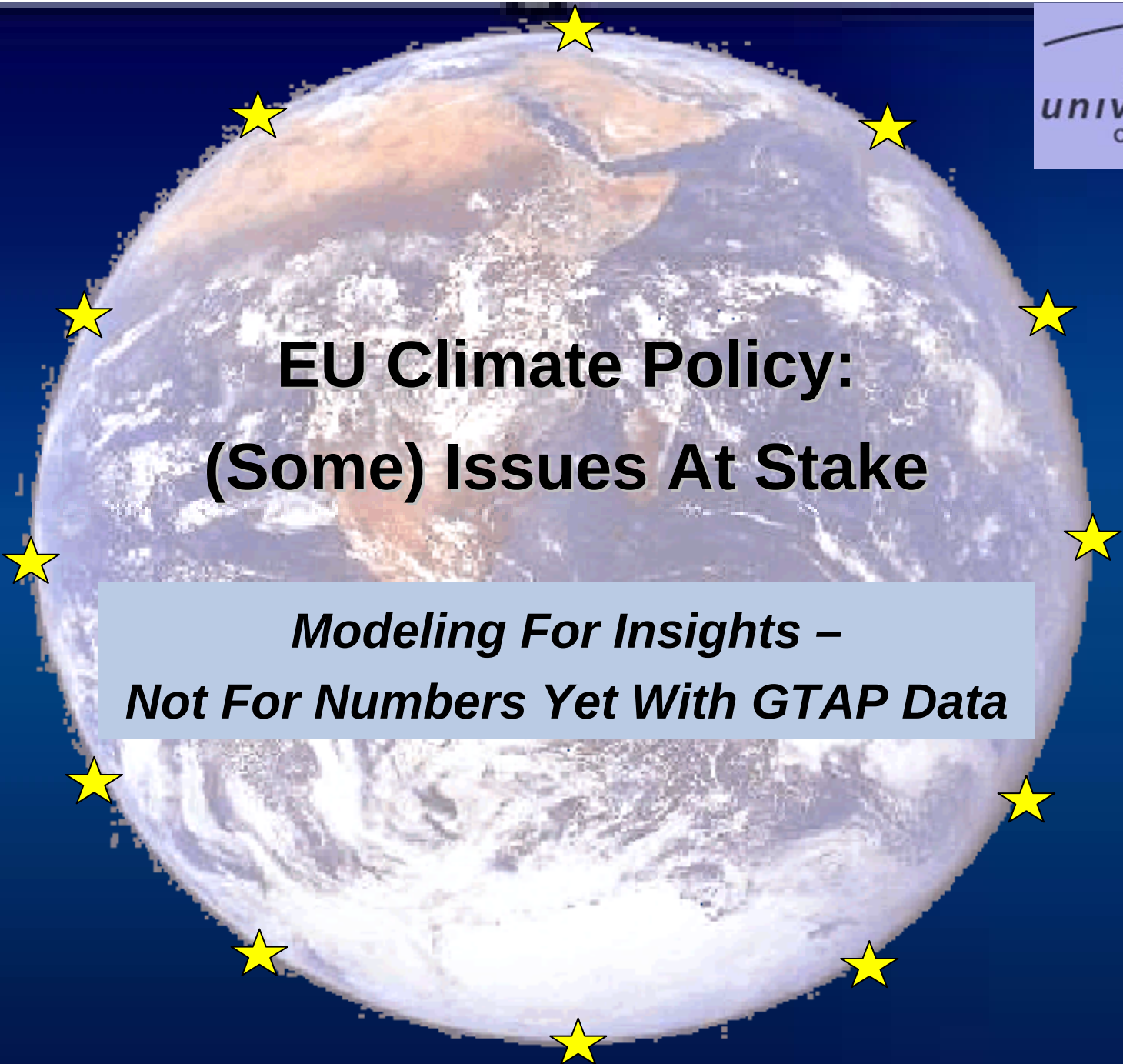


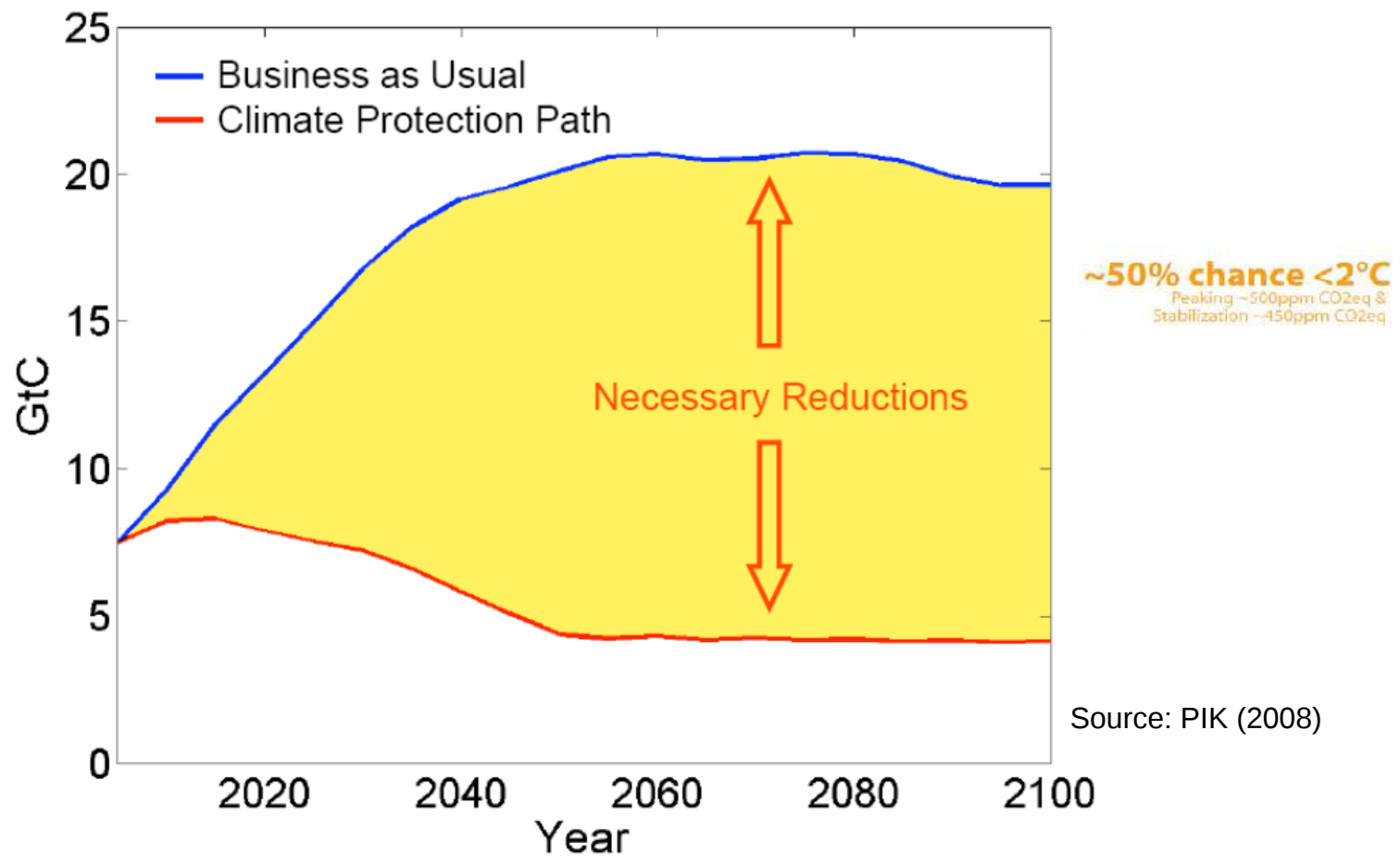


EU Climate Policy: (Some) Issues At Stake

*Modeling For Insights –
Not For Numbers Yet With GTAP Data*

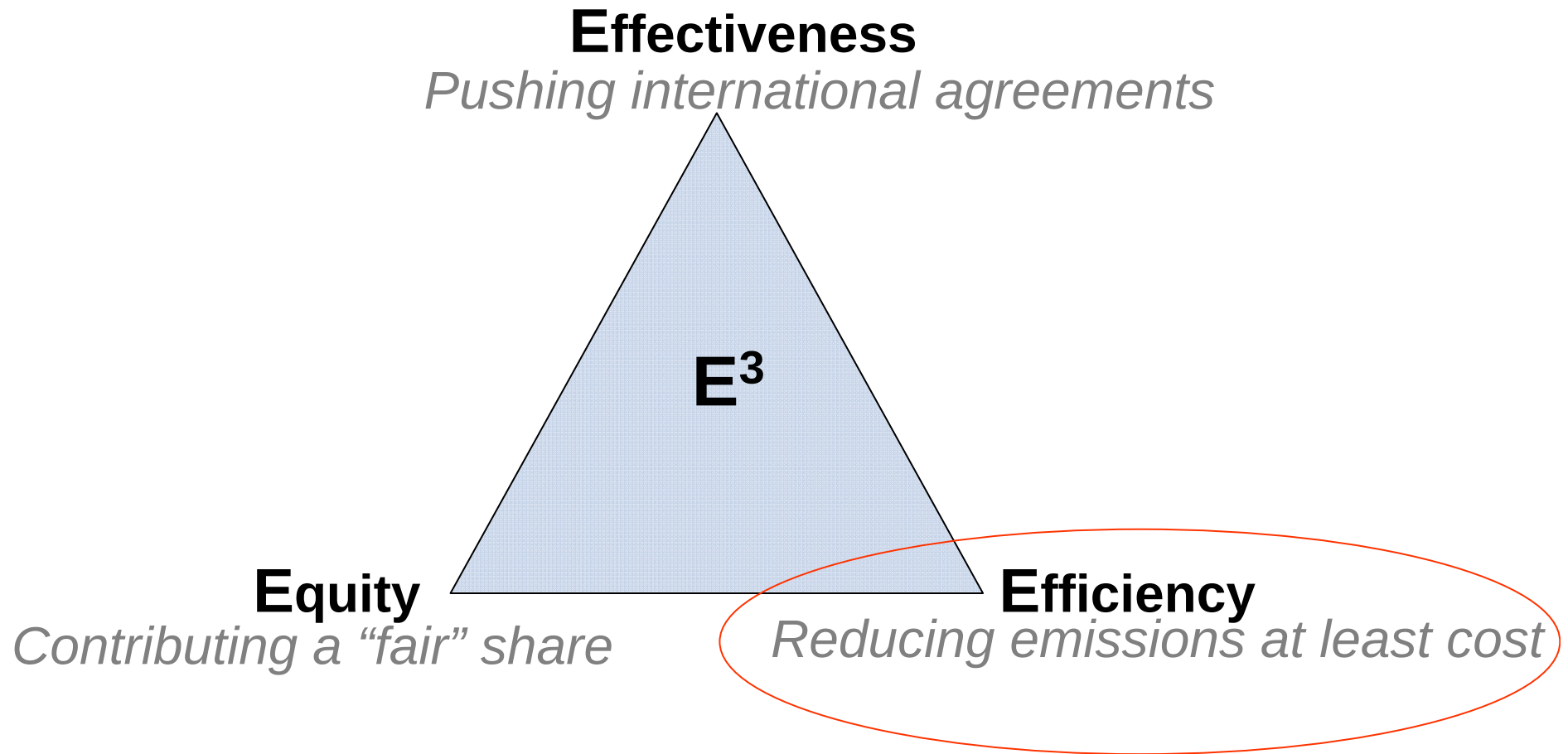
Global Climate Policy Background: 2°C Target

Reduction requirements for anthropogenic greenhouse 2°C:



IPCC (AR4): Halving of global GHG₂₀₀₀ by 2050

Guidelines for EUnilateral Climate Policy



Fundamental interdependencies:

- Without efficiency normative equity disputes get enforced.
- Without equity (fairness) the incentives for cooperation decline.
- Without broad cooperation global effectiveness will not be feasible.

Pushing International Climate Policy Agreements

Timeline International Action on Climate Change



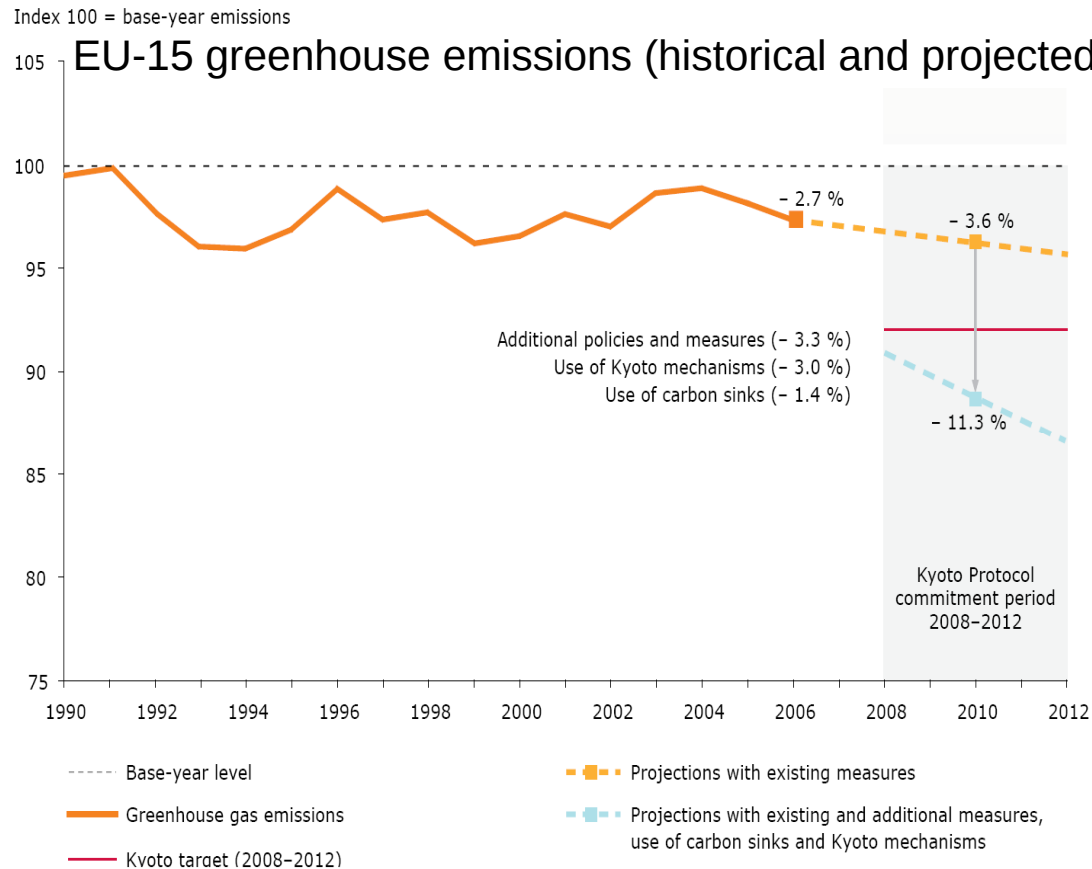
Source: PEW (2009)

Milestones since 2005:

- G8+5:     
- Bali / Copenhagen: Climate regime under the UN umbrella („Kyoto Plus“)
- Cancún: Ceiling of global warming to 2°C

Contributing a “Fair” Share

Compliance with Kyoto commitment:

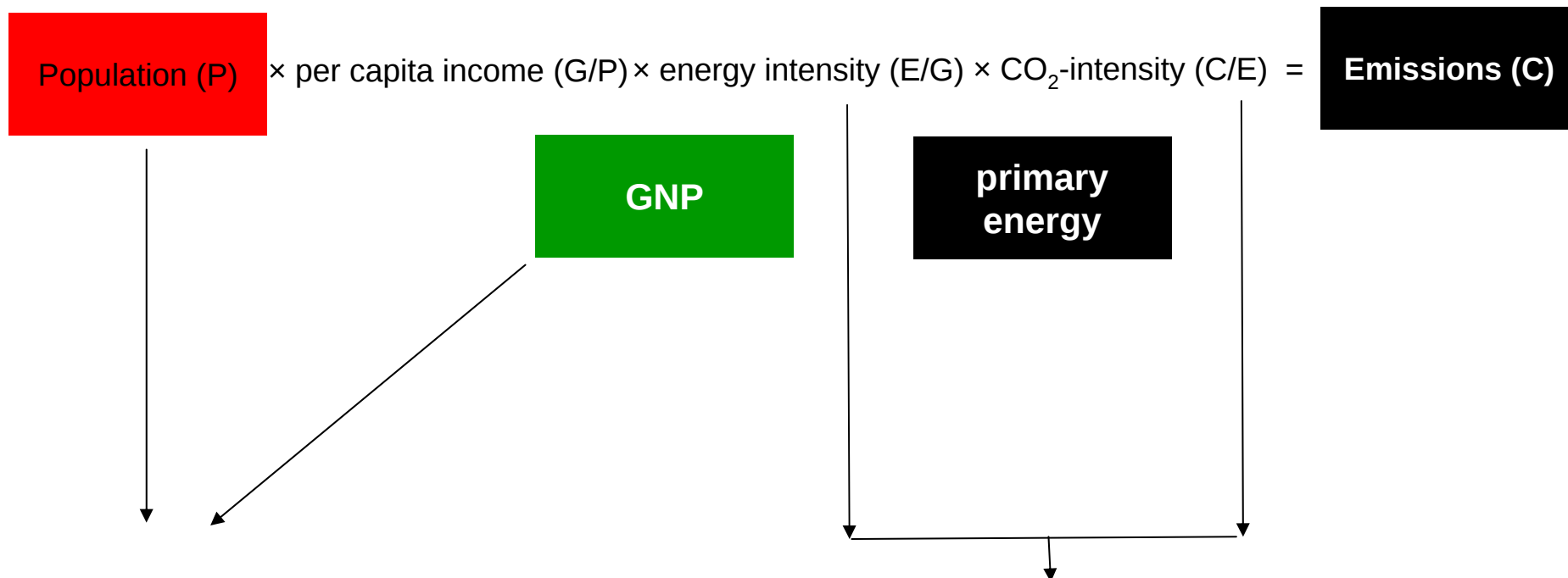


Source: EEA (2008)

Leading role in Post-Kyoto commitments (EU-20-20-20):

- Unilateral pledge of 20% emission reduction (vs. 1990) in 2020
- Increase to 30% for „comparable action“ of other industrialized regions

Reducing Emissions At Least Cost



No (realistic) options:

- Human population control
- Economic growth constraints

Options:

- Energy efficiency improvements
- Fuel switching
- Carbon capture and storage

First-best rules for cost-effective emission reduction:

- One target (emission reduction) → one instrument (**emissions trading**)
- Markets then work out the optimal mix of fuel switching, energy efficiency improvements, structural change etc.

The Good News: EU Emissions Trading Works

EU ETS in operation since 2005:

- Large-scale implementation of market-based climate policy (*cap-and-trade*)
- First multi-jurisdictional emissions trading system

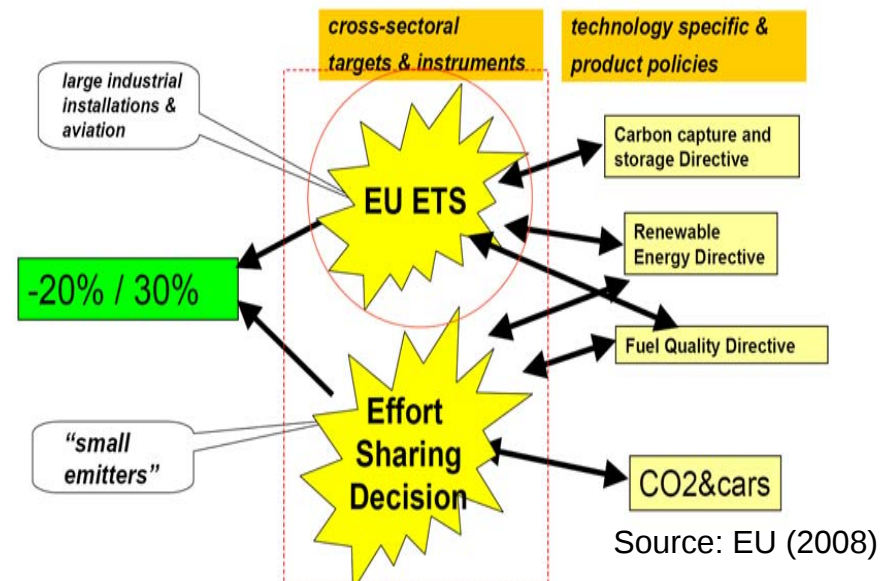
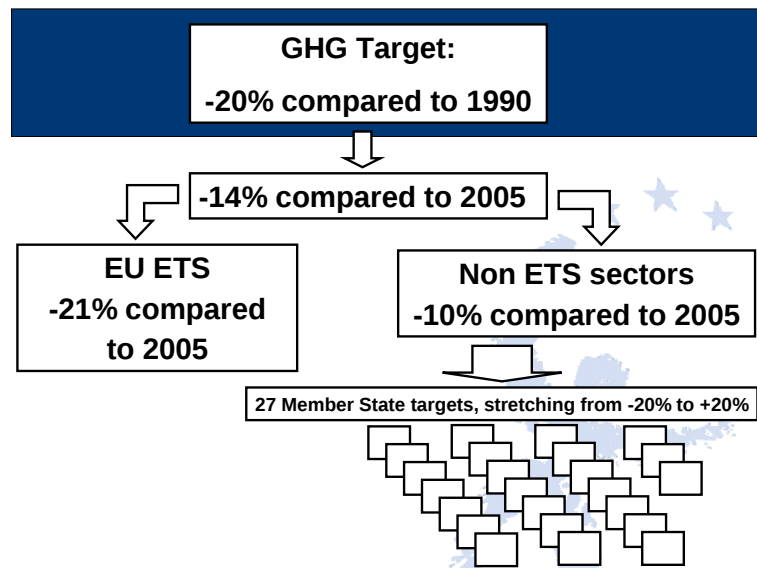
Reforms to improve on cost-effectiveness (from 2013 onwards):

- EU-wide cap with harmonized emission allocation rules instead of (27) national allocation plans in phases 1 (2005-2007) and 2 (2008-2012)
- Shift from free allocation towards auctioning of emission allowances
- Increased coverage of EU ETS by sectors (aviation, petro-chemicals, ammonia, aluminium) and gases (nitrous oxide, perfluorocarbons)
- Enhanced access to project-based flexibility mechanisms (CDM)

The Bad News: A Myriad of Targets and Instruments

The EU 20-20-20 (by 2020) climate and energy policy package:

Object	Target	Reference
■ GHG emissions	-20%/-30%	compared to 1990
■ Energy efficiency	+20%	compared to business-as-usual
■ Renewables' share	20%	primary energy share in 2020
■ Biofuels	10%	transport fuel share in 2020



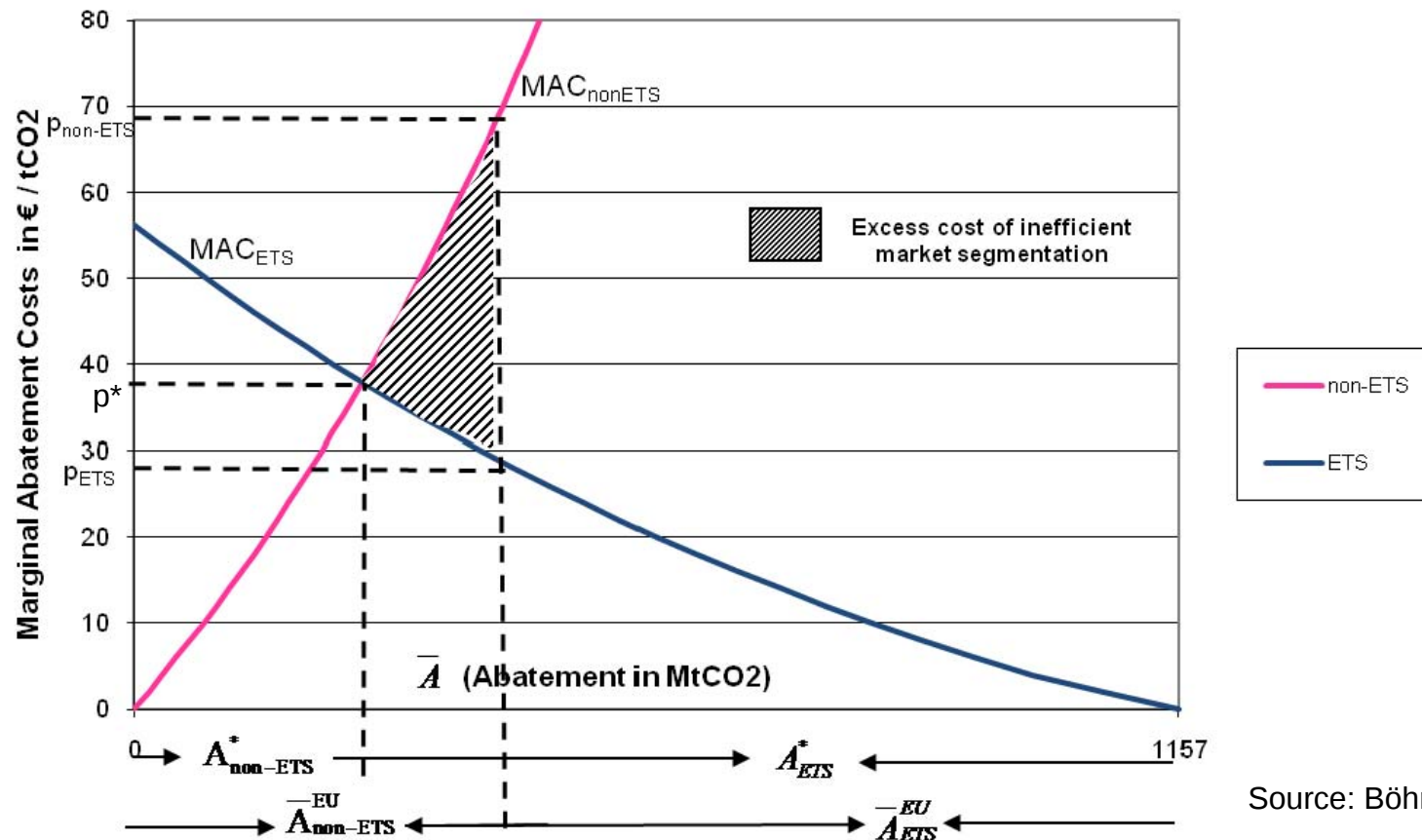
Two obvious deviations from cost-effective climate policy design:

- Segmentation of EU emission market (differences in marginal abatement costs)
- Overlapping regulation (e.g. green quota on top of EU ETS emission ceiling)

Excess Cost of EU Emission Market Segmentation

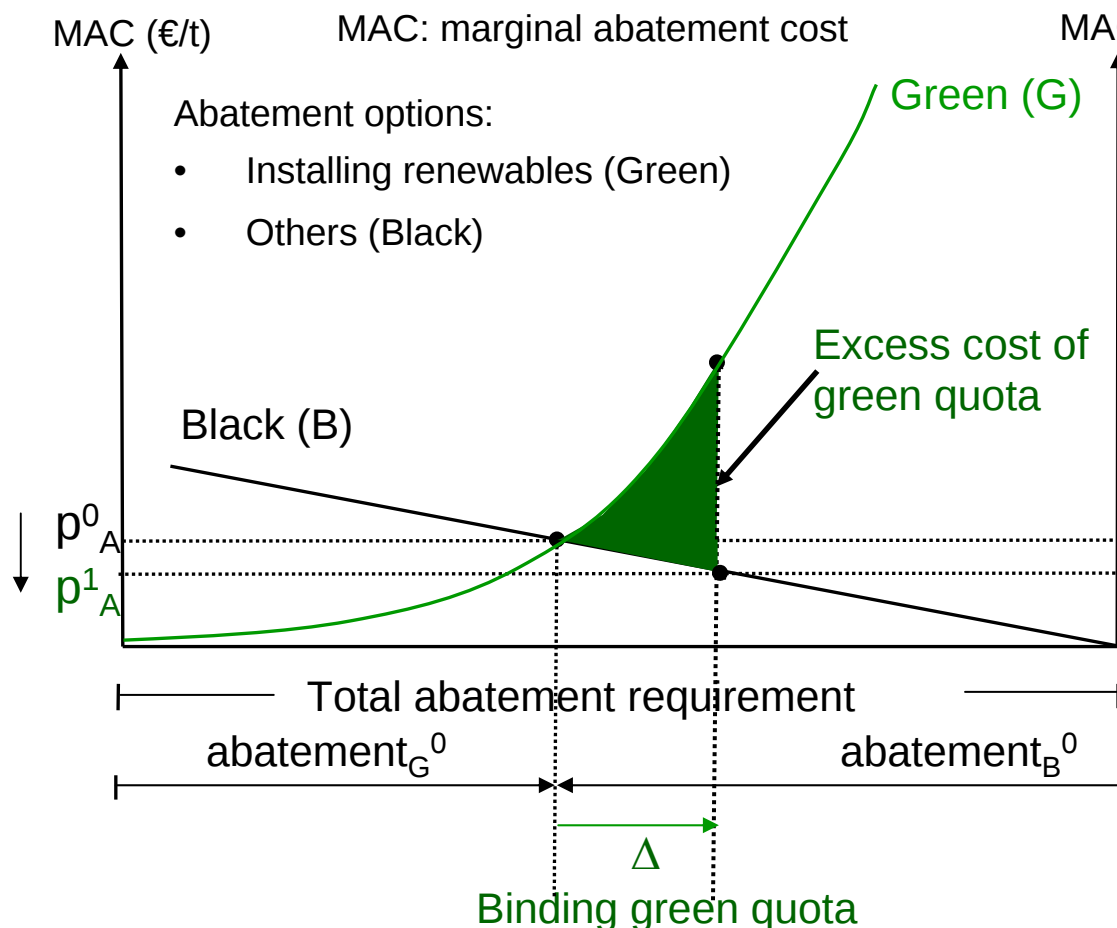
EU emission market segmentation:

- 1 international EU ETS market
- At least 27 domestic non-ETS markets (each of them subject to specific regulations)



Excess Cost of Overlapping Regulation

- If green quota becomes binding (alike positive feed-in tariffs), the economy will be too green, i.e., excessively based on renewable energy.
- If white quota becomes binding (alike efficiency standards), the economy will be too white, i.e., excessively energy efficient.



Another green paradox:
"Green serves the dirtiest"

Source: Böhringer and Rosendahl (2011)

Excess Cost of Overlapping Regulation

Examples from real life:

- Feed-in tariffs for renewables (Germany):
 - Photovoltaics:
CO₂ abatement cost: 400 - 1000 €/t
 - Wind power:
CO₂ abatement cost: 50 - 200 €/t
- EU fuel efficiency standards (120 g/km)
 - CO₂ abatement cost: > 200 €/t
- EU ban on light bulbs
 - Opportunity costs > ? €/t

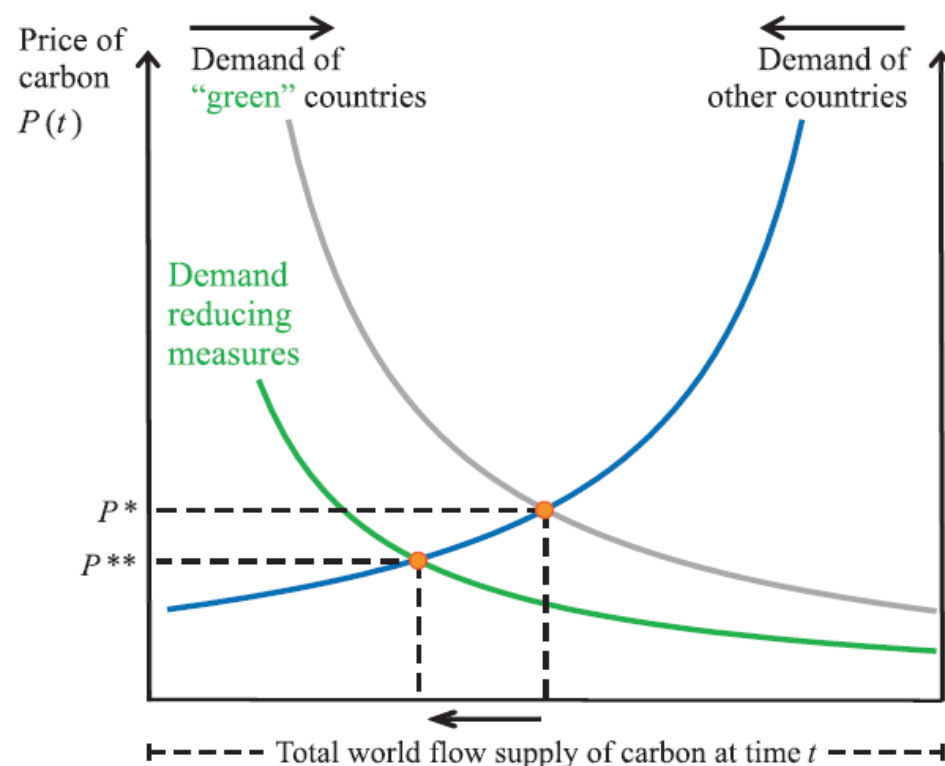


Compared to: EU CO₂ allowance price < 20 €/t

Unilateral Action and Leakage

Emission leakage

- Energy channel
- Trade channel

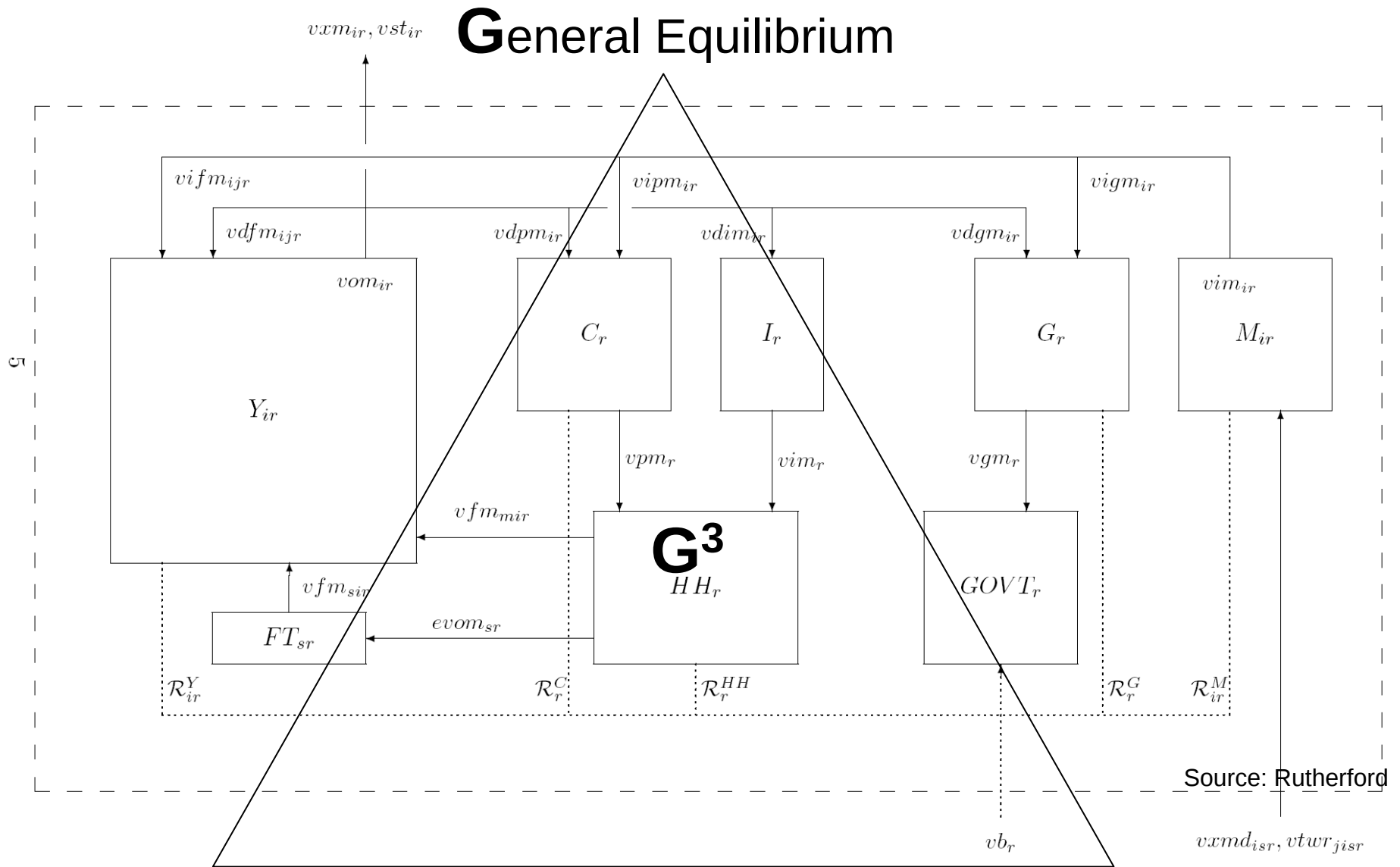


Source: Sinn (2007)

Second-best argument for anti-leakage measures:

- Border carbon adjustment (import tariffs and export rebates)
- Output-based rebates
- Differentiated domestic CO₂ pricing (including exemptions)

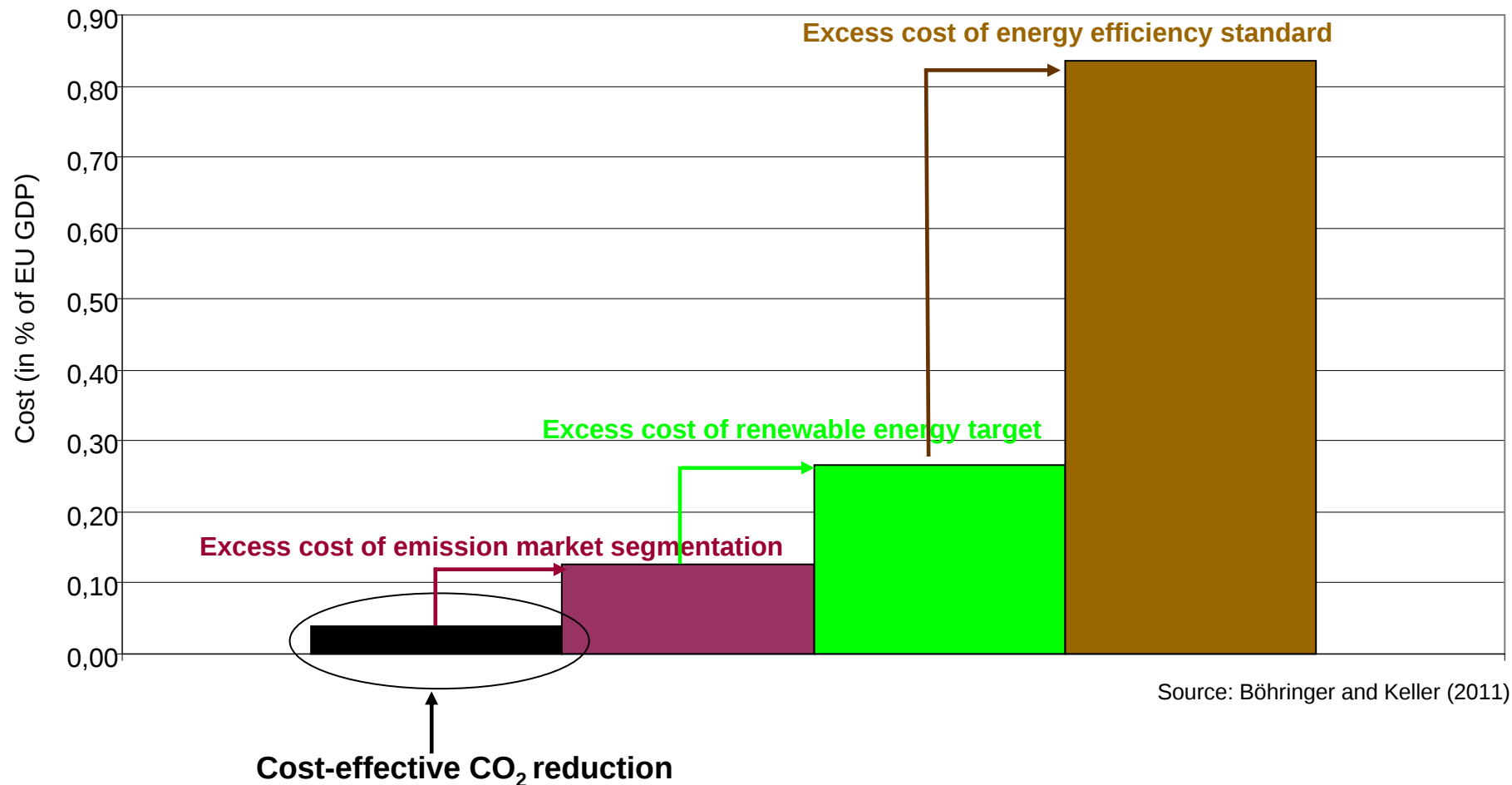
Reality Check: Framework of Assessment



GAMS/MPSGE

G_{TAP} data

Excess Cost of (Over-)Regulation: EU-20-20-20



1. Comprehensive EU emissions trading to reach 20% CO₂ emission reduction
2. Segmentation into ETS and non-ETS markets
3. Additional green quota in electricity production (35%)
4. Additional reduction of primary energy use by 20% vis-à-vis BaU

Evidence on Excess Cost of EU Climate Policy

Emission market segmentation induces non-negligible cost.

With the focus on climate protection additional targets for renewable energy or energy efficiency are:

- either automatically achieved with the cost-effective climate policy and thus redundant
- **or binding and thereby induce excess cost**

Need for justification of vague additional objectives such as strategic innovation policy or energy security:

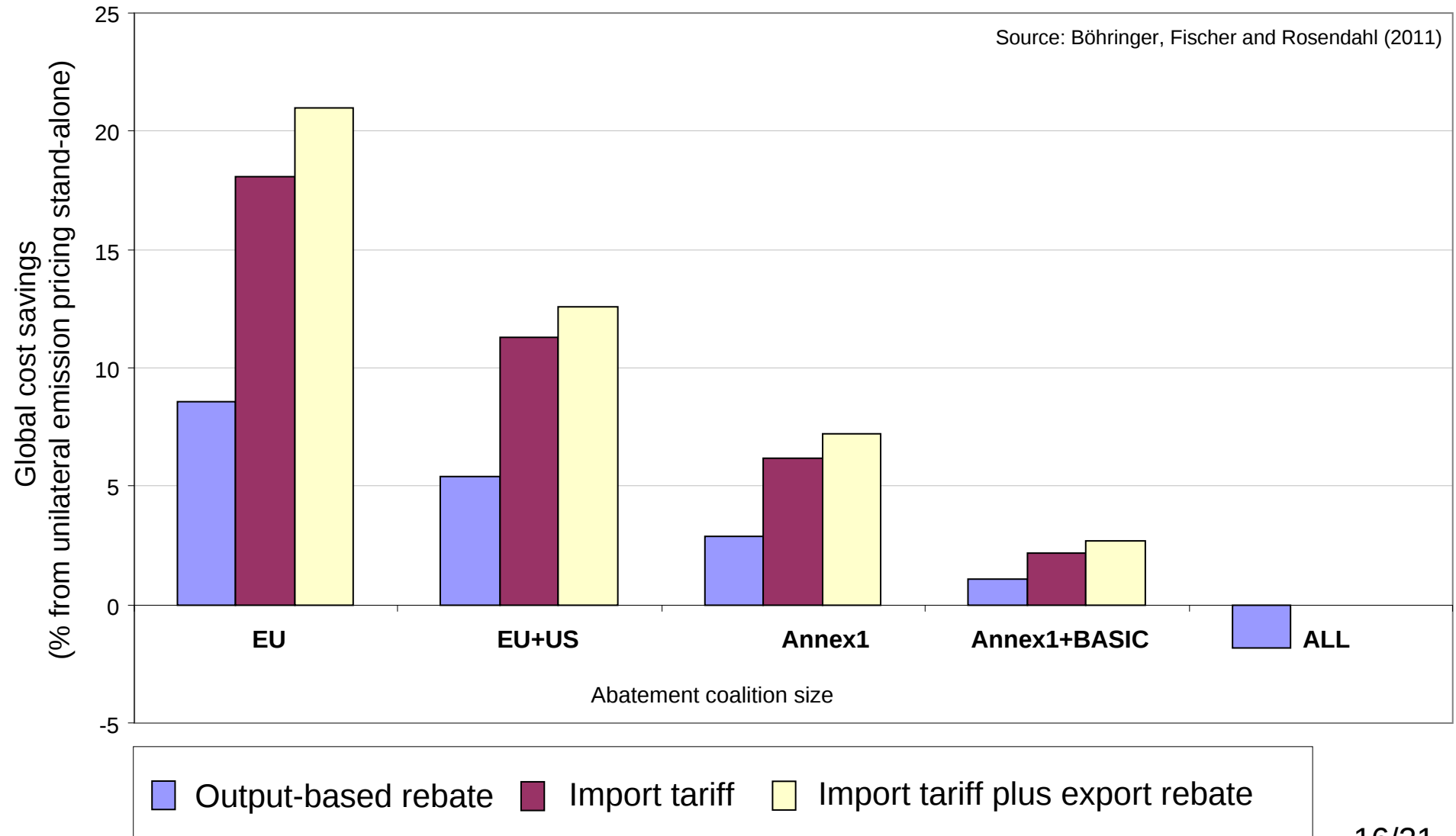
- Definition of meaningful indicators
- Economic cost-benefit analysis
- Choice of appropriate instruments

Nota bene:

Efficiency target stand-alone deteriorates rather than improves EU energy security in terms of common indicators such as ESMI or ESPI. Source: Böhringer and Keller (2011)

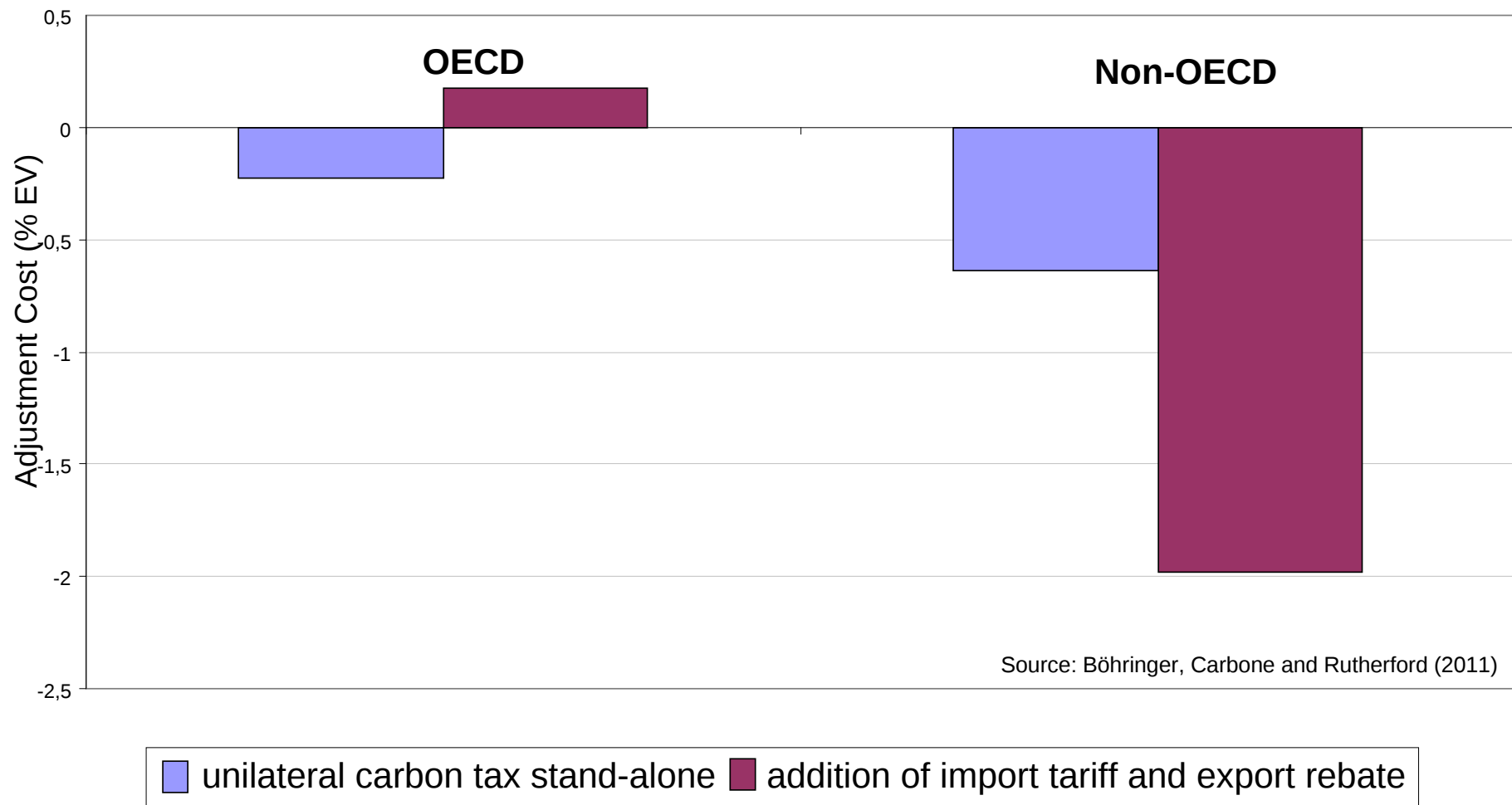
Global Cost-Effectiveness of Anti-Leakage Measures

Example: 20% unilateral emission reduction by abatement coalition



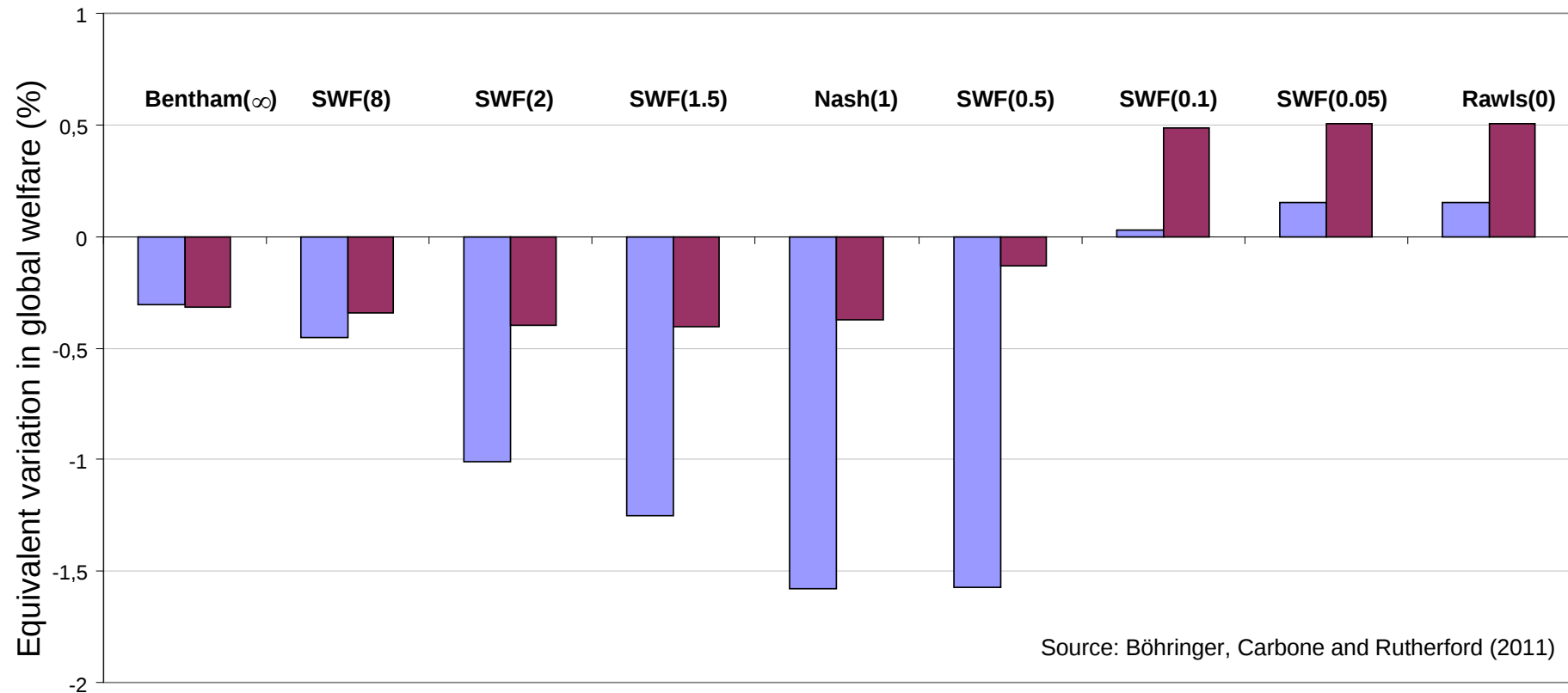
Pitfall: Burden Shifting

Example: 20% unilateral emission reduction by OECD



Pitfall: Alternative Views on Social Welfare

Example: 20% unilateral emission reduction by OECD



■ unilateral carbon tax stand-alone ■ addition of import tariff and export rebate

$$SWF = \left(\sum_r \theta_r C_r^{(1-1/\rho)} \right)^{1/(1-1/\rho)}$$

ρ : inequality aversion coefficient
 C_r : per – capita welfare in region r
 θ_r : population share of region r

Caveats on Anti-Leakage Measures

Little to win:

- Border tariffs or output-based rebates for energy-intensive and trade-exposed are relatively blunt second-best instruments.
- Implementation comes along with potentially large transaction cost.
- Output-based rebates may induce excess cost at larger coalition sizes.

Much to lose:

- Border tariffs by industrialized countries work at the expense of developing countries through shifts in the terms of trade.
- Border carbon measures may trigger a detrimental equity debate with the risk of trade wars or at least limited prospects for a more inclusive Post-Kyoto agreement.

EU Climate Policy: Towards Better Regulation

(Some) Merits:

- Pushing climate policy at the international level
- Credible through fulfillment of Kyoto targets and ambitious 2020 targets
- Fore-runner in large-scale market-based regulation (EU ETS)

(Some) Challenges:

- Comprehensive market-based regulation: Let markets not bureaucrats work!
- Review of over(-lapping) regulation
- Careful assessment of anti-leakage measures

$G^3 - G_0$ GTAP G_0



Grazie per l'attenzione!