

Coal and environment – a case study

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Structure

- Coal's relevance today and tomorrow
- Challenge for the future of coal
- Coal usage at German Vattenfall
- Using coal, but avoiding carbon dioxide
- Activities to gain acceptance for CCS
- Requirements for a legal framework

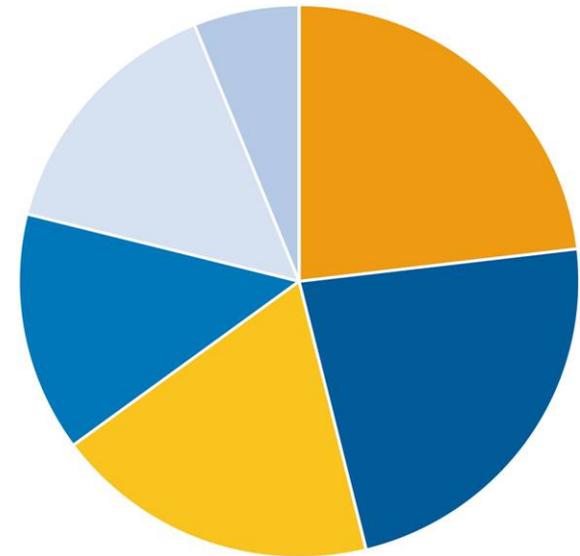


Lignite in Germany

Nearly a quarter of the power demand in Germany is covered by lignite. Lignite is mined without subsidies in opencast mines and converted with high security and high environmental standards to power and heat in nearby power plants.

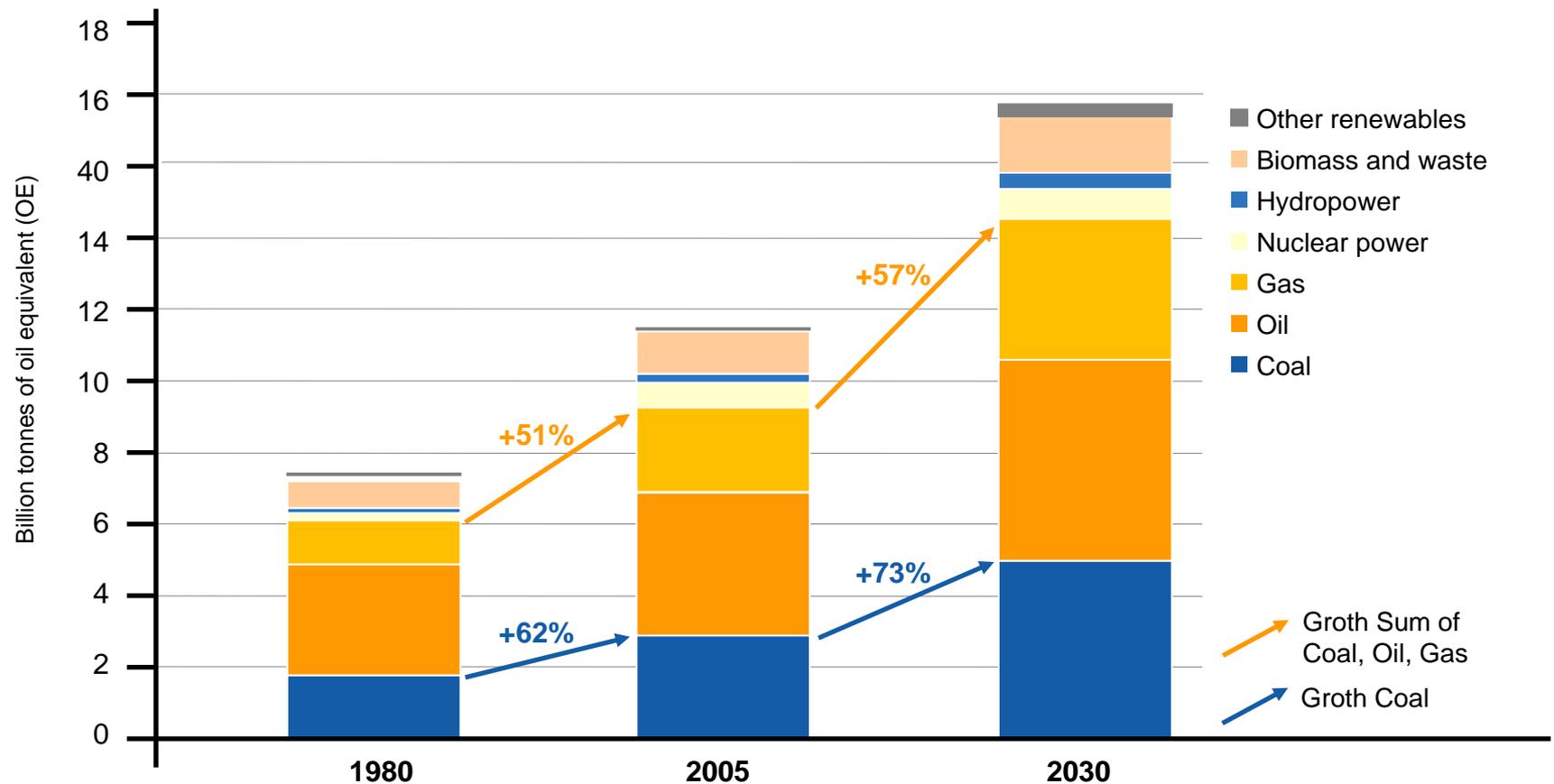
Gross Energy Generation 2009 in Germany

	Lignite	24 %
	Nuclear energy	23 %
	Hard coal	18 %
	Renewables	16 %
	Natural gas	13 %
	Other	6 %



Source: BDEW, 01/2010

Outlook: development of global energy mix



Source: International Energy Agency (IEA), World Energy Outlook 2007

Role of coal in the future

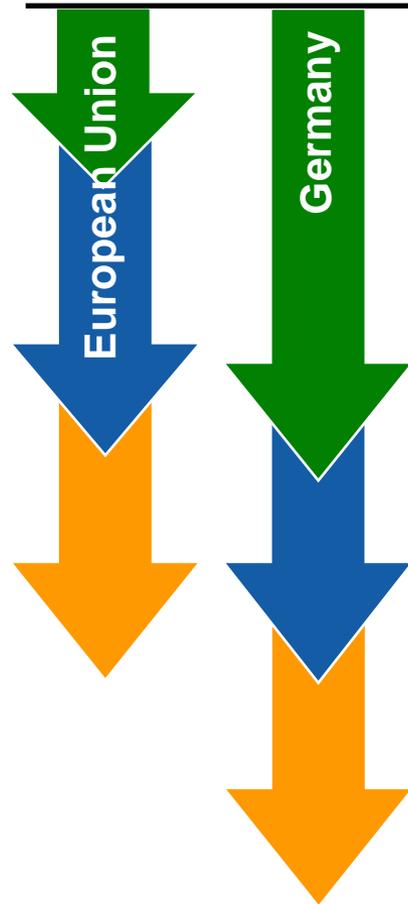


- Coal is needed to meet the global energy demand. And the use of coal for example in India and China will even increase.
- Also Germany cannot refrain from lignite as the only domestic fossil energy source that can be extracted in large amounts without subsidies.



It is not in question, "if" coal will be used in the future, but "how" we are going to use it.

CO₂ emissions: Targets for reduction are set



European Union (EU):

- Kyoto target for EU-15 (1997): reduction of 8 per cent until 2012*
- Target for EU-27 (2007): decrease of CO₂ emissions by 20 per cent until 2020*
- If other big countries join emission trading, goal rises to 30 per cent*

Germany:

- Kyoto target of 21 per cent reached* (burden sharing within EU-15).
- Meseberg 2007: decrease of CO₂ emissions by 30 per cent until 2020*
- Meseberg target rises to 40 per cent, if EU sets goal of 30 per cent*

*) reduction compared to 1990

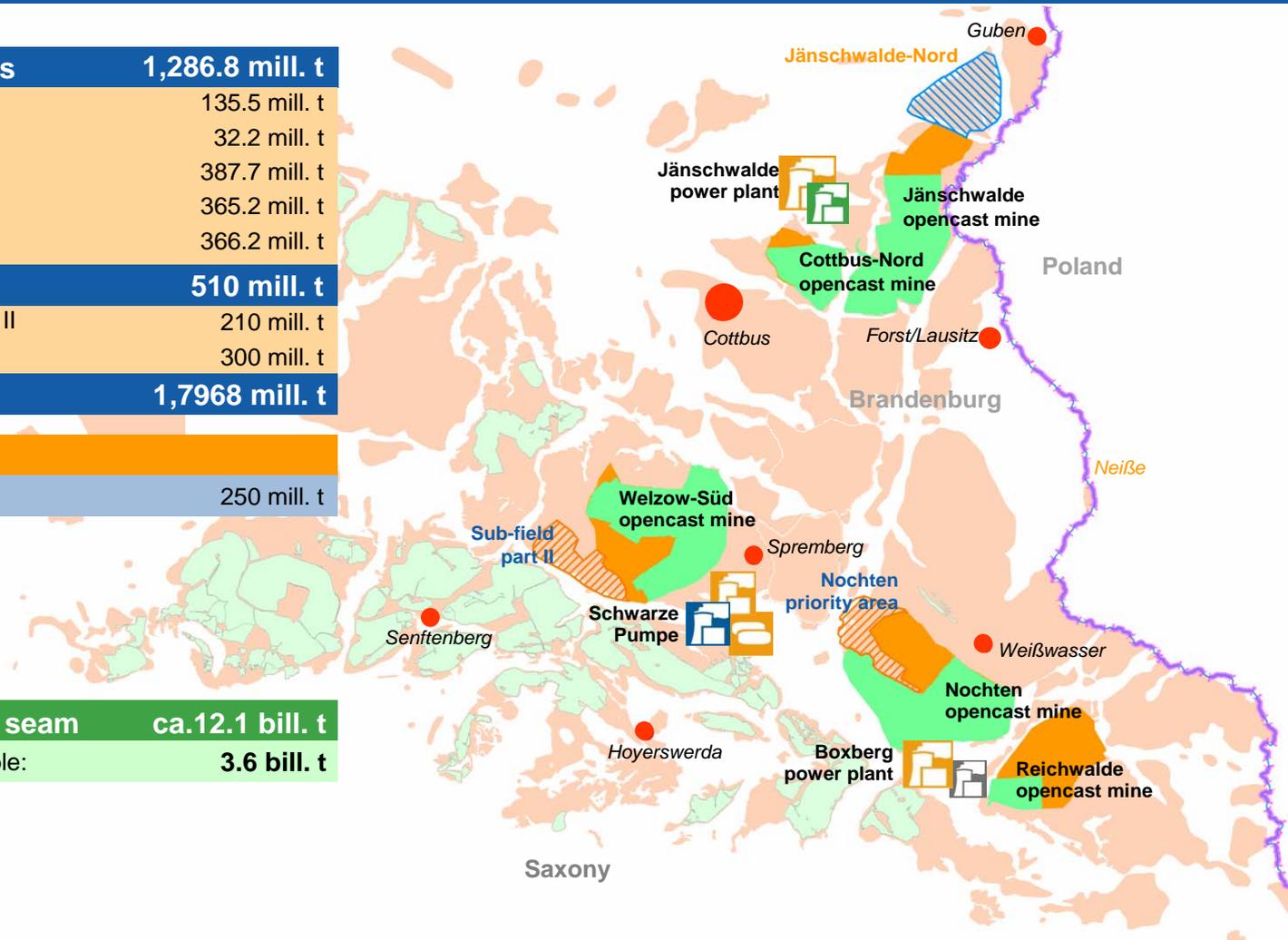
Lignite Reserves and 2nd Lusatian Seam

Approved mining fields	1,286.8 mill. t
Jänschwalde	135.5 mill. t
Cottbus-Nord	32.2 mill. t
Welzow-Süd	387.7 mill. t
Nochten	365.2 mill. t
Reichwalde	366.2 mill. t
Continuation	510 mill. t
Welzow-Süd, sub-field part II	210 mill. t
Nochten, priority area	300 mill. t
Total	1,796.8 mill. t

Future coal field	
Jänschwalde-Nord	250 mill. t

Reserves 2nd Lusatian seam	ca.12.1 bill. t
of it commercially exploitable:	3.6 bill. t

-  Spreading of 2nd Lusatian seam
-  Depleted seam areas



At a Glance

Lignite mining

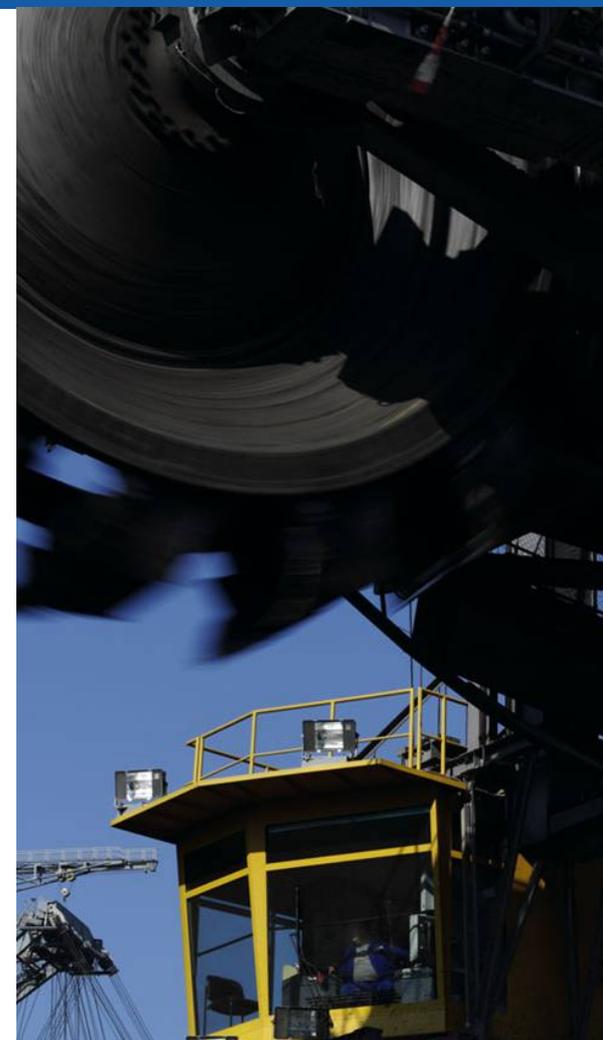
Jänschwalde opencast mine	11.9 mill. t
Cottbus-Nord opencast mine	6.4 mill. t
Welzow-Süd opencast mine	21.1 mill. t
Nochten opencast mine	16.3 mill. t

Lignite-fired power plants

Jänschwalde	3,000 MW
Boxberg	1,900 MW
Schwarze Pumpe	1,600 MW
Lippendorf (50% Shares)	920 MW

Power generation (gross)

50 TWh



State: 12/2009

Using coal, but avoiding carbon dioxide

Developing CCS

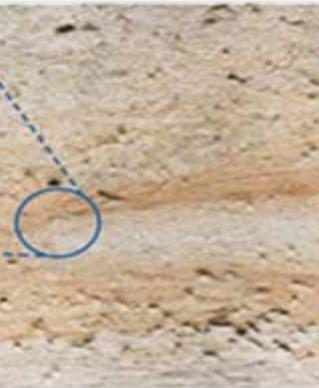
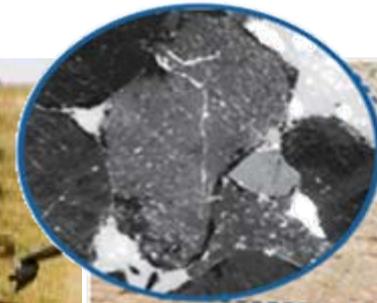
Capture
CO₂ Sequestration



Transport
CO₂ Pipeline



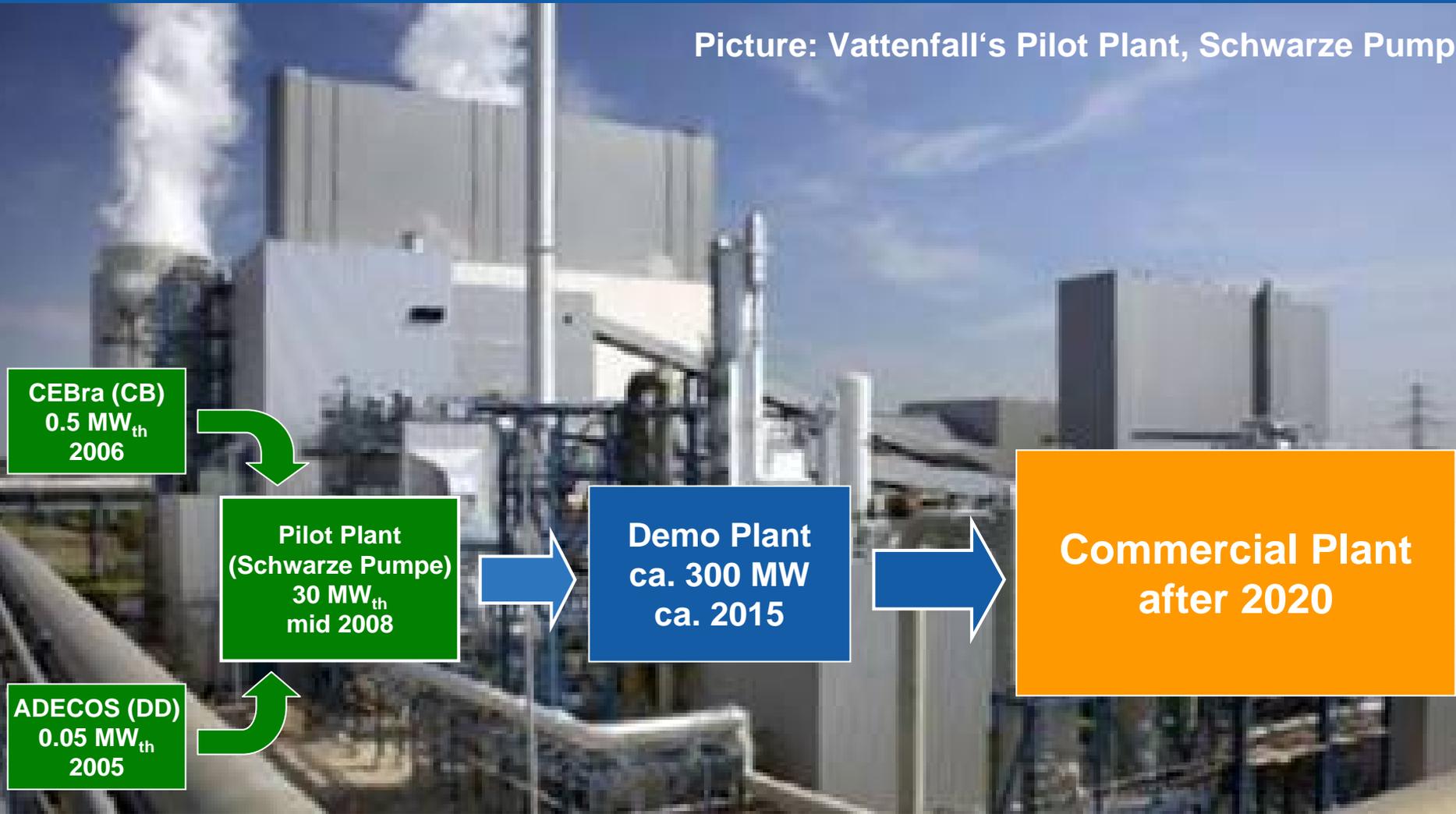
Storage
Geological Storage



Target: Parallel development of technology for carbon dioxide capture and storage.

Development of CO₂ sequestration

Picture: Vattenfall's Pilot Plant, Schwarze Pumpe



Possible storage sites for demo phase



Birkholz and Neutrebbin:

- Identified as two promising structures for a CO₂ storage demonstration project by Vattenfall in 2007.

Distance to demo plant:

- 50/100 km pipeline transportation from the Oxyfuel & Post-combustion capture demo at the Jänschwalde power plant.

Storage horizon:

- Sandstones of the Middle Buntsandstein formation at approx. 1,300 m depth
- Cap-rock: Several hundred meters of mudstone.

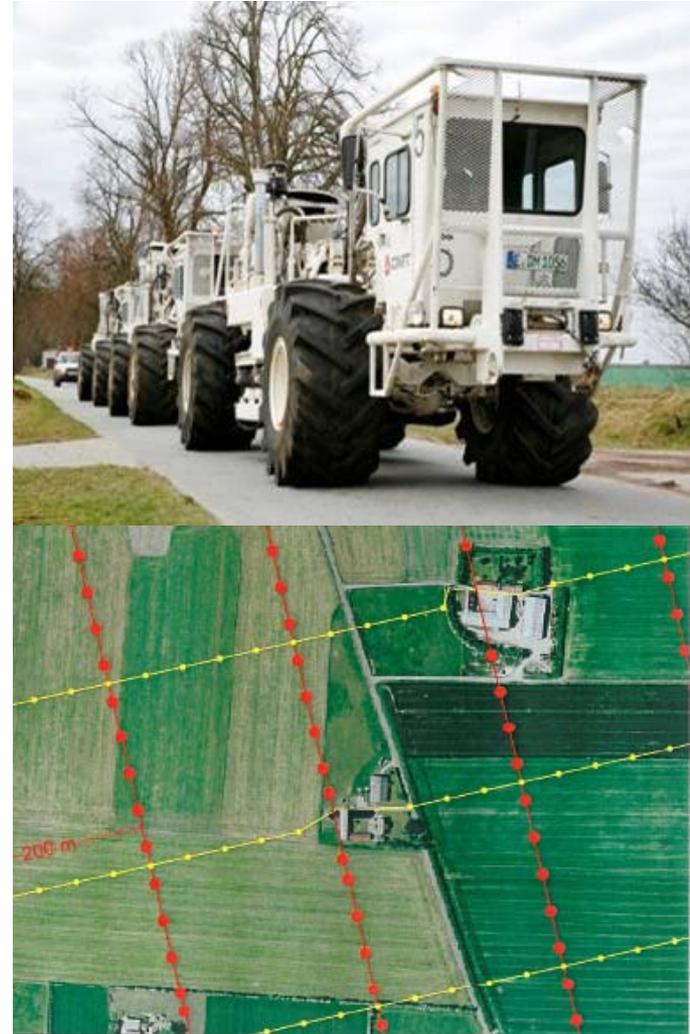
Storage volume:

- Total volume to be injected 50 Mton of CO₂ (base-case).

Next step: exploring the geological formation

Vattenfall needs to explore the potential storage sites

- to be able to evaluate the suitability of the geological formations;
- to be able to answer open questions on a valid basis;
- as an essential step towards a permit procedure for later CO₂ storage.



But the region is concerned



The planned exploration is discussed highly emotional:

- Concerned people in the region reject all activities connected with potential CO₂ storage;
- To fight exploration appears to them as the first step to prevent later CO₂ storage.



**Gaining acceptance
in the region
is the key for success
of the whole demo project.**

Vattenfall's activities in the region I

Dialogue with the region:

- Local information campaign (mailing, advertising, roadshow);
- Increased regional presence (information centre Beeskow);
- Telephone hotline.

Dialogue with important stakeholders:

- E-mail newsletter with general information on CCS and on the project;
- continuous contact program;
- Ca. 700 national and international guests in information centre Beeskow.



Vattenfall's activities in the region II



Giving detailed information:

- Series of lectures by neutral experts in the information centre Beeskow;
- Internet platform (www.vattenfall.com/ccs);
- Different brochures for different stakeholders.

Enabling employees to argue for CCS:

- Comprehensive information via intranet, employees magazine or specific CCS seminar.

Example: Regional Advisory Board

Regional Advisory Board to accompany the geological exploration in eastern Brandenburg:

- Initiated by the federal government of Brandenburg;
- Board comes together every four weeks;
- Since July until now four sessions held;
- The board is professionally moderated.

Function of the Board:

- Accompanying the exploration;
- Supervising the results of the exploration to care for maximal transparency.

17 decision-making members:

- Representatives of both exploration regions (Beeskow, Neutrebbin), f. e. major, district administrator;
- Representatives of the citizens' initiative against CCS;
- Governmental supervising authority;
- Vattenfall.

CCS requires a legal framework

- 5th June 2009 an EU directive on CCS had been published;
- The EU directive should lead to comparable laws for the implementation of CCS in all EU member states;
- In Germany the implementation of a national law on CCS is discussed since last summer;
- German legislation has not enacted a law on CCS by now.

! Germany needs a law on CCS soon, to benefit from CCS in the mix with other instruments to avoid CO₂.

! The law must ensure the security of storage site AND must enable private investment in the new technique.

Conclusions

- Germany and the world need coal and other fossil fuels to meet the energy demand – today and tomorrow. Parallel we need to reduce CO₂ emissions in all sectors.
- CCS enables us and large scale industries to use fossil fuels and to reduce CO₂ emissions at the same time. Therefore Germany should develop and use CCS in mix with other instruments.
- Both: Acceptance for CCS by the public and a suitable legal framework are necessary for successful implementation of the new technology.



A white flag is waving against a clear blue sky. The word "VATTENFALL" is printed in large, bold, black capital letters across the middle of the flag. To the right of the text is a logo consisting of three stylized, overlapping curved shapes in yellow, white, and blue. The flag is attached to a pole on the left side.

VATTENFALL

Thank you for your attention!