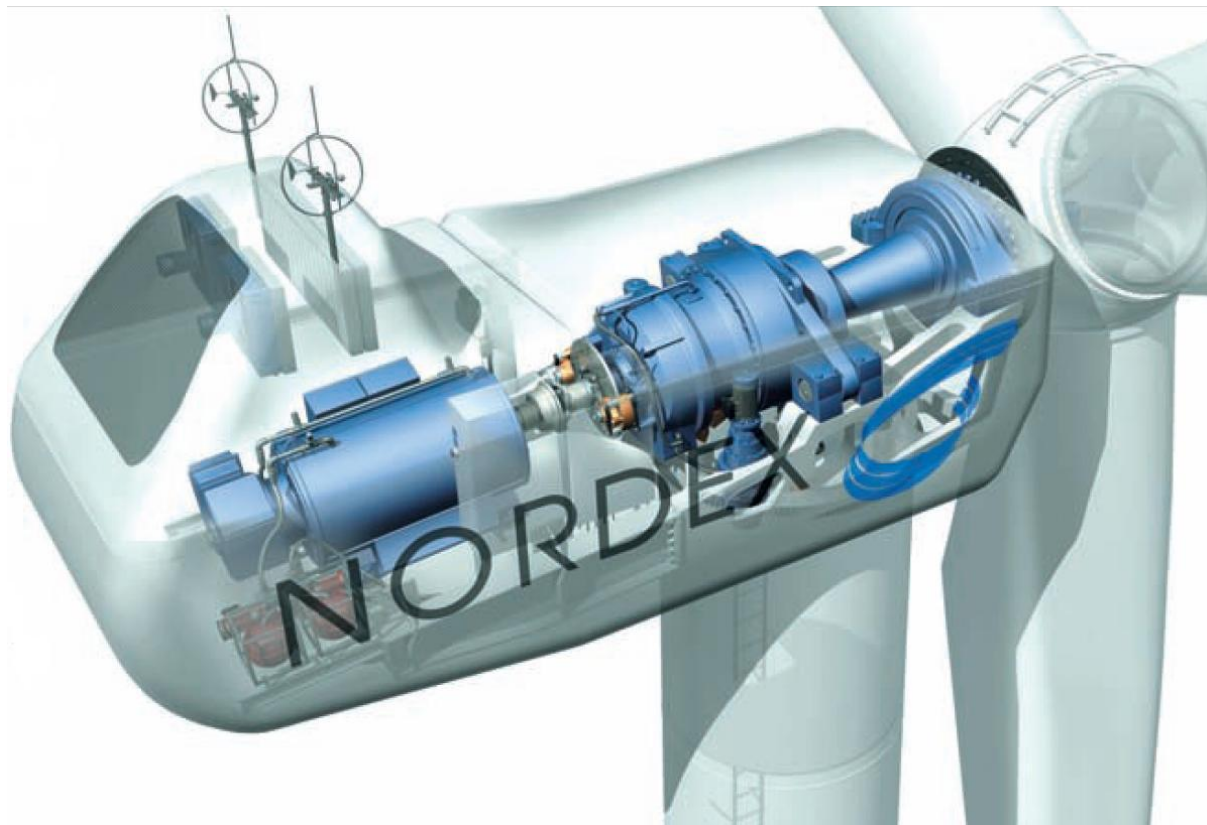
In this example annual mean
wind speed varies by 30 % over
site area



Output normalised wind speed

I. TECHNOLOGY: Wind turbine 1/2

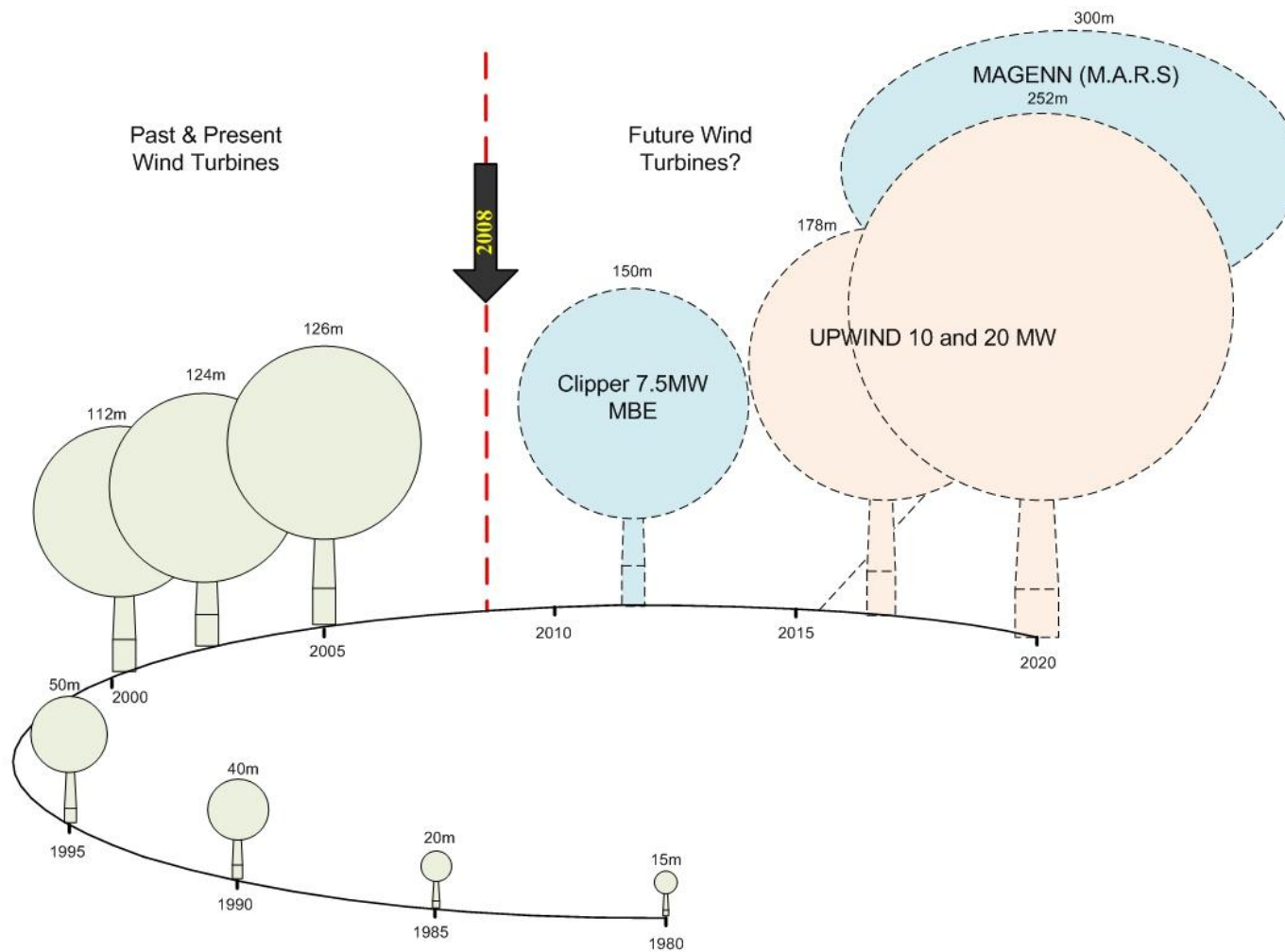
WIND TURBINE –WHAT'S INSIDE?



I. TECHNOLOGY: Wind turbine 2/2

WIND TURBINES

How big
will they
get?



II. GRID INTEGRATION 1/3

Wind power fits well in power systems, the need for additional integration efforts depend on:

- Wind power penetration
- Flexibility of the power system in question:
 - Generation (up and down regulation capability)
 - Demand management and storage
 - Interconnection (available capacity)
 - Power market characteristics (e.g. for balancing services): time, geographical area.

Flexibility varies widely in EU. Integration efforts (e.g. moving to more flexibility) can be implemented by suitable market design (rules, incentives).

THE MAIN CHALLENGES

Increased power flows as wind power capacity increases

Distance of wind power from load centres

ISSUES

European grid is weak on interconnections

Often weak distribution grids

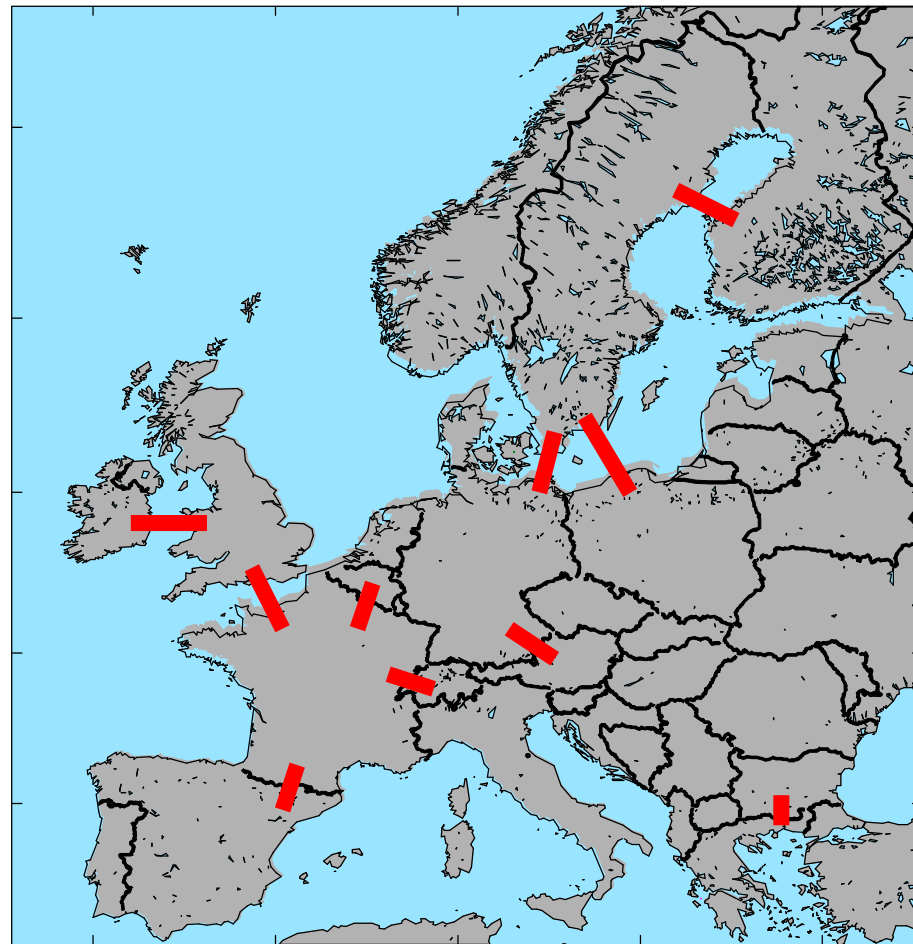
Interconnection projects face long lead times (10 years) due to planning obstacles.

Cost allocation : example approach = Infrastructure planning law in Germany (offshore grids for wind power to be built by TSO s).

II. GRID INTEGRATION 3/3

Large amounts of wind power (2020, 2030 scenarios) will increase congestions in interconnectors

Prediction errors results affect actual cross-border flow during a substantial part of the time → can aggravate the congestions.



III. ECONOMICS OF WIND POWER: Costs 1/2



Cost structure of a typical 2 MW wind turbine installed in Europe (€²⁰⁰⁶)

	INVESTMENT (€1,000/MW)	SHARE OF TOTAL COST %
Turbine (ex works)	928	75.6
Grid connection	109	8.9
Foundation	80	6.5
Land rent	48	3.9
Electric installation	18	1.5
Consultancy	15	1.2
Financial costs	15	1.2
Road construction	11	0.9
Control systems	4	0.3
TOTAL	1,227	100

Source: EWEA 2009 report "The Economics of Wind Energy"

- Æ Investment costs
- Æ O&M costs
- Æ Electricity production
- Æ Average wind speed
- Æ Turbine lifetime
- Æ Discount rate

- Æ Wind energy: 75% of costs paid upfront
- Æ Conventional power: less capital intensive –
uncertain fuel and carbon costs

III. ECONOMICS OF WIND POWER: Costs 2/2

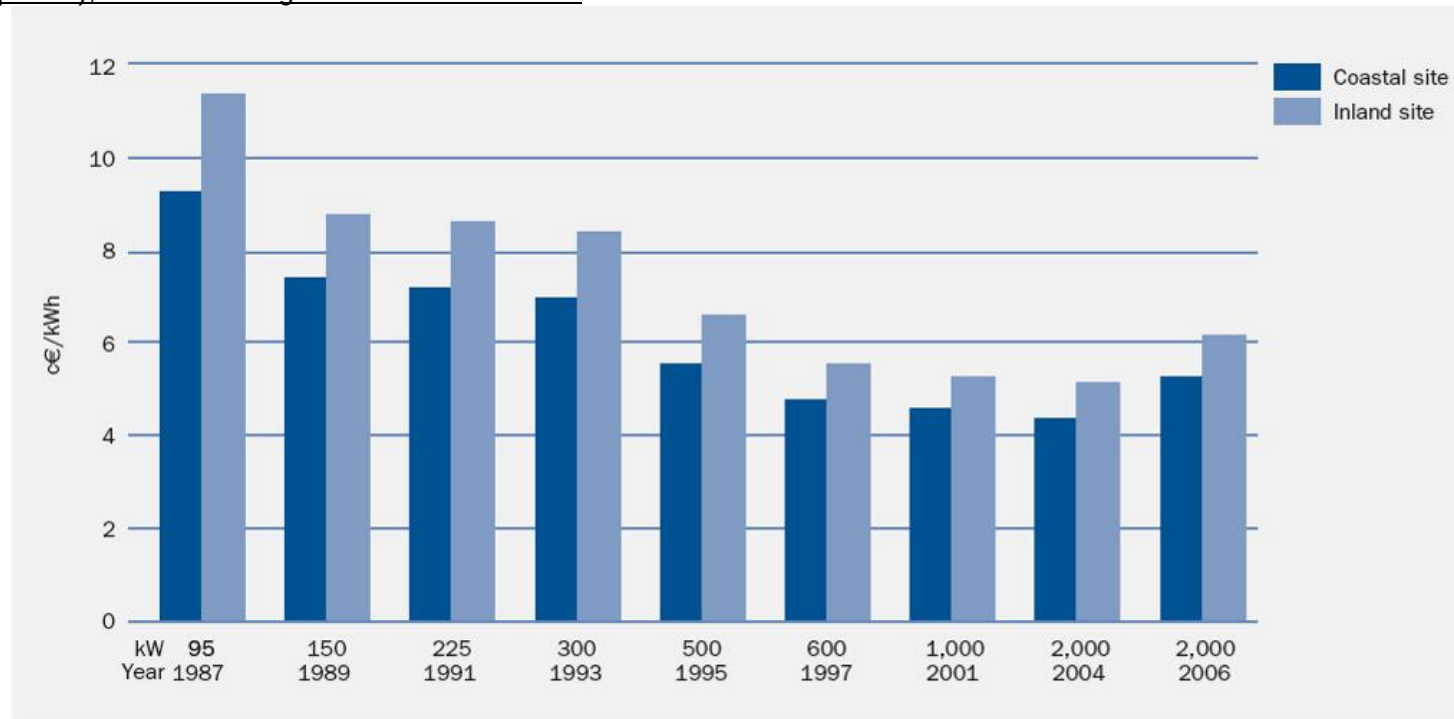
Production costs are decreasing

ÆTrend towards larger turbines

ÆTrend towards improved cost-effectiveness

ÆCosts have gone down by more than 40%

Total wind energy costs per unit of electricity produced, by turbine size (c €/kWh, constant €²⁰⁰⁶ prices), and assuming a 7.5% discount rate



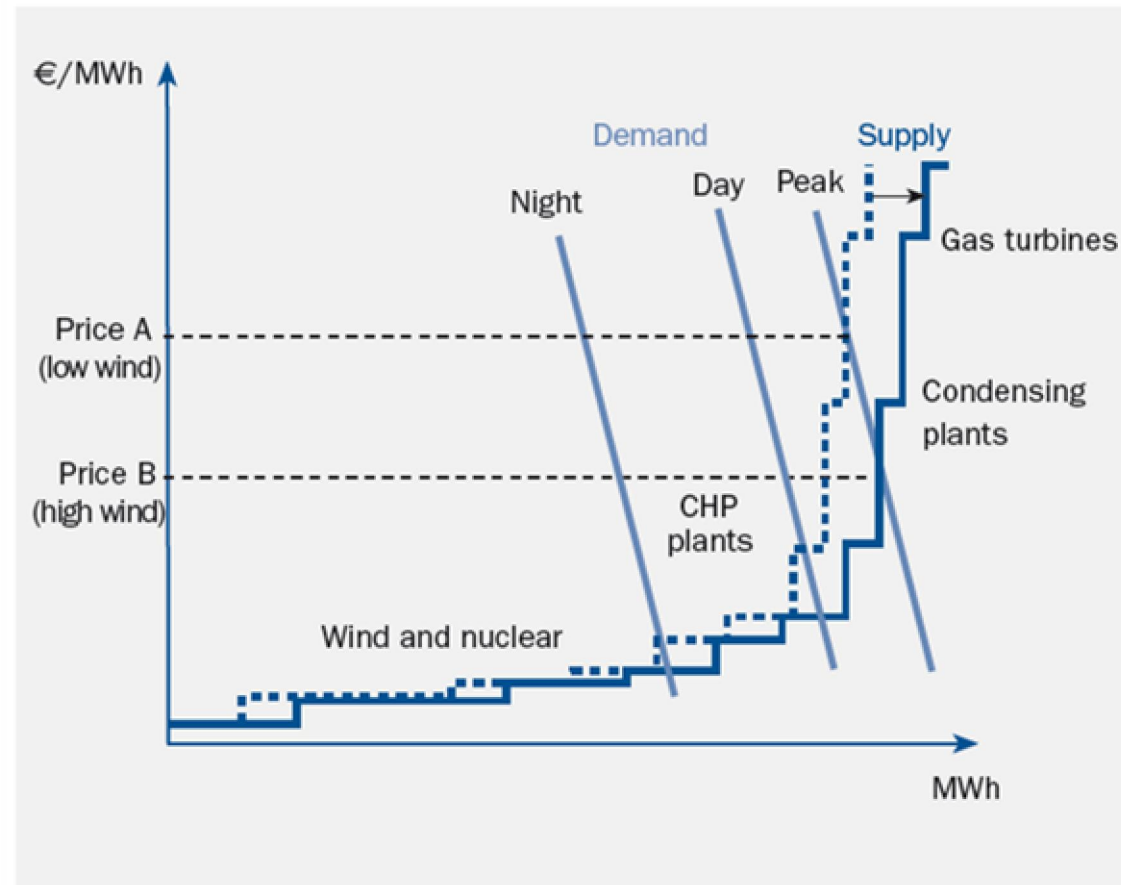
Source: EWEA 2009 report "The Economics of Wind Energy"

III. ECONOMICS OF WIND POWER: Electricity price

Wind energy reduces power price

- Æ Impact of wind power depends on time of the day
- Æ High demand and high wind impact the spot power price significantly
- Æ Lower power spot price is beneficial to all consumers

How wind power influences the power spot price at different times of day

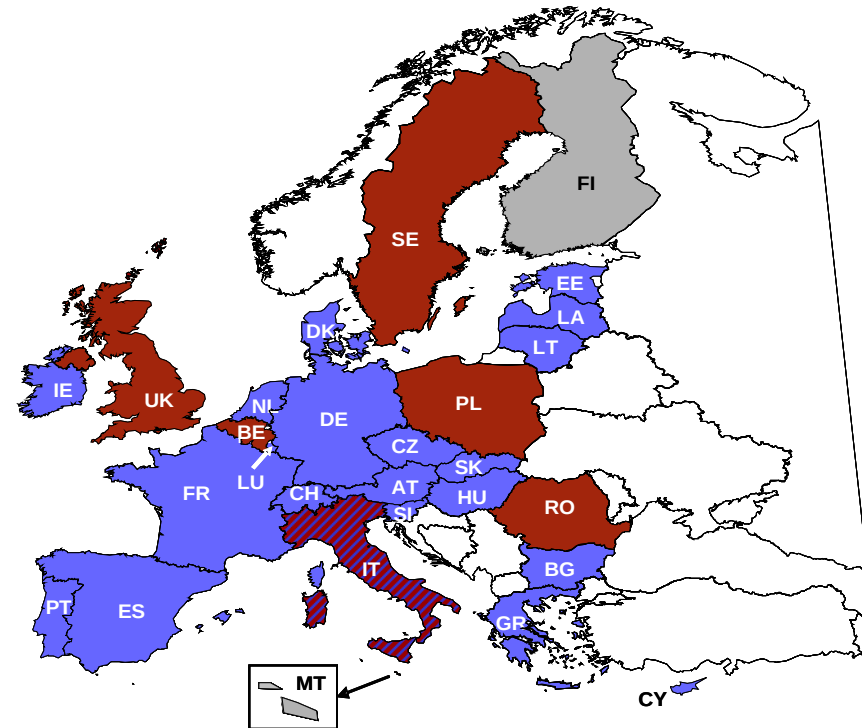


Source: EWEA 2009 report "The Economics of Wind Energy"

IV. INDUSTRY AND MARKETS: Support schemes for RES-E 1/2

National support schemes

- Each Member State can choose its own support scheme
- Strong tendency towards:
 - Feed-in tariffs
 - Quota obligations with tradable green certificates



■ Feed-in tariff
■ Quota/ TGC

■ Tax incentives/ Investment grants

IV. INDUSTRY AND MARKETS: Support schemes for RES-E 2/2



1. Feed-in tariffs (FIT)

Renewable electricity can be fed into the grid at a guaranteed tariff for a determined period of time

2. Quota obligation with tradable green certificates (TGC)

Additional revenue above market price from selling TGCs

3. Tender procedures

In a bidding round projects with the lowest generation costs can obtain financial support

4. Incentives

Tax incentives or investment grants

IV. INDUSTRY AND MARKETS: Employment 1/2

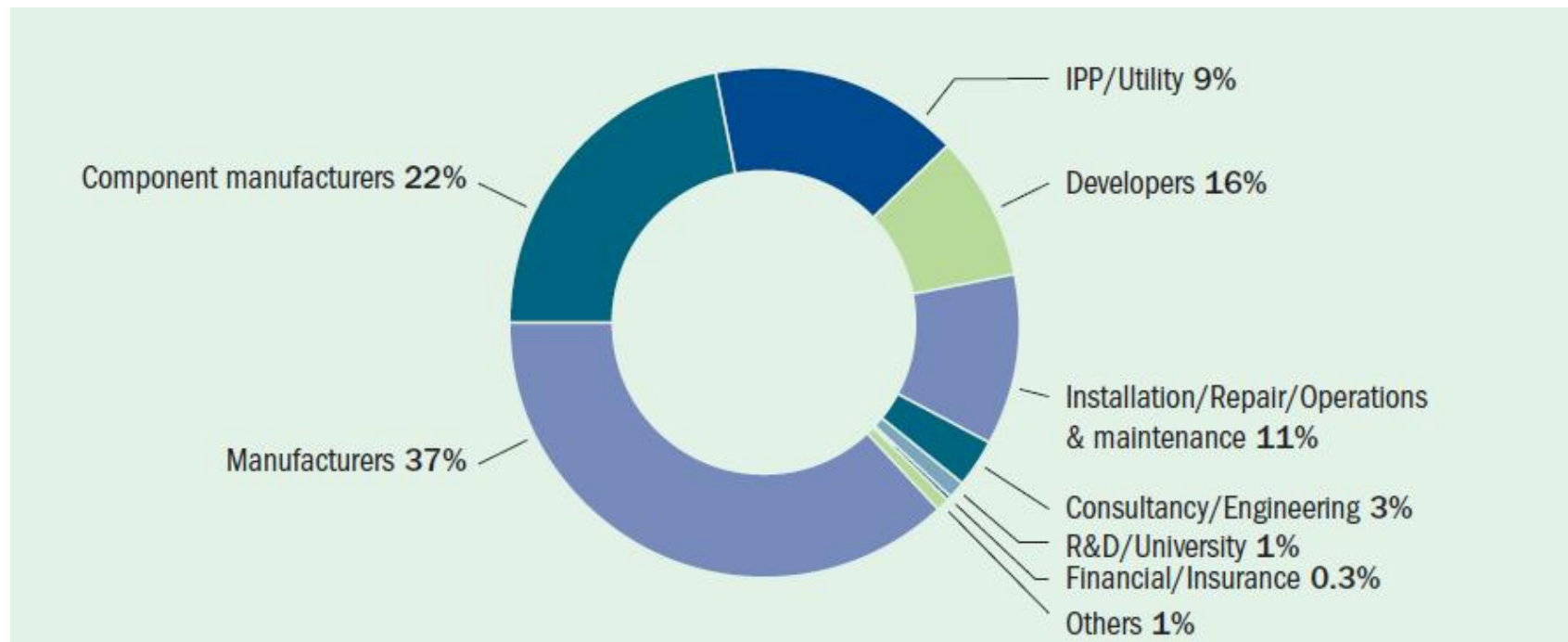


What is the current employment situation?

- The EU wind energy sector directly employed approximately **108,600 people** in 2007
- Including indirect jobs, the sector employed **154,000 people**
- Direct employment has increased by **60,237 (125%)** since 2002
- On average, the wind energy sector in Europe has created **33 new jobs every day, seven days a week over the past five years**
- Wind turbine and component manufacturers are responsible for the **59%** of direct wind energy employment

IV. INDUSTRY AND MARKETS: Employment 2/2

Employment breakdown across sectors



Global environmental benefits

- Wind energy is a clean energy source

Local environmental impacts

- Are site-specific, vary among the different species and should be put in context
- Can be avoided/minimised: the role of environmental assessments, mitigation and compensation measures

Conclusions and recommendations

- Achieving the 20% RES target while respecting biodiversity

Environmental Positive Impacts

Wind energy also offers an opportunity to practice ecological restoration:

- Changes in land management next to wind farms may benefit the creation of new vegetation and animal habitats
- Wind farms may act as refuge if hunting is not allowed within the wind farm area (new bird species appearing in the area)
- Restoration of blanket bogs, peat and wetlands –both between and around the turbines

Any impacts of wind energy should not be viewed in isolation. They should be judged against the far more serious environmental impacts of producing electricity from other energy sources

CONTENTS



Wind Energy –The Facts



Benefits of wind energy



Latvian wind market

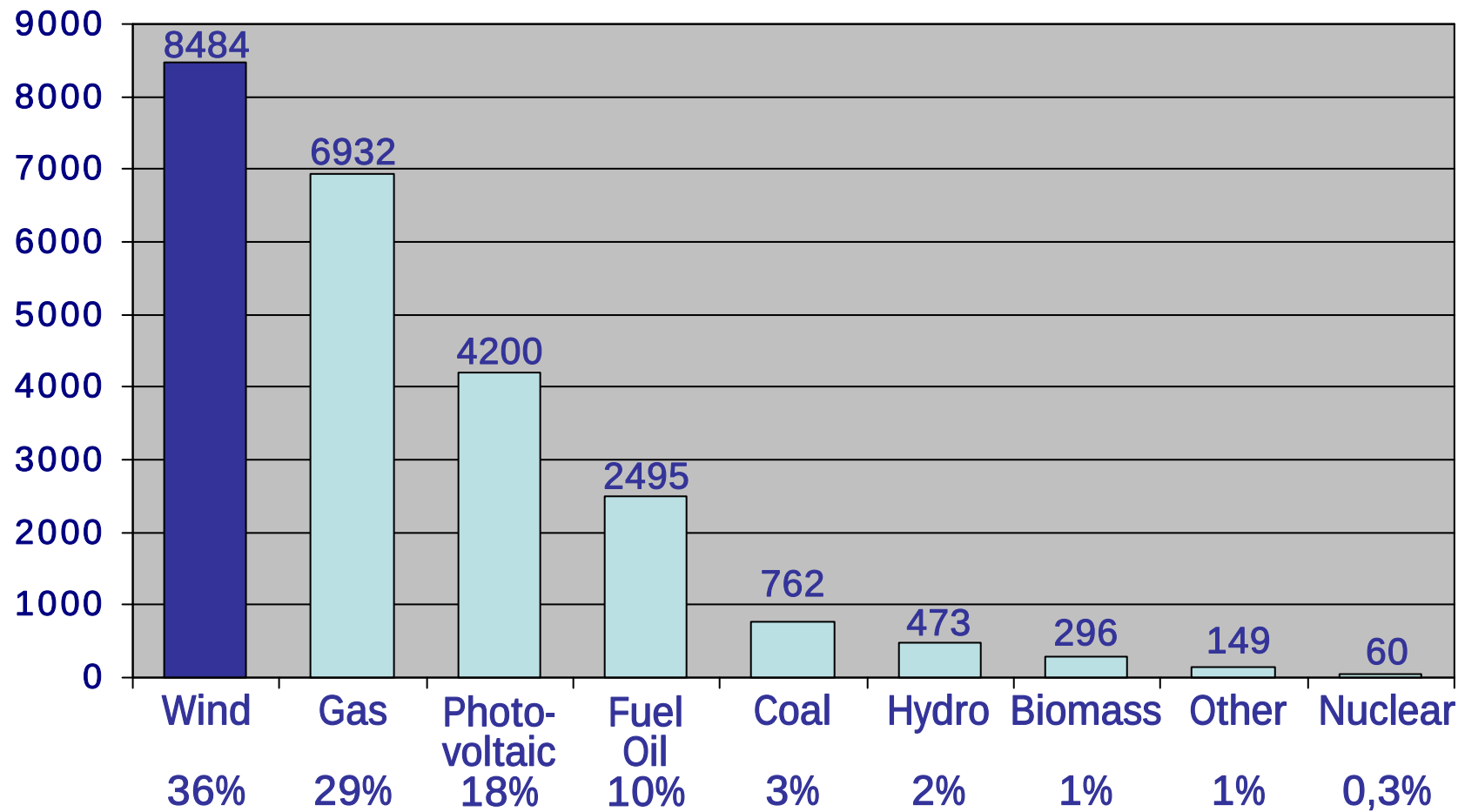
EU is importing 54% of its energy...

	EU share of proven global reserves	Years of domestic production
Oil	0.5% - 0.8%	7.7 –7.8 years
Gas	1.4% - 2%	14.4 –14.8 years
Coal	3.5%	50 years
Uranium	1.9%	

Source: European Commission 2008

WIND LEADS THE EU POWER SECTOR

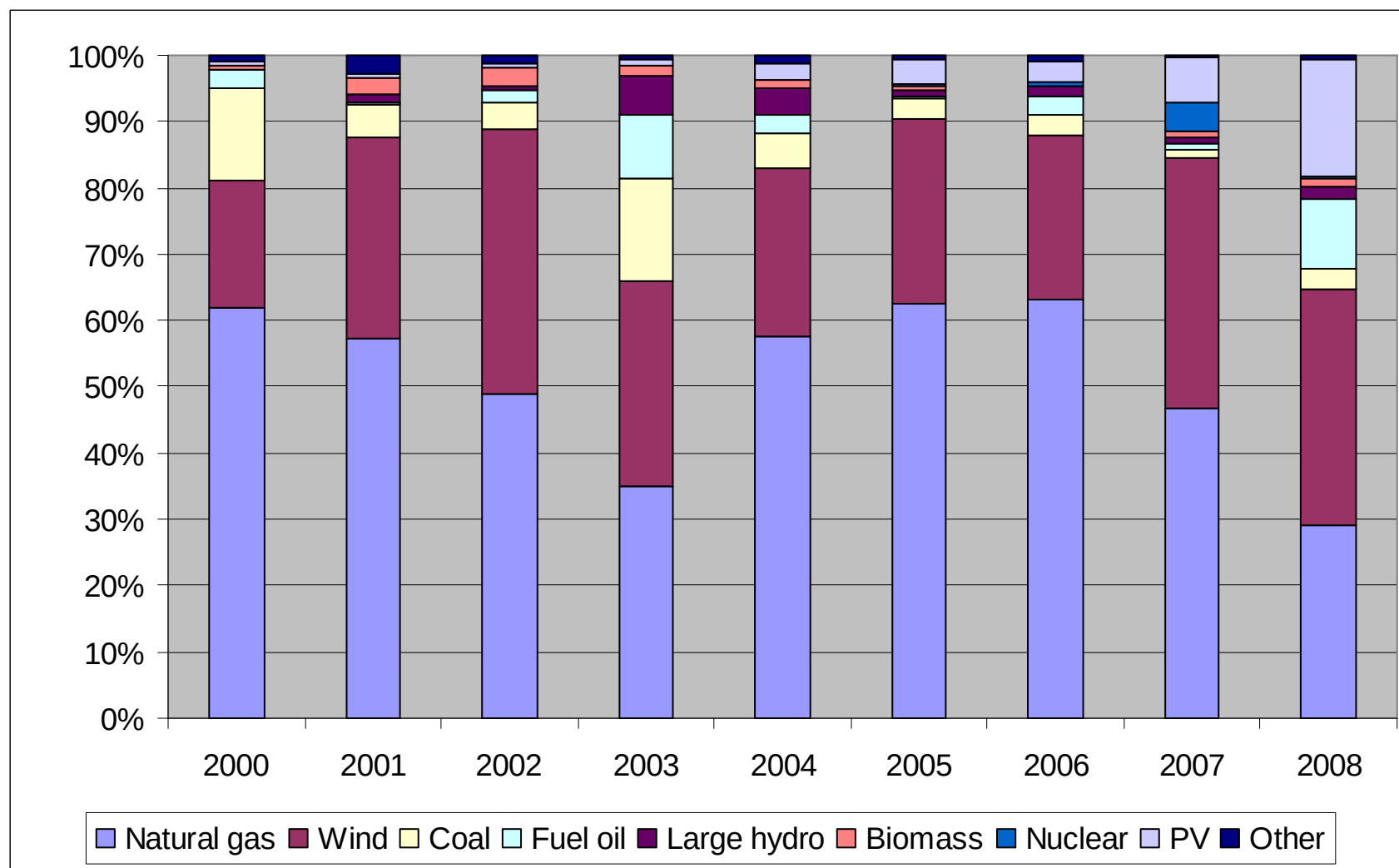
NEW POWER CAPACITY INSTALLED IN 2008 Total installed: 23,851 MW



Note: Preliminary figures for solar photovoltaic installations

Source: EWEA, EPIA and Platts PowerVision

NEW CAPACITY INSTALLED BY ENERGY SOURCE IN EU (2000-2008)



Source: Platts PowerVision 2008

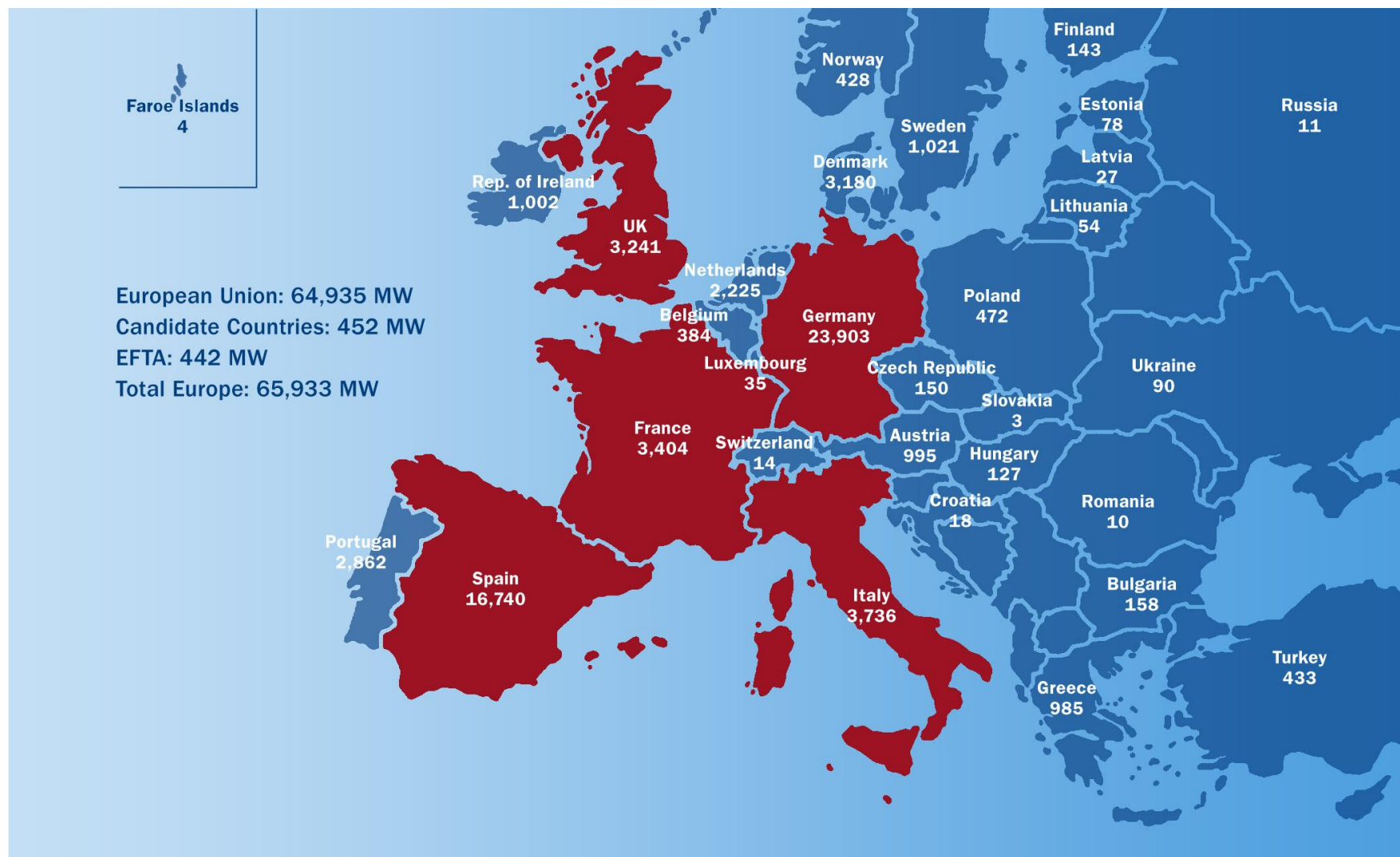


EU TOP 5 WIND ENERGY CAPACITY



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Source: EWEA Wind Map 2008



WIND ENERGY IN EU-27 –2008 FACTS (I)



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- Æ 65 GW installed capacity, incl. 1.47 GW offshore
- Æ Annual installations of 8.5 GW, incl. 0.35 GW offshore
- Æ Electricity production of 142 TWh
- Æ Meeting 4.2% of total EU electricity demand
- Æ Providing power equivalent to the needs of 35 million average EU households



WIND ENERGY IN EU-27 –2008 FACTS (II)



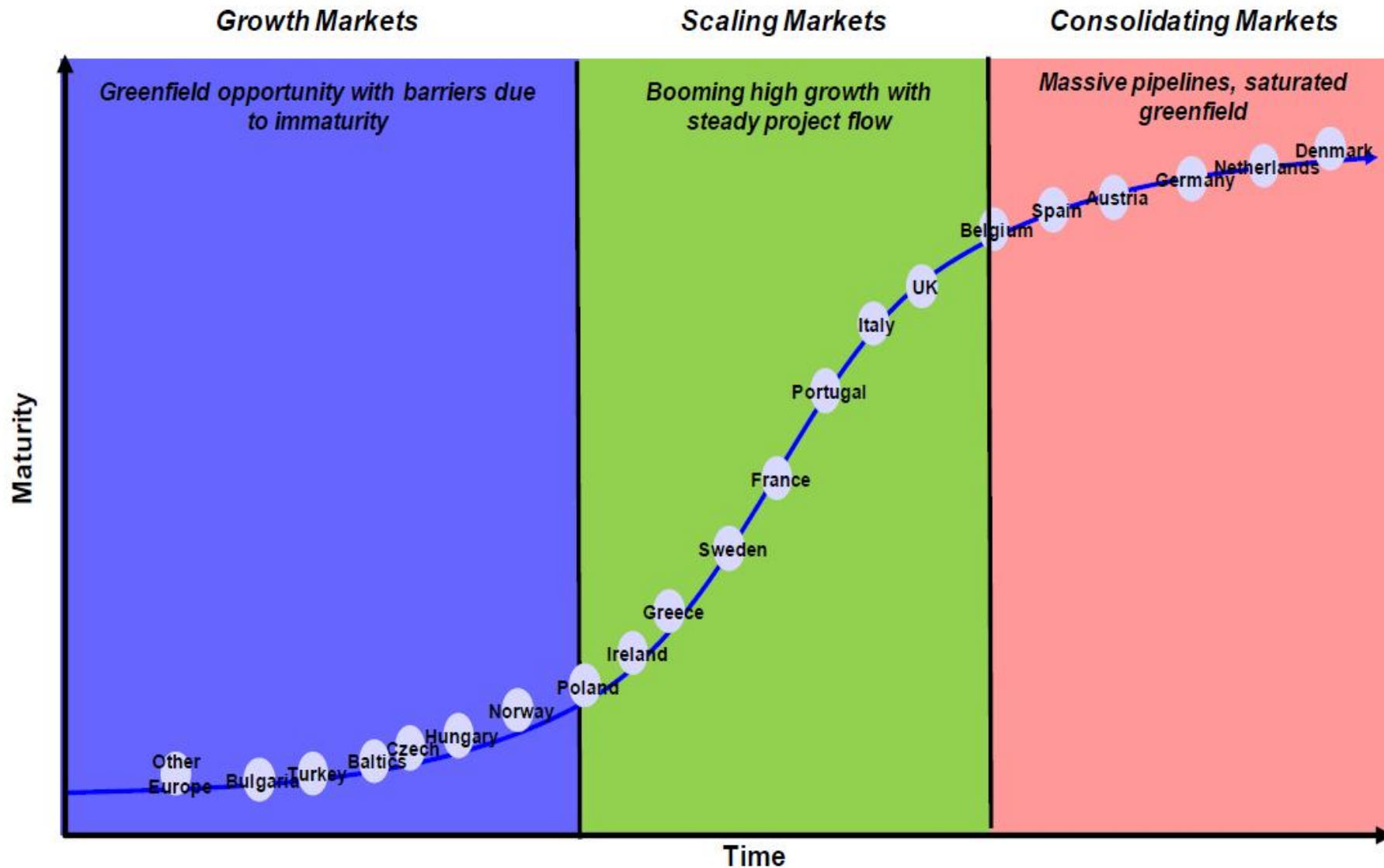
- Æ Avoiding 108 Mt of CO₂ –equivalent to taking more than 50 million cars off the road (20% of the EU car fleet) and equal to 31% of the EU-15's Kyoto obligation
- Æ Annual avoided fuel cost of €5.4 billion
- Æ Annual avoided CO₂ costs of approximately €2.4 billion
- Æ Annual investments in wind turbines of €11 billion



ONSHORE MARKETS ARE DEVELOPING AT THREE SPEEDS



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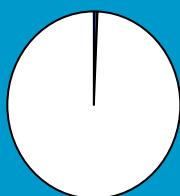


Source: Emerging Energy Research

WIND ENERGY EXPANSION

Rising energy demand and contribution from wind power

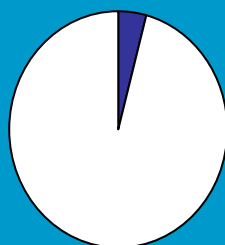
1980s-1990s



Two decades to
install 0.9% of EU
electricity demand

Demand:
2,577 TWh

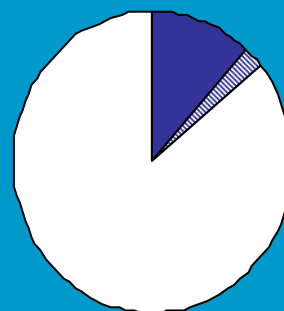
2008



Accelerating pace:
reaching 4.2%
end 2008

Demand:
3,380 TWh

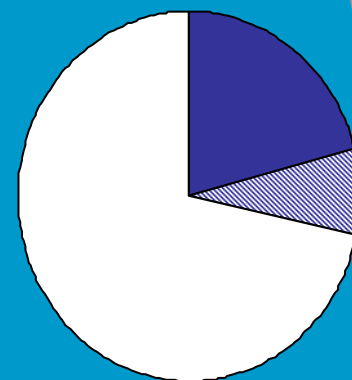
2020



11.6%-14.3%
despite growing
demand

Demand:
4,107 TWh

2030



Meeting between
20.8% & 28.2%
of the EU need

Demand:
4,503 TWh

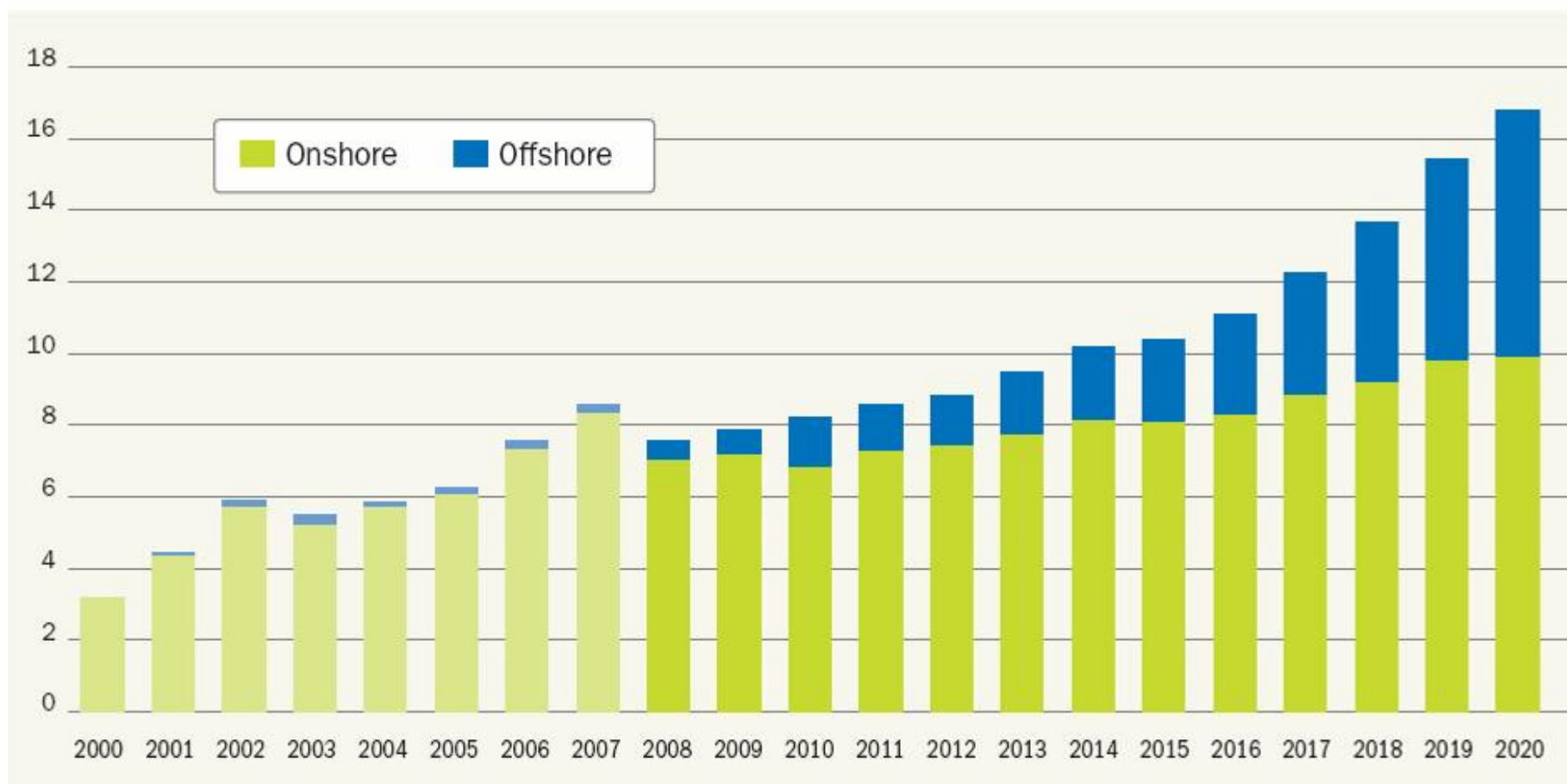


EU 27 - WIND ENERGY ANNUAL INSTALLATION 2000-2020 (GW)



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Source: EWEA

CONTENTS



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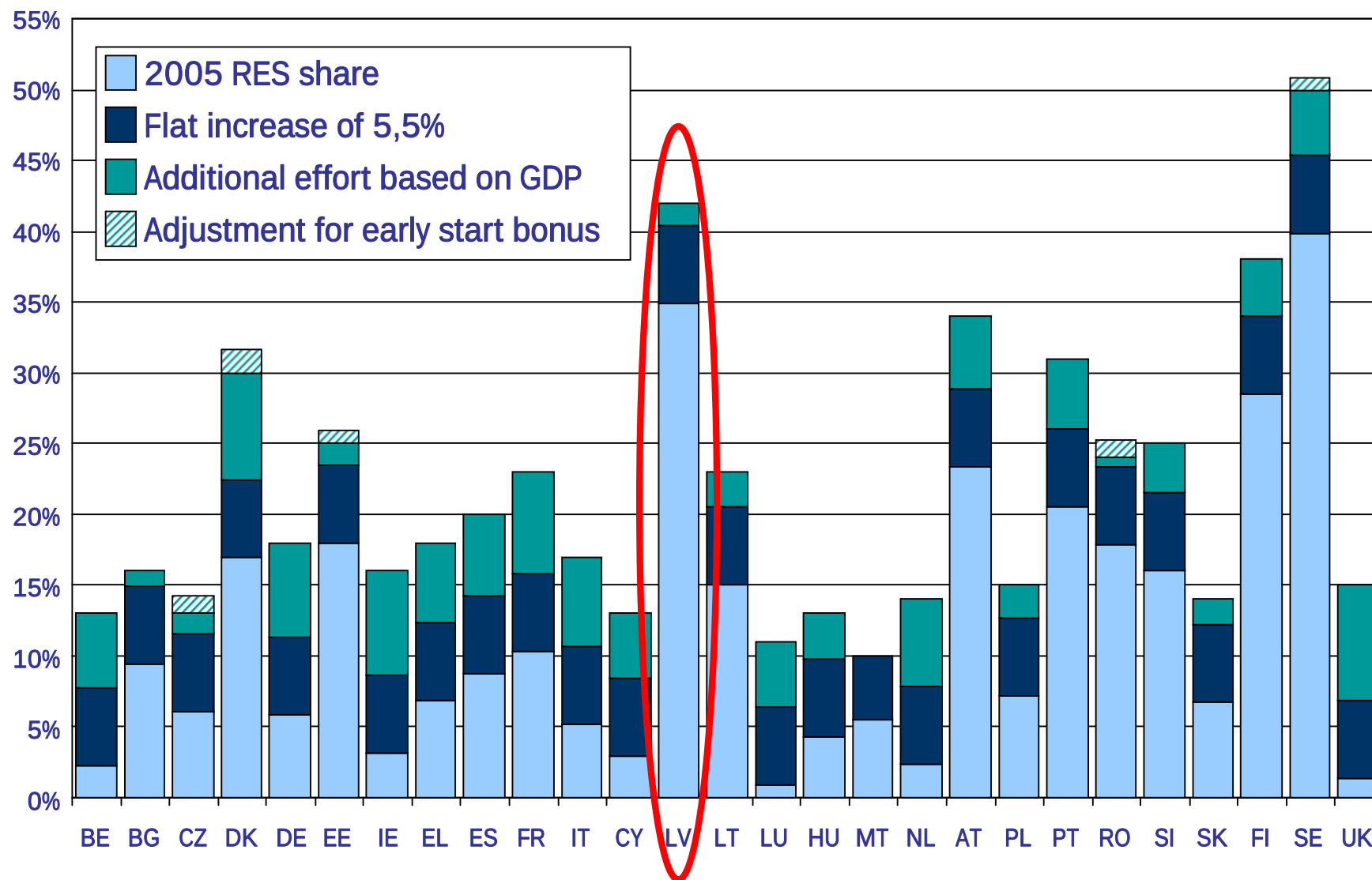


Benefits of wind energy

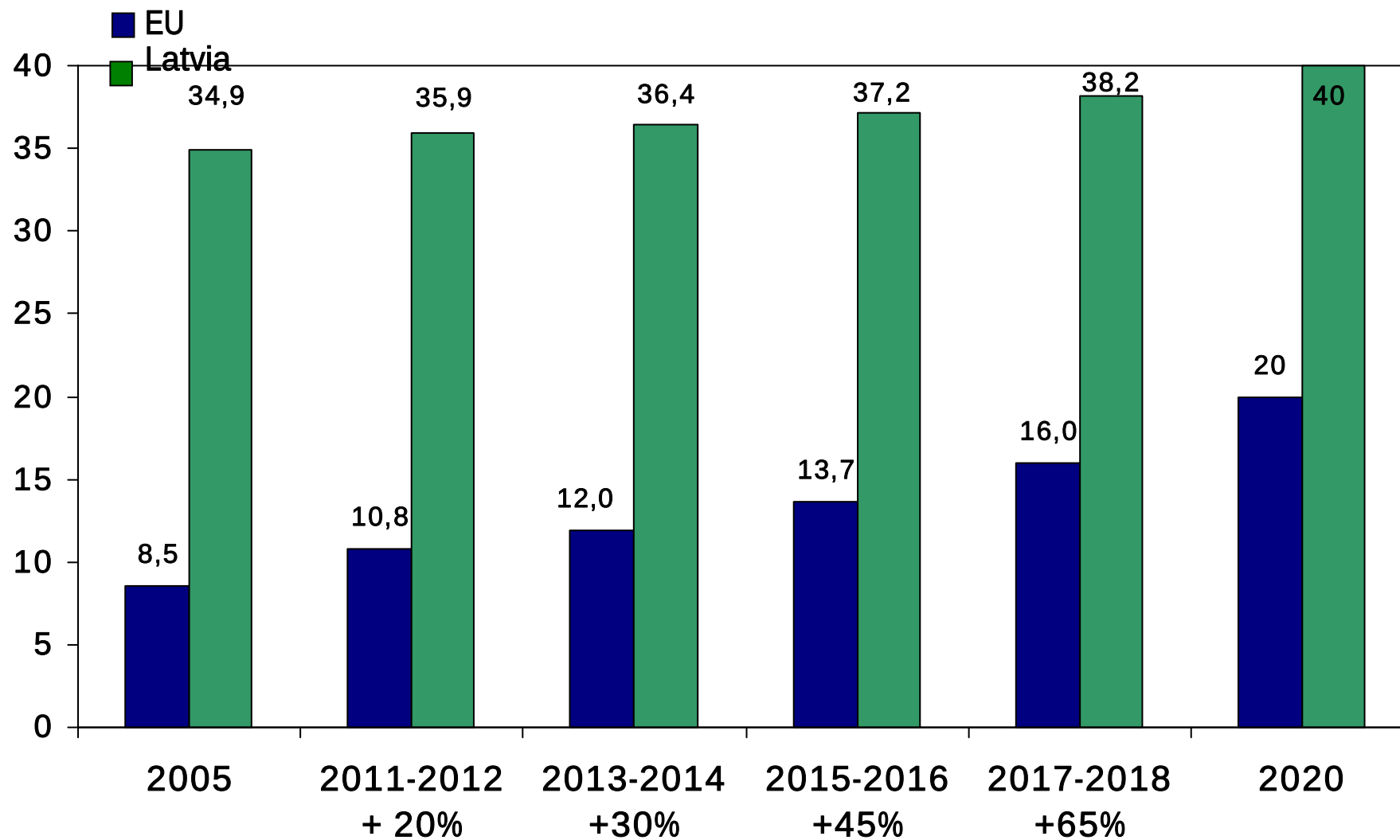


Latvian wind market

DIFFERENTIATED NATIONAL TARGETS



INDICATIVE TRAJECTORY



EUROPEAN WIND ENERGY EVENTS



Come to this year's offshore wind event in Stockholm (14 - 16 September 2009)

Over 80% of the exhibition space has already been sold.

2000 participants expected

More information: www.eow2009.info



EWEA's annual event will take place in Warsaw, Poland (20 –23 April 2010).

More information: www.ewec2010.info

THANK YOU VERY MUCH FOR YOUR ATTENTION



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