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CLIMATE IMPACT RESEARCH

Fit for 55: Challenges towards more ambitious EU ETS and its impact on the power sector

Sebastian Osorio & Michael Pahle

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EU Green Deal and Fit-for-55 package

Bloomberg Green

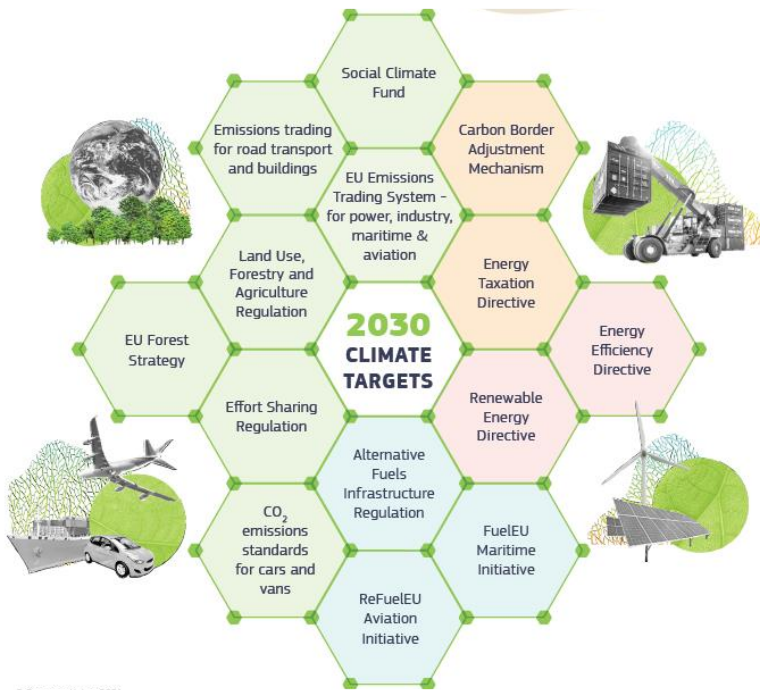
Green

EU Kicks Off Biggest Push Yet on Climate, Braces for a Fight

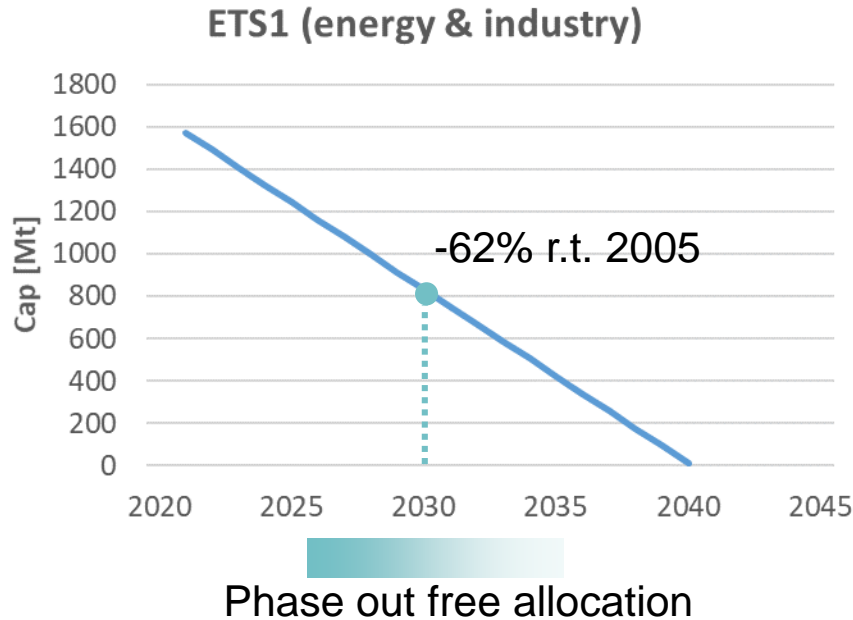
By Ewa Krukowska and John Ainger

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“Nothing we presented today is going to be easy. It’s going to be bloody hard,” European Commission climate chief Frans Timmermans said. But he said the “existential threat which is the climate crisis” called for radical steps.



A much tighter ETS cap



- Cap reduced by 4.2% (2005 level) each year (up from 2.2%), zero emissions in regulated sectors by ~2040
- Carbon price forecasts 2030: 48-52 €/t (EU Commission)

HOW HIGH IS THE CARBON PRICE REQUIRED TO REACH MORE AMBITIOUS 2030 TARGETS?

IMPACT ON THE POWER SECTOR
FOSSILS? ELECTRICITY PRICES?



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Tightening EU ETS targets in line with the
European Green Deal: Impacts on the
decarbonization of the EU power sector

Robert C. Pietzcker ¹  , Sebastian Osorio ¹  , Renato Rodrigues 

Potsdam Institute for Climate Impact Research, Potsdam, Germany

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LIMES-EU in a nutshell

- Linear optimization model
- Temporal resolution:
 - From 2010 to 2070 in 5-year steps
 - 10 representative days per year
 - 8 time slices per day -> 80 in total
 - Perfect foresight
- Geographical scope: Europe (29 model regions)
 - EU (w/o MT and CY) + CH + NO + aggregated Balkan
- 35 generation and storage technologies
- EU ETS energy-intensive industry and DH: MACCs
- Policy focus: EU ETS

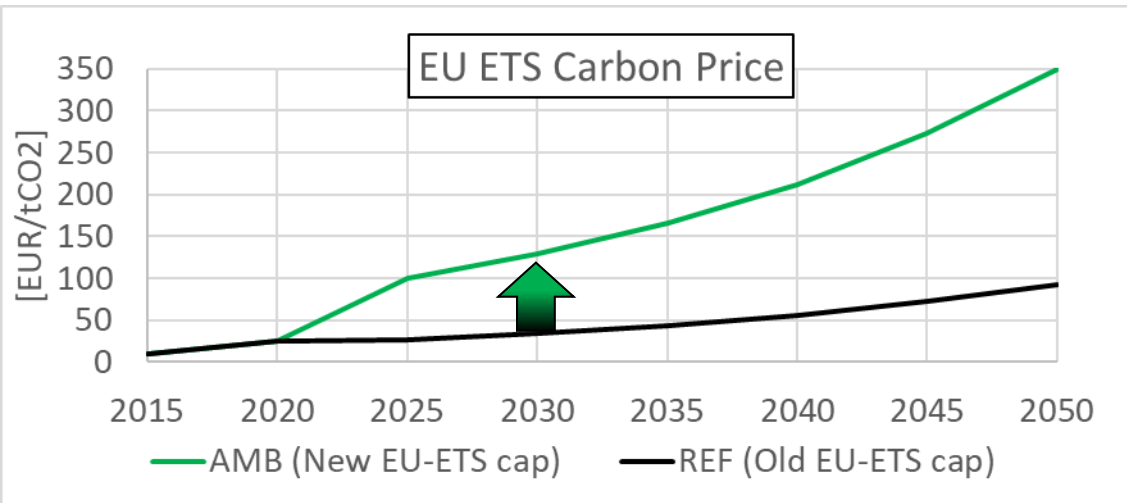


Scenario setup and assumptions

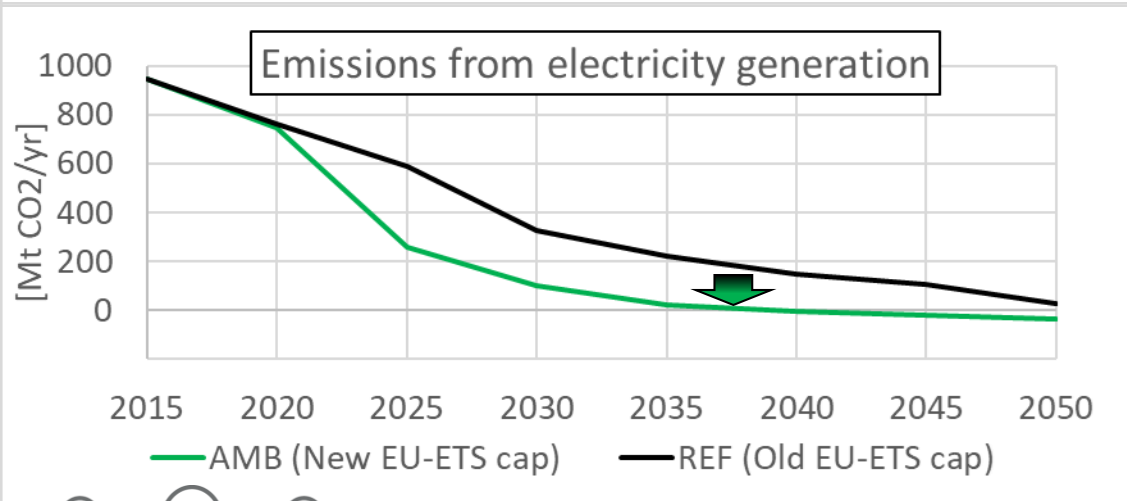
- Target ambition
 - REF: LRF = 2.2% -> 43% in 2030 -> budget = 35 GtCO₂
 - AMB: LRF = 4.3% -> 63% in 2030 -> budget = 19 GtCO₂
- No CCS before 2030 and limited between 2030 and 2040
- Phase-out plans to date (nuclear in DE, BE, CH; coal in 15 MS [Europe Beyond Coal, 2019])
- EU ETS: Banking allowed; MSR cancellations of 5.1 GtCO₂ (Osorio *et al.* 2020b)
- Sensitivities:
 - High demand: 6880 TWh in 2050 (i.e., 170% wrt default assumptions) [DEEDS scenario explorer]
 - No transmission expansion (fixed to 2020 values)
 - No CCS available / no nuclear expansion (only under construction)

Fit for 55 cumulative cap (+UK):
~21 Gt

Tighter ETS caps have large impact on carbon prices and emissions

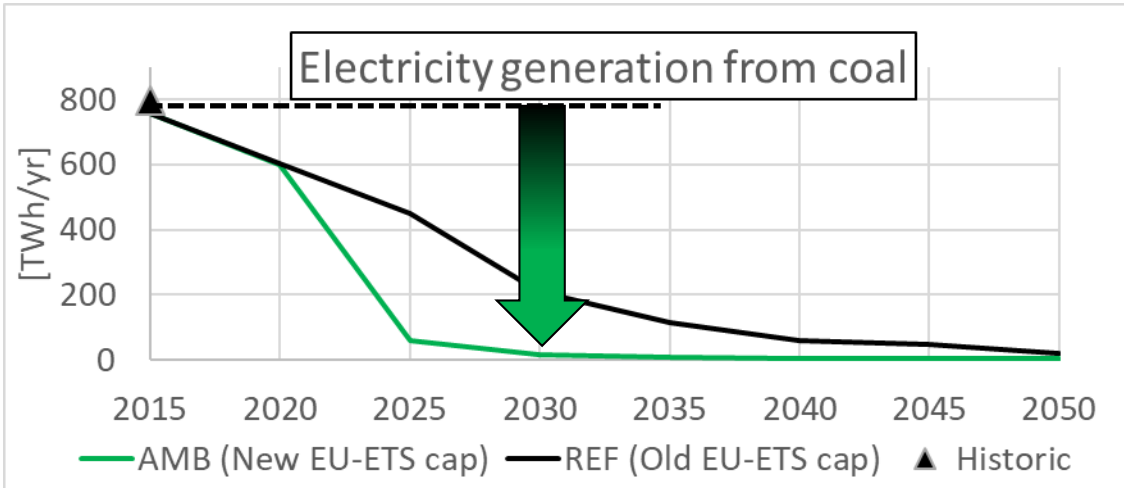


- CO₂ prices in the ETS would more than triple, from 35€/tCO₂ in 2030 to 130€/tCO₂

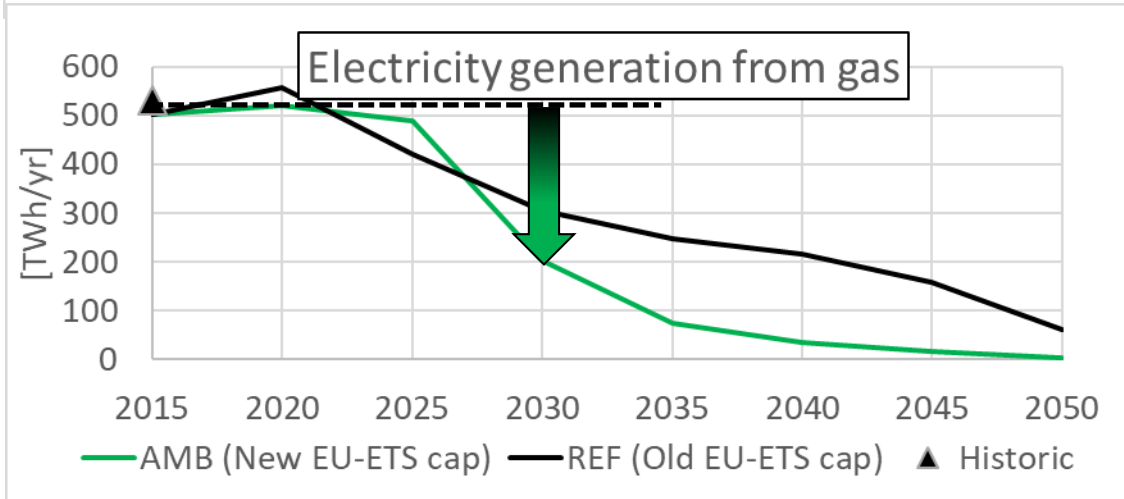


- Power sector would be carbon-neutral before 2040

Price-driven phaseout of fossil fuel use



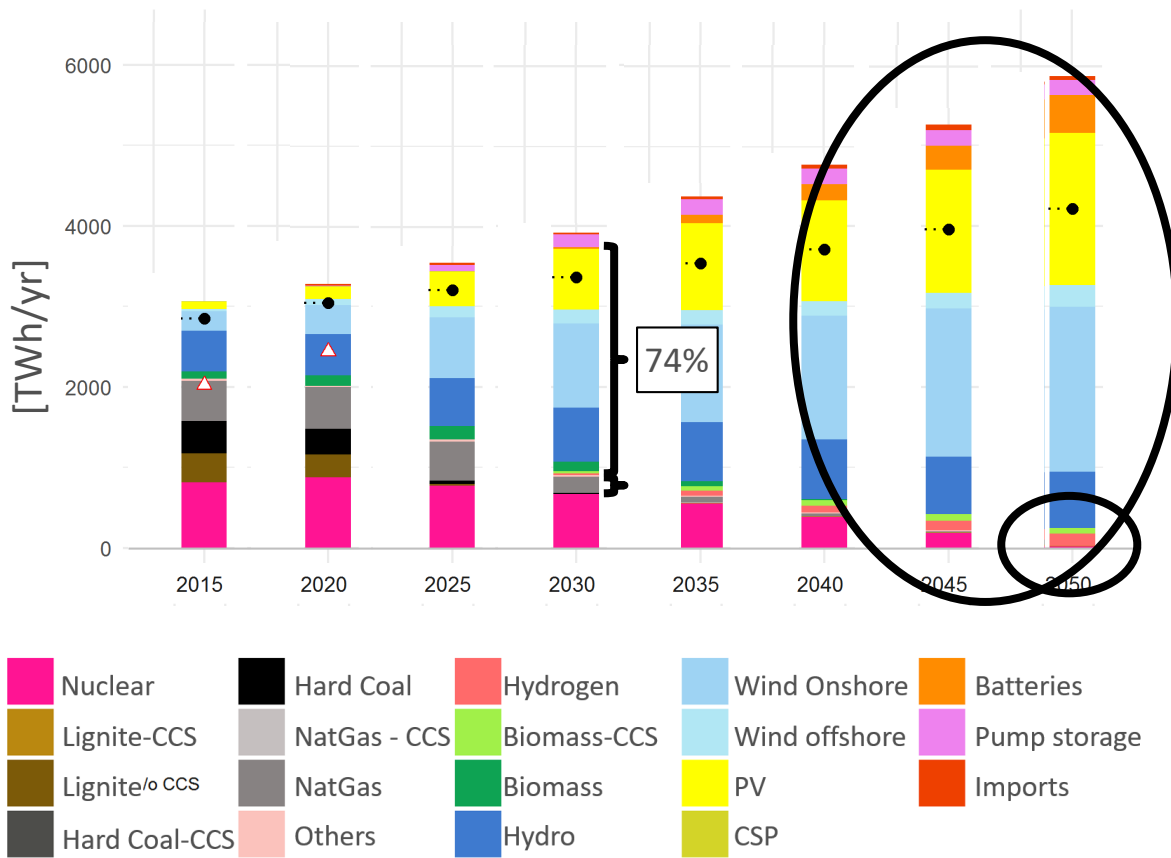
EU-wide coal phaseout by 2030 (<20TWh) – driven by carbon prices



In 2030, gas-based generation is reduced by 60% vs 2015

Carbon prices >100€/tCO₂ transform power sector

EU electricity generation



Long-term EU power sector almost exclusively based on renewable energies

Nuclear and fossil-CCS not competitive in the EU power sector

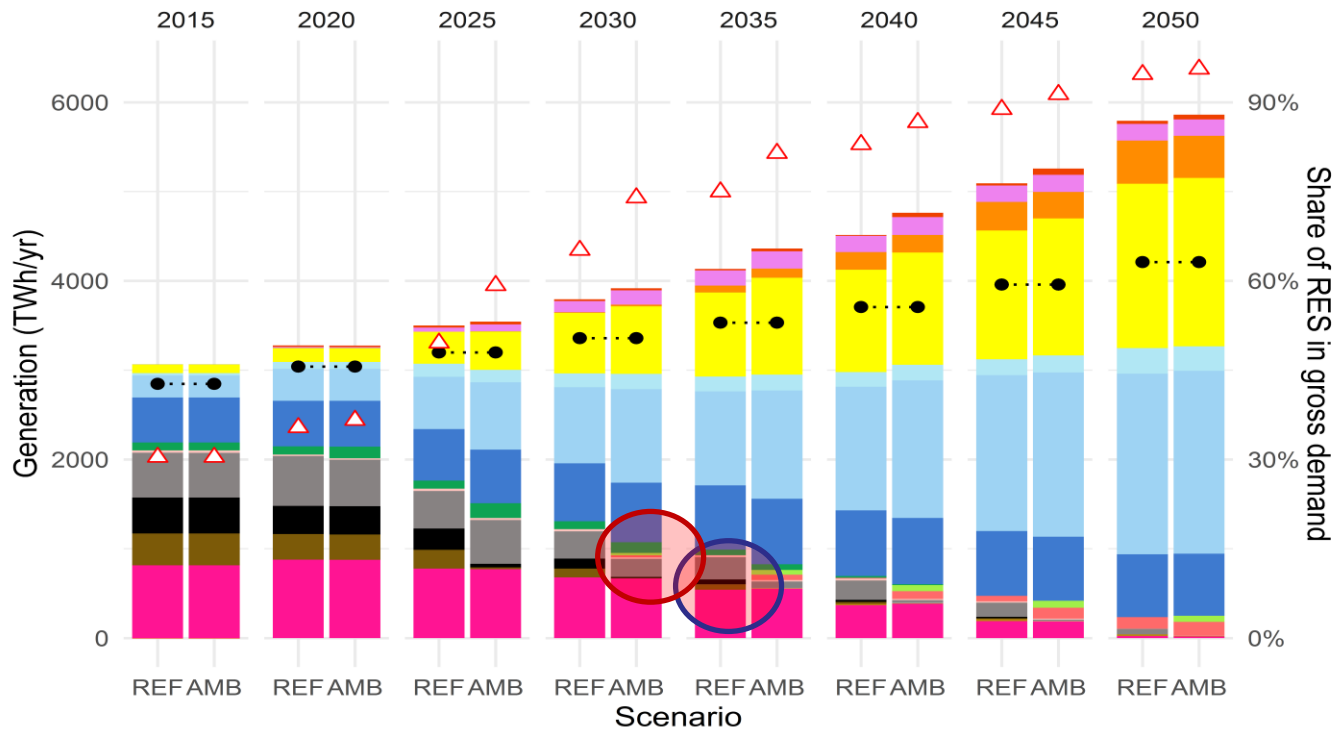
In 2030, renewables share reaches >70%

For this, high investments needed 2020-2030:

50 GW/yr PV, 30 GW/yr wind
4GW/yr H₂, 2 GW/yr batteries

Fossil fuels strongly reduced by 2030

Effects of increasing the target stringency on technology-mix

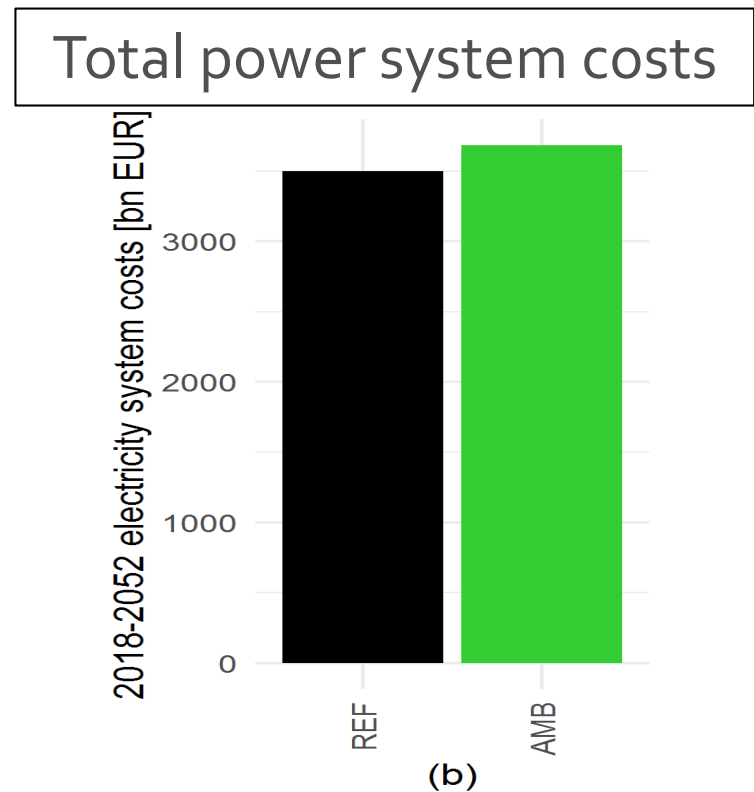
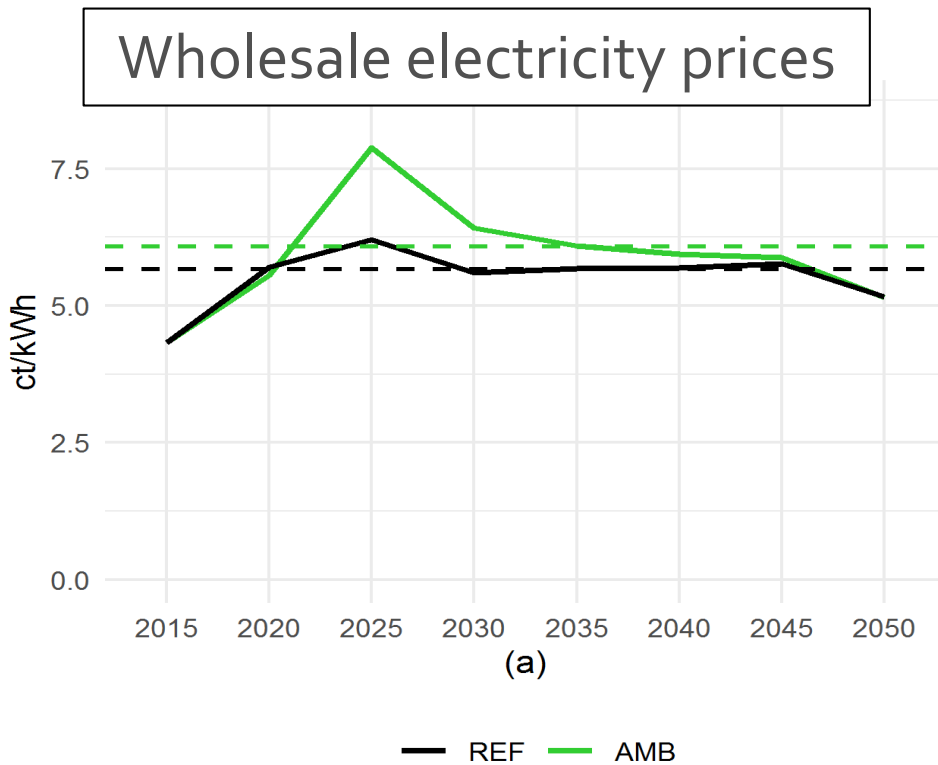


Coal and gas use still significant after 2030 in REF

REF to AMB -> speeding up vRES deployment by 1-5 years

BECCS only deployed in AMB

Economic impacts



Electricity prices increase on average by 0.4 ct/kWh (~2 ct/kWh max in 2025)

Total power sector costs increase by roughly 5%

To sum up...

- To achieve -55% emission target, CO₂ price needs to reach 130 eur/t in 2030
- At such prices, the power sector would fundamentally transform by 2030:
 - EU-wide coal phase-out; gas-based power generation reduced by >50%
 - Renewable energy share increases to >70% in electricity% -> yearly investments of 50GW/yr PV, 30GW/yr wind
- Increasing the target ambition:
 - Speeds up the transition by 2-15 years for different parts of the electricity system
 - Power sector carbon-neutral by 2040, halve cumulated emissions
 - 0.4ct/kWh increase of average electricity prices; total discounted power system costs would only increase by 5%

TO WHAT EXTENT WOULD THE MARKET STABILITY RESERVE (MSR) TIGHTEN FURTHER THE ETS?

WHAT PROBLEMS MIGHT ARISE WITH THE MSR REFORM?



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Reviewing the Market Stability Reserve in light of more ambitious EU ETS emission targets

Sebastian Osorio ^{a, *}, Oliver Tietjen ^{a, b}, Michael Pahle ^a, Robert C. Pietzcker ^a, Ottmar Edenhofer ^{a, b, c}

^a Potsdam Institute for Climate Impact Research (PIK), Member of the Leibniz Association, P.O. Box 60 12 03, D-14412, Potsdam, Germany

^b Technical University, Berlin, Germany

^c Mercator Research Institute on Global Commons and Climate Change, Berlin, Germany

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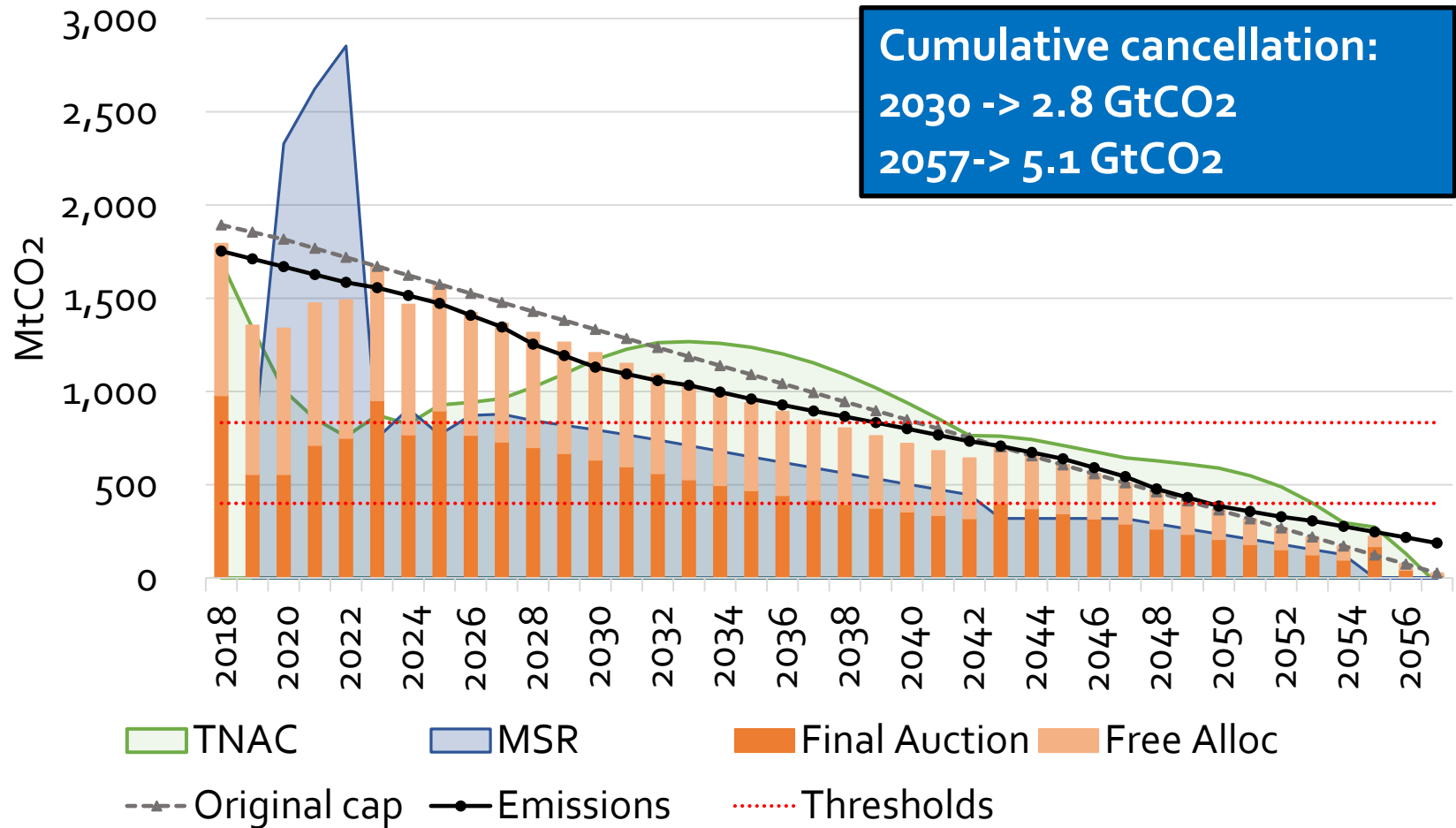
The MSR

Deal with “structural supply-demand imbalance” (European Parliament and Council of the European Union, 2015)

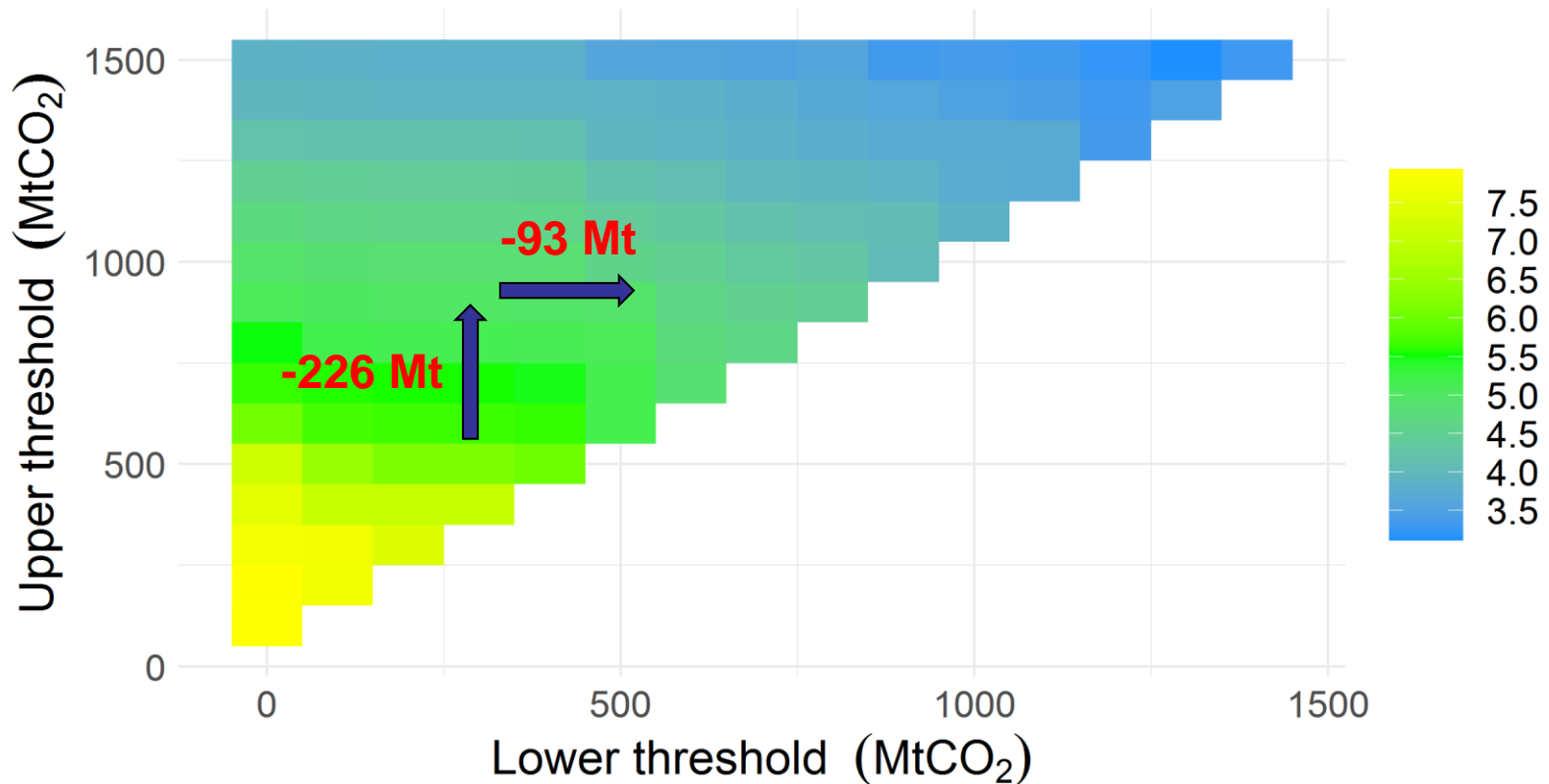
Three main rules:

- If total number of allowances in circulation (TNAC) $> 833 \text{ MtCO}_2$
 - > Intake: transfer from market to MSR (24% of TNAC until 2023, 12% after)
- If TNAC $< 400 \text{ MtCO}_2$
 - > Outtake: transfer from MSR to market (100 MtCO_2)
- If MSR $>$ auction
 - > Cancellation: deletion from the MSR (difference between MSR and auctions) - from 2023 only

Prolonged period of cancellations

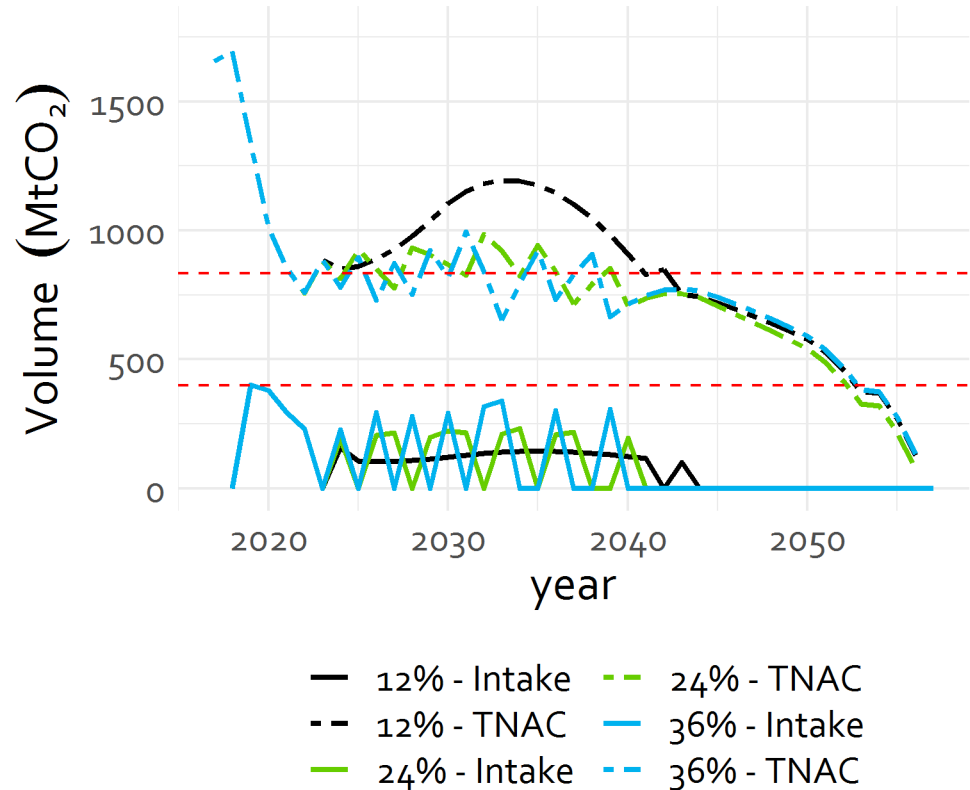
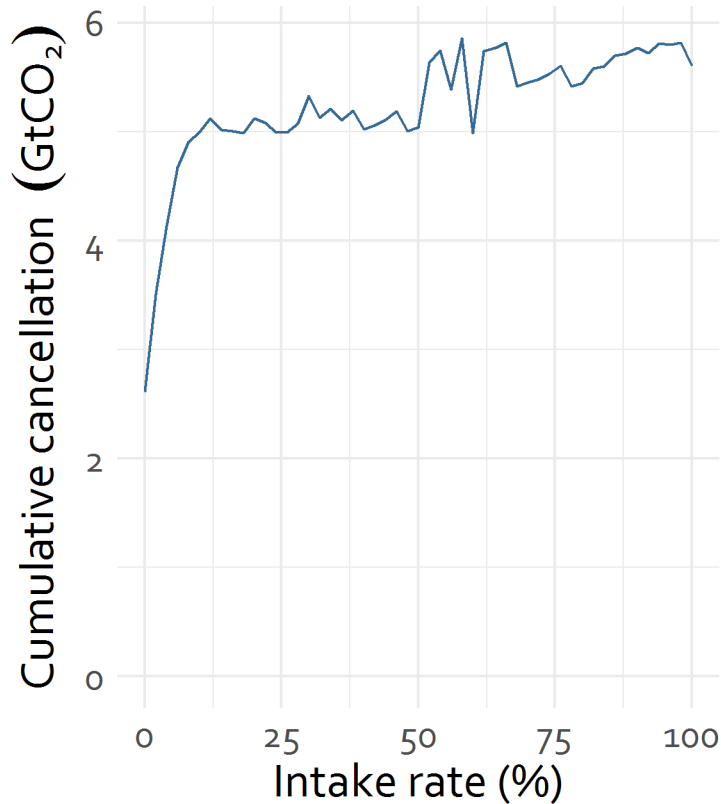


A larger impact from upper threshold



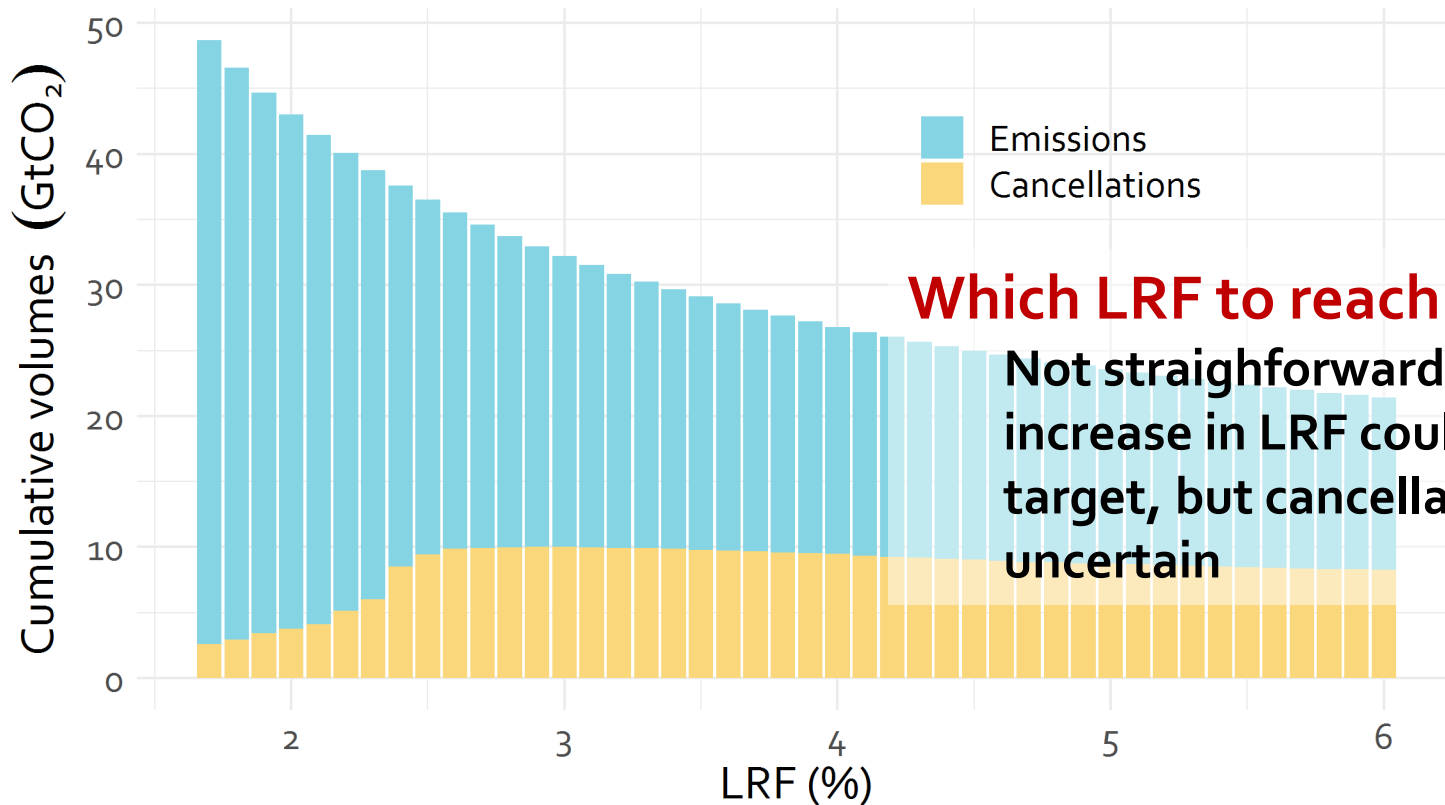
Highest cancellation for low values of the lower and upper thresholds:
-> not only more transfers to the MSR, but also less outtake from it

Problems might arise when increasing the intake rate



Small variation of cancellation for intake rates above 10%, but higher intake rates induce some instability to the intake volumes as the TNAC drops faster

Effects of tightening the cap

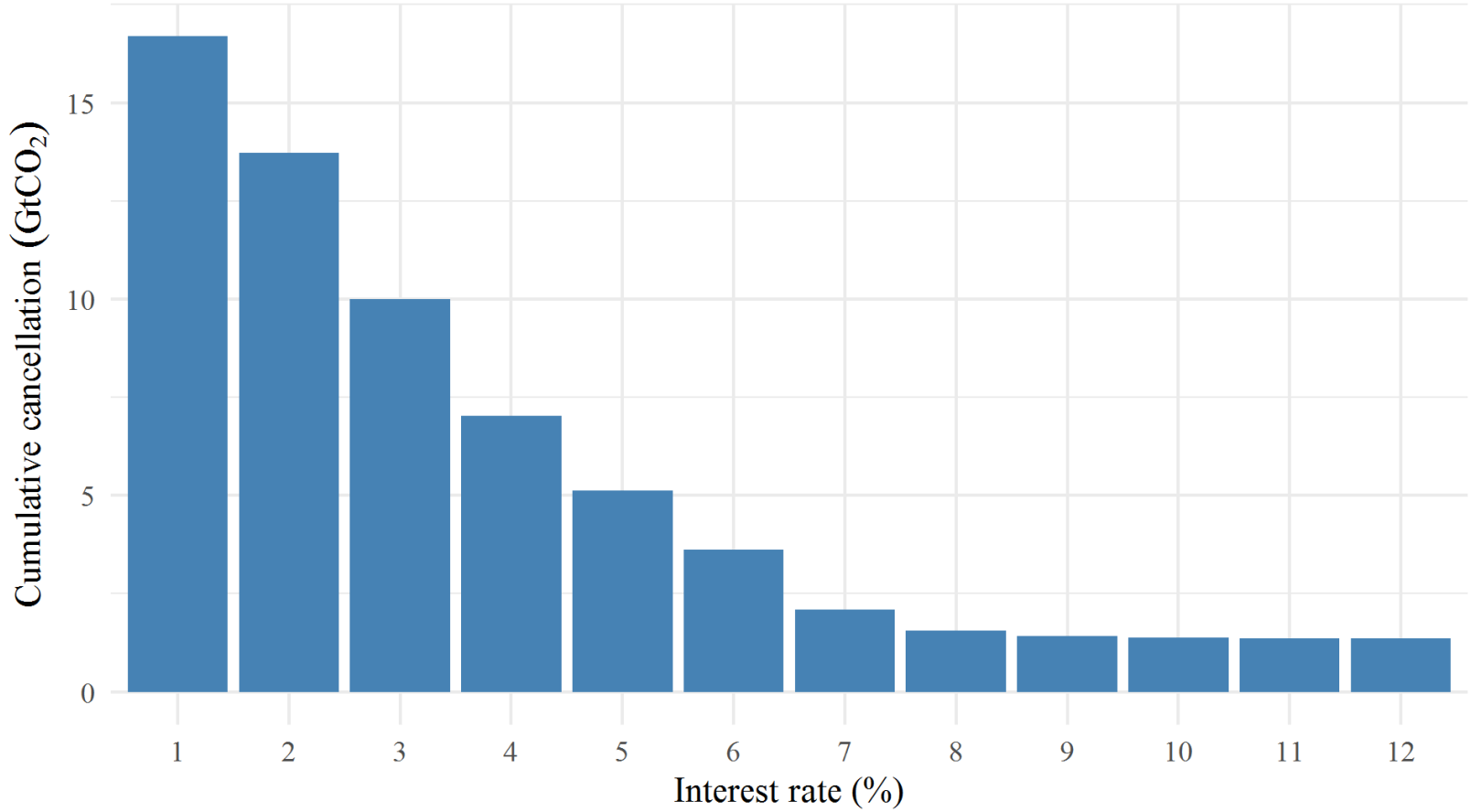


Which LRF to reach 2030 target?
Not straightforward -> small increase in LRF could deliver such target, but cancellations are uncertain

Feedback effect:

Higher LRF leads to strong long-term scarcity of allowances -> higher short term prices (due to banking) -> higher TNAC -> higher intake into the MSR

How does uncertainty look like?



How to tweak the MSR?

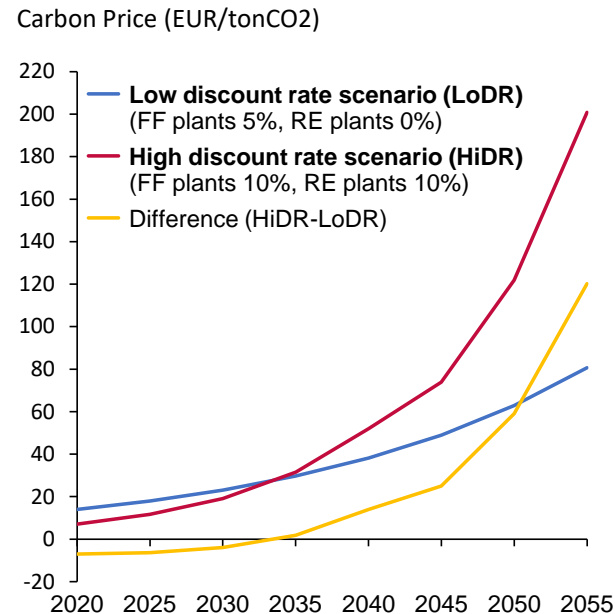
- Under uncertainty high intake rate may cause some additional price jumps or higher price volatility
- Reinforcement effect between LRF and cancellations -> risk of overshooting
- The (unpredictable) expectations of market actors about future CO₂ prices and costs will – via the MSR – have strong influence on the size of the cap
- Way forward? “Price stability reserve”?

MORE AMBITIOUS TARGETS HEAVILY RELY ON REACHING HIGH CARBON PRICES, BUT THERE IS RISK OF POLITICAL BACKLASH

MAY POLITICAL PRESSURE SOFTEN THE CAP?

Risk that the cap may be softened?

- If prices become **too hockey stick-shaped**, the resulting political pressure may soften the cap (cp. current electricity price rise)
- Crucial factor: **costs of capital for renewables**, determined by...
 - General interest rate (IR)
 - Market risk / renewable policy => risk premium
- **Higher IR and exposing RE to market risk** bends price path upwards
- Effect much more pronounced under **tighter cap**
- Next generation of RE policies: not technology subsidies, but **risk-transfer mechanisms**



Overall conclusion

- Fit for 55 requires prices in the order of >100 eur/t by 2030
 - Fossil phase-out almost completed by 2030, power sector emissions to zero in 2040
 - Limited impact on electricity prices
- Do not forget the MSR:
 - Undesired effects of 'strengthening' the MSR
 - Reinforcement effect between cap tightness and MSR cancellations
 - But huge uncertainty regarding investors behaviour (short-sightedness) and other economic /technical/regulatory factors
- How to deal with political feedback to sharp price increase?
 - Need to de-risk RES investments and adapt the instrument design of carbon markets