The contribution of nuclear energy to the EU policy objectives

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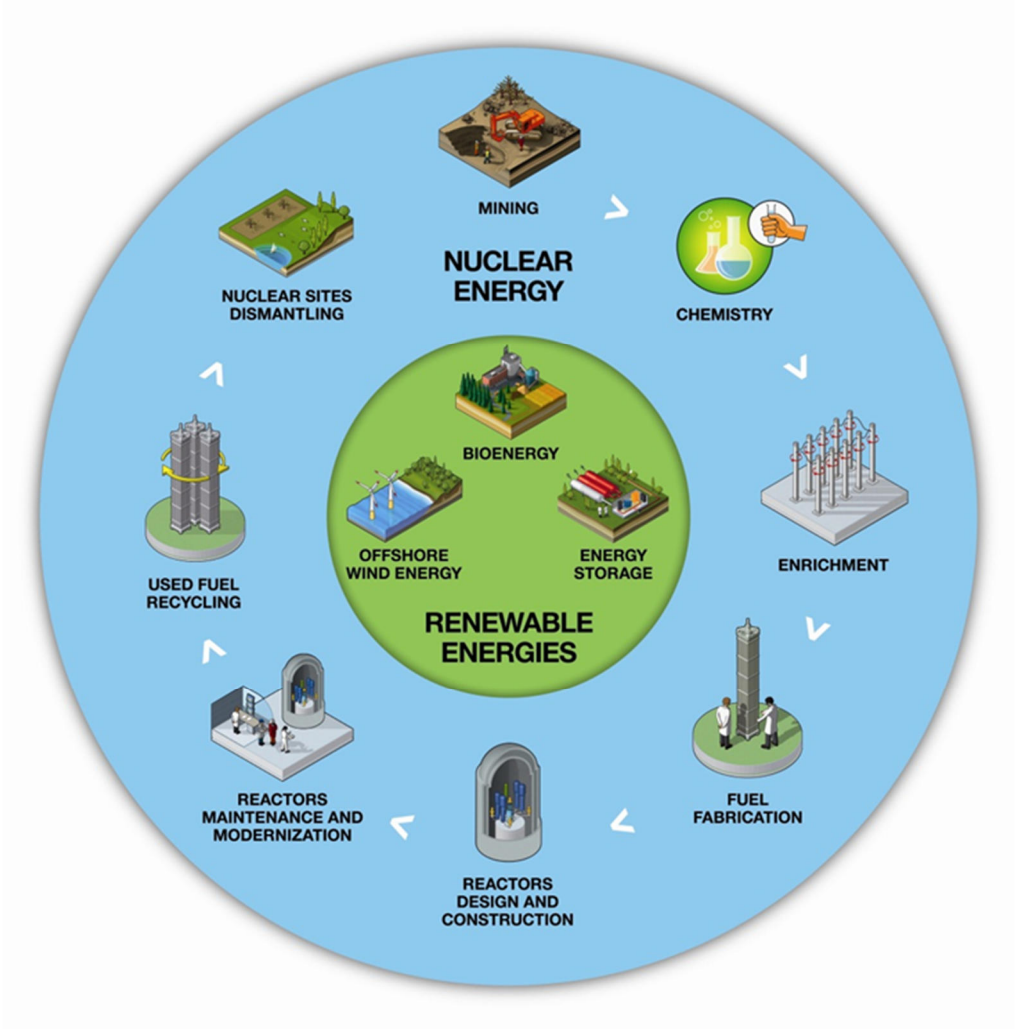
AREVA is a world leader in nuclear power and also invests in renewable energies



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AREVA is a global company with a European business base

2013 Key figures

€41.5bn
backlog at 12/31/2013

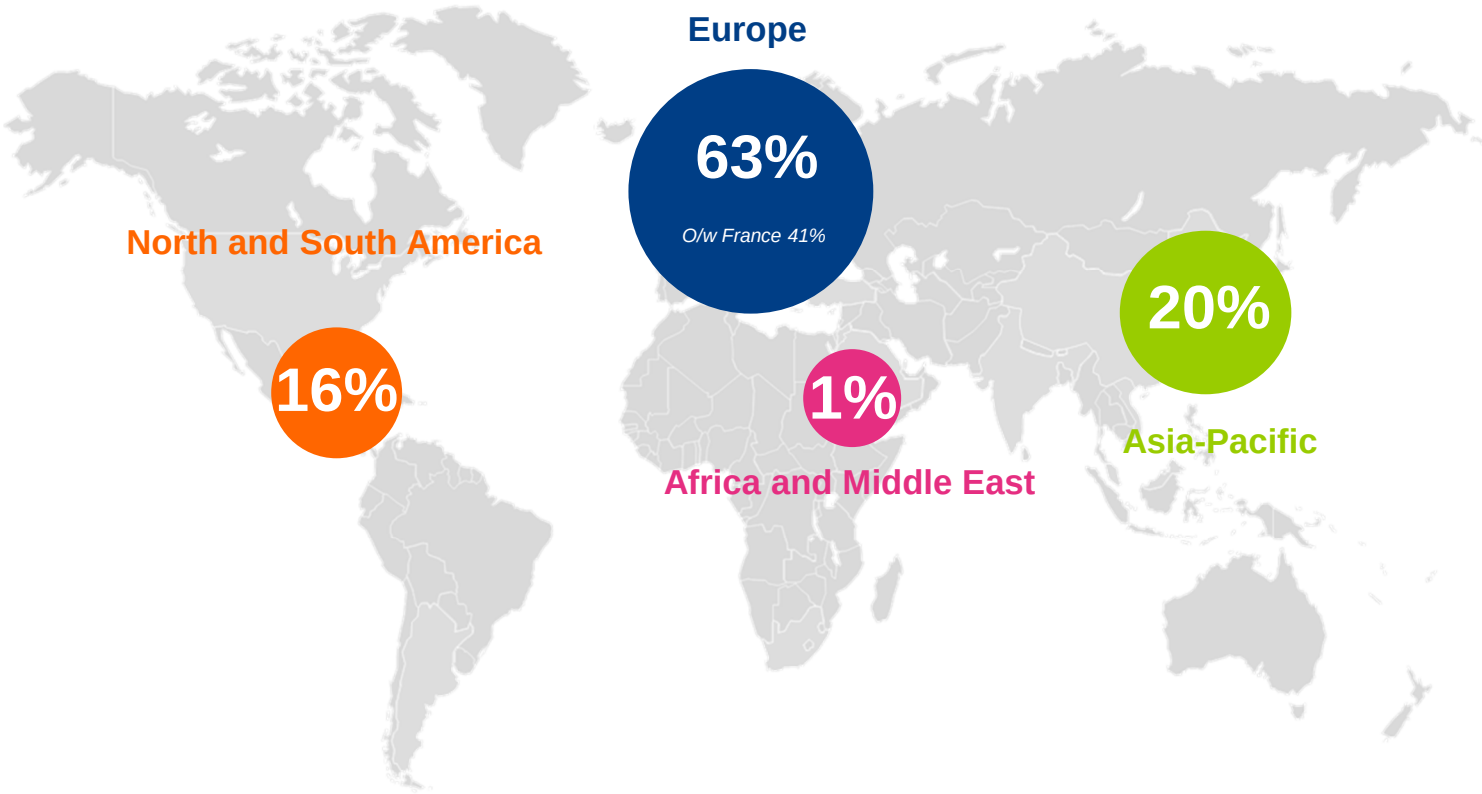
€9.24bn
in revenue

45,340
employees

4,4% of sales devoted to R&D

112
registered patents

Geographic distribution of 2013 revenue



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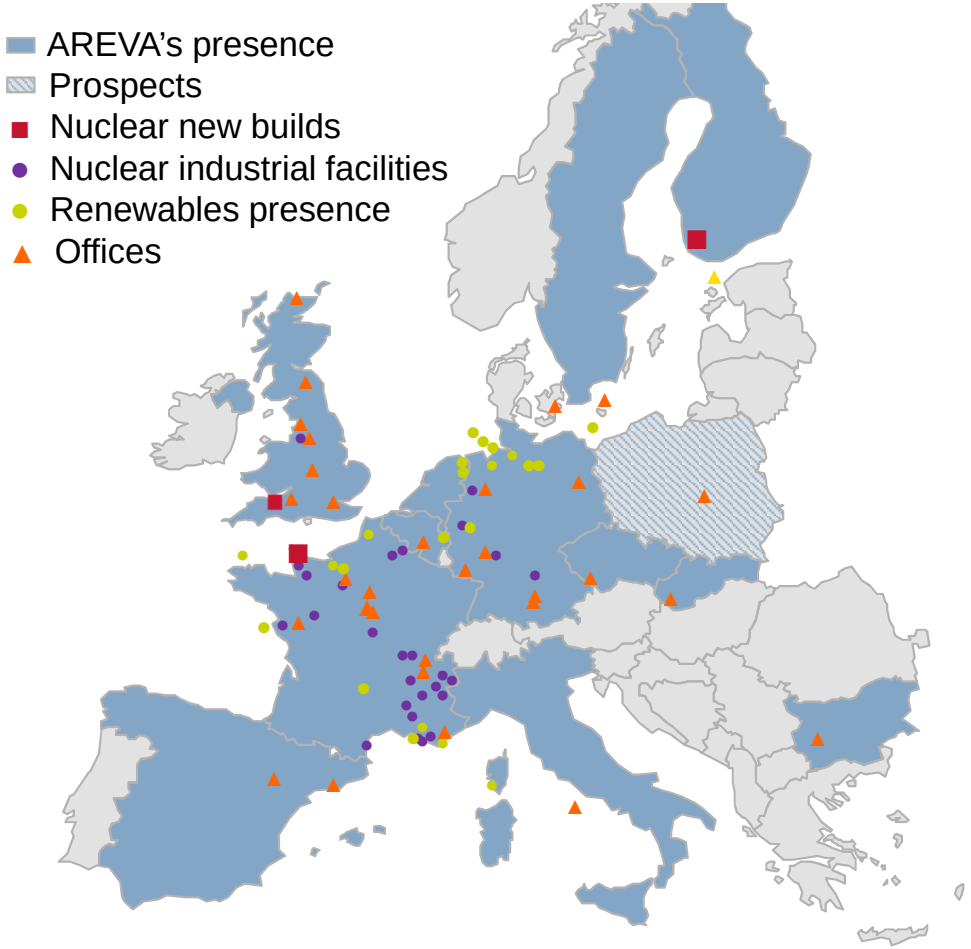
AREVA's EU industrial footprint is particularly strong in France and in Germany



France

- **28,564** employees
- **30** industrial facilities, mainly in the nuclear fuel cycle

Germany

- **5,700** employees
- **8** industrial facilities, notably for offshore wind turbine manufacturing

UK

- **150** employees
- **2** industrial facilities

83% of AREVA's workforce is in Europe, for only 63% of its sales

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Agenda

- **Nuclear energy in the world and in Europe**
- Nuclear energy contribution to the EU policies
- Challenges and perspectives

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Energy market fundamentals support development of nuclear and renewables

Macroeconomics	Energy demand: **x2 by 2050** vs. 1990
Geopolitics	Energy **independence** and **security** of supply imperative
Resources	Increasing **difficulties in extracting resources** leading to higher **prices**
Environment	GHG emissions reduction goal of **50% by 2050** to limit temperature increase to 2°C vs. 1990
Economics	Need of mastered, stable and predictable **energy costs**

WEO 2014
2012 – 2040
New Policies Scenario

Demand in nuclear energy*	**+ 2.3% / year**
Demand in renewable energies*	**+3.7%** / year**

* TWh
** Including hydro power

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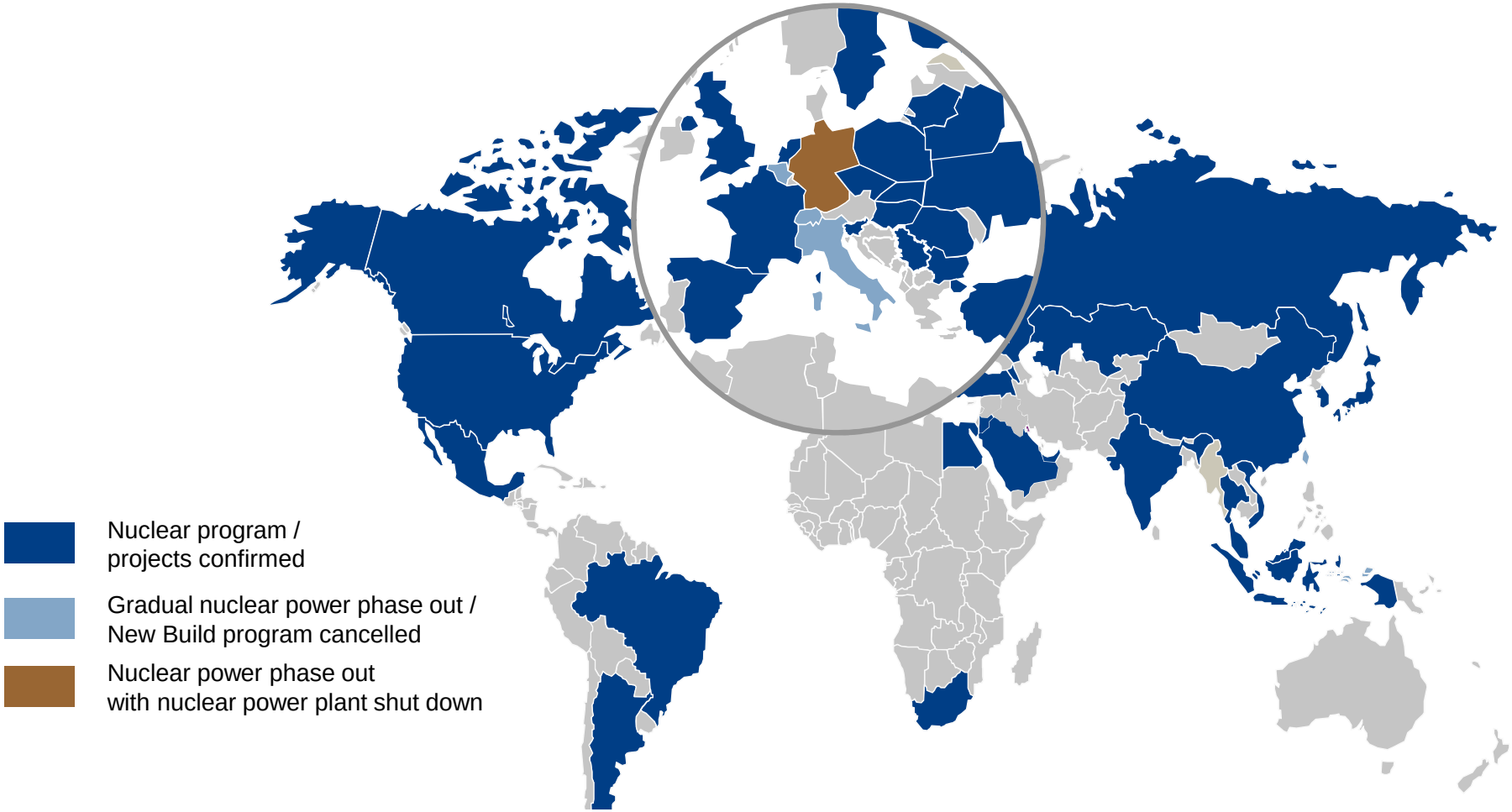
Post Fukushima, most countries have confirmed the importance of nuclear in their energy mix



According to IEA, the number of nuclear countries will increase from 31 in 2013 to 36 in 2040

1. Source: WEO 2014 (IEA)

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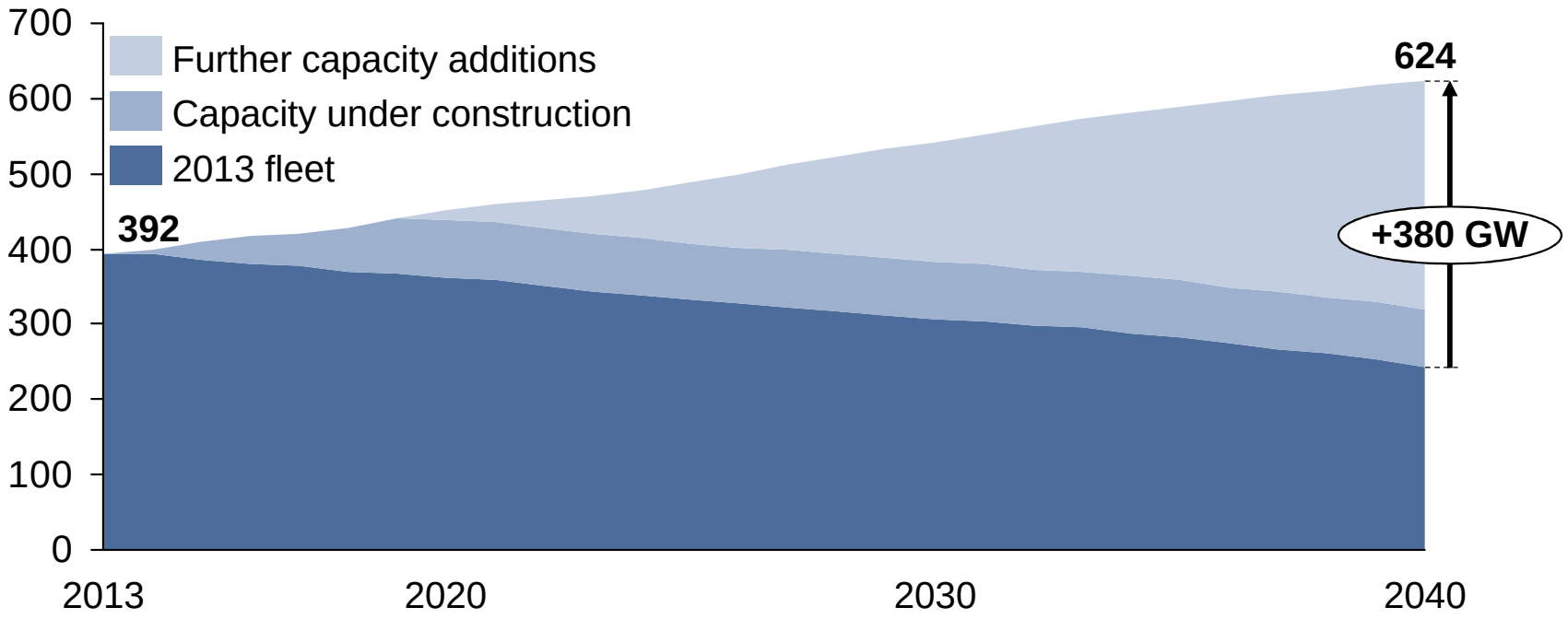
According to the IEA, 380 GW of nuclear power capacity will be commissioned by 2040

Global installed nuclear capacity
(GW, gross)



There are more than 70 nuclear power plants currently under construction throughout the world, including 4 in the European Union

Source: WEO 2014, New Policies Scenario (IEA)

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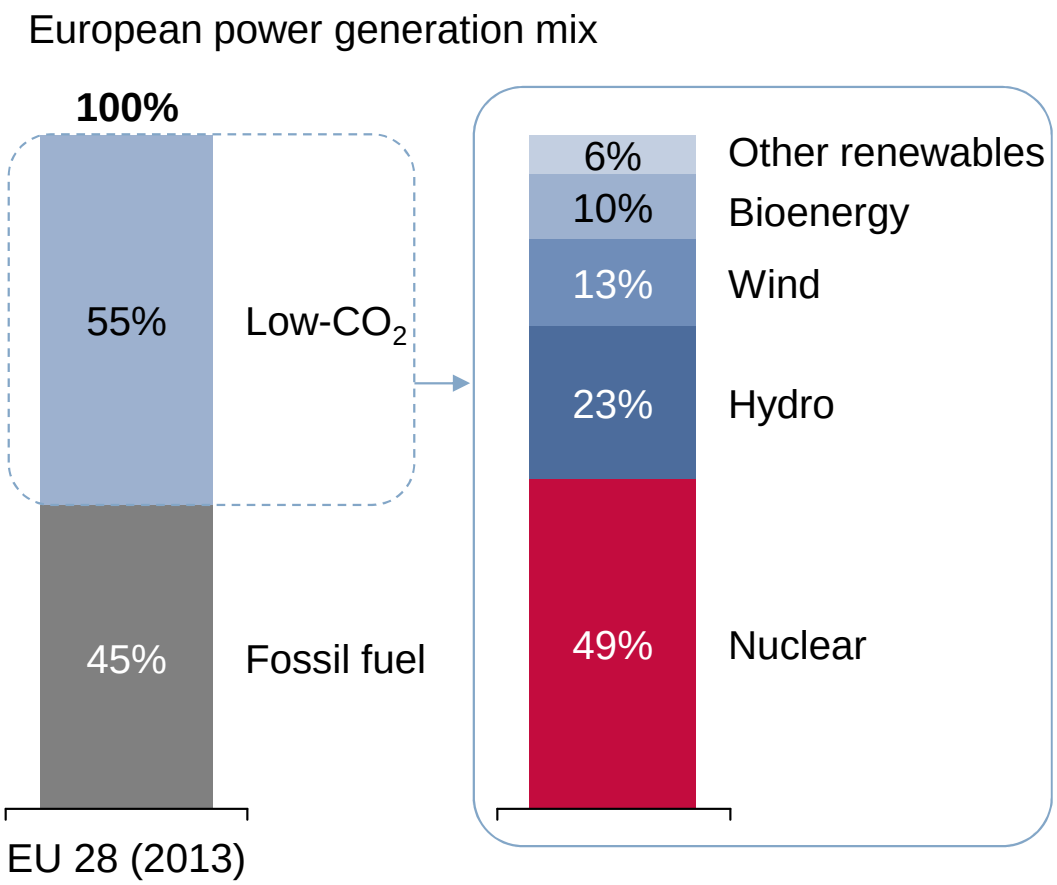
In an interconnected electricity system, the whole EU benefits from the low-CO_2 nuclear power generation



Nuclear energy accounts for half of the CO_2-free electricity generated in the EU

Sources: WNA, Enerdata

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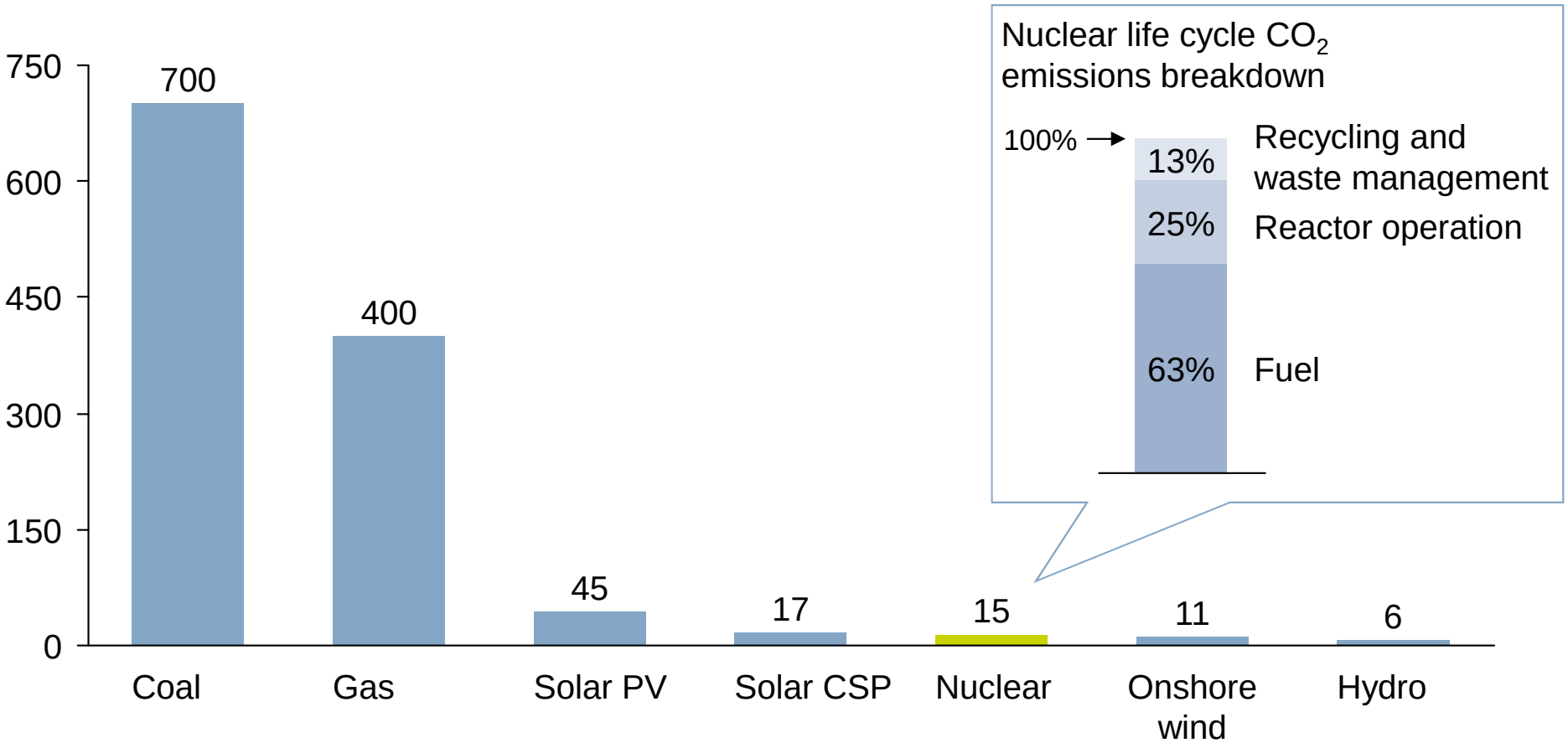
Nuclear power, similarly to renewables, has a very low carbon footprint

Technology-specific CO_2 emissions – New build (gCO_2/kWh)



Source: "External costs from emerging electricity generation technologies" (2009 NEEDS project), Paul Scherrer Institute (Dones 2003)

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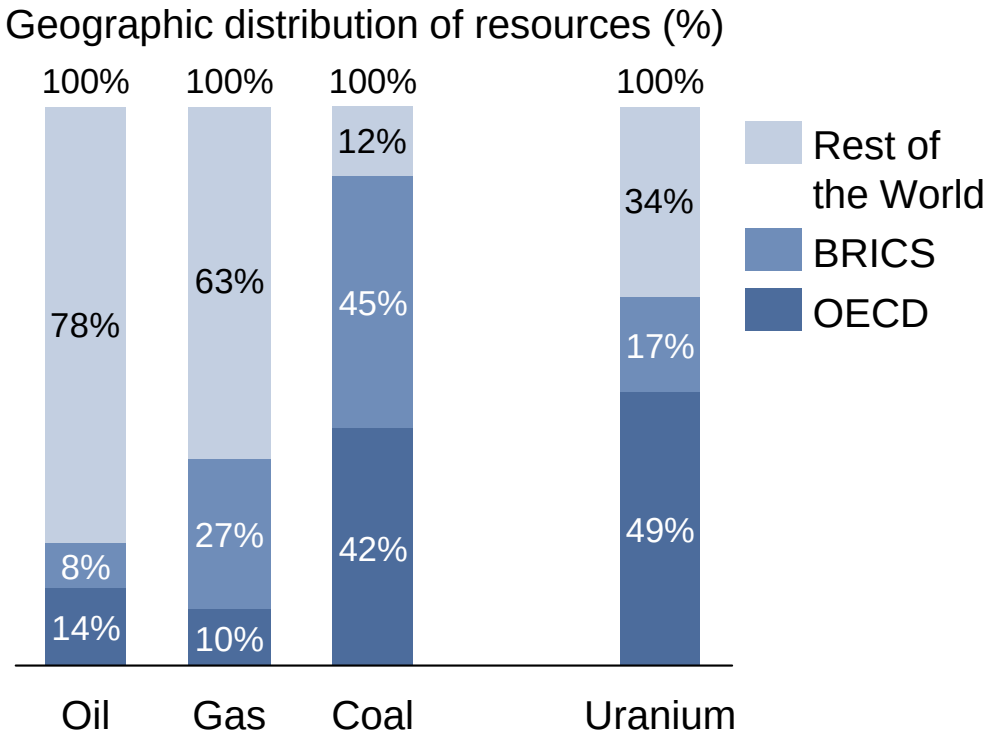
Nuclear power contributes positively to overall energy security of supply

Unlike fossil fuels resources, uranium mines are well distributed around the globe



Nuclear power is an asset for the implementation of a European Energy Security Strategy

Quality, reliability and security of the electricity system

- One of the few low-CO_2 baseload technologies available

Technological leadership and EU industrial base

- Fully qualified supply chain for nuclear reactors (incl. SMEs)
- Leadership and industrial base for fuel cycle (incl. recycling)

"The EU's energy security can be increased by having recourse to indigenous resources as well as safe and sustainable low carbon technologies"[1]

1. Quote from the European Council, October 2014
Source: Enerdata 2012

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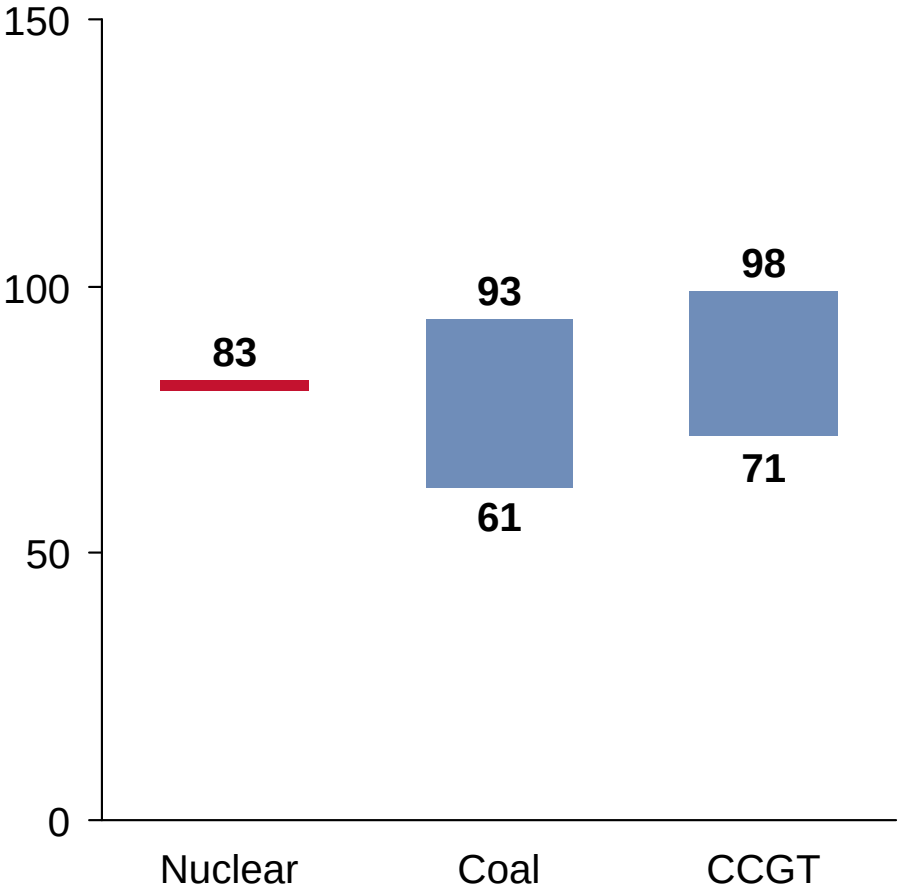
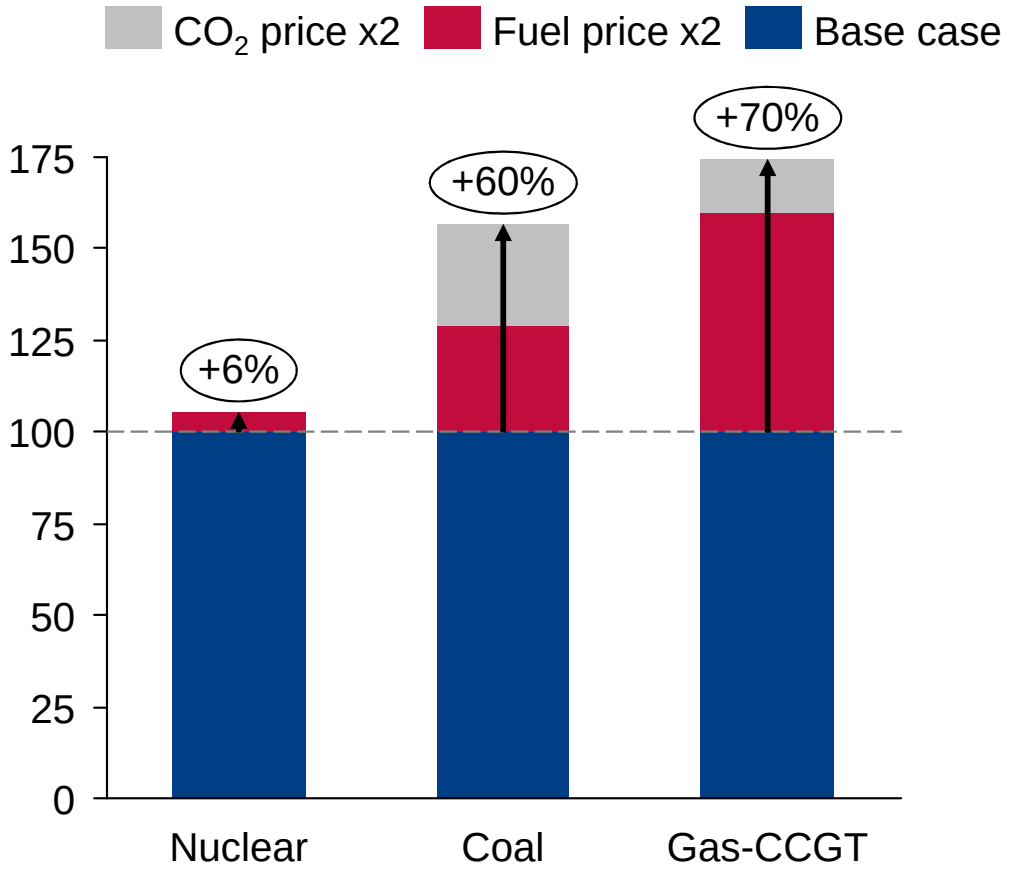
Nuclear power is competitive, with a structurally stable cost

Levelized costs of electricity generation in Europe for nuclear, coal and gas (CCGT)
(€/MWh, new build online in 2030)



Impact of doubling fuel and carbon prices on production costs
(base 100)



Source: WEO 2014 (IEA) – ranges show uncertainties on fossil-fuel and CO_2 prices

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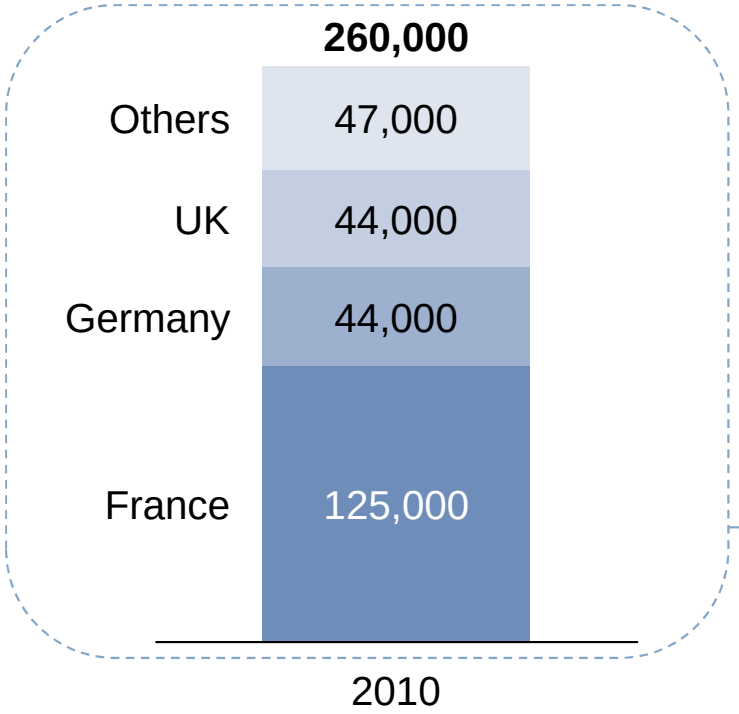
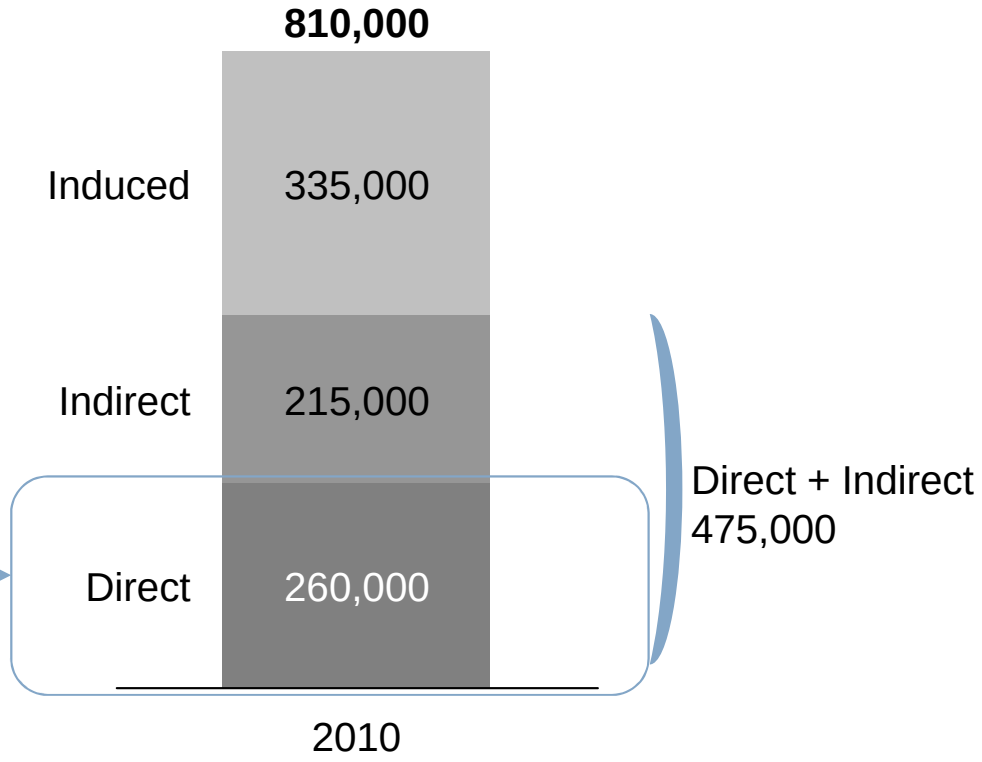
Nuclear power supports 260,000 direct jobs and over 800,000 total jobs in the EU

Direct nuclear jobs in the EU, 2010
(Full time equivalent)



Total nuclear jobs in the EU, 2010
(Full time equivalent)



The Hinkley Point C project will provide around 25,000 job opportunities throughout the build for nearly a decade

Sources: France: PwC, Germany: BMU, UK: Cogent-ssc, Belgium: PwC, Others: French Senate / AREVA analysis
Hinkley Point C: EDF Energy

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EURATOM provides a robust, up-to-date European framework for the responsible use of nuclear energy

Revised Nuclear safety Directive

(2014)

- The amendment implements **lessons learned from the Fukushima accident**
- The revision of the directive confirms the EU commitment to **ensuring the highest level of nuclear safety through:**
  - A common high level nuclear **safety objective**
  - More **independent** regulators and more **cooperation** among them
  - Strengthened provisions on transparency

Radioactive waste management Directive

(2011)

- All Member States must have to decide and implement a plan towards **final repositories for nuclear waste**
- **Deep geological disposal** is considered as the safest and most sustainable option as the endpoint for high-level radioactive waste
- Industrial solutions to manage used fuel and optimize waste production exist, in particular **recycling**

A strong European framework is a condition for public acceptance and for the development of new project in the EU

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The EU Climate and Energy policy framework for 2030 sets decarbonization as its first objective

The European Council agreed on three key objectives for 2030

1 GHG emissions	**- 40%** by 2030 compared to 1990	Binding at EU level and Member States level
2 Renewable energy sources	**27%** in 2030	Binding at EU level only
3 Energy efficiency	**+ 27%** by 2030 compared to projections of energy consumption based on the current criteria	Indicative

AREVA welcomes in particular a number of items in the agreement

- **Ambitious GHG reduction objective** (COP21)
- **Reformed ETS** as the main tool to achieve decarbonization
- **Hierarchy of objectives** correcting the flaws of the 3X20 strategy
- Reaffirmation of the **sovereignty of Member States regarding their energy mix**

The new framework should contribute to limit policy turbulences on the energy market and provide stability to investors

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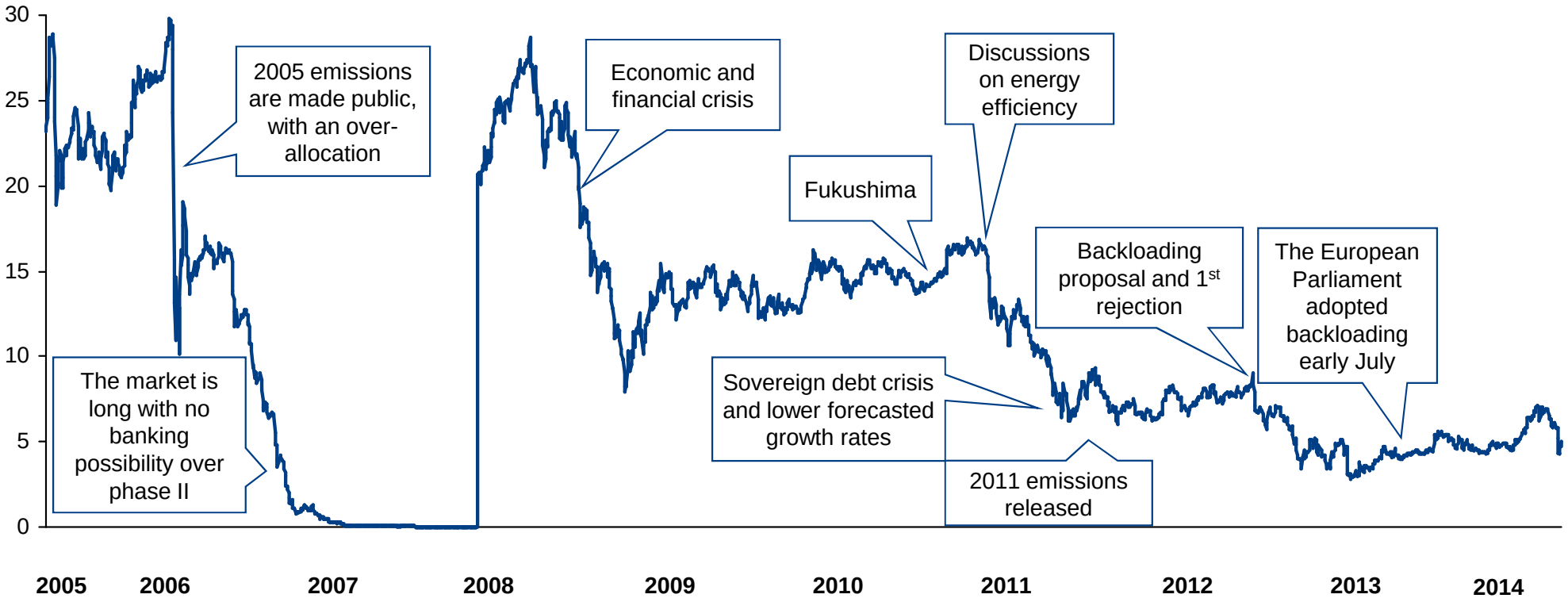
The ETS must be reformed to send consistent, long-term signals to investors

Evolution of spot carbon prices on the EU-ETS, June 2005 – April 2014 (€/tCO_2)



The proposed MSR is a welcomed first step towards a reformed ETS, but as a volume-based tool, it must be complemented in order to ensure a stable and sufficiently high CO_2 price

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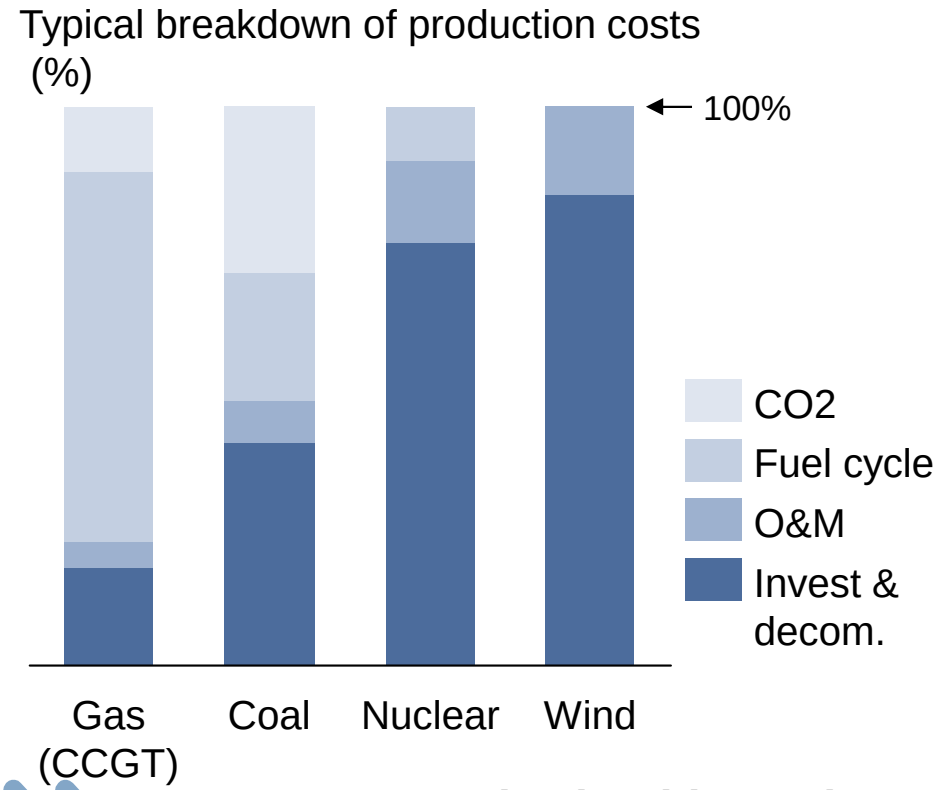
New financing mechanisms are necessary to foster low-CO_2 investments

Low-carbon technologies are characterized by high upfront and low operating costs



A pragmatic approach is needed to give investors visibility over the long-term

Proven examples at MS level

- **UK Electricity Market Reform**
  - E.g. Hinkley Point C (CfD, State guarantee)
- **Finland Mankala model**
  - E.g. Olkiluoto 3 (Finland)
- **Long-term contracts**
  - E.g. Exeltium (France)

Possibilities at EIB level

- Loan guarantees
- Direct loan with repayment flexibility
- Standby credit lines

European tools should remain technologically neutral and support all projects contributing to EU energy and climate objectives

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