

# Climate Change – challenges and options

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September 23, 2003



## Vattenfall's main competitors



	Electricity sales (TWh)	Net sales (EUR billions)
Electricité de France	529	48
E.ON AG	321	37
RWE AG	255	47
Enel S.p.A.	240	30
Vattenfall Group	188	11
Endesa	133	17
Electrabel (Suez)	112	15

## The Vattenfall Group Q2 2003

	Nordic Countries	Germany and Poland	Total
Net sales, MSEK	23 059	35 439	58 498
Electricity generation, TWh	40	39	79
Heat sales, TWh	3	16	19
Employees	8 636*	27 641	35 227

\*)Includes 124 employees in other countries

Vattenfall  
– A leading European energy company



# Mission

To be number one for...



**The Environment**



**The Customer**



**The Economy**

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# Europe August 2002...



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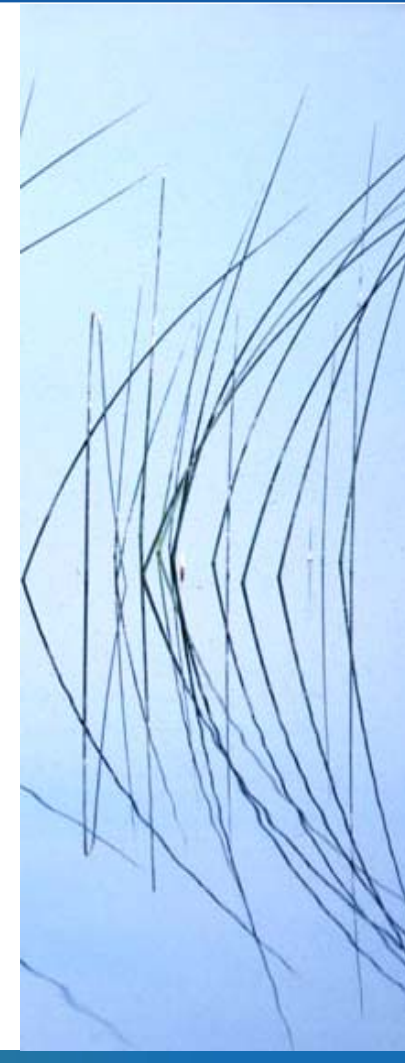
# Europe August 2003...



“This Directive establishes a scheme for greenhouse gas emission allowance trading within the Community in order to promote reductions of greenhouse gas emissions in a cost-effective and economically efficient manner”.

Adopted by the European Parliament 2 July 2003.

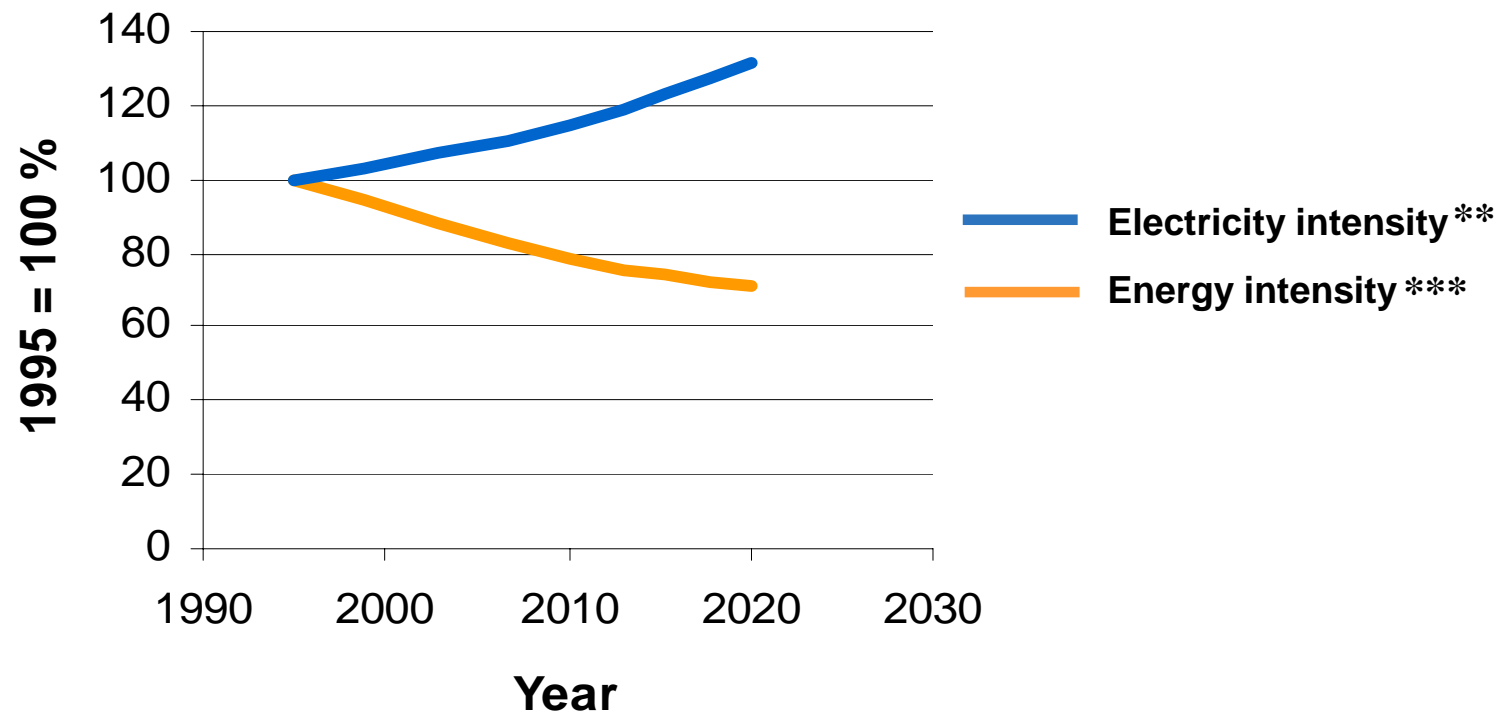
- March 2004: National Allocation Plans
- January 2005: Effective
- First period: 2005-2007
- Second period: 2008-2012



## Main features of the EU Emissions Trading Scheme

- All plants will be allocated a number of emission allowances, normally based on historical need.
- Number of allowances will be gradually reduced to reflect reduction targets of EU. Major part of allowances will be issued at no cost.
- Plant owners must always possess sufficient number of emission allowances.
- Allowances are tradable. There will be a trade-off between physical reduction of emissions and buying/selling allowances in the market.

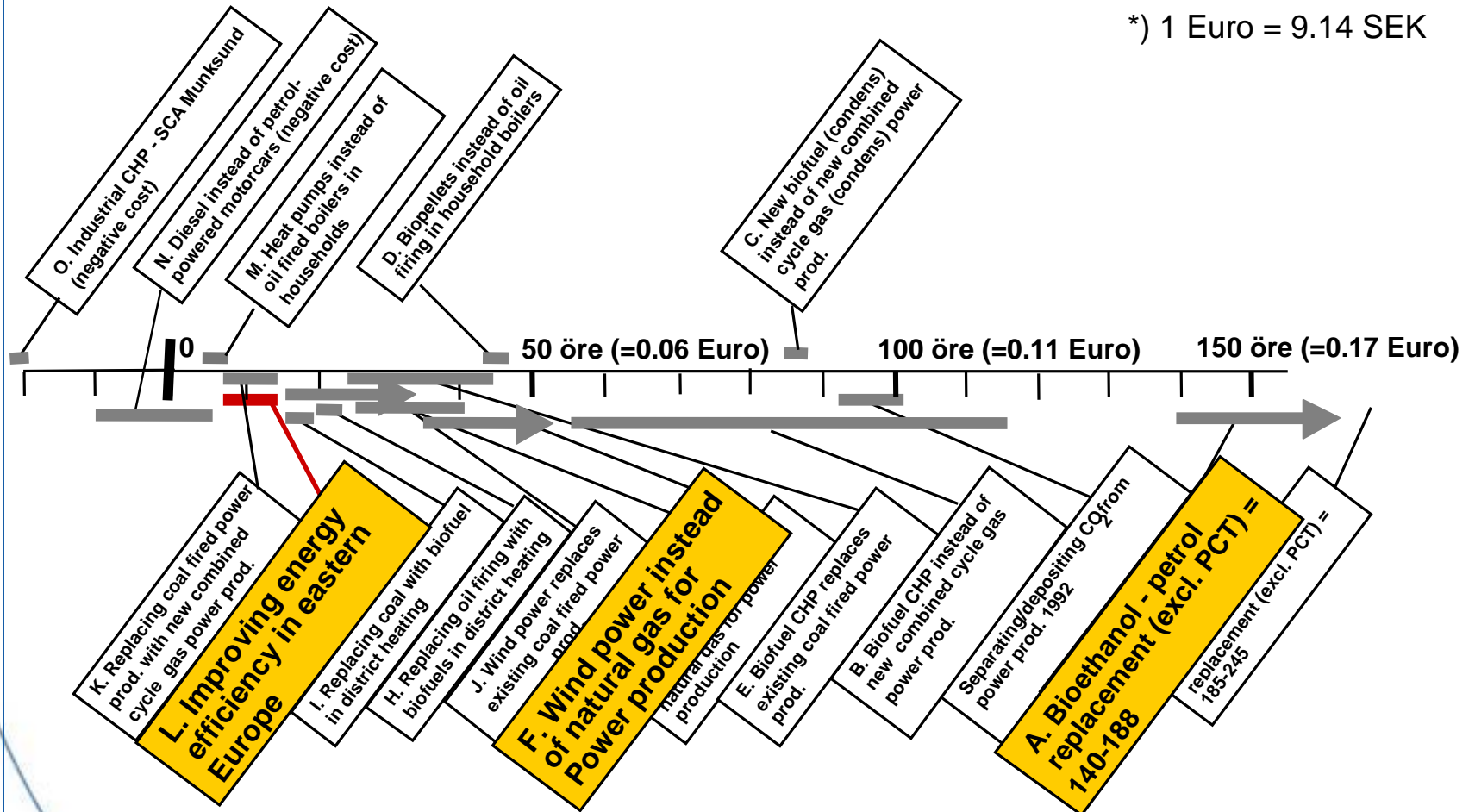
## Increased electricity intensity in EU\*



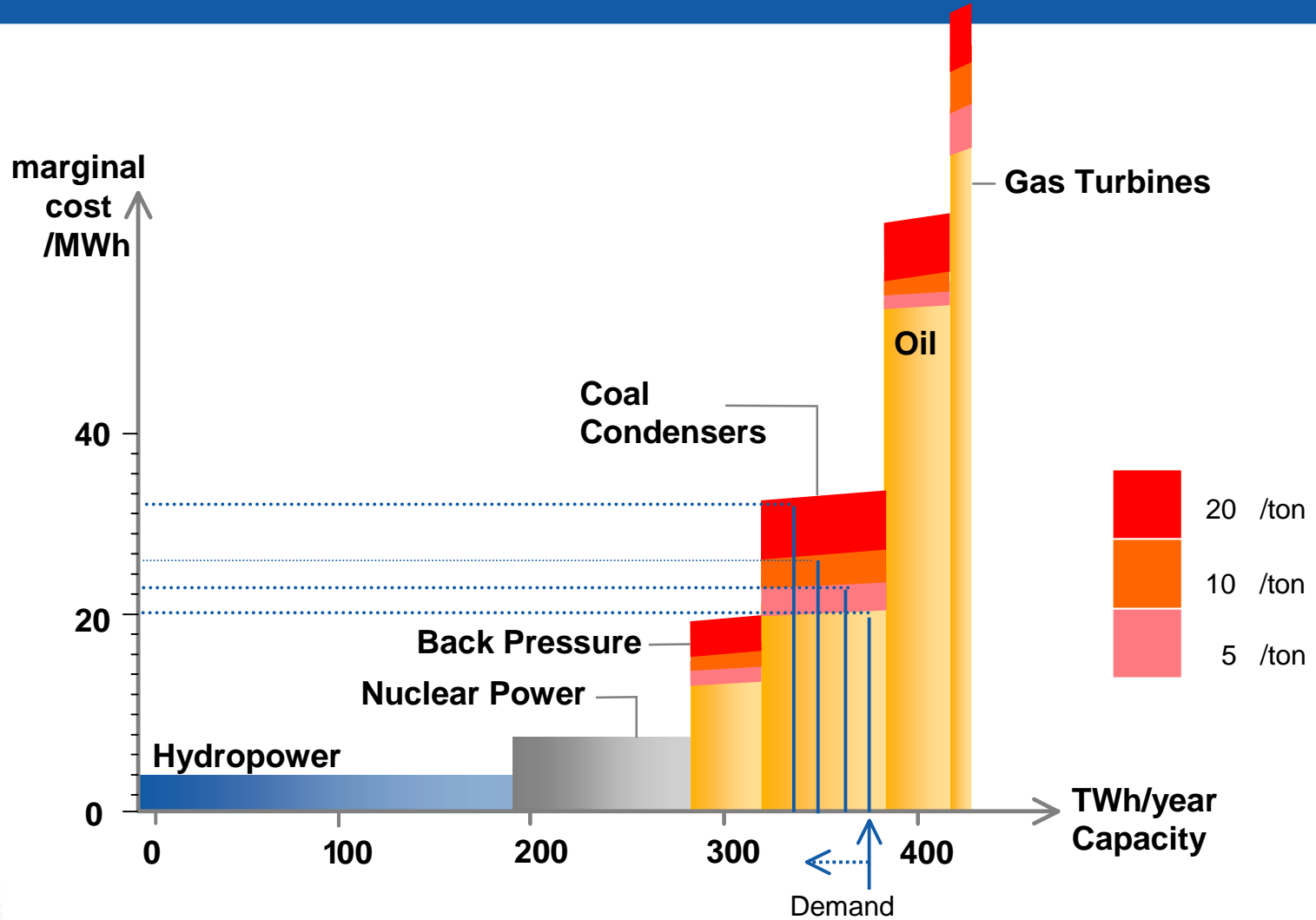
\*) EU-commission prognosis \*\*\*) Electricity demand/Total primary energy use \*\*\*\*) Total primary energy use/GDP

# Specific costs of measures to reduce CO<sub>2</sub> emissions, öre/kg\* CO<sub>2</sub>

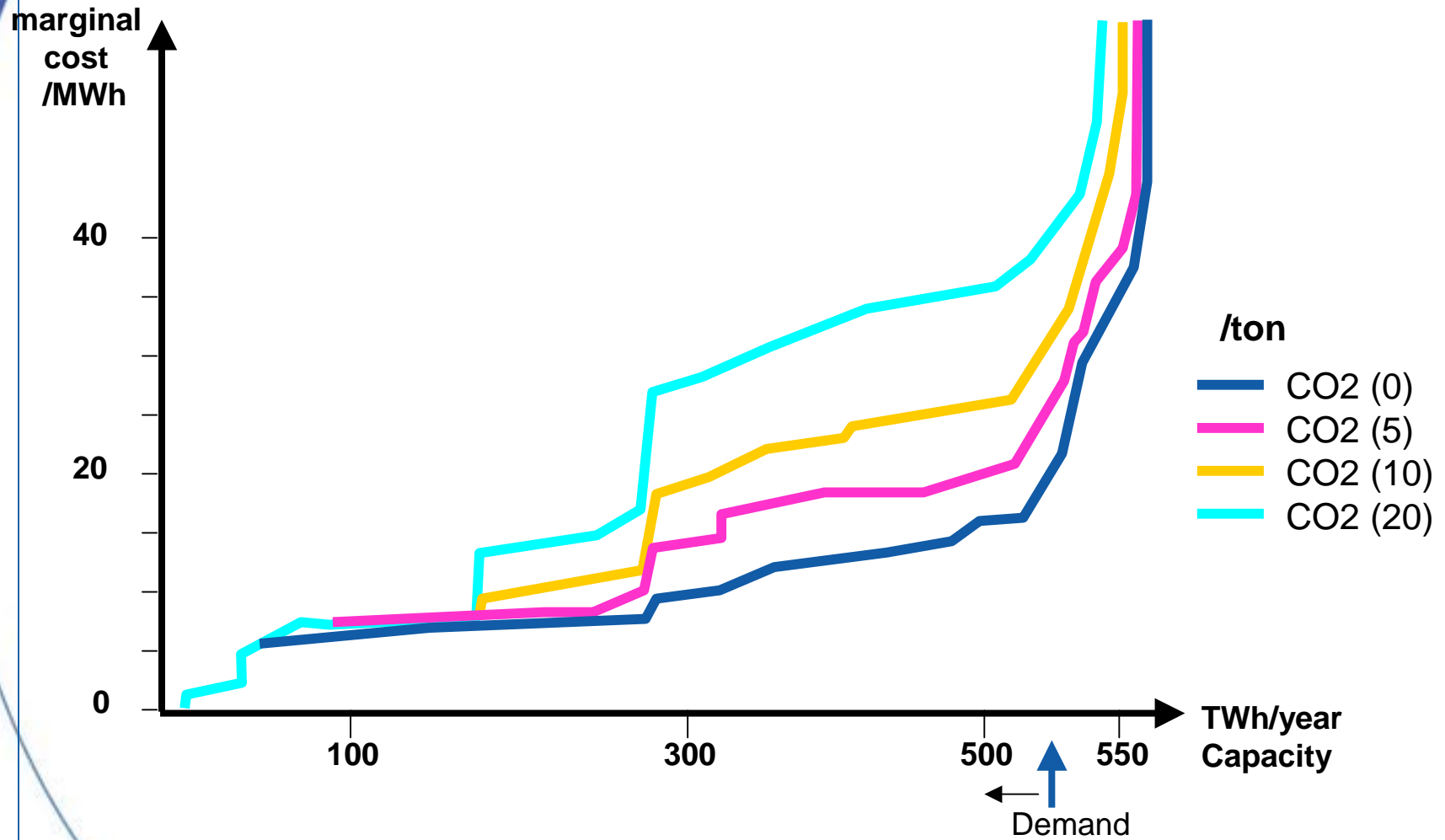
\*) 1 Euro = 9.14 SEK



# Supply and Demand in the Nordic Region



# Supply and Demand in Germany



## Analyses show that...

### ...if

- the reduction in the power sector from *today's* level is 15%, and
- the trading system does not grant the new EU members credits for reductions since 1990

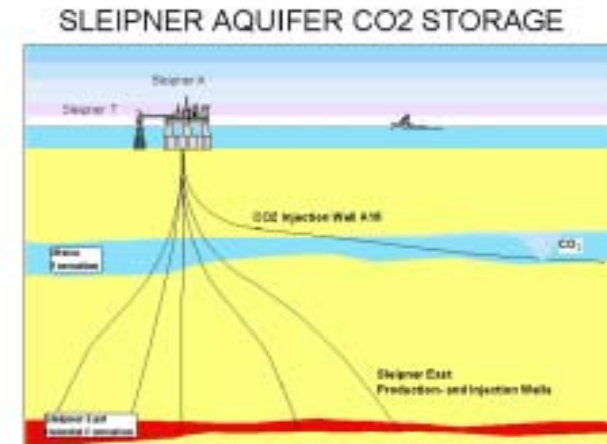
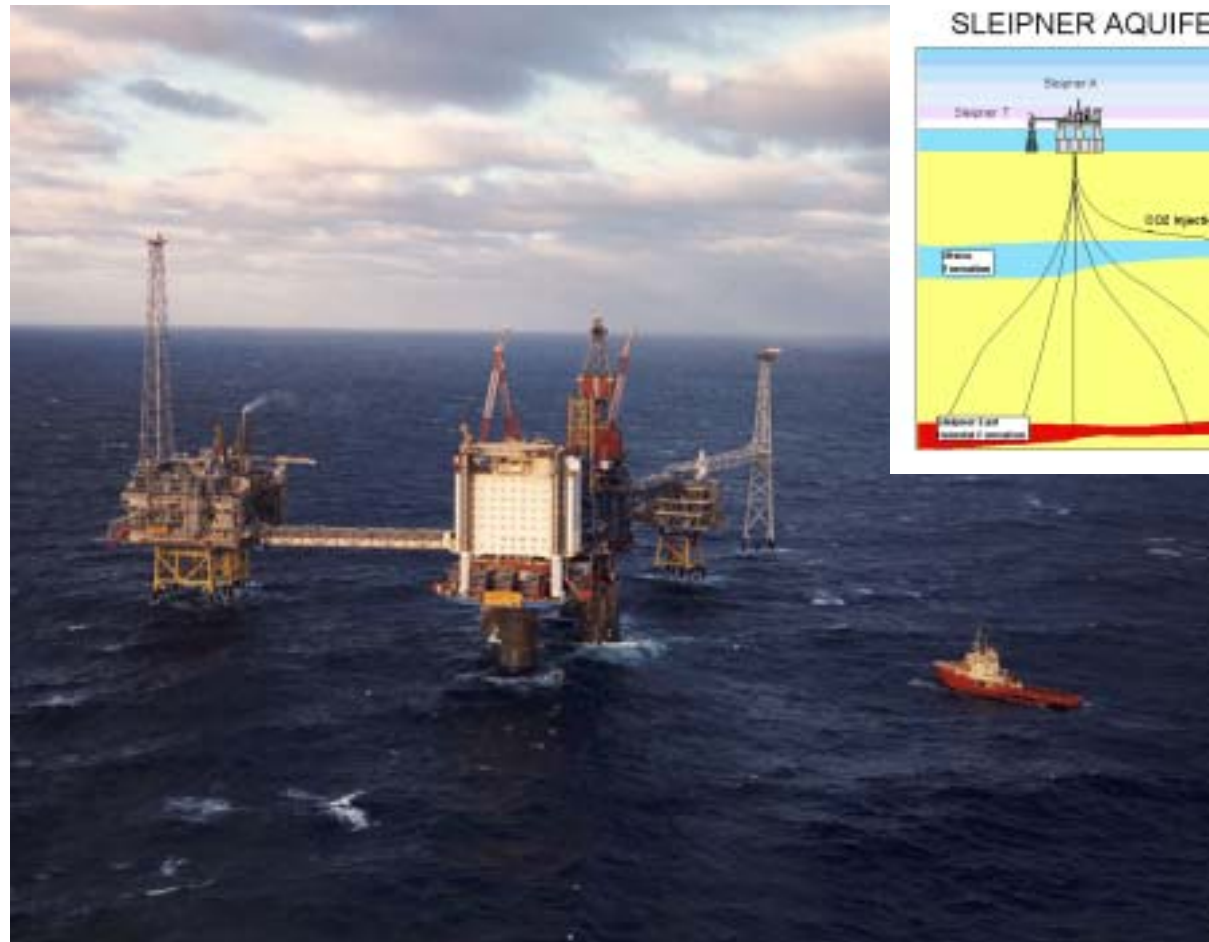
### then ...

- allowances will cost up to 20 €/ton CO<sub>2</sub>,
- electricity whole-sale prices will increase significantly (up to 60%)

### ...by 2012, but...

- with such credits to the new EU members, or JI/CDM credits, allowance prices may be 7-10 €/ton and electricity price increases 15-30 %

## Storage of CO<sub>2</sub> in a Saline Aquifer Beneath the North Sea



CO<sub>2</sub>-injection into the saline aquifer Utsira.  
(Source:STATOIL)

The Sleipner field. Oil and gas production facilities. (Source: STATOIL )

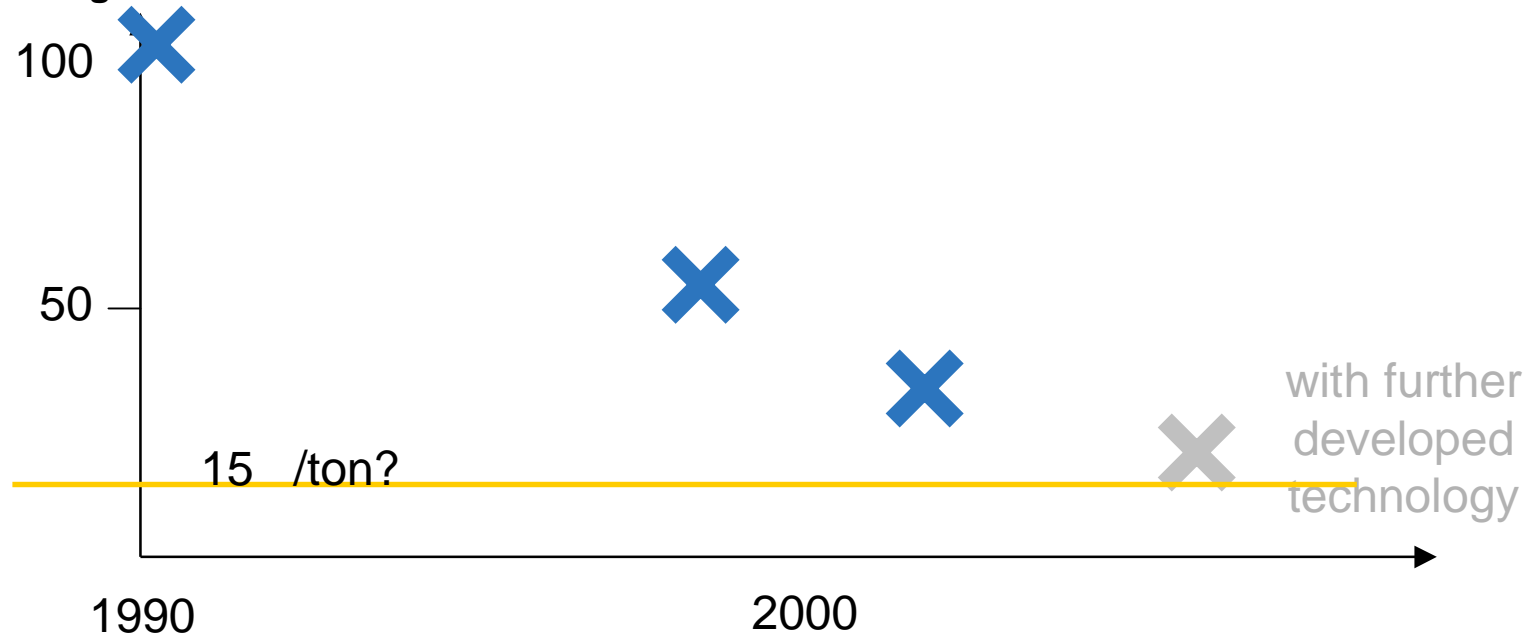
## Vattenfall initiative "CO<sub>2</sub> free power plant"

- Objectives:
  - To evaluate if CO<sub>2</sub> capture and storage is an option for future use of fossil fuels without CO<sub>2</sub> emissions.
  - To create enough knowledge for a decision to build a demo plant
- The project runs up to 2007
- To eliminate CO<sub>2</sub> emissions from coal at less than 20 €/ton CO<sub>2</sub> seems possible
- As part of the project, Vattenfall has taken a leading role in an EU R&D project proposal

## Separation and storage of CO<sub>2</sub> from electricity generation

Development of total  
estimated cost  
(separation, transport  
and storage)

öre/kg CO<sub>2</sub>



\*) 100 öre = 1 SEK = 0,11 EUR August 2002

## Vattenfall's strategy on climate change in short:

- Cost effective measures must be the basis for all actions
- A sustainable energy system is built on:
  - Renewable energy sources
  - Efficiency in generation and utilization
  - Emissions trading
  - CO<sub>2</sub> separation and storage
- Trading solutions has to be properly designed and rewarding early actions since reduction of CO<sub>2</sub> emission is crucial for investments