

CLIMATE CHANGE

15/2026

Interim report

EU ETS 2 Market Stability Reserve: Analysis of Reform Proposals

Scenario & Modelling Results

by:

Harry Öhman, Marcus Ferdinand

Veyt, Oslo, Norway

Srijna Jha, Andreas Wehrl

The Climate Desk TCD Consulting GmbH, Bregenz, Austria

publisher:

German Environment Agency

CLIMATE CHANGE 15/2026

KLIFOPLAN Federal Ministry for the Environment, Nature
Conservation, Nuclear Safety and Consumer Protection

Project No. (FKZ) 37K2 44 108 0
FB002046/ENG

Interim report

EU ETS 2 Market Stability Reserve: Analysis of Reform Proposals

Scenario and Modelling Results

by

Harry Öhman, Marcus Ferdinand

Veyt, Oslo, Norway

Srijna Jha, Andreas Wehrl

The Climate Desk TCD Consulting GmbH, Bregenz, Austria

On behalf of the German Environment Agency

Imprint

Publisher

Umweltbundesamt
Wörlitzer Platz 1
06844 Dessau-Roßlau
Tel: +49 340-2103-0
Fax: +49 340-2103-2285
buergerservice@uba.de
Internet: www.umweltbundesamt.de

Report performed by:

The Climate Desk TCD Consulting GmbH
Gallusstrasse 45
6900 Bregenz
Austria (Head Office)

Report completed in:

October 2025

Edited by:

Section V 3.3 Economic Aspects of Emissions Trading, Auctioning, Evaluation
Fabian Schmid, Paula Müller

DOI:

<https://doi.org/10.60810/openumwelt-8323>

ISSN 1862-4359

Dessau-Roßlau, März 2026

The responsibility for the content of this publication lies with the author(s).

Abstract

The EU Emissions Trading System 2 (EU ETS 2), covering emissions from buildings and road transport, will start in full in 2028 after a four-year long reporting phase. Currently, policymakers are debating the design of its Market Stability Reserve (MSR) and its role in smoothing allowance supply, limiting price increases, and safeguarding the system's environmental integrity. As a contribution to these ongoing discussions, this report uses Veyt's EU ETS 2 market model to compare seven reform options and analyse their impacts on prices, the Total Number of Allowances in Circulation (TNAC), the annual MSR releases and withdrawals, and system-wide CO₂ emissions.

Three central findings emerge:

1. All reform options reduce carbon prices and increase emissions, but their effects vary by magnitude and timescale of the additional MSR releases. Allowing MSR releases to continue after 2030 produces the steepest price decrease (24% lower in 2027¹ and 68% lower in 2032). But this also yields the largest cumulative emissions increase effects (6% higher until 2040). Alternatively, when such post-2030 MSR releases are capped at 50 Mt instead of 100 Mt annually, this softens the initial effects on prices (11% lower in 2027 and 36% lower in 2032) and cumulative emissions (5% higher until 2040).
2. Making MSR thresholds and release volumes dynamic smoothens interventions over time. This prevents large surplus spikes, delivers moderate early price relief (about 10% lower than in 2027), and limits cumulative emissions increases compared to the more generous release designs. Dynamisation also reduces uncertainty by removing sharp MSR releases, participants can be more confident of future supply.
3. The combination of smaller MSR releases (50 Mt) from 2031 to 2034, which uses dynamic thresholds, and a strengthened Price Stability Mechanism (PSM), emerges as the most balanced reform option. It delivers a moderate and steady price reduction of roughly 30% by 2032 with a cumulative emissions increase of 4% until 2040.

Overall, the results confirm a clear trade-off. More generous or prolonged MSR releases lower prices but inflate supply and cumulative emissions, which undermines cap integrity.

Two policy implications follow:

1. Making the MSR thresholds and volumes dynamic is beneficial because it avoids threshold effects and smoothens interventions over time.
2. Extending the MSR lifetime can help ease the market when it is the tightest, but it should be paired with safeguards such as phased invalidation and annual release caps to balance price stability with environmental integrity. If the existing emission reduction targets in the covered sectors are to be achieved, additional climate policies in the policy mix need to be strengthened in order to compensate for the reduced mitigation impact of the EU ETS 2.

¹ The simulations were finalized in May 2025. Hence, the postponement of EU ETS 2 to 2028 is not considered in the analysis which however does not change the key results and policy implications of the analysis.

Kurzfassung

Das EU-Emissionshandelssystem 2 (EU ETS 2) für die Sektoren Gebäude und Straßenverkehr wird 2028 nach einer vierjährigen Berichtsphase vollständig in Kraft treten. Aktuell diskutiert die Politik über die Ausgestaltung der Marktstabilitätsreserve (MSR) und deren Rolle zur Glättung des Angebots an Zertifikaten, zur Begrenzung von Preisanstiegen und zur Absicherung der Umweltintegrität des Systems. Als Beitrag zu diesen laufenden Diskussionen vergleicht der vorliegende Bericht anhand des EU-ETS-2-Marktmodells von Veyt sieben Reformoptionen. Er analysiert deren Auswirkungen auf Preise, die Gesamtzahl der sich im Umlauf befindlichen Zertifikate (TNAC), die jährlichen Ausschüttungs- und Entnahmemengen durch die MSR, sowie die systemweiten CO₂-Emissionen.

Drei zentrale Erkenntnisse lassen sich festhalten:

1. Alle Reformoptionen führen zu einer Senkung der CO₂-Preise und einem Anstieg der Emissionen. Die Auswirkungen variieren jedoch je nach Umfang und Zeitrahmen der zusätzlichen Ausschüttungen. Wird die Ausschüttung von Mengen durch die MSR nach 2030 fortgeführt, ergibt sich hieraus der stärkste Preisrückgang (-24 % im Jahr 2027² bzw. -68 % im Jahr 2032). Dies bewirkt zugleich die größten kumulierten Emissionssteigerungen (+6 % bis 2040). Begrenzt man die MSR-Ausschüttungsmengen nach 2030 auf 50 Mt anstatt 100 Mt, dämpft dies die anfänglichen Preiseffekte (-11 % im Jahr 2027 bzw. -36 % im Jahr 2032) und die kumulierte Emissionserhöhung (+5 % bis 2040).
2. Die Dynamisierung der MSR-Schwellenwerte und Ausschüttungsmengen führt zu einer zeitlichen Glättung der Eingriffe. Sie verhindert starke Überschussspitzen, bewirkt eine moderate frühzeitige Preisdämpfung (-10 % im Jahr 2027) und begrenzt den kumulierten Emissionsanstieg im Vergleich zu großzügigeren Ausschüttungsregelungen. Die Dynamisierung reduziert zudem Unsicherheiten, da abrupte MSR-Ausschüttungen vermieden werden und so das Vertrauen unter Marktteilnehmern in die zukünftige Angebotsentwicklung gestärkt wird.
3. Die Kombination aus einer reduzierten MSR-Ausschüttung (50 Mt) zwischen 2031 und 2034, die über dynamische Schwellenwerte geglättet ist, mit einem gestärkten Preisstabilitätsmechanismus (PSM) erweist sich als ausgewogenste Reformoption. Sie führt zu einer moderaten und stetigen Preissenkung von etwa 30 % bis 2032, während der erwartete Emissionsanstieg bis 2040 bei kumulierten 4 % liegt.

Insgesamt bestätigen die Ergebnisse einen eindeutigen Zielkonflikt. Großzügigere oder längere MSR-Ausschüttungen senken die Preise, indem sie das Angebot erhöhen, wodurch wiederum die kumulierten Emissionen steigen. Das gefährdet die Integrität der Emissionsobergrenze (Cap).

Daraus ergeben sich zwei politische Implikationen:

1. Eine Dynamisierung der MSR-Schwellenwerte und -mengen ist vorteilhaft, da dadurch Schwellenwerteffekte vermieden und Interventionen im Laufe der Zeit geglättet werden.
2. Eine Verlängerung der Laufzeit der MSR kann dazu beitragen, den Markt in Zeiten der größten Knappheit zu entlasten; dies sollte jedoch mit Schutzmaßnahmen wie einer schrittweisen Invalidierung und der Begrenzung jährlicher Ausschüttungsmengen einhergehen, um Preisstabilität und Umweltintegrität in Einklang zu bringen. Wenn die bestehenden Emissionsreduktionsziele in den erfassten Sektoren erreicht werden sollen,

² Die Modellierungen wurden im Mai 2025 abgeschlossen. Aus diesem Grund ist die Verschiebung des EU-ETS 2 auf das Jahr 2028 in dieser Analyse nicht berücksichtigt, was die zentralen Ergebnisse und politischen Implikationen der Analyse jedoch nicht beeinflusst.

müssen zusätzliche klimapolitische Maßnahmen im Policy-Mix gestärkt werden, um die reduzierten Emissionsminderungen des EU-ETS 2 zu kompensieren.

Table of Contents

List of figures	9
List of tables	9
List of abbreviations	10
1 Introduction.....	11
2 Structure and Scope	12
3 Current EU ETS 2 MSR and PSM Design	13
4 Scenarios Design.....	15
5 Modelling approach & outputs	19
6 Results & discussion	20
6.1 Overall system impacts (all scenarios).....	20
6.2 Longer Effectiveness (Scenario 6a and Scenario 6b)	22
6.3 Dynamisation of the MSR (Scenario 3)	24
6.4 Combination Scenario (Scenario 7).....	25
7 Trade-offs & policy implications.....	28
8 Conclusions & next steps.....	30
9 List of references	31
A Annex – TNAC evolution for all scenarios	32

List of figures

Figure 1:	Schematic explaining the PSM	14
Figure 2:	EU ETS 2 Price from 2027 to 2040 for all scenarios.....	20
Figure 3:	Snapshot of EU ETS 2 Price in 2027 and 2032 relative to base case.....	21
Figure 4:	Overview of Emissions response from 2027 to 2040 for all scenarios.....	22
Figure 5:	Longer Effectiveness MSR original and adjusted (S6a, S6b) EU ETS 2 price & TNAC.....	23
Figure 6:	Longer Effectiveness MSR original and adjusted (S6a, S6b) emissions response	24
Figure 7:	Dynamisation (S3) EU ETS 2 price and TNAC.....	25
Figure 8:	Combination scenario EU ETS 2 price and TNAC.....	26
Figure 9:	Combination scenario emissions response	27
Figure 10:	Overview of TNAC evolution from 2027 to 2040 for all Scenarios, relative to base case.....	33

List of tables

Table 1:	Scenarios at a glance	17
Table 2:	Comparison of proposal by the European Commission with modelled scenarios.....	18

List of abbreviations

Abbreviation	Explanation
BEHG	German Fuel Emissions Trading Act (Brennstoffemissionshandelsgesetz)
BMUKN	Federal Ministry for the Environment, Climate Action, Nature Conservation and Nuclear Safety (Germany)
DEHSt	German Emissions Trading Authority
EU	European Union
EU ETS 2	EU Emissions Trading System for buildings & road transport
EUA2	EU Allowance (EU ETS 2); 1 EUA2 = 1 tCO ₂
MSR	Market Stability Reserve
Mt	megatonnes (million tonnes)
PSM	Price-Stability Mechanism
S1... S6a / S6b / S7	Scenario labels used in this study
TCO	Total Cost of Ownership
TNAC	Total Number of Allowances in Circulation
tCO₂	metric tonnes of CO ₂
UBA	German Environment Agency

1 Introduction

This report forms part of the multi-year research project “Evaluation of the further development of the BEHG and EU ETS 2,” commissioned by the German Environment Agency (UBA) and the Federal Ministry for the Environment, Climate Action, Nature Conservation and Nuclear Safety (BMUKN). The aim of the project is to provide German and EU decision-makers with a rigorous scientific foundation for calibrating EU ETS 2, ensuring that the scheme delivers an effective carbon pricing signal.

The EU ETS 2, established under Directive 2003/87/EC as amended by Directive (EU) 2023/959, will commence with surrender obligations in 2028³ and cover emissions from road transport, buildings, and small-industry installations. It operates as a full-auction system aiming to reduce GHG emissions in these sectors by 42% by 2030 relative to 2005 levels. By mid-2025, the debate over EU ETS 2’s design had gained fresh momentum. On 25 June 2025, a joint non-paper endorsed by nineteen Member States (Austria et al., 2025) drew attention to three vulnerabilities of the current design: (i) uncertain launch year- price levels, (ii) volatile Market Stability Reserve (MSR) trigger mechanics, and (iii) the limited fire-power of safeguard provisions such as the 45 € (2020) soft cap and single 20 Mt Price-Stability Mechanism (PSM) release. The paper calls for targeted adjustments – earlier auctions, smoother MSR thresholds, a strengthened PSM and an extended MSR lifetime, to be assessed ahead of the market’s roll-out. In response, the European Commission (2025) proposed adjustments to Decision (EU) 2015/1814 regarding the MSR for the EU ETS 2.

Against this backdrop, the present study delivers an ex-ante test of several MSR and PSM configurations which are similar to the proposed adjustments by Member States and the European Commission (see Table 2 for a comparison). Leveraging Veyt’s EU ETS 2 market model, we compare the legislated December 2023 rule-set with seven reform options and track their influence on:

- ▶ Allowance prices (as relative deviations from base case);
- ▶ Total number of allowances in circulation (TNAC);
- ▶ Annual MSR flows (withdrawals/releases); and
- ▶ System-wide emissions.

³ In November 2025, the Environment Council agreed to postpone the start of the surrender obligation in EU ETS 2 from 2027 to 2028 by triggering Article 30(k)(2) letters (a) to (e) of Directive 2003/87 (Council of the European Union, 2025).

2 Structure and Scope

The objective of this paper is to present the modelling and internal exchanges undertaken between April and June 2025 into a concise policy report. The simulations were finalized in May 2025. Hence, the EU ETS 2 postponement to 2028 is not considered in the analysis which however does not change the key results and policy implications of the analysis. All price results shown are in relative terms compared to the base case (i.e. no absolute price levels).

The analysis covers seven scenarios, each modifying a specific element of the MSR or the PSM. Scenarios 1 to 5 (Strengthening PSM, Additional PSM, Forward Activation, Dynamisation, Increase MSR Threshold) are examined over the period 2027–2032, while Scenario 6a and 6b (Longer Effectiveness of the MSR – original and adjusted) and the Combination scenario extend from 2027 to 2040 to capture the post-2031 dynamics that become relevant once the current invalidation rule would otherwise remove remaining allowances from the reserve.

While every scenario's design and results are described, this paper's narrative emphasises two: the Longer Effectiveness scenarios (original and adjusted) and the Dynamisation scenario. The emphasis is justified by their analytical value: the Longer Effectiveness scenarios (especially the original setup) illustrate the strongest downward pressure on prices, and thus the highest impact on emissions and TNAC, providing a clear view of the price integrity tradeoff. The Dynamisation scenario, on the other hand, demonstrates how a structural redesign of MSR thresholds and release volumes can moderate prices without collapsing overall cap integrity. The Strengthened PSM and the Combination scenario are also discussed to show, respectively, how tactical price triggers function and how multiple levers interact when applied together.

3 Current EU ETS 2 MSR and PSM Design

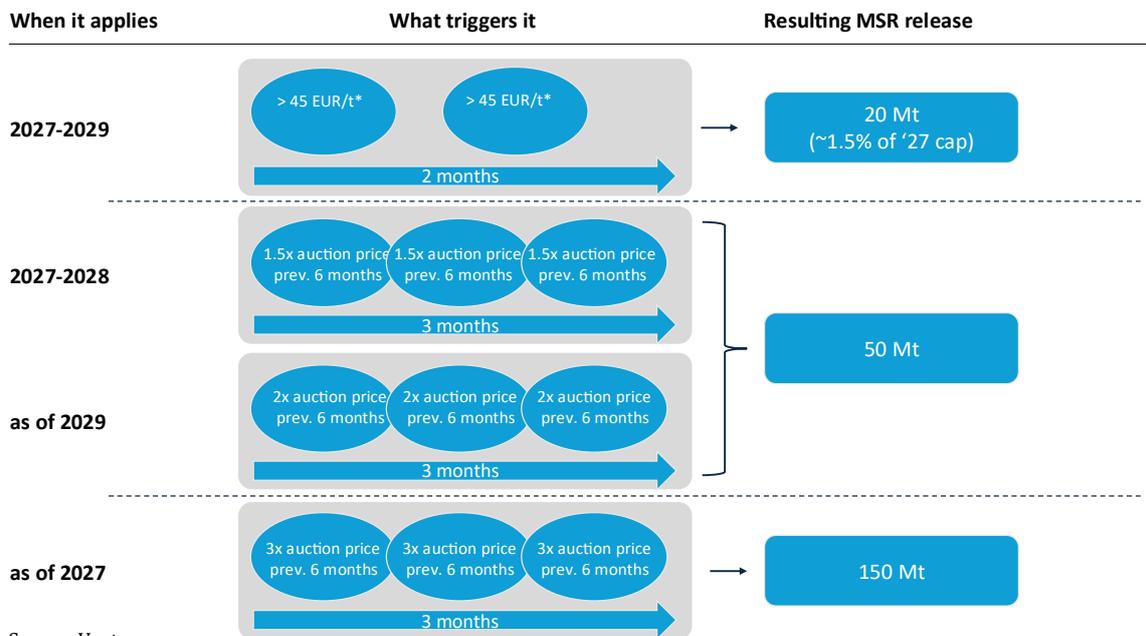
To interpret the scenarios, it is useful to summarize the baseline MSR and PSM design⁴. The MSR for EU ETS 2 operates with fixed TNAC thresholds and constant annual release as well as withdrawal volumes. When the TNAC exceeds the upper threshold, allowances are withdrawn from auctioning and placed into the reserve; when it falls below the lower threshold, allowances are released from the reserve back into the market. The upper TNAC threshold is set at 440 Mt, while the lower threshold is 210 Mt. The annual adjustment volume, whether a withdrawal or a release, is fixed at 100 Mt per year. An initial reserve of 600 Mt is created at the start of 2027⁵. The earliest release from the MSR based on the described TNAC trigger can occur in 2028, depending on observed TNAC values in the preceding year. Any allowances that remain in the reserve are invalidated on 1 January 2031.

In parallel, a Price-Stability Mechanism (PSM) exists to counter short-term price spikes. One part is an absolute price trigger, set at 45 €/t in 2020, rising with inflation and expected to equal 56 €/t in 2027 (nominal), which if exceeded for at least two consecutive months between 2027 and 2029, can prompt a 20 Mt release, which may be doubled under Article 30h(7) of the Directive. The other part is a graduated relative price trigger, based on the ratio of current prices to a trailing average. When prices breach 150% (applies only to 2027 and 2028), 200% (from 2029 on) or 300% of the trailing price average (the exact calculation is defined in the legislation), the mechanism can release increasing volumes, 50 Mt, 50 Mt and 150 Mt, respectively. These PSM volumes are additional to the TNAC-based MSR flows, meaning that in extreme price situations, the market may see multiple overlapping releases in the same year. It is worth noting that across all model runs, the second type of trigger - based on price increases rather than absolute levels, was not activated even once. An exceptionally large price move would be required to activate these relative price trigger releases.

⁴ As defined in Article 30h of Directive 2003/87/EC (as amended by Directive (EU) 2023/959) and Decision (EU) 2015/1814 (as amended by Decision (EU) 2023/857) as of May 2025 and thus without consideration of the EU ETS 2 postponement to 2028 and the proposal of the European Commission to adjust the MSR in the EU ETS 2 (see Table 2).

⁵ With the postponement the initial reserve of 600 Mt is created at the start of 2028.

Figure 1: Schematic explaining the PSM



4 Scenarios Design

The modelling tested seven distinct modifications to the MSR/PSM architecture. Each scenario isolates a single policy lever to assess its direct effect, except for the Combination scenario, which bundles several changes to illustrate compound impacts. For clarity, we summarize each scenario in Table 1 below and compare it with the proposal by the European Commission to adjust the MSR Decision in Table 2.

Scenario 1: Forward Activation

This scenario advances the first possible MSR release to September 2027 by using an extrapolated 2026 cap (approximately 1,099 Mt) for the TNAC calculation. The rationale is to offer earlier liquidity and thus faster price relief in the very first years of EU ETS 2.

Scenario 2: Higher TNAC Thresholds

Here, both the lower and upper thresholds are increased, with the lower threshold rising from 210 to 300 Mt and the upper threshold from 440 to 500 Mt. Because the lower threshold is higher, releases become more likely, while the higher upper threshold makes withdrawals less likely. This makes the MSR “more generous,” potentially alleviating some of the market tightness.

Scenario 3: Dynamisation of the MSR

Rather than a flat 100 Mt adjustment, the mechanism scales with TNAC. Within a 210–300 Mt band, release volumes increase proportionally with TNAC: zero when above 300 Mt and 100 Mt when it is below 210 Mt.

Mathematically, when TNAC lies within the band releases will be given by:

$$\text{Release} = \frac{(300 - \text{TNAC}) \times 100}{300 - 210}$$

For example, at TNAC = 260 Mt, the release would be ~44 Mt under our calibration. This yields a smooth injection profile and avoids cliff-edge behaviour where small TNAC moves flip the system from 0 to 100 Mt.

Scenario 4: Strengthened PSM (45 € trigger)

This scenario permits up to two releases of 40 Mt per year (in total 80 Mt) if the absolute 45 € (in 2020 euros) trigger is exceeded. The aim is to enhance the responsiveness of the PSM in the early years (2027–2029).

Scenario 5: Additional PSM Tier (60 € trigger)

In addition to the 45 € absolute trigger, a higher tier at 60 € (in 2020 euros) is introduced. If prices exceed this second threshold, an extra 40 Mt is released, functioning as an additional safety valve.

Scenario 6a: Longer Effectiveness of the MSR (Original)

The 2031 invalidation rule is removed, allowing the reserve to remain active beyond 2030. The MSR can release up to 100 Mt per year when triggers are met. This significantly increases the potential supply of allowances in the 2030s, providing sustained downward pressure on prices but also implying higher cumulative emissions from the covered sectors.

Scenario 6b: Longer Effectiveness of the MSR (Adjusted)

Similar to 6a, no 2031 invalidation will take place, but releases in the early 2030s are capped at 50 Mt instead of 100 Mt. This partial relief of scarcity results in higher prices earlier in the 2030s

compared to Scenario 6a, but allows more injections later (since the reserve empties more slowly) and ultimately leads to lower prices as 2040 approaches.

Scenario 7: Combination

This scenario incorporates the interventions from the Strengthened PSM, Dynamised MSR, and Longer Effectiveness MSR (adjusted) scenarios, together with the additional policy stipulating that no new MSR releases occur after 2034.

Although all scenarios are included in the analysis, the paper focuses primarily on the results from Scenario 6a and 6b (Longer Effectiveness – Original and Adjusted respectively), Scenario 3 (Dynamisation), and Scenario 7 (Combination). The Longer Effectiveness scenarios create the most pronounced drop in prices, with estimations suggesting reductions of around 68% by 2032 (6a) and around 36% by 2032 (6b) compared to the base case, thereby providing a clear lens on the trade-off between price stability and environmental integrity. The Dynamisation scenario, in contrast, represents a more moderate reform that addresses structural shortcomings in the MSR without producing excessive increases in emissions. The Combination scenario brings together elements of both approaches, striking a balance between lower and more stable prices on the one hand and ambitious emission outcomes on the other.

Table 1: Scenarios at a glance

#	Scenario	Key parameter change	Expected policy intuition
1	Forward activation	Advance first release to Sept 2027 (using extrapolated 2026 cap \approx 1 099 Mt)	Earlier liquidity and price relief if needed
2	Higher thresholds	TNAC range widened to 300–500 Mt	More releases \rightarrow possibly more relief in tight market conditions
3	Dynamised MSR	Pro-rata release within 210–300 Mt band (e.g. 44 Mt at TNAC = 260 Mt)	Smoother injection profile
4	Strengthened PSM	Up to 2 releases of 40 Mt per year if 45 € trigger exceeded	Faster response to price spikes
5	Additional 60 € PSM tier	+40 Mt release when price > 60 €	Extra safety valve at high prices
6a	Longer effectiveness original	No 2031 invalidation; remaining MSR allowances stay valid post-2030, 100 Mt per year	Sustained decrease in prices
6b	Longer effectiveness adjusted	No 2031 invalidation; remaining MSR allowances stay valid post-2030, 50 Mt per year	Only partial but long-term scarcity relief compared to 6a
7	Combination	Joint application of 3 + 4 + 6b with the additional adjustment that the last possible MSR release is in 2034	Illustrates cumulative effects

Table 2 benchmarks the key elements of the European Commission’s proposal against the closest corresponding scenarios in our analysis, to make clear where the policy design overlaps and where it differs in magnitude and triggers. Overall, the proposed measures map well to our Dynamised MSR, Strengthened PSM, and Longer Effectiveness scenarios, but with some differences in parameterisation (e.g., TNAC bands/trigger levels and the size and frequency of potential releases).

Table 2: Comparison of proposal by the European Commission with modelled scenarios

Scenarios	Proposal by the European Commission	Similar scenario in the analysis
Dynamised MSR	Pro-rata release within 210–260 Mt band (e.g. 40 Mt at TNAC = 240 Mt)	Pro-rata release within 210–300 Mt band (e.g. 67 Mt at TNAC = 240 Mt) [Scenario 3]
Strengthened PSM	Up to 2 releases of 40 Mt per year if 45 € trigger exceeded	Up to 2 releases of 40 Mt per year if 45 € trigger exceeded
Longer effectiveness	No 2031 invalidation; remaining MSR allowances stay valid post-2030, 100 Mt per year	No 2031 invalidation; remaining MSR allowances stay valid post-2030, 100 Mt per year [Scenario 6a]

5 Modelling approach & outputs

The simulations were conducted using Veyt's EU ETS 2 price-forecasting model, last updated in late May 2025. Hence, the EU ETS 2 postponement to 2028 is not considered in the analysis which however does not change the key results and policy implications of the analysis. Due to the short-term nature of the report, the assumptions used by Veyt were used without any further adjustments for UBA and BMUKN. The model integrates sector-specific demand functions informed by total cost of ownership (TCO), price elasticity assumptions and is calibrated to historical patterns in the uptake of clean technologies. Furthermore, the model assumes that agents have perfect foresight of future allowance prices. Policy rules - MSR thresholds, release volumes size, PSM triggers, and invalidation rules are implemented exogenously according to the legislative default as of May 2025.

In the base case, the quantity mechanism of the MSR triggers just one release in 2030 (based on TNAC of 2029). The PSM's 45 € trigger is met in 2027–2029, leading to 20 Mt annual releases. No relative price triggers are activated. In total, 160 million allowances are released from the MSR in the base case.

All price outcomes are presented as relative changes to the base case. The study tracks four core outputs on an annual basis:

- ▶ The relative change in the EUA2 price versus the base case, typically shown as an index (%) with the base case set to 100%.
- ▶ The TNAC displayed against the relevant thresholds.
- ▶ The MSR releases and withdrawals in million tonnes per year, showing how much supply is injected or removed.
- ▶ The change in EU ETS 2 emissions, expressed as a deviation from the base case (in Mt CO₂).

Each output is visualised in a dedicated figure with all seven scenarios plotted. To keep the paper concise and accessible, the core text emphasises Scenarios 3, 6a, 6b and 7 while the figures let readers compare all scenarios on equal basis.

6 Results & discussion

6.1 Overall system impacts (all scenarios)

The deep-dive scenarios correspond to reform ideas highlighted in the June 2025 non-paper (Austria et al., 2025) and taken up by the European Commission (2025) in their proposal to amend the MSR Decision, particularly MSR lifetime extension and dynamic thresholds.

Price Impact

Across all scenarios, every reform option reduces the EU ETS 2 price below the base trajectory in the early years, though to varying degrees, with the largest magnitude being -24% in 2027 and -68% in 2032 (Scenario 6a). From 2027 until 2029, the relative reductions often lie in the range of 0 – 20%, depending on the scenario. By 2032, the spread widens further.

Figure 2: EU ETS 2 Price from 2027 to 2040 for all scenarios

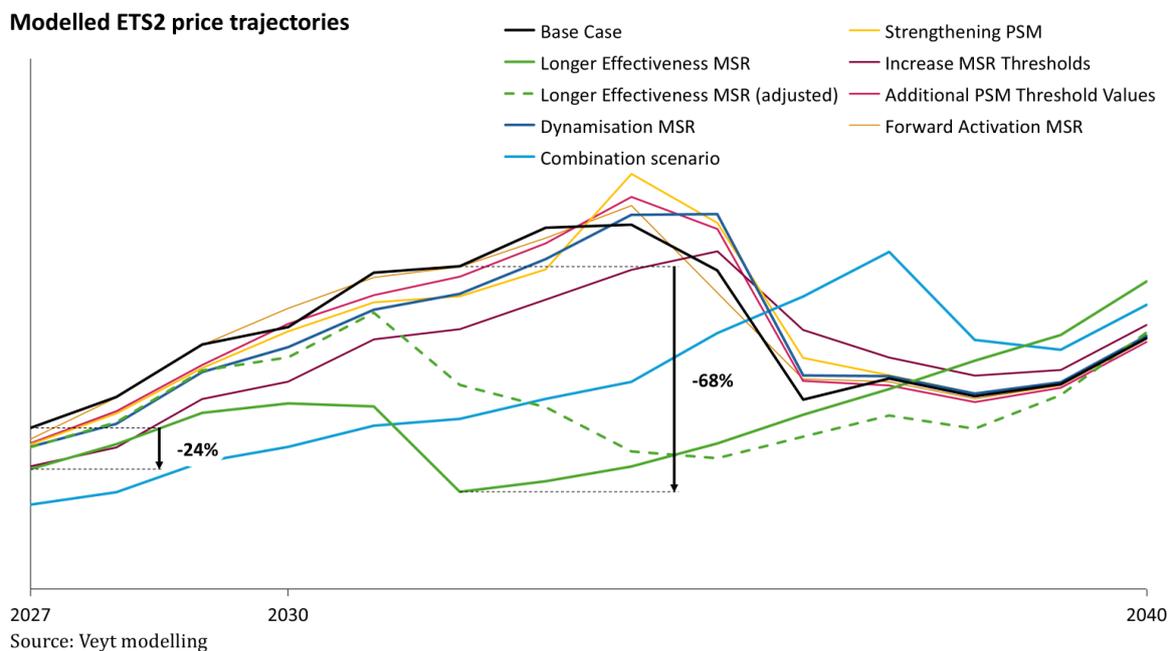
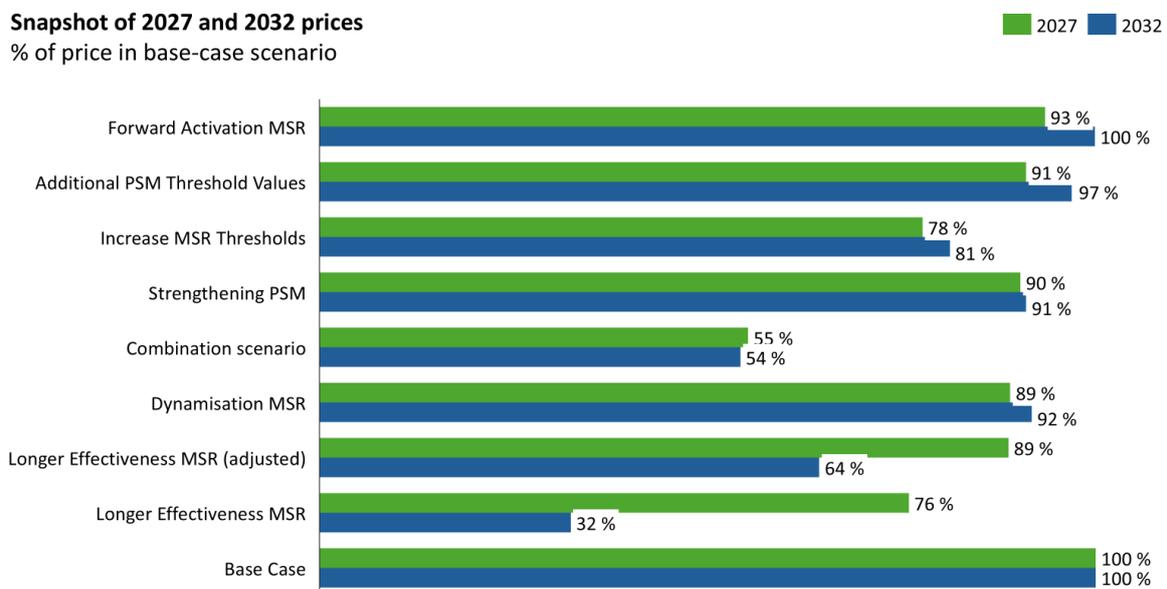


Figure 3: Snapshot of EU ETS 2 Price in 2027 and 2032 relative to base case

Source: Veyt modelling

4

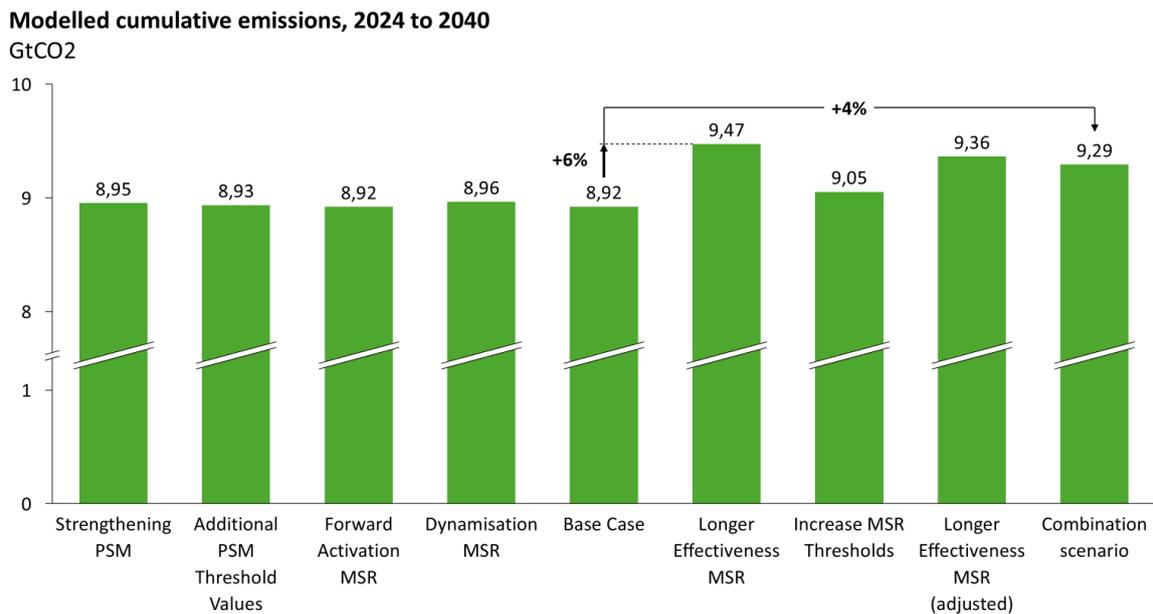
Emissions response

Price-driven abatement broadly follows the price difference: the deeper and longer the price reduction, the greater the uplift in emissions relative to the base case. This is because both the emissions increase and the price impact usually stem from the same root cause -namely, a more generous supply of allowances.

The *Longer Effectiveness MSR* scenario results in the highest additional emissions to 2040, reflecting the more generous supply profile that arises when remaining allowances in the MSR are no longer invalidated after January 2031.

An interesting dynamic emerges when we compare cumulative emissions: the *adjusted* Longer Effectiveness MSR scenario results in lower cumulative emissions than the original one. As the adjusted scenario caps MSR releases at 50 Mt per year after 2031, supply is tighter in the earlier years. This pushes prices higher, leading to faster uptake of clean technologies and consequently lower emissions.

Although the cumulative supply is the same in both the adjusted and original Longer Effectiveness MSR scenario, the timing of abatement matters. Earlier uptake of clean technologies tends to be “locked in”: once consumers or firms have switched, the effect persists (for example, a buyer who has already purchased an electric vehicle (EV) is unlikely to return to a combustion vehicle (ICE vehicle) the following year).

Figure 4: Overview of Emissions response from 2027 to 2040 for all scenarios

6.2 Longer Effectiveness (Scenario 6a and Scenario 6b)

Price impact

Scenario 6a removes the invalidation of MSR allowances in 2031 and allows 100 Mt MSR releases when the market is tight, producing the strongest price relief: -24% in 2027 and -68% in 2032 relative to the base case. The adjusted scenario 6b still eliminates the invalidation of MSR allowances in 2031 but caps post-2030s releases at 50 Mt. This yields a price decrease of -11% in 2027 and -36% in 2032. The reason prices are lower before 2030 is that market participants anticipate a more generous supply later on.

Because scarcity in the market is only partially relieved in scenario 6b, prices remain higher than in scenario 6a in the early years to ensure sufficient abatement. These higher prices in the first years accelerate the uptake of clean technologies, leading to lower emissions before 2040. At the same time, the slower depletion of the reserve means more allowances are available later in the period. As a result, prices fall even further than in scenario 6a towards 2040 - not only due to the additional allowances released, but also because earlier clean-technology adoption has been locked in, reducing demand for allowances in the final years.

TNAC evolution

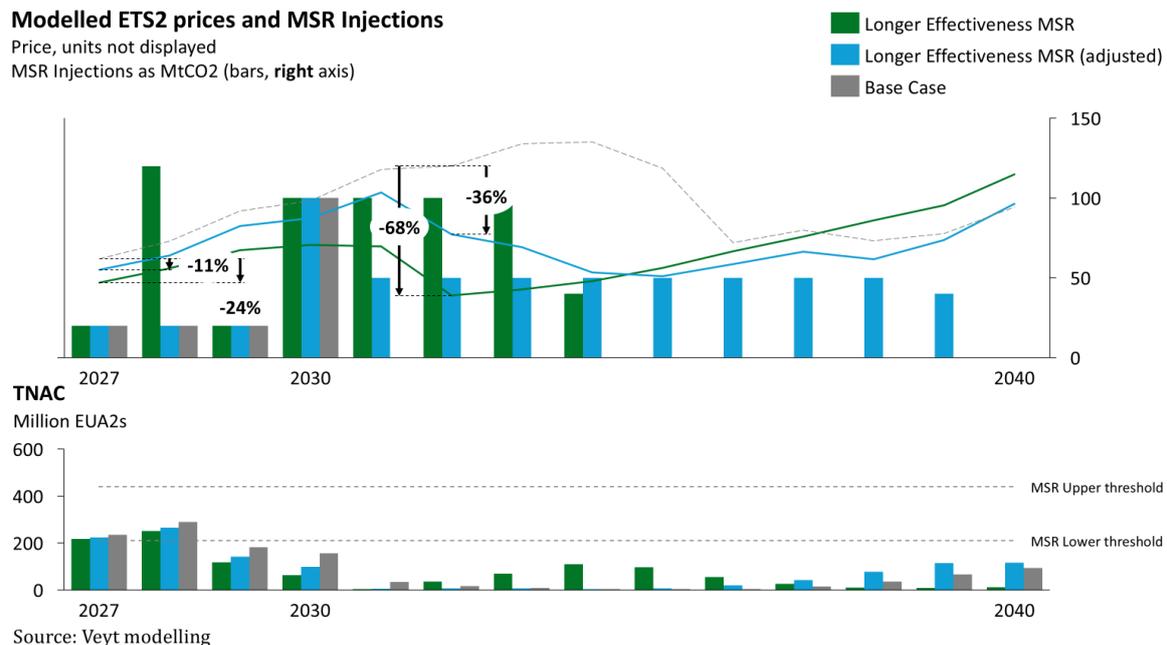
Before 2030, TNAC is lower in both the adjusted and unadjusted *Longer Effectiveness MSR* scenarios compared to the base case. The mechanism is straightforward: lower prices mean higher emissions and therefore less allowances are set aside for the future (since TNAC essentially measures the stock of saved allowances). Because agents in our model are forward-looking, they respond to this expected additional supply of allowances in the future by saving (or “over-abating”) less today, which results in a lower TNAC in the pre-2030 years.

The common denominator for the post-2030 development of TNAC is that in all cases the market remains sufficiently tight. Therefore, the TNAC stays below the lower threshold every year after 2030; so that a release is determined by whether allowances in the MSR are invalidated or not.

Beyond this, however, the trajectories diverge significantly across the scenarios and the base case:

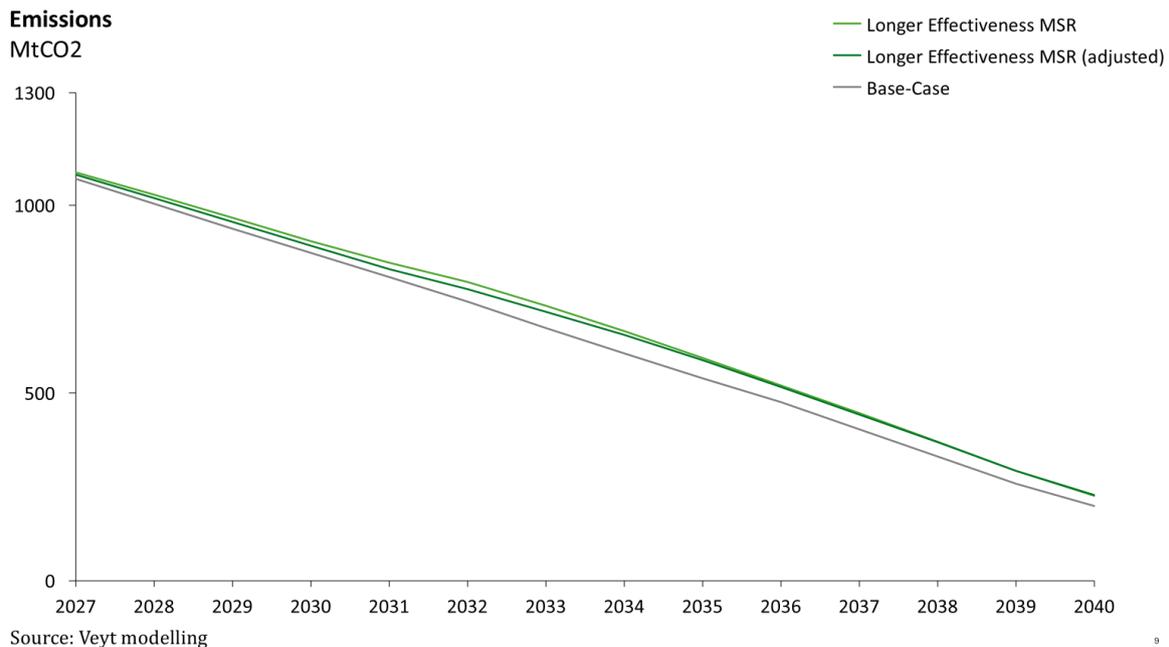
- ▶ **Base case:** The market remains tight. The price increases slowly and eventually reverses, leaving very little incentive to save allowances. As a result, TNAC remains very low.
- ▶ **Original Longer Effectiveness MSR:** Here, we observe a build-up of the TNAC during the 2030s. This happens for two reasons. First, there's a mechanical effect: when TNAC drops below 210 Mt, the MSR automatically releases allowances until it's empty, which adds to the supply. Second, and more importantly, prices play a key role. Because prices were relatively low before 2030, they need to rise more steeply afterward to rebalance the market. Market participants anticipate these higher future prices and start cutting emissions earlier to avoid them. This reduction in emissions creates excess allowances, which builds up the TNAC already in the early 2030s.
- ▶ **Adjusted Longer Effectiveness MSR:** In this case, MSR releases after 2030 are capped at 50 Mt per year. This spreads releases more evenly across time, which limits the scope for building net length (or equivalently increasing the TNAC) immediately after 2030. The tighter supply in this scenario compared to the one above means that the required abatement in the early 2030s translates into lower emissions. This is reflected in the higher TNAC observed in the final years.

Figure 5: Longer Effectiveness MSR original and adjusted (S6a, S6b) EU ETS 2 price & TNAC



Emissions response

Because in scenario 6a we can observe the deepest and most persistent price drop, it leads to the highest cumulative emissions increase to 2040. In scenario 6b, early decade prices are higher, which raises abatement and reduces the cumulative emissions increase relative to scenario 6a, yet emissions still exceed the base case due to the prolonged availability of MSR volumes. This illustrates a central point - extending the MSR's lifetime will undoubtedly help with market tightening, but the tradeoff between price stabilisation and cap integrity remains unavoidable.

Figure 6: Longer Effectiveness MSR original and adjusted (S6a, S6b) emissions response

6.3 Dynamisation of the MSR (Scenario 3)

Price impact

In scenario 3, prices start below the base case (around -11% in 2027) and rise steadily through the early 2030s, remaining roughly 8% below the base case at their mid-decade peak. In the late 2030s, the path shows a distinct step-down followed by a short plateau, before increasing again into 2040.

The rationale is that the Dynamisation of the MSR allows for proportional releases from the MSR whenever the TNAC is above the lower threshold, rather than requiring a sharp trigger. In the base case, if TNAC hovers just above the threshold, no release occurs. Under the Dynamisation scenario, at least some release is provided. Since the TNAC is close to the lower threshold in the early phase of EU ETS 2 (pre-2030), this results in more frequent releases and thus lower prices than the base case.

After 2030, the price trajectories of the Dynamisation of the MSR and the base case gradually converge and are fully aligned by the end of the 2030s. At that point the MSR reserve is exhausted, and the market is tight, so supply is essentially the same across both scenarios. The one interesting deviation is that in 2034–2036 prices in the dynamised case rise slightly above the base case. The reason is that lower prices in 2027–2033 led to somewhat less decarbonization during that period, requiring higher prices later on to deliver the necessary emissions reductions.

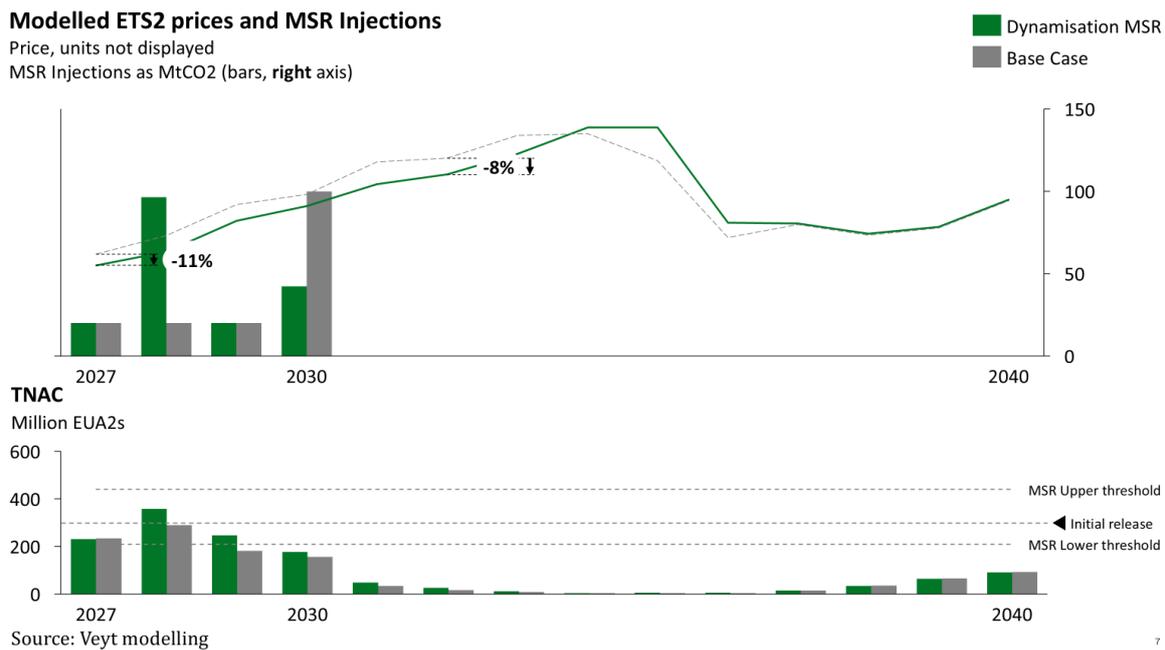
TNAC evolution

In both the base case and the Dynamisation scenario, the TNAC is just above the lower threshold in 2027. In the base case, this has no consequence, since releases only occur when the threshold is breached. In contrast, under the Dynamisation design this proximity is enough to trigger a proportional release, leading to a sizeable injection of 96 Mt in 2028. Although this temporarily

inflates the TNAC, the surplus is quickly absorbed and the TNAC again falls close enough to the threshold to warrant a further release of 42 Mt.

In both scenarios, the PSM is also activated, releasing 20 Mt in each of 2027, 2028 and 2029.

Figure 7: Dynamisation (S3) EU ETS 2 price and TNAC



Emissions response

Prices are lower than in the base case, so emissions still rise (see Figure 3), but the cumulative increase is smaller than in scenarios that inject large volumes or do not invalidate the allowances in the MSR post 2030. This reflects that making thresholds dynamic is likely beneficial for the integrity of the system because it prevents large surplus spikes while still stabilizing prices.

6.4 Combination Scenario (Scenario 7)

Price impact

When the MSR extension (as stipulated in the adjusted Longer Effectiveness scenario, including the additional rule that no new allowances are released after 2034) is combined with a stronger PSM and dynamic MSR thresholds, prices become more stable. Specifically, the initial price increase is less pronounced, and neither the "price hump" observed in the early 2030s under scenarios without an MSR extension nor the "price slump" evident in the pure extension scenarios (6a and 6b) emerges in this Combination scenario.

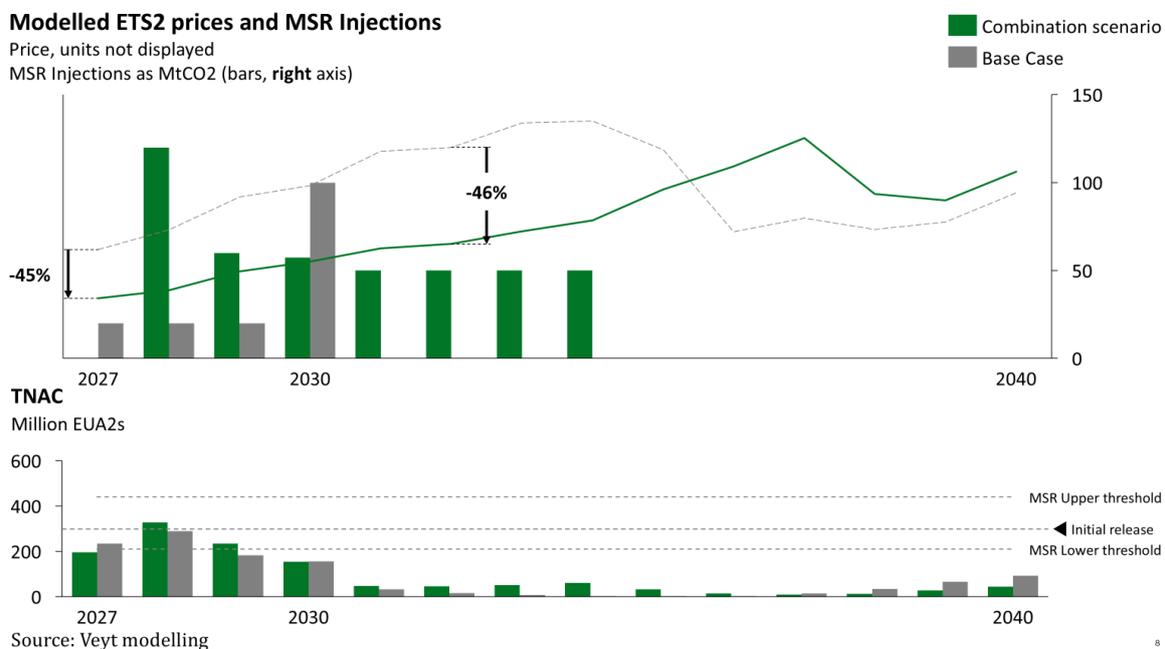
At the same time, prices are significantly lower than in the base case for most of the modelling period: starting in 2027 we see 45% lower prices than in the base case, and this gap widens slightly to 46% in 2032.

Towards the end of the 2040s, prices in the Combination scenario increase above the level estimated for the base case. As with the previous scenarios where lower prices were observed in the early phase of the system, this is paired with higher prices in later stages because less abatement has been undertaken early on due to the slightly more generous supply, which necessitates greater abatement later and consequently higher prices.

TNAC evolution

Already in 2027, the TNAC falls below the lower threshold for the MSR, resulting in an MSR release in 2028. The consequent effect of this release is that the TNAC rises above both the lower threshold and the initial threshold, meaning no quantity-based release occurs in 2029. However, in that year the price trigger is activated, and as the amount released through the PSM is increased in this scenario, this results in a release of 60 million allowances in 2029. Even with this release, the TNAC falls below the lower threshold in 2030 and remains below it for the rest of the modelling period. This means that after 2030 there are consistent annual releases of 50 million allowances until the releases of allowances from the MSR cease in 2034 (as stipulated in the Combination scenario). At the point when the reserve allowances are invalidated, there are 164 million allowances left in the reserve. These releases provide sufficient cushion to prevent the price increases observed in the base case. Indeed, TNAC remains somewhat elevated, between 30 and 60 million, until 2036, although not quite as elevated as in the original Longer Effectiveness scenario.

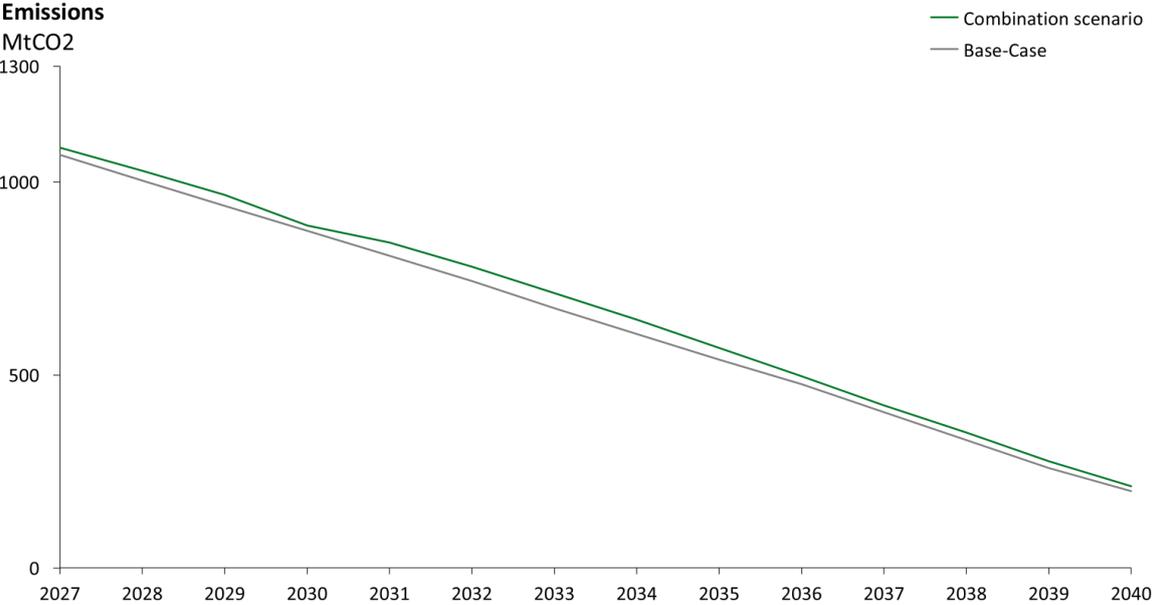
Figure 8: Combination scenario EU ETS 2 price and TNAC



Emissions response

Emissions remain above base case levels throughout the modelling period. That said, cumulative emissions are lower than in the Longer Effectiveness scenarios. Whilst cumulative emissions in the Longer Effectiveness scenarios exceed the base case by 6% and 5% for the unadjusted and adjusted variants respectively, the Combination scenario comes in at 4% above the base case. This offers some encouragement that it may be possible to balance the trade-off between price stability and emissions outcomes.

Figure 9: Combination scenario emissions response



Source: Veyt modelling

10

7 Trade-offs & policy implications

The modelling confirms a clear and unavoidable political trade-off: any reform that injects more allowances (earlier or for longer) will suppress prices but inflate the surplus and, ultimately, cumulative emissions. Conversely, constraining or smoothing releases protects cap integrity but delivers less price relief. The tension is most visible when comparing the two Longer Effectiveness variants of the MSR, full 100 Mt releases versus 50 Mt releases, with the Dynamisation scenario. The Combination scenario delivers the most stable price path, avoiding both the early-2030s “price hump” and the later “price slump,” while maintaining balanced allowance supply and moderate TNAC levels throughout the period.

The core trade-off

Extending the life of the allowances in the MSR reserve beyond 2030 undoubtedly helps with market tightening, because the MSR retains the ability to respond when prices would otherwise spike in the early 2030s. Yet the same mechanism that dampens prices pushes emissions above the base case: in the original Longer Effectiveness scenario, prices fall by up to 68% in 2032, cumulative emissions increase the most of any scenario (an increase of 6%). The adjusted version constrains releases to 50 Mt after 2030, mitigating price fall in the early 2030s and forcing more abatement, but still trading higher emissions for lower prices later in the decade.

Make thresholds and volumes dynamic

Introducing dynamic TNAC thresholds with a proportional release volume is likely beneficial. It replaces the current on/off “cliff” and scales interventions to the size of the deviation. The Dynamisation scenario demonstrates that this approach smooths year to year injections, avoids 100 Mt spikes, and keeps TNAC oscillating in a narrower corridor, thereby delivering price relief without producing a persistent surplus.

Policy design pointers:

- ▶ Calibrate release volumes proportionally instead of defaulting to a flat 100 Mt.

We identify these additional, similar policy ideas that warrant exploration, but we did not explicitly test them in this analysis:

- ▶ Define thresholds as a percentage of rolling TNAC or annual emissions levels (e.g. 20–40%), rather than fixed Mt values, so that the MSR automatically adjusts to market size and maintains a consistent level of responsiveness as the cap and emissions decline over time.
- ▶ Build in gradual adjustments (e.g. annual recalibration of the band) to reflect market growth or contraction, ensuring that thresholds and intervention volumes evolve in line with changing market fundamentals and prevent structural over- or under-supply.

Extend MSR lifetime, but with safeguards

Lengthening the MSR’s effectiveness period beyond 2030 clearly enhances price stability, as seen in both Longer Effectiveness scenarios. However, doing so without constraints shifts the system towards recurring surplus and higher emissions. A balanced approach could retain the reserve past 2030 while adding effective safeguards (see Pahle et al., 2025) such as phased invalidation, annual release caps, or a gradual “sunset” of available volumes. The adjusted 50 Mt release in scenario 6b is one illustration: it reduces early -decade surplus growth and forces more abatement up front compared to scenario 6a, though it still requires careful management of late decade- injections.

Possible safeguards:

- ▶ Introduce a declining cap on annual MSR releases after 2030 (e.g. 50 Mt, then 40 Mt, etc.).
- ▶ Apply a rolling cancellation rate (e.g. invalidate 10% of the reserve each year post-2030).

Role of the PSM: Tactical not structural

Strengthening the PSM (extra tiers, more frequent triggers) is effective for short term price spike control, particularly in 2027–2029, but it does not address structural surplus dynamics and undermines cap integrity. The overuse of trigger-based releases risks causing injections to cluster in a single year, followed by a period of inactivity. This would counteract the MSR's intended objective of avoiding volatility. Therefore, the PSM should remain a tactical overlay on a well-calibrated MSR.

Complementary measures to dampen price pressure

To achieve price relief as well as the EU climate targets, policy makers should prioritise strengthening complementary sectoral policies (e.g. tighter efficiency standards in buildings, accelerated electrification in road transport) over MSR adjustments. Ambitious complementary policies in the EU ETS 2 sectors reduce emissions and thus demand for EUA2s. In contrast – as described above – all scenarios lead to higher emissions than in the base case. This implies that with the discussed MSR adjustments the EU ETS 2 does not by itself guarantee the achievement of EU climate targets for the covered sectors any longer.

8 Conclusions & next steps

This analysis shows that redesigning the EU ETS 2 MSR can materially lower allowance prices, but at the cost of higher TNAC and cumulative emissions. An inherent trade-off between price stability and environmental integrity arises. In the most price decreasing case, the original Longer Effectiveness scenario (Scenario 6a) cuts prices by about 24% in 2027 and 68% in 2032 relative to the base case, moderately increasing allowance availability. The adjusted Longer Effectiveness (Scenario 6b) run tempers this effect to -11% in 2027 and -36% in 2032, because it caps 2030s releases at 50 Mt; scarcity is only partly relieved, prompting more abatement and leaving more reserve volume to push prices down further by the late 2030s.

Against this backdrop, Dynamisation (Scenario 3) and the Combination (Scenario 7) scenarios emerge as balanced options. In the Dynamisation scenario, by making thresholds and volumes proportional to market size, it smooths interventions, avoids cliff edge releases, and contains surplus buildup while still delivering a meaningful, steady price reduction. This confirms that making thresholds dynamic is likely beneficial for stabilizing prices without excessively undermining cap integrity. The Combination scenario delivers a stable price trajectory with smoother adjustments over time, as coordinated MSR and PSM releases help maintain balanced TNAC levels, while emissions remain moderately above the base case, indicating improved price stability with limited impact on overall cap integrity.

Looking ahead, several strands of work would add value. First, exploring further combination scenarios, for example, pairing dynamic thresholds with a moderated extension of MSR lifetime, could identify a “sweet spot” where prices are sufficiently stable and environmental targets remain intact. Second, refining demand elasticities and behavioural parameters (especially in transport and buildings) would sharpen estimates of emissions responses. Finally, phased invalidation designs or declining annual release caps after 2031 merit testing to capture the benefits of an extended MSR.

In summary, dynamic MSR rules (Scenario 3) appear to offer a prudent structural reform, while any extension of the reserve’s lifetime should be coupled with safeguards to balance price relief and integrity. Complementary sector policies can further backstop climate ambition if lower prices risk weakening abatement incentives.

9 List of references

Austria, Belgium, Bulgaria, Croatia, Czechia, Estonia, Germany, Italy, Latvia, Lithuania, the Netherlands, Poland, Romania, Slovakia, Slovenia, & Spain. (2025, June 25). *Joint non-paper on ETS2 price uncertainties and possible improvements* [Non-paper]. [Joint Non-paper on ETS2 Price Uncertainties and Possible Improvements \(PDF, carbon-pulse.com\)](#)

Council of the European Union. (2025, November 5). *Proposal for a regulation of the European Parliament and of the Council amending Regulation (EU) 2021/1119 establishing the framework for achieving climate neutrality – General approach (Outcome of proceedings)* (ST 14960/25). [Council of the EU: General Approach on Amending the European Climate Law – ST 14960/25 \(PDF, consilium.europa.eu\)](#)

European Commission. (2025, November 27). *Commission proposes targeted adjustments to the Market Stability Reserve Decision to support a smoother start for ETS2*. [European Commission: Proposed Adjustments to the Market Stability Reserve Decision for ETS2 \(climate.ec.europa.eu\)](#)

Pahle, M., Günther, C., Feindt, S., & Edenhofer, O. (2025, May 15). *Wie weiter mit dem ETS2? Vorschläge und Erwägungen zur Stärkung der Glaubwürdigkeit*. Konrad-Adenauer-Stiftung. [Pahle et al. \(2025\): Wie weiter mit dem ETS2? – Konrad-Adenauer-Stiftung \(PDF, kas.de\)](#)

A Annex – TNAC evolution for all scenarios

TNAC evolution

Across all scenarios, TNAC rises in the first years of EU ETS 2. This reflects the frontloading of the cap, which is designed to provide an initial buffer to the market and encourage allowance savings. The effect is reinforced where additional MSR or PSM releases occur, leading to higher peaks in the late 2020s. The strongest build-up is seen in the Forward Activation MSR scenario, where early releases lift TNAC close to 400 Mt, while the lowest peak occurs in the Longer Effectiveness MSR scenario, where the more generous supply reduces incentives to save.

After this initial build-up, TNAC falls sharply in the early 2030s as the market tightens and the surplus is absorbed. From this point, the trajectory depends on the release profile of the MSR:

- ▶ In the Base Case, with cancellations after 2030, TNAC drops to very low levels and remains tight.
- ▶ In the unadjusted Longer Effectiveness MSR, large post-2030 releases drive a renewed TNAC increase through the mid-2030s.
- ▶ In the adjusted Longer Effectiveness MSR, capped annual releases limit this effect, keeping TNAC lower early on but leading to higher levels by the late 2030s due to front-loaded abatement.
- ▶ By the late 2030s, a different dynamic takes over. As clean technologies become significantly cheaper, abatement opportunities are more favourable. In scenarios where a large share of abatement already occurred earlier in the period, much of the required reduction has been achieved. Yet because abatement is inexpensive at this stage, additional reductions still go ahead. This results in an over-achievement of reductions, which translates into extra allowance savings and a visible rebound in TNAC in the closing years of the model horizon.

The notable exception is again the Longer Effectiveness MSR scenario, where the continued release of large reserve volumes counteracts this mechanism. Here, the market remains looser, and the late-2030s rebound in TNAC is much less pronounced.

Figure 10: Overview of TNAC evolution from 2027 to 2040 for all Scenarios, relative to base case

