CO2 Capture and Storage in Future International R&D Programmes

17th November 2004, Vienna

COORETEC - R&D for Zero-Emission Fossil-Fuelled Power Plants

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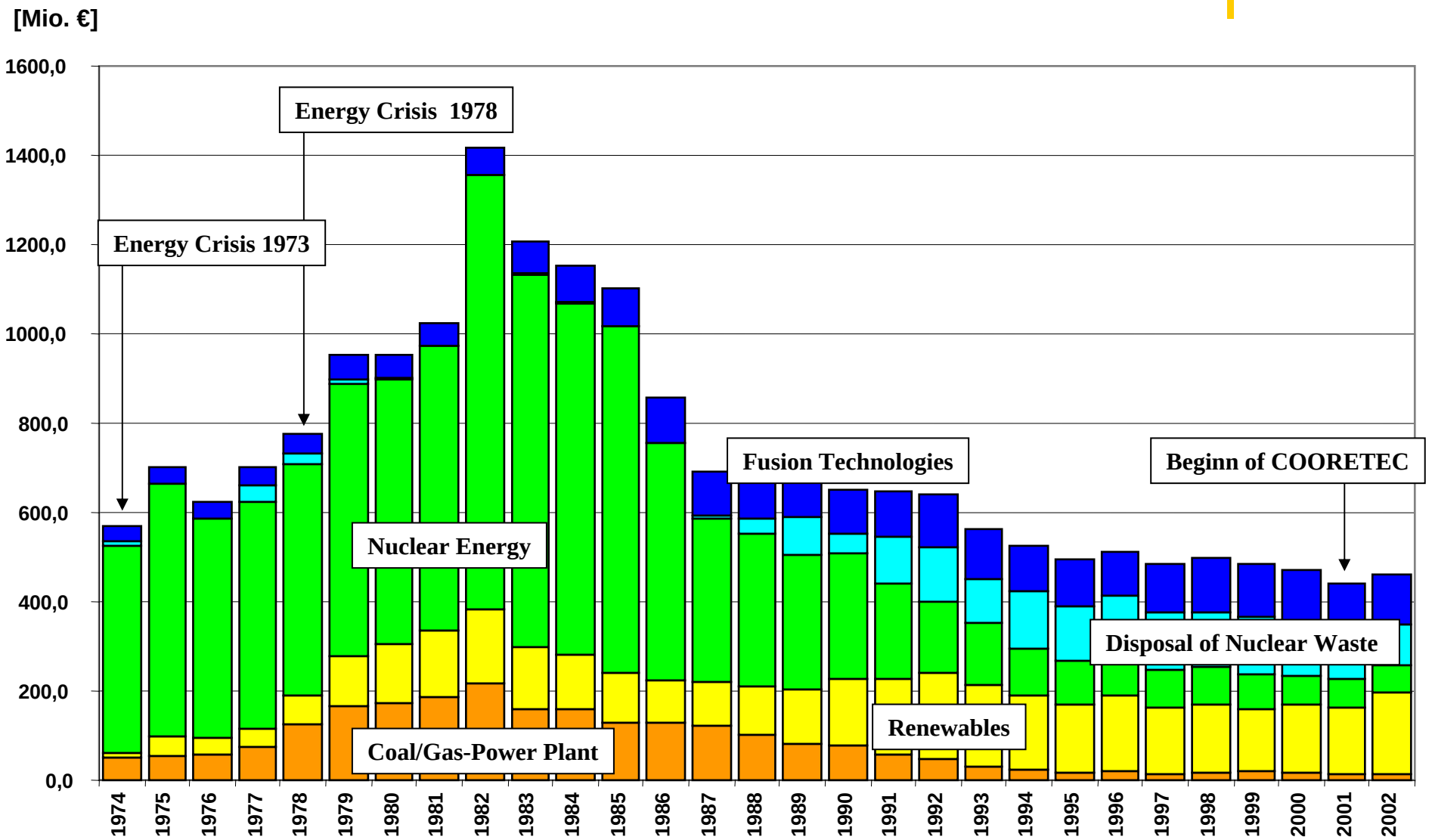
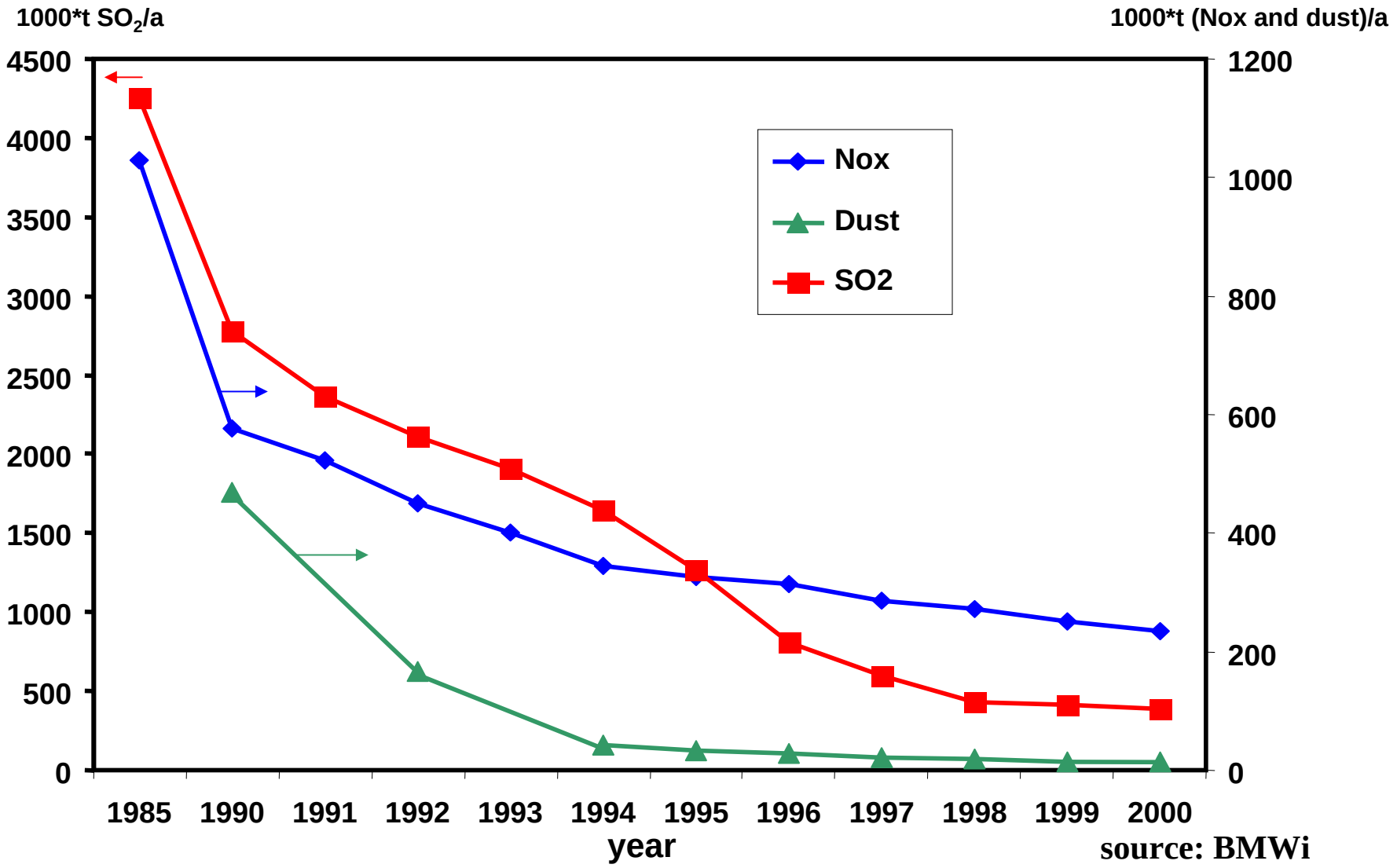
Historie: Budget R&D

Federal Ministry
of Economy and Labour



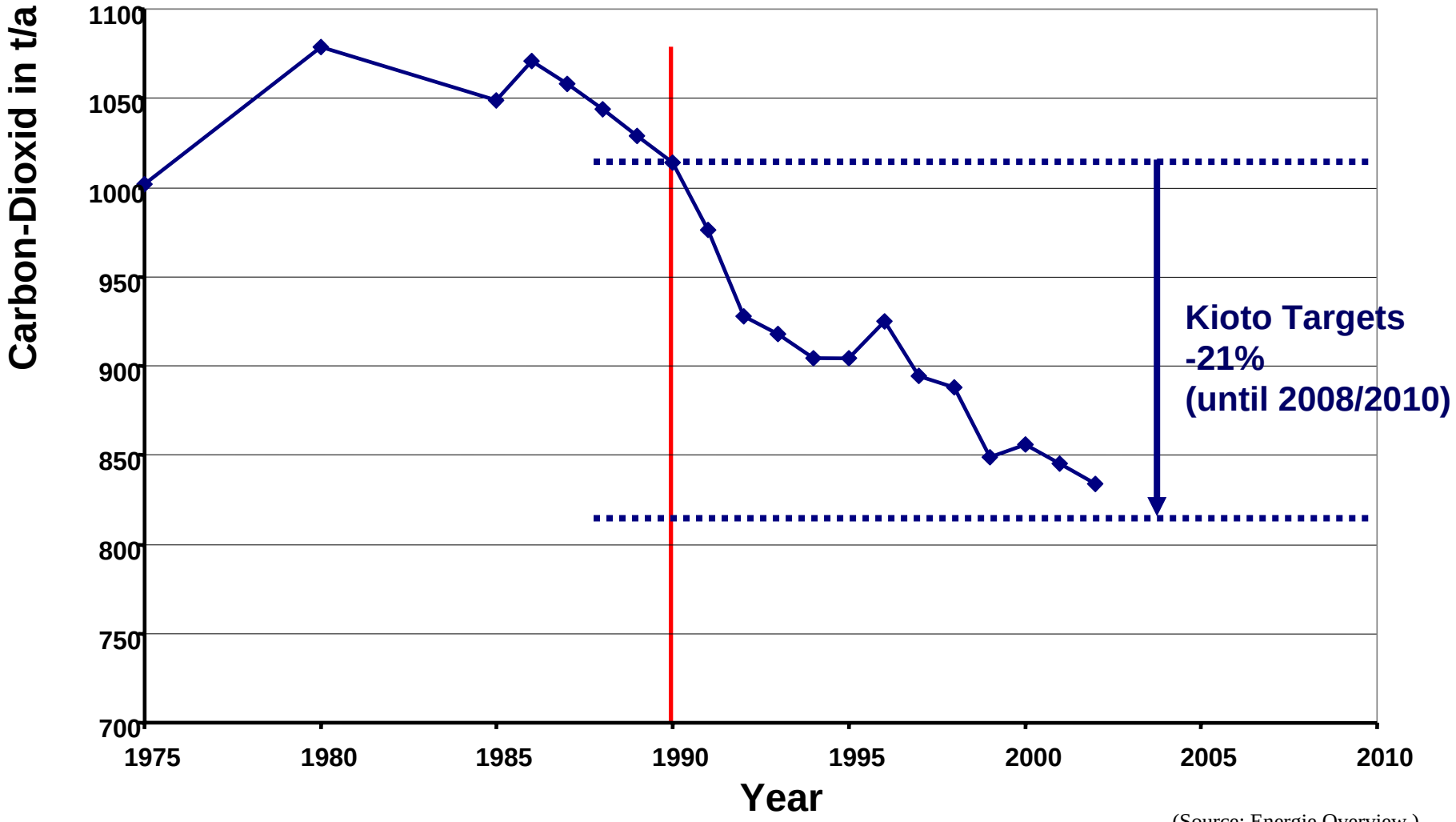
Outcome of Research and Developement

Federal Ministry
of Economy and Labour



Emissions: Carbondioxid t/a in Germany

Federal Ministry
of Economy and Labour



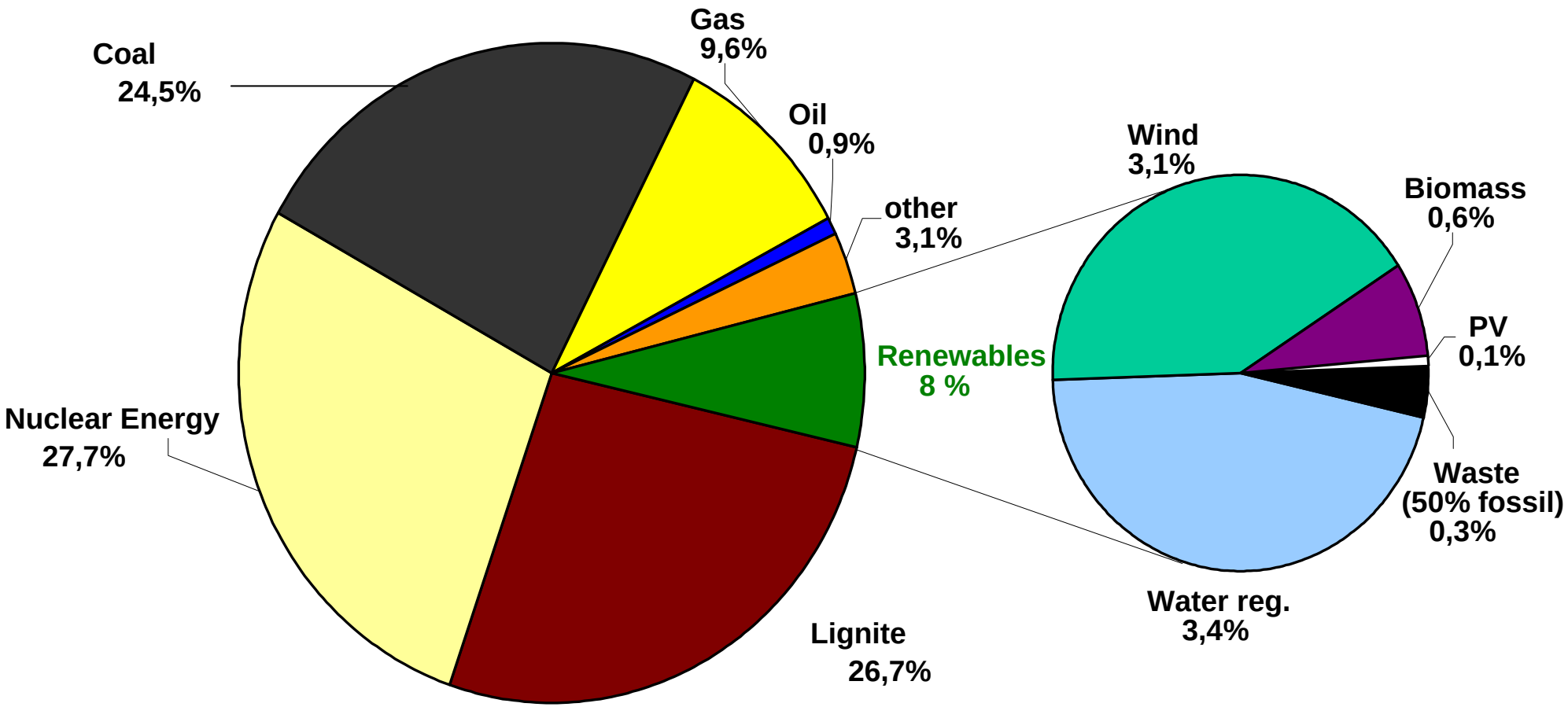
(Source: Energie Overview)

R&D

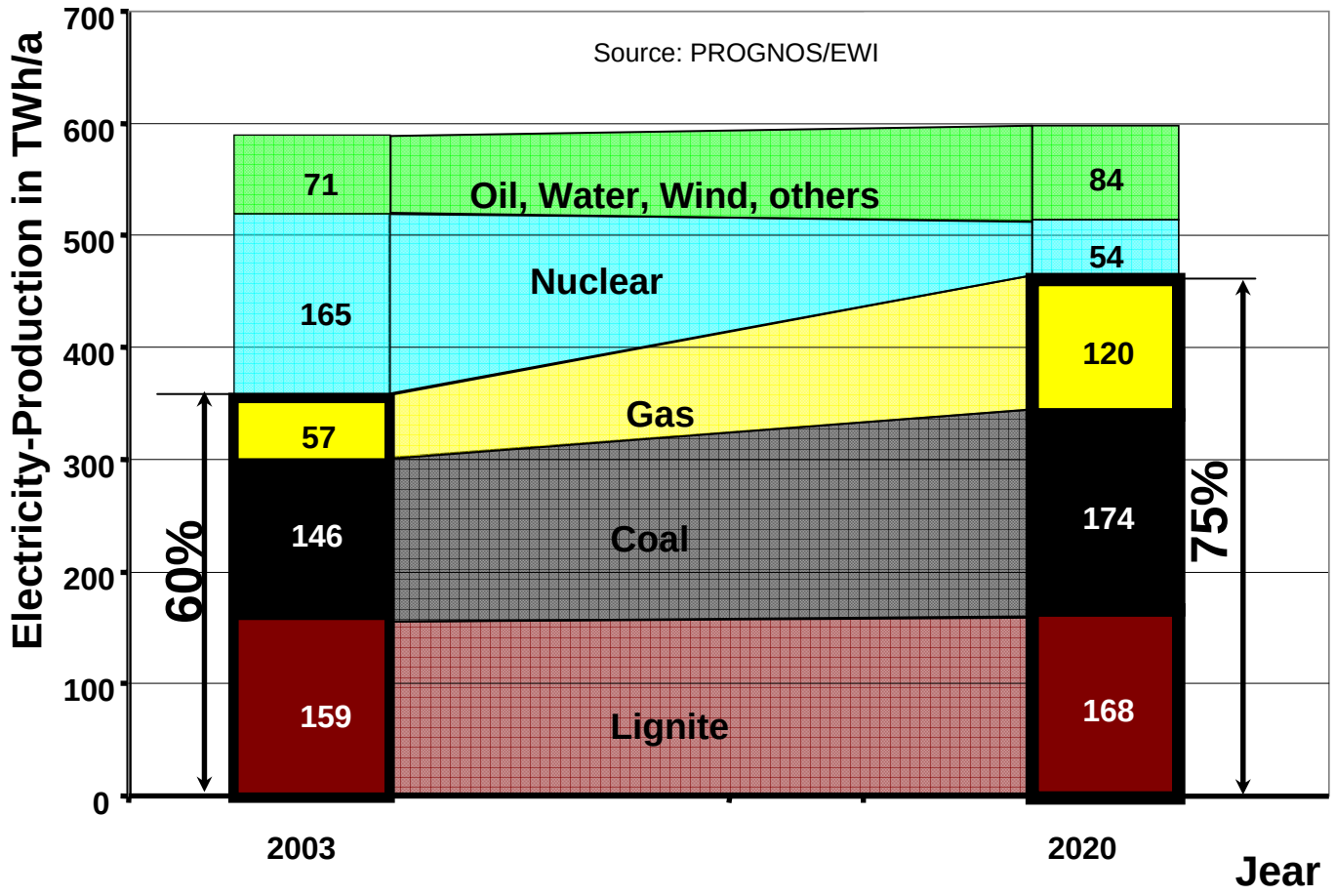
- Priority for **Renewables** and Energy saving : Doubling of Renewables till 2010.
- **Get off** Nuclear Power till 2020
- Reduce of **Greenhouse Gases** till 2020 about 40% in case that the EU reduce about 30 %

Production of Electricity in Germany 2003

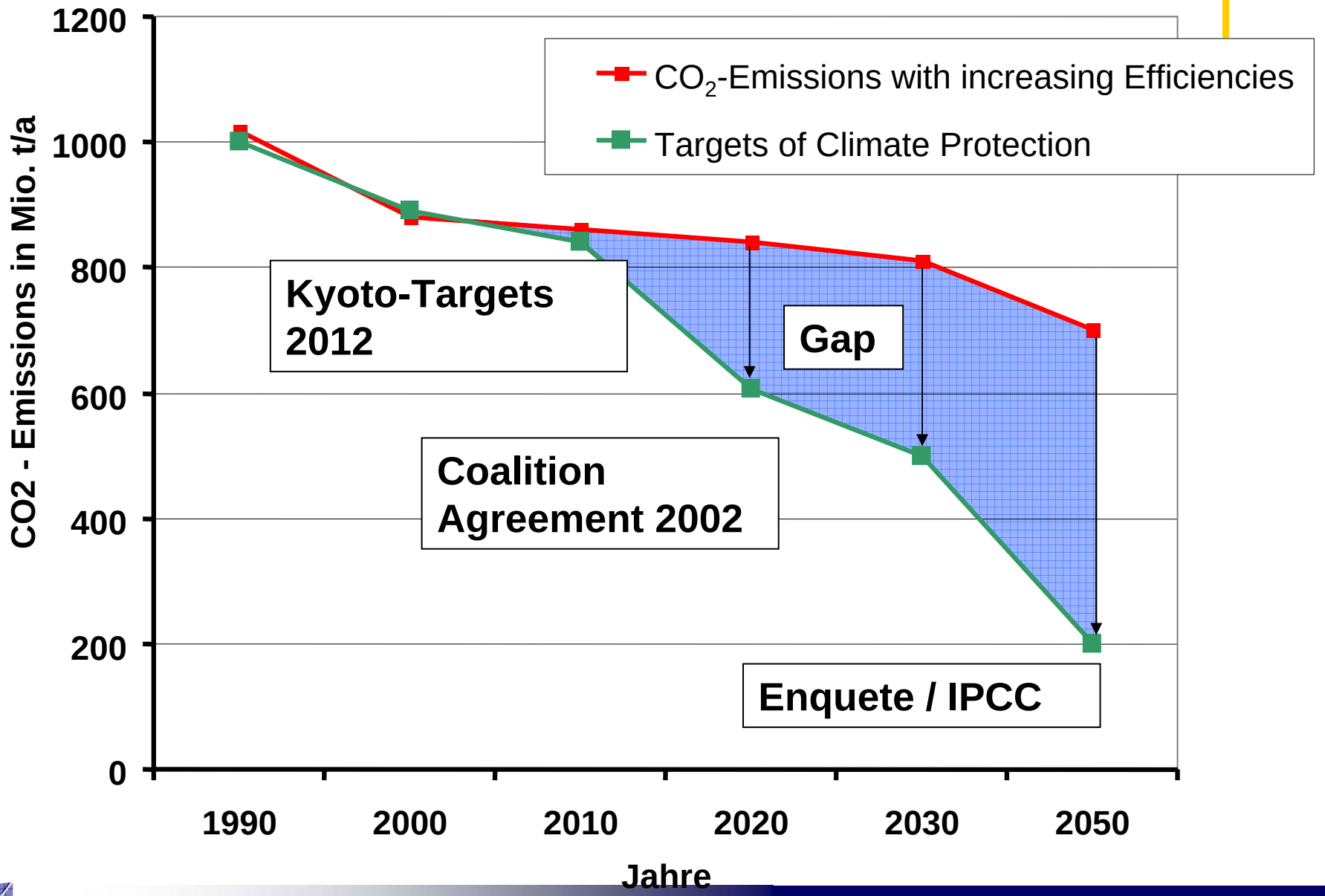
Federal Ministry
of Economy and Labour



Energiemix in Germany



Targets of Climate protection



Take interim stock

1. **Potential** of Efficiency till 2020: + 15 bis 20%
   Demand of Replacement in Germany 40 GW

2. CO_2 -Reduction through **improvements of Efficiencies** : 30%

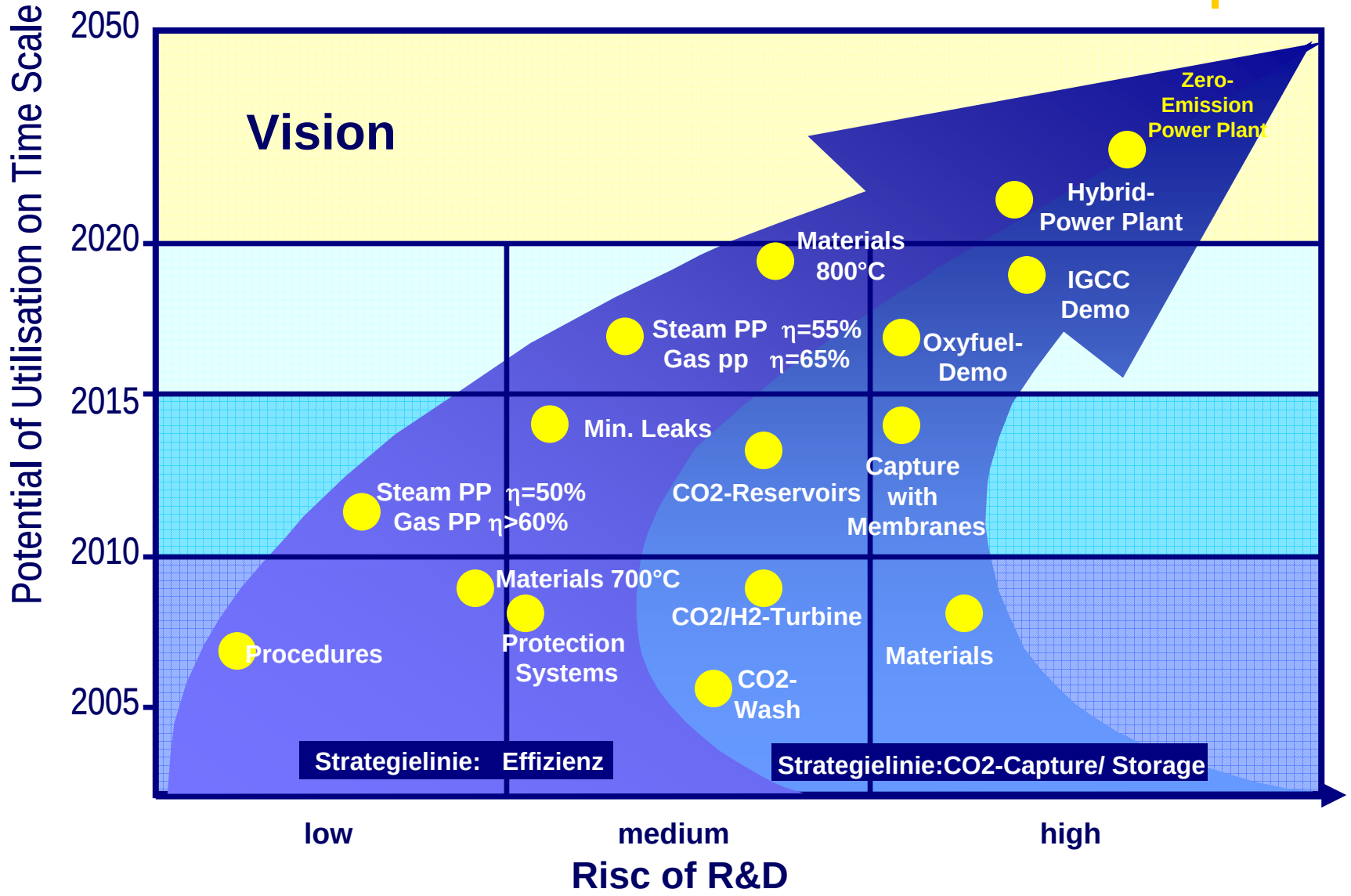
3. Improving Efficiencies makes get off **Nuclear Energy** without increasing CO2-Emissions..

4. **Kyoto Targets 2012** are available

5. More ambitioned **CO_2-Reduction-Targets** are only available with CO2-Capture and Storage Technologies.

COORETEC: Roadmap

Federal Ministry
of Economy and Labour

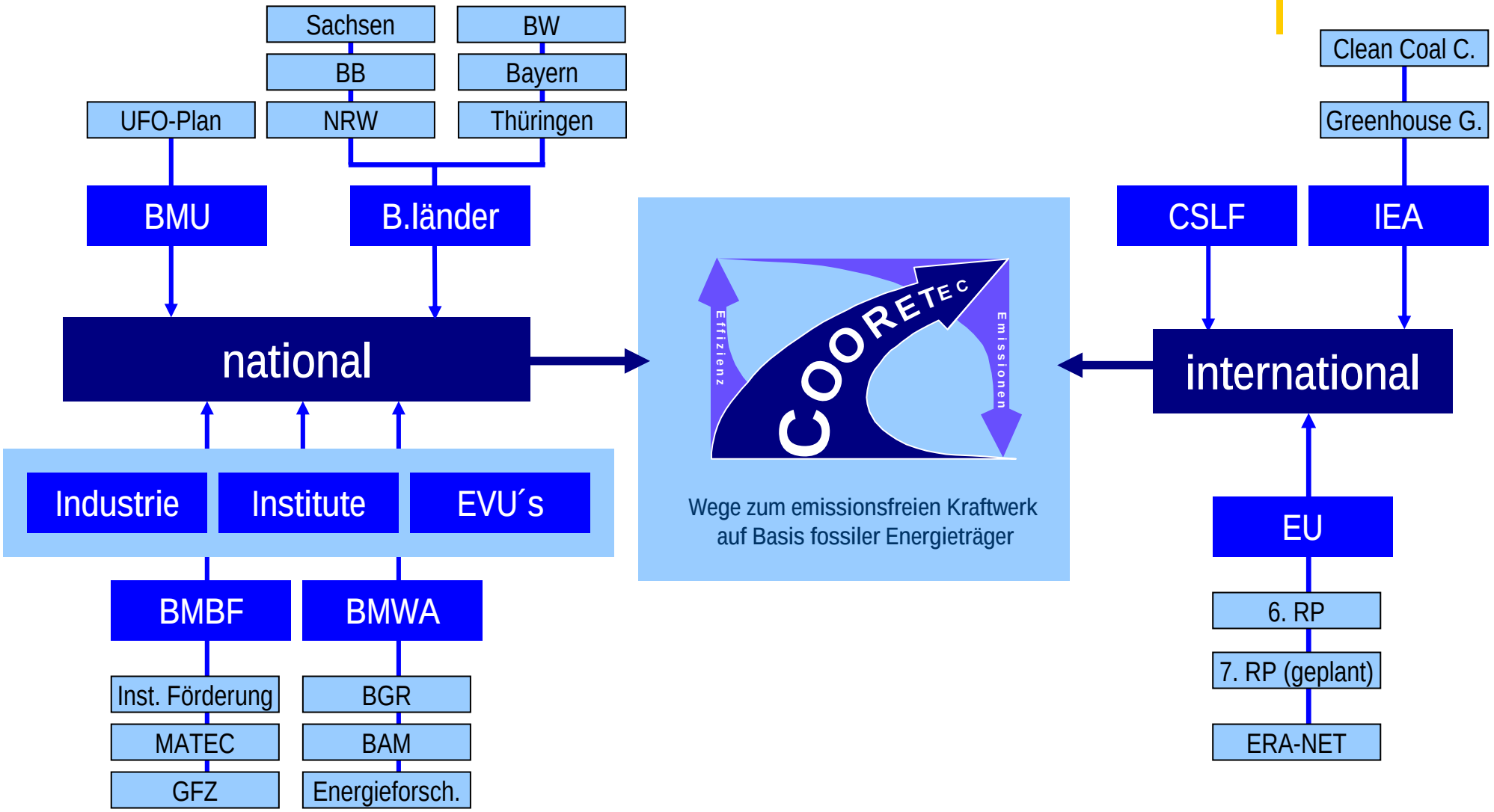


Key-Technologies

- **Oxyfuels** with decomposition of Air
  O_2 and CO_2-Membranes
  CO_2 and H_2 Turbines
- **Gasificationtechnologies** with Potential of generating new Productlinies: synthetic fuels, chemical Products, electricity, heat
- **New Materials**: nickel based steel, ceramics...
- CO_2 Capture and **Storage** Technologies
- Public **acceptance**

R&D-Network of COORETEC

Federal Ministry
of Economy and Labour



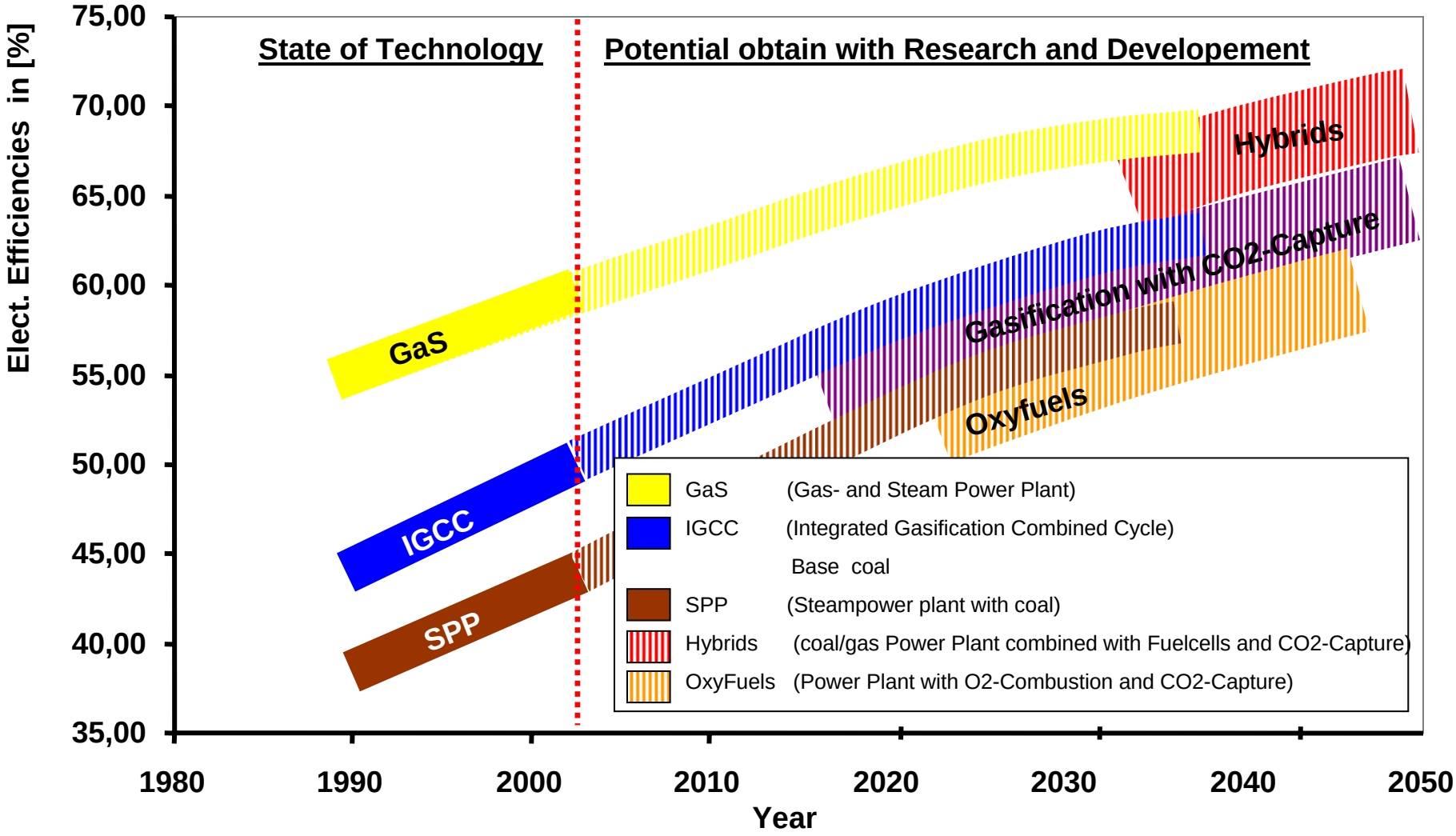
Zero - Emission -Powerplant - Technologies

- **Oxycoal** Power Plant Technology: (Post-Combustion Capture) 9 Mio. €
- **IGCC** and Gasification-technologies and (Pre-Combustion-Capture) 7 Mio. €
- **CO_2-Storage** in Ketzin: CO_2SINK 7 Mio. €

Efficiency of Turbo-components 12 Mio. €

Materials: nickel based steel, protection systems, ceramcics 6 Mio. €

Power Plant-Concepts: Trend of Efficiencies



Summery

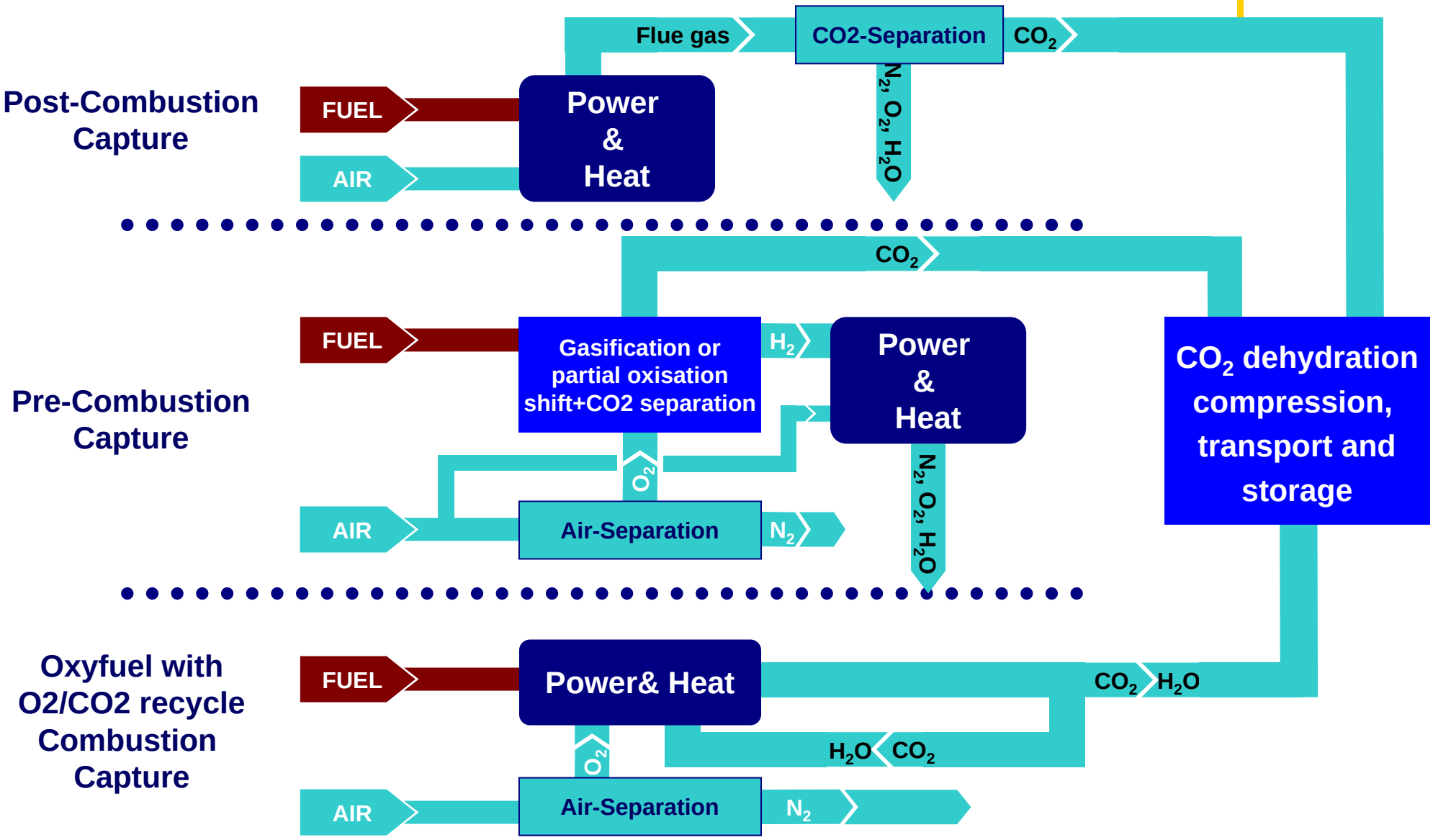
- Increasing share of gas and coal on **Energy Mix** (75% in 2020)
- **Opt out of nuclear Energy** (30% of elctricity-Production) till 2020
- Need of **Replacement**: 40 GW till 2020
- **Potencial** of increasing efficincy is limited to 20 %

One **Purpose** of Research and Developement is to take **precautions**

COORETEC-Concept:

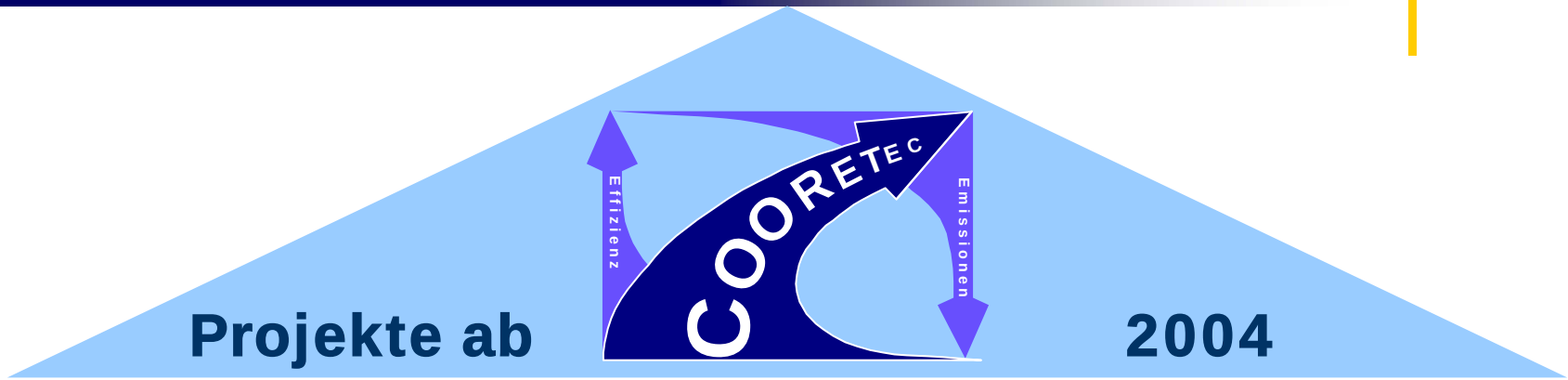
- Increasing **Efficiencies**: GuD 65%; DKW 55%; IGCC 58% (2020)
- Technologies for **CO2 Capture and Storage**:
- New Prozesses: Precombustion /Postcombustion - Capture
- **Hybridtechnologies**: Powerplant + Fuelcells

CO2-Abtrennung am Kraftwerk



Themenschwerpunkte : Situation

Federal Ministry
of Economy and Labour



Effizienz-Säule

Grundlagen:
COOREFF
(AG Turbo)

Werkstoffe:
Marcko-Wärmedämmschichten
Marcko-700° Kraftwerk

Sonderprobleme:
Verschlackung

CO_2-Säule

Grundlagen:
COOREFF
(AG Turbo)

Kraftwerkskonzepte
OXYFUEL-Kraftwerk

Speicherkette
CO_2Sink (EU-Projekt)

Zusammenfassung:

- **Weltenergiebedarf** steigt stark an (2000 GW zusätzlich bis 2020)
- Der **Anteil fossiler Energieträger** an der Stromversorgung >60%
- **Ersatzbedarf** in Deutschland ab 2010 ca. 40 GW
- Ausstieg aus der **Kernenergie** (CO_2-neutral) ist beschlossen
- **Kioto-Ziele**: -21% bis 2012 und -40%- CO_2 bis 2020
- Ziele sind nur durch **Verbesserung der Effizienz** nicht erreichbar
- **Energieforschung:** Schaffung langfristiger technischer Optionen
- **Vorsorgeprinzip:** Option der CO_2 -Abtrennung und Speicherung
- **Es bedarf:** Bündelung nationaler Kräfte
  Internationale Kooperationen