The Economics of Climate Change in Transport: Right and Wrong Incentives

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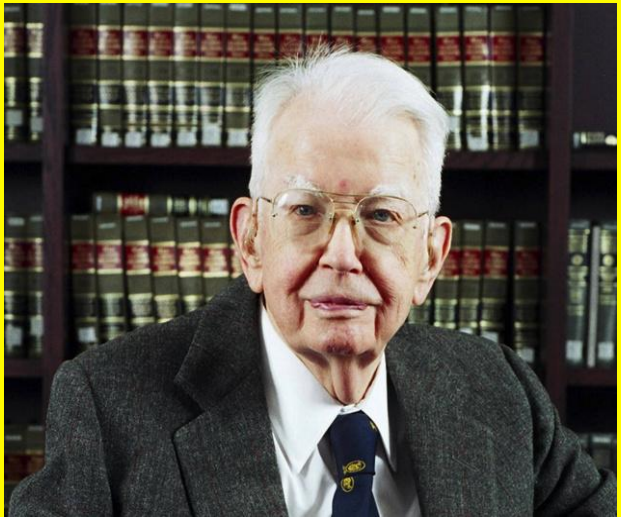
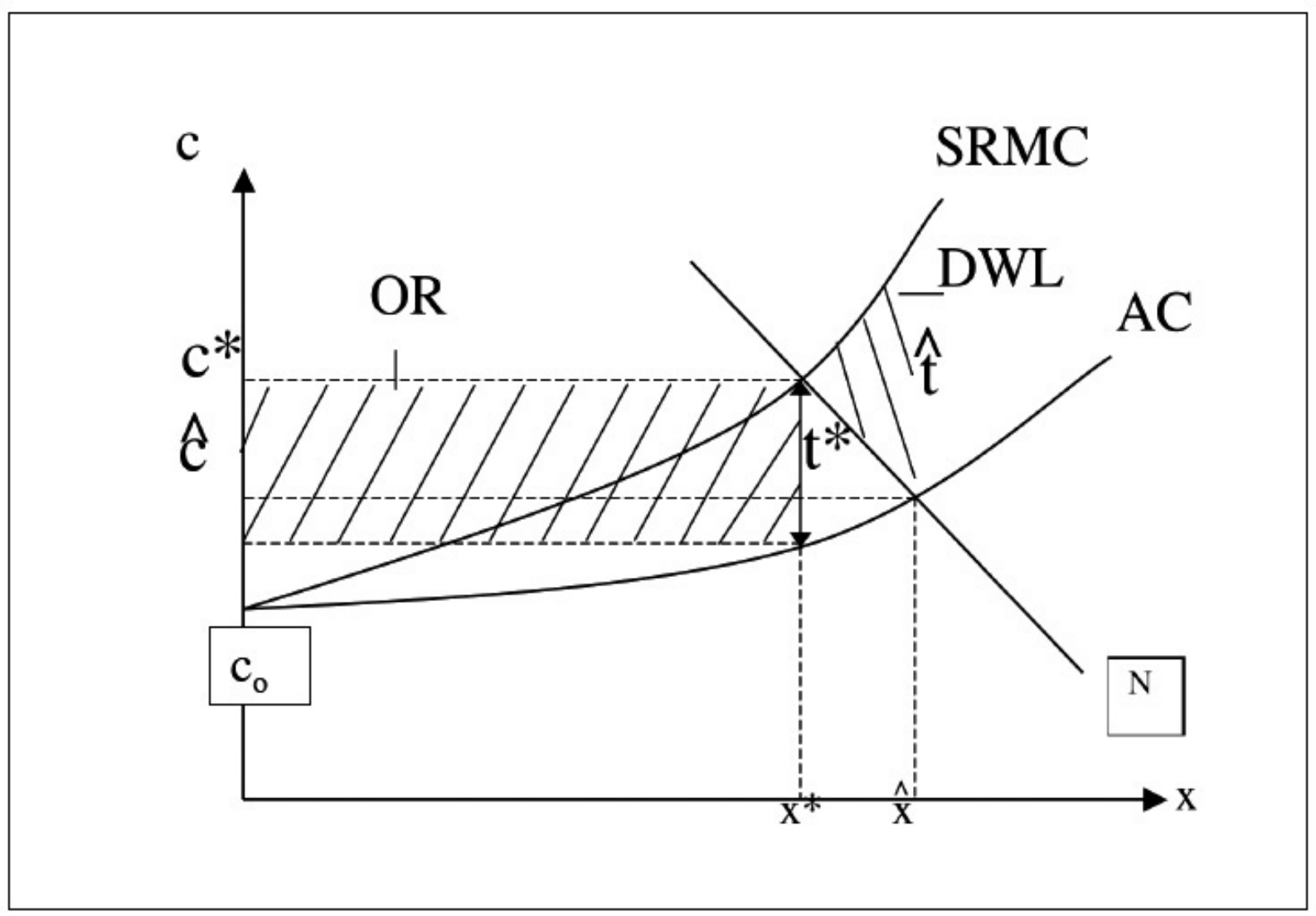
- Theoretical issues
- Mitigation or adaptation
- Economic valuation of GHG
- Economic instruments
- Right and wrong incentives
- Conclusions

Theoretical Issues

- Pigou
- Coase
- Ecological economics and Baumol/Oates



Pigou: Taxation of Externalities



Pigou: Taxation of Externalities

- Pigou-tax: Marginal social costs minus marginal private costs
- Optimum: Intersection demand curve SRMC
- Marginal cost of damage = marginal cost of avoidance

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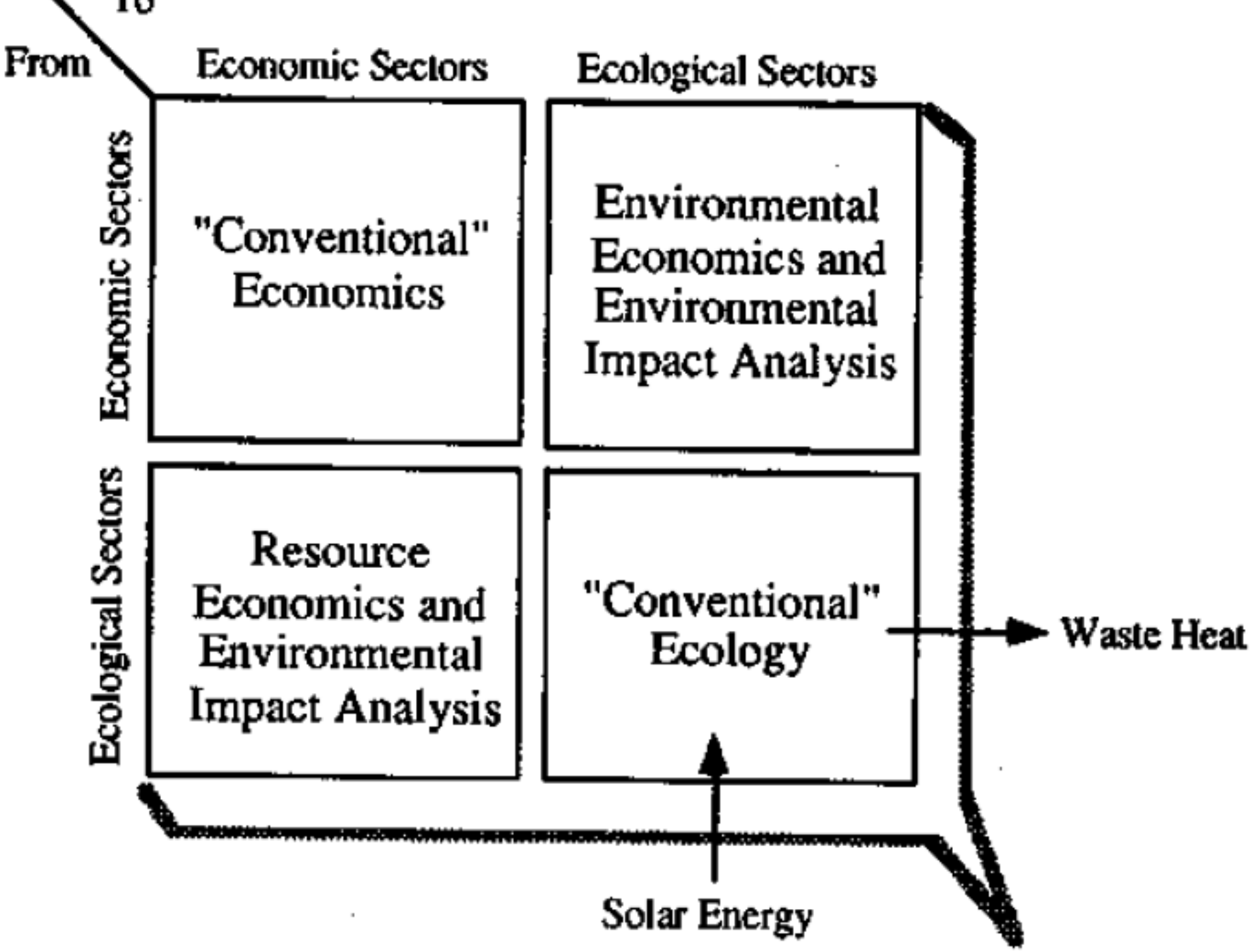
Coase: Reciprocity

ECON

- Problem: Property rights not defined
- Impact: Reciprocal
- No transaction cost: Define property rights, regardless to whom
- Transaction cost: Check benefits vs. losses from removal of externalities

EcoEcon: No trade-off

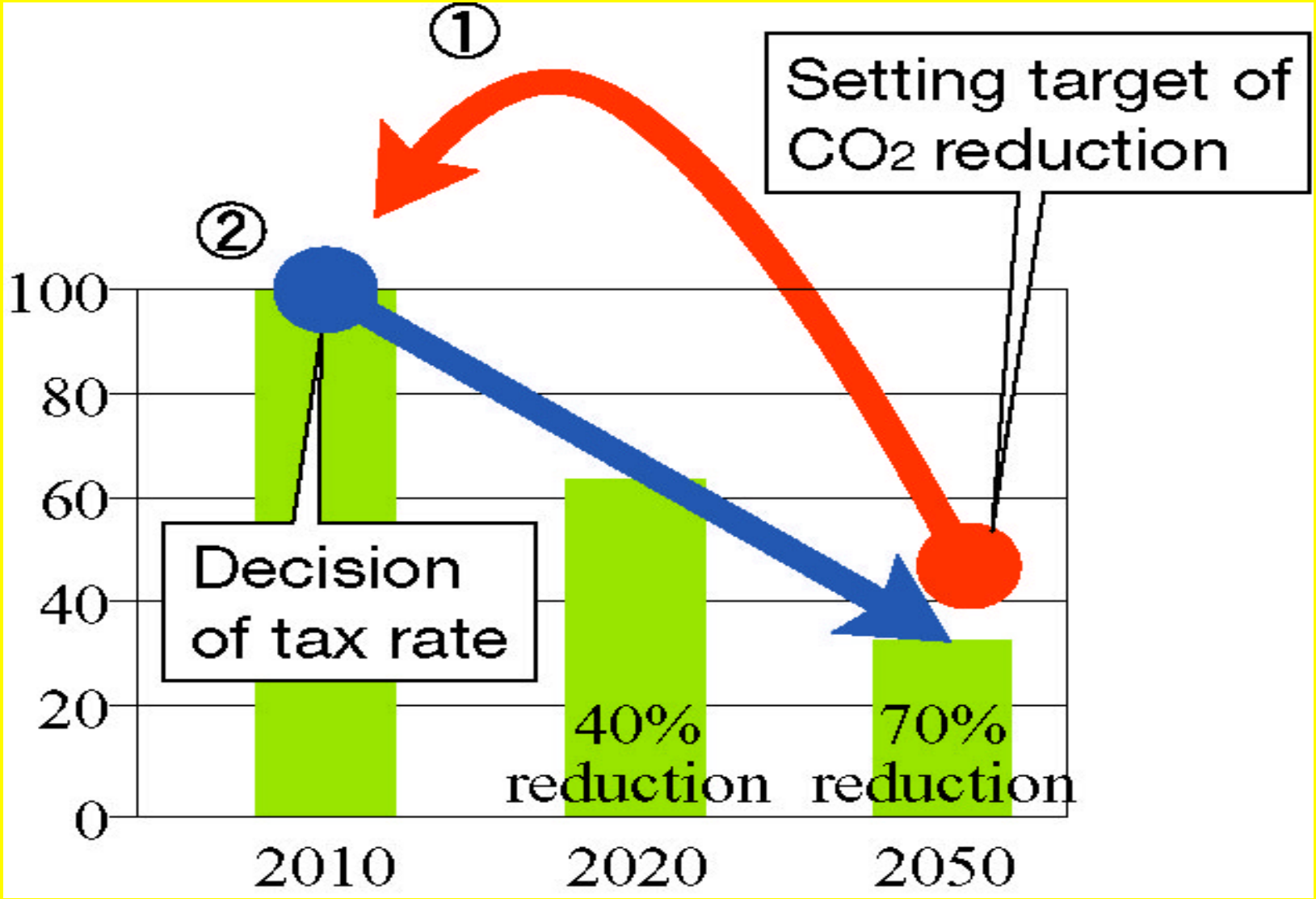
- Robert Costanza (Founder of Int. Society for Ecological Economics)
- No trade-off between material consumption and existential environmental risk
- Safe minimum values
- Baumol/Oates pricing to guarantee that safe minimum values are not overrun
- More general: Least cost combination of pricing, regulation and other measures



Ecological

Source: Costanza et al. 1991

Baumol/Oates Prices



Variant: Emission Trading

- Combination of Baumol and auction theory; J.H. Dales, 1968
- Quantity driven: Setting a cap
- Allowances allocated by auctioning or by state rules (e.g. grandfathering)
- Free trade of allowances among polluters
- Up-stream, mid-stream, down-stream

Mitigation or Adaptation?

ECON

- Economic device: Least cost combination
- Benefits of target achievement > mitigation cost
  ➔ mitigation
- Target not achievable or mitigation cost > adaptation cost
  ➔ adaptation
- Intertemporal problem:
  ➔ mitigation costs occur now, benefits in a far future

Problem of Social Discount

ECON

- Example: Damage in 2114: 1 mill. €. Discount rate 8%. Present value: 455 €
- Stern (2006): Very low rate of discount (0.1 %) Example: Present value 905,000 €
- Nordhaus (2007): Higher rate (1.5 %) Example: Present value 225,000 €
- Benefits of Stern‘s mitigation strategy to be subdivided by 5 with the Nordhaus discount rate

- Social rate of discount determined by
  - ethical parameters (rate of „rapacity“, intergenerational equity, preferences of environment)
  - production/consumption parameters

Economic Valuation of GHG

- Contingent valuation (WTP)
- Market valuation (price of certificates; zero-carbon products and services)
- Damage cost estimation
- Avoidance cost estimation
- Values between 5 and 250 € (Stern: ≈ 70 €)

Economic Instruments

- Taxation
- Regulation
- Cap and trade
- Infrastructure provision
- Technology policy and subsidisation

Widely incentive compatible examples

- Top runner system (Japan)
- Singapore road user charging
- Versement transport (France)
- Swiss LSVA
  German and Austrian HGV charging incomplete
- German air ticket tax (but: diversion to foreign airports)

Widely not incentive compatible examples

- EU energy taxation (present legislation, draft Directive not pushed forward)
- Vignette systems for road user charging
- Incomplete charging systems (12 t weight limit in Germany, only motorways + selected primary roads, no bus charging)

Regulation

Widely incentive compatible examples

- 95 g/km regulation for pass. cars starting in 2020 (with a number of incompatible details)
- Interoperability regulation for railway technology and control systems
- Railway packages
- SESAR for aviation in the EU

Regulation

Widely not incentive compatible examples

- Fleet mix for 95 g/km regulation; no regulation for HGV and buses
- Calculation of CO2 emissions, text cycles and assumptions for pass. cars
- Licensing of giga-trucks
- Safety regulations for trucks and buses

Regulation: The Big Bluff

❖ How to achieve the target 95 g//km?

- Shifting introduction for new fleet to 2021
- Weighing of EEV 2020-2023
- Favourite test cycles for plug-in hybrids
  Mercedes S 500 2.8 l/100 km = 65 g/km
  Porsche Panamera S 3.1 l/100 km
- Difference EU norm vs. actual fuel consumption 38% (ICCT)
- Difference EU norm vs. actual fuel consumption for plug-in hybrids: up to 300% for long-distance trips

Widely incentive compatible examples

- Principle of ETS in the EU (with many incompatible details)
- Plan of EU Commission to include aviation

Cap and trade

Widely not incentive compatible examples

- Issuing too many allowances free of charge
- Shifting the plan to include aviation
- Inclusion of the railways while competing transport modes with higher CO2 footprint are not included
- „Kyoto-measurement“ of GHG production

Germany Road Transport CO2 Emissions 2030 vs. 2010

Endenergieverbrauch (PJ)				
- Kyoto-Monitoring[1)4)]	1990	1548	-22,2	-1,2
- Energiebilanzen[2)]	2110	1786	-15,4	-0,8
- TREMOD[3)]	2222	1808	-18,6	-1,0

Infrastructure Provision

Widely incentive compatible examples

- Multi-modal approach for TEN-T
- EIA and SEA for transport investments
- Integrated master-planning in member states
- Consideration of CO2 saving as a benefit component of cba

Widely not incentive compatible examples

- Tendency to reduce investment budgets of member states in real terms
- Tendency to neglect maintenance and re-investment
- No consideration of up- and downstream emissions of CO2 in CBA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Antequera/Bobadilla
Cartagena
Algeciras
Valletta
Limassol
Lefkosia
TENtec

Technology policy and subidisation

Widely incentive compatible examples

- Support of environmentally friendly modes as long as external costs are not internalised
- Public investment in technology research, if target driven
- Support of infrastructure for alternative technologies
- Fostering competitiveness for regions lagging behind, if transport quality is a bottleneck factor

Technology policy and subidisation

Widely not incentive compatible examples

- EU co-finance with high co-funding rates
- Parallel investment in road and rail
- Subsidisation of developing particular technologies (MAGLEV, electric propulsion)

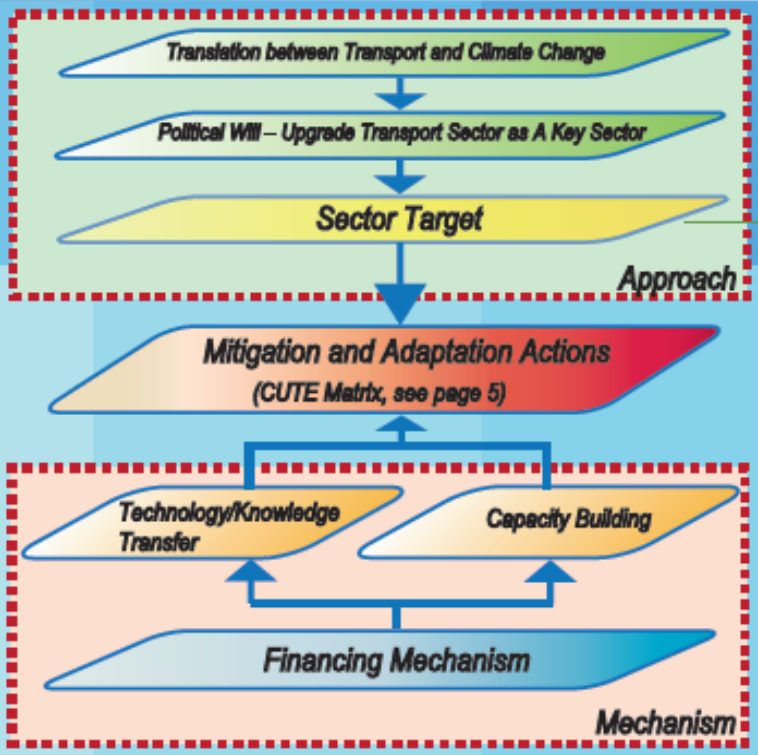
Conclusions

- Measurement and allocation of GHG – emissions stimulates export of production and GHG
- Area – related actions foster carbon leakage
- Incomplete taxation or charging systems foster undesired diversion and arbitrage
- Incomplete cap and trade systems are open to manipulation
- Inappropriate text cycles give wrong indications on the positive effects of particular technologies (e.g. hybrid propulsion)

Conclusions

- Incomplete consideration of GHG emissions in CBA (no comprehensive CIA)
- Incomplete and manufacturer friendly regulation systems decelerate technical progress
- No progress with international standards: climate conferences and COPs take high GHG inputs and produce negligible results

Designing Mechanism

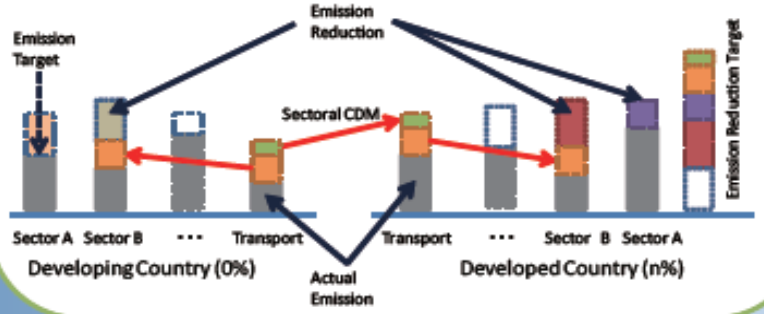


Financing Mechanism

- Programmatic CDM + CDM Risk Hedge Fund
- CDM accredited ODA
- Domestic Public Funding, Private Funding
- Climate Fund, Mitigation Fund, Capacity-building Fund

Sector Approach

The sector approach aims to allocate emission reduction target for each sector inside the country. The approach may encourage developing countries to reduce emissions particular in transport sector through joint implementation with other sectors even if they do not have a national target emission



From Project CDM to Programmatic CDM

The Programmatic CDM is not an option but a new scheme to realize a project which consists of a bundle of similar projects. Compared with traditional project CDM, Programmatic CDM can absorb the risks of each individual CDM project due to uncertainty in reaching the emission targets proposed in transport sector.

CDM Risk Hedge Fund

The Risk Hedge Fund avoids the risk of loss in the process of mitigating CO_2 emission in transport sector. A certain percent (X%) of each project may be collected to put into this Fund. The Fund should be established to finance a certain percent of CDM projects in transport sector.