
EU ETS Market Stability Reserve

Simulations with the Zephyr model

CEPS – MSR Taskforce – April 10th, 2014
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Zephyr is a simulation model of supply-demand equilibrium in the EU ETS from 2005 to 2030

- Operators (sectors) are represented :
 - they have **baseline emissions**, driven by growth
 - they receive **free allocation** (if non-electricity)
 - they have marginal **abatement cost** curves
- Operator **reduce emissions** as long as their marginal abatement cost is below the market price
 - without anticipations, operators buy deficits and sell surpluses
- Operator **anticipate** the future and **can bank surplus** allowances
 - they look at how much EUAs they will need in the future (=emissions)
 - they can chose to reduce emissions earlier vs. later, to which correspond different banking patterns
 - **different anticipation scenarios** can be simulated exogenously
- Each year the price starts at zero and rises until we reach a EUA **supply-demand equilibrium** on the market

- **Up to 2020** : hypothesis of a small impact of backloading on the price and on emissions, leading to a cumulated banking of 2,100 Mt in 2021

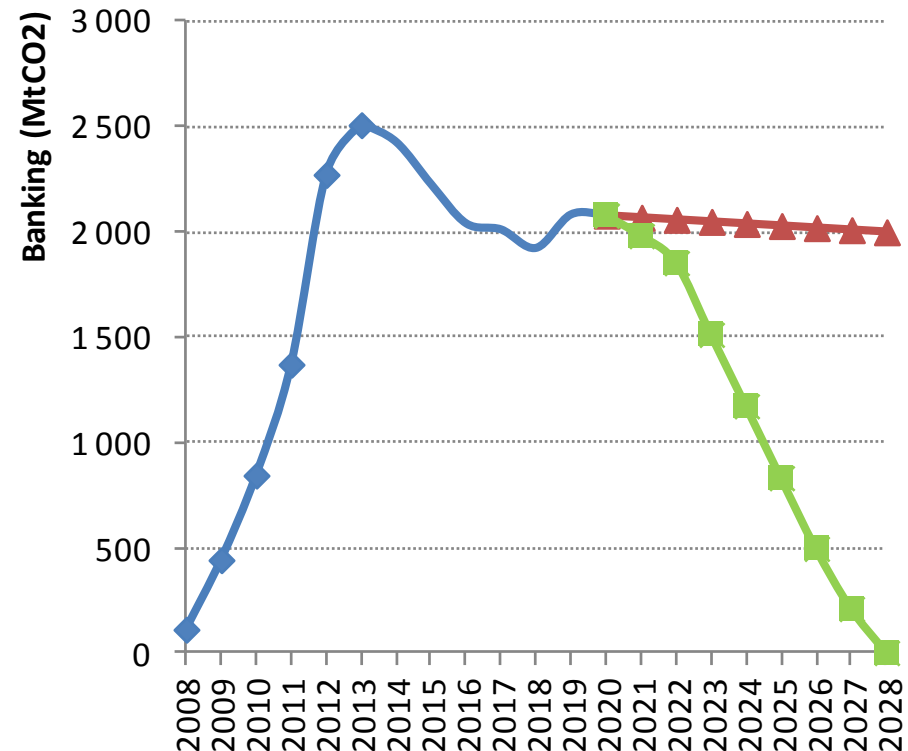
- **After 2020** :

- What will happen in reality will depend on actors' intertemporal choices; the model enables us to simulate two extreme situations:

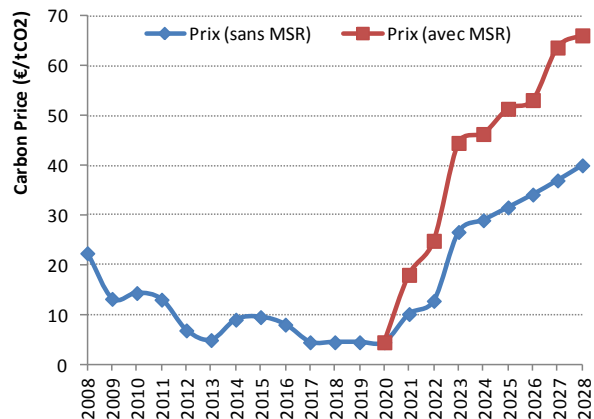
- **Red scenario** = more emission reduction now (anticipation of higher future reduction costs)
→ banking of surplus allowances

- **Green scenario** = less emission reduction now (lower future reduction costs)
→ banking diminishes

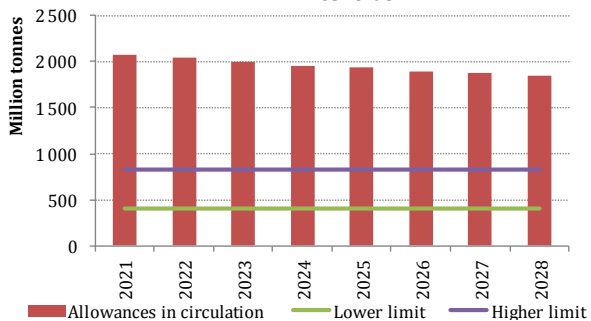
Corresponding banking scenarios



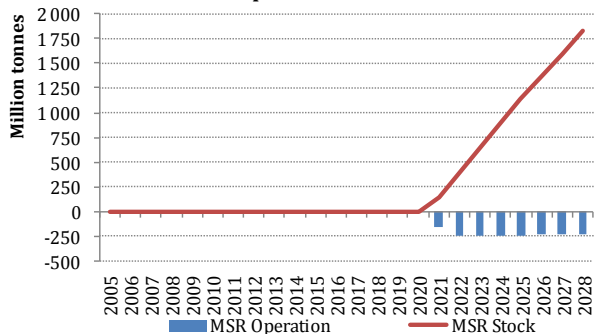
Reaction to MSR by early reductions



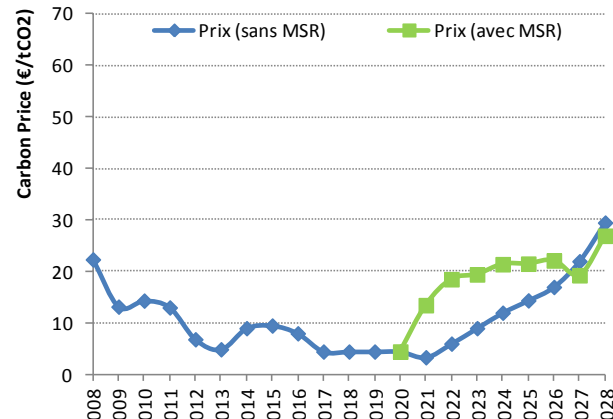
Thresholds



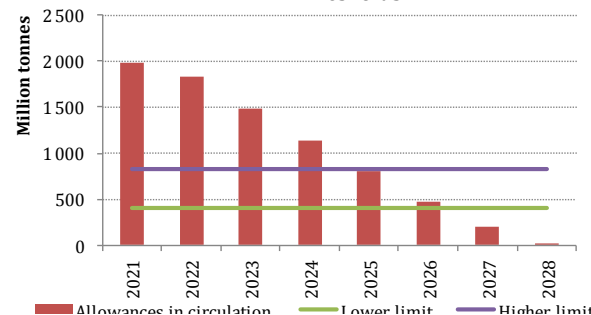
MSR Operations and stock



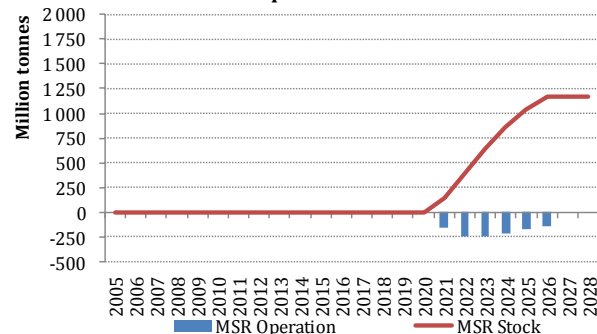
Reaction to MSR by late reductions



Thresholds



MSR Operations and stock



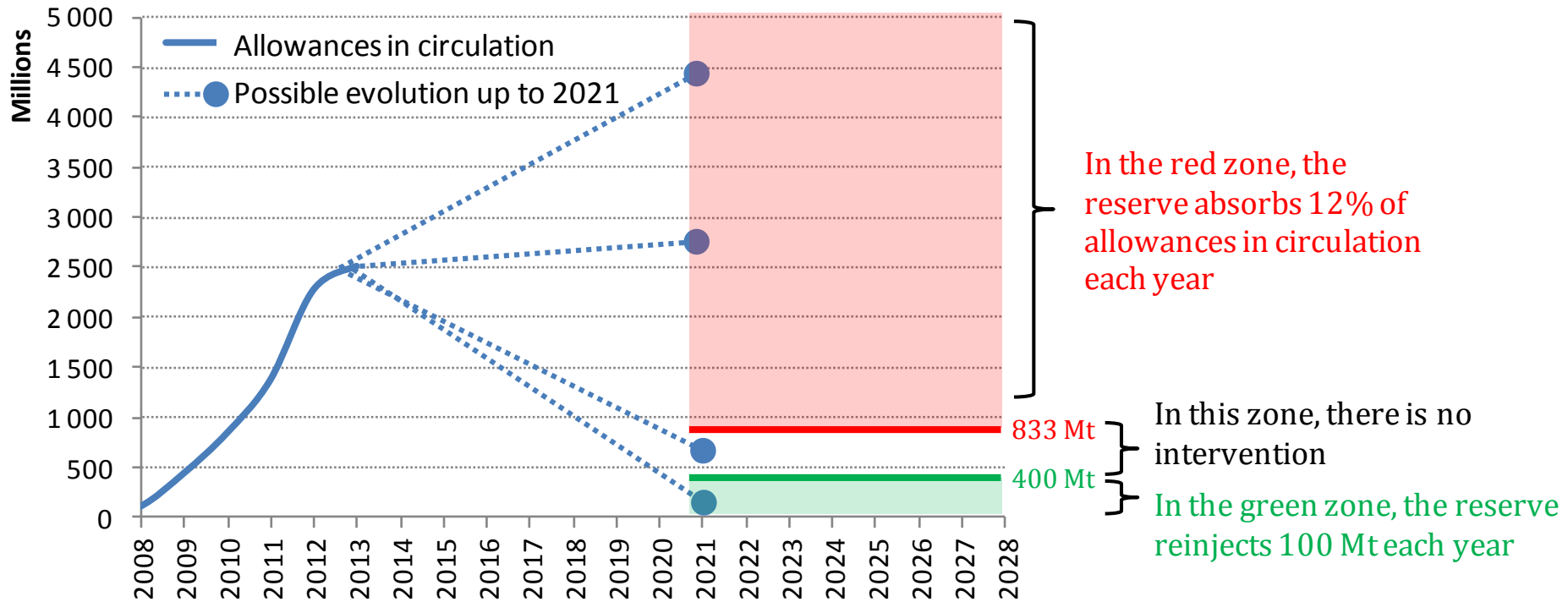
- The Commission proposal is a first step towards **flexibility of the supply** of allowances, necessary to ensure the **credibility** of the ETS over time
- The mechanism **leads in all cases to higher prices**:
 - By the mechanical set-aside of allowances
 - removals: probable ; size >100 Mt/yr
 - injections: less probable ; size <100 Mt/an
 - In our two scenarios, implied strengthening of the constraint in Phase 4
 - between 1,200 et 1,800 Mt in the MSR at the end of 2028
- The mechanism **can lead to greater volatility** on the market:
 - « Robotic » interventions ; fixed thresholds, difficult reevaluation
 - Time delay between observation and action
 - No differentiation between the causes justifying or not an intervention (banking as the only « thermometer ») : em. red. triggers the MSR !
- This leads us to propose an improvement of the current governance framework by the creation of an **Independent Carbon Market Authority**



Thank you for your attention

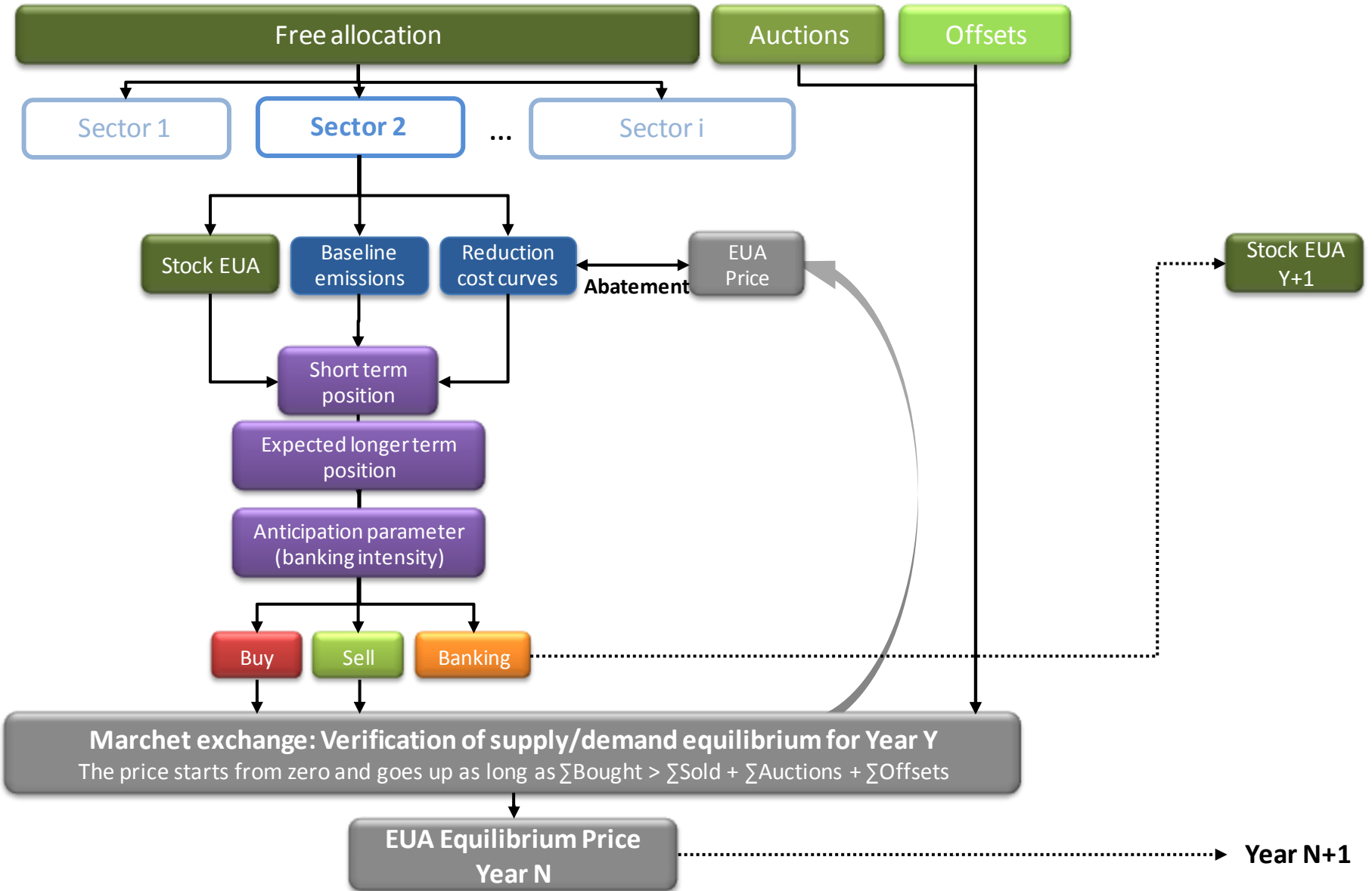
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- Two years delay between observation and action (availability of emission and surrender data)
- Emergency threshold on price variations (Art 29a) can trigger a reinjection of 100 Mt/yr
- In 2013, banking = 2,500 Mt. Where will banking be at the start of MSR in 2021? How will the MSR react to change in banking behavior ?

The Zephyr model



Allowance Cap

-21% in 2020 / 2005

-43% in 2030 / 2005 from 2021 on

Backloading on 2014-16 and 2019-22 (300, 350, 300 then 300, 200, 200, 200)

Growth/Baseline emissions

Ex post : Production index \times emission elasticity to production (0.6)

Ex ante : GDP growth \times emission elasticity to GDP (0.48)

GDP : 1.5%/yr until 2020, 1.6%/yr afterwards

Kyoto offsets

Ex post : observed use (1,060 Mt en phase 2)

Ex ante : \sim potential use on 2013-2020 (600 Mt) ; 0 Mt after 2020

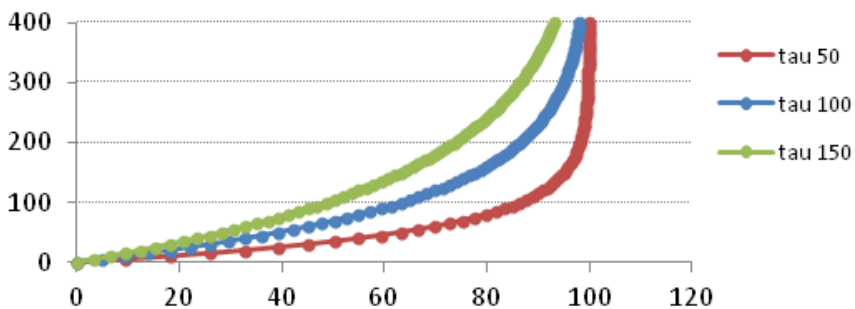
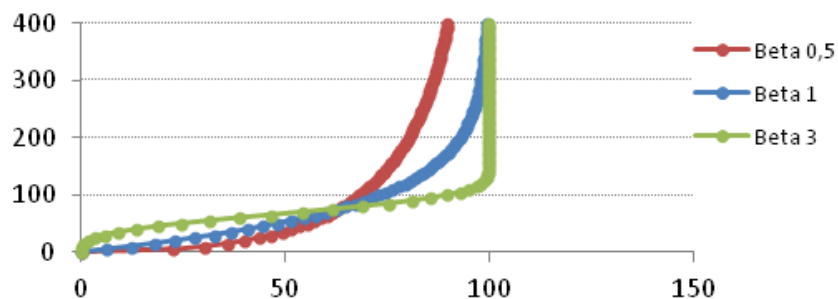
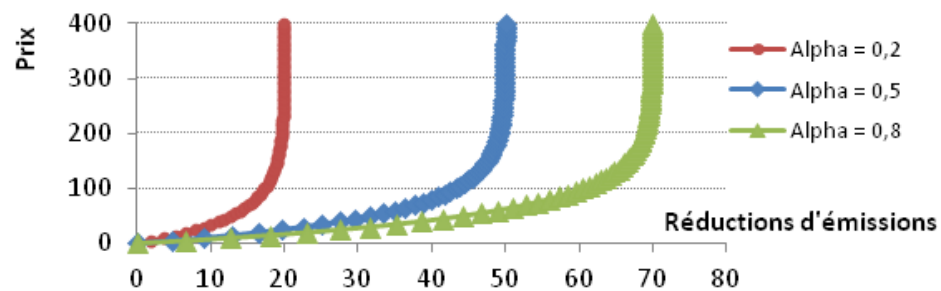
Other

No demand from the aviation sector

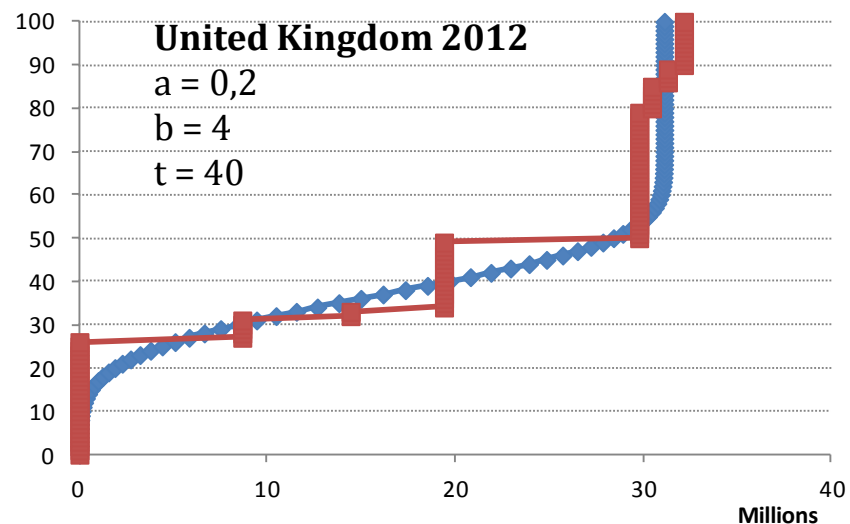
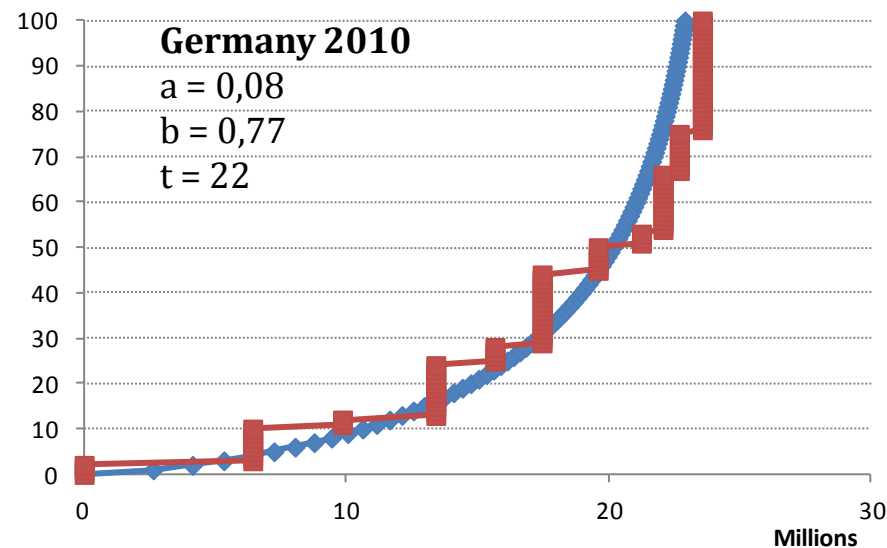
10% of annual emission reductions are removed from baseline emissions

Principe

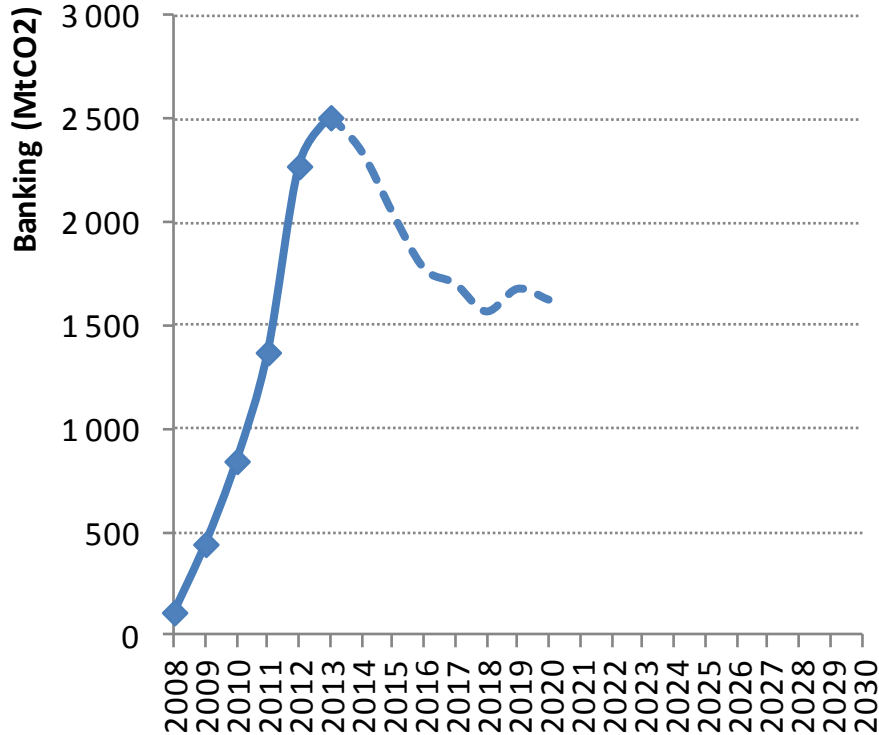
$$E_p = E_0 \left(1 - \alpha \left(1 - e^{-\left(\frac{p}{\tau}\right)^\beta} \right) \right)$$



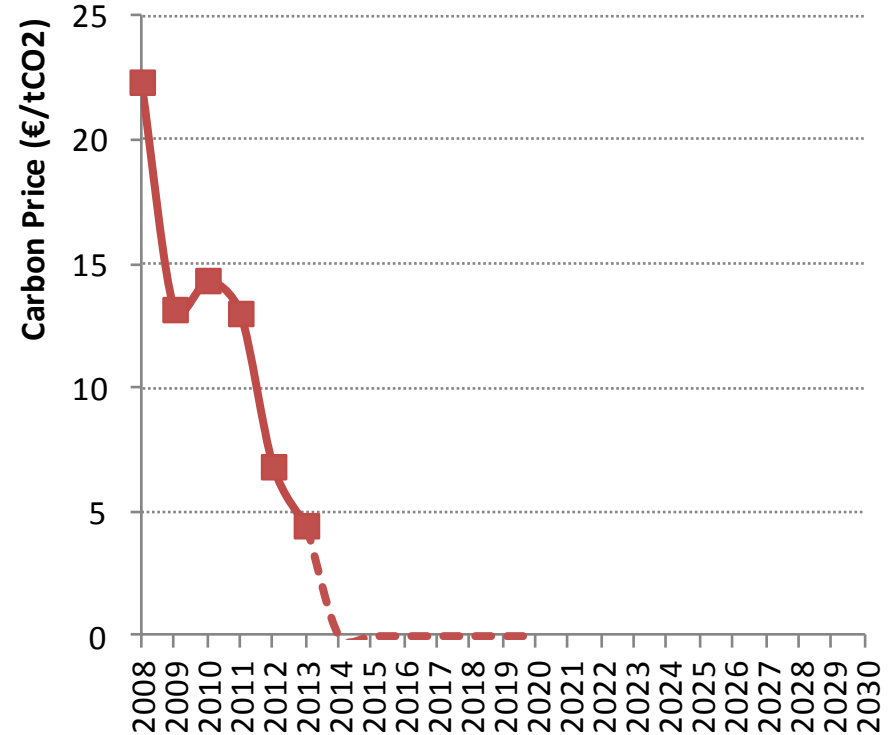
Examples



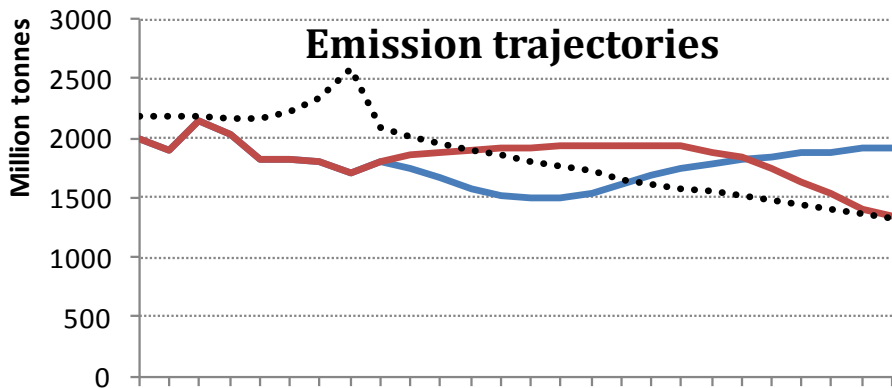
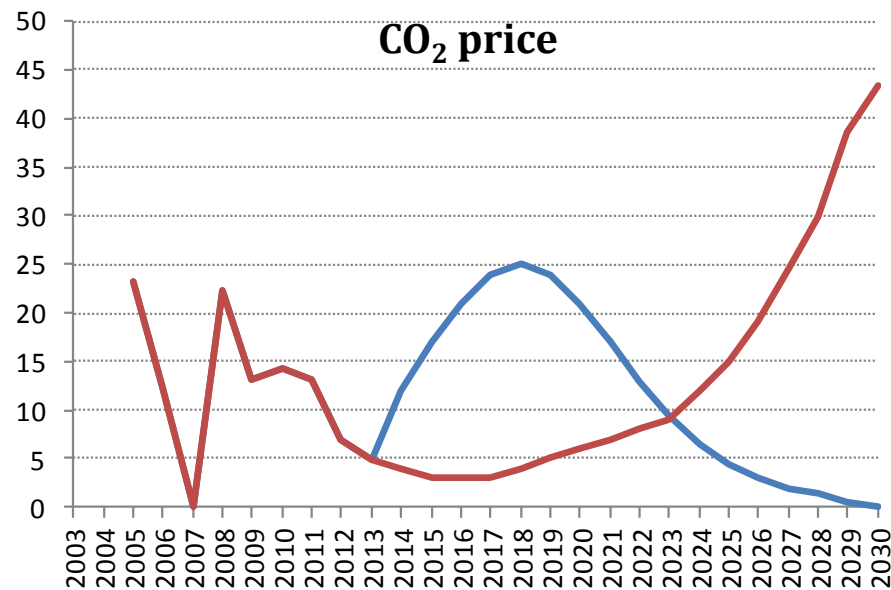
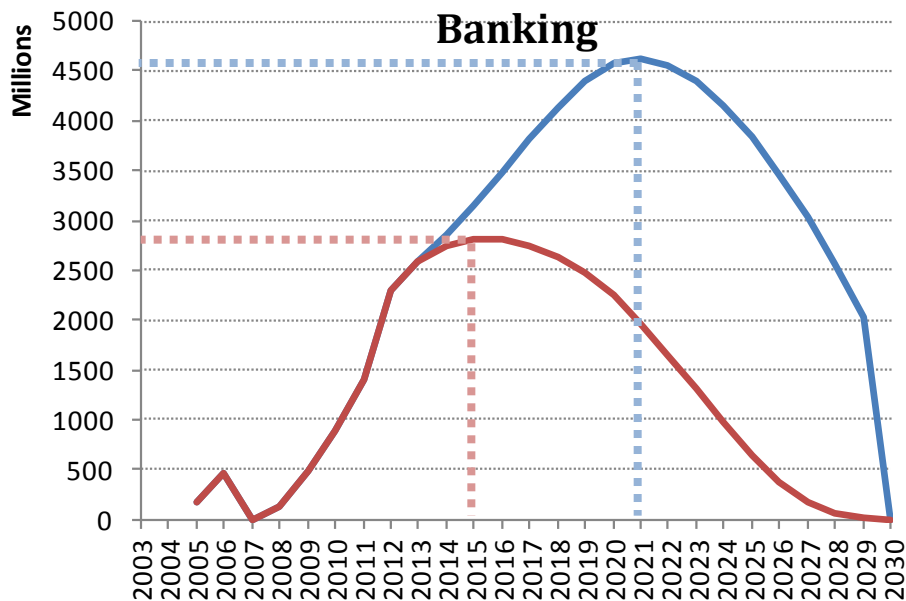
Banking



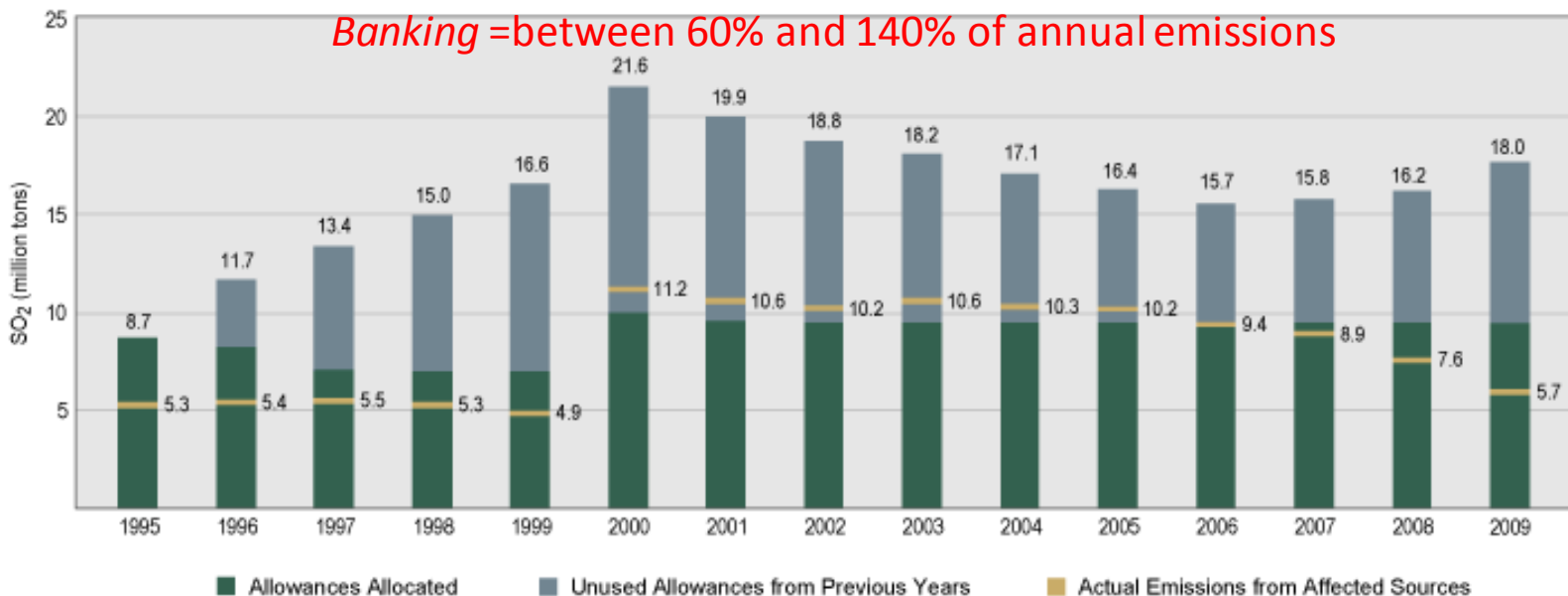
EUA price



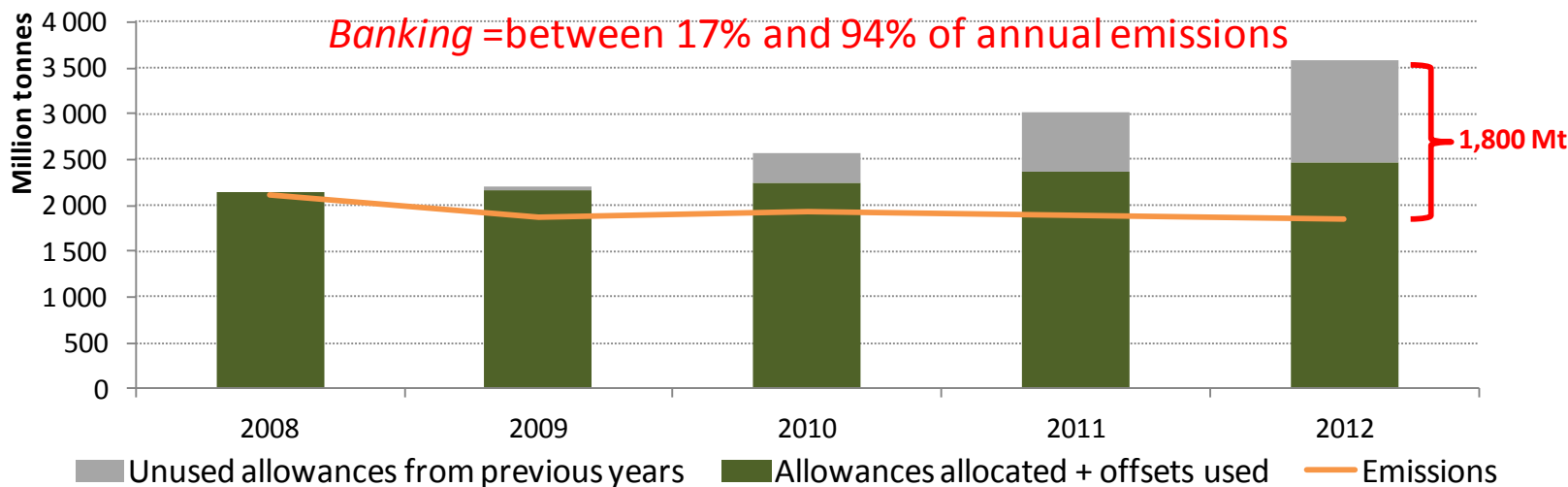
- When the carbon price is zero, emissions are maximum (baseline), so that cumulated banking is minimized (depending on baseline growth)
- In our case, 1.6 Gt en 2020



US SO₂ Trading Program



EU ETS



Function	Associated actions
Continuous monitoring and information transparency	<ul style="list-style-type: none"> • Collect, analyze and share data on market transactions and prices, emission trajectories, compliance behaviors, low carbon investments, competitiveness effects • Motivate and justify its decisions
Liquidity and market functioning in the short term	<ul style="list-style-type: none"> • Primary market: quickly adjusting the timing of auctions • No need for secondary market interventions
Credibility of the medium to long term constraint over time	<p>The public authority (not the ICMA) determines the emissions target, and the policy tools to achieve this target</p> <p>The ICMA implements the political target in the covered sectors and it can dynamically adapt the EU ETS cap in two cases:</p> <ul style="list-style-type: none"> • Ensure consistency with other policy instruments over time • Control unexpected effects of offsets and non-EU allowances
Accountability	<ul style="list-style-type: none"> • Periodic hearings by EU bodies • Public reporting