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Status of CCS Developments in Germany – links to the European CCS Project Network

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Two main research programs – COORETEC and Geotechnologien

BMWi Initiative "COORETEC": *CO_2–Reduction–Technologies*

- **R&D of low-CO_2-emission power plant technologies**
- **collaborative research between science and industry**
- **reduce risks and follow market-oriented developments**
- **focus on two strategic developments:**

Improvement of Efficiency	**Natural Gas**	**Natural Gas Combined Cycle (NGCC)**
	Coal	**Steam Power Plant (SPP)**
		IGCC
CO_2-Capture	**Natural Gas**	**NGCC with Post-Combustion Capture**
	Coal Combustion	**SPP with Post-Combustion Capture**
		Oxyfuel
		Chemical Looping Combustion
	Coal Gasification	**IGCC with Pre-Combustion Capture**
		Chemical Looping Gasification

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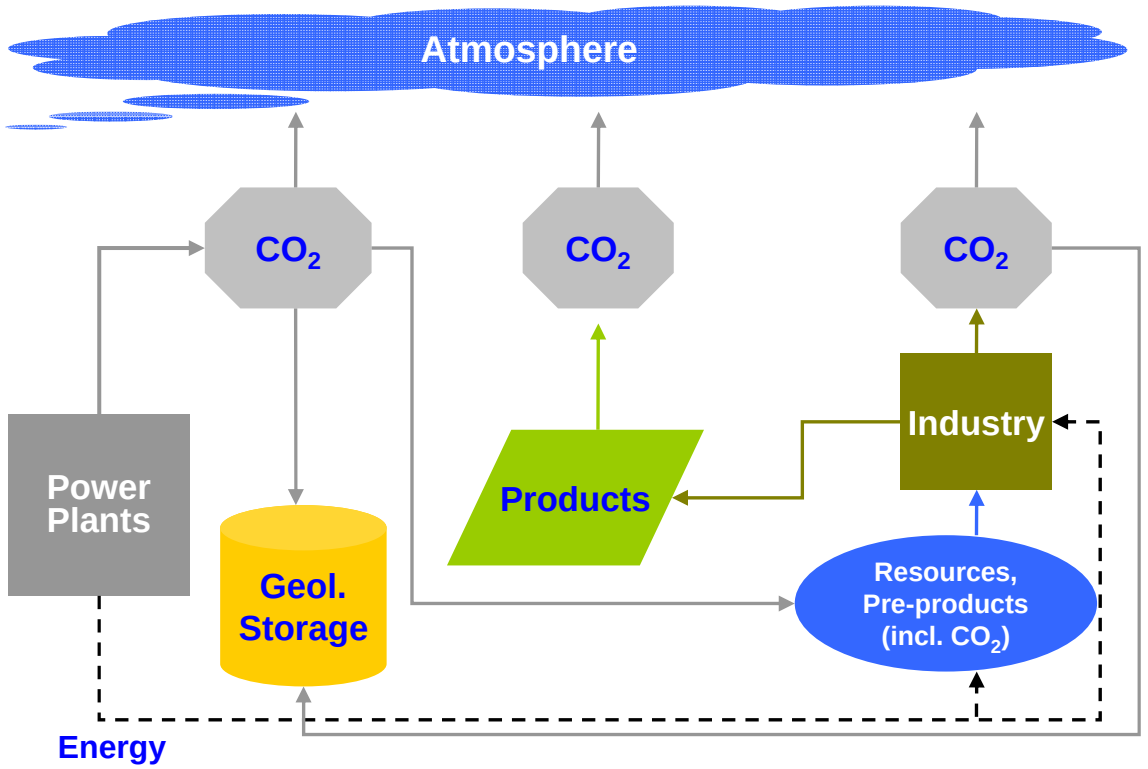
Implementation of a new R&D program recycling and utilization of CO_2



Kuckshinrichs et al.
(FZ Jülich, ITMC, RWTH) 2010

Power plant efficiency, CO_2-capture and storage, CO_2-utilization

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German Draft CCS-Law of April 1st, 2009

- **Integrates all stages of CCS-technologies: Capture, transport, exploration of storage sites, injection and decommissioning.**
- **Main Provisions:**
  - **National storage site potential analysis (Fed.Geological Surv. + Env. Agency)**
  - **Licensing process through a comprehensive planning approval procedure for storage permit guaranteeing long-term security of the storage sites**
  - **Obligations for operator of CCS storage sites (i.e. responsibilities, reporting)**
  - **Liabilities during injection, after decommissioning and transfer of responsibility**
  - **Conditions for decommissioning and long-term monitoring**
  - **Transfer of responsibilities from operator to state 30 years after closure**
- **Review clause: Evaluation of the application of CCS legislation by Federal Government by 2015: Propose amendments if necessary.**

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June 2009: Parliament postpones CCS Legislation

Background:

- Lack of public acceptance of storage projects in Federal States
- Discussions about financial compensation for state governments and/or local authorities
- Consideration of other types of underground utilization (geothermal energy, natural gas storage, ……)
- Constraint time schedule during the parliamentary discussion process with respect to Federal Election on September 27, 2009

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New Coalition Agreement of October 2009

- Support for the construction of new and highly efficient coal fired power plants
- Short-term implementation of the EU-CCS-Directive in a new national legislative framework
- Accompanied by information campaign to enhance public acceptance and to inform the public on benefits of CCS with respect to climate change and technology development
- Implementation of a new R&D program for recycling and utilization of CO_2

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Current Situation

- New draft law prepared, hearings of associations and federal states (August 2010)
- Change of several legal provisions
  - Clarify that first of all feasibility of CCS has to be demonstrated before being applied commercially (after 2020)
  - Limit on demonstration project numbers and size (annual maximum storage amount per project limited to 3 Mill. t and total annual storage amount limited to 8 Mill. t)
  - Time limit with respect to applications for storage permits
  - Considerations on competing underground utilization
  - Evaluation paragraph consolidated
  - Knowledge sharing added
  - Rights of site owners consolidated

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Current Situation

- New draft criticised from both environment and trade/industry associations
- Some environment associations open to test CCS-technologies, others like Greenpeace with rejection of further use of coal, CCS-technologies, and the new draft.
- Critics of trade/industry associations
  - time limitation
  - open questions with respect to financial security mechanism
  - drinking water issues
  - considerations on competing underground utilization
- New energy concept with strong focus on Renewables and Energy Efficiency (Nuclear and Fossil Fuels as bridges, CCS to be tested with demonstration projects)

Conclusions from current situation

➡ Problems with the implementation of the directive are mainly connected to onshore sites

- Understanding the risks of onshore storage in saline aquifers
- Brine displacement and risk for drinking water pollution
- Conflict of interest with other forms of underground utilization
- Pressure propagation and influenced underground area
- Transfer of responsibilities for closed sites

➡ Public acceptance for CCS

- Major difficulties with public acceptance for new coal power and soft coal mining
- Reduction of power plant efficiency
- Questions with respect to the economics of CCS
- Severe questioning about the concepts of onshore storage

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Benefit of the CCS Project Network

- Link to the German CCS- draft law (§ 40: knowledge sharing and §44: evaluation – implementation, international experience, technology assessment, adapting legislation)
- Increase technological expertise within governments for several issues of the EU-directive (risk estimation, transfer of responsibility, monitoring of leakage)
- Knowledge sharing with respect to storage and monitoring
- Best practice for different technology pathways
- Progress of projects and permitting procedure
- Public perception
- Incorporation of smaller scaled projects?

  (smaller scaled storage and research projects like Lacq, Barendrecht, Altmark are extremely important to get public confidence for secure onshore storage)