EU ETS reform in the Climate-Energy Package 2030: First lessons from the ZEPHYR model

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POLICY BRIEF

On January 22nd the Commission published its proposal for the future "Climate and Energy Package 2030" which will be submitted to the European Council on 20 and 21 March. It contains a proposition for the creation of a « Market Stability Reserve » for the European CO_2 market.

- The proposed mechanism leads to higher price levels through a mechanically-induced scarcity of permits.
- The reserve brings about greater volatility compared to the reference scenario, which is detrimental to a clear price signal.
- The reserve may induce participants to deviate from their optimal inter-temporal emissions reductions paths.
- In fact the stability reserve could become a source of "instability"! That is why the proposed system would be improved by a governance reform.

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On January 22 the Commission published its proposals for the future "Climate and Energy Package 2030" which will be submitted to the European Council on 20 and 21 March. The main elements are:

- The Commission proposes a **CO_2 reduction target of 40% by 2030 compared to 1990**, to be shared between the sectors covered by the ETS and those who are not. Achieving this goal would require an acceleration of greenhouse gases emission reductions within the EU.

- **New targets are proposed for renewable energy**: a target of 27% renewables in the total energy mix in 2030, and 45% for the production of electricity. Contrary to what was the case for 2020, these goals will not be broken down by Member State.

- The gains in **energy efficiency** will not reach the 20% target by 2020 set in 2008. The Commission considers that achieving the greenhouse gas reduction target of 40% requires increasing energy efficiency gains to 25% by 2030.

- **The European emission trading system (EU ETS) will be reformed after 2020 with the creation of an annual allowance reserve** ("market stability reserve"). This reserve would automatically adjust the supply of auctioned allowances according to predefined rules, preventing any discretionary element in managing the supply of allowances.

- Other documents from the Commission deal with the link between energy and competitiveness, purchasing power and security of supply.

The proposed measures for the EU ETS are designed to remedy the turbulence that have greatly affected its efficiency since 2011. They may go unnoticed in the package of proposed objectives, yet they concern the central economic instrument responsible for the deployment of emission reductions at least cost. The EU ETS covers since 2005 almost all European CO_2 emissions associated with the production of electricity and heat and energy-intensive industries (refining, steel, cement, glass and ceramics, paper). This system can be the source of a very effective signal to achieve the emission reduction target: the carbon price.

Our analysis, based on simulations from the ZEPHYR model, is that the lowering of the cap resulting from a target of 40% reduction in total emissions, coupled with the implementation of a "stability reserve", should lead to a significant price increase from 2021. Our simulations also reveal the risk of growing price volatility resulting from the automatically programmed interventions. In fact the stability reserve could become a source of "instability"! That is why the proposed system would be improved by a governance reform setting up an independent authority with a specific mandate to dynamically control the supply of allowances and send a readable and credible price signal to economic actors.

1. EU ETS reform for the post-2020: description of the proposed mechanisms

The Commission proposals arrive in the context of structural reforms aimed at changing the operation of the EU ETS after 2020. If these measures come into force, they will be added to the decisions that have already been taken, i.e. to change the timing of allowance auctions during the third phase ("backloading"). The Commission proposal consist of two main elements: the reduction of the annual allowance cap from 2021, and the creation of an allowance reserve (market stability reserve, MSR).

1.1 The reduction of the allowance cap from 2021

The first part of the proposal gives more visibility to participants by translating the goal of reducing emissions by 40% retained for the entire European Union to 2030 for the actors subject to the EU ETS. This revision will take the form of an increase in the linear reduction factor of the allowance cap from the current 1.74% per annum to 2.2% per year starting in 2021. This revision explicitly leads to a reduction target of 43% by 2030 relative to 2005 emissions for facilities subject to the system. The additional effort compared to the existing situation represents reductions of 550 Mt over the period 2021-2030.

1.2 The establishment of a « market stability reserve »

The Commission proposes an automatic mechanism to control the quantity of allowances in circulation.
The observed indicator that serves as the basis for intervention is the "quantity of allowances in circulation", i.e. the amount of allowances held by participants that have not been used to cover emissions. It is calculated as the sum, since 2008, of all allowances allocated for free or auctioned, plus Kyoto credits used by covered installations, less the emissions of covered installations (and less the allowances that have already been put in the reserve). The figure is calculated each year with data for year n-2 (due to the availability of verified emissions and surrender data). It would therefore take two years between the observation and a possible intervention in the market.

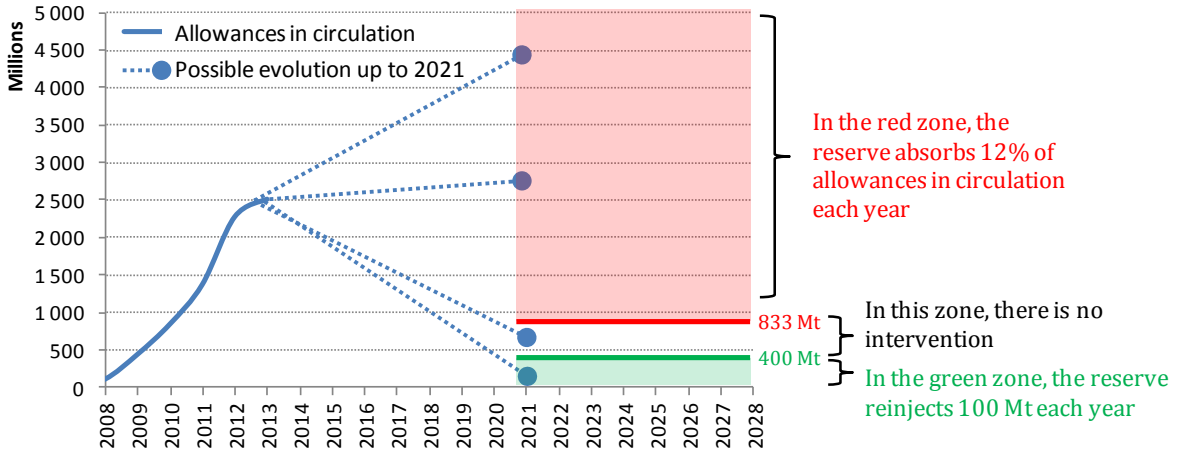
An asymmetric mechanism, which removes allowances easily but injects them sparsely.
The proposal from the Commission defines two triggering thresholds based on the quantity of allowances in circulation, a low threshold and a high threshold. It adds a third trigger, an emergency threshold based on changes in the price of allowances. As long as the quantity of allowances in circulation is between the low threshold and high threshold, there is no intervention. In contrast, when the amount is outside these limits (below the low threshold or above the high threshold) a market stability reserve (or MSR) enters into action and removes or adds allowances to the auctions of the current year.

- **High threshold**: when the quantity of allowances in circulation is greater than 833 Mt, 12% of the amount of allowances in circulation is removed from auctions of the current year and placed in the MSR. The amount withdrawn cannot be less than 100 Mt (amount withdrawn at the threshold level of 833 Mt). If the amount of allowances in circulation is greater than 833 Mt (at present it is about 2,000 Mt) this withdrawal will be higher (240 Mt for 2,000 Mt, 360 Mt for 3,000 Mt etc.).

- **Low threshold**: when the quantity of allowances in circulation is less than 400 Mt, 100 Mt are removed from the reserve and added to the auctions of the current year. This mechanism cannot lead to releasing more than 100 Mt from the reserve each year.

- **Emergency threshold**: if for six consecutive months the allowance price is higher than three times its average value over the previous two years, 100 Mt are removed from the reserve and reinjected in the auctions of the current year. When the price is low for long enough, it is possible that this threshold gets easily triggered (e.g. if the price goes from 5 to more than 15 €/tCO_2). In contrast, when the price is greater than a few tens of euros, activation becomes less likely (a price increase from 25 to more than 75 €/tCO_2). As in the previous case, this mechanism cannot lead to releasing more than 100 Mt from the reserve in a given year. In addition, the emergency threshold is only valid when the price is rising: the reserve will not withdraw additional allowances if the price is to be divided by three.

Figure 1 – MSR triggering mechanism



Climate Economics Chair, from European Commission

The objective of the Commission therefore seems to reduce the amount of allowances in circulation to an area between 400 and 833 Mt, well below the level achieved at the end of the second period. The potential effects of this proposal depend on how the market will react to this mechanism, which is what we are trying to depict in the following analysis based on simulations from the ZEPHYR model.

2. Simulations using the ZEPHYR model

2.1 Assumptions

The ZEPHYR model simulates the supply and demand for allowances on the market, year after year. The behaviour of covered installations is represented as follows: operators compare the carbon price to their reduction cost and reduce their emissions whenever that cost is less than the price of an allowance. The demand for allowances also takes into account the expectations of participants who may choose to keep unused allowances or purchase allowances to bank them, if they expect future price increases and/or if they choose to engage in early emission reduction. The amount of unused allowances ("banking") is therefore a key variable for understanding the inter-temporal market equilibrium, which depends on both technical and economic choices of manufacturers and on their expectations.

To try to anticipate the possible impacts of the measures proposed by the Commission, we integrated in all our scenarios the measures that have already been taken: the allowance "backloading" over the third period, and the transition to a 2.2% annual reduction factor from 2021. From these assumptions, we constructed two reference scenarios (without MSR), on

which are then grafted the introduction of a market stability reserve. We chose to represent two different anticipation cases which are both typical and conventional scenarios:

- A **high scenario** where participants' expectations lead them to reduce their emissions early and to keep a large quantity of allowances for a future use (high banking).

- A **low scenario**, where participants do not consider it necessary to immediately reduce emissions or hold many allowances, where they use fairly quickly the allowances they hold (low banking).

The results are graphically shown on page 6, and key lessons are outlined in the next section.

2.2 Simulation results

The proposed mechanism leads to higher price levels, through a mechanically-induced scarcity of permits.
As said above, the MSR is asymmetric in nature since the quantity of allowances that can be withdrawn on a yearly basis is at least one time bigger than that which can be injected back into the market. What is more, the system's historical situation suggests that the upper bound is very likely to be breached first, and for a few years in a row from 2021 on. The process will automatically constrict the future supply of allowances without it being possible to quickly reinject back withdrawn allowances. It is however worth noting that the impact of the reserve heavily depends on agents' anticipations: in the high scenario prices levels reach 50 euro per ton in 2021 and remain above price levels in the baseline scenario until 2030; in the low scenario price rises less compared to the first case in 2021 before falling down below the reference price when the automatic rules lead to additional allowances entering the market.

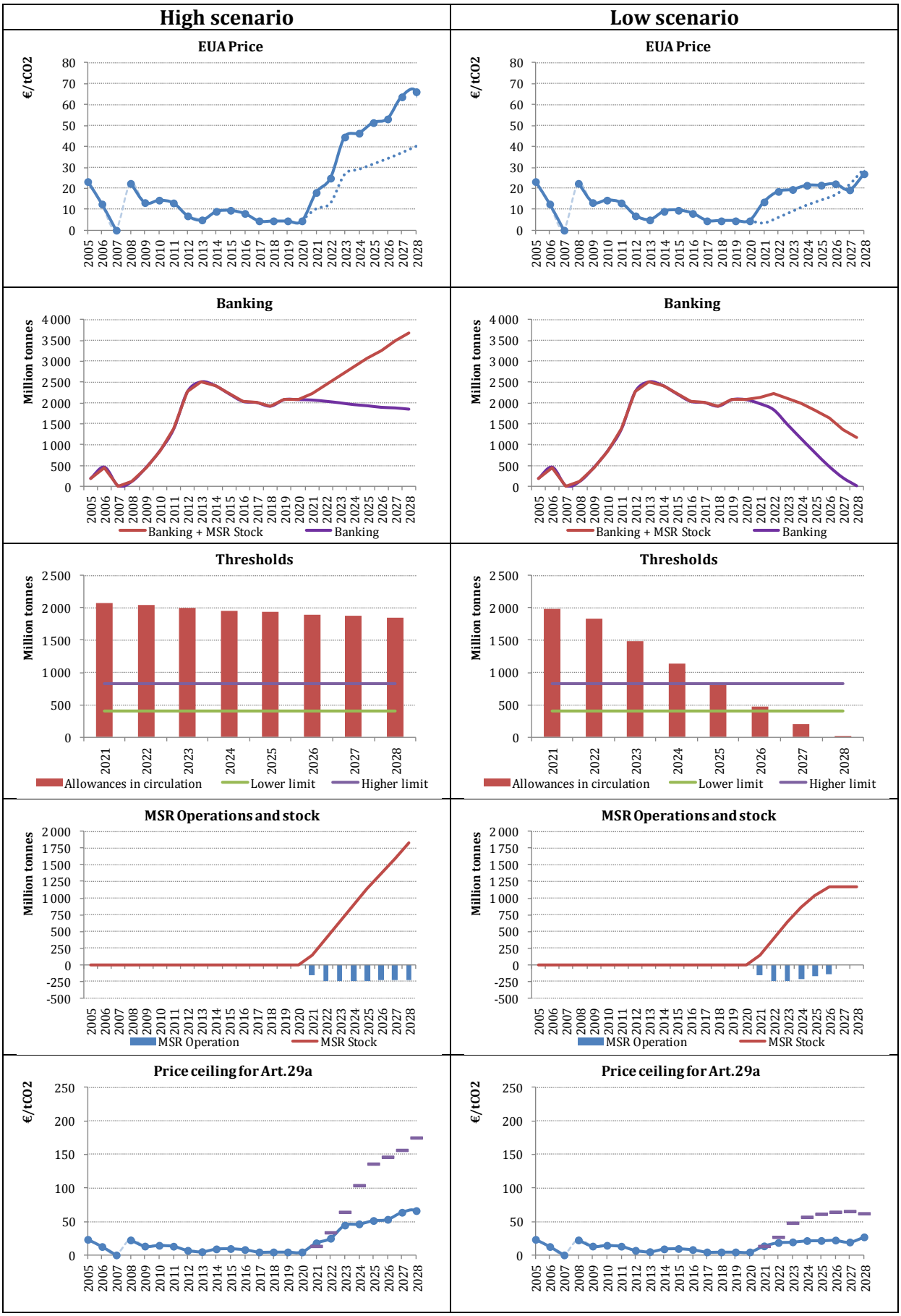
The reserve's operating rules bring about greater volatility compared to the reference scenario (without MSR) which is detrimental to a clear price signal.
Higher volatility can be observed in both scenarios and results from the reserve's "robot-type" behaviour which does not take into account agents' reactions to shifts in their economic environments. However, these reactions will impact a much greater quantity of allowances than that which could be automatically added or withdrawn by the MSR. Participants' needs for allowances naturally fluctuate over time, driven by a large variety of factors (evolution of abatement costs, energy relative prices, technology changes, economic and weather conditions, etc.). In the proposed mechanism, there are no provisions dedicated to identify which of these factors should be adjusted for by the MSR. Nor are there provisions for tweaking thresholds over time. Should this mechanism be implemented in 2021, its first evaluation would be scheduled for no sooner than 2026, with a potential correction coming after 2030 given the inertia of the decision-making process on this matter.

The reserve's operating rules may induce participants to deviate from their optimal inter-temporal emissions reductions paths.
Both freely allocated and bought allowances – whether on the market or at auctions – can be banked for future use without restrictions on their validity over time. This provision is included in the majority of carbon markets worldwide since it allows participants to account for their anticipations in their buy/sell decisions, thereby optimizing their emissions reductions paths over time. This possibility improves the economic efficiency of the system. However, with the MSR in place, should agents deem it more efficient to presently buy allowances with the intention to bank them for future use, they would mechanically ease the triggering of the reserve which, in turn, would go against their interests as an equivalent quantity would be withdrawn from auctions. Conversely, should agents reckon they do not need to own allowances at present and that they would be better off buying them later on, the total number allowances in circulation would be reduced and the reserve more likely to pump out additional allowances on

the market. In these two schematic cases automatic rules would therefore be contrary to the economic rationale.

3. Conclusion

Our analysis, based on simulations from the ZEPHYR model, is that the lowering of the cap resulting from a target of 40% reduction in total emissions, coupled with the implementation of a "stability reserve", should lead to a significant price increase from 2021. Our simulations also reveal the risk of growing price volatility resulting from automatically programmed interventions. In fact the stability reserve could become a source of "instability"! That is why the proposed system would be improved by a governance reform setting up an independent authority with a specific mandate to dynamically control the supply of allowances and send a readable and credible price signal to economic actors.



Source : ZEPHYR model, Climate Economics Chair

Note: In both scenarios, the upper threshold is triggered in 2021, which leads to a withdrawal of allowances which itself leads to a price increase that triggers the emergency threshold. MSR operation in 2021 reflects these two opposite effects.