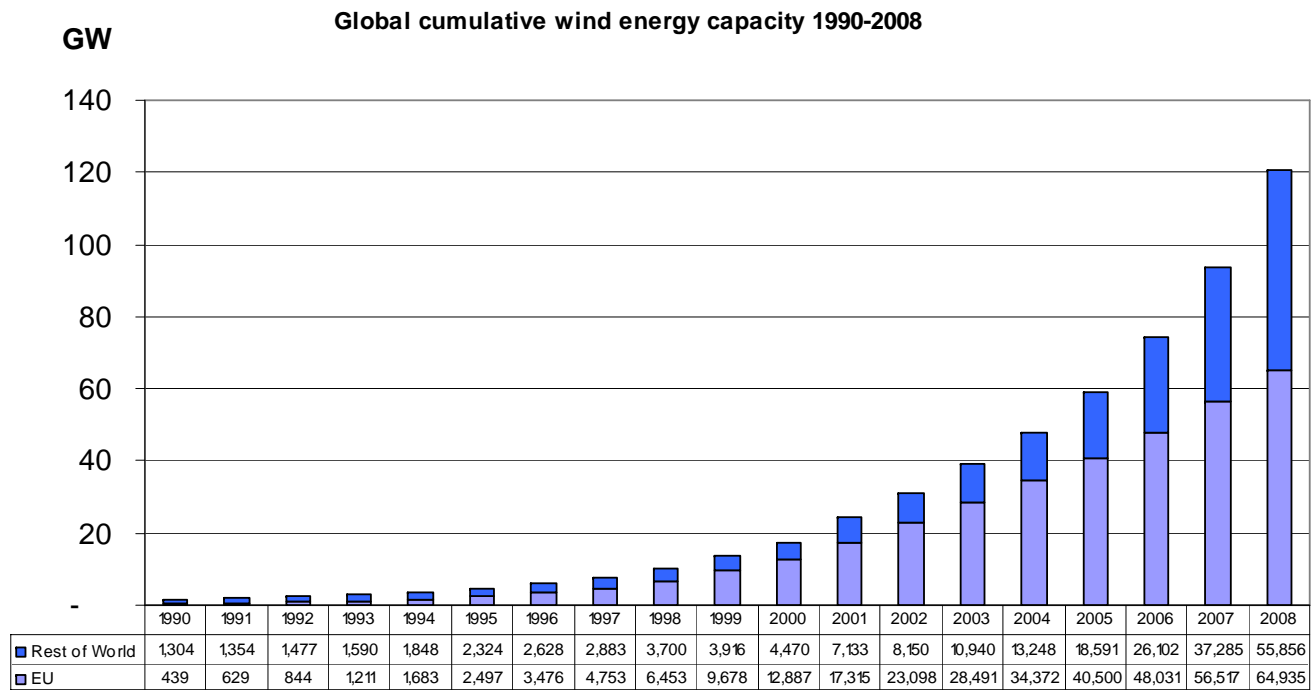


Wind energy - Europe's power technology of choice

UNFCCC - COP 15
Copenhagen 15 December 2009

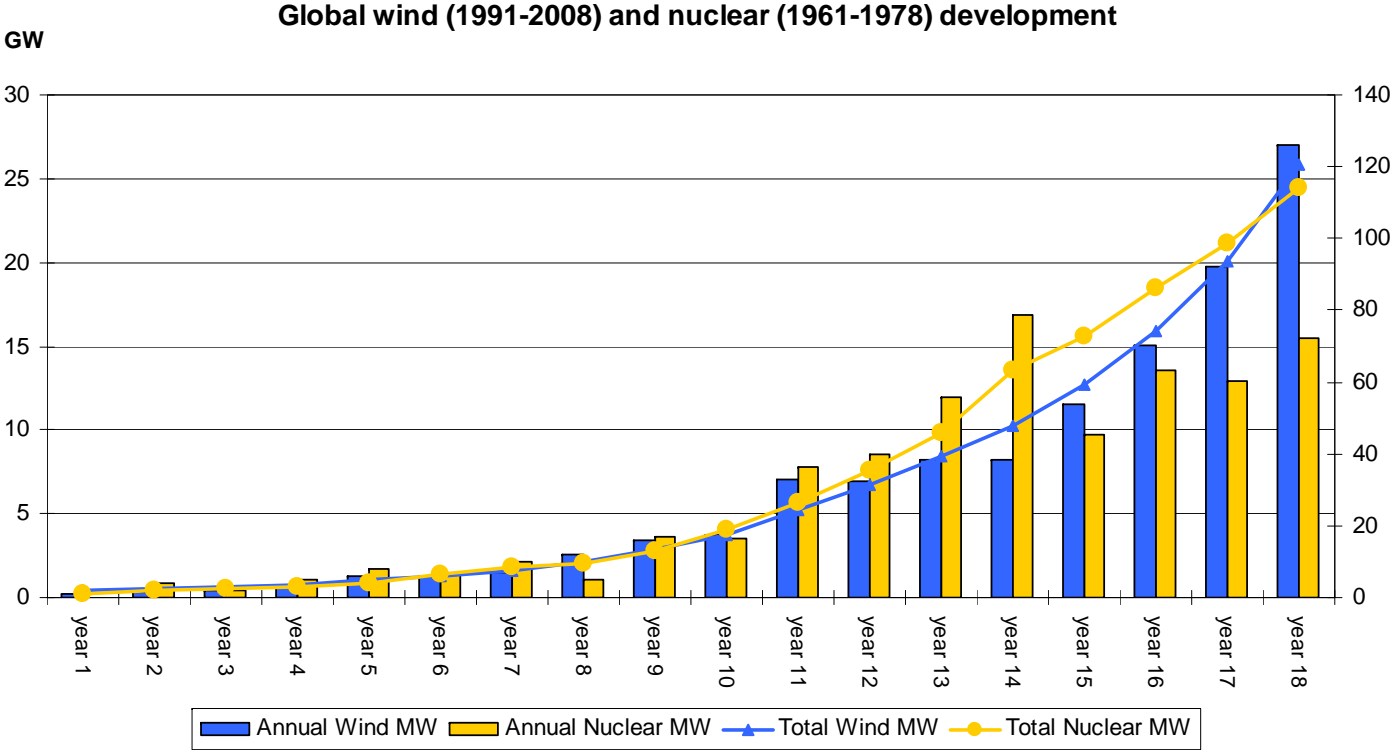
CHRISTIAN KJÆR
Chief Executive Officer
European Wind Energy Association

Global market 1991-2008



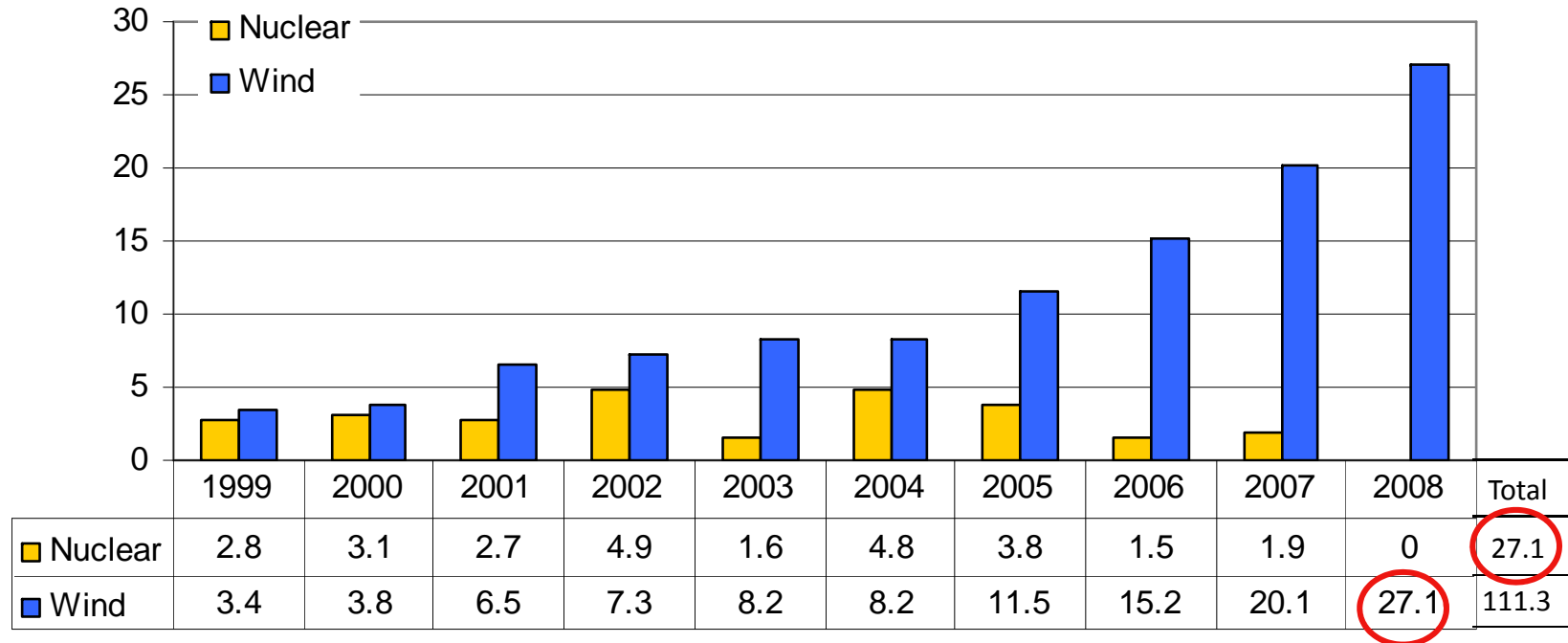
Annual market 2008: €35 billion

Nothing unusual about wind market growth



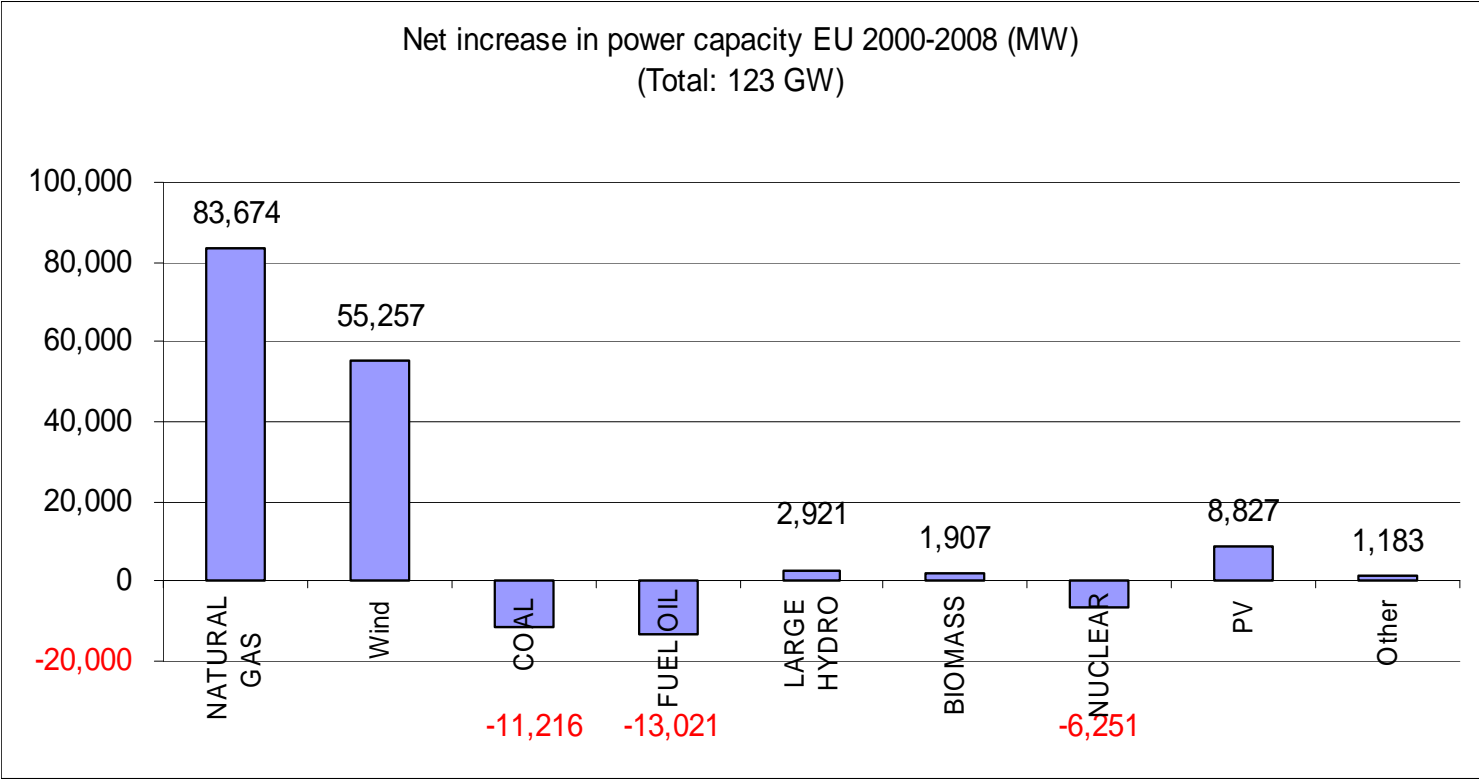
How fast can you build 27.1 GW

Global annual investments in wind and nuclear 1999-2008 (GW)



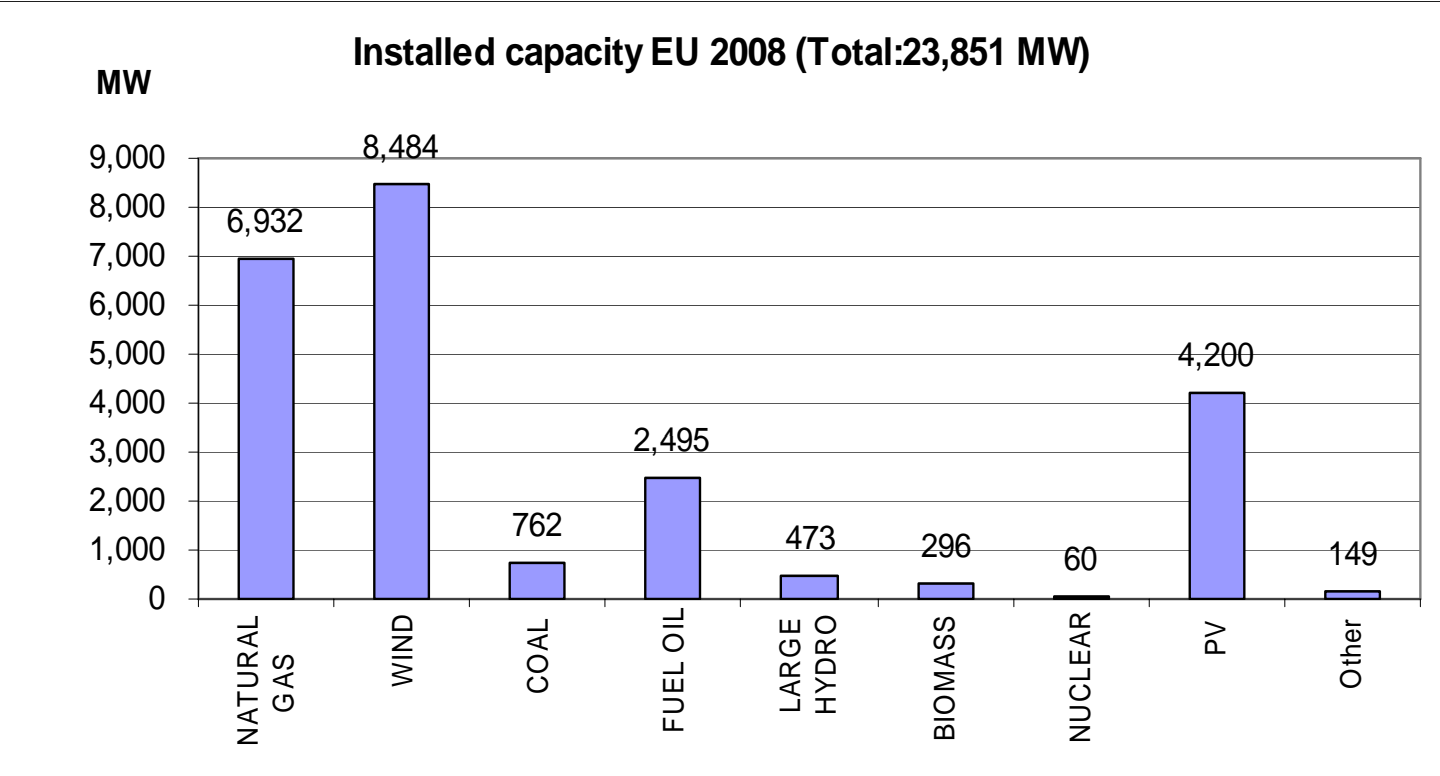
Source: EWEA and IAEA

EU energy mix is changing



Source: Platts Powervision, EWEA, EPIA

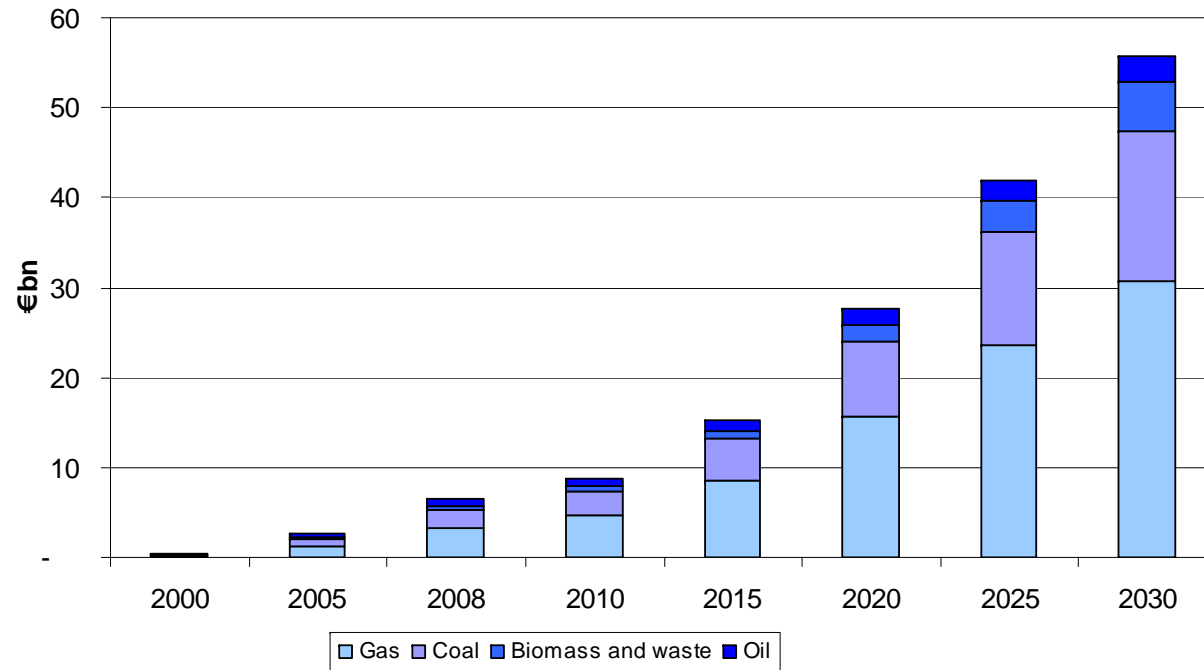
Wind largest source of new capacity in 2008



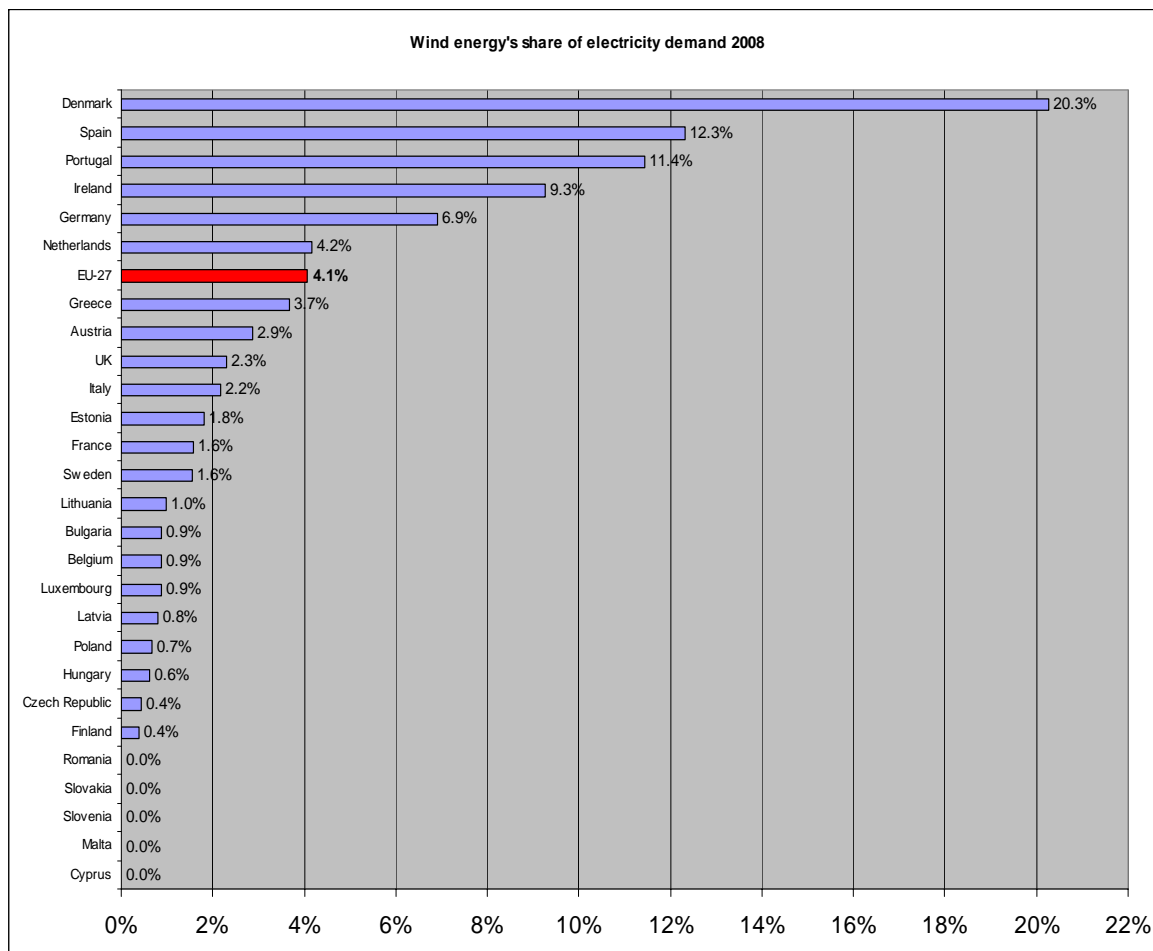
Source: Platts Powervision, EWEA, EPIA

Wind energy avoided €6.5 bn in fuel cost in 2008

Avoided fuel cost from wind - International Energy Agency (IEA) fuel prices



Share of electricity in EU-27



European Union targets for 2020

- 20% Reduction in GHG
(30% with international agreement)
- 20% Renewable energy share
- 20% Energy efficiency (Not legally binding)

20% renewable energy by 2020

20% Renewable Energy by 2020 requires:

- 34% electricity from RES
- 25% heating from RES
- 10% biofuels from RES

Electricity 2005: 15% from renewables incl. 10% large hydro and 2.5% wind

Excluding large hydro the share of renewable electricity must increase fivefold from 5% to app. 25%, in 15 years

How Much Wind Power in 2020?

European Commission

- Renewable Energy Roadmap, 2006
12% (180 GW - 9.6 GW / year)
- Investing in Low Carbon Technologies, 2009
20% (260 GW – 16 GW / year)

EWEA

- 14-17% (230 GW – 13.75 GW / year)

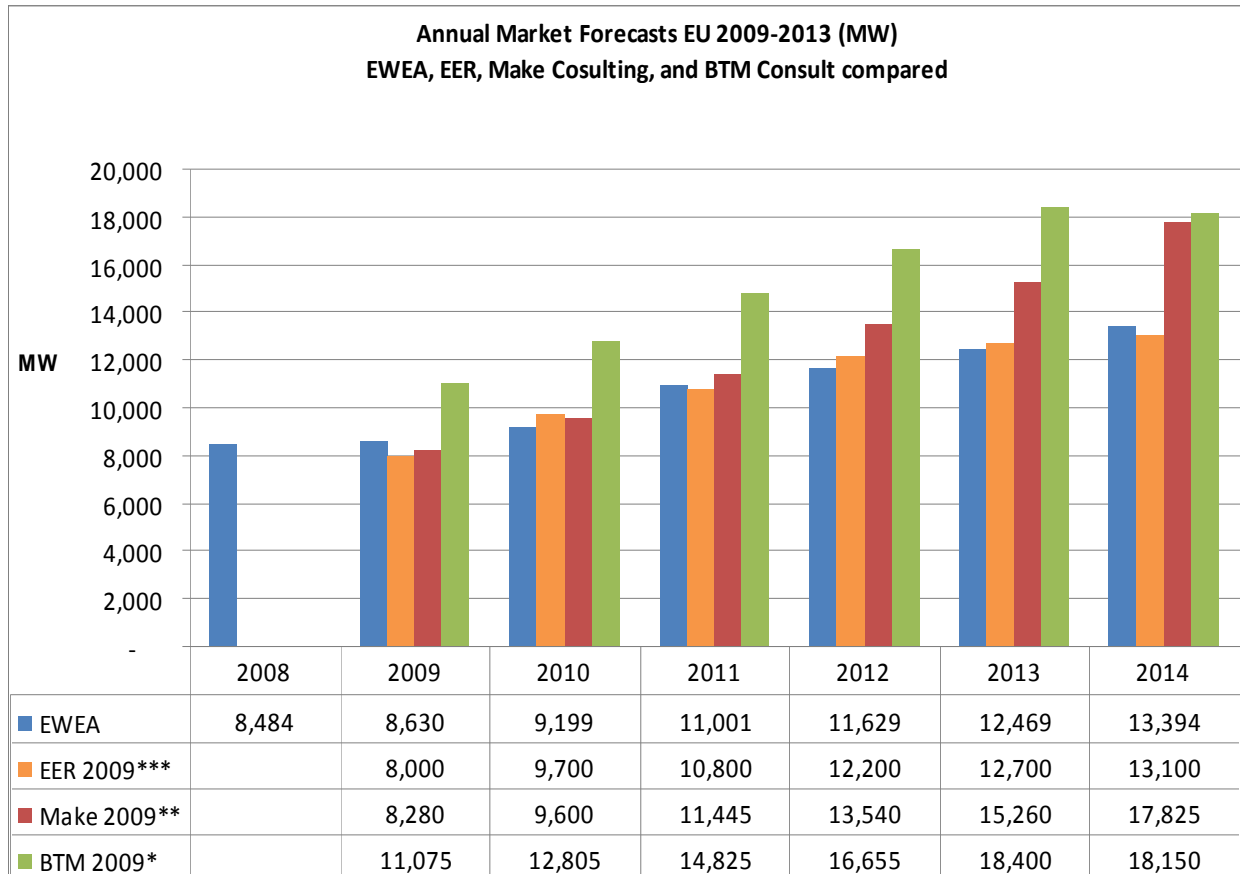
EER

- 221 GW (13 GW / year)

BTM Consult

- 312 GW (20.5 GW / year)

Wind Energy Market – EU 2009-2013



Source: EWEA, BTM Consult, MAKE Consulting, Emerging Energy Research

Example: wind in the EU

Gas, coal and oil plants produce on av. 666 gCO₂/kWh

Wind production

2008: 137 TWh

2012: 234 TWh

2020: 582 TWh



avoids

91 Mt CO₂

146 Mt CO₂

333 Mt CO₂

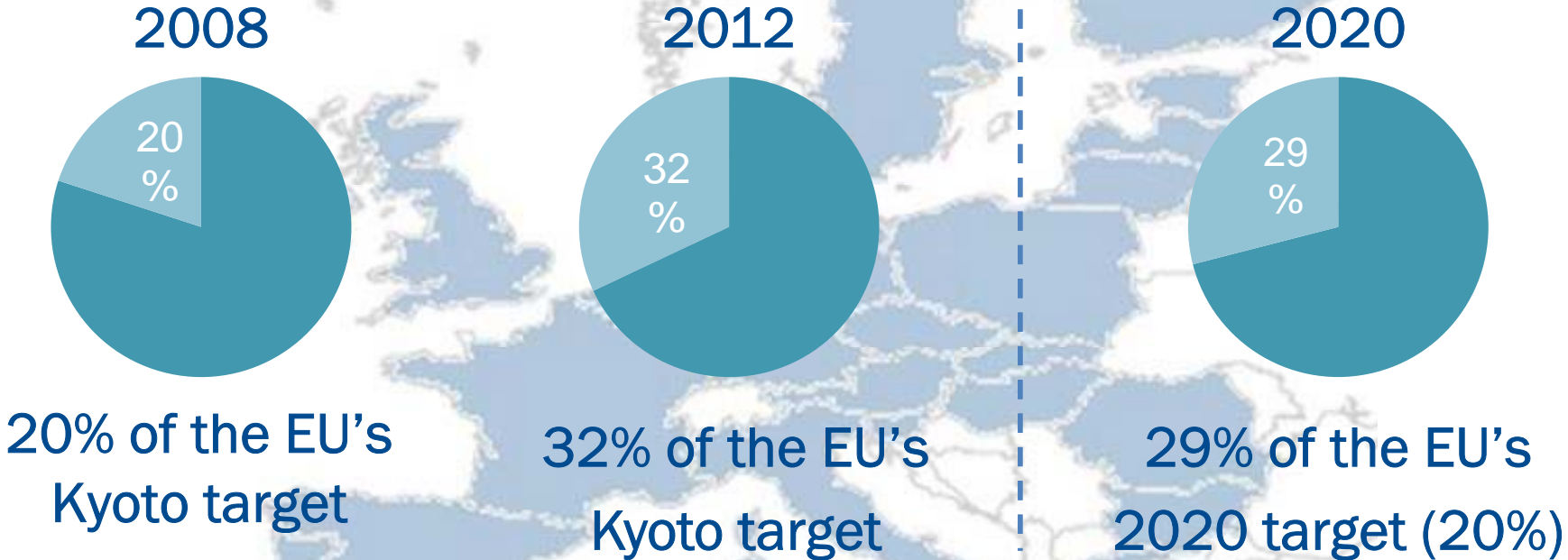
Kyoto Protocol EU target 2008-2012 = 7.8%

→ 450 MtCO₂e per year below 1990 emissions

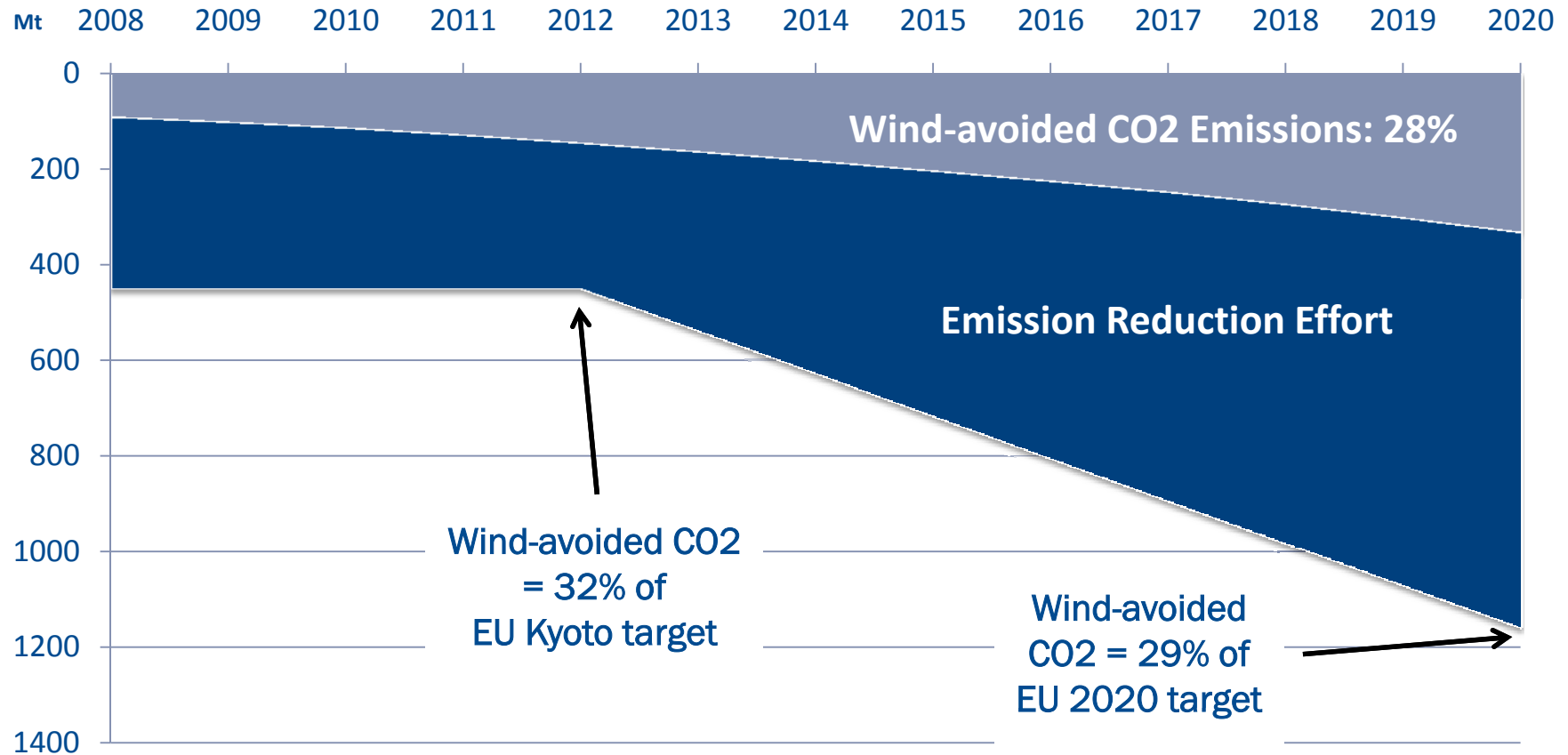
EU Climate package target by 2020 = 20%

→ 1160 MtCO₂e in 2020 below 1990 emissions

EU Wind Power will avoid as much CO2 as...



From 2008-2020, wind will avoid 28% of the EU cumulative reduction efforts



EU 2020 – Wind power versus car emission

EU 2012 – Wind avoids
146 MtCO₂, eq. to
→ 46 million cars
→ 20% of EU fleet !

EU 2020 – wind avoids 333
MtCO₂, eq. to
→ 168 million cars
→ 80% of EU fleet !

EU fleet - 214 million cars



EU importing 54% of its energy – and rising

	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

Three major global challenges...

- ➔ Energy Crisis (2017 Oil future contract \$99/barrel)
- ➔ Environmental crisis (IPCC: 25-40% reduction by 2020)
- ➔ Financial crisis
- ... and three European challenges
- ➔ App. 350 GW of new electricity generating capacity must be constructed before 2020 (50% of current total)
- ➔ Increasing energy imports at higher cost
- ➔ Ineffective competition in EU power markets and lack of power infrastructure investments

Economics of Wind Energy

- ➔ Cost of wind power is unaffected by changes in carbon and fuel cost – it can be predicted with great certainty: low-risk investment
- ➔ Think of wind energy as the government bond of power sector investments
- ➔ Need for consistent economic analysis of costs, benefits and risks of each power generation technology

€700