

UN ECE Ad hoc Group of Experts on Cleaner Electricity Production from Coal and Other Fossil Fuels  
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# **Carbon Capture and Storage (CCS) and Clean Electricity Production: The Investor's Point of View**

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**World Energy Council**

CONSEIL MONDIAL DE L'ENERGIE

Imagine, you are ...

- ... a privat investor seeking diversification of his portfolio
- ... a banker setting up a fund on clean electricity generation with CCS
- ... a private equity or venture capital manager  
buying into CCS manufacturing (boilers, turbo-generators, separation  
plants, solvents, pipes, compressors...)
- ... a utility considering investing into CCS-supported capacities  
(new, retrofit, capture-ready)
- ... an advisor to the Cabinet of Ministers  
on CCS policy



The question is always the same:

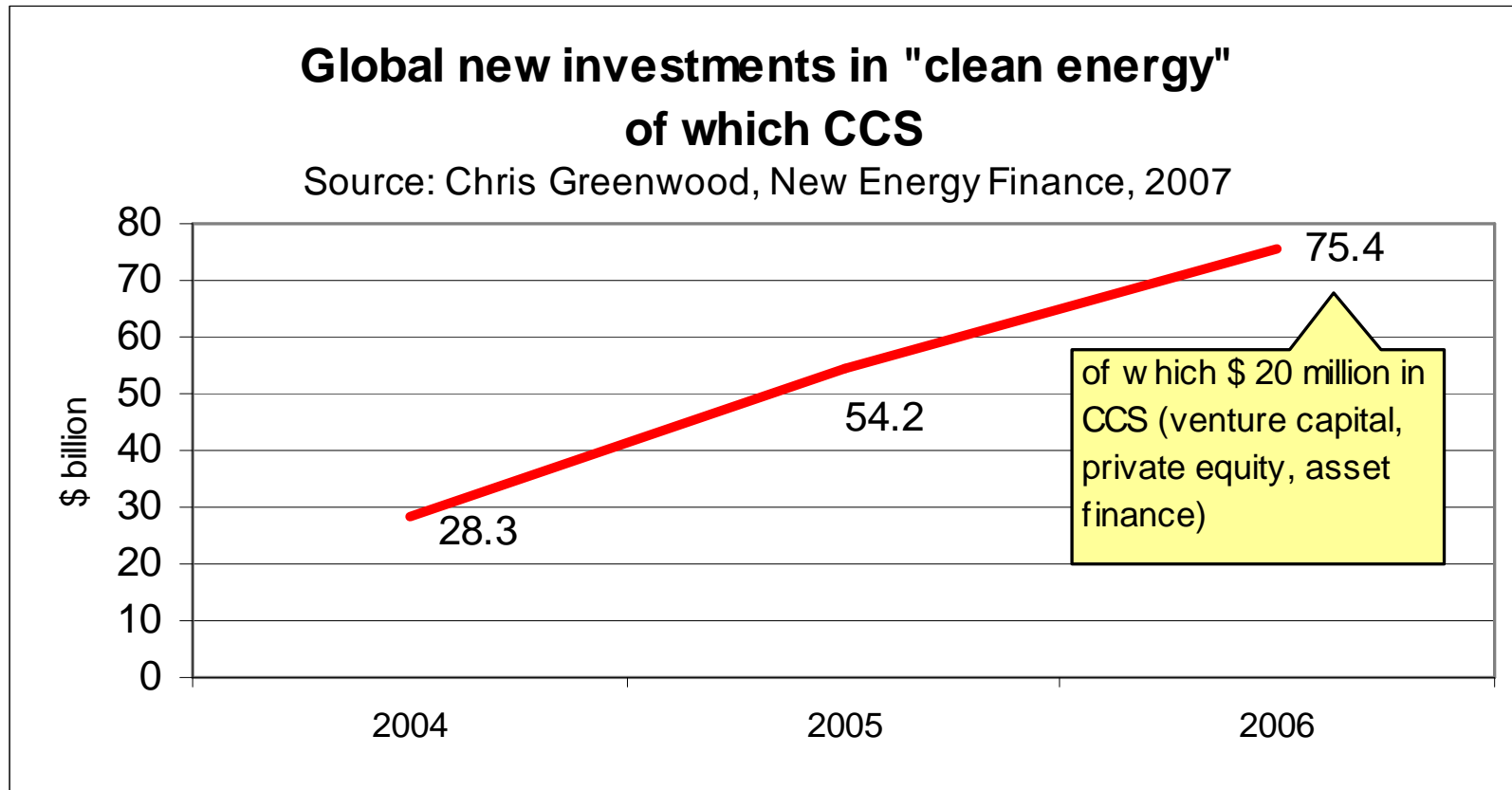
Is investing into CCS for power generation profitable?

If not, under which condition will it be? When?

At what risk?



## How many CCS investments so far?



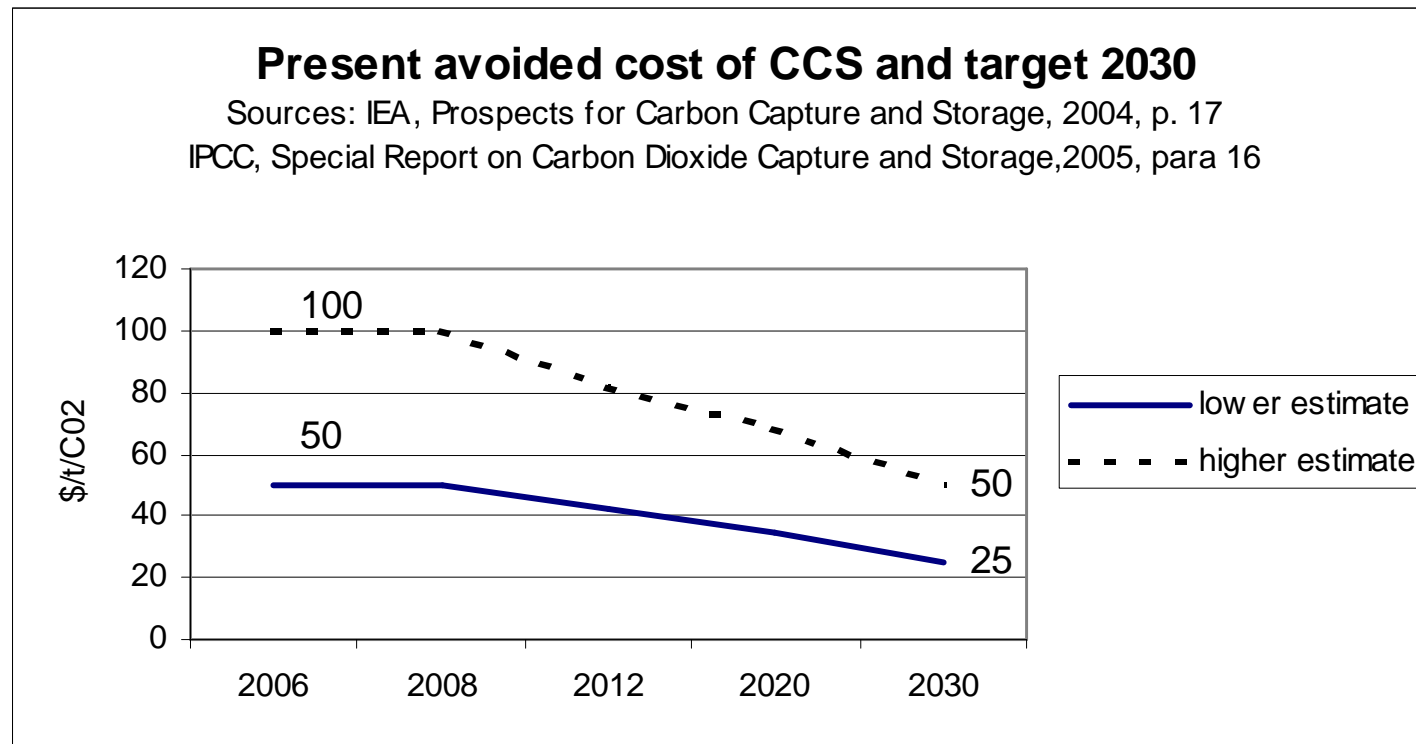
Chris Greenwood defines « Clean energy » as renewables, efficiency, bioenergy, hydrogen, fuel cells, carbon market services (excl. nuclear). There are presently about 1500 venture capital/private equity « clean energy funds » worldwide with investments totalling \$10.76 billion in 2007.

## Why so few so far?

- CCS – a relative newcomer in search for technical and commercial maturity
- Legal constraints: CCS power generation not eligible in EU ETS, CDM, JI
- High CCS cost
- Depressed returns on carbon markets due to abundance of EU allowances
- High project transaction costs – authorisation, verification, additionality ...
- A multitude of emission reduction schemes affecting transparency and coherence of ECE and global carbon markets

(Allowance markets: EU ETS, US/Canadian Western Climate Initiative - WCI, North East US Regional Greenhouse Gas Initiative - RGG, New SouthWales Certificates, Chicago Climate Exchange, ...)  
(Project-specific transactions: CDM CER – Certified Emission Reduction, JI ERU - Emission Reduction Units, AAU/GIS – Assigned Amount Units/Green Investment Scheme, voluntary initiatives, ...)

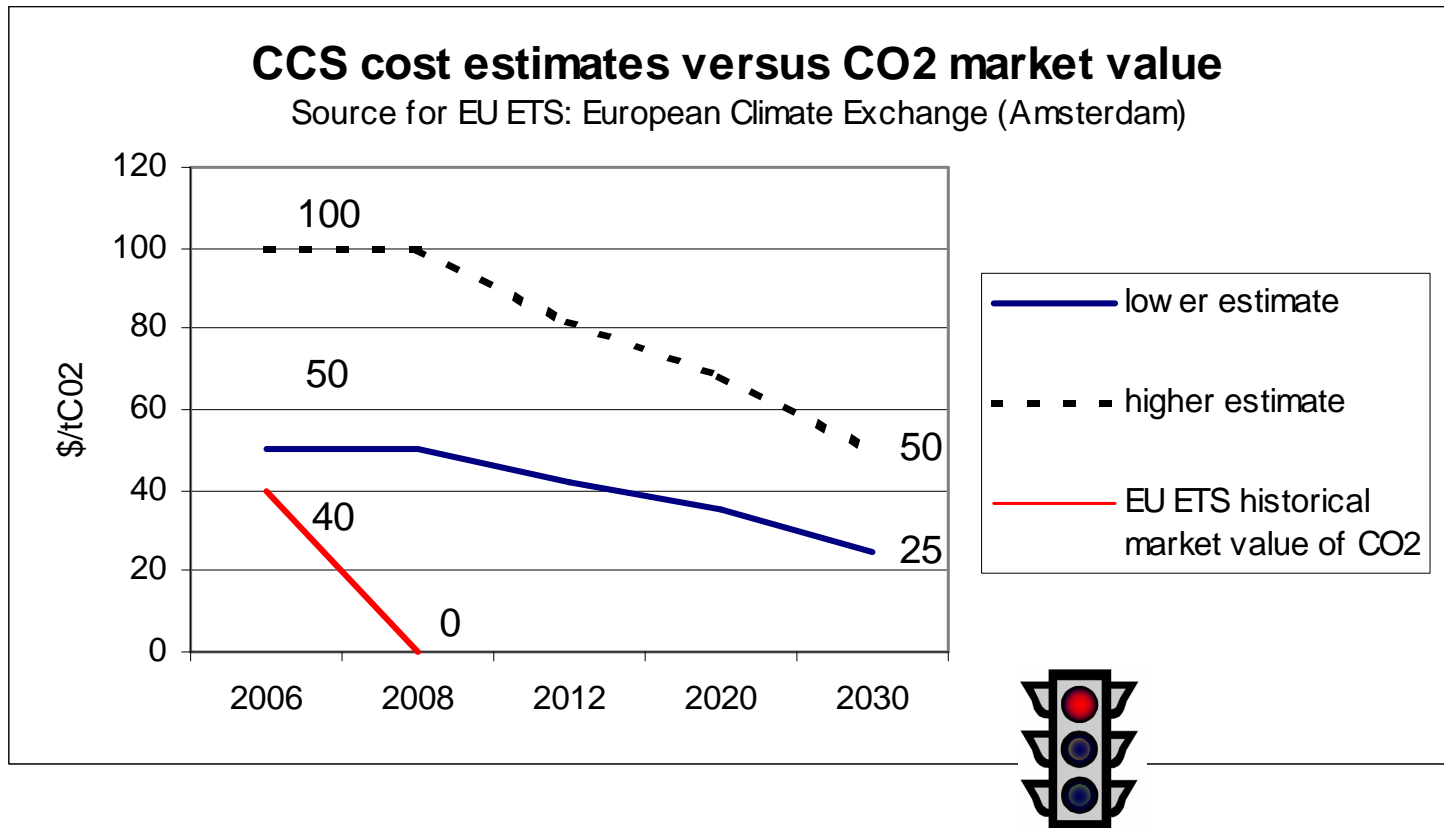
## And the future? First, consider the evolution of CCS costs



Reduction due to technological advances, standardisation, economies of scale, addition of biomass

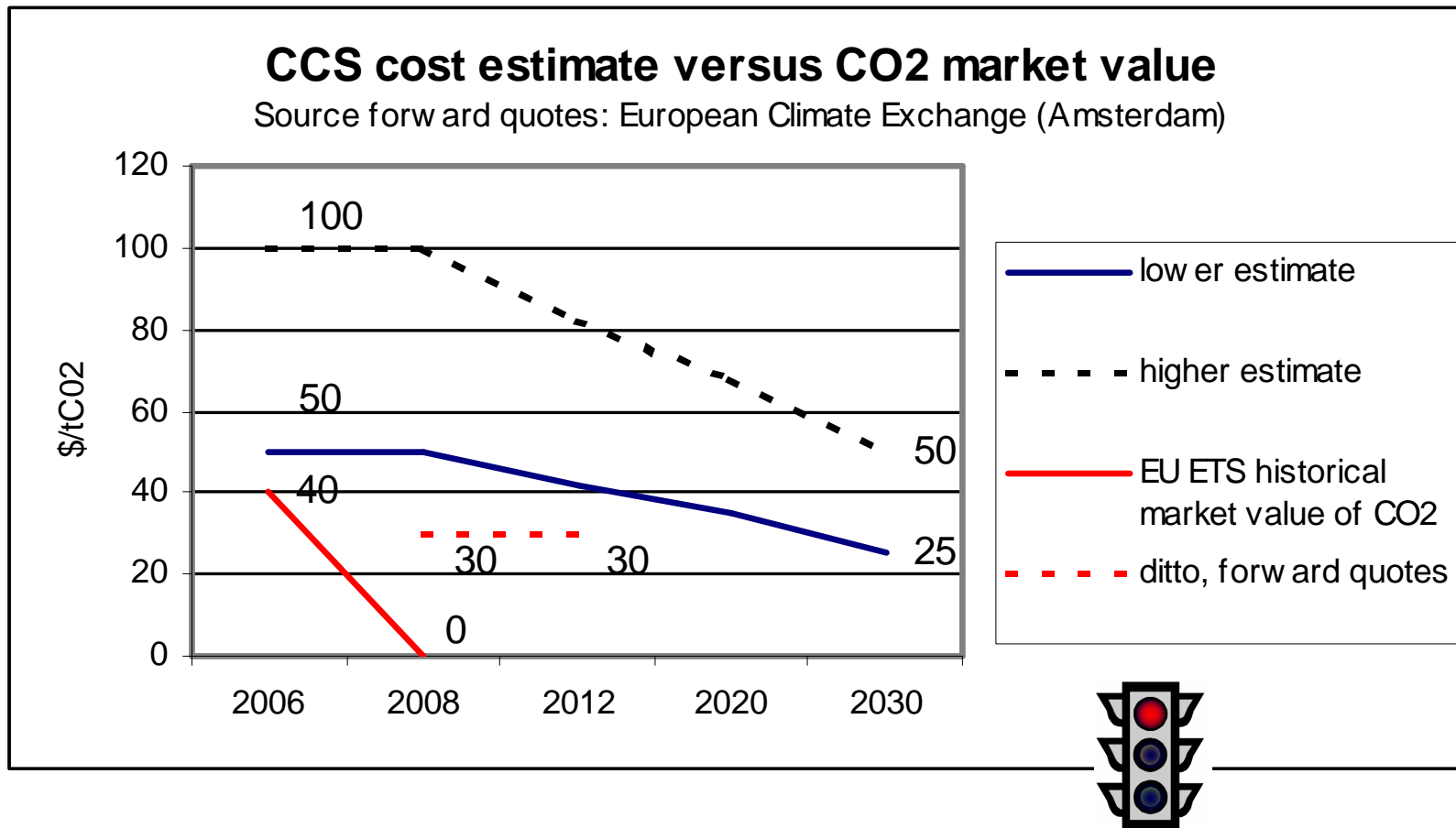
Note: IPCC puts present ranges at 40 to 90 \$/tCO<sub>2</sub>

# Did carbon credits cover those costs in EU ETS Phase I (2005-2007)?



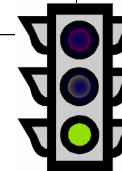
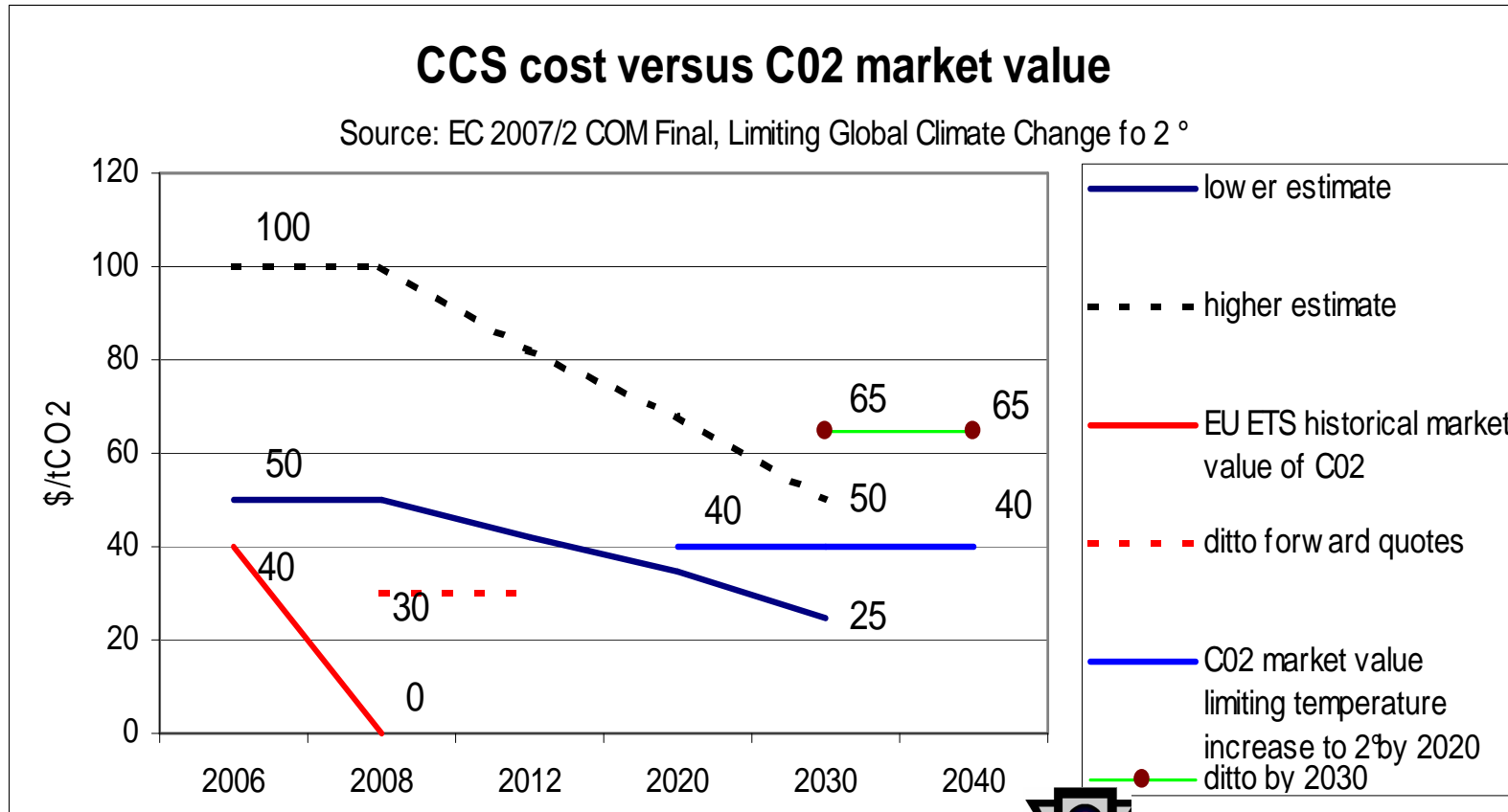
In 2006, the EU ETS European Union Emission Trading System undertook transactions of about 1100 mtCO<sub>2</sub>. The Clean Development Mechanism Certified Emission Reductions – CERs and Joint Implementation Emission Reduction Units – ERUs handled in 2006 450 mtCO<sub>2</sub> at an average price of \$ 10.4 tCO<sub>2</sub> (source: Pedro Huarte-Mendicoa, World Bank 2007). The Kyoto-based Green Investment Scheme with Assigned Amount Units (AAU/GIS) of interest in central and eastern Europe is presently of minor importance, but has potential.

# What are the expectations for EU ETS Phase II (2008-2012)?



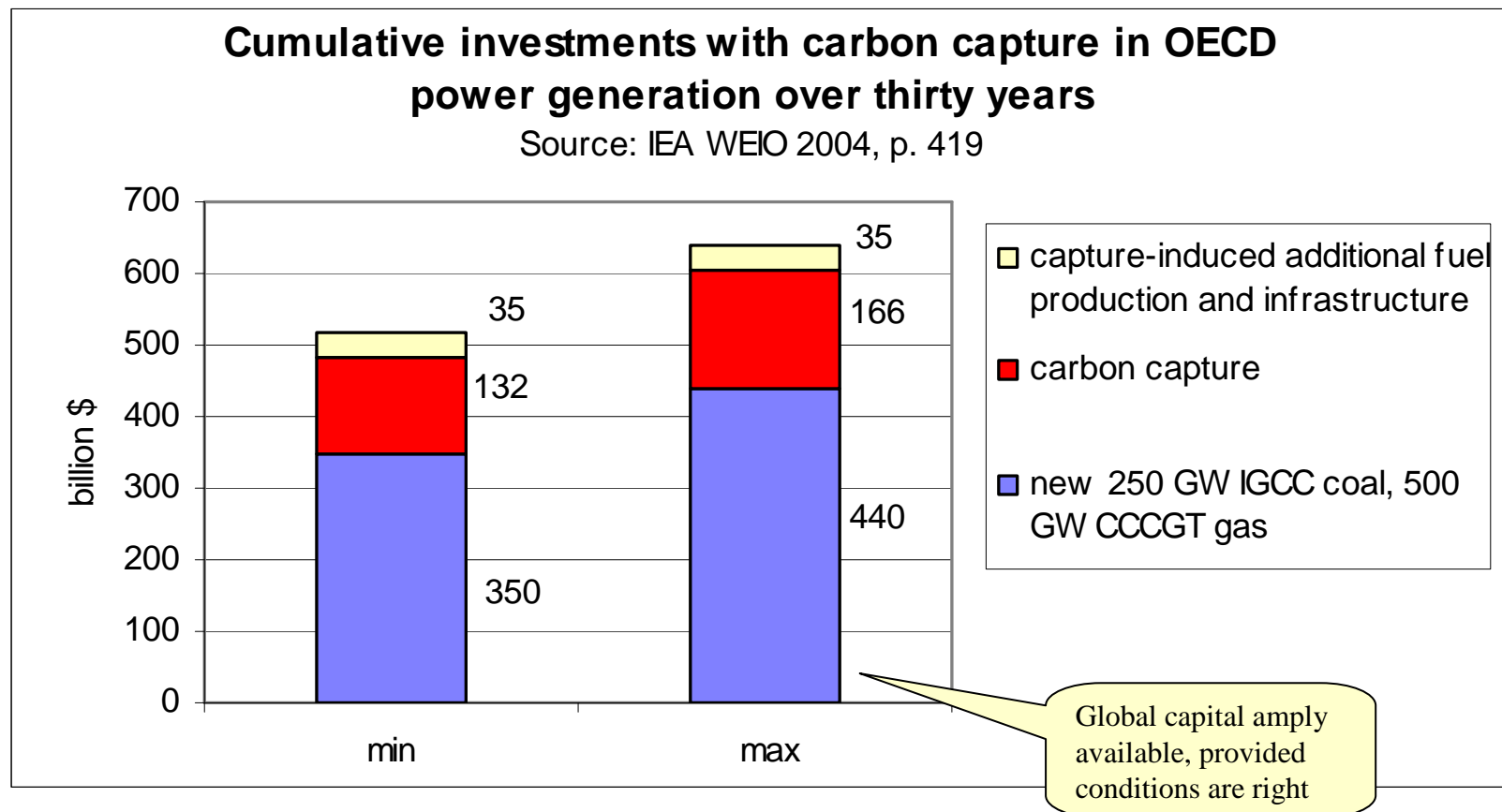


Would CCS costs be covered under **stricter mitigation** policies?

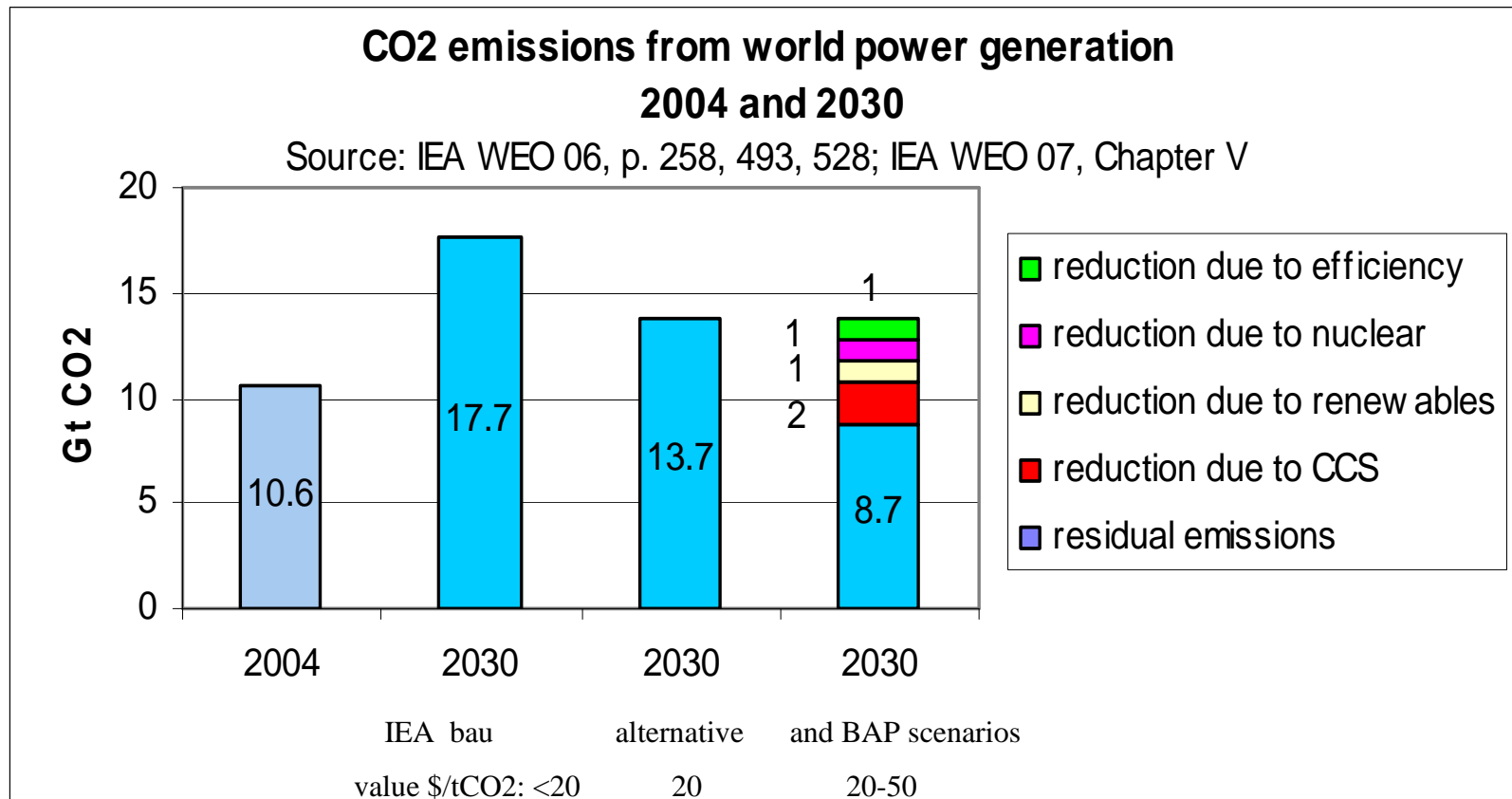


## How would such mitigation policies impact on investment needs for CCS power generation?

Count between \$500 and 1000 million for first demoplants, 50 % of which for CCS.  
Later, CCS adds less: 25 %. CCS adds 2 to 3 UScents/kWH.








# How would those investments in CCS power generation reduce CO<sub>2</sub> emissions?



See also IPCC, Contribution of WG III to the Fourth Assessment Report, Technical Summary, Table TS.10; in its Message model with CO<sub>2</sub> concentrations at 490-540 ppm, CCS tops efficiency, renewables and nuclear.

## Conclusions and recommendations:

Bearing in mind the uncertainties surrounding the estimates made and policies assumed:

- **For a private investor**, CCS in power generation is not a profitable proposition for quite some time. 
- **For a fund** with a 5-year and high-performance profile, investment in CCS-related manufacturing is premature, except for EOR. 
- **For private equity and venture capital**, there are no quick and large profits in perspective in CCS power generation and manufacturing. 
- **For manufacturers of CCS components**, short-term profitability is less important than acquiring lead competence and proprietary rights. 
- **For a utility** with its 60-year planning and operating horizon, CCS should be considered now and as part of a long-term strategy (hydrogen economy). 

• **For ECE**, there is a role of assisting investments in clean electricity generation with CCS by



1. advocating eligibility of CCS projects in emission trading systems on an equal footing with other mitigation options.
2. strengthening legal frameworks and institutional capacities in CEE with regard to emission reduction schemes and carbon markets (JI-ERUs - Joint Implementation Emission Reduction Units and the Kyoto-based Green Investment Scheme with Assigned Amount Units - AAU/GIS)
3. generally, contributing to the convergence and transparency of the many emission reduction mechanisms used in the ECE region.

**The objective:**

1. reducing emissions from fossil fuel-based power generation
2. enabling a regionwide, transparent and coherent carbon market as part of a global system

Thank you.



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## Annex: the profitability of CCS depends critically on

- stricter, predictable and globally coordinated mitigation policies by **2012**
- carbon prices rising permanently beyond \$ 25 – 35 t/CO<sub>2</sub>
- CCS-conscious legal and regulatory frameworks by **2012**  
(transborder transportation, monitoring and verification of storages, post-operational liabilities, mandatory carbon-ready design, incentives early CCS power generation)
- demonstration of reliable and diversified technology routes by **2015**
- continuous reduction of CCS cost
- commercialisation of CCS as of **2020**
- public acceptance.

