



Federal Ministry
of Education
and Research

Germany's research funding programme on CO₂ utilization

Workshop on innovation and climate policy - CO₂ Reuse Technologies

22nd Oktober 2012, Brüssel

PD Dr. Lothar Mennicken, BMBF

Igniting ideas!



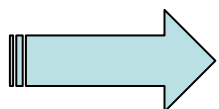
Global Context

Global Challenges:

- Climate change
- Lacking energy supply
- Scarcity of resources
- Economic structural change



Decoupling economic growth – resource consumption



Structural changes: alternative raw material



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R&D strategic framework

**Sustainability Strategy for Germany
(2002 ff)**



Sustainability

**High-Tec Strategy for Germany 2020
(2006; revised 2010)**





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R&D strategic framework

Framework programme: “Research for Sustainable Development”

Budget : ~ 2 Bill. € (2010 – 2015)



“6. Energy Research Programme”

Budget: ~ 3,5 Bill. € (2011 - 2014)





High-Tech Strategy: fields of action

National climate/energy targets:

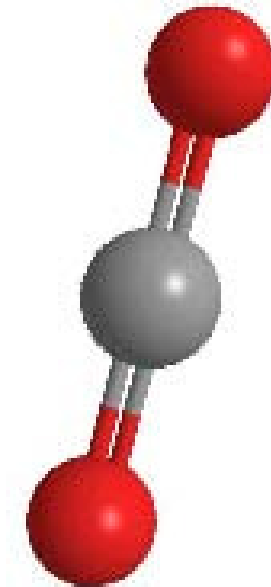
- Reduction of GHG emissions up to 40 % (2020 vs 1990)
- Doubling energy productivity (2020 vs. 1990)
- Primary energy consumption: 50 % renewable energy (2050)



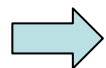
CO₂ Management Strategies

3 Strategies:

- Avoidance: CO₂ emission reduction
- Utilization: CO₂ utilization as raw material (CCU)
- Storage: CO₂ Storage (CCS)



CO₂ molecule



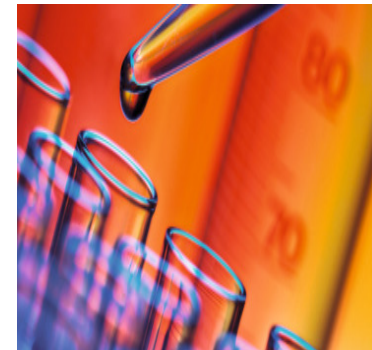
Principle: **Avoidance** before **utilization** before **storage**

R&D funding: Chemical Processes and Use of CO₂

Budget: ~ 100 Mio. € (2009-2016)

key aspects:

- utilisation of CO₂ as renewable raw material
- utilisation of CO₂ for products
- utilisation of CO₂ for chemical energy storage
- reduction of GHG emissions from industrial production by applying functional liquids in chemical processing
- CO₂-capture and activation





Project: Dream Production

- Alliance of industry and science
- Producing high-quality plastics using CO₂
- Pilot plant opened 2011



Foto: ©Bayer AG



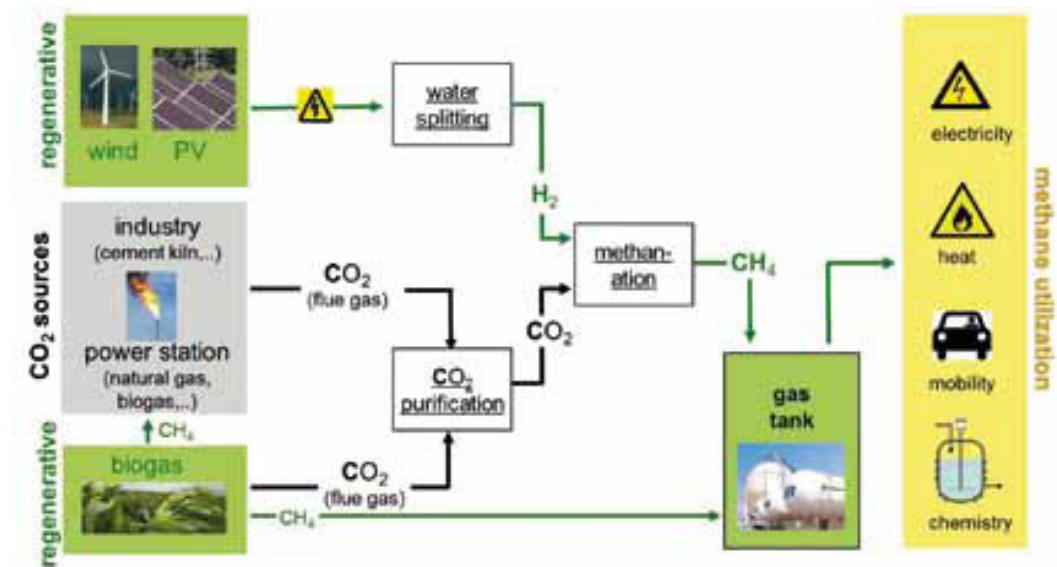
Project: SEE

- Alliance of industry and science
- SEE-Storage of Electrical Energy from Renewable Sources in the Natural Gas Grid
- H₂O-Electrolysis and Synthesis of Gas Components



Project: IC⁴

- Alliance of industry and science
- iC⁴ - Integrated Carbon Capture, Conversion and Cycling
- three elements of IC⁴: prevention, removal and recycling of carbon dioxide





BMBF R&D activities on “CO₂ Reuse Technology” within the funding initiative “Energy storage”

- **04/2011: Release of joint funding initiative „Energy storage“ by BMWi, BMU, BMBF (200 Mio. €)**
- **BMBF focus: basic research**
 - **Hydrogen generation and storage (e. g. Power2Gas)**
 - **Electrochemical storage systems (batteries, redox flow)**
 - **Thermal storage systems (PCM)**
- **10 projects (in prep.) focus on chemical energy storage using CO₂**
- **mostly application-oriented (BMWi, BMU)**
- **BMBF 88 Mio. € (ca. 58 Mio. € granted, 32 projects)**
- **3 projects will be funded by BMBF (e.g. Catalytic synthesis of methane/methanol)**





Outlook

- R&D investment in CCU to be continued
- Focus on Energy storage
- European/ Global challenge



VISION:

Green Energy/Green individual Mobility
Green C-Source for the chemical industry

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Thanks for your attention!
Danke für Ihre Aufmerksamkeit!