Introduction to the European Union, its Energy Policy and off shore wind development

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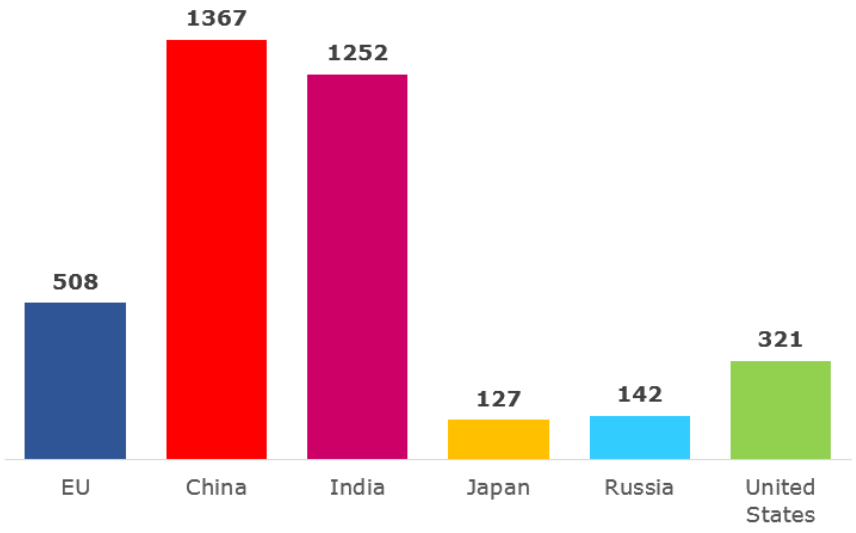
The European Union: 500 million people – 28 countries

Member States of the European Union

Candidate countries and potential candidates

Population in millions (2015)



2nd largest democracy

24 official languages

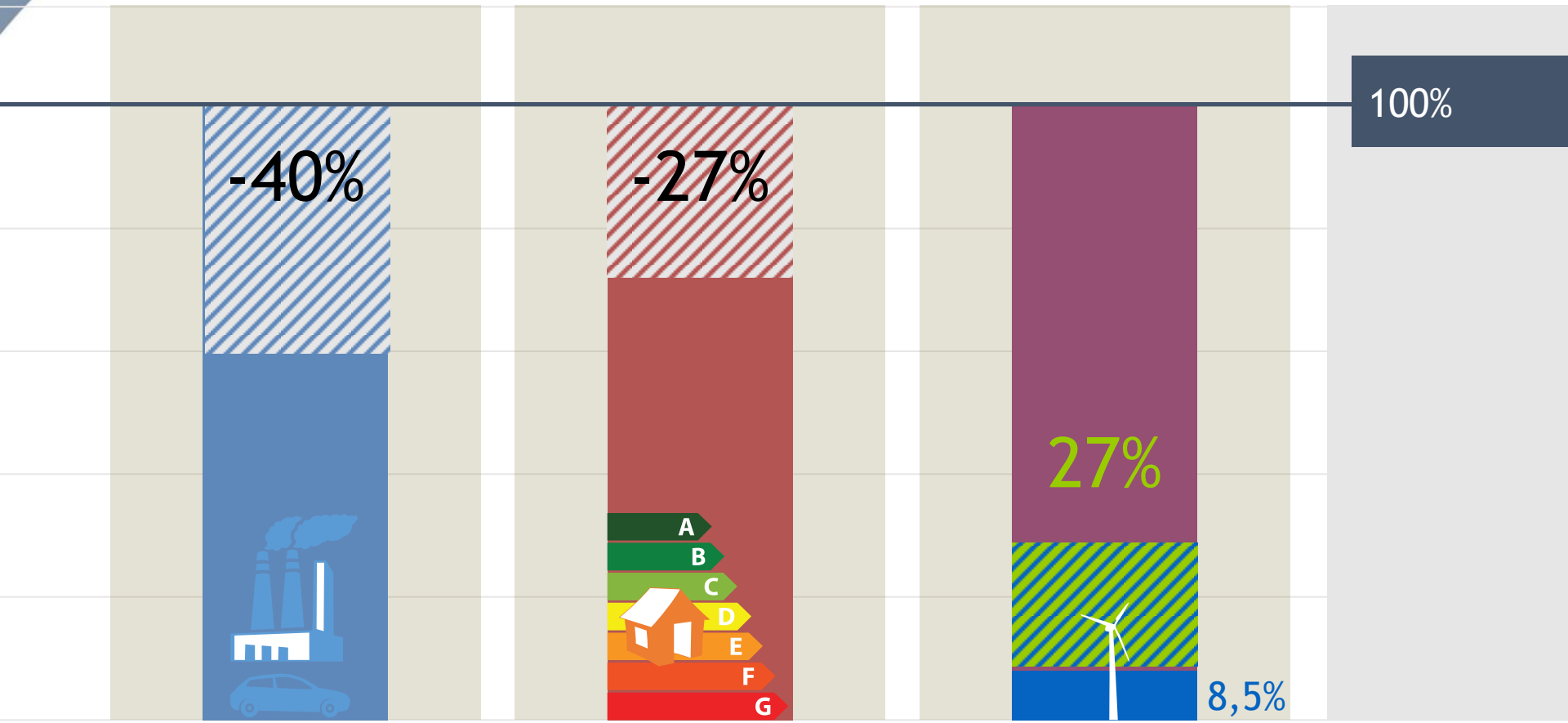
Largest development aid contributor

Major trading partner to India

Most ambitious climate policies in the world

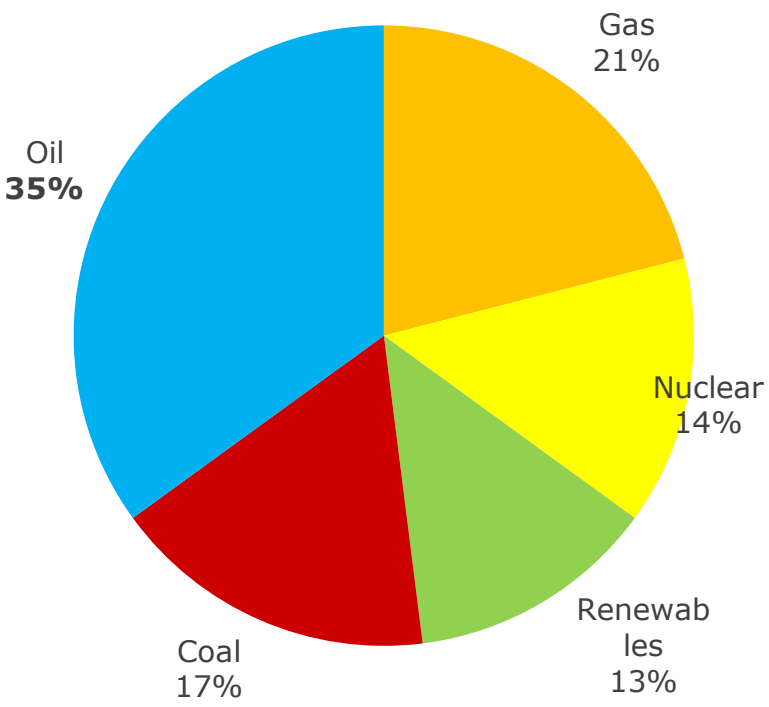
Climate change – a global challenge

To stop global warming, EU leaders decided in 2014 to:

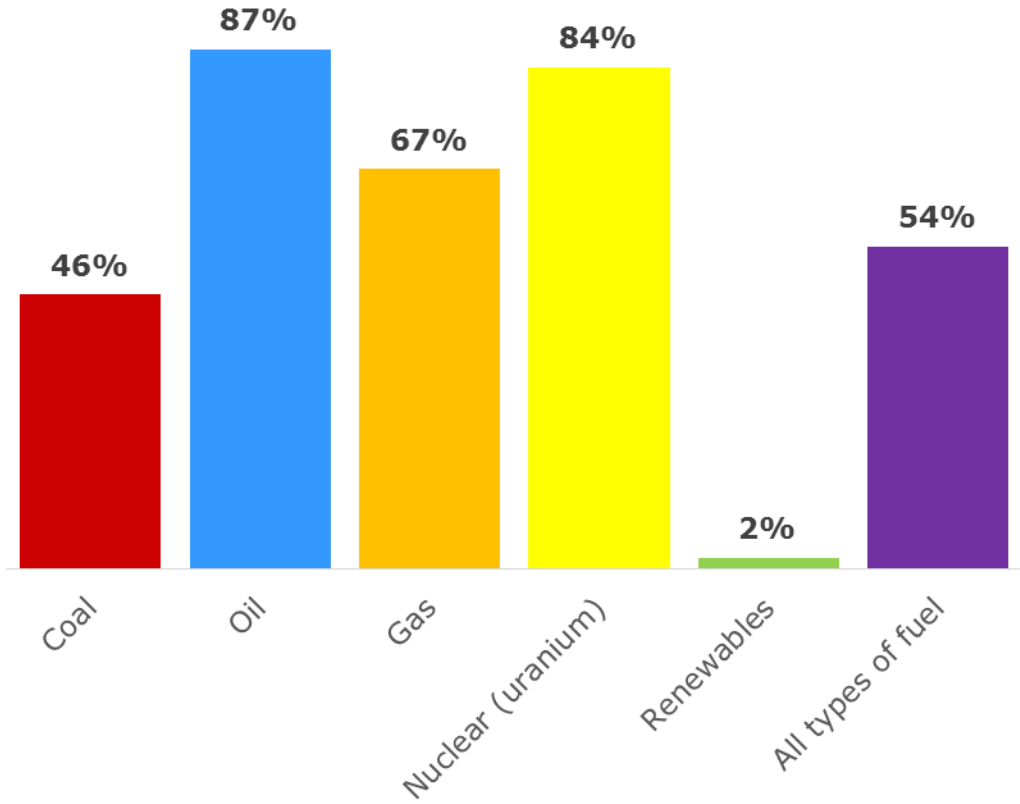


Energy sources in a changing world

Fuel used in the EU 2014



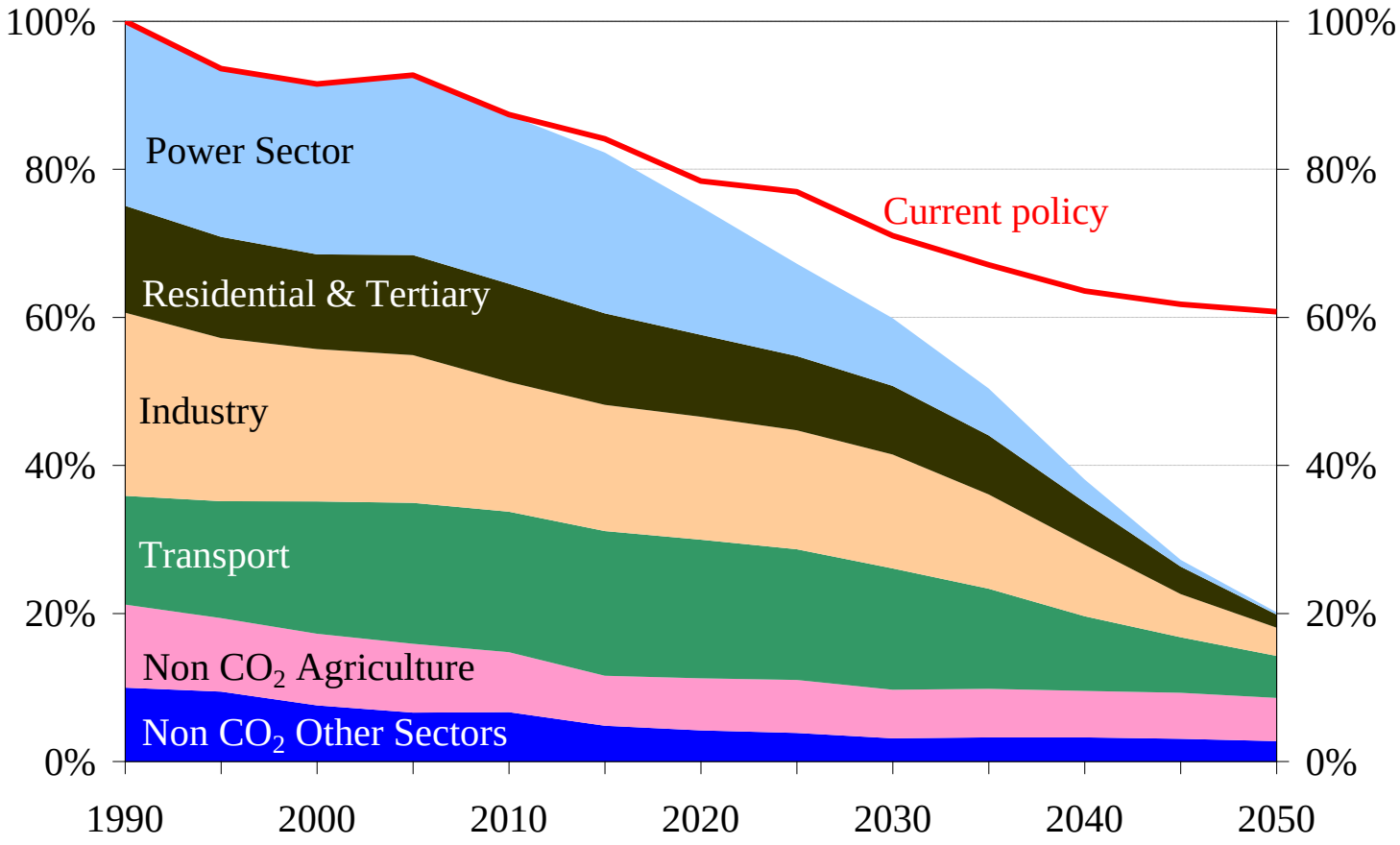
Share of fuel imported from outside the EU in 2014



Low carbon roadmap for 2050

Basis of scenarios 80% domestic GHG reduction in 2050

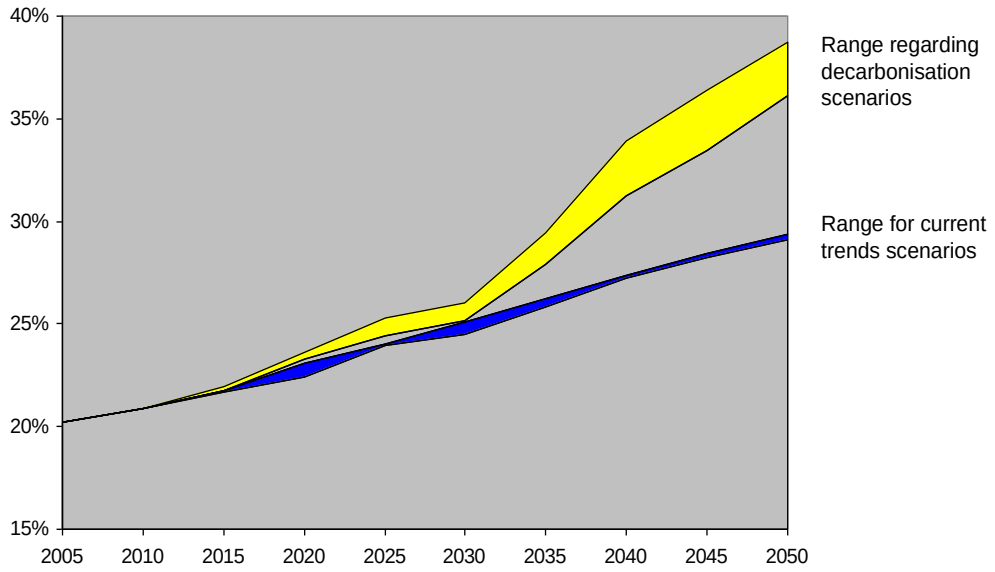
Efficient pathway:
-25% in 2020
-40% in 2030
-60% in 2040



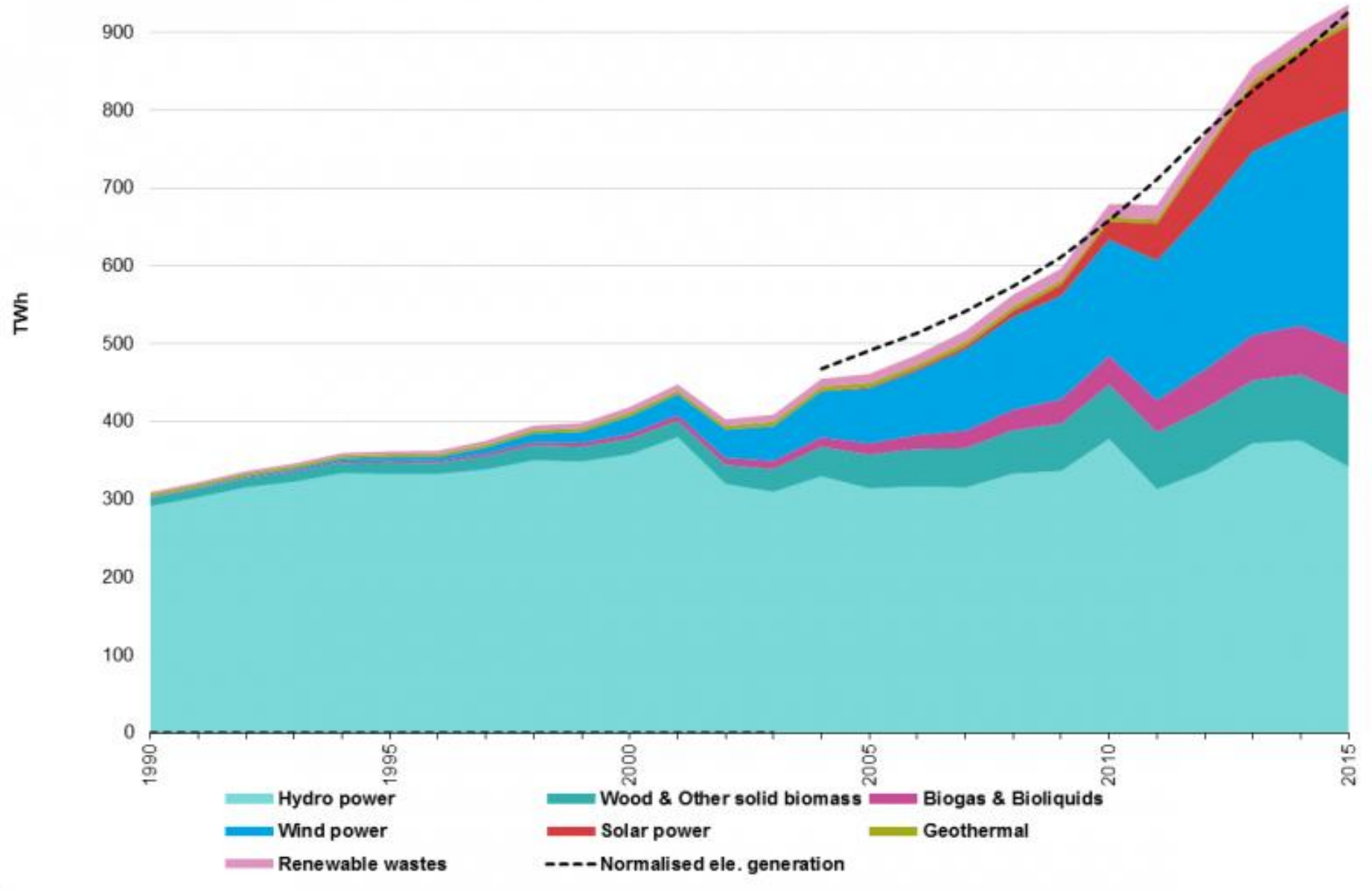
Economic weight of RE

- 3 times more renewable power per capita
- Export 35 billion euros of exports in RE
- 40% of world wind turbines are made by European companies
- 1 million jobs in Europe and growing
- By 2050, 60% RE in electricity production, no more coal or fuel

Graph 1: Share of electricity in current trend and decarbonisation scenarios (in % of final energy demand)



Split of renewable energies

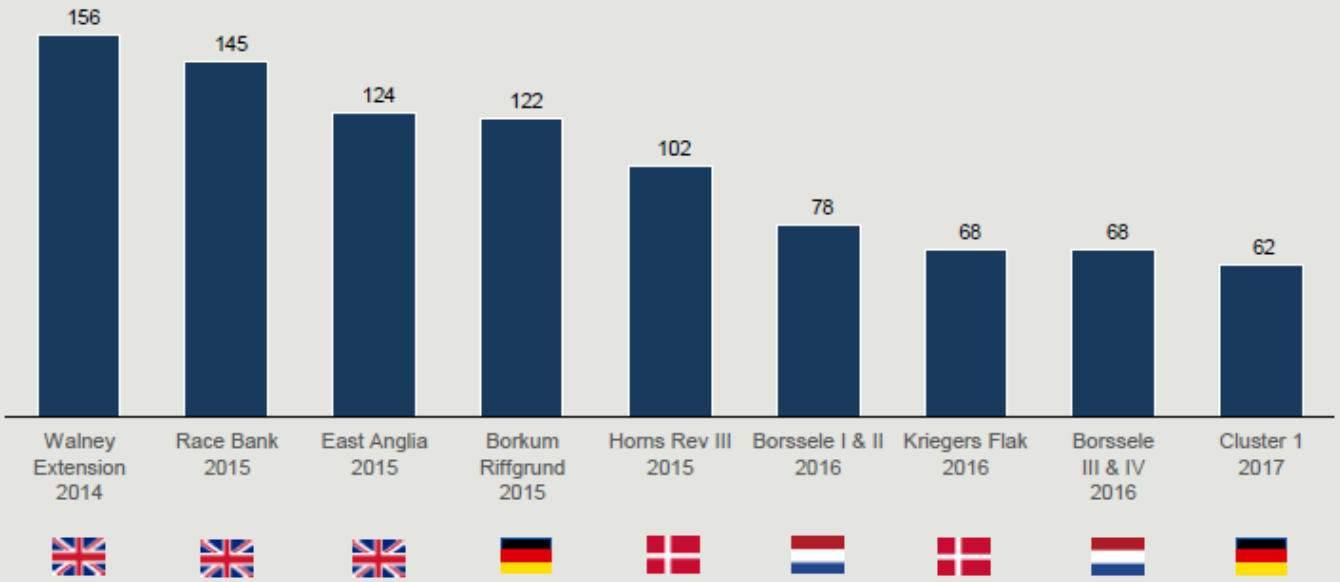


Statistics of wind energy in the EU

- With a total installed capacity of 153.7 GW, wind energy now overtakes coal as the second largest form of power generation capacity.
- 12.5 GW of new wind power 10,923 MW were installed onshore, and 1,567 MW were installed offshore (2016).
- Wind power accounted for 51% of total power capacity installations (2016).
- 300 TWh generated in 2016: 10.4 % of EU's electricity demand.
- €27.5 billion were invested in 2016 to finance wind energy development.
- Off shore wind Levelised Cost of Energy dropped 30% in 5 years.

Evolution of LCoE in the most recent bids

Levelised costs for society of electricity, incl. transmission costs
EUR/MWh[1], 2016-prices, bid announcement year.



Sources: DECC; Danish Energy Agency; Energinet.dk; NEV (Dutch Energy Scenarios), Bundesnetzagentur
1. Levelised revenue (price) of electricity over the lifetime of the project used as proxy for the levelised cost to society. It consists of a subsidy element for the first years and a market income for the whole lifetime. Discount rate of 3.5% used to reflect society's discount rate. Market income based on country specific public wholesale market price projections at the time of contracting where available else an average of 5 analytics is used. For comparability across projects and because there is no transparency round the TSO costs of transmission a generic scope adjustment (incl. transmission and extra project development costs) have been applied. Due to the specific DC transmission set up in Germany cost estimates from the Offshore Netzentwicklungsplan 2017 have been applied.

DONG energy

THE EUROPEAN OFFSHORE WIND INDUSTRY

Key trends and statistics 2016

JANUARY 2017

338 new grid-connected offshore wind turbines IN **6** wind farms

3,589 turbines are installed and grid-connected

4.8 MW average size offshore wind turbines

Work carried out in: **15** wind farms

NEW PROJECTS: **24.2** GW of consented wind farms

CABLE SUPPLIERS TO OFFSHORE WIND FARMS

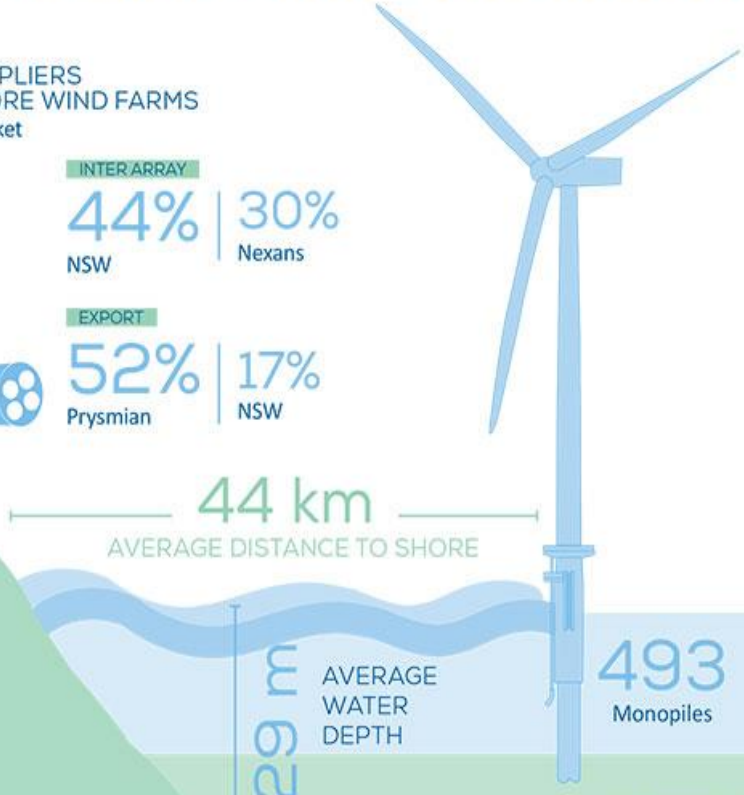
European market

INTER ARRAY

44% NSW | 30% Nexans

EXPORT

52% Prysmian | 17% NSW



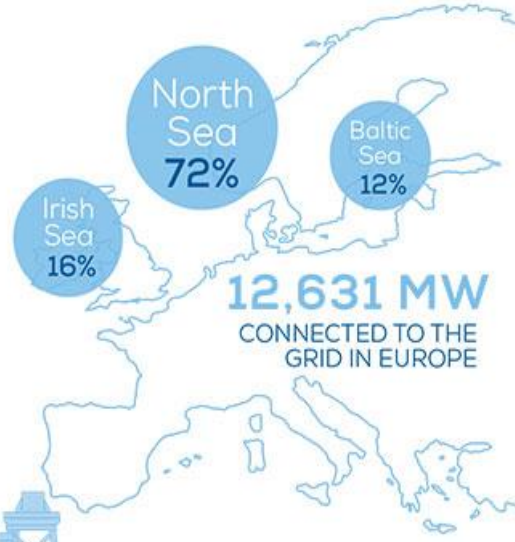
44 km AVERAGE DISTANCE TO SHORE

29 m AVERAGE WATER DEPTH

493 Monopiles

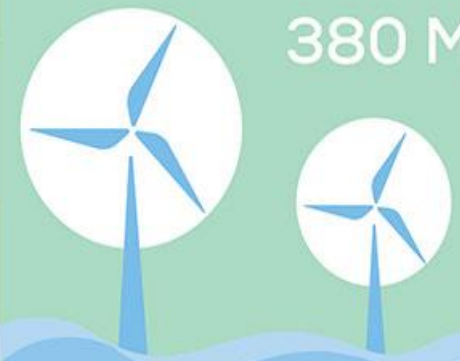
67 Jackets

SUBSTRUCTURES Installed in 2016



12,631 MW CONNECTED TO THE GRID IN EUROPE

AVERAGE SIZE OF CONNECTED WIND FARMS



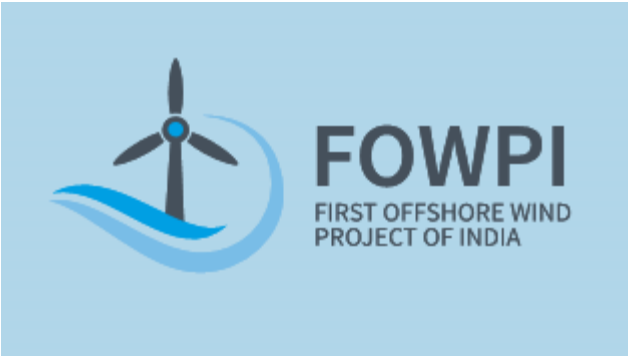
380 MW

TOP 3 DEVELOPERS IN 2016

Northland Power | DONG Energy | Global Infrastructure Partners

DOWNLOAD FULL REPORT PDF windeurope.org/stats/eu-offshore-2016

First Offshore Wind Project of India



Technical assistance awarded to COWI S/A and Windforce

Aim to : prepare the technical tender documents.

Jan 16-Dec 18

EUR 1.7 M – INR 7.5 Cr

Thank You!