WG Raw Materials, Energy and Environment

Institute of Economics

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The EU Emission Trading System and Its Implementation in Germany:

A Critical Evaluation

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Objective of this Presentation

Is the German national allocation plan economically efficient?

Are the realised Allocation Rules sustainable in the long run?

Contents

Directive 2003/87/EC: Scope

Article 2 and annex I

CO_2 emissions of

- energy transformation/conversion,
- ferrous metal production/processing,
- mineral converting industry,
- other defined industrial plants,

from plants with a defined minimum size.

Directive 2003/87/EC: Allocation Rules

Article 9 f., Annex III and guidelines of the Commission

2005-07:
At least 95% of the allowances are granted for free.

2008-2012:
At least 90% of the allowances are granted for free.

Otherwise: Relatively wide scope for national legislators.

National Allocation Plan

Implementation of *directive 2003/87/EC* in Germany:
Greenhouse gas emission law and *national allocation plan*.

Greenhouse gas emission law
creates the legal basis for ET in Germany.

National allocation plan
- defines emission goals for the periods 2005-07 and 2008-12 as well as
- the concrete allocation rules for the period 2005-07.

Ideal Type of Allowance Allocation -1

Requirement 1:
All sectors emitting CO_2 have to participate in the Emission Trading System.

Requirement 2:
Strict separation between line operation on the one hand and allowance allocation on the other hand.

The question whether allowances are auctioned or granted to ancient emitters for free is not relevant with respect to economic efficiency (but with respect to distributional effects).

Ideal Type of Allowance Allocation -2

Requirement 1:
All sectors emitting CO_2 (or Greenhouse Gas emissions) have to participate in the Emission Trading System.

Proposal: Kieler model (from the beginning of the 1990s)

- Fuel traders and importers as participants of trading system.
- They are obliged to procure allowances equivalent to the CO_2 content of fuels sold by them.

(- Allowances are auctioned.)

Advantage: All sectors involved.

Problems with CO_2 sequestration.

Ideal Type of Allowance Allocation -3

Requirement 2:
Allowance allocation is strictly separated from plant operation.

Practical example: US SO_2 model

- Allowances are allocated to old plants (fossil fired power plants constructed before 1990) using a defined method based on fuel consumption of a base period.
- New plants do not get any allowances for free. They have to buy allowances according to their needs.

(- Grandfathering.)

Allocated allowances represent a definite asset independently from plant operation.
The use of allowances produces opportunity costs which are considered as additional operating costs.

Evaluation of the Macro Plan

Because of the restriction on selected sectors (and CO_2), EU emission trading considers less than one half of EU CO_2 emissions (and only 40 % of Kyoto budget).

The macro plan defines the emission goals of sectors which participate in emission trading and non-ET sectors.

Economically efficient: Partitioning which leads to equalisation of marginal abatement costs in ET and non-ET sectors.

Problem: Emission budget of ET sectors is too voluminous. This leads to high marginal abatement costs in non-ET sectors.

Evaluation of Allocation Rules -1

	Ideal type of allocation	National allocation plan (first trading period)
Old plant	Allocation is based on the emissions of a base period. Allocation is strictly separated from plant operation.	Allocation is based on the emissions of a base period. Allocation is not strictly separated from plant operation. If emissions are 60 % lower than emissions in the base period, allocation only for actual emissions.
New plant as substituting plant	No allocation.	Allocation is equivalent to the allocation entitlement of the replaced plant for 4 years; for additional 14 years allocation is equivalent to plant needs.
Additional new plant		Allocation is equivalent to the rule 'production quantity multiplied with emission value if best available technology is used' for 14 years; Differentiation between emission values of gas- and coal-fired power plants.

Evaluation of Allocation Rules -2

Criticism: Great discrepancy between the ideal type and the realised type of allowance allocation.

Precondition for cost efficiency: Same opportunity costs for CO_2 emissions independently from source. But:

- New plants replacing old ones receive allowances equivalent to their needs in the years 5 to 18 without consideration of specific emissions. CO_2 rich fuels are not discriminated.
- A certain discrimination of the usage of CO_2 rich fuels is implied for additional new plants. But this discrimination is not equivalent to specific CO_2 emissions.
- The 60% rule makes the shut down of old plants and a plant operation which leads to emissions less than 60% of the base period unattractive. Entitlement on full allowance allocation would be lost.
- Transfer rule leads to a further distortion with respect to production decisions, but encourages the replacement of old plants.

Effects on the German power generating industry -1

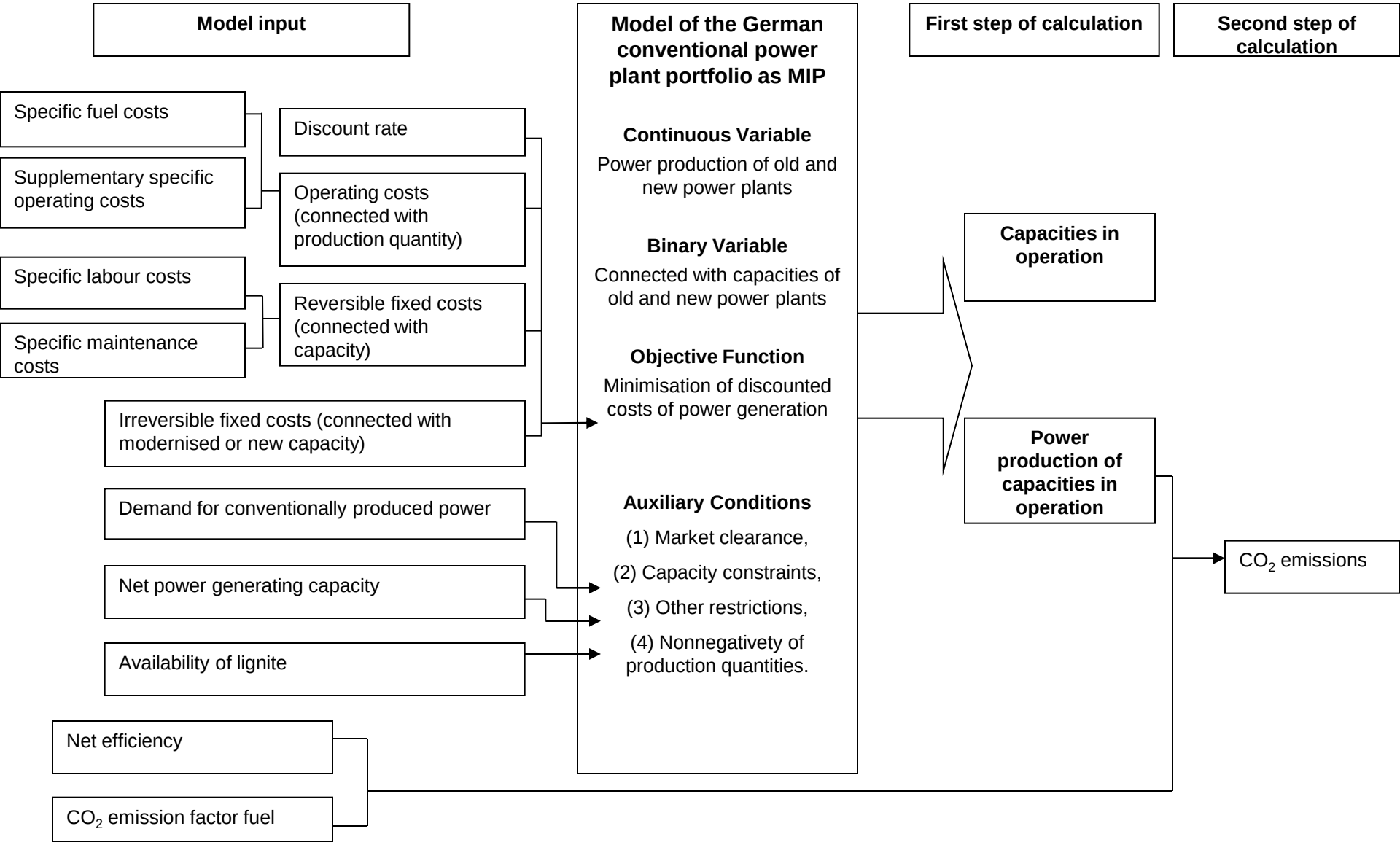
The German Power Plant model is used to assess the effects of the national allocation plan on the German power generating industry. This model was developed at the Institute of Economics, university of Erlangen-Nuremberg.

Basics of the model:

- Mixed integer program.
- Multi-periods approach (until 2030).
- Minimisation of total discounted costs under several constraints (amongst others a given demand for electricity of different load segments).
- Partial equilibrium model.
- Innovative element: modernisation of existing plants and construction of new plants are modelled as alternative investment options.

Scenario calculations are made under the assumption of an ideal type vs. the realised type of allowance allocations (the allocation rules of trading period one are extrapolated for the future).

Structure of the German power plant model



Effects on the German power generating industry -3

Scenario calculations show the following:

- Ideal type and realised type of allowance allocation lead to a very different mix of energy sources and a very different power plant portfolio.
- The realised type of allowance allocation leads to higher CO_2 emissions compared to an ideal type.
- The planned phasing out of nuclear energy assumed, realised allocation rules tend to an over-allowance allocation in the years after 2015. Necessity to revise allocation rules.

Effects on the German power generating industry -4

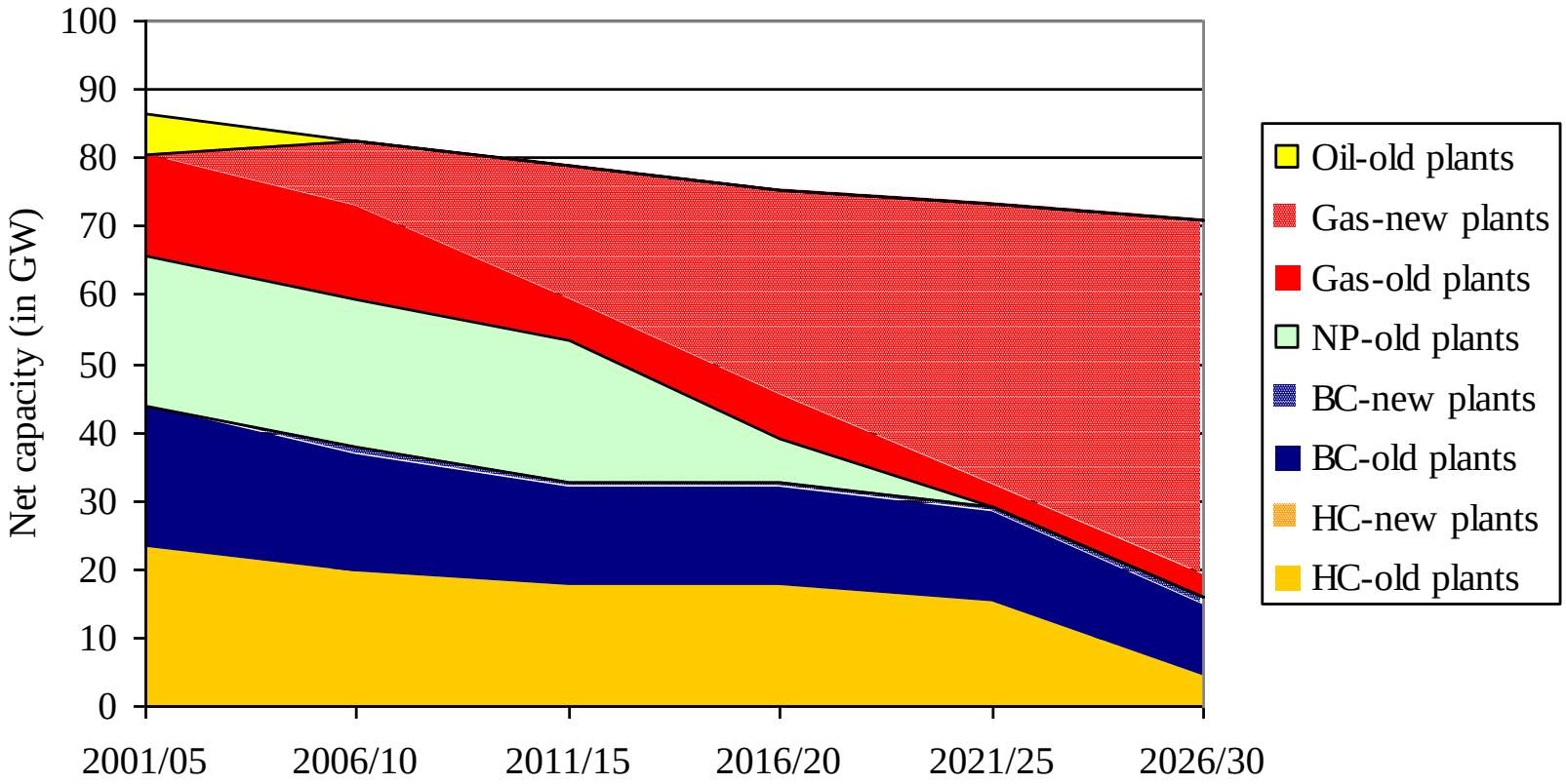


Figure: Share of new and total capacity from various energy sources (in GW_{el} net capacity) – ideal type of allowance allocation

Effects on the German power generating industry -5

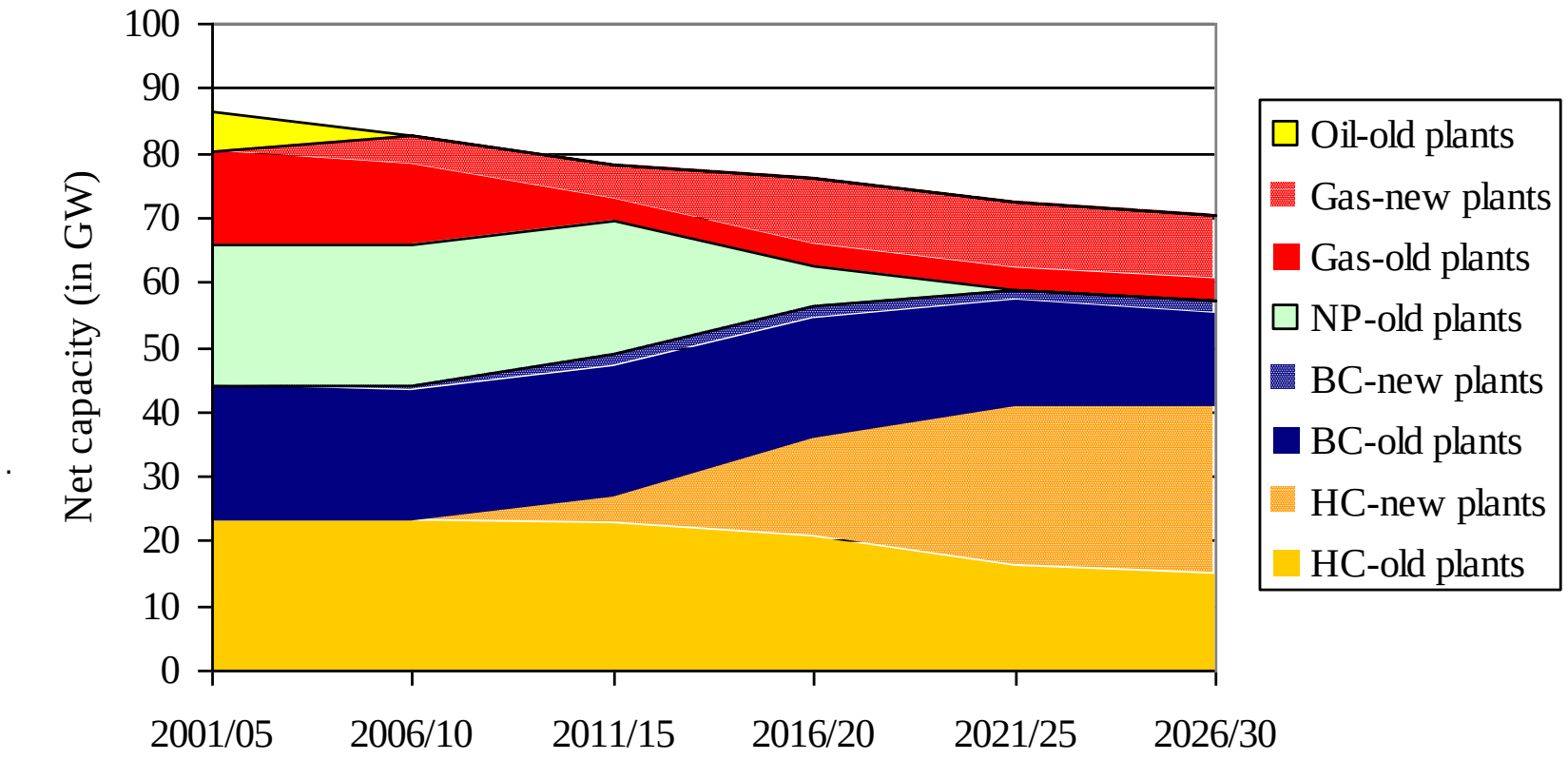


Figure: Share of new and total capacity from various energy sources (in GW_{el} net capacity) – realised type of allowance allocation and a moderate reduction of allowance allocation for old plants assumed

Effects on the German power generating industry -6

Result of scenario calculations: The planned phasing out of nuclear energy assumed, realised allocation rules tend to an over-allowance allocation in the years after 2015.

Reason:

On the one hand: New plants receive allowances in accordance with their needs for years. On the other hand: Nuclear power plants which will be shut down in the next decade will in the first run be replaced by hard coal fired power plants.

Consequence:

Allowances are created from nowhere because nuclear power stations as zero-emitters did not need allowances.

And:

Quantity of allowances expands (2005: nuclear power stations produce almost one third of total power generation).

Effects on the German power generating industry -7

National allocation plan intends to reduce allocation for old plants in return.

Problem:

An (accelerated) reduction of allowance allocation for old plants accelerates the replacement through new power plants, which receive as many allowances as they need for years.

This effect thwarts (largely) the attempt to reduce the quantity of allocated allowances.

Summary

The German national allocation plan can be improved with respect to two things:

- Macro plan: emission budget for ET sectors is too voluminous and emission budget for non-ET sectors is too small. Potential for cost reduction through shifting.

- Great discrepancy between the ideal type and the realised type of allowance allocation. Results:

  - Great efficiency losses.
  - Tendency to an over-allocation of allowances in the years after 2015, at least if the phasing out of nuclear energy is realised.

  Allocation rules must be changed in the medium term. A more efficient system should be realised.