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# NEW ENTRANTS ALLOCATION OF CO2 EMISSIONS ALLOWANCES IN THE EU ETS – THE ELECTRICITY SECTOR CASE

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## Overview

Power generation accounts for ~60% of EU ETS emissions and the response of the power sector is central to both Kyoto compliance and to the price of EU ETS allowances. One central consideration on the design of a trading program is how to distribute emission allowances. Due to the iterative nature of international emission reduction negotiations, the EU ETS is also developed iterative in approach – implying that national allowance allocations are only decided for one commitment period at a time. Thus the allocation is quite different from the one-off allocation methods implemented in US SOx and NOx cap and trade programs. We analyze distortions resulting from the allocation methodology.

This paper focuses specifically on potential distortions from New Entrant Allocation (NEA) to the electricity generation sector. New plants receive free allowances to new entrants under the current grandfathering-dominant allocation mechanisms, partly to compensate for distortions created by closure conditions. Our analysis captures effects of NEA on electricity prices, demand, operation, fuel/technology choice and CO2 emissions, and provides insight into the complexity of fine-tuning incentives with NEA rules, to implement CO2 reductions in the power sector. In particular, our numerical simulations demonstrate the distortionary effects posed by fuel/technology specific benchmarking and restrictions on NEA reserves.

## Methods

We assess the financial incentives resulting from the allocation process for power generators in liberalized electricity markets. We apply three approaches: Firstly, we illustrate the incentives resulting from the provisions in national allocation plans for the choice of investment quantity. Secondly, we use a simple model to calculate long-run equilibrium investment choices model with three technologies. Thirdly, we calculate the investment path for the UK power sector, starting with today's generation mix and assuming competitive investment choices and perfect foresight. In this paper we do not assess strategic behavior of generators in the electricity, gas or $CO_2$ market, but assume a competitive market with free entry, such that marginal investment recovers fixed costs without unusual profits.

## Core Results

We first use the simple model to assess the impact of uniform new entrant allocation. Figure 1a shows that with increasing value of NEA, equilibrium installed combined cycle gas capacity increases and replaces peakers (or demand response). Further increase of NEA implies an increase in coal production hence CO2 emissions rise correspondingly as shown in Figure 1b. Electricity prices decrease monotonically as NEA act as a capacity payment. In contrast, the fuel specific benchmark (Figure not included in abstract) results in immediate increase in installed coal capacity and electricity prices

If it is assumed that not only one country but all countries apply such a methodology, then the limited European CO2 budget prohibits increases in CO2 emissions, and requires higher CO2 prices. These feed through to higher electricity prices.

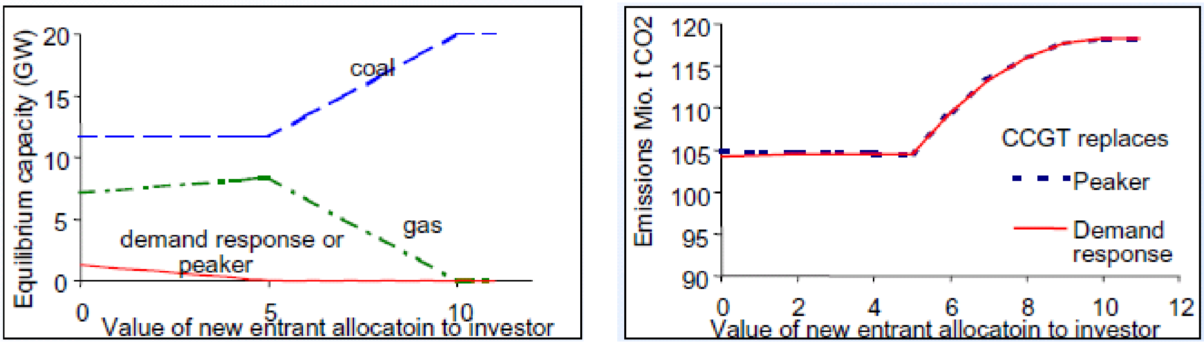


Figure 1a. and 1b. National perspective, uniform new entrant allocation. Installed capacity and CO2 Emissions. Demand response/peaker replaced by CCGT•At high levels of subsidy coal replaces CCGT

We use an investment planning model to capture the behavior of the UK power systems with existing generation structure that can be adjusted over time. We start with a base case assuming no updating or NEA. When NEA is introduced, CO2 emissions decrease for both uniform and fuel specific benchmarking. This small CO2 emissions reduction results from an accelerated shift to gas, with NEA acting as the investment support. This may, however, be a risky mechanism to use. Our results presented in Figure 2 show that the system's improved CO2 performance is inverted dramatically if we assume higher gas prices (5 Euro/mmbtu) and a continued high fuel specific new entrant allocation. Although not explicitly modeled, initially reduced electricity prices with NEA might increase demand and thus further increase CO2 emissions.

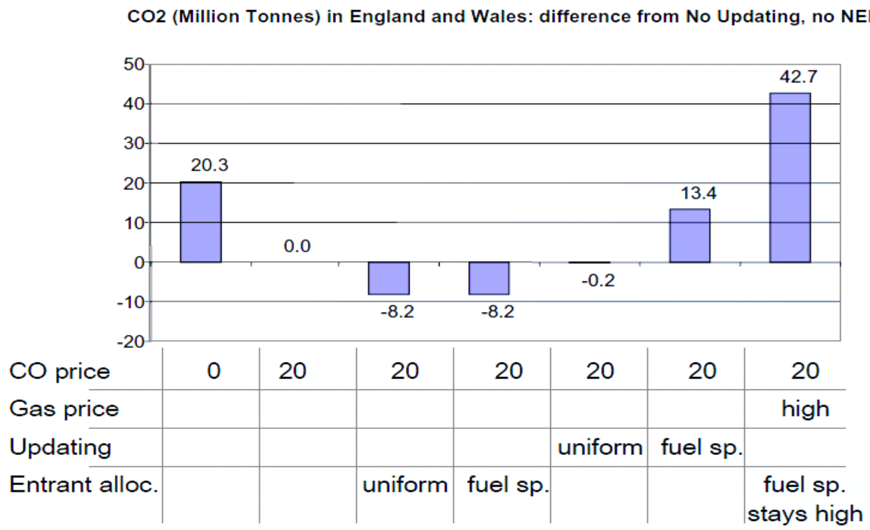


Figure 2. Impact of allocation on CO2 emissions

## Conclusions

Our numerical simulations capture the impact of NEA on investment and technology choice and highlight perverse incentives created by fuel or technology specific NEA rules. Using a uniform benchmark can act as a capacity payment supporting all new investment and can reduce electricity prices as it reduces scarcity premium. However, this requires sufficiently large new entrant reserves, low barriers to entry, access to fuels (e.g. gas) and regulatory certainty about future allocations. With this, together with concerns that uncertainty about future allocation decisions also feeds into investment uncertainty delaying shifts towards lower carbon technologies, this paper argues for a move towards the phasing out of NEA, whilst in the mean time recommends the use of a uniform benchmark NEA that is not specific to fuel.