WIND ENERGY STATISTICS AND TARGETS

DONE
2012 100 GW of wind power installed = total electricity consumption Sweden, Ireland, Slovenia and Slovakia

2020 230 GW EWEA estimate (including 40 GW of offshore wind power)

2050 735 GW EWEA estimate

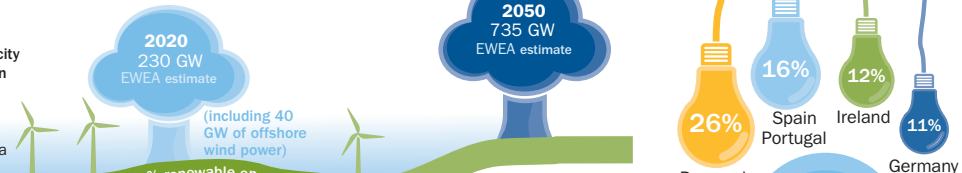
This growth has been driven by the EU's binding target of 20% renewable energy by 2020.

DONE
around **7%** 2011 of the EU's electricity demand

15-17% EWEA estimate of the EU's electricity demand

50% EWEA estimate **32-49%** EC estimate of the EU's electricity demand

EC = European Commission



% of electricity generated by wind power **2011**

powering over **57 million households** per year

100 GW OF WIND ENERGY =

COAL
72 Mt mined transported burned
emitting 219.5 Mt CO_2
costing €4,983 mn for fuel

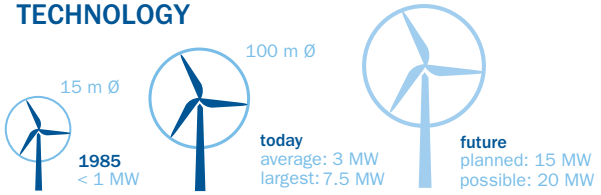
=

GAS
42.4 mn m³ extracted transported burned
emitting 97.8 Mt CO_2
costing €7,537 mn for fuel

"Every time we spend $1 subsidising renewable (energy sources), we spend $6 on subsidising fossil fuels."

Connie Hedegaard, Commissioner for Climate Action, December 2012

TECHNOLOGY



Wind turbine manufacturers are also developing **longer blades** and **lighter rotors** in order to optimise and increase energy production.

FINANCE

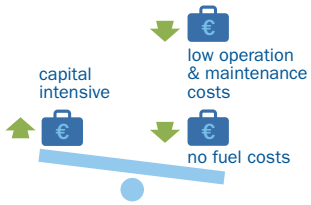
2011
≅ **€12.6 bn** worth of investments in EU wind farms

Investors include power producers, international finance institutions, private equity and pension funds.

The **lack of EU renewable energy targets after 2020** and the **instability of national support mechanisms** for renewables increase the perception of risk and make financing more expensive.

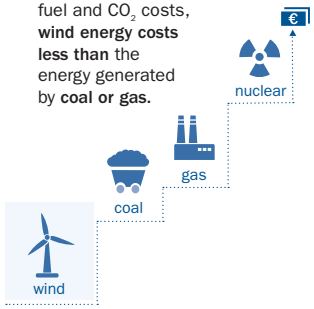
Offshore wind is a **developing sector:** relatively new with new entrants, and cost reductions expected through technology innovation.

Wind energy:



COSTS, ENERGY SUBSIDIES AND ELECTRICITY PRICES

- **Wind power** is becoming **competitive** with **fossil fuels.** Taking into account the fuel and CO_2 costs, **wind energy costs less than** the energy generated by **coal or gas.**



EU R&D money

€353 mn FOR WIND ENERGY

1983 2011

€12 bn FOR NUCLEAR

EWEA
THE EUROPEAN WIND ENERGY ASSOCIATION

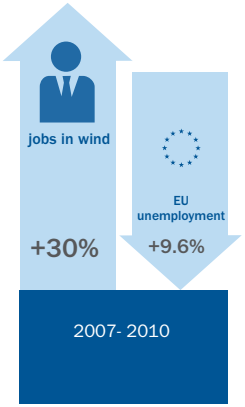
EWEA is the voice of the wind industry, actively promoting wind power in Europe and worldwide. It has over 700 members from almost 60 countries making EWEA the world's largest and most powerful wind energy network.

www.ewea.org

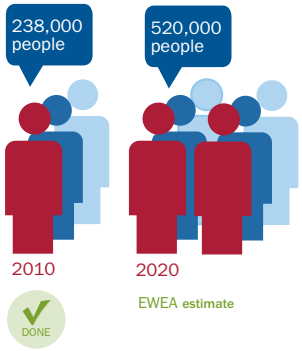
- In **2010 avoided fossil fuel costs from wind power production was €5.71 bn.** That is estimated to grow to **€25.3 billion by 2020** and to **€58 billion by 2020.**
- **Wind power can drive down wholesale electricity prices.** This is already happening, according to credit agency Moody's and financial analysts UBS.
- The **EU's oil and gas import bill** in **2012** is estimated at **€470 billion** – 3.4% of the EU's GDP This bill **has increased by €200 billion** over the past three years.

JOBS AND GREEN GROWTH

- Wind energy contributed **€32 billion to the EU economy in 2010.** Between 2007 and 2010 the wind energy sector increased its contribution to GDP by 33%.
- The **EU** accounted for **27.4% of the global wind energy market** in 2010. The **EU wind energy sector was a net exporter** of €5.7 billion worth of products and services in 2010.



people employed in EU wind energy



"Strong renewables growth to 2030 could generate over 3 million jobs, including in small and medium sized enterprises."

European Commission, Communication – Renewable energy: a major player in the European energy market, June 2012

- The **power grid** needs to be **reinforced** and **better interconnected to** improve **security of supply**– regardless of the source of energy – and in order to improve **competition** in the electricity market, which would **bring down prices.**
- For an efficient integration of wind and other renewables, **intraday** and **balancing power markets are needed**, with demand-side management.
- **Reinforcing** key parts of the **grid** will provide **massive savings** of **€1-2 billion per year.**

EUROPE'S ELECTRICITY SUPPLY

Grid operators can integrate large amounts of wind power:

electricity demand met by wind power **IN DENMARK**
2011: 26%
by 2025 the government aims for: 50%

electricity demand met by wind power **IN SPAIN**
2011: 16%
at times it reaches 50%

"Variability and uncertainty are familiar aspects of all power systems."

International Energy Agency, 2011

WIND ENERGY & NATURE

- Birdlife, WWF, Greenpeace, Friends of the Earth and others **support wind energy**. Birdlife recently stated that **climate change** was the single **largest threat to birds** and wind and renewables were a **clear solution to climate change**.
- The potential environmental effects of a wind farm are assessed before construction is allowed to start.

NO fuel
NO greenhouse gases
NO air pollution
NO toxic substances
NO water pollution
MINIMAL water use

"Climate change poses the single greatest long-term threat to birds and other wildlife. Wind power is the most advanced renewable technology, available at a large scale, over this time period. The RSPB supports a significant growth in offshore and onshore wind power generation in the UK."

***Royal Society for the Protection of Birds** (RSPB)*

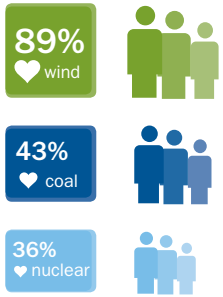
"At IKEA, we want to take a leading role in the transition to a low-carbon society by only using 100 percent renewable energy. By only using wind power in Sweden [..] we will not only be selfsufficient in electricity in Sweden, generating enough to supply all IKEA buildings and operations in the country, but it will give us opportunities to supply IKEA stores in other countries with wind power."

Steve Howard,
Chief Sustainability Officer, IKEA Group, June 2012

PUBLIC OPINION

Eurobarometer survey (2011)

EU citizens:



- The growing participation in the annual Global Wind Day (15 June) shows **support for and interest in wind energy is increasing. www.globalwindday.org**
- The Global Consumer Wind Study 2012 by Vestas and TNS Gallup shows that **85% of consumers surveyed want more renewable energy.**

HEALTH

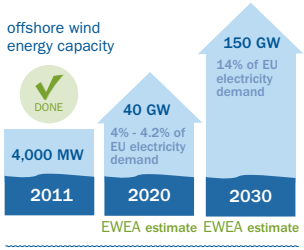
Noise levels from turbines meet **World Health Organisation** (WHO) recommendations for residential areas.

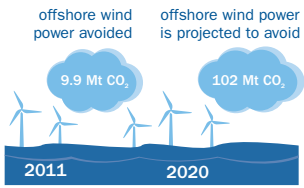
There is **no evidence** "that the audible or sub-audible sounds [including infrasound] emitted by wind turbines have **any direct adverse physiological effects**", concluded a study, 'Wind Turbine Sound and Health Effects', conducted in 2009 by a panel of medical professionals from the US, Canada, Denmark, and UK.

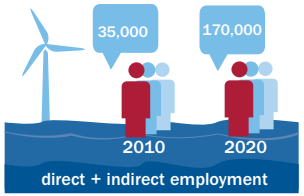
The most audible **sound** of wind turbines is a **light swishing** - and usually the wind itself is louder.

Wind energy emits **no particles**, unlike fossil fuels, which severely affect human health.

OFFSHORE

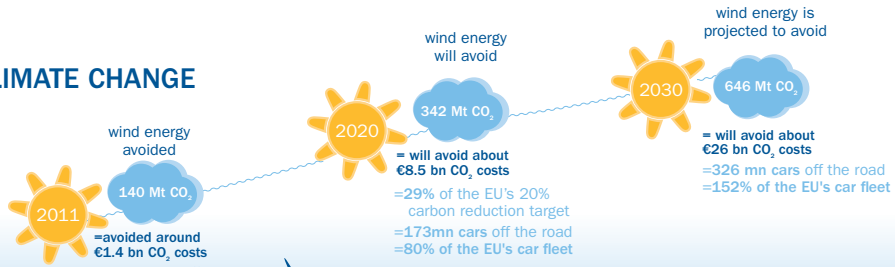






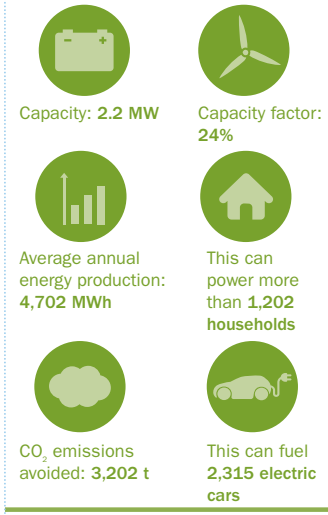
- In 2011, **Europe** was the **world's leader** in offshore wind energy with more than **90%** of the world's installed capacity.
- Offshore represents around **10% of EU annual wind energy installations.**
- EWEA estimates that approximately **a quarter of Europe's wind energy** could be produced offshore in 2020.
- In 2011 the **average size** of offshore wind turbines installed and grid connected reached **4 MW**, a 14.2% increase on 2010.
- Offshore wind farms can provide **regeneration areas for fish and other sea creatures** because of reduced trawling activities and because the foundations act as an artificial reef, encouraging the creation of new habitats.

CLIMATE CHANGE

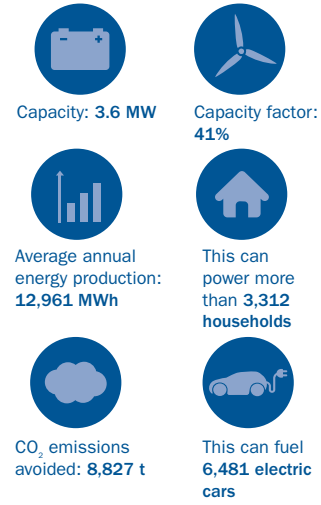


- For **every kWh of wind energy used,** approximately **696g of CO_2** will be **avoided.**
- Wind energy produces no greenhouse gas emissions during its operation. **A turbine** will **produce** up to **80 times more energy** than is used to **build, install, operate, maintain** and **decommission it.**

The average European **ONSHORE** wind turbine



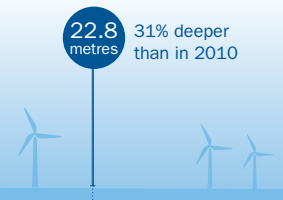
The average European **OFFSHORE** wind turbine



Annual investments in offshore wind farms are expected to increase

Average water depth of offshore wind farms

2011



Capacity (MW)

The ability to generate electricity is measured in watts. To describe the capacity of wind turbine or other power plants, the terms kilowatt (kW = 1,000 watts), megawatt (MW = 1 million watts), and gigawatt (GW = 1 billion watts) are most commonly used.

Electricity production (MWh)

Electricity production and consumption are measured in kilowatt (1,000 watts) hours per hour (kWh). One 50 watt light bulb left on for 20 hours consumes one kilowatt-hour of electricity.

Capacity factor

A modern wind turbine is available to produce electricity 80-98% of the time, but it generates different outputs depending on the wind speed. During one year, it will typically generate about 24% of the theoretical maximum output (41% offshore), which is the capacity factor (conventional power stations: 50-80%). More comparable with other sources of electricity is the overall efficiency, the relationship between the energy input (the wind) and the energy output (the electricity). The efficiency of a wind turbine has a theoretical limit of 59% (compared to coal with about 35% and gas with about 50%).