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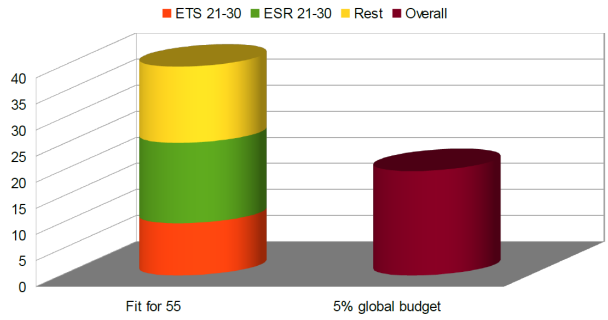
MAKING THE EU ETS AND ESR LEGISLATION COMPATIBLE WITH THE PARIS AGREEMENT

Introduction

In the 2015 Paris Climate Agreement countries engaged *"to limit temperature increase to 1.5°C above pre-industrial levels"* as going beyond that threshold would bring dangerous and irreversible impacts. Multiple assessments have made it clear that we are currently not on track to achieve this objective and are heading towards a 2.5°C temperature rise[1]. **Governments therefore agreed at the November 2021 Climate Summit in Glasgow to *"revisit and strengthen the 2030 targets in their nationally determined contributions as necessary to align with the Paris Agreement temperature goal by the end of 2022"***.

This commitment obviously also applies to the EU. With its current targets to reduce net greenhouse gas emissions by at least 55% by 2030 and to achieve climate neutrality by 2050 **the EU requires 10% of the available global carbon budget[2] to limit temperature rise to 1.5°C (with a 66% likelihood), while the EU represents only 5% of the world's population[3]. It is beyond discussion that further reductions are needed to bring EU greenhouse gas emissions in line with 1.5°C compatible carbon budgets.[4]**

Graph 1: global carbon budget vs. EU budget



Two important EU instruments to do this are currently being revised:

- The **Emissions Trading System (ETS)** governing emission reductions in the power and industry sectors through limiting emissions from around 10.000 major emitting installations;
- The **Effort Sharing Regulation (ESR)** which sets targets for each Member State to limit emissions not covered by the ETS (mainly in the agriculture, buildings, road transport and waste sectors).

This paper looks at possible scenarios to bring the ETS and ESR in line with 1.5°C carbon budgets.

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1 See: UNFCCC (2021). Nationally determined contributions under the Paris Agreement. Revised synthesis report by the secretariat. 25 October 2021. unfccc.int/documents/307628; and: UNEP (2021). The Heat Is On. A world of climate promises not yet delivered. Emissions Gap Report 2021. October 2021. www.unep.org/resources/emissions-gap-report-2021

2 The available global carbon budget refers to the amount of CO_2 that all countries can still emit to stay within a certain temperature limit. In its latest assessment the IPCC indicated that to have a 66% chance of limiting temperature rise to 1.5°C, total global CO_2 emissions should be limited to 400 billion CO_2.

3 Both the UN Framework Convention and the Paris Agreement call upon governments to share the efforts to limit temperature rise on the basis of equity, historical responsibility and capability. This means that richer countries with historically high shares of emissions, such as the EU would actually need to take a bigger responsibility than others to reduce the global carbon budget. This means the EU would need to substantially reduce its domestic emissions, in this example up to its per capita share of the remaining global carbon budget, and additionally provide massive financial support for climate action in poorer countries.

4 Further information on the calculation of EU carbon budgets can be found in the Annex.

Current legislation, proposed revision and alternative pathways

In 2018 the EU adopted new legislation that governs the ETS and ESR from 2021 onwards as part of the EU's efforts to reduce overall greenhouse gas emissions by at least 40% by 2030 (as compared to 1990). This legislation aims to reduce ETS emissions by 43% by 2030 (as compared to 2005) and ESR emissions by 30% (also compared to 2005). Since then the EU agreed to increase its 2030 climate target to a reduction of net greenhouse gas emissions by at least 55% by 2030. As a follow-up of this decision the European commission in June 2021 proposed a revision of the ETS and ESR legislation as part of the so called Fit for 55 package. This proposed revision aims at reducing ETS emissions by 61% and ESR emissions by 40%. Table 1 below gives an overview of the total emissions that would be possible under the ETS and the ESR for the full period from 2021 to 2030.

Table 1: Total amount of emission allowances for the period 2021 to 2030 and reductions achieved in 2030 (compared to 2005 for ETS and ESR emissions and to 1990 for the sum of both) under currently agreed and recently proposed amendments to ETS and ESR legislation (in $MtCO_2$-e)

ETS			ESR			TOTAL ETS+ESR	
Scenario	**Total emissions 2021-2030**	**2030 emissions/2005**	**Scenario**	**Total emissions 2021-2030**	**2030 emissions/2005**	**Total emissions 2021-2030**	**2030 emissions/1990**
ETS43	13.785	-43%	**ESR30**	19.944	-27%[i]	33.729	-39%
ETS61	11.867	-61%	**ESR40**	18.809	-40%	30.676	-53%[ii]

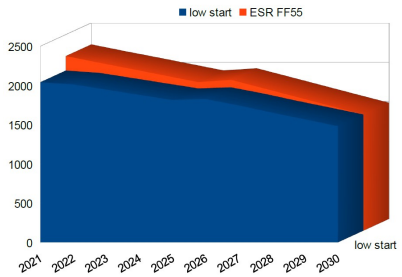
[i] Due to Brexit and changes to the calculation of 2005 emissions, the de facto ESR target under the current legislation is -27% (as opposed to the agreed -30%); [ii] As the new overall 2030 target is a net target, also taking into account carbon removals, the target set for ETS and ESR emissions is at least 52.8%.

There are basically three ways to reduce the carbon budgets of both the ETS and the ESR, in order to bring them in line with the Paris Agreement and 1.5°C compatible pathways:

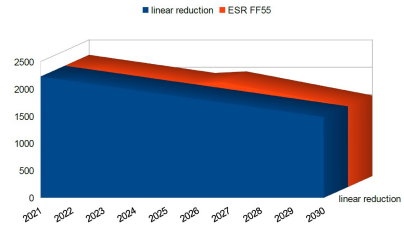
- **Lowering the starting level** from where emissions are being reduced;
- **Increasing the emission reduction target in 2030**; and
- **Improving the reduction pathway** to go from the starting level to the target in 2030.

Graphs 2 to 4 show how carbon budgets are influenced by changing any of these three parameters. Further information is found below and in the Annex.

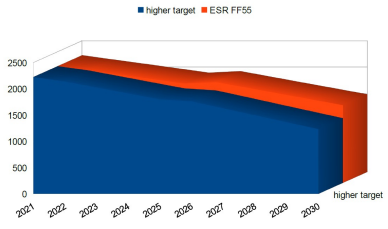
Graph 2: Change in carbon budget by adapting the starting level in the ESR



Graph 3: Change in carbon budget by adapting the pathway in the ESR



Graph 4: Change in carbon budget by adapting the 2030 target in the ESR



In order to assess the impact of these different options, five alternative pathways[5] have been developed: two alternative pathways for the ETS and three alternative pathways for the ESR. These pathways are described in Table 2 below, and compared to the currently agreed legislation and proposed revision from June 2021.

5 Note that the description of these scenarios focuses on their impact in 2030 but what happens after 2030 is also important. All alternative scenarios assume greenhouse gas emissions to be reduced to net zero by or before 2040 (as opposed to the EU's target of achieving net zero by 2050 which applies to the ETS61 and ESR40 scenarios).

Table 2: Description of starting levels, end date targets and reduction pathways for different ETS and ESR scenarios

Name	Description	Name	Description
ETS43	*(legislation currently in force)* - 2021 starting level: based on 2020 ETS target; - reduction pathway: linear reduction of 2.2%/year; - 2030 target: -43% of 2005.	**ESR30**	*(legislation currently in force)* - 2021 starting level: based on 2016-2018 average emissions; - reduction pathway: linear reduction from 2021 to 2030 target; - 2030 target: -30% of 2005.
ETS61	*(June 2021 Commission proposal)* - 2021 starting level: based on 2020 ETS target - reduction pathway: 2021-2023 same as ETS43; rebase in 2024 (-200 Mt); 2025-2030: linear reduction of -4.2%/year from 2024; - 2030 target: -61% of 2005.	**ESR40**	*(June 2021 Commission proposal)* - 2021 starting level: based on 2016-2018 average emissions; - reduction pathway: 2021-2022 same as ESR30; 2023-2025 linear reduction from 2022 towards 2030 target; 2026-2030: linear reduction from average 2021-2023 in 2024 towards 2030 target; - 2030 target: -40% of 2005.
ETS/REBASE	- 2021 starting level: at actual emissions in 2020; - reduction pathway: 2021-2023 same as ETS43; rebase in 2024 (- 590 Mt); 2025-2030: linear reduction of -4.2%/year from 2024; - 2030 target: -80% of 2005.	**ESR40+**	- 2021 starting level: based on actual emissions in 2020; - reduction pathway: 2021-2022 same as ESR30; 2023 rebase to level equal to linear reduction from 2020 actual emissions or 2020 ESD target (whatever is lowest) towards 2030 target; linear reduction from 2023 towards 2030 target; - 2030 target: -40% of 2005.
ETS/LRF+	- 2021 starting level: from 2020 ETS target; - reduction pathway: 2021-2023 same as ETS43; rebase in 2024 (-200 Mt); 2025-2030: linear reduction with 6.2% from 2024; - 2030 target: -73% of 2005.	**ESR50**	- 2021 starting level: based on 2016-2018 average emissions; - reduction pathway: 2021-2022 same as ESR30; 2023-2025 linear reduction from 2022 towards 2030 target; 2026-2030: linear reduction from average 2021-2023 towards 2030 target; - 2030 target: -50% of 2005.
		ESR50+	- 2021 starting level: based on actual emissions in 2020; - reduction pathway: 2021-2022 same as ESR30; 2023 rebase to level equal to linear reduction from 2020 actual emissions or 2020 ESD target (whatever is lowest) towards 2030 target; linear reduction from 2023 towards 2030 target; - 2030 target: -50% of 2005.

Please note that for the alternative pathways, it would be more ideal to change the starting level already in 2021, but given implementation has started we have opted to postpone changes till 2023 or 2024 (as in the Commission's June 2021 proposals).

For each pathways its impact on both overall emission allowances for 2021 to 2030 as well as for emission levels in 2030 is assessed. Given the late start of any changes a large surplus of unused allowances will still exist and, if fully carried over, would lead to allowable emissions in 2030 to be higher than the target level. This would make achieving climate neutrality in 2050 (or earlier) more challenging. This strengthens the need for more ambitious pathways to be approved. The results for all pathways are in Tables 3 and 4 below.

Table 3: Total emissions for the period 2021 to 2030 (in $MtCO_2$-e) and emission reductions in 2030 for different alternative pathways for the ETS legislation

Pathway	Total emissions 2021-30	2030 emissions/2005
ETS43	13.785	-43%
ETS61	11.867	-61%
ETS/REBASE+	9.137	-80%
ETS/LRF+	11.048	-73%

Table 4: Total emissions for the period 2021 to 2030 (in $MtCO_2$-e) and emission reductions in 2030 for different alternative pathways for the ESR legislation

Pathway	Total emissions 2021-30	2030 emissions/2005
ESR30	19.944	-27%
ESR40	18.757	-40%
ESR40+	17.866	-40%
ESR50	17.611	-50%
ESR50+	16.582	-50%

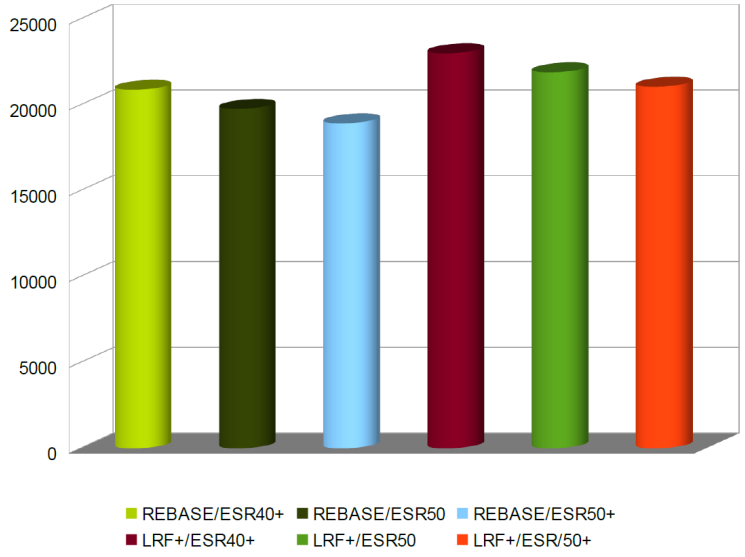
Stronger rebasing and higher 2030 targets needed to be consistent with Paris Agreement

Combining the alternative pathways creates six scenarios, three based on an increased rebasing in the ETS and three based on an increased linear reduction factor in the ETS, always combined with either an increased target, a faster linear reduction or a combination of both in the ESR. Table 5 below provides an overview of these six scenarios and the total 2021-2030 emissions budget for all six scenarios while Graph 2 shows the corresponding 2020-2050 carbon budget.

Table 5: Total emissions for the period 2021 to 2030 (in $MtCO_2$-e) for the legislation currently in place, for the proposed revisions and for 2 existing and 6 alternative scenarios

Scenario	Total emissions 2021-2030	2030 emissions/2005	Scenario	Total emissions 2021-2030	2030 emissions/2005	Total emissions 2021-2030	2030 emissions/1990
ETS43	13.785	-43%	ESR30	19.944	-27%	33.729	-39%
ETS61	11.867	-61%	ESR40	18.809	-40%	30.676	-53%
ETS/REBASE+	9.137	-80%	ESR40+	17.866	-40%	27.003	-62%
ETS/REBASE+	9.137	-80%	ESR50	17.611	-50%	26.748	-67%
ETS/REBASE+	9.137	-80%	ESR50+	16.582	-50%	25.719	-67%
ETS/LRF+	11.048	-73%	ESR40+	17.866	-40%	28.914	-59%
ETS/LRF+	11.048	-73%	ESR50	17.611	-50%	28.659	-64%
ETS/LRF+	11.048	-73%	ESR50+	16.582	-50%	27.630	-64%

Graph 2: total 2020-2050 carbon budgets for different scenarios (in $MtCO_2$)



While all scenarios provide EU carbon budgets well below what the European Commission is proposing under the Fit for 55 Package, only two scenarios foresee the EU's carbon budget to remain below a 5% share of the global carbon budget. Both these scenarios envisage a more ambitious rebasing of the ETS combined with a stronger 2030 target both for the ETS (through applying the 4.2% linear reduction from the rebased amount) and the ESR (moving from -40% to -50%).

Anything short from tackling surplus emissions that have been built up and will continue to built up under both the ETS and ESR will not allow the EU's climate policies to be in line with the Paris Agreement. Similarly, without increasing the level of ambition in both the ETS and ESR, the EU's contribution to the Paris Agreement will remain insufficient.

Annex 1: Pathways for strengthening the ETS and ESR

1. ESR starting levels

The ESR currently foresees that Member States' 2021 emissions allowances are calculated on the basis of their average emissions in 2016, 2017 and 2018. Since then however emissions have been strongly reduced and with this approach, many Member States will likely start with a substantial surplus in emission allowances as their actual emissions in 2021 will be well below the 2016-2018 average. Table 1 gives an overview of actual emissions in the ESR sectors.

Table 6: Total emissions in the ESR sectors

	Total emissions ($MtCO_2$-e)
2016	2.221,1
2017	2.252,0
2018	2.220,5
2016-18 average	*2.231,2*
2019 (preliminary)	2.208,7
2020 (proxy)	2.085,0

On top of this, Member States have performed very differently towards achieving their 2020 target under the Effort Sharing Decision. Some Member States have 2016-2018 average emissions (well) below their 2020 target, while for others starting from 2016-2018 averages would actually mean that their starting level in 2021 would be higher than their 2020 target. This is, in light of the increased urgency to act on climate change, hard to defend. Table 2 below gives an overview of the 2020 ESD target and the 2021 starting level in the current ESR Implementing Act for the five Member States with the biggest gap.

Table 7: Comparing ESD 2020 target and 2021 emission allowances for countries with highest gap (in $MtCO_2$-e)

	2020 ESD target	current 2021 allowances	Difference
Austria	47,8	48,8	1,0
Belgium	68,2	71,1	2,9
Germany	410,9	427,3	16,4
Ireland	37,7	43,5	5,8
Poland	205,2	215,0	9,8

A revision of the 2021 emission allowances based on a linear reduction starting from the 2020 ESD target, or 2020 actual emissions for those countries where emissions in 2020 were below the 2020 target, would substantially reduce total emission allowances as indicated in Table 3.

Table 8: Comparing different approaches to setting 2021 annual emissions allowances in the ESR (in $MtCO_2$-e)

	2020	2021	difference to Implementing Act
Implementing Act		2.226	-
lowest 2020 actual/ESD target	2.069	2.010	-216

We propose to rebase 2023 emission allowances on the basis of a linear trajectory starting from 2020 emission levels that reflect the lowest number of either actual 2020 emissions or the 2020 ESD target.

2. ESR reduction pathways

The ESD as well as the 2019 Implementing Act were based on a linear reduction between the 2013 respectively 2021 starting level and the targets in 2020 and 2030. The new Commission proposal has a different (more complex) approach, based on three steps:

- in 2021 and 2022, emissions allowances would be the same as those of the Implementing Act (thus corresponding to a -30% target for ESR emissions);
- in 2023, 2024 and 2025, emission allowances would be reduced following a linear reduction from 2022 allowances towards the new 2030 target to reduce ESR emissions by -40%;
- in 2026 to 2030, emissions allowances would be linearly reduced corresponding to a pathway starting in 2024, based on average emissions in 2021 to 2023, towards the -40% target in 2030.

The third step could actually allow countries to increase their allowances again from 2026 onwards, as shown in graph 3 above. We therefore propose to delete this third step and have emissions reduced from 2023 to 2030 based on a linear reduction from actual 2020 emissions towards the 2030 target.

3. ESR targets

The Commission has proposed an overall target for the ESR of -40%, with some countries having to reduce their ESR emissions by -60% and some others by only -20%. Especially the last is problematic as it seems hard to assume that countries that only reduce their ESR emissions by 20% by 2030 would be able to achieve carbon neutrality by 2050. Alternatively a target of -50% should is proposed.

4. ESR scenarios

We propose three scenarios:

In the first one (ESR40+) we amend the Commission's proposal by creating a linear reduction pathway from 2020 actual emissions in 2020 towards -40% in 2030, and apply the numbers of this pathway from 2023 onwards. This means that:

- for 2021 and 2022 we copy the numbers from the Delegated Act;
- for 2023, we set the number equal to the level of 2023 when applying a linear reduction from 2020 actual emissions to the 2030 target;
- from then on we use a linear reduction pathway between 2023 and 2030.

In the second one (ESR50) we amend the Commission's proposal by increasing the 2030 target to -50%. This means that:

- for 2021 and 2022 we copy the numbers from the Delegated Act;
- for 2023 to 2025 we use the relevant numbers when applying a linear reduction from 2022 emissions under the Delegated Act towards a -50% target in 2030;
- for 2026 to 2030 we apply a linear reduction from 2024 to 2030 whereby the 2024 level is defined by the average emissions of 2021 to 20323 and the 2030 target is set to -50%.

In the third one (ESR50+) we amend the Commission's proposal by creating a linear reduction pathway from 2020 actual emissions in 2020 towards -50% in 2030, and apply the numbers of this pathway from 2023 onwards. This means that:

- for 2021 and 2022 we copy the numbers from the Delegated Act;
- for 2023, we set the number equal to the level of 2023 emissions when applying a linear reduction from 2020 actual emissions to a 2030 target of -50%;
- from then on we use a linear reduction pathway between 2023 and 2030.

5. ETS starting level and rebasing

The ETS currently foresees that total 2021 emissions allowances are calculated on the basis of a linear reduction (by 2.2%) from the 2020 target. However, actual emissions in the ETS are well below this target and using the 2020 target to set the emission reduction pathway creates a substantial increase of unused emission allowances (see Table 9). We advocate for using the 2020 actual emissions as the starting level from which to reduce emissions by 4.2%.

Table 9: ETS 2020 target vs actual emissions

	Total emissions ($MtCO_2$-e)
2020 target	1.615
2020 actual emissions	1.224
difference	391

6. Linear reduction Factor

The ETS legislation currently in force foresees an annual reduction of emissions by 2.2% (of 2005 emissions). The Commission is now proposing to increase this to 4.2%. In order to increase the level of ambition in the ETS, the LRF could be increased, eg. by another 2% to 6.2%.

7. ETS scenarios

We propose two scenarios:

In the first one (ETS/REBASE) we amend the Commission's proposal by creating a linear reduction pathway from 2020 actual emissions, and apply the numbers of this pathway from 2024 onwards. This means that:

- for 2021, 2022 and 2023 we keep the emission levels currently in force;
- for 2024, we set the emissions level equal to where emission allowances would be on a linear reduction with 4.2%/year from 2020 actual emissions;
- for 2025 to 2030 we linearly reduce emissions by 4.2%/year from 2024.

In the second one (ETS/LRF) we amend the Commission's proposal by increasing the linear reduction factor from 4.2% to 6.2% from 2024 onwards. This means that:

- for 2021, 2022 and 2023 we keep the emission levels currently in force;
- for 2024 we set the emissions level equal to where emissions allowances would be on a linear reduction with 4.2%/year from the 2020 target (as in the Commission's proposal);
- for 2025 to 2030 we linearly reduce emissions by 6.2%/year from 2024.

Annex 2: Calculating the EU's carbon budget

The EU's carbon budget is calculated on the basis of:

- (a) expected CO_2 emissions for the period 2020 to 2050;
- (b) expected carbon removals through land use, land use change and forestry for the period 2020 to 2050.

(a) CO_2 emissions are calculated as 81.49% of expected greenhouse gas emissions, for the following periods:

- 2020: 3.377 $MtCO_2$-e
- 2021 to 2030: as in the scenarios above
- 2031 to 2040/2050: linear reductions from emissions in 2030 towards:
  - -80% in 2050 for the ETS43/ESR30 scenario

    - net zero in 2050 for the ETS61/ESR40 scenario (with 310 $MtCO_2$-e removals in 2050)
    - net zero in 2040 (with 600 $mtCO_2$-e removals in 2040) and -95% in 2050 for all other scenarios

(b) carbon removals are calculated for the following periods:

- 2020: 277 $MtCO_2$-e
- 2021-2030:
    - 225 $MtCO_2$/year for the ETS43/ESR30 scenario
    - linear increase from 225 $MtCO_2$-e in 2021 to 310 $MtCO_2$-e in 2030 for the ETS61/ESR40 scenario
    - linear increase from 225 $MtCO_2$-e in 2021 to 600 $MtCO_2$-e in 2030 for all other scenarios
- 2031-2050:
    - 225 $MtCO_2$-e/year for the ETS43/ESR30 scenario
    - 310 $MtCO_2$-e/year for the ETS61/ESR40 scenario
    - 600 $MtCO_2$-e/year for all other scenarios