

Work-in-progress



**ewi** Energiewirtschaftliches Institut  
an der Universität zu Köln

# Complementary Policies in the Reformed EU ETS: The Devil Is in the Detail.

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Martin Hintermayer & Lukas Schmidt.

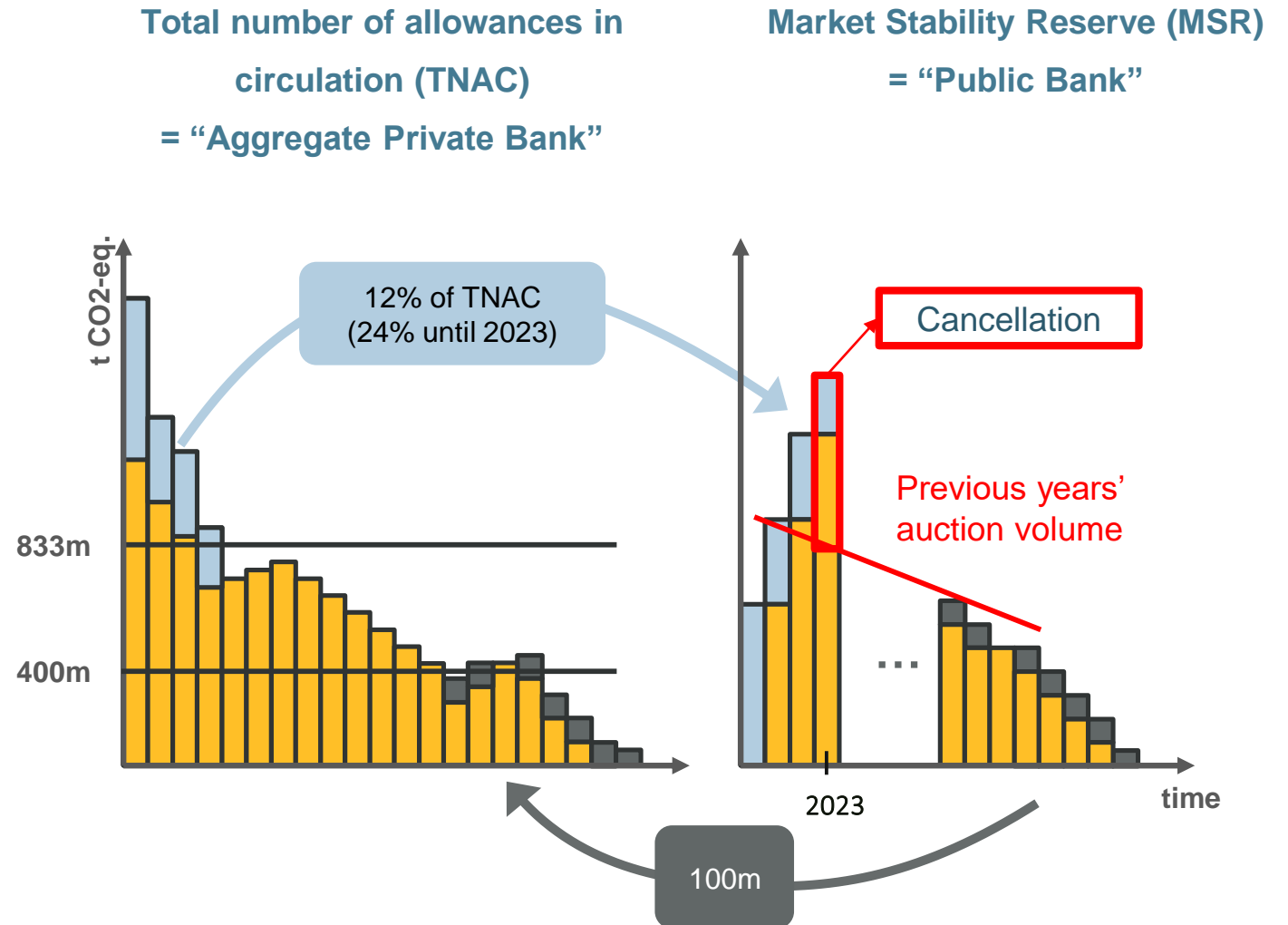
# The EU ETS Reform: MSR, cancellation and national allowance withdrawal

## Targets :

- Strengthen price signal in the short-term
- Make EU ETS more robust towards shocks
- Increase compatibility with complementary policies

## Measures:

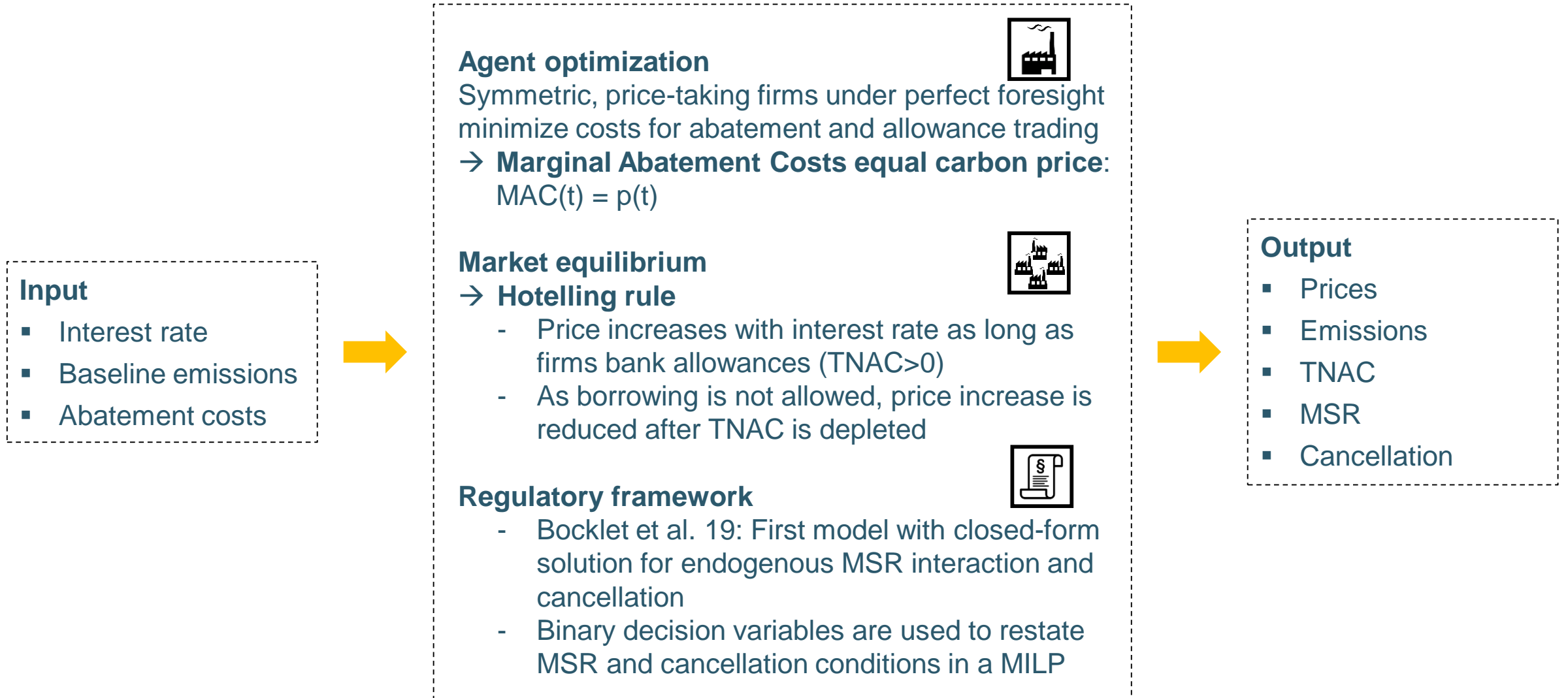
- Introduction of the MSR restricts private banking
- Cancellation mechanism endogenizes allowance supply
- Possibility for nation states to withdraw allowances from auction volumes in case of coal phase-outs



## Complementary policies and the reformed EU ETS

- EU ETS reform makes the total emission budget within the EU ETS flexible depending on market outcomes
- Complementary policies still hot topic in political and scientific discussion:
  - Overlapping national policies to unilaterally increase level of ambition w.r.t. abatement (e.g. coal phase-out)
  - Carbon Price Floor in the EU ETS to increase price level and/or investment reliability
- The reform changes the case for complementary policies within the EU ETS:
  - The reform enables complementary policies to become effective in lowering aggregate emissions
  - But: complementary policies can now also backfire! That means additional measures can increase aggregate emissions compared to business-as-usual [Perino,19]

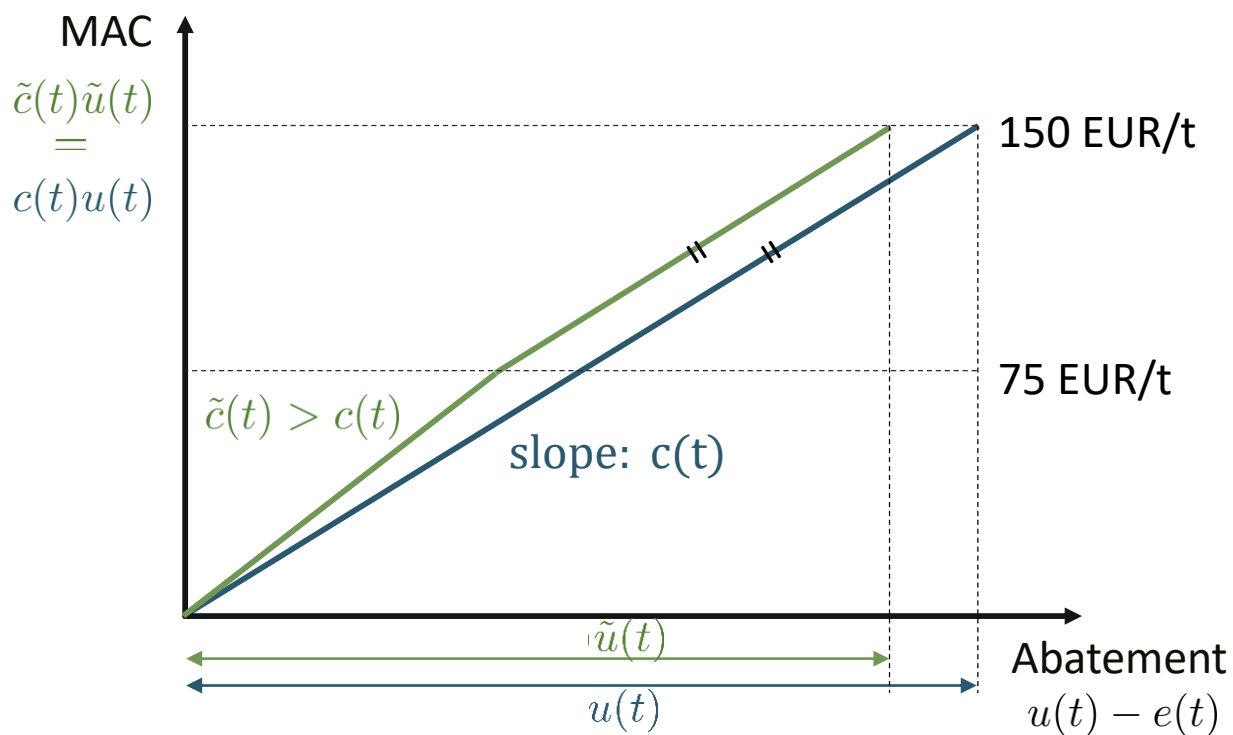
# EU ETS partial equilibrium model depicting individual actors' decision-making under current regulation



# How does an overlapping policy impact the abatement costs?

Abatement costs:  $AC(t) = \frac{c(t)}{\alpha} (u(t) - e(t))^\alpha$

$\alpha=2$ :  $MAC(t) = c(t)(u(t) - e(t))$



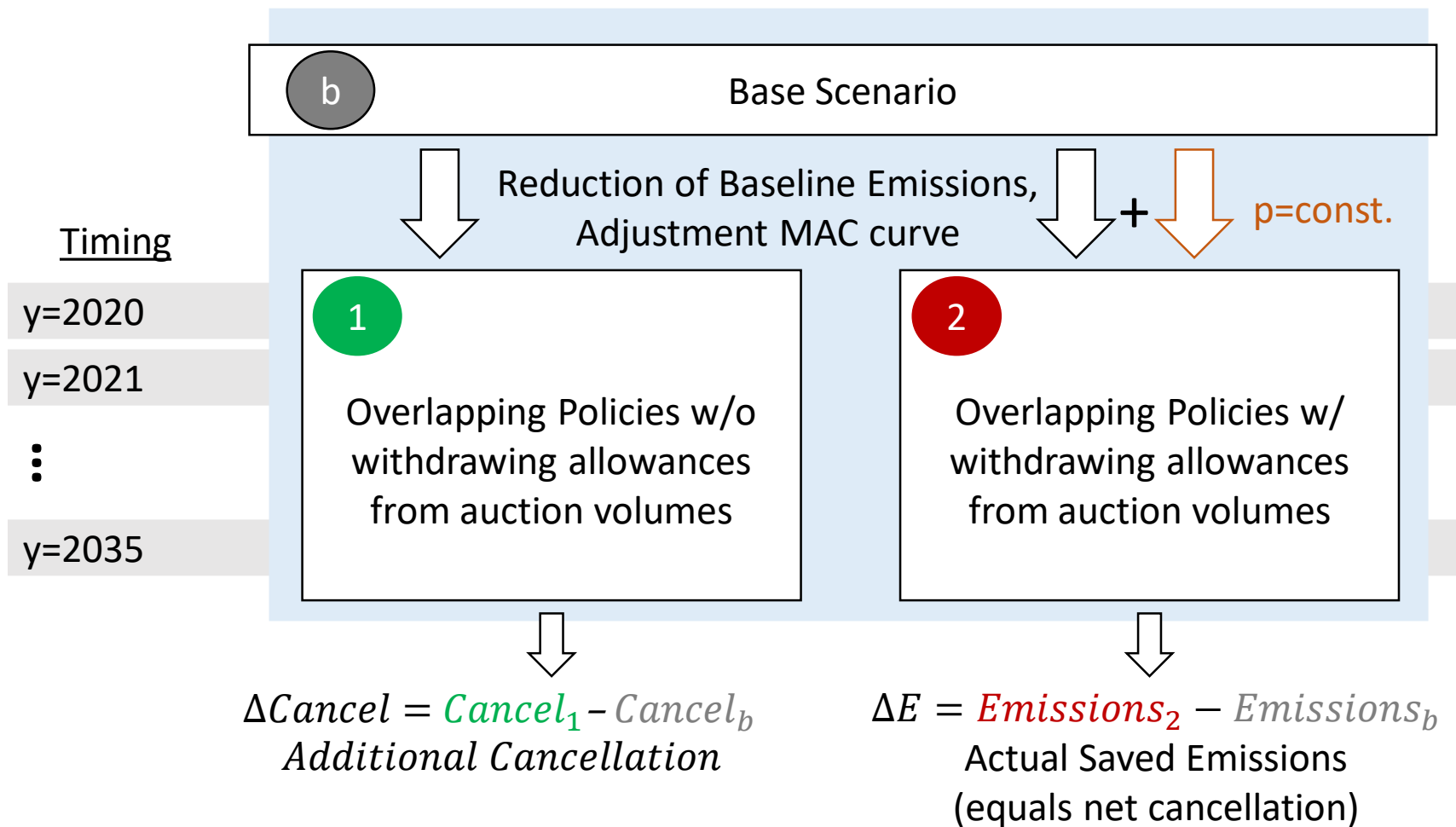
- Marginal abatement costs are typically assumed to be linear (compare [Perino 17], [Carlen 18] or [Quemin and Trottignon 19])

(in the upcoming paper we also look at different curvatures)

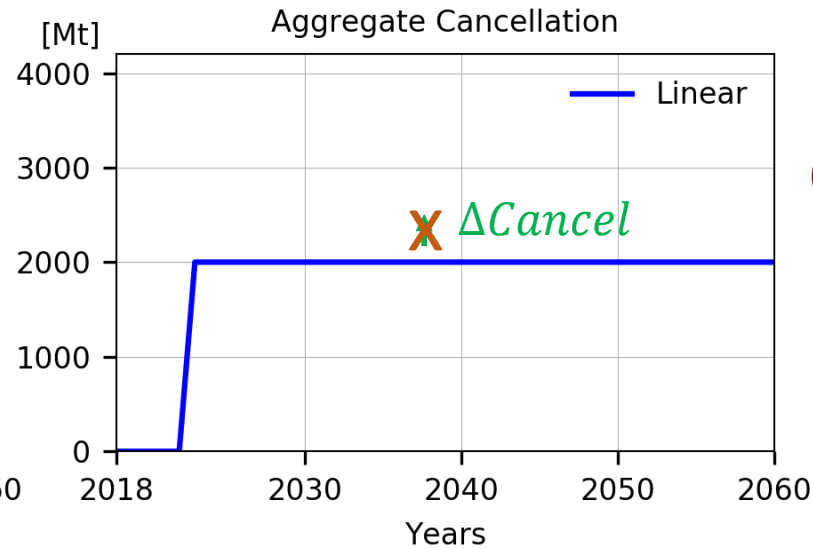
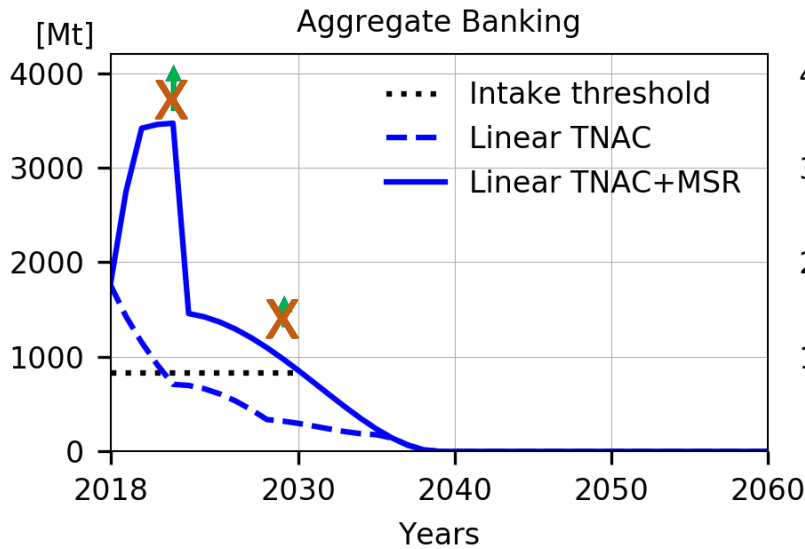
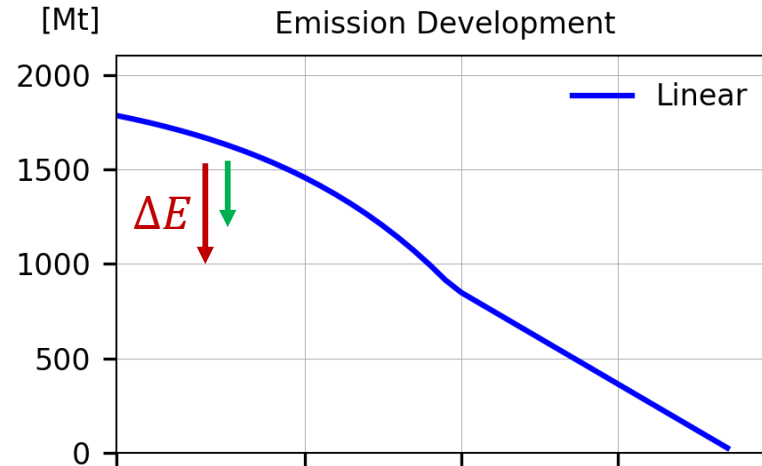
- Overlapping national policies usually do not target most expensive abatement options
- Stylized depiction of coal phase out
  - 5% reduction of baseline emissions since lignite/coal are most carbon-intensive form of electricity generation, 1900 instead of 2000 Mt
  - A coal phase-out leads to a steeper first part of the MAC curve.

$u(t)$ : baseline emissions  
 $e(t)$ : chosen emissions  
 $c(t)$ : costs parameter

# Set up: Model Runs to assess Overlapping Policies



# Base Scenario and stylized impact of overlapping policies

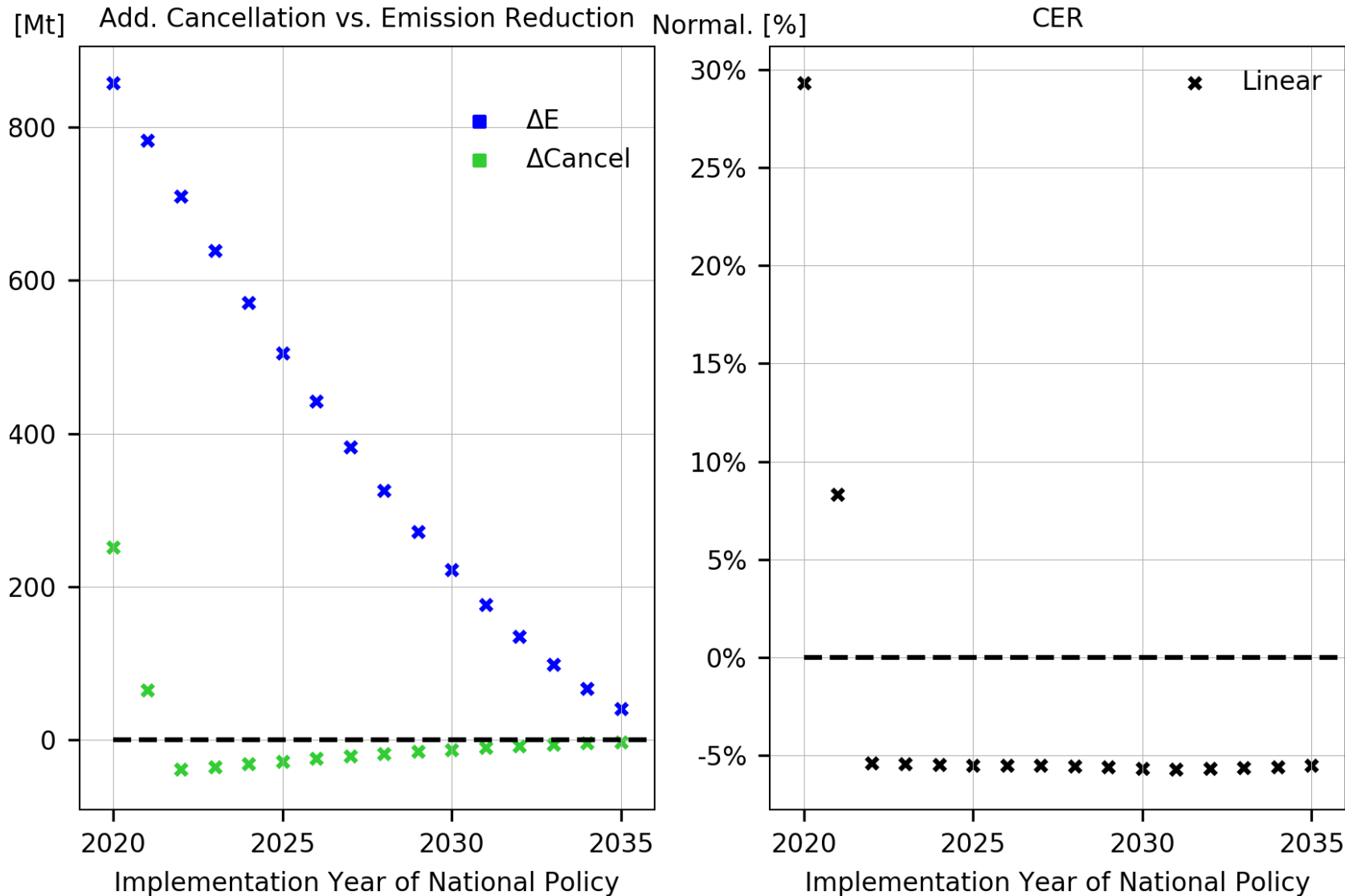


- Cancellation of about 2000 Mt in base scenario

1 Overlapping Policies w/o withdrawing allowances from auction volumes

2 Overlapping Policies w/ withdrawing allowances from auction volumes

# Overlapping Policies: Impact on Cancellation and Emissions



- Coefficient of Emission Reduction:

$$CER = \frac{\Delta Cancel}{\Delta E}$$

- Waterbed effect is punctured for early implementations
- Later, overlapping policies increase total emissions due to the green paradox effect
- National allowance withdrawal is important to make overlapping policies efficient in terms of emission reduction



# Carbon Price Floor (CPF) can be implemented differently

## Buyback

- Governmental institution guarantees to buyback an unlimited amount of allowances
- Hotelling does not have to hold when  $p=CPF$

Directly increases the value of EUAs:

$$p = CPF$$

## Top-up-tax

- Firms have to pay tax on emissions :  
$$T = CPF - p \quad \text{if } p < CPF$$
$$T = 0 \quad \text{else}$$
- Firms optimize their emissions based on:

$$MAC = p + Tax$$

- But the market value of EUAs is not directly altered by the introduction of the Top-up-tax

## Auction reserve price

- Auction reserve price for allowance auctions

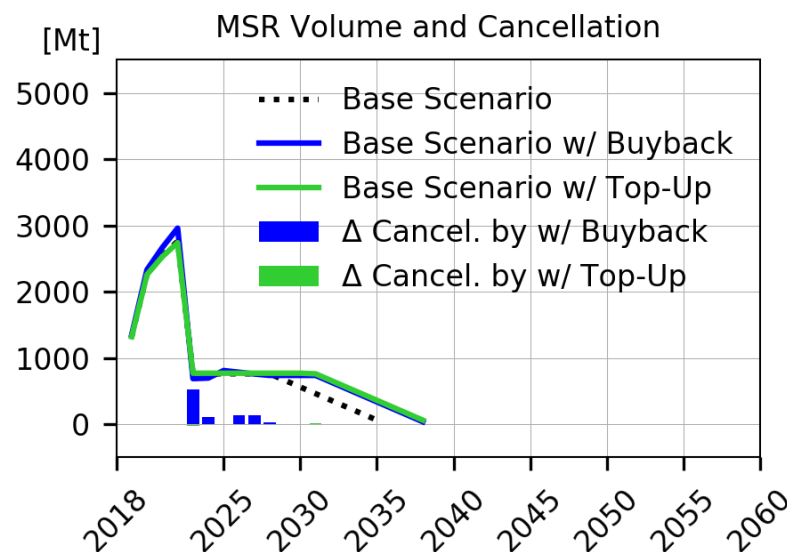
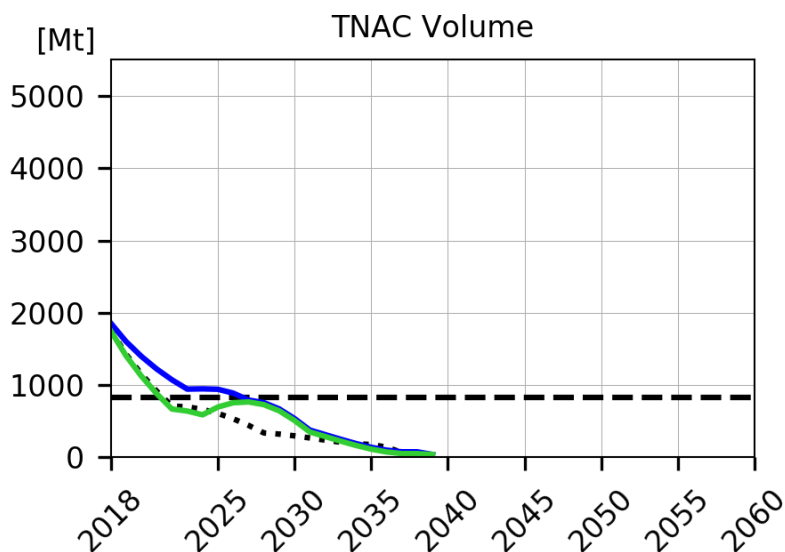
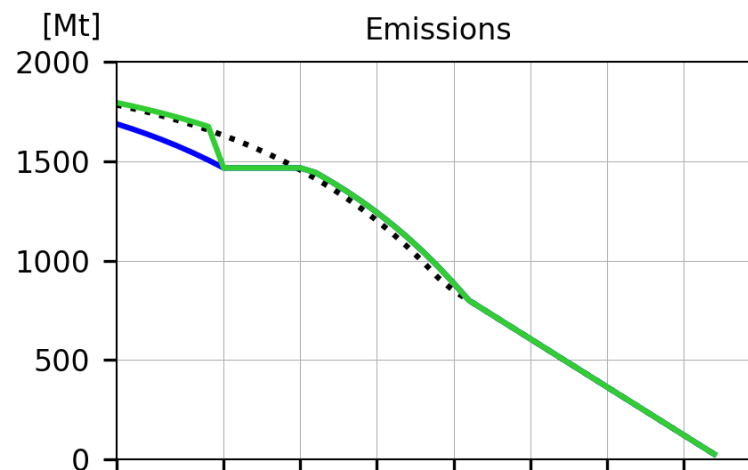
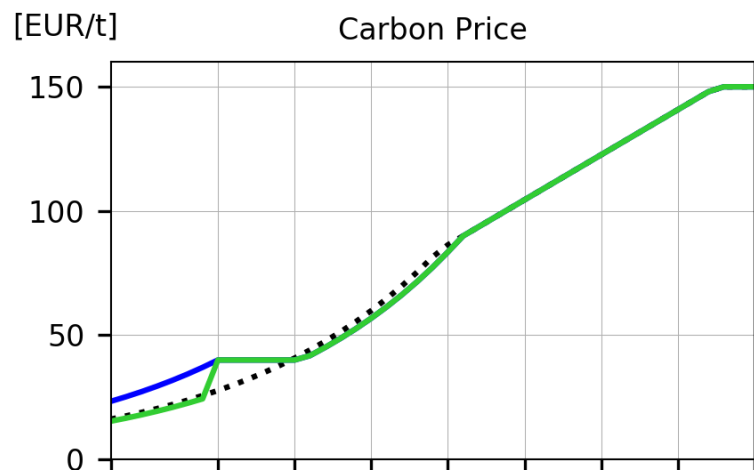
As long as there are “enough” allowances (banked or allocated for free) in the market:

$$p < CPF$$

If allowances are scarce in the market:

$$p = CPF$$

# Buyback vs. Top-Up-Tax: Impact on market outcomes



- Under both implementations price increase is anticipated but different effects
- Buyback:
  - Price increase to discounted CPF already today
  - Lower emissions and higher cancellation
- Top-up-tax:
  - Since it doesn't impact the EUA price itself, no price increase today
  - Green paradox: Future taxation of asset decreases its value today
  - Hence, slightly lower price today

# Findings

- Reform of the EU ETS allows for effective policies, but policies can also backfire.
- Success of policies is driven by various aspects, among others:
  - Curvature of MAC curve
  - Timing of policies
  - Concrete implementation, impact on MAC curve
- To ensure effectiveness in this complex environment direct supply adjustments are important, i.e. withdrawing of allowances from auction volumes by nation states.
- Extend the possibility for allowance withdrawals to all kinds of overlapping policies.
- Different CPF implementations have different outcomes w.r.t. prices, emissions and revenue, in particular in the short-term.