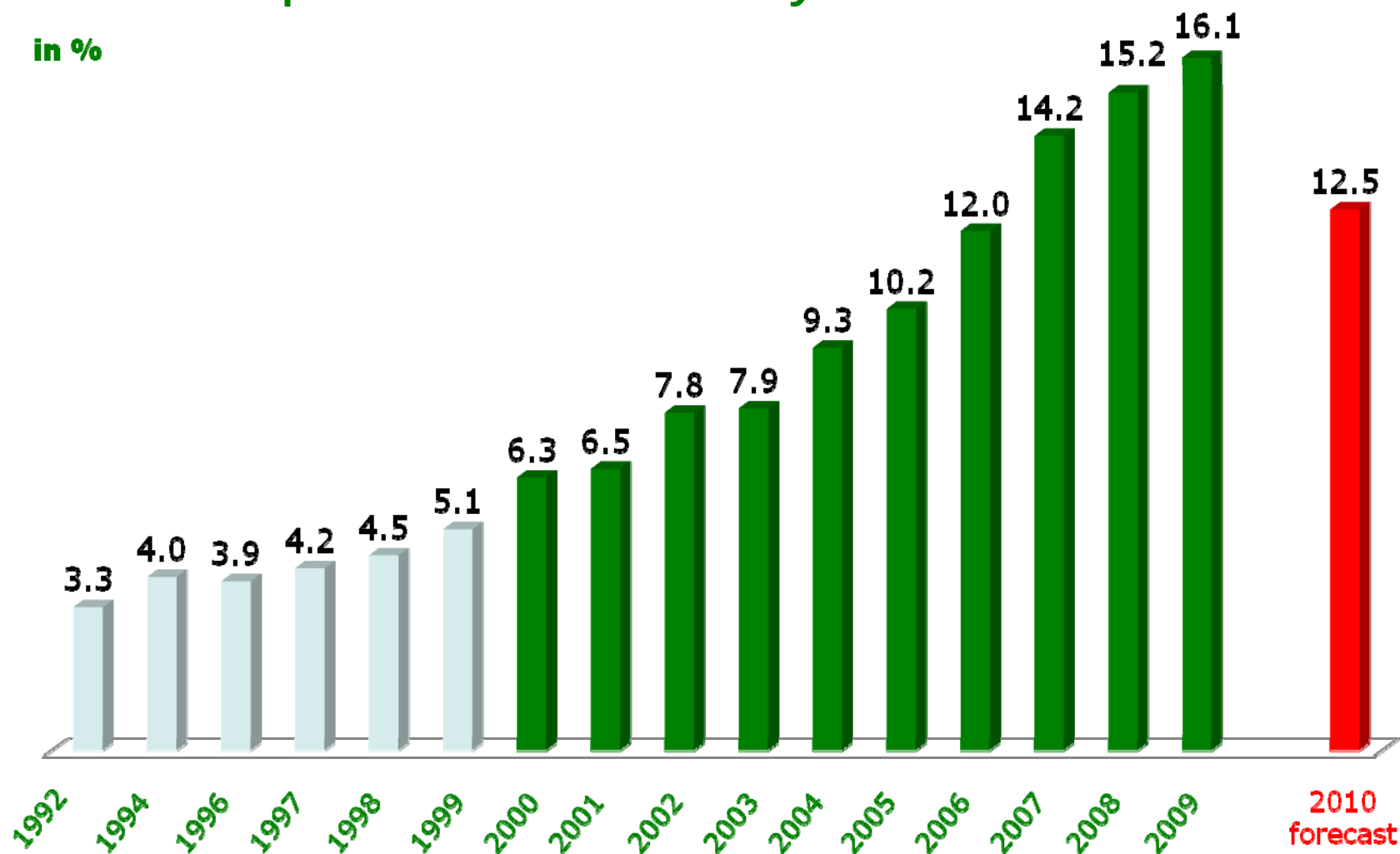


***Renewable Energy and
climate policy
Barcelona
April 2010***

Hans-Josef Fell,
Member of German
Parliament

Share of Renewables in the Gross Electricity Consumption in Germany

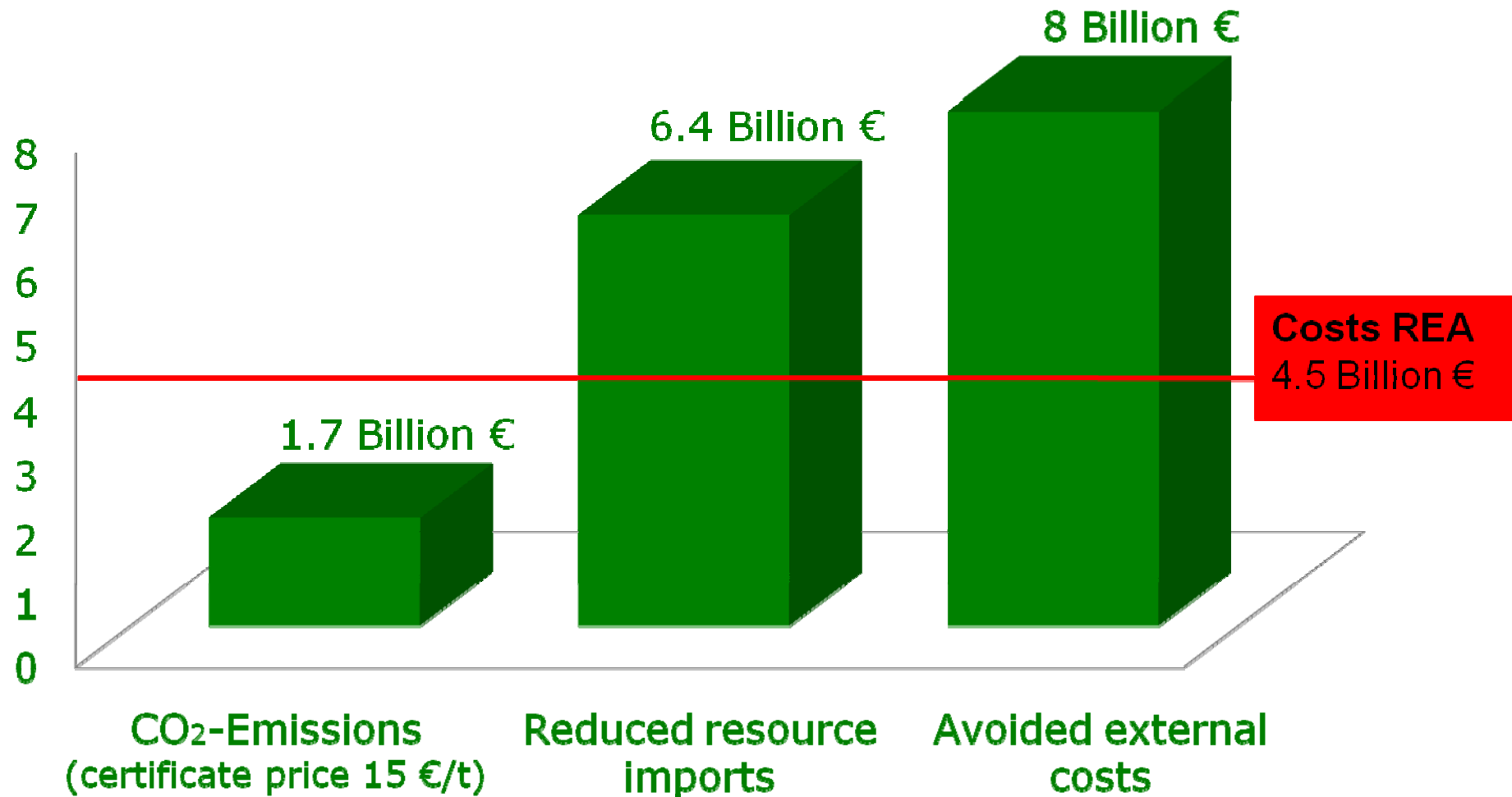
in %



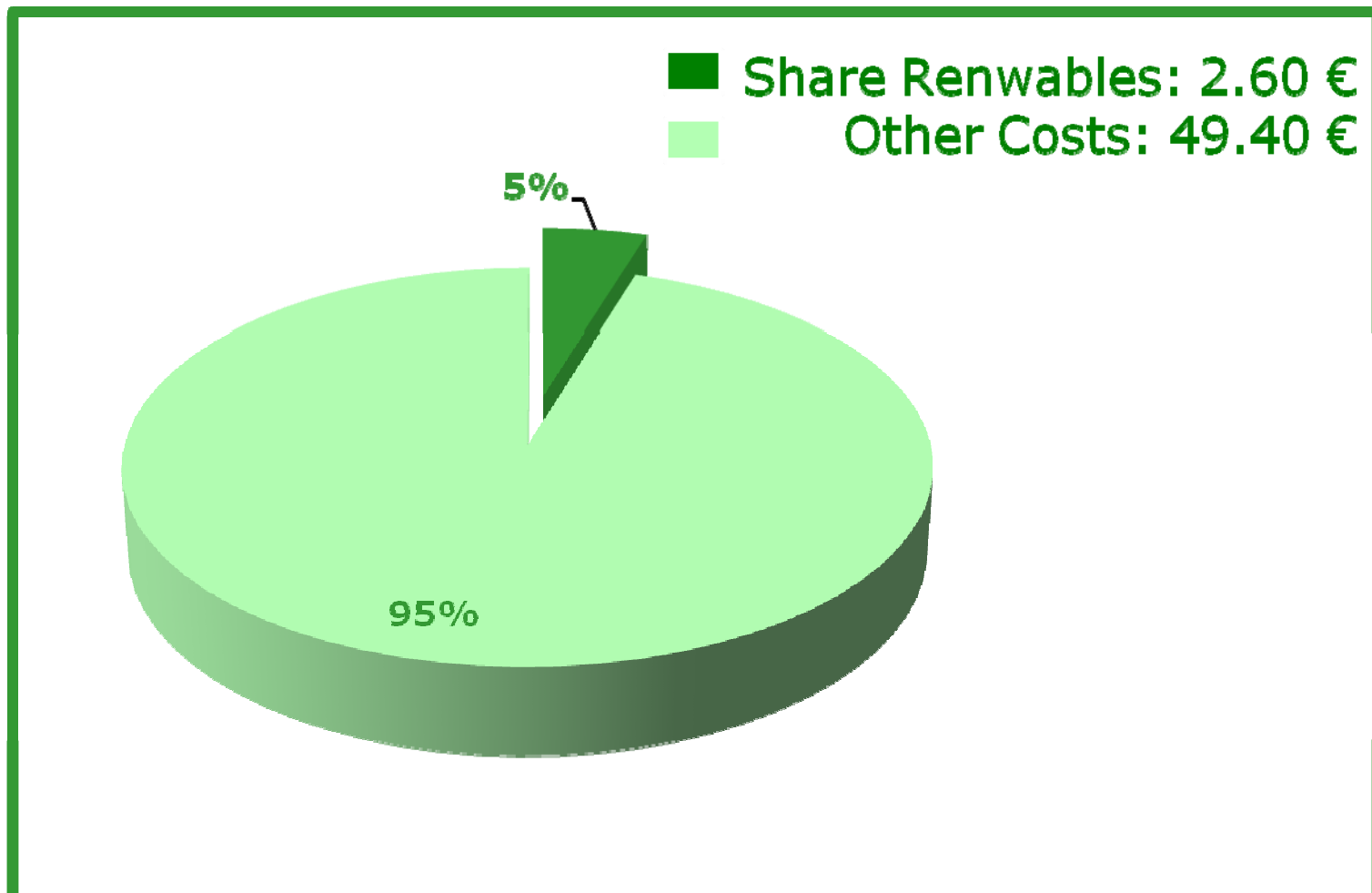
Source: BDEW

Hans-Josef Fell
www.hans-josef-fell.de

Avoided Costs due to Renewable Energies in 2009



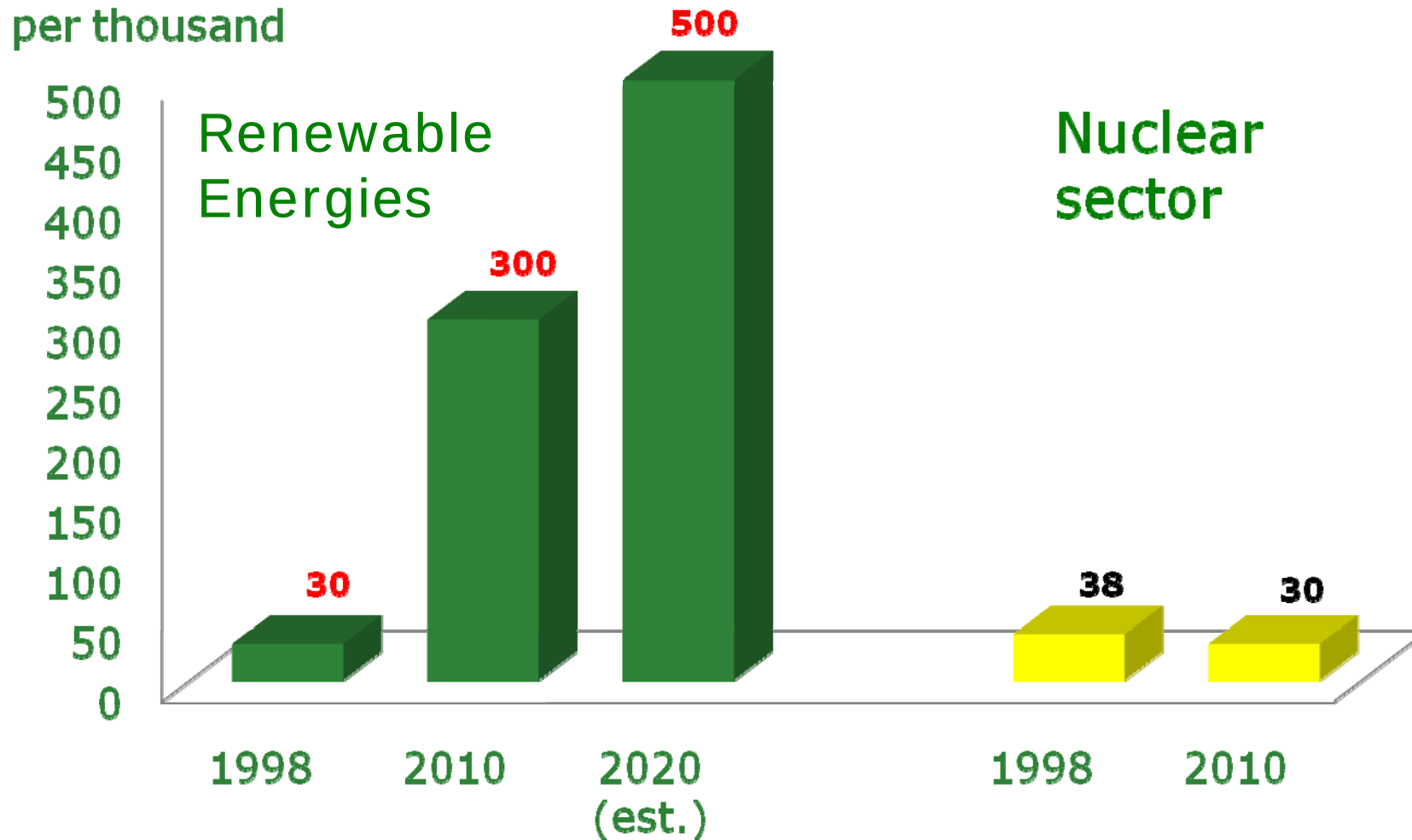
Average electricity costs for a multi-person household in Germany: 52 €



Source: BMU 2009

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Job engine renewable energies in Germany

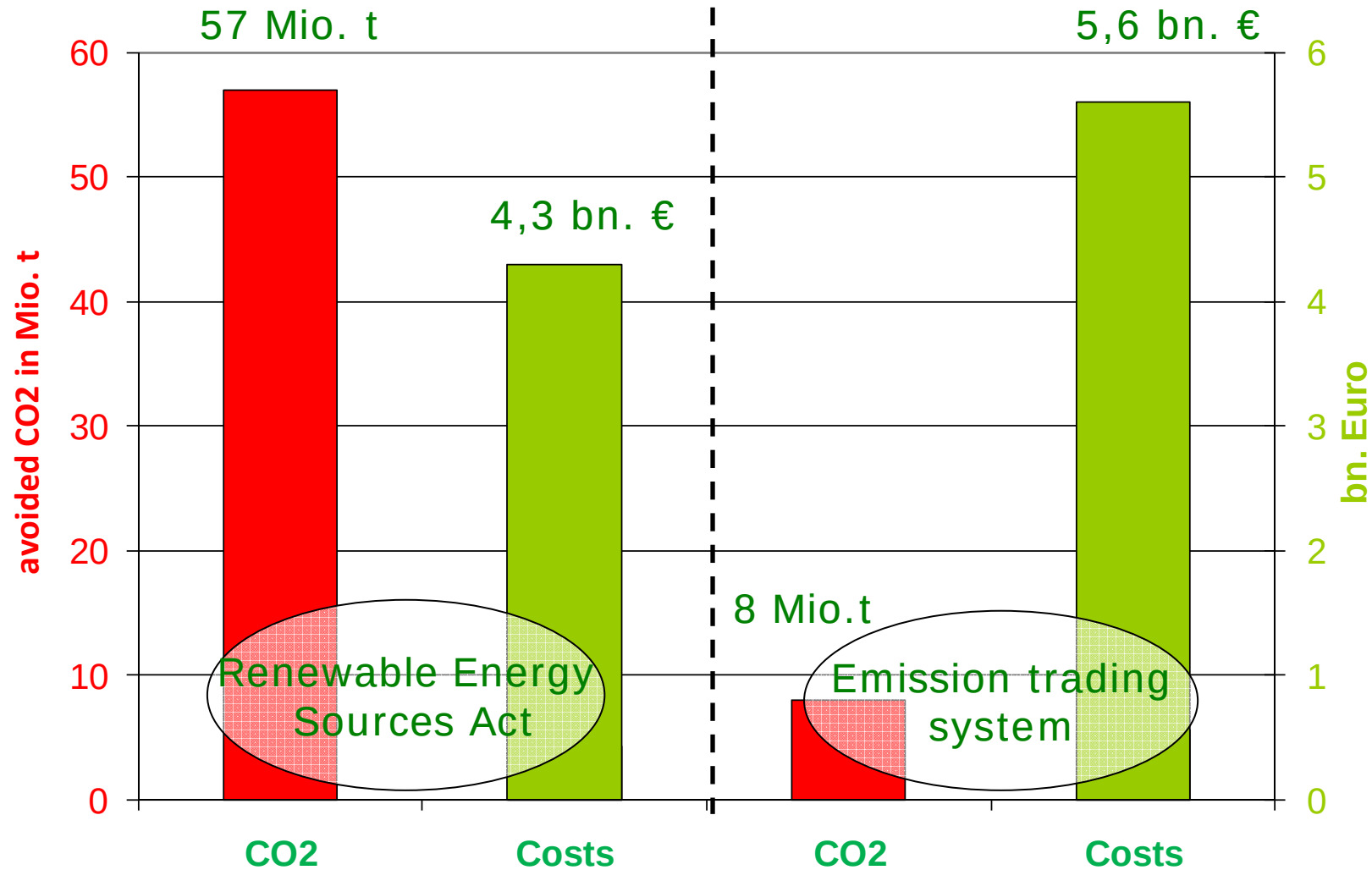


Source: BEE /BMU 2009

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Comparing Climate protection tools in Germany

Renewable Energy Sources Act (2007) v. Emission trading system (2005-07)



A Path to Sustainable Energy by 2030



‘Wind, water and solar technologies can provide 100 percent of the world’s energy, eliminating all fossil fuels.’

(Mark Z. Jacobson & Mark A. Delucchi)

Renewable energies are cheaper than global fossil energy bill

Estimated costs fossil, nuclear energies (US \$)	
Petroleum	3350-4475 Bil.
Natural Gas	550-830 Bil.
Coal	150-300 Bil.
Electricity	1490-2150 Bil.
Sum per year (without external costs!)	5000–7750 Bil.
Sum 2010-2030 (+ 20% rise)	200 000 Bil.
Sum to replace world's energy by 2030	100 000 Bil.

Sources:

Mark Z. Jacobson/ Mark DeLucchi 2009, A plan for a sustainable future, in: Scientific American Nov. 2009
Dr. Werner Zittel 2010, Worldwide Estimated Yearly Energy Costs (EWG 2010)

Hans-Josef Fell
www.hans-josef-fell.de

Key components of a successful feed-in law

- Privileged grid access
 - Attractive feed-in tariff for each RE technology (must be high enough for cost-efficient RE power production)
 - Feed-in cost distributed via electricity price
 - No cap on total amount of generated RE power
 - Guaranteed feed-in period
- Also important: No obstacles through approval procedures in practice

Photovoltaic



Innovation of Wind Power Technology

20 Years Development of Wind Power Technology
(20 kW to 6 MW)



Biogas



Geothermal Energy



Hot-Dry-Rock Method

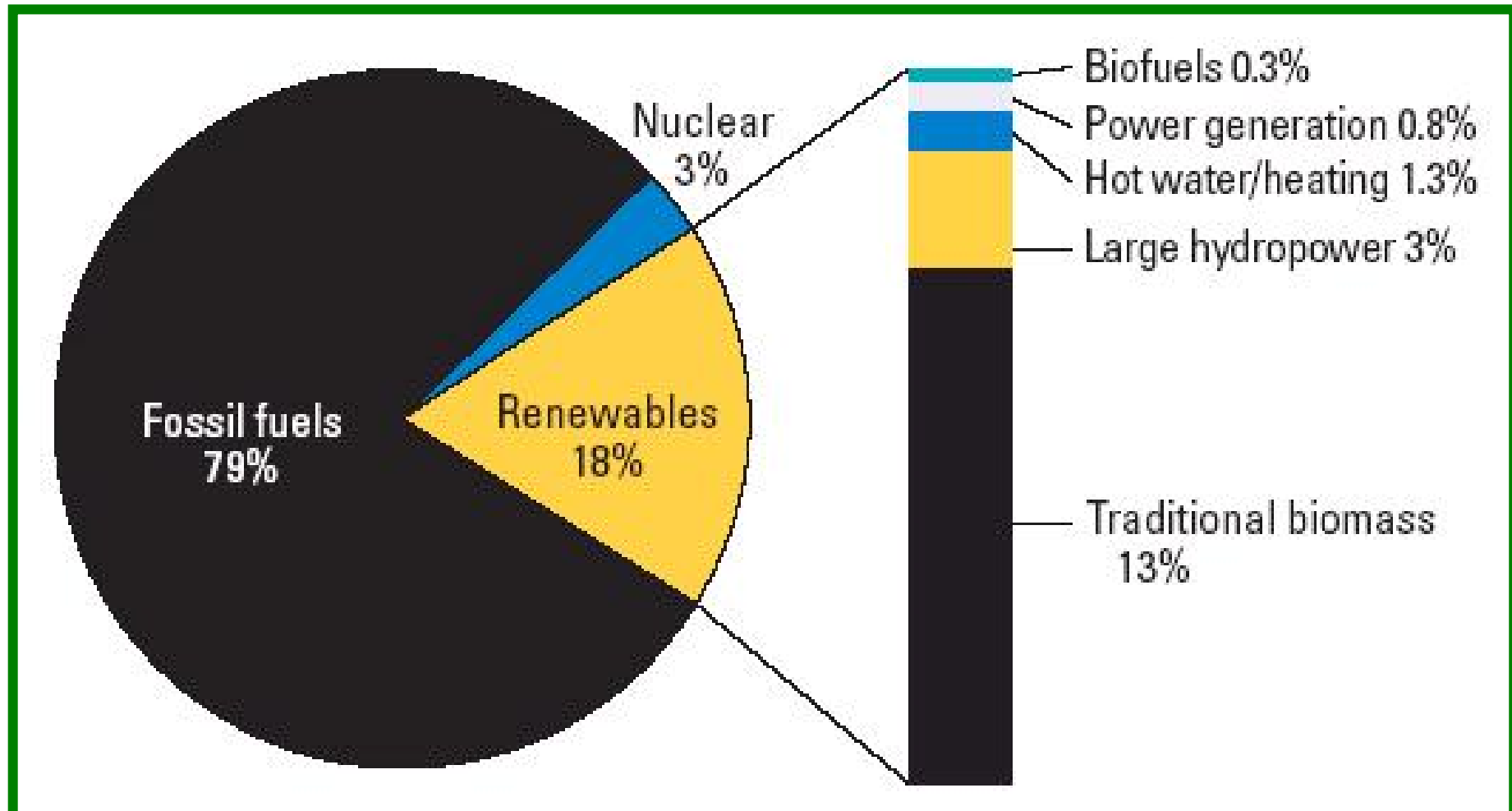
Small Hydropower



Source: Badenova

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Renewable Energy Share of Global Final Energy Consumption



Source: REN21

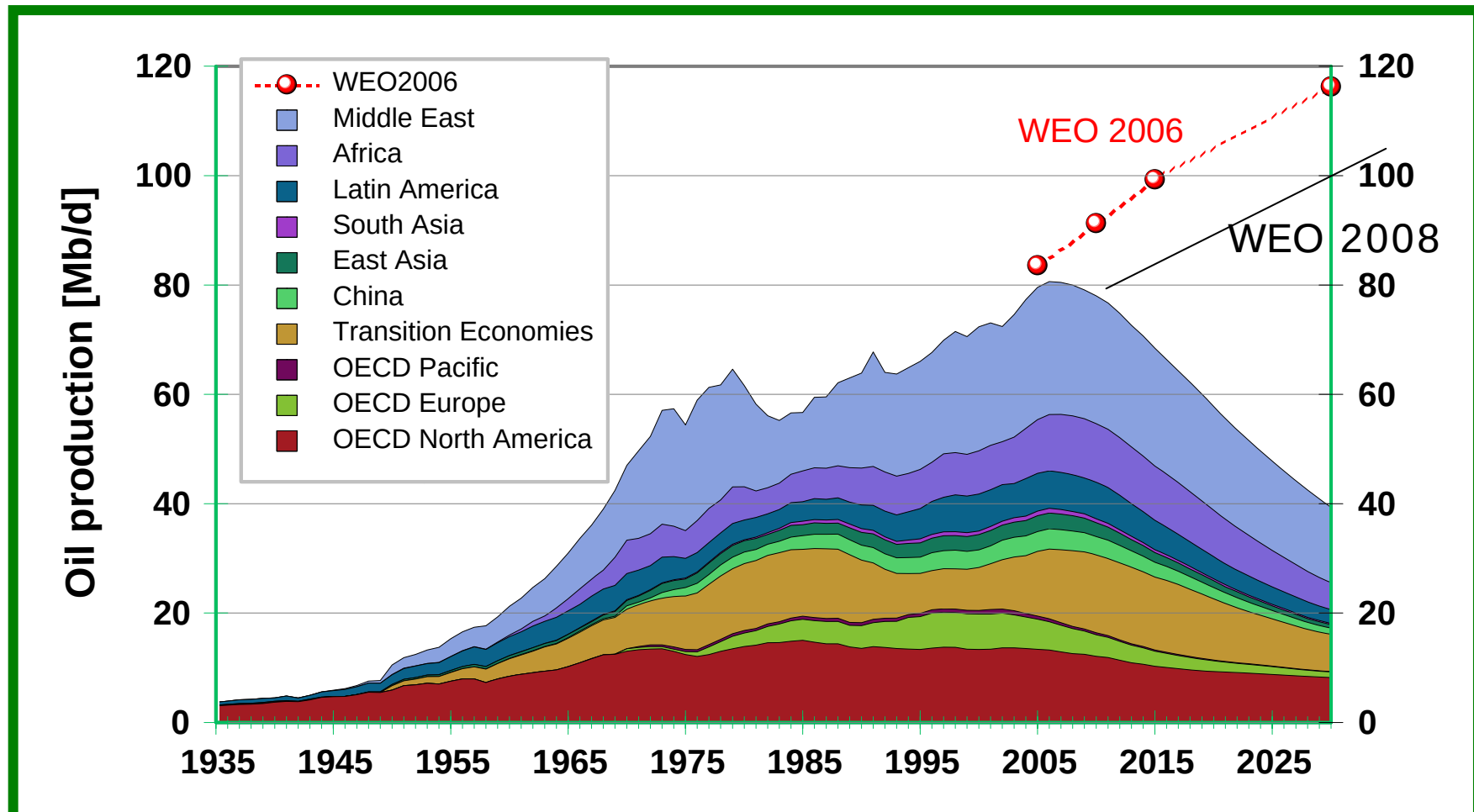
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Worldwide Potential Renewable Energy

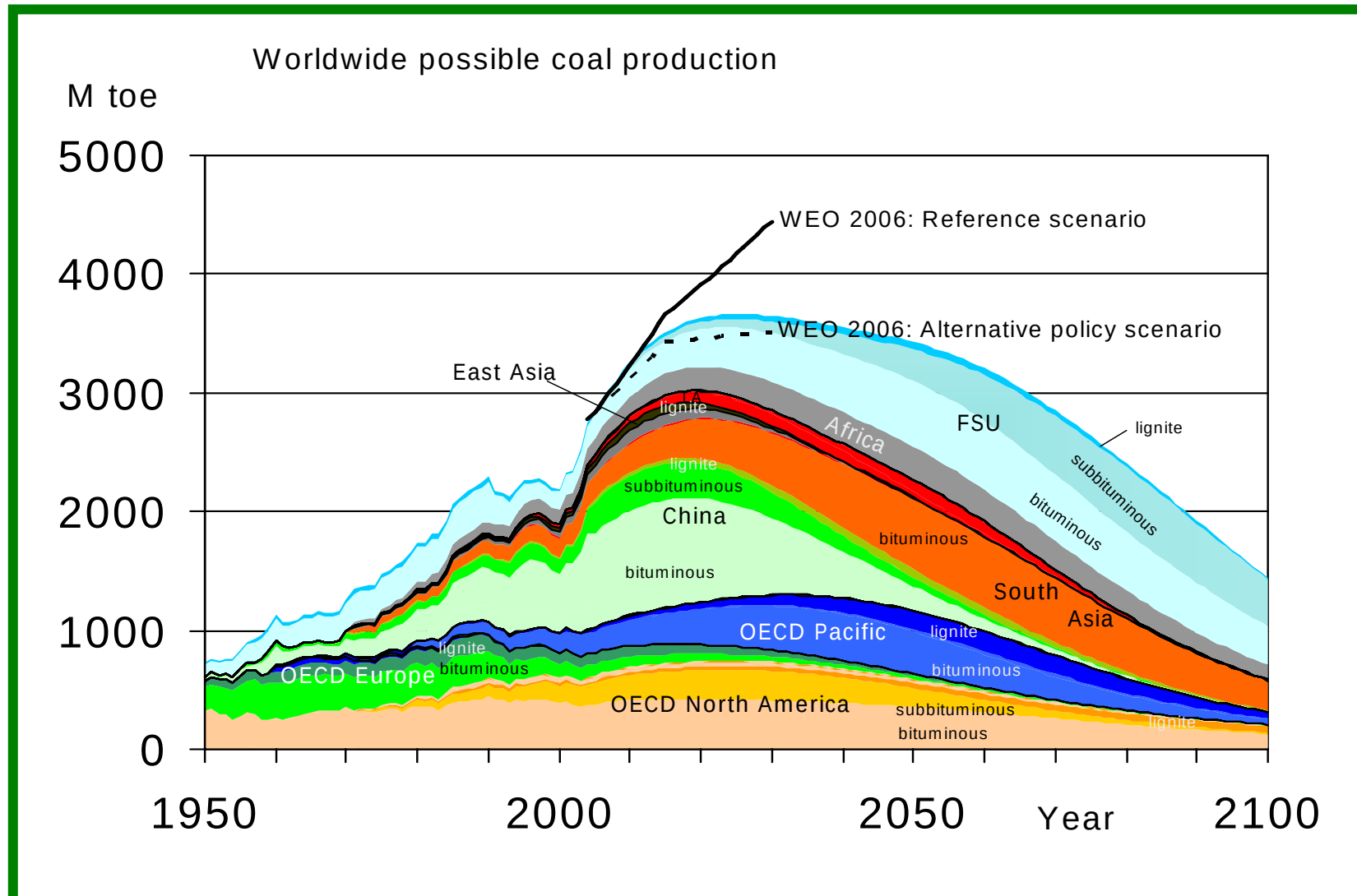


Oil production world summary

Energy Watch Group

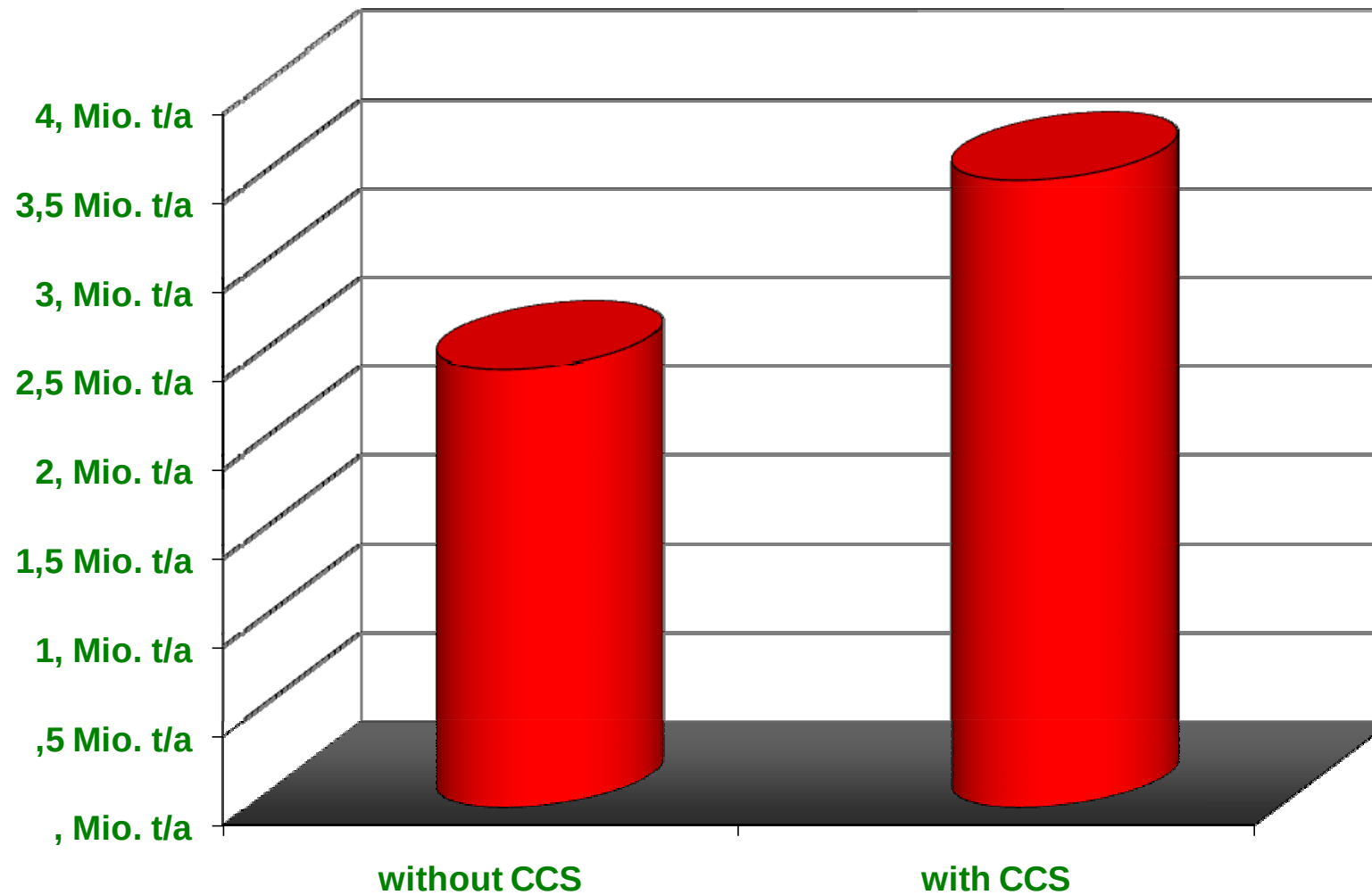


Global coal production: Peak 2030



Example: Lignite Power Station Neurath

Consumption of lignite from mine Mio. t/a

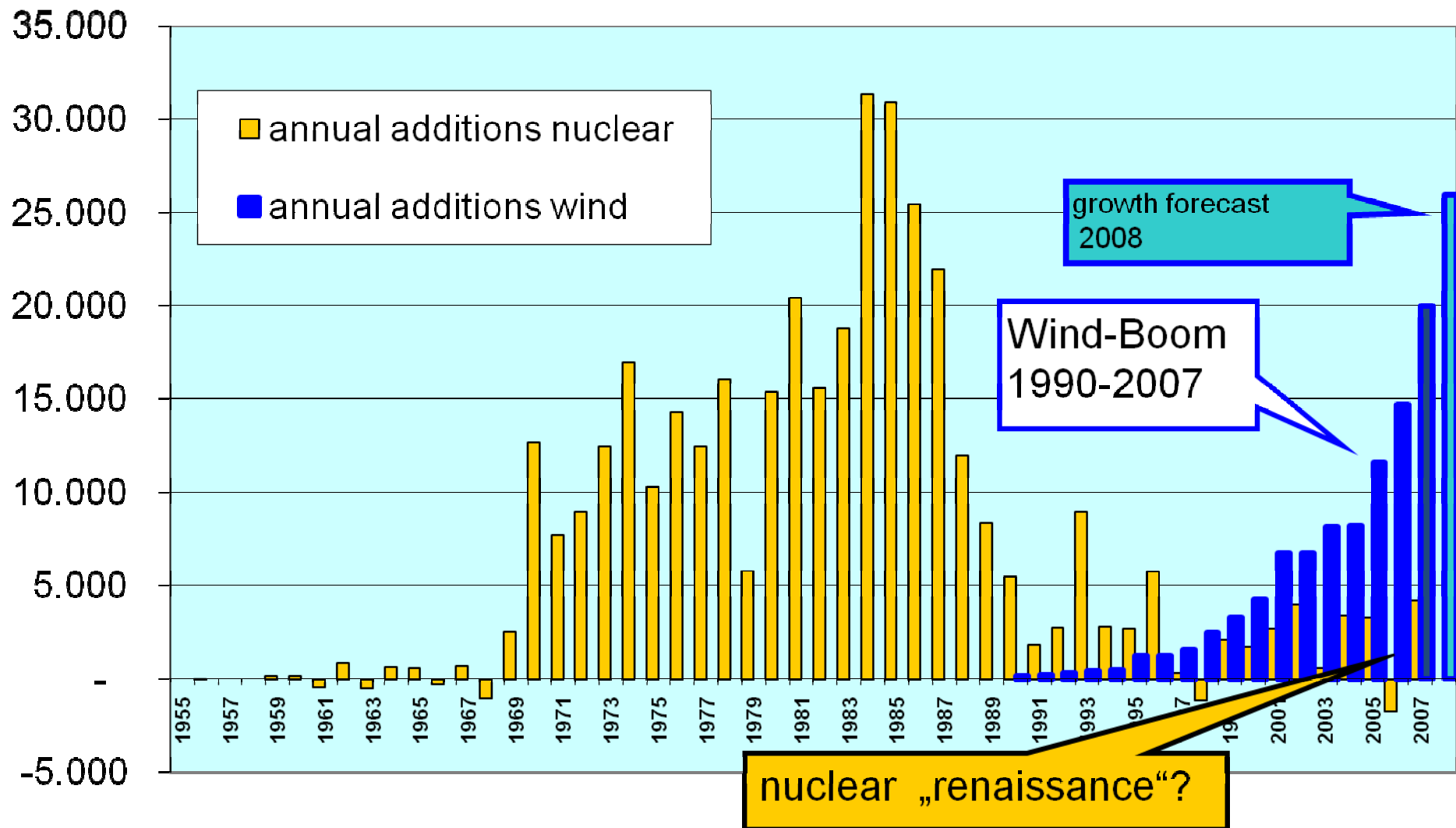


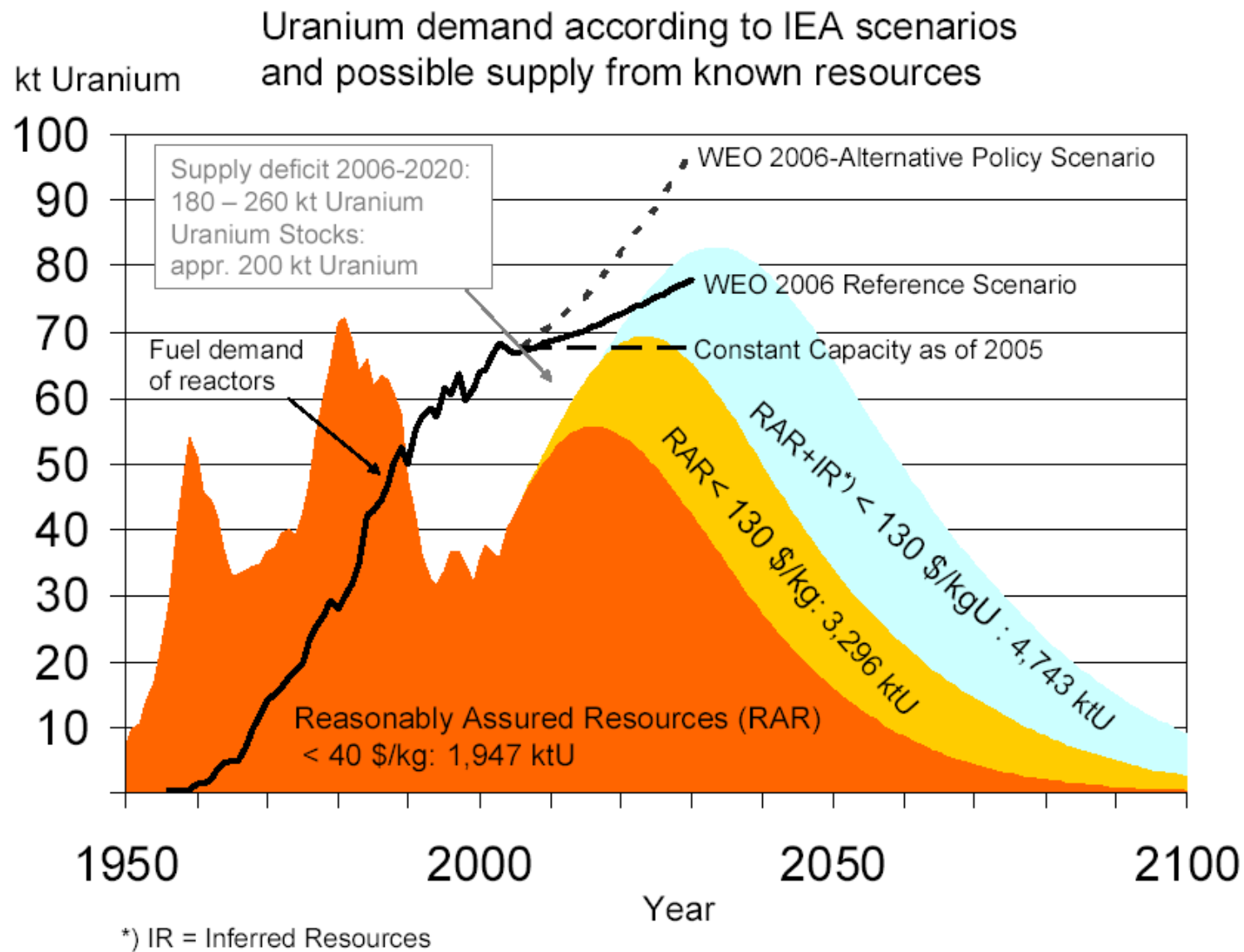
Pripjat Towncenter

April 2006: 20 years after Tchernobyl nuclear accident

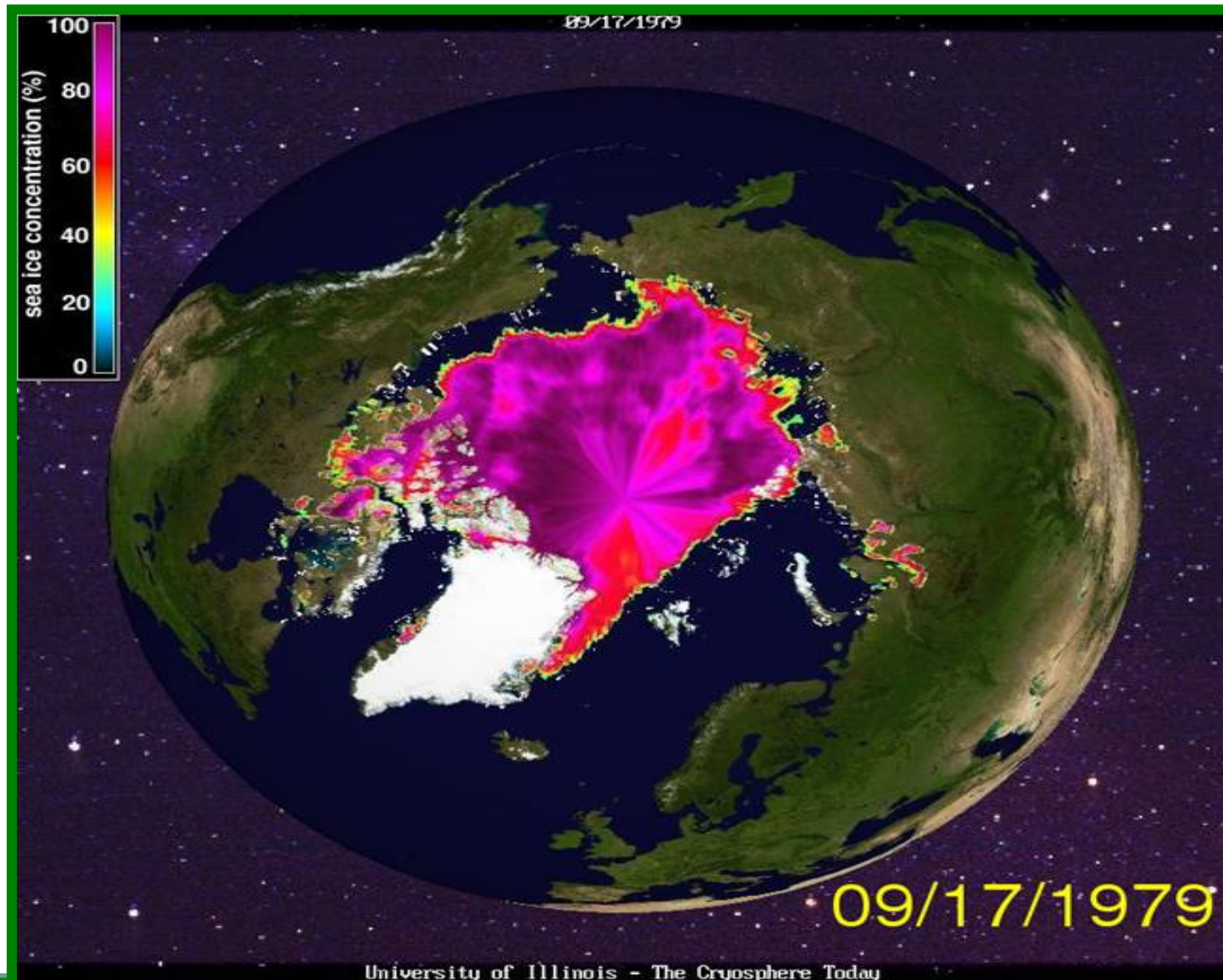


Annual additions of nuclear and wind capacities in Megawatt





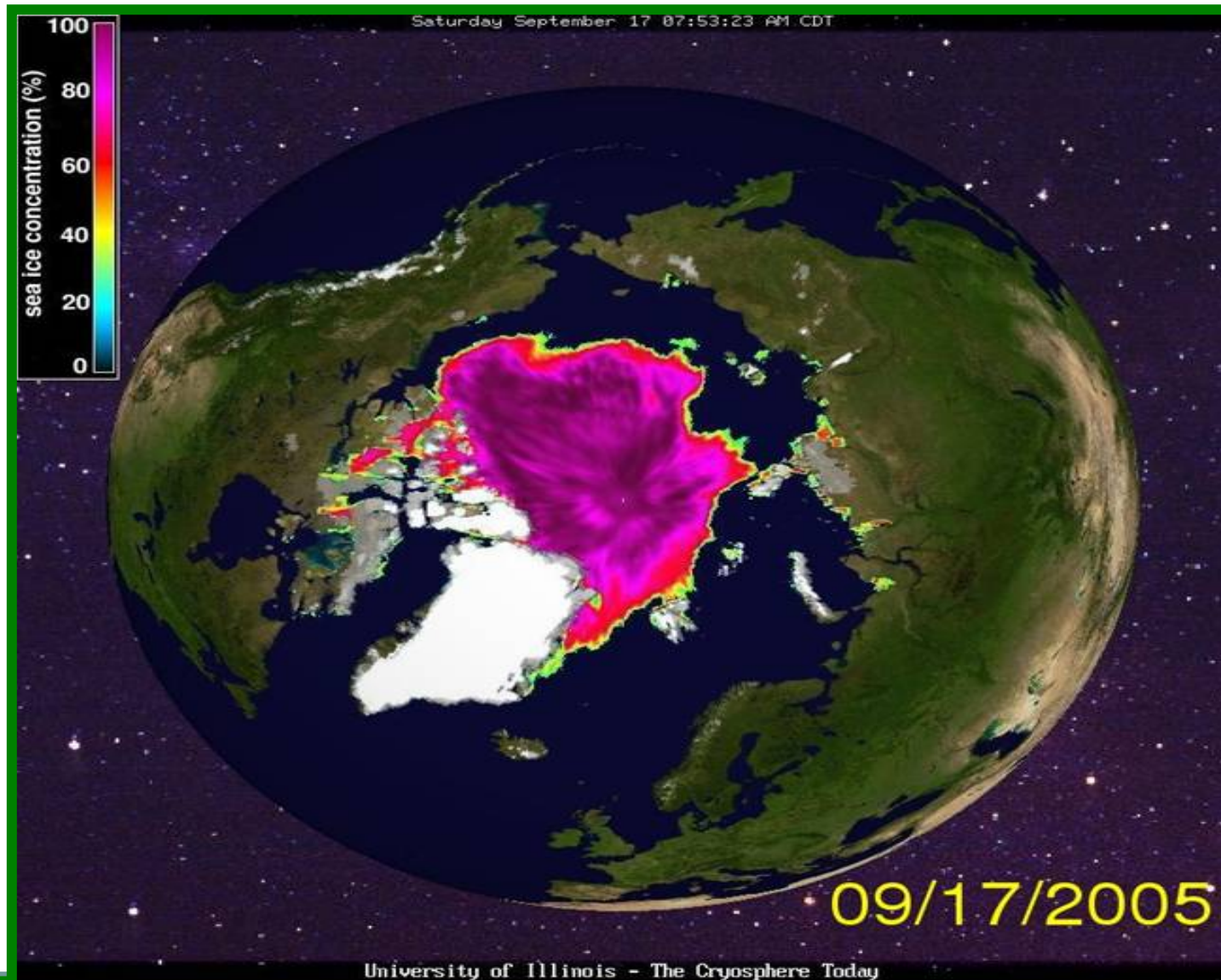
Arctic sea ice



Quelle: Prof. Dr. Anders Levermann

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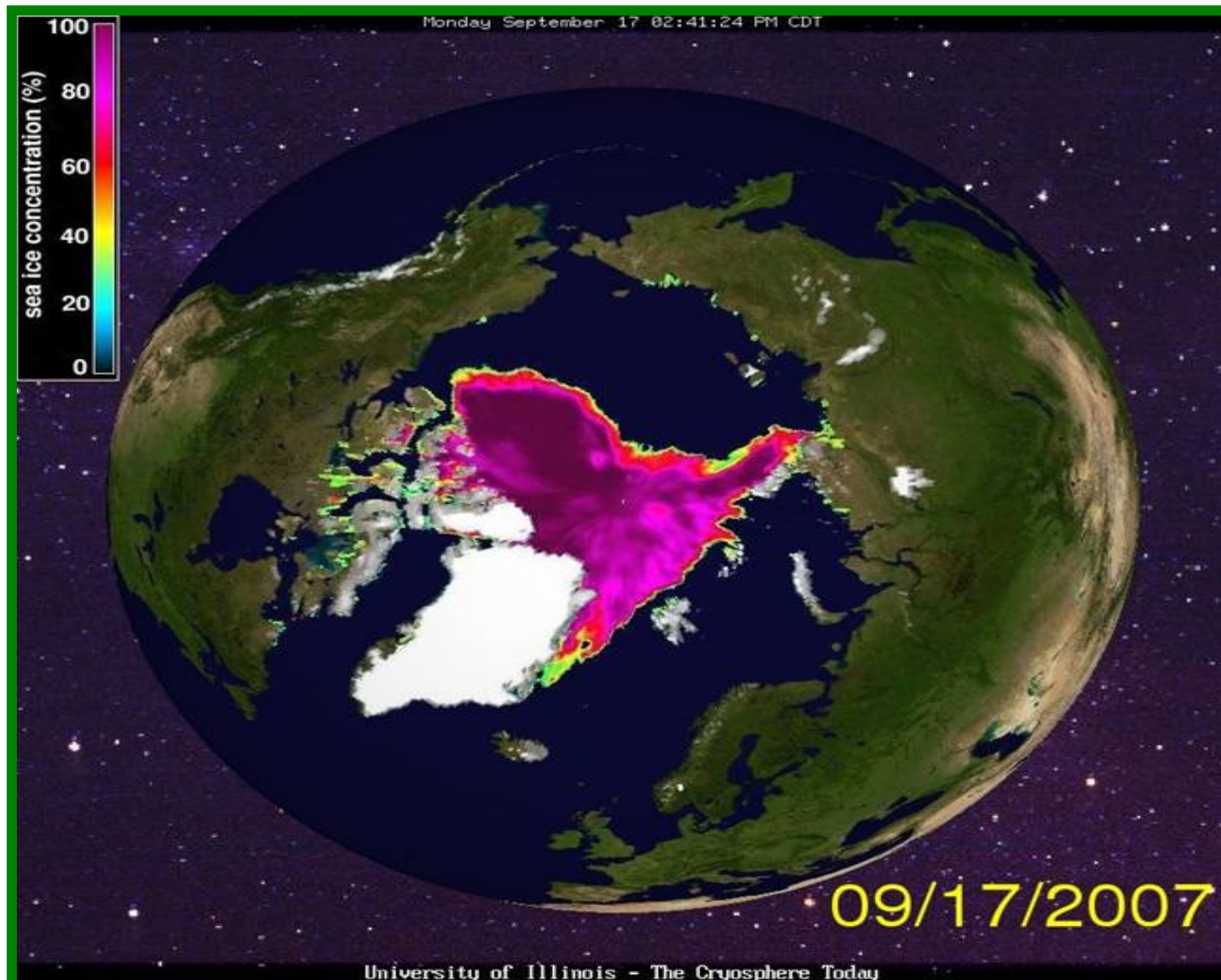
Arctic sea ice



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Arctic sea ice



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Climate problems can only be solved by two strategies:

1. Stop greenhouse gas emissions
(not only reduce the emissions)
 - promote renewable technologies
 - completely cancel the use of fossil and nuclear energies
2. Take out carbon from atmosphere
 - convert plants to humus soil
 - reforesting big areas

The Target must be: **330 ppm CO₂**

Hydrothermal carbonization (HTC)

Process:

- Input: plants (+ side products)
- Outcome: biochar (+ energy)

Usage of biochar:

- fuel
- chemical base
(oil substitute)
- CO₂–binding in soil



Climate protection with HTC

- 20 t biochar can be put into soil per hectare
- With an additional 100 t carbon due to the growing generativity of the soil (e.g. afforestation)
- Around 200 Gt CO₂ could be taken out of the atmosphere in the next 30 years

-> 330 ppm

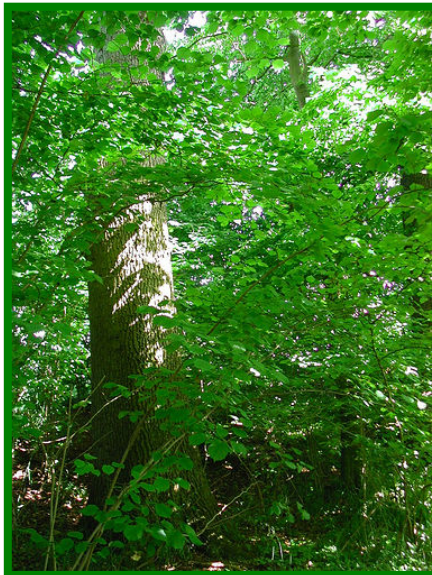
- Needed: about 8 Mio. HTC-machines worldwide
- Overall costs: US \$ 1000 Bil.

Afforestation by sowing forest seeds



- Forest seeds are much cheaper than plantation (US \$ 500 per hectare)

- In the Tropics an annual rate of return of up to US \$ 10 000 can be achieved



- In a temperate zone an annual rate of return at least US \$ 500 per hectare

Climate-protection policies

Promoting renewable energy, chemistry & organic farming:

- Laws for feed-in-tariffs
- tax relief for renewables
- canceling subsidies for intensive agriculture, for fossil and nuclear energy and chemistry
- research and education offensive for renewables and organic farming
- reduction of approval obstacles
- dispose big areas for reforestation

not successful: quota or certificate systems

(unable to promote fast climate protection)

Many Thanks
for your Attention!

**HANS-
JOSEF
FELL**
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