

International Conference
„The Advanced Technologies Against Climate Change
27.-28. May 2008, Sofia

Part of the solution: Addressing the challenges of building new fossil-fuelled power plants in Europe

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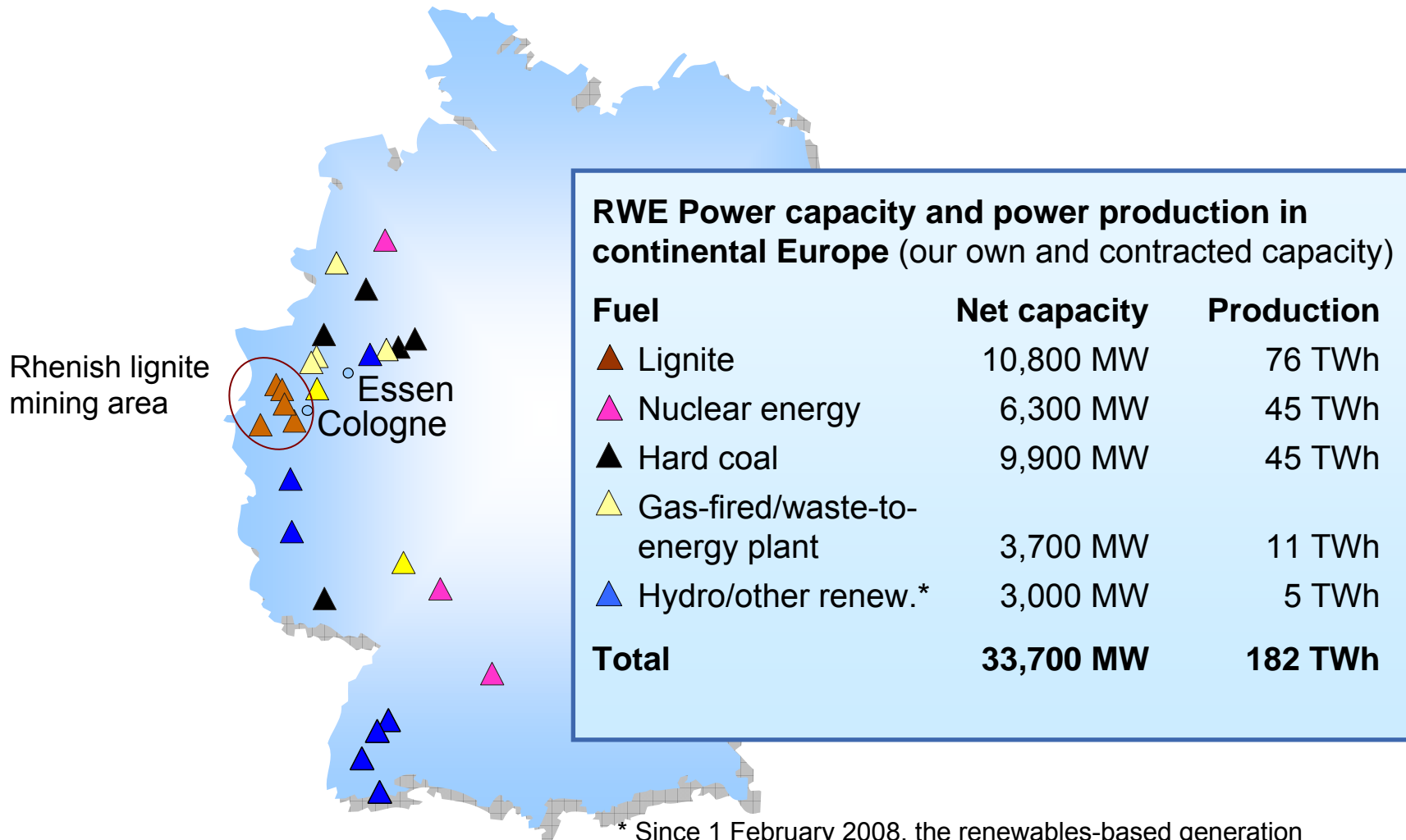


VORWEG GEHEN

Agenda

- 0 Introduction
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- 2 Challenge: Plant Costs and Fuel Price Developments
- 3 Challenge: Climate Protection and Emissions Trading
- 4 From Challenges to Solutions
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- 6 Upshot

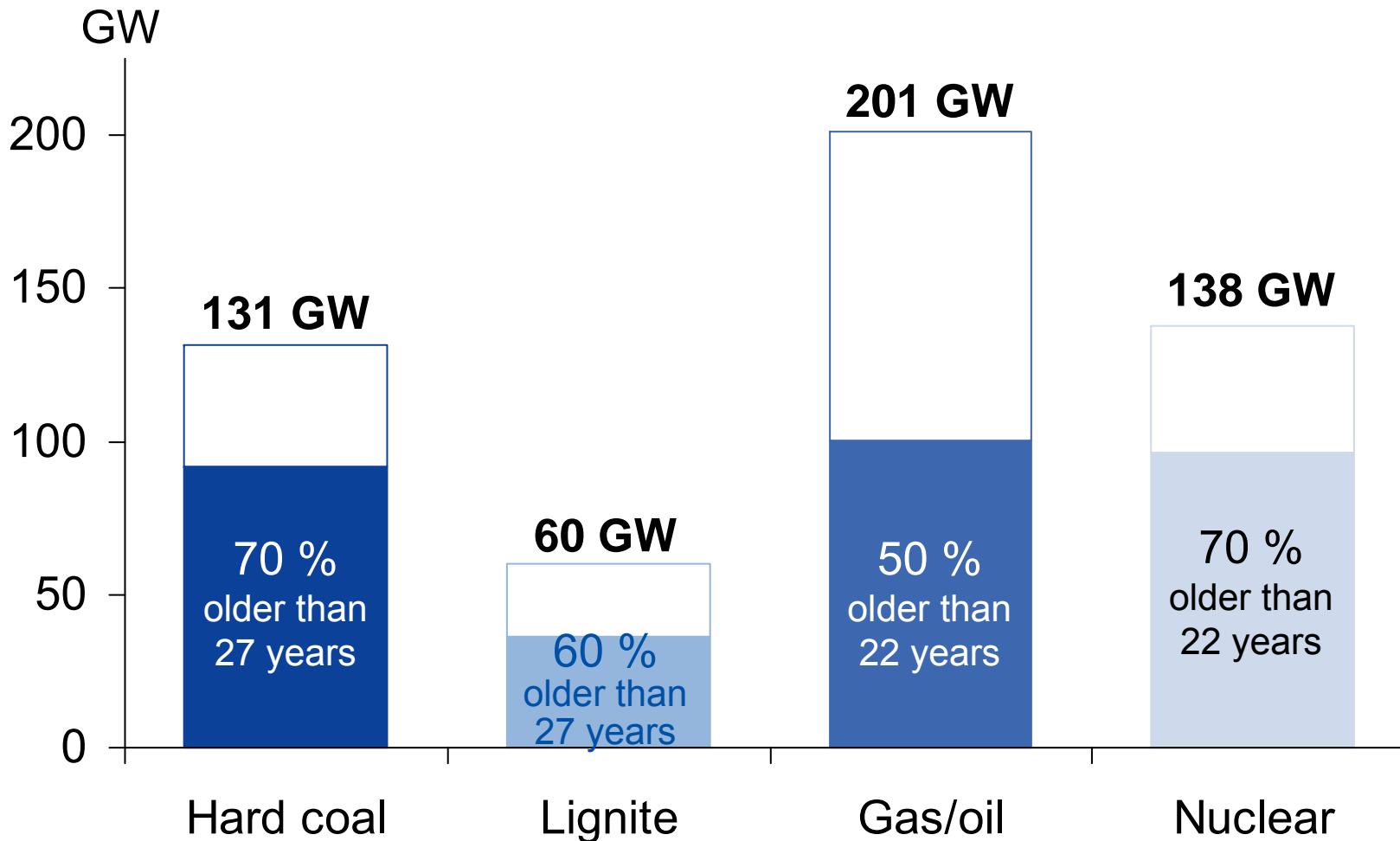
Power plants of RWE Power in Germany



* Since 1 February 2008, the renewables-based generation assets have been owned by the new Group company RWE Innogy.

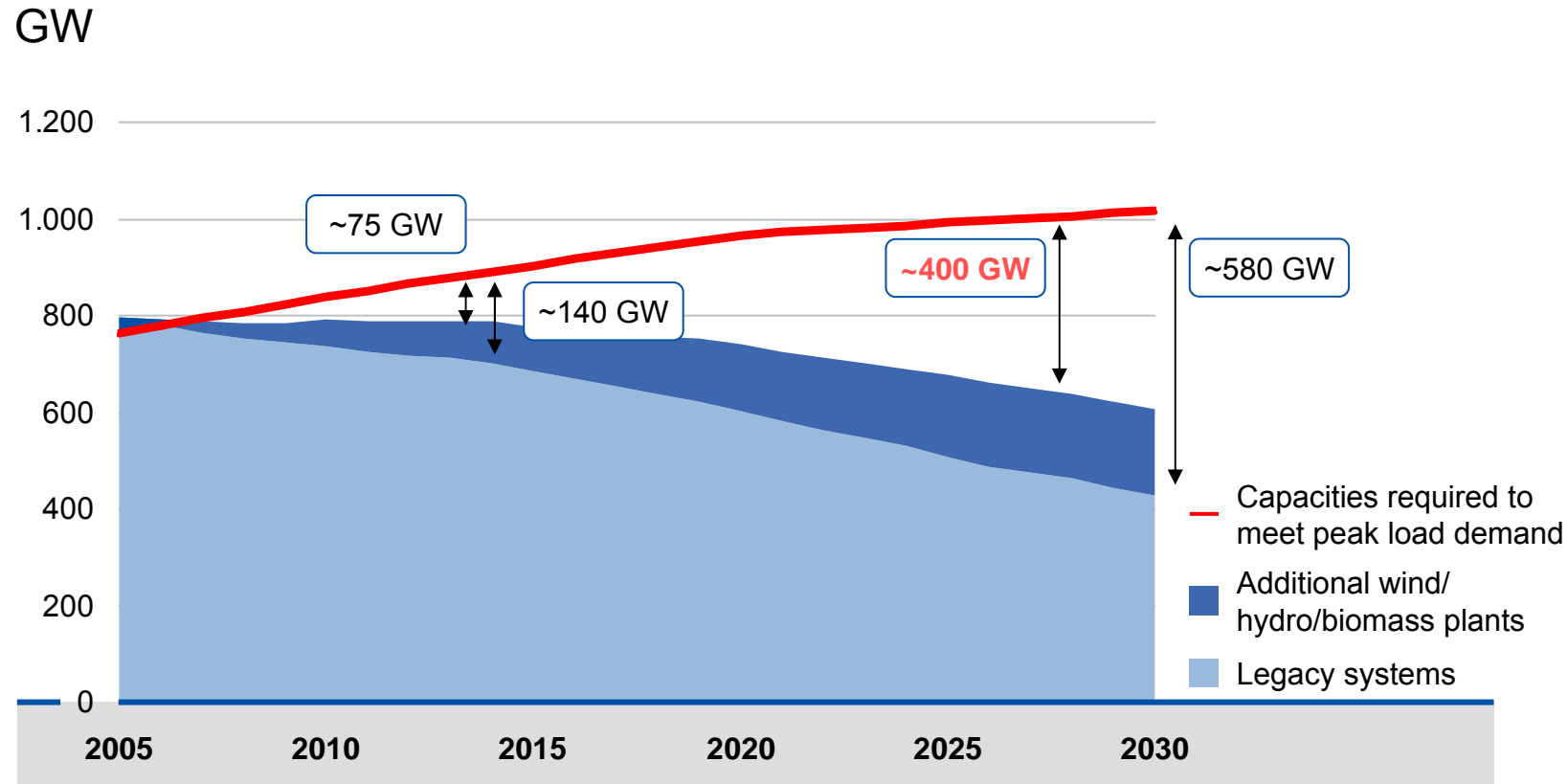
1 Challenge: Europe and its capacity gap

Outdated power plants in the whole of Europe ...



1 Challenge: Europe and its capacity gap

... require new thermal power plants to be built until 2030



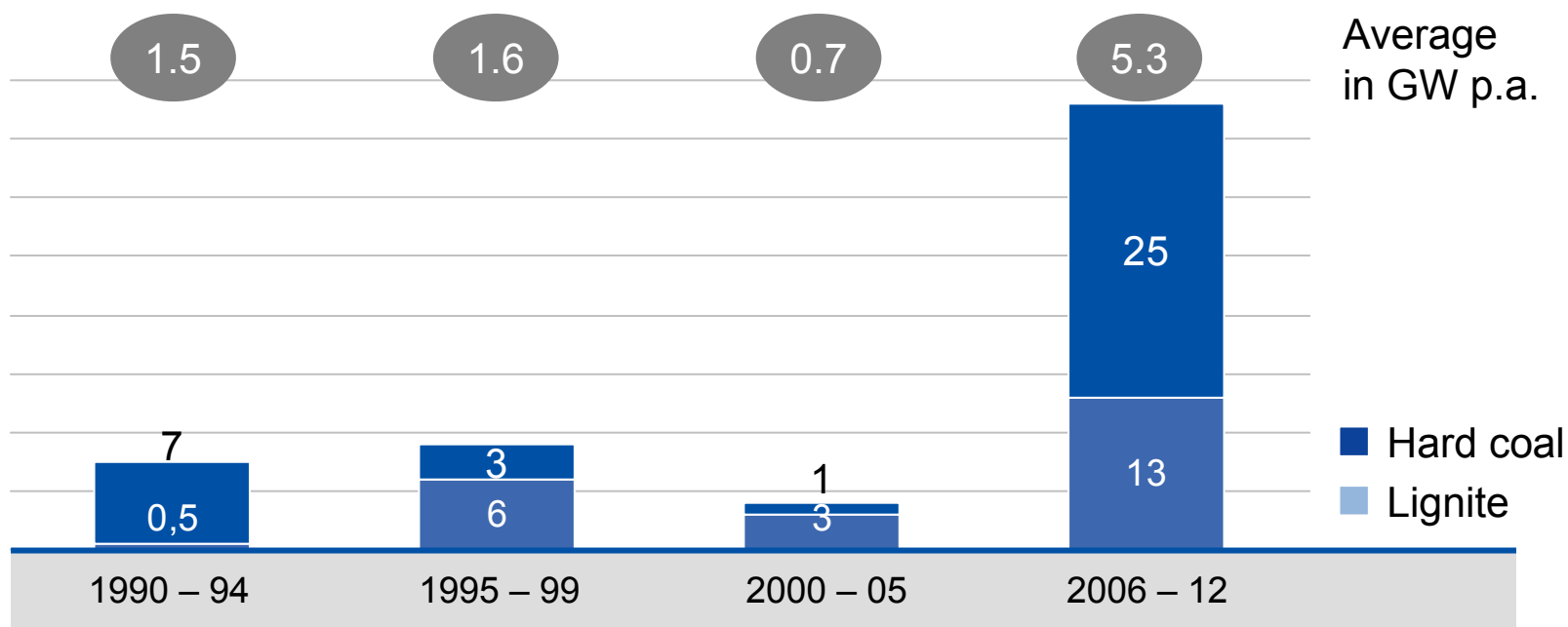
EU 27, Norway, Switzerland
Source: BCG, EURPROG, UCTE, RWE, 2006

2 Challenge: Plant Costs and Fuel Price Development

European plant builders are running out of capacities

Investment programmes for new coal-fired power plants challenge the capacities of plant builders.

Construction of new coal-fuelled power plants against time in Europe^{1, 2}



¹ 1990 - 2005: Power plants with more than 150 MW

² 2006 - 2012: Power plants with more than 300 MW

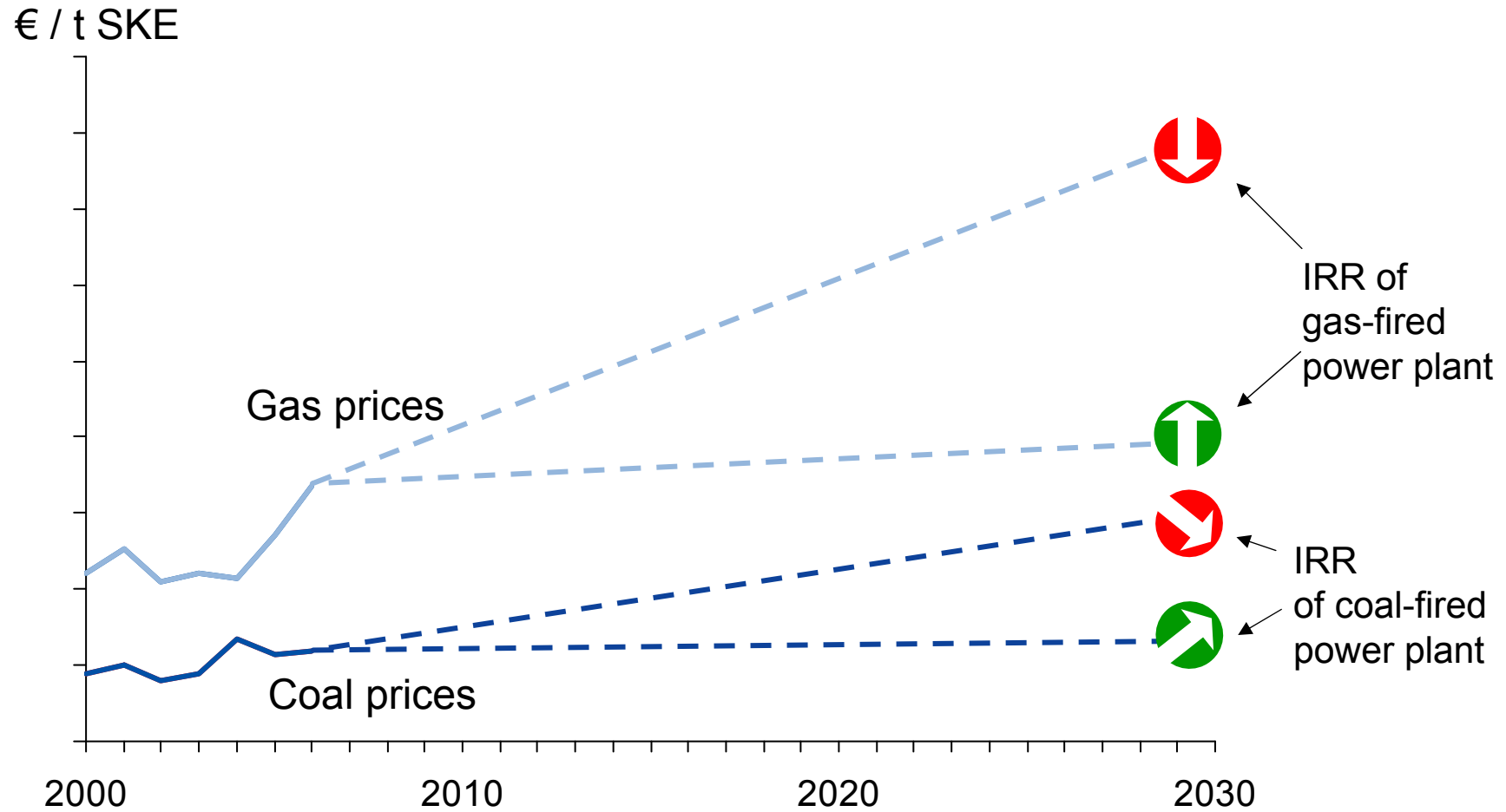
Source: UDI, Platts, RWE, BCG 2006

EU 25 excl. Malta, Baltic states, Greece; plus Switzerland, Norway, Romania, Bulgaria, the Balkans (former Yugoslavia)

2 Challenge: Plant Costs and Fuel Price Development

Future fuel-prices pose an investment risk

... and influence the profitability of power plant projects



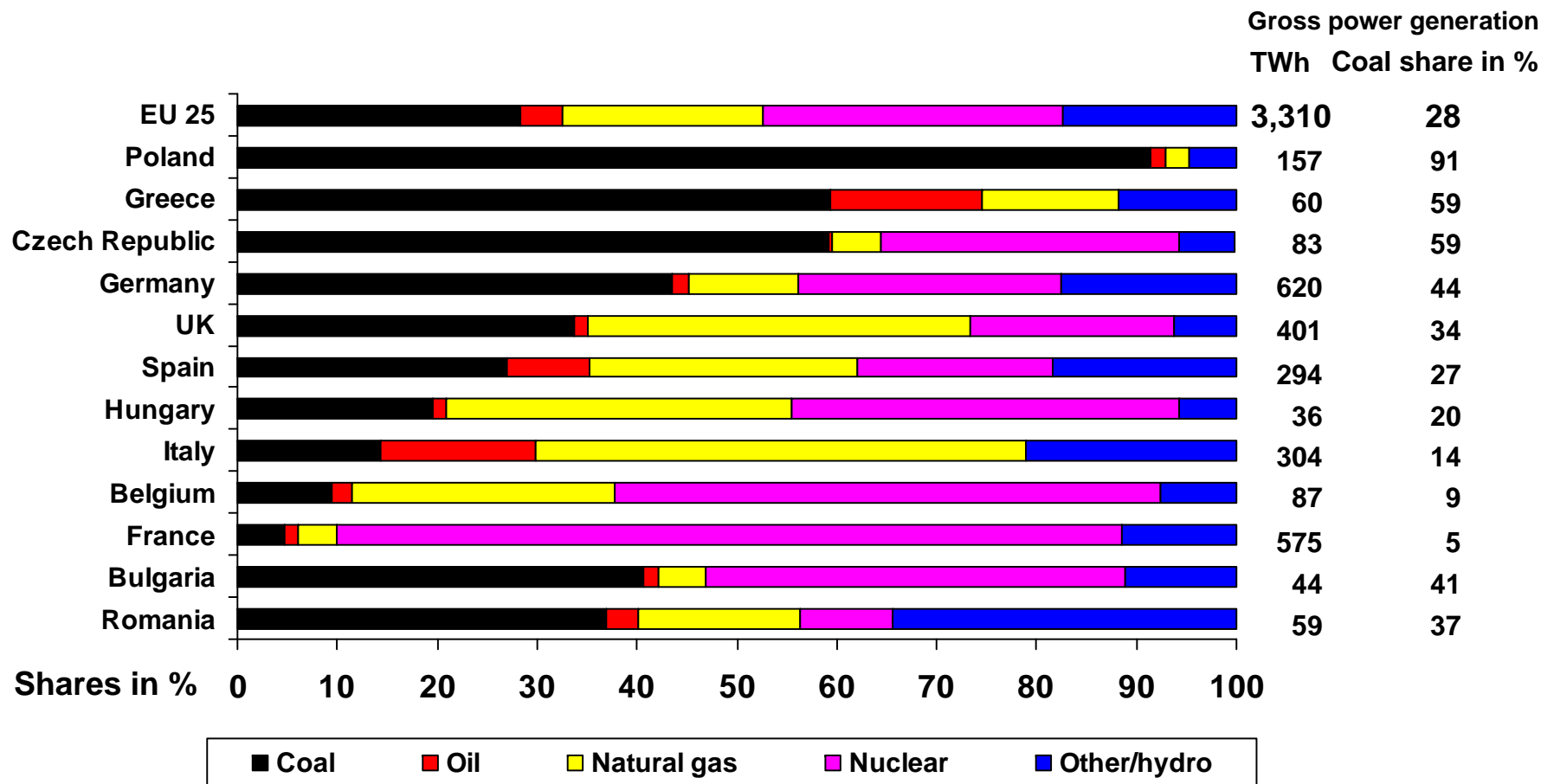
3 Challenge: Climate Protection and Emission Trading

EU climate change package: emissions trading proposals threaten coal-based power plants

- > Reduction of greenhouse gas emissions by 20 % by 2020 compared with 1990: this means the energy sector and industry have to reduce their emissions by 21 % by 2020 compared with 2005
- > Crucial cornerstones of the emissions trading proposal are:
 - EU-wide uniform emission caps for energy and industry with an annual 1.74-% cut in allocation amounts
 - Full auctioning for energy sector as of 2013
- > Assessment:
 - Out of responsibility for its customers, RWE wants to prevent high CO₂ prices.
 - Thus, cost efficiency in climate protection is RWE's guiding principle.
 - Full auctioning poses a risk to the economic efficiency of constructing new coal-fired power plants after 2012.

3 Challenge: Climate Protection and Emission Trading

Power generation structures of selected European nations in 2005



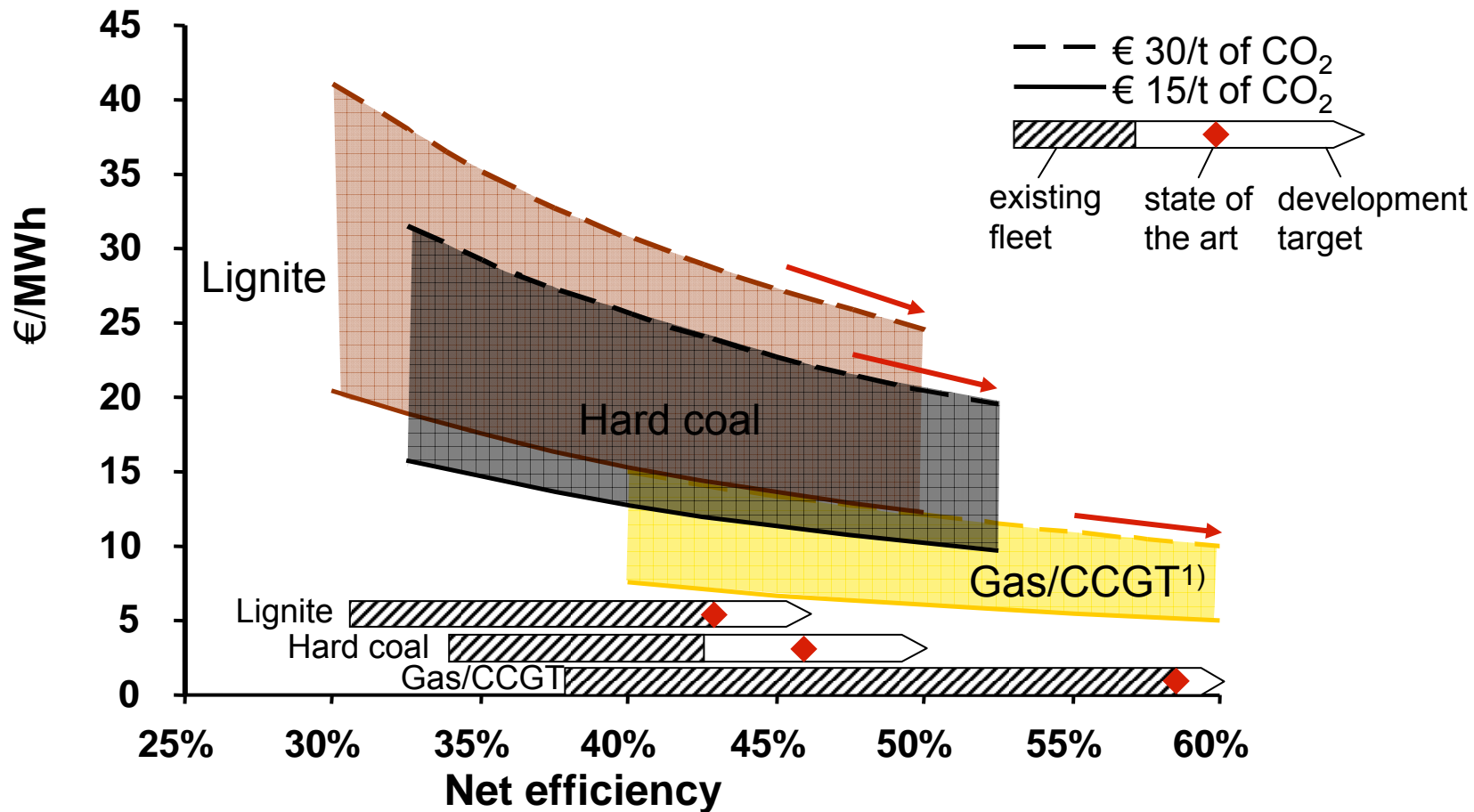
Source: EUROSTAT – energy/annual statistics 2005 – 2007 edition



4 From Challenges to Solutions

Efficiency improvements in coal-fired plants have the biggest CO₂ effect

CO₂ as part of electricity costs

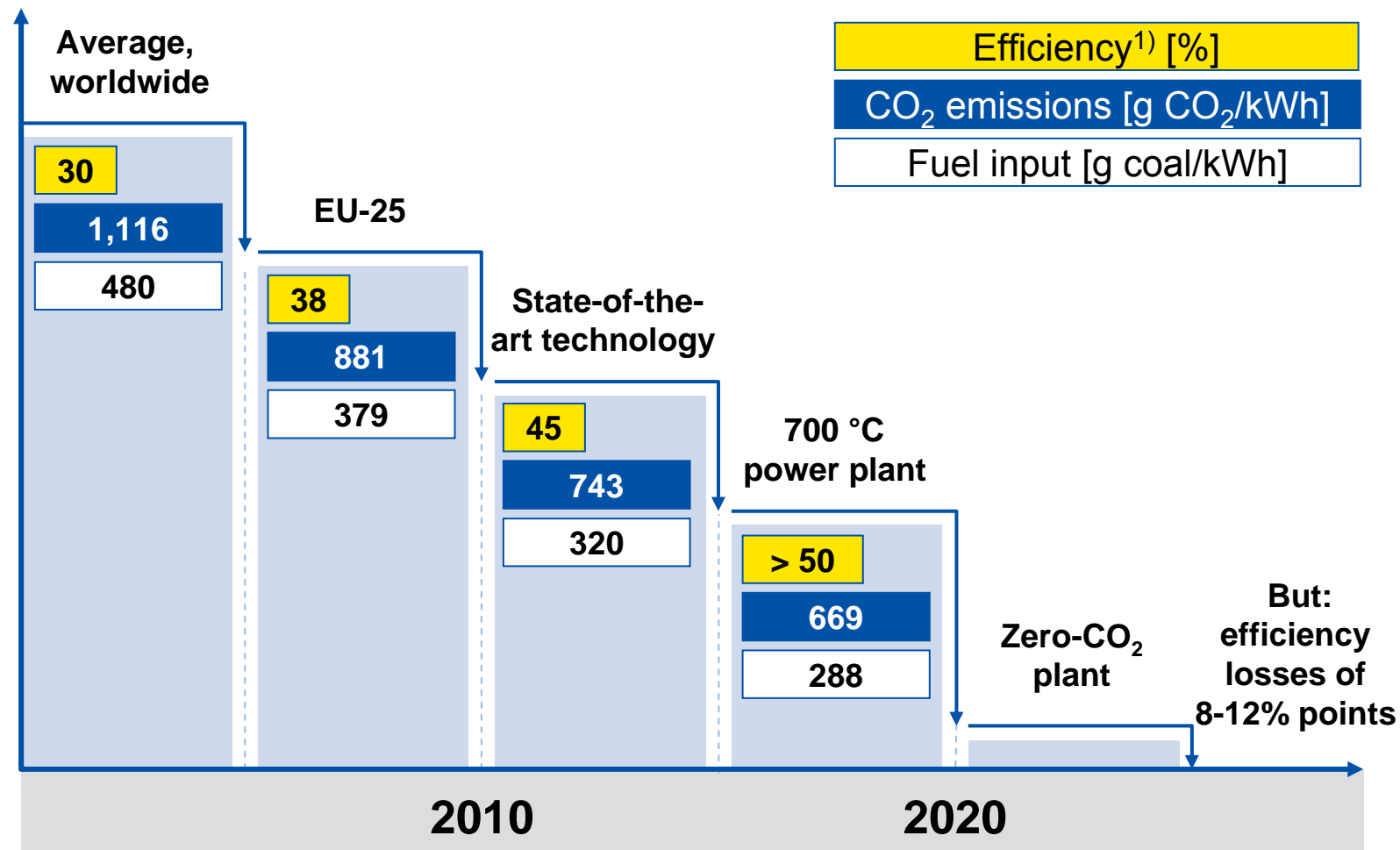


¹⁾ CCGT = combined-cycle gas turbine

4 From Challenges to Solutions

CO₂ reduction through higher efficiency essential for hard coal plants

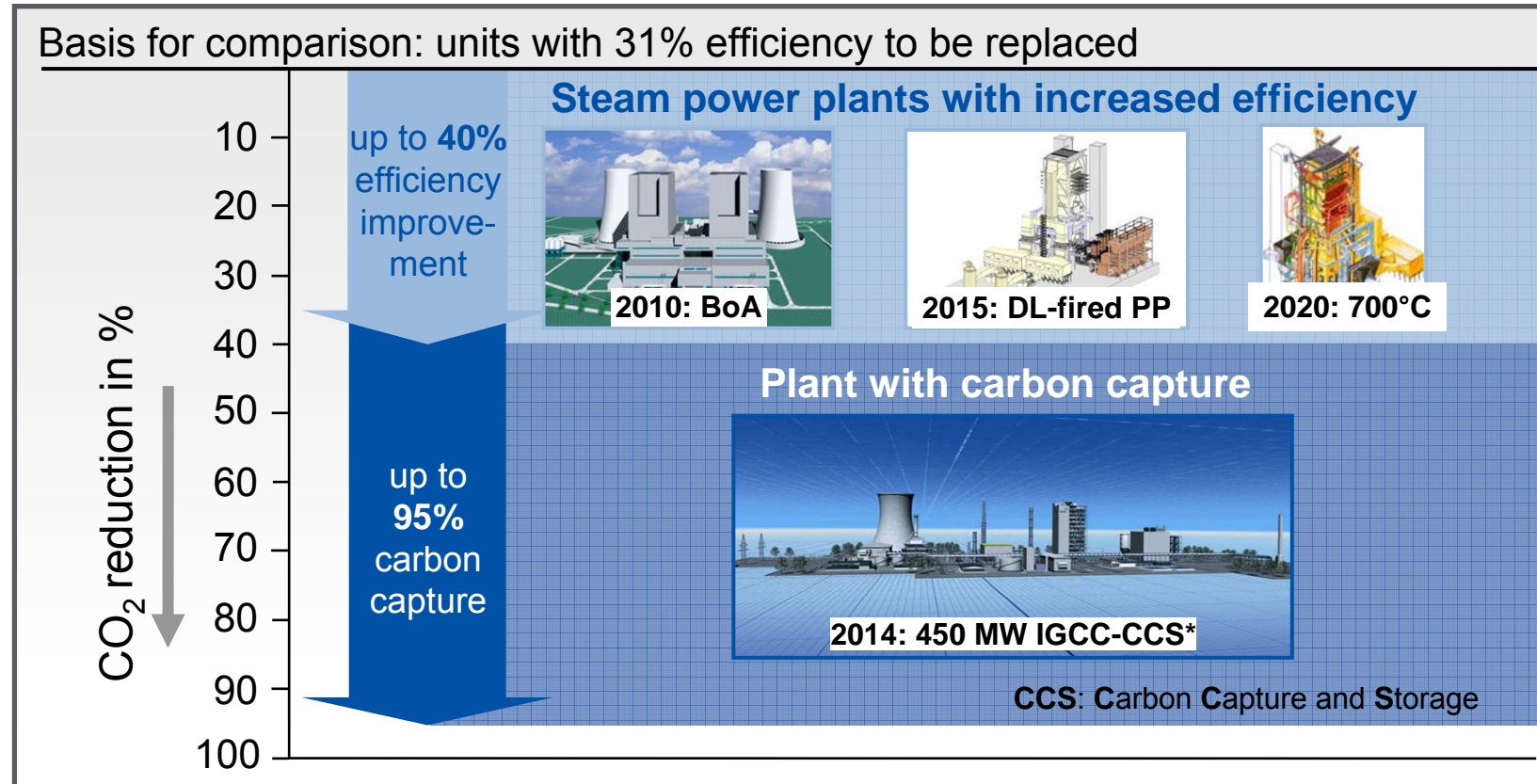
CO₂ emissions per kWh



¹⁾ Average data for hard coal-fired plants


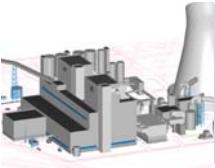



4 From Challenges to Solutions

The next technical innovation tasks: Newbuild coal-fired power plants have significant CO₂ reduction potential



Increase in efficiency necessary to compensate the efficiency losses of CO₂ capture

Current new-build programme

	BoA 2&3 Neurath	<ul style="list-style-type: none">> Project proceeding as planned> Commercial operation as of 01/10 (07/10)
	Westfalen hard coal-fired PP	<ul style="list-style-type: none">> Approval phase> Commercial operation as of 06/11 (12/11)
	Further options for hard coal- fired PPs	<ul style="list-style-type: none">> Further twin unit plant planned at the Eemshaven site> Commercial operation as of 2011/12
	EM CCGT plant	<ul style="list-style-type: none">> Construction started in 04/07> Commercial operation as of 04/09
	EM PP TGT & GW PP TGT	<ul style="list-style-type: none">> Optimization of the provision of control reserves in the portfolio> Procurement phase for up to 5 units

5 RWE – Part of the Solution

Next power plant generation with higher efficiencies being developed

Efficiencies of over 50% can be reached by lignite- and hard coal-fired power plants in 2020

Joint development goal:
700°C lignite/hard coal power plant

Efficiency: + 4%-points

- New materials allow steam parameters of 350 bar/700 °C



COMTES-700
Material tests

NRW PP700
Pre-engineering study
for demonstration plant

(VGB, operators,
manufacturers, EU)

RWE Power development goal:
Dry lignite-fired power plant

Efficiency: + 4%-points

- Recovery of drying energy based on WTA* technology

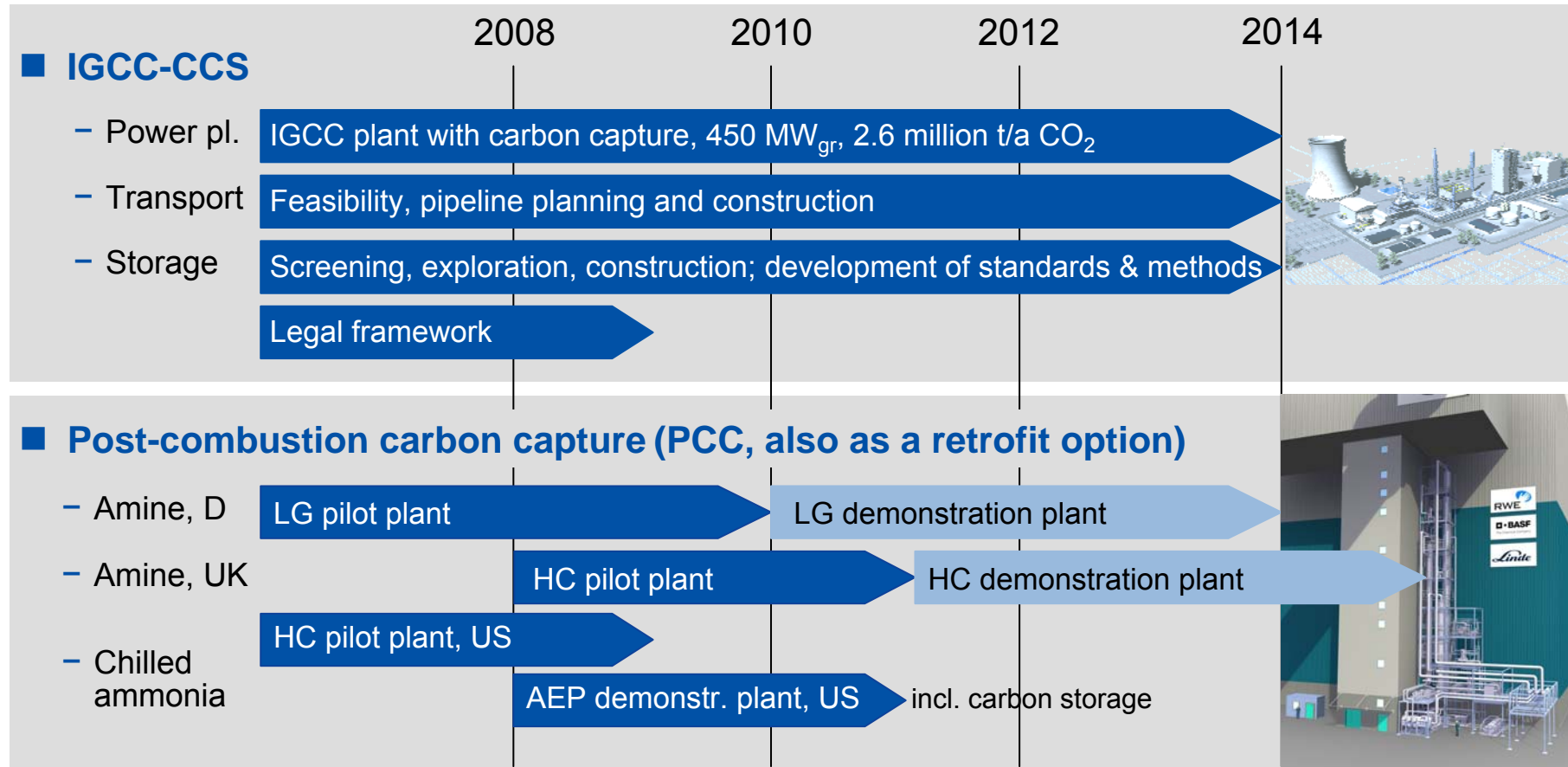


Demonstration plant for
fluidized-bed drying
under construction at
the BoA lignite power
plant in Niederaussem

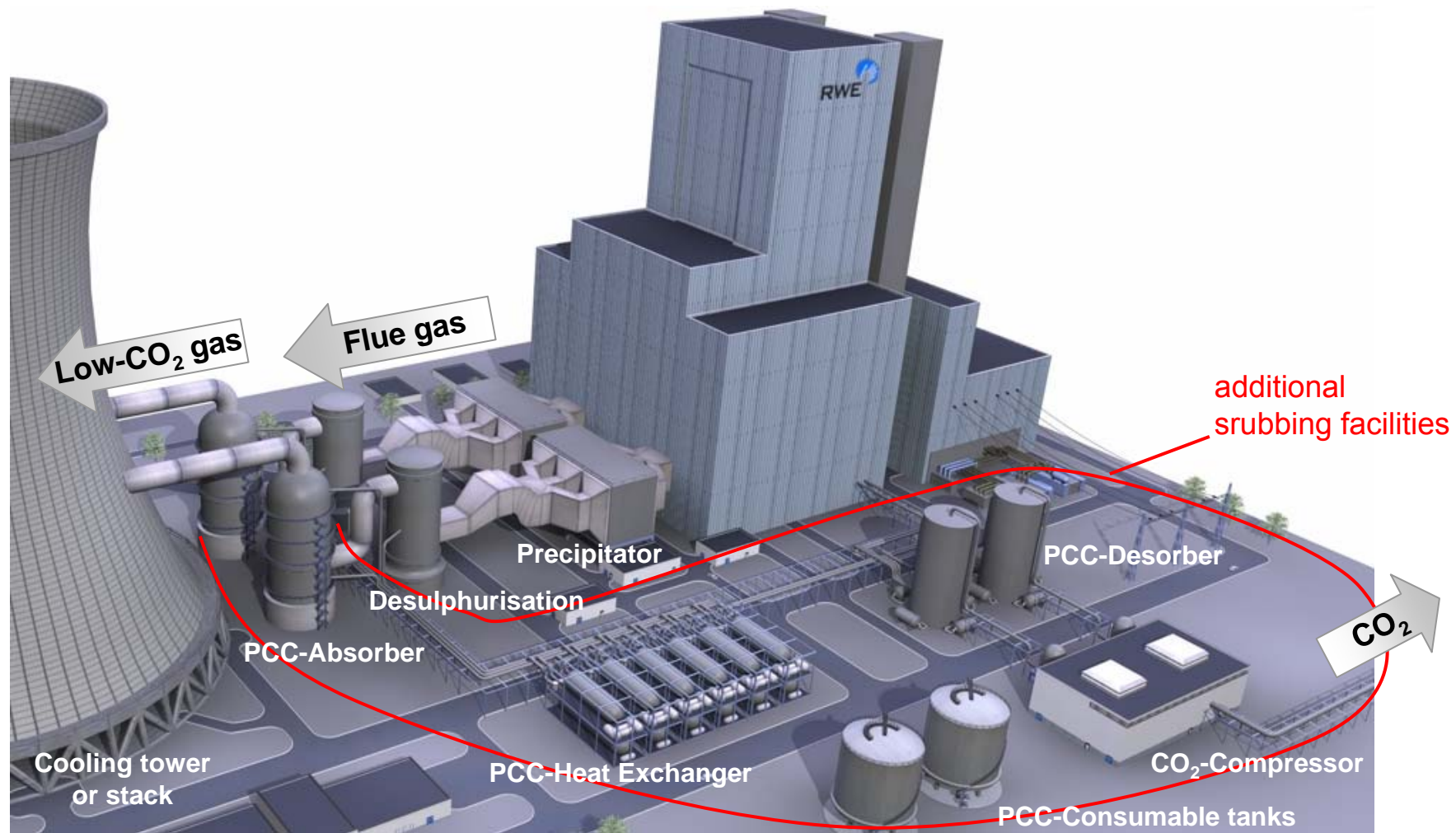
Throughput: 110 t/h
Investment: €50 million
Commissioning: 06/08

5 RWE – Part of the Solution

RWE activities undertaken to develop carbon capture and storage technology



Future conventional power plant with Post-Combustion Technology



Clean coal technologies require political support

- > **Define ambitious, realistic climate protection targets** geared towards technical and economic reduction potentials.
- > Press ahead with **the development of a regulatory framework** for coal-based power plants with carbon capture and storage.
- > **Limit economic risks** of CCS technology **by suitable incentive schemes.**
- > **Promote research** into developments in energy technology **free of ideologies** and **increase** the associated research budgets.
- > **Gain and promote** acceptance of all energy sources and technologies with the aid of factual information.

Who, if not us?

- We strive for climate protection that pays.
- Even if the shares of renewables and gas increase significantly:
We cannot do without coal.
- To achieve our goal, we are investing many billions of € in the most state-of-the-art coal and gas-fired power plants.
- To achieve our goal, we are working to gradually increase the efficiencies of coal-fired power plants to over 50 percent.
- To achieve our goal, we are planning to build the world's first ever large-scale coal-fired power plant equipped with carbon capture and storage.

Innovation powered by RWE.

