

# Notes on Carbon Finance

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# Copenhagen and Climate

## (3x3)x(4x4)

- **We know what to do**
  - Capturing the energy efficiency opportunity
  - De-carbonizing energy sources
  - Accelerating the development and deployment of new energy technologies
  - Preserving and expanding the world's carbon sinks
  - Changing the attitudes and behaviors of managers and consumers
- **Three mistakes**
- **Three stages**

# Copenhagen and Climate (3x3)

- **Three mistakes**

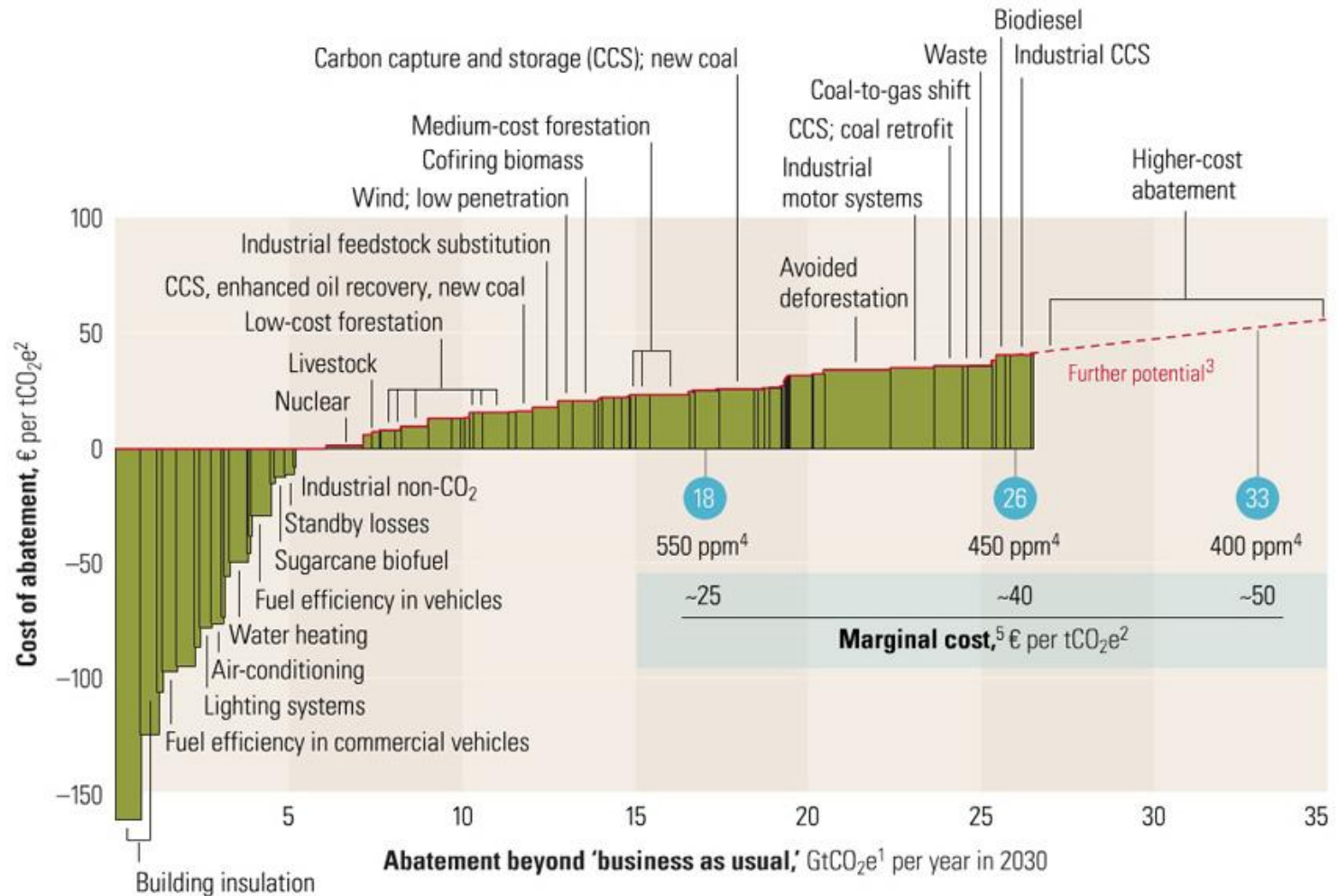
- Inclusiveness vs. non-cooperative foundations
  - Self-interest action in international regimes
- Marginal inputs that drive emissions not set by relative prices alone in regulated national markets
  - Multiple levels of regulation
- Targeted mechanisms for varied gaming

- **Three stages**

- Don't get it wrong: Copenhagen (2009→ 2012)
- Widening and tightening: open institutions and learning (2012→2020)
- Growing out of carbon: unstable systems without real margins (2020→)

Global cost curve for greenhouse gas abatement measures beyond 'business as usual'; greenhouse gases measured in GtCO<sub>2</sub>e<sup>1</sup>

● Approximate abatement required beyond 'business as usual,' 2030



<sup>1</sup>GtCO<sub>2</sub>e = gigaton of carbon dioxide equivalent; "business as usual" based on emissions growth driven mainly by increasing demand for energy and transport around the world and by tropical deforestation.

<sup>2</sup>tCO<sub>2</sub>e = ton of carbon dioxide equivalent.

<sup>3</sup>Measures costing more than €40 a ton were not the focus of this study.

<sup>4</sup>Atmospheric concentration of all greenhouse gases recalculated into CO<sub>2</sub> equivalents; ppm = parts per million.

<sup>5</sup>Marginal cost of avoiding emissions of 1 ton of CO<sub>2</sub> equivalents in each abatement demand scenario.

# Key climate (negotiation) questions

- What should all countries be doing for themselves?
- What can be done (in addition to national self-interest) with an international mechanism to pay for positive carbon values?
- What current costs can innovation bring down (and how are innovation gains shared)?
- How do we recognize the negative impacts of climate change on development?
- *How do we build (negotiate) institutions to advance these goals and prevent unproductive investment of scarce funds?*

# National self-interest

- **Implement negative cost measures (energy efficiency)**
- **Eliminate subsidies that distort incentives**
- **Reform other inefficient regulation or policy**
- **Recognize local (national) collective value**
  - **Environmental services beyond carbon**
  - **Ecosystem services and other capturable domestic economic gains**
  - **National carbon services (scale or politics)**
- **Country studies: National pathways (to a set goal) as informational: baselines and incremental costs**

# Negotiation dynamics and goals: Going right at Copenhagen

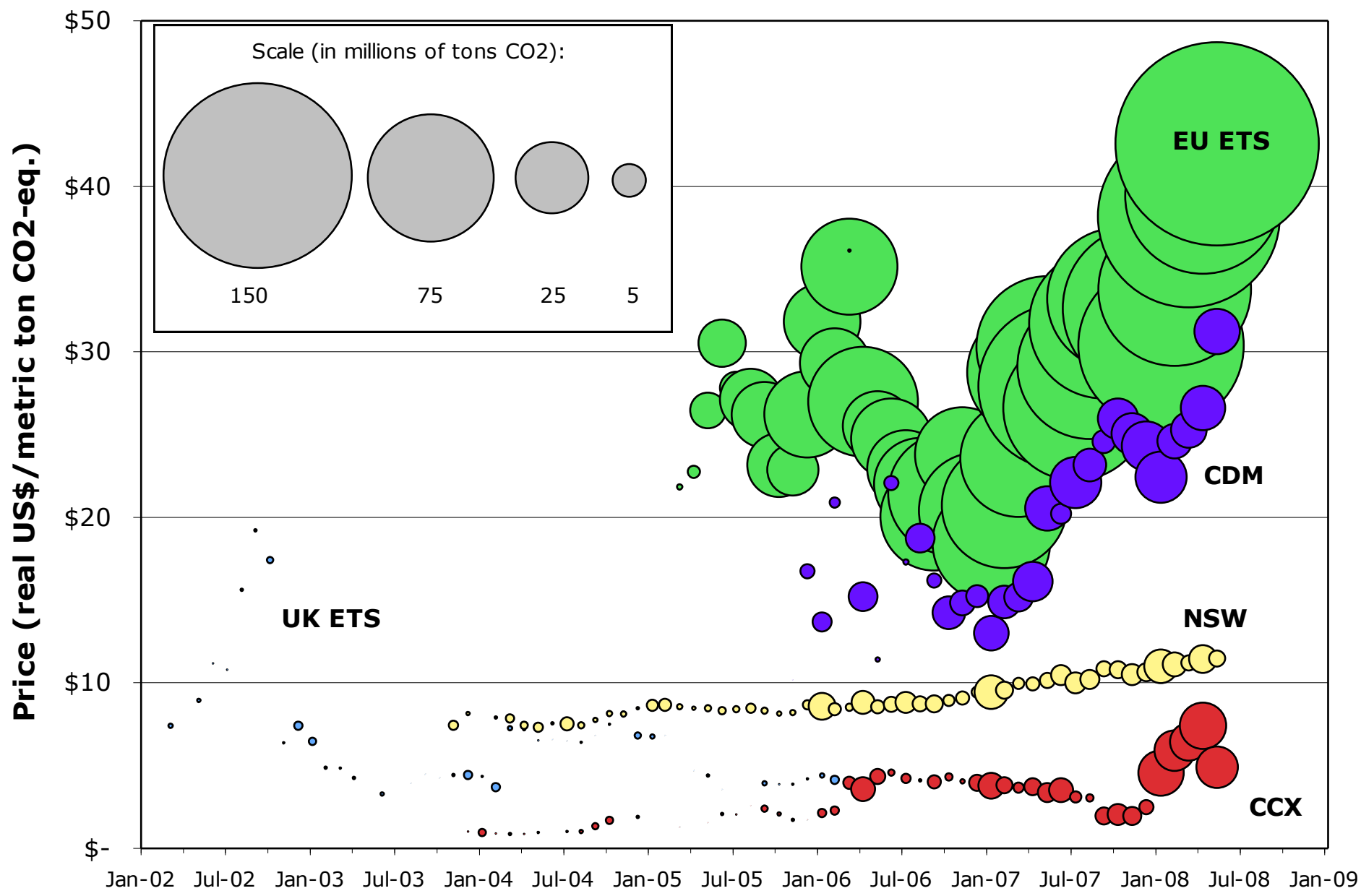
- **National action plans to implement self-interested climate actions (policy baselines)**
- **Linked international support packages with incentives to mitigate beyond (do more than comply with) national climate baselines**
- **Deforestation and land use (incremental) emissions reduction mechanisms**
- **Innovation acceleration mechanisms**

# Reframing and Learning: Going wrong at Copenhagen?

- **Energy Efficiency: International Action?**
- **Technology support: IPRs? Sectoral measures (divide EE from costly)?  
Monitoring capacity?**
- **Deforestation: Agricultural market drivers?**
- **Innovation acceleration: Transforming downstream markets? Multilateral record?**
- **Adaptation: Ex post or ex ante ODA?**
- **Carbon finance: productive investments?  
tendering? Expertise?**

# Copenhagen and Climate (4x4)

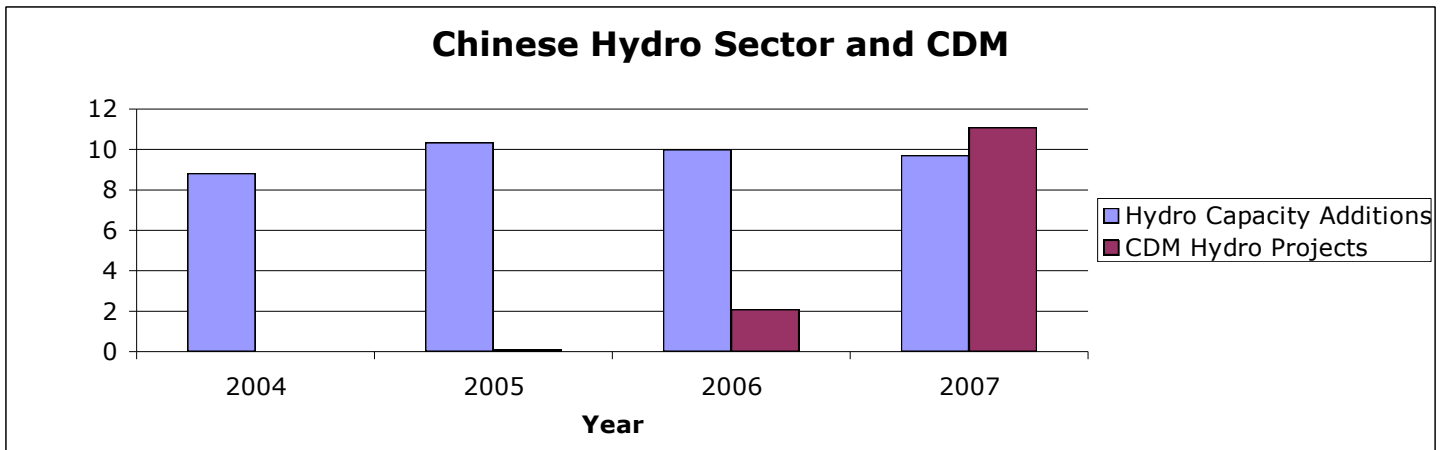
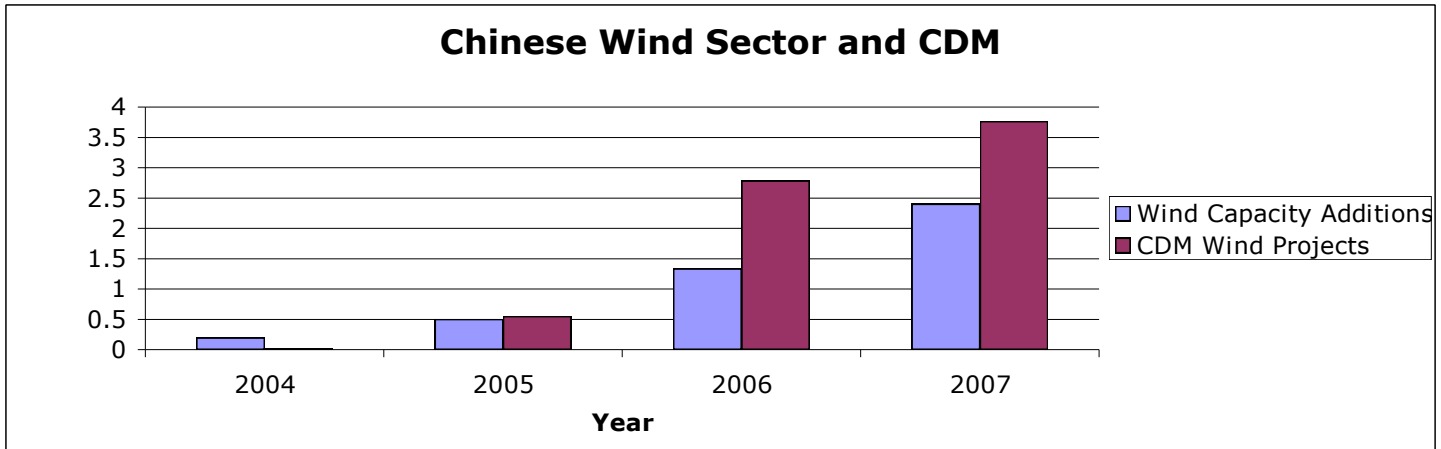
- **Key questions**
  - **Clarity of concepts and facts**
    - Input markets and institutions: varied gravity forces
    - First margin: energy efficiency as global good?
    - Second margin: technology transfer & deep deforestation
    - Third margin: technology development upstream?
  - **Multi-level interventions**
    - Dynamics of political gravity frame climate policy
    - National development (and security) first
  - **Counter-gaming (over optimality)**
    - TEAPS & symmetric knowledge; thieves catch thieves
    - Barriers and first of a kind subject to manipulation; prices ex post; offsetting subsidies and distortions
  - **Game plans**
    - SD-PAMS, national actions (baselines) + supports: WTO offers
    - Limiting the scope of the CDM?
    - Indirect measures (global dynamics)



# Chinese CDM inventories

- **1003 Projects since 2005**
  - 152 registered (of 895 globally at end 2007); 22 awaiting registration; 803 at validation stage (of 2800 global)
- **Current pipeline: 246 Megatons CO<sub>2e</sub> (91.5 registered)**
  - Global totals are 1150 registered (~455 China); 2600 promised (~1200 China)
  - By volume, 1/3 of total HFC-23 destruction and N<sub>2</sub>O capture
- **Projects (by number) in pipeline**
  - Hydropower: 48.5%
  - Wind: 16% (36.8% of registered)
  - Waste heat 16.5% (industrial energy efficiency)
  - Landfill gas, biomass, CBM at 3-4%
  - Growing: fossil fuel switch, cement (materials), supply side energy efficiency (more efficient coal)

# Environmental Credibility

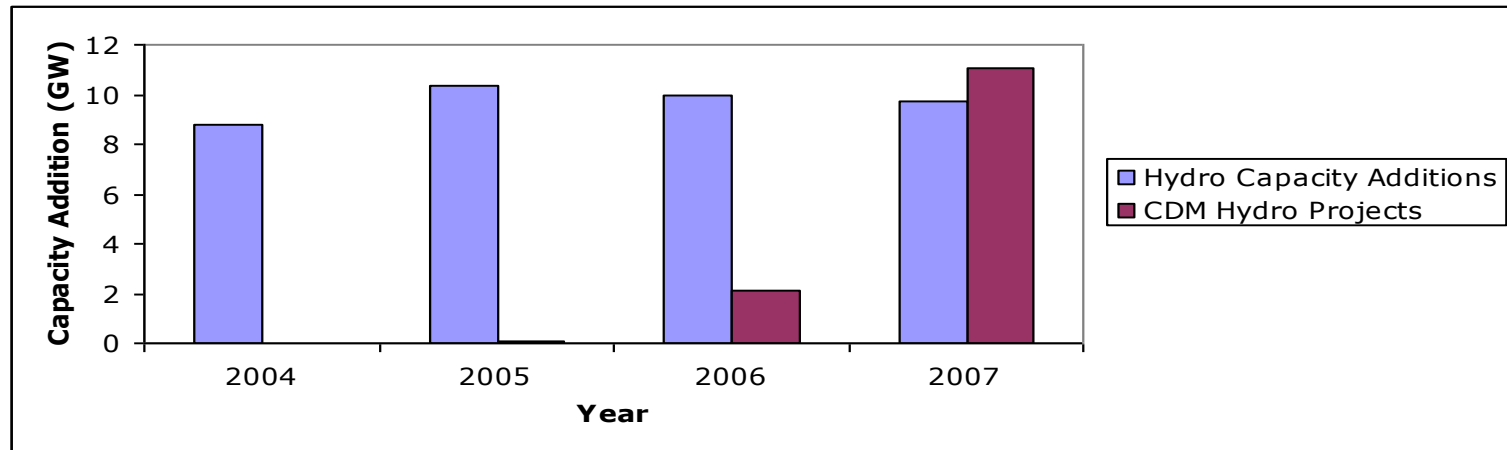


# Environmental Credibility: Renewables Example: Hydro

Strong push for exploitation of hydro resources in China

~10 GW per year added to Chinese nameplate capacity

In 2007, 10 GW of proposed hydro projects in the CDM

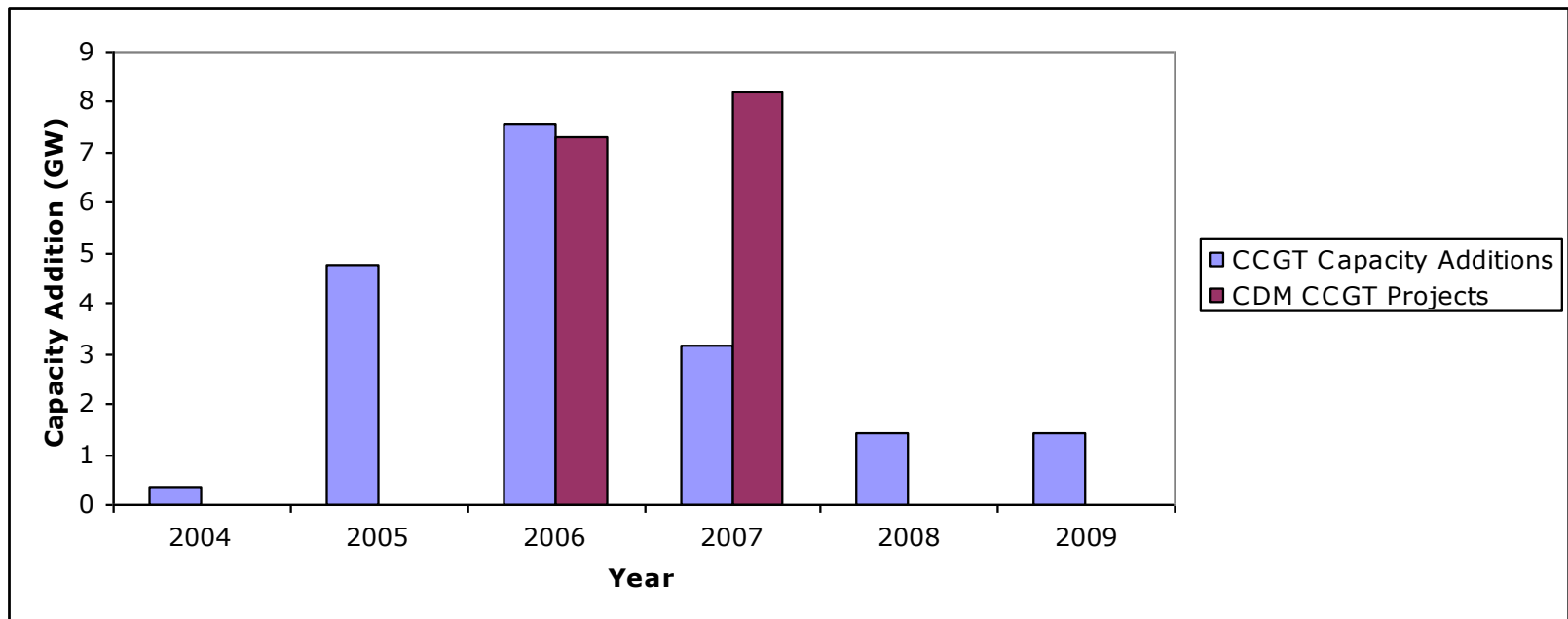


Data: IEA

# Next: CCGT and Supercritical Coal

18.4 GW of CCGT planned between 2004 and 2009

15.5 GW of CCGT currently in CDM pipeline



Data: International Gas Union, Gas to Power – China (2005)

# Productive Carbon Finance

- **Overlay problems: multiple regulation levels**
  - Markets that operate on top of distorted prices and subsidies do not yield efficient solutions
  - Endogenous market factors set up PDD additionality
  - Displacement: Non-enforcement or non-enactment of national local regulation (national values)
- **Asymmetric institutional skills & knowledge**
  - Expertise in underlying market drivers (national)
  - Varied expectable regulatory problems (gaming) in different mechanisms
  - Thieves catch thieves

# Endogenous market prices set up PDD marginality (beyond industrial gases)

- **Gas flaring**
  - Perfectly commercial at post-2001 prices
  - Gas prices paid domestically lower than int'l price
  - Sales to public off-takers (utilities) are uncertain
  - Transmission costs not compensated
- **Renewables (wind)**
  - 10% RPS (2010); 20% 2020; but not enforced
  - Uncertain feed-in tariffs set case by case; vary by owners of assets
- **Hydropower**
  - Low tariff for hydro power supplied to grid
  - Built under business as usual

# Endogenous market prices set up PDD marginality (beyond industrial gases)

- **Coal and gas power**
  - New vintages supplied for efficiency against rising coal prices, local environment; diversification of energy supplies
- **Energy efficiency**
  - Why not pure local good on IRR? (systemic know how?)
  - Commercial energy prices low through subsidies
  - Banks will not lend on EE raising capital costs
  - VAT & Local content rules drive up costs
- **Landfill gases**
  - Price of domestic natural gas low
  - Displacement of local environmental value
  - Prices of electricity vary at wholesale and retail for electricity generation
- **Subsidies and virtual baselines**
  - Integrated oil firms retail losses offset by upstream subsidies; capital subsidies; lump-sum payments; dividend policy

# CDM issues & remedies

- **Infra-marginal rents**
  - HFC-23 reductions: 4.7 B euro paid > 100 M costs (incentives?)
  - Auctions (supply) and administered prices (demand side)
- **Environmental productivity**
  - Dynamic baselines (HFC-23 additionality); expert (private) funds (TEAPS or carbon trust) with targeted counter-gaming versus regulatory problems
  - National programs versus leakage (programmatic crediting?)
- **Time bias**
  - Prices (opportunity costs) and quantities (supplementarity)
- **Market transformation vs. ongoing subsidy**
  - Positive list; infrastructure investment
- **Endogenous safety valve less reliable/transparent than explicit price cap**
- **Weakest margin**
  - Only at edges of existing projects; energy efficiency? CCS?

# Targeted financial mechanisms

- **Existing projects margin: poor targets and dynamic baselines**
  - **Fuel switching: NG market development**
    - Upstream growth and security; local environment; policy & infrastructure
  - **Renewables**
    - Cap price; national subsidies and portfolio standards
    - Inefficient over carbon price in quantity mandates?
  - **Transportation fuels & hybrids**
    - National caps, national mandates, oil prices
    - Carbon efficiency in first generation beyond wastes?
  - **Forestry**
    - International leakage
    - Excessive payments
    - Agricultural drivers

# Carbon Finance Design

- **Self-revelation of baseline (incentives to win bids)**
  - Self-interest separated from added value
    - Self-interest split between private and national
- **2 part evaluation**
  - Country risk (Costa Rica problem)
  - Project carbon productivity
- **Auction structure for funds**
  - Minimize infra-marginal rent transfers
  - Fund contributions at national market price of permits
- **Private expertise at operational level**
  - Public trusteeship or oversight boards
- **Differentiated by regulatory problems**
  - Counter-gaming against displacement
- **Automatic link to national development goals**
- **Voluntary actions; preparation for cap baselines**