



## Long-Term Policy: Concepts, Methods, Industry Practice

Berlin Conference on the Human Dimensions of Global  
Environmental Change

22. Februar 2008

Stefan Ulreich, Upstream/Generation

## Uncertainties require adequate portfolio approach

### **E.ON's strategy targets on a diversified generation portfolio**

- ⇒ Combination of different fuels and technologies
- ⇒ Coverage of different geographical regions and countries

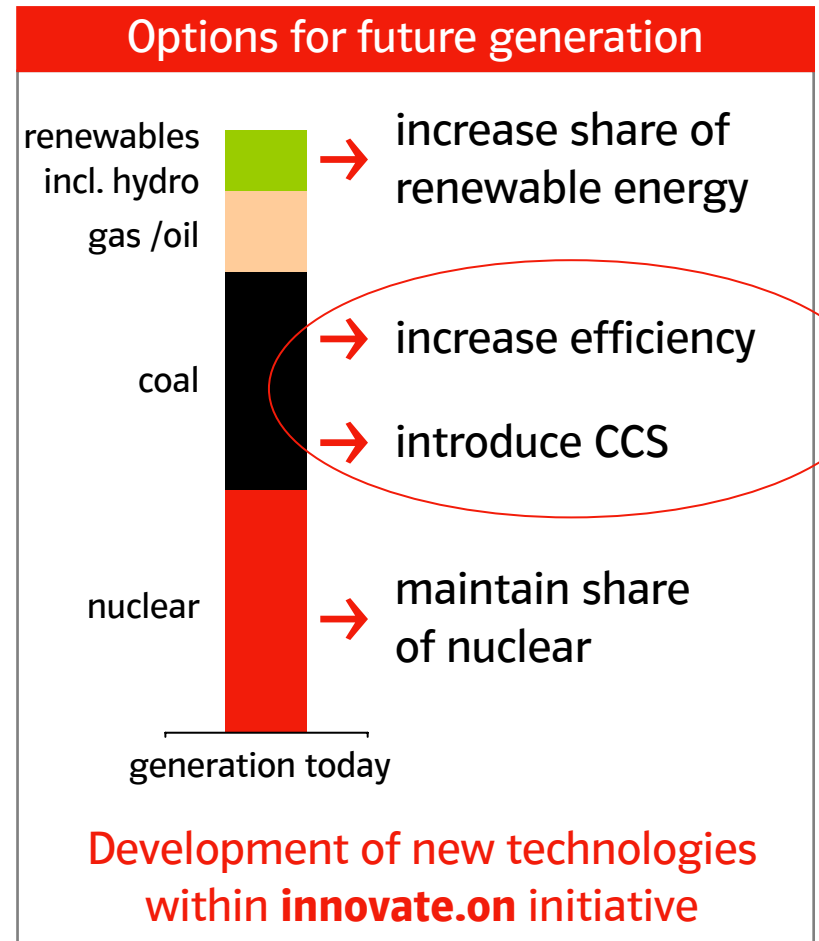
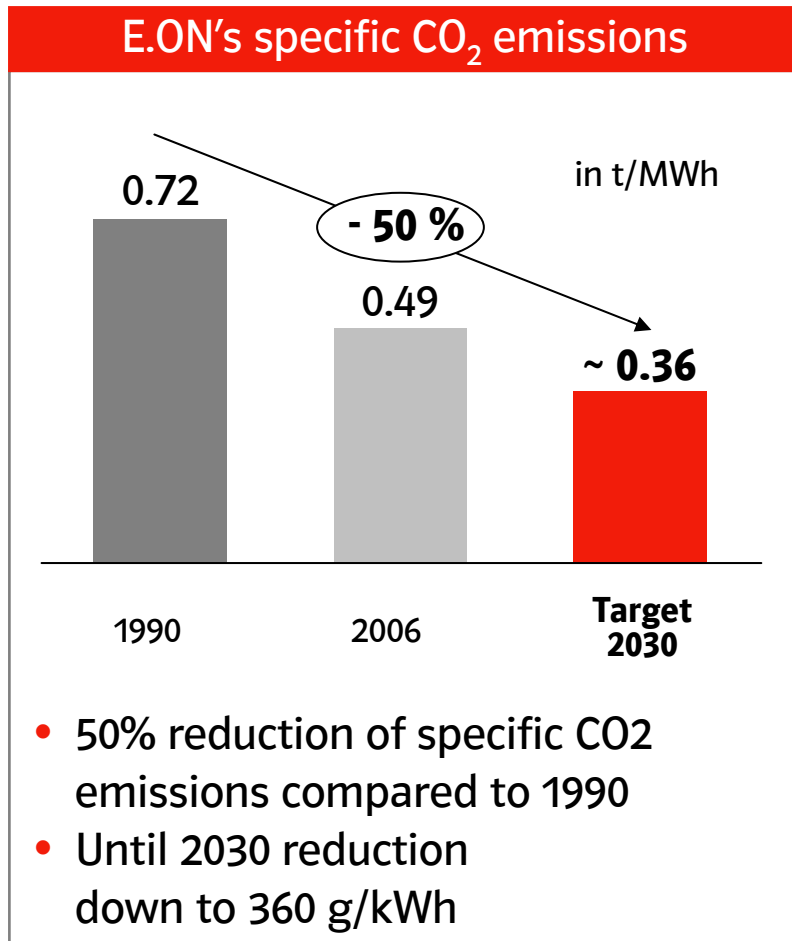
### **E.ON's competence delivers key requirements for an efficient portfolio**

- ⇒ Understanding of commodities and other market relevant aspects
- ⇒ Consistent long term market scenarios
- ⇒ Risk reducing portfolio design through largely anti-correlated fuels

# Contents

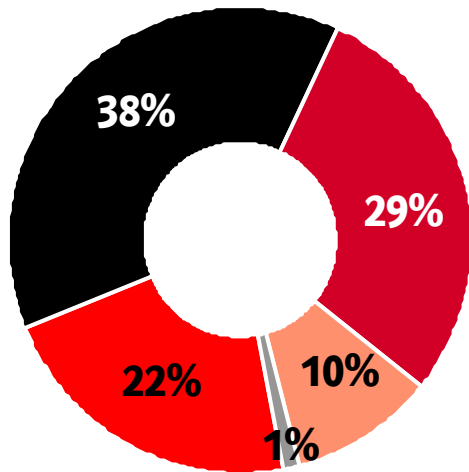
- **Portfolio approach**
- Clean Coal
- Renewables
- Nuclear

# E.ON is setting itself challenging CO<sub>2</sub> reduction targets

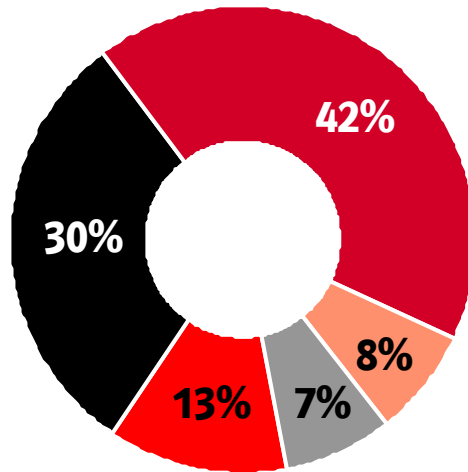


# Acquisitions and new build program will deliver E.ON's carbon target of 360 g CO<sub>2</sub>/kWh by 2030.

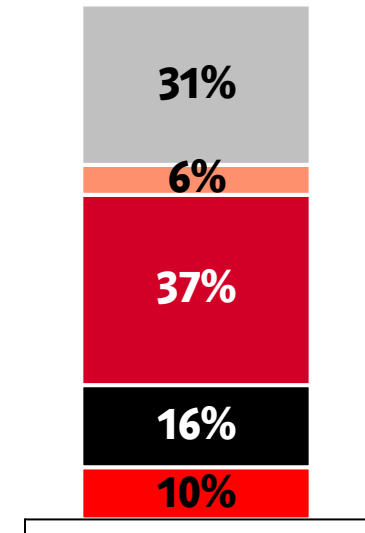
**E.ON's portfolio 2007  
(51 GW)**



**E.ON's portfolio 2015<sup>1</sup>  
(90 GW)**



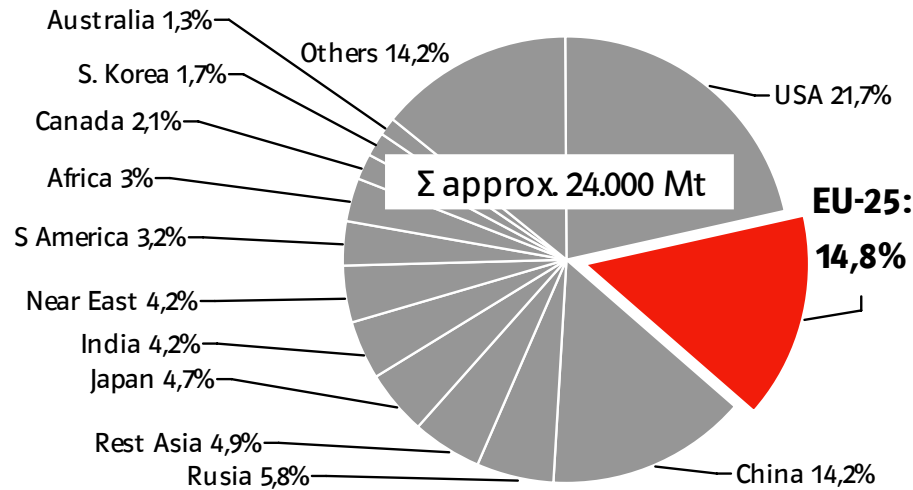
**E.ON's target portfolio  
2030 (% inst. capacity)**



<sup>1</sup> Including Endesa assets/ Viesgo, transaction still pending, closing of transaction in first half of 2008 expected

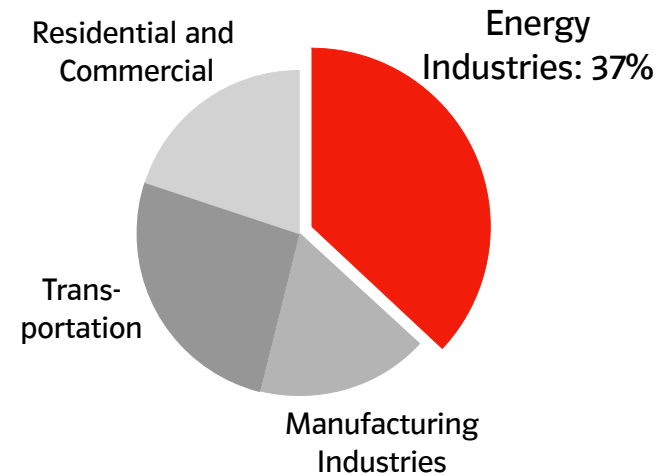
# CO<sub>2</sub> emissions are not a EU but a worldwide issue

**Global distribution of CO<sub>2</sub> emissions 2003**



Source: UNFCCC

**EU CO<sub>2</sub> emissions by sectors**



Source: UNFCCC GHG Inventory

→ **The European energy sector contributes with 1,400 Mt CO<sub>2</sub> approx. 6 % to the global CO<sub>2</sub> emissions:  
Task for Europe: Develop technological solutions!**

## Contents

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# E.ON ensures Capture Readiness for all coal based new built power plants



Capture Readiness = technical feasibility of future CCS retrofit

## Systems

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- Arrange **components** to allow later upgrade
- Ensure additional **supply and disposal infra-structure**

## Infrastructure

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- Assign **space** for future requirement of CO<sub>2</sub> scrubber and compression
- Ensure **cooling** requirements

## CO<sub>2</sub> transport and storage

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- Detailed **concept** for feasible **transport** system and long term CO<sub>2</sub> **storage**

- Take final decision on CCS investment once technologies enter the market
- Push R&D activities on the way to optimise CCS processes



# CO<sub>2</sub> capture in fossil power plants – Three different technologies in development stage

## 1. Pre Combustion Capture (IGCC)

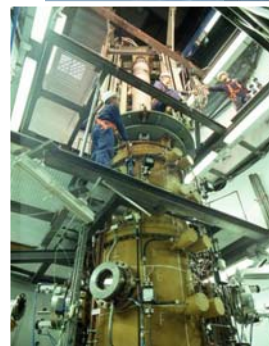
Coal gasification, CO-shift, hydrogen production and hydrogen combustion in a H<sub>2</sub> gas turbine



FutureGen

## 2. Oxyfuel

Burning fossil fuels with pure oxygen



OxyCoal-AC



CASTOR

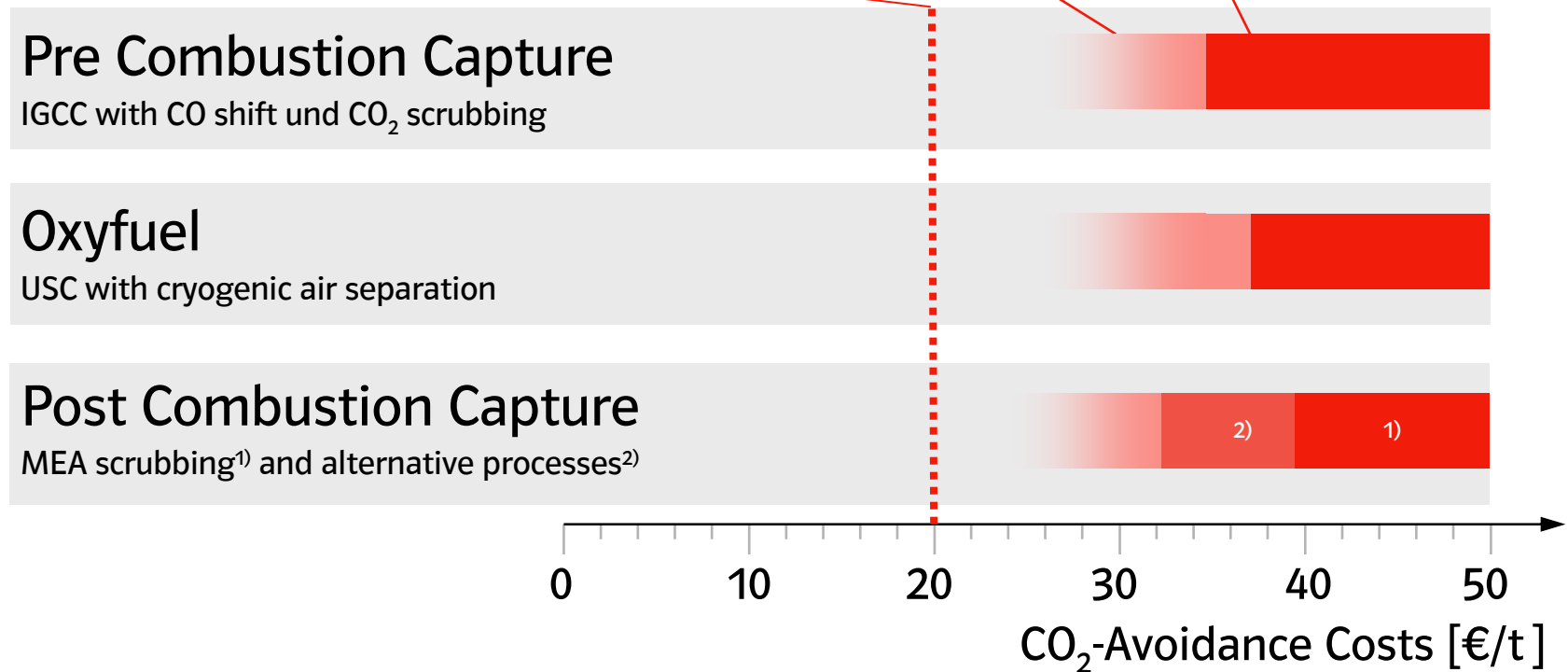
## 3. Post Combustion Capture

CO<sub>2</sub> capture from power plant flue gas (scrubbing process)

Economic viability will decide about future deployment

# CO<sub>2</sub> avoidance costs of the main technologies

Goal of Zero Emission Platform by 2020      potential      "Today's forecast 2020"



Carbon Values of approx. 35 €/t lead to economical viability of CCS.  
 Today, it is uncertain which technology will be the leading one.

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# Huge investments in renewable production

## Nordik

- OKG wind 15 MW (2008)
- Rödsand II 212 MW (2011)

## Germany

North sea:

- Amrumbank 400 MW (2011)
- Delta 400 MW (2012+)

Baltic sea:

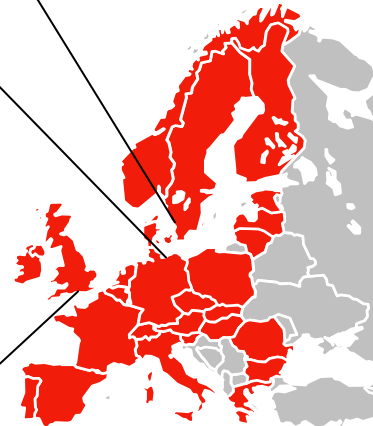
- Sky 2000 150 MW (2010/11)
- Arkonabecken 400 MW (2014)

## UK

- Several small projects ~ 500 MW (2009+)
- Robin Rigg 180 MW (2009)
- London Array\* 1000 MW (2010+)

## Spain / Portugal

- Installed Capacity 260 MW
- Development phase under construction 560 MW
- 90 MW



## Important E.ON Wind projects

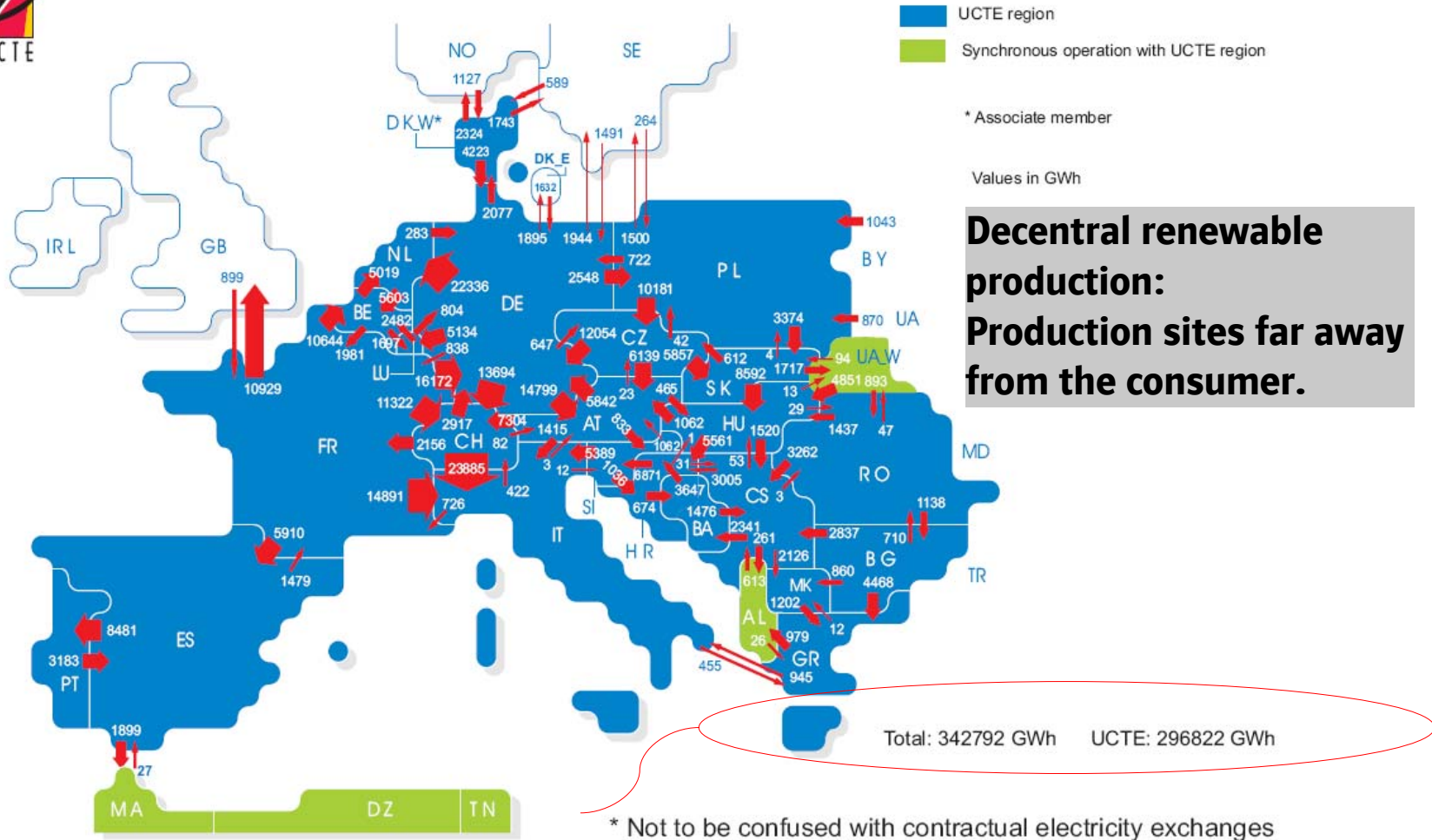
Diversified Portfolio of On- and Offshore:

- Currently installed 680 MW
- Additional plans for 2.580 MW
- € 6,0 Mrd. investments until 2010
- Further investments after 2010

# Extending grid as a prerequisite for renewable investments



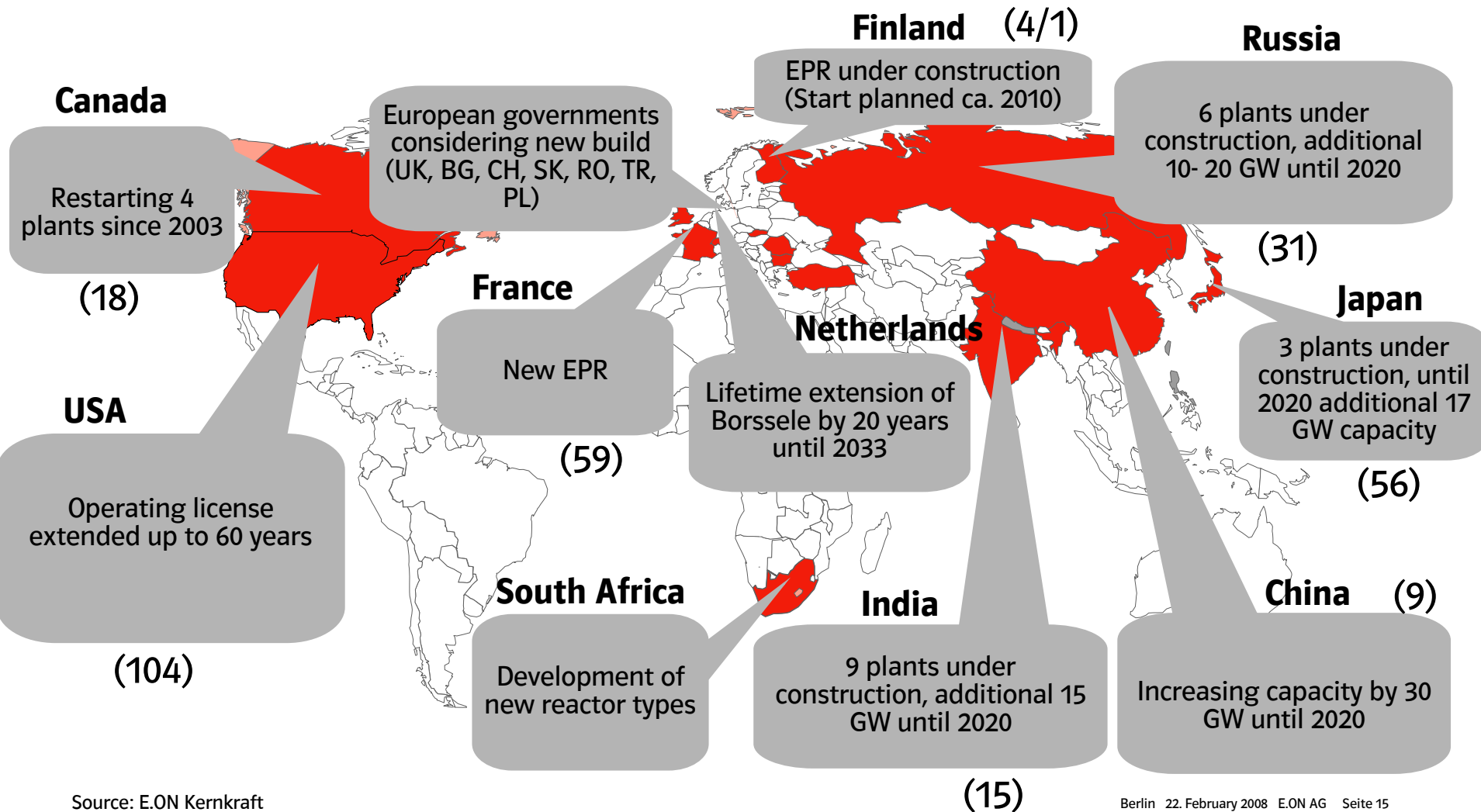
Physical energy flows 2006

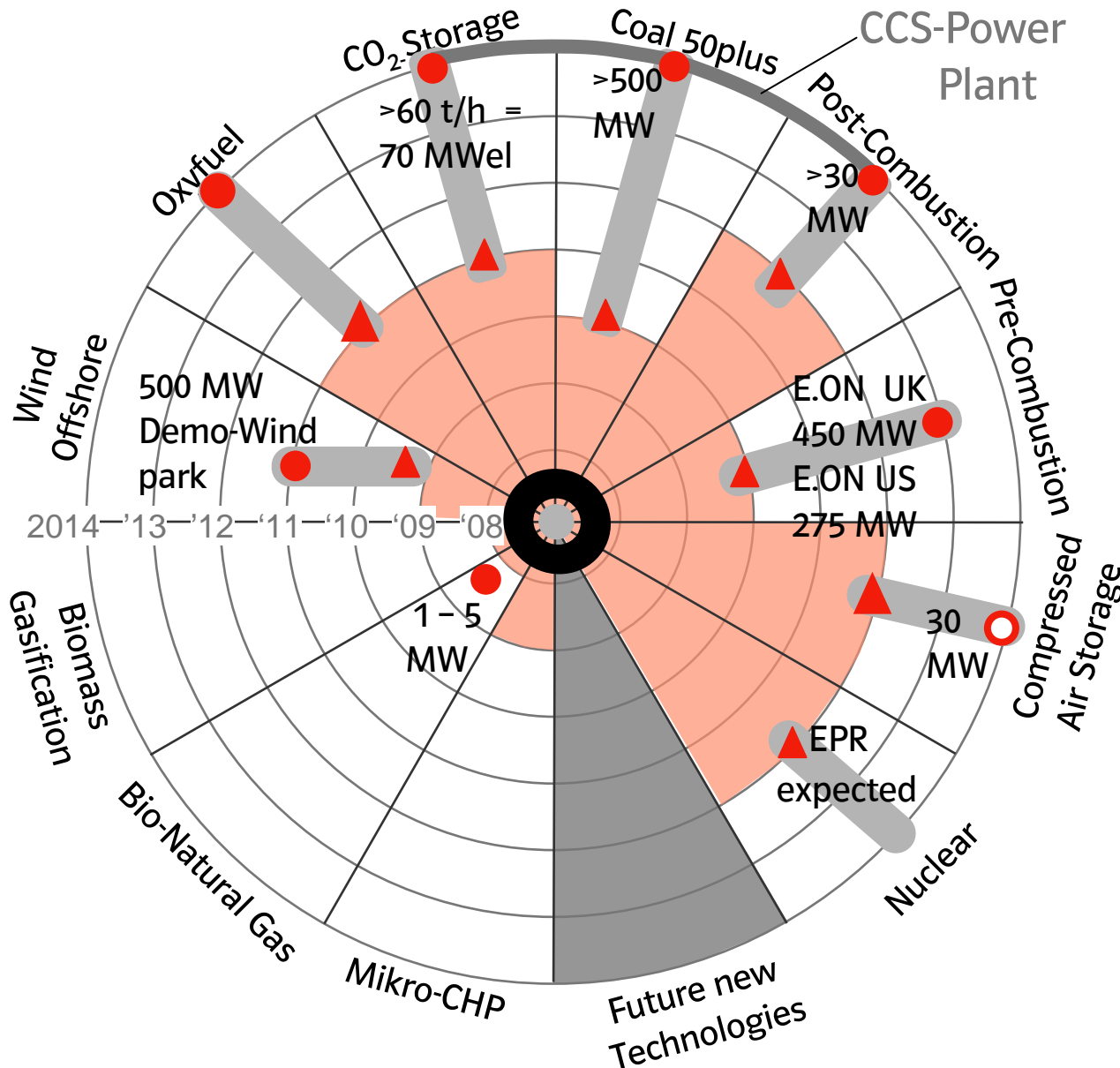


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# Nuclear energy maintains key position in global generation





## Technology „Radar“

○ research materials and chemicals, test facilities

■ Engineering, site screening, procurement permissions

▲ Construction phase Start End



## Stabilise framework ...

- Stepwise auction: No frictions in the current system
- Give long-term view on CO<sub>2</sub>-goals: At least sign-posting 2030, 2040, 2050
- Use technology!