Dynamic allocation for the EU Emissions Trading System

Enabling sustainable growth

- Final report –

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Preface

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The Dutch Energy Agreement for sustainable growth, finalised in September 2013, is a prominent example of how a more sustainable energy system can be supported by a broad group of stakeholders. The Energy Agreement was developed and signed by 40 stakeholders in total including the Dutch government, business groups, energy-intensive industry, the power sector, green NGOs, and several other influential organisations.

One of the agreements made is to work towards structurally improving the functioning of the EU Emissions Trading System (ETS) by combining three aspects: 1) an increased reduction of the ETS cap in line with the long-term goal to reduce greenhouse gas emissions by 80–95% by 2050 compared to 1990; 2) preserving the position of internationally competing firms (so-called carbon leakage companies) by allocating 100% free allowances based on realistic benchmarks and actual production, based on the best performance in the industry; 3) compensation of indirect carbon costs from electricity consumption based on best performance in the sector.

This report is an elaboration of this specific part of the Energy Agreement and describes and analyses an improved system of free allocation of emission allowances that could enter into force as of 2021.

The report has been made possible by the Dutch Ministry of Infrastructure and Environment, the Dutch Ministry of Economic Affairs and the Confederation of Netherlands Industry and Employers (VNO-NCW). Valuable input has been provided by a wide steering group consisting of representatives of the aforementioned organisations and in addition representatives of the Dutch Association for Energy, Environment and Water (VEMW), the Association of the Dutch Chemical Industry (VNCI), the Dutch Technology Industry Association (FME), the Dutch Green Business Association (De Groene Zaak), the Association of Energy Companies (Energie Nederland), and green NGOs.

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Executive summary

The EU Emissions Trading System (EU ETS) was established in 2005 to promote reductions of greenhouse gas emissions in a cost-effective and economically efficient manner across different sectors of the economy. The basic premise of an ETS is that each installation covered by the scheme is obliged to surrender an emission allowance for each tonne of CO_2 it has emitted.

For the 2013–2020 period, over 40% of the emission allowances are distributed to industrial installations for free. Free allocation of allowances is intended to preserve the international competitiveness of Europe's industries and to prevent so-called "carbon leakage": the relocation of production and as a result greenhouse gas emissions from Europe to other regions with lower carbon costs. Carbon leakage undermines the environmental effectiveness of the EU ETS as well as the EU's social-economic agenda for industrial growth.

Historical activity level

Under current allocation rules, a *historical* activity level and a carbon-intensity benchmark that takes into account best practices in industry determine the amount of allowances that are allocated to a company for free. In addition, a cross-sectoral correction factor is applied, which gradually increases to -18% by 2020.

However, allocation based on historical activity levels is not sufficient to prevent carbon leakage and incentivise carbon-efficient growth. Companies that increase their productivity beyond historical levels would be suffering from a shortage in allocated allowances, even if they were amongst the best performers in their sector. As the additional production faces the full costs of emission allowances, this could hamper production or investment decisions. As such, the present allocation methodology is not adequate to fully prevent carbon leakage.

In times of recession, the current allocation rules may also result in over-supply of allowances in the market, driving down the carbon price. Industrial activity in Europe declined during Phase II of the EU ETS (2008–12), primarily due to the economic crisis, and a surplus of around 2 billion allowances built up. Because the supply of allowances in the EU ETS is fixed, the price of allowances dropped to record lows since the start of Phase II in 2008.

The European Commission has proposed to tackle the current issue of over-supply by the introduction of a Market Stability Reserve. While this measure helps to overcome the structural imbalance of supply and demand that stems from allocation based on historical production, it does not improve the prevention of carbon leakage.

Dynamic allocation

This report elaborates on a model that is expected to meet this demand for improvement: "dynamic allocation". Dynamic allocation couples the free allocation for both direct and indirect emissions to actual production instead of historical production. Based on a benchmark that includes a realistic carbon efficiency improvement rate and on recent activity levels, a company receives a certain amount of free allowances for a year. But unlike the present allocation method, in dynamic allocation this amount will be corrected afterwards, based on the realised activity in that year.

Without correction factor

At the same time, dynamic allocation implies the absence of a cross-sectoral correction factor. In the present system, a possible way out for companies not able to bear carbon costs imposed by the correction factor is to reduce their production. Under a dynamic allocation system, companies would no longer have this option to solve a shortage position. Without the correction factor, companies are provided with the certainty that the amount of free allowances is purely related to a realistic benchmark and actual production levels. For manufacturers and investors, this will increase their confidence that the EU ETS will not unnecessarily negatively affect their investments and capacity expansions in Europe. Dynamic allocation also significantly simplifies and harmonises the treatment of new entrants and closures, and makes the New Entrants Reserve superfluous. Compensation for direct and indirect emissions could be harmonised by integrating both in the benchmarks.

Allocation Supply Reserve

An Allocation Supply Reserve (ASR) is needed for the dynamic allocation model to properly combine a fixed allocation budget with a flexible allocation in the absence of a cross-sectoral correction factor. The ASR is used to store allowances when fewer are needed and to provide allowances for free allocation when more are required than anticipated (i.e. if production levels are higher than forecasted). Calculations show that under various scenarios dynamic allocation is a feasible approach that respects the total ETS cap and functions properly well beyond 2035.

The ASR can co-exist with the Market Stability Reserve (MSR) that the European Commission has proposed, or both could be integrated into one reserve. Both the MSR and the ASR are able to tackle the current surplus and both are in principle able to provide a more stable carbon price signal. An important difference is their main purpose: the MSR is focused to improve the supply–demand balance in the market, while the ASR primarily aims at preventing carbon leakage and providing incentives for carbon-efficient growth.

Increased investment security

With the proposed system of dynamic allocation, the number of auctioned allowances will be reduced due to the allocation to the industry: in the period 2021 to 2030, the difference compared to a reference scenario with current allocation rules and the current Carbon Leakage list would amount to an average reduction of approximately 400 million allowances per year. At the same time, it can be assumed that the carbon price is strengthened by putting a robust amount of allowances (e.g. 900 million) upfront in the Allocation Supply Reserve, which will further increase investment security. Finally, financial compensation to electricity-intensive industries is no longer needed because this compensation is in this proposal incorporated in the dynamic allocation. If the system is designed well, additional administration costs to both participants and authorities are limited.

In short, dynamic allocation is an elegant, improved allocation mechanism that prevents carbon leakage, facilitates long-term planning by investors and provides incentives for carbon-efficient growth. In addition, it provides an attractive architecture for international expansion of ETS, which may contribute to a more global level playing field in the long term and hence a further reduction of carbon-leakage risks. In fact, all of the new emission trading systems around the world that employ benchmarking also use some type of dynamic allocation. As the 2030 package is on the table, including proposals to strengthen the EU ETS, now is a good time for Europe to consider this important alignment.

How to read

This report is structured as follows: in Chapter 2 the basic elements of dynamic allocation are introduced and the system is compared to the current allocation methodology. Chapter 3 analyses the robustness of dynamic allocation in the long term, given the decrease of the ETS cap and its impact on auction volumes. Chapter 4 zooms in on aspects related to the implementation of dynamic allocation, like costs for participants and competent authorities. The annexes provide answers to frequently asked questions (Annex I) and technical details behind the calculations of Chapter 3 (Annex II).

1 Introduction

The EU Emissions Trading System (EU ETS) was established in 2005 to promote reductions of greenhouse gas emissions in a cost-effective and economically efficient manner across different sectors of the economy. The basic premise of the ETS is that each installation covered by the scheme is obliged to surrender an emission allowance for each tonne of CO_2 it has emitted. The possibility of trading is essential, and implies that each company can decide either to reduce its emissions by taking measures, or to buy extra allowances to cover the emissions. In economic theory, this would result in the cheapest reduction measures being implemented first.

In the context of the 2030 energy and climate policy framework, the European Commission (EC) has recently proposed two measures to improve the EU ETS as the backbone of this framework. The EC proposed a steeper reduction of the ETS cap after 2020 and the establishment of a so-called Market Stability Reserve. Both reforms focus mainly on modulating one part of the total amount of allowances under the ETS cap, namely the allowances issued through auctioning. The other part – the free allocation to industry, which makes up of over 40% of allowances issued in the current trading period – is not explicitly addressed.

Free allocation

Free allocation of allowances is intended to preserve the international competitiveness of Europe's industries and to prevent so-called "carbon leakage": the relocation of production and as a result greenhouse gas emissions from Europe to other regions with lower carbon costs. Carbon leakage undermines the environmental effectiveness of the EU ETS as well as the EU's social-economic agenda for industrial growth.

In its recent 2030 policy framework for climate and energy, the European Commission recognised the need for improved allocation rules. As long as third countries do not take comparable climate action, "an improved system of free allocation of allowances with a better focus" is needed (European Commission, 2014a). In the corresponding impact assessment, the EC adds: "If it would be decided to preserve the approach of free allocation through benchmarking up to 2030 to address the risk of carbon leakage, a number of important design features will need to be revisited" (European Commission, 2014b).

In a response to the new policy framework, the European Council recently invited the European Commission to rapidly develop "measures to prevent potential carbon leakage and call for long-term planning security for industrial investment in order to ensure the competitiveness of Europe's energy-intensive industries" (European Council, 2014). This call for preserving industrial competitiveness in Europe is in line with the EC's recent communication for a "European Industrial Renaissance " in which Member States are asked to "recognise the central importance of industry for boosting competitiveness and sustainable growth in Europe and for a systematic consideration of competitiveness concerns across all policy areas" (European Commission, 2014c).

Dynamic allocation

As further detailed in Chapter 2.1, the key issue is that the current allocation rules are not sufficient to fully prevent carbon leakage, due to use of historical activity levels and a significant correction factor (see Box 1). This report introduces a model that could meet the request of the European Council to improve the allocation rules in this context: "dynamic allocation". Dynamic allocation refers to the allocation of free allowances based on actual production levels, instead of historical levels, which may differ significantly. While maintaining the absolute emission cap – which is a prerequisite – dynamic allocation improves the flexibility and simplicity of free allocation within the EU ETS, removes incentives for divestment, and increases the confidence of investors by minimising uncertainty about the impact of ETS on their investments in the EU.

Dynamic allocation is an elegant, improved allocation mechanism that facilitates long-term planning by investors and provides incentives for carbon-efficient growth. In addition, it provides an attractive architecture for international expansion of ETS, which may contribute to a more global level playing field in the long term, and hence a further reduction of carbon leakage risks.

Box 1: Current allocation model

The current allocation methodology used in the EU ETS is based on fixed carbon-intensity benchmarks in combination with fixed, historical activity levels. This combination is not used in any other scheme outside the EU ETS except for Switzerland's. Allocation to industry is also capped to a certain limit. If industry requires more allocation than is available within this cap, a uniform correction factor applies to all industrial installations. This uniform correction factor includes the linear reduction of the overall ETS cap.

This gives the following formula for industrial installations exposed to a significant risk of carbon leakage:

$$\text{Allocation} = \text{Benchmark} \times \text{Fixed historical activity level} \times \text{Correction factor}$$

To some extent, allocation is made quasi-dynamic by rules that regulate an increase/decrease of allowances if capacity increases/decreases by over 10%. If the activity level drops severely, e.g. below 50% of the historical baseline, allocation is cut by a discount factor of 50%. The issue is that these rules in practice result in insufficient predictability and certainty for companies (see Box 3 for further details). More importantly, increase of production within existing capacity will never lead to additional emission allowances, which therefore face the full carbon costs.

The uniform correction factor is -5.73% in 2013 and gradually increases to -17.56% in 2020. The correction factor for the period after 2020 has not been announced yet. Based on extrapolation of current rules it would increase roughly from -20% in 2021 to -40% in 2030, thereby hampering the protection of installations operating at benchmark level against carbon leakage.

In the current system, all allowances that are not allocated for free will be auctioned.

2 Dynamic allocation – the basics

In this chapter the basic concept and the main characteristics of dynamic allocation are described, and compared to the current allocation methodology.

The total volume of emission allowances under the cap is divided into two sections: a free allocation budget for industry and a volume of allowances assigned for auctioning. Dynamic allocation is designed to make free allocation to industry more flexible, while at the same time attaining a predefined emissions cap, enabling carbon-efficient growth and achieving an effective carbon price signal.

The basic concept of dynamic allocation consists of the following elements:

- the actual production level of the installations concerned
- an emission-intensity benchmark covering direct and indirect emissions
- an Allocation Supply Reserve (ASR).

This gives the following formula to determine the allocation to installations exposed to carbon leakage:[1]

$$\text{Allocation} = \text{Benchmark} \times \text{Actual activity level}$$

In the period preceding a trading period, an allocation budget for industry, covering the full trading period, is determined, based on benchmarks and forecasted activity levels, without a uniform correction factor (see for further details also Annex I: Q&A). Future activity levels are taken into account, based on expected economic production. The benchmarks to be used are realistic and reflect how they become more ambitious over time in a predetermined manner.

After the allocation budget is determined, the remaining volume available within the ETS cap is assigned to the auctions. Thus, this amount will be set and fixed from the start, providing predictability to the market.

By definition, a dynamic allocation approach means that free allocation will vary year by year. In years of higher than expected production (and hence higher allocation), more free allowances may be needed than originally anticipated. This is provided by an ambition-neutral Allocation Supply Reserve (ASR). The opposite happens in years of low production where fewer allowances are needed than budgeted: the difference is not auctioned but stored in the ASR for later use.

Importantly, the ASR is filled upfront with allowances taken from the allowances available within the ETS cap, for example the backloaded allowances, which assures that the sum of freely allocated and auctioned allowances does not exceed the predefined cap (see Figure 1). In this way, the ASR ensures that allocation is compatible with a declining EU ETS cap without compromising it, while at

[1] For sectors not exposed to a sufficient risk of carbon leakage, an additional factor should be added to reflect a gradual decline in free emission allowances.

the same time providing predictability regarding both future auctions and future free allocation of allowances. In Chapter 3 it is further demonstrated that dynamic allocation is compatible with the declining EU ETS emissions cap.

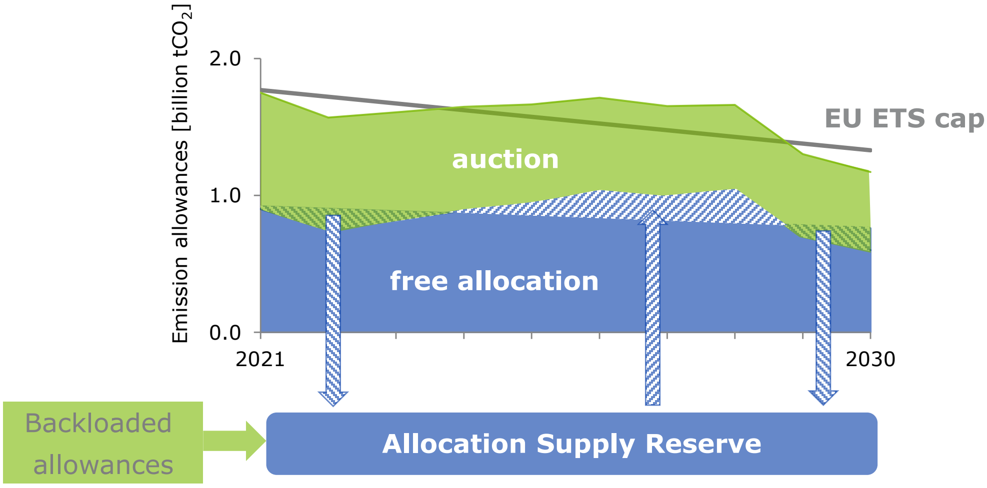

Figure 1: Conceptual design of dynamic allocation. As the Allocation Supply Reserve (ASR) is filled upfront with backloaded allowances, the total ETS cap (or budget) is not exceeded. To illustrate how it works, we assume an economic recession in 2021–2023. In this period, the ASR consumes allowances as industry needs less free allocation than originally anticipated (area marked by \\). In 2024–2028, a period of higher than expected economic production is assumed. Now the ASR will provide the amount of free allowances exceeding the initial allocation budget (area marked by //). At the end of the decade a new recession kicks in, triggering the ASR to consume allowances, like before. In all circumstances, the auction volumes – which are fixed upfront – are not impacted by dynamic allocation. Note that we assume in this graph more ambitious benchmarks over time as technology develops.

2.1 The use of actual activity levels

The defining component of dynamic allocation is the use of actual activity levels (Ecofys, 2008). In other words, free allocation becomes flexible and is supplied in line with economic developments. For individual ETS installations, the carbon costs per unit product become equal to its performance against the benchmark. Whether the activity level is above or below a historical reference level is not relevant anymore. This way, carbon efficiency within the EU is promoted, and incentives causing emissions to be moved outside the EU are avoided.

The following example shows the functionality of using actual activity levels under dynamic allocation. An installation that operates at benchmark level will have an allocation equal to its annual emissions, regardless of its exact activity level. When its production grows beyond its historical baseline, net carbon costs do not change and in this example remain zero. The combination of predictability, and net – rather than full[2] – carbon costs at the margin, allows the efficient installation to increase

[2] As applicable under the current allocation rules.

production and gain competitive advantage based on its superior performance compared to less carbon-efficient installations, instead of its ability to move production outside the EU ETS area.

In contrast, the current allocation methodology lacks this carbon-efficiency incentive: each installation receives a more or less fixed allocation throughout the trading period. Free allowances, not linked to actual output but based on a historical reference, act as a lump-sum payment. Consequently, at the margin, the full carbon price signal is experienced. Or, as the International Emissions Trading Association puts it: "In periods of economic development, the use of historical activity levels render any output above these levels uncompetitive due to full marginal costs and could serve as a growth disabler" (IETA, 2013).

Under the current system, a carbon-efficient installation operating at benchmark level can sell allowances if its production is below historical baseline (usually referred to as opportunity costs), while it will experience full carbon costs for any production beyond historical baseline. This way, the carbon-efficient installation is incentivised to produce fewer rather than more products. It could even be economically efficient to sell allowances left over and use the revenues to import products from outside the EU ETS, a direct form of carbon leakage. Because of these notions, it is now generally accepted in literature that the current allocation methodology, based on historical output levels, is not sufficient to avoid carbon leakage (e.g. Neuhoff, 2008; Climate Strategies, 2009; Carbon Trust, 2010; Sato *et al.*, 2013; CE Delft, 2013; Vivid Economics & Ecofys, *in prep*). If operators of carbon-efficient installations nevertheless decide to grow (and hence experience full carbon costs for additional production), they will have more difficulty competing with less carbon-efficient competitors: the less-efficient competitors can sell allowances by decreasing their production, which help them to stay alive longer in the market.

Of course, actual activity levels are only known, and can only be verified, after the year for which the allocation is needed. Recalculation is therefore required, which is a common practice e.g. for taxes, energy and water. A solution is to use the most recent verified activity levels (usually dating back one or two years) as a starting point and make a correction, in either direction, once the actual, verified activity level is known. This is the approach used in the ETSs of California, Australia[3] and New Zealand, and in the pilot ETS of Shenzhen (China).

2.2 Building blocks for realistic benchmarks

The second defining element of dynamic allocation consists of realistic benchmarks, covering both direct as well as indirect emissions, and providing simultaneously a carbon-efficiency incentive and protection against carbon leakage. Furthermore, the use of benchmarks is instrumental in creating global competitive conditions.

Setting benchmark levels requires a careful balance between an ambitious long-term goal and adequate protection against carbon leakage. The latter requires benchmark levels not to be set too low, since that can still lead – in combination with high carbon prices – to carbon leakage. However,

[3] The Australian ETS may be dismantled or changed, with the effect of abandoning the (relatively) high fixed carbon prices of the initial fiscal years.

the level of the benchmarks should also take account of an ambitious climate policy in relation to the available emission volumes. In addition, an overly generous benchmark would lead to over-allocation to many installations (i.e. those performing better than the benchmark).

To define realistic benchmarks is beyond the scope of this report. Nevertheless, the following building blocks could serve as starting points for further exploration to find a well-balanced approach for realistic benchmarks.

In principle the current product benchmark approach in the EU ETS could serve as starting point.[4] While the current benchmarks are static, an important element of dynamic allocation is the use of benchmarks that are based on realistic *carbon-efficiency improvement rates*. This should reflect the increasing ambition level of the EU ETS as a whole, and realistic carbon-efficiency improvement rates of the industrial sectors based on, amongst others, industrial energy and carbon roadmaps that have been presented in recent years (e.g. CEFIC, 2013; CeramUnie, 2012; Eurofer, 2013).[5] Also the steepness of the benchmark curve could be taken into account.[6] A new data collection is most likely not needed.

Box 2: What creates the incentive for emission reductions?

The incentive to reduce emissions is provided by the carbon price and the benchmark principle, not by the absolute level of the benchmarks. The benchmark principle gives carbon-efficient producers an economic advantage compared to less carbon-efficient ones. The incentive for less efficient producers is therefore to close the gap with their more efficient competitors as much as possible. The carbon price provides that any reduction of carbon emissions – even for the most efficient plants – directly leads to cost savings from handing in fewer emission allowances, translated as less need to buy or more room to sell allowances. The absolute level of the benchmark is in this context not directly relevant.

An essential characteristic of dynamic allocation is to provide long-term certainty and predictability of the amount of allocation per unit product and ultimately the carbon costs per unit product. Although this could technically be limited to direct carbon costs, indirect carbon costs can form a significant component of carbon costs as well. It would therefore be consistent to use dynamic allocation for both direct and indirect costs, in particular to apply the same rules regarding eligibility for carbon leakage compensation as well as the amount of allocation by means of a benchmark that includes both direct and indirect emissions.[7]

Allocation for indirect costs is not difficult to realise, especially for products with a product benchmark that includes emissions (from electricity consumption), i.e. one can simply apply these benchmarks and get rid of the corrections applied in the current scheme. Additionally, one can use the

[4] See Annex I: Q&A for how to deal with dynamic allocation for products without a product benchmark.
[5] Note that once installations report emissions and activity levels, the EC can deduce actual carbon improvement rates. It is important, though, that carbon efficiency improvement rates are agreed upfront to provide the required predictability.
[6] In this way products that realised a rather flat benchmark curve are not punished for their achievement, while products with a relatively high difference between average performance and top 10% are then required to realise higher emission reductions.
[7] An alternative solution would be to develop a European-wide harmonised system of financial compensation.

benchmarks for electricity consumption that have been developed in the current EC guidelines on state aid (European Commission, 2012).

To avoid undue limitations on growth, the link to actual production will be especially important for fast-developing countries, such as Brazil, India, China, South Africa, Mexico and Turkey. Limiting free allocation to historical activity levels would be a growth disabler for these fast-emerging economies and is therefore unattractive. Given the large annual growth rates and uncertainty about these rates an emissions intensity target is a more logical and palatable first step. This type of overarching commitment fits well with production-based allocations capped by efficiency standards (benchmarks). The establishment of similar benchmarks and allocations across the world will be key to achieving a global level playing field.

2.3 How does it work in practice?

Allocation in a certain year is based on the verified activity level of the previous year and a correction of the allocation given in the previous year.[8] To illustrate how dynamic allocation works in practice for an individual installation, consider a hypothetical plant with an emission intensity of 1.1 tCO_2 per tonne of product, which improves by 1% per year. For the level of free allocation the plant is subject to a product benchmark of 1.0 EUA per tonne of product,[9] which is also assumed to decrease by 1% per year.[10]

Dynamic allocation with a one-year correction afterwards is calculated as follows (see Table 1):[11]

- In 2021, the plant receives free allocation based on its activity level in 2020, that is 1.0 EUA / tonne product x 1000 tonne product = 1000 EUAs.
- In 2022, the plant receives free allocation based on its verified activity level in 2021. In addition, a correction is made to account for the difference between realised output in 2021 (=1030) and the output level that was used for the 2021 allocation calculation (=1000), a difference of +30. Hence, the allocation in 2022 is 0.99 EUA / tonne product x 1030 + 1.0 EUA / tonne product x 30 = 1050 EUAs.
- In times of reduced production the plant automatically receives less allocation. For example, in 2027 the plant receives allocation based on its 2026 activity level (=1000) and the 2027 benchmark, plus the difference between 2025 and 2026 activity levels (-100) times the 2026 benchmark. The allocation for 2027 is then 0.94 EUA / tonne product x 1000 – 0.95 EUA / tonne product x 100 = 846 EUAs.

It follows that:

- The net carbon costs in the period 2021–2030 are 0.10 tCO_2 / tonne product, in line with the operator’s expectation based on its performance against the benchmark.

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[8] In formula format this reads: Allocation (i) = Benchmark (i) × AL (i-1) + Benchmark (i-1)×(AL(i-1)-AL(i-2)), with AL as the activity level and i the year. In theory one could leave out the second part of the equation, which is the ex-post correction, with a drawback that allocation would then less reflect the economic situation of the installation. In other words: in times of growth the installation would need to pre-finance the additional allocation.
[9] 1 EUA is an EU allowance to emit 1 tonne of CO_2 equivalent.
[10] This annual decrease in benchmarks corresponds to the baseline scenario in Chapter 0, and serves just as an example.
[11] A delay of two years as in California would work analogously.

- Assuming a carbon price of €30 / EUA the net carbon costs are 0.10 EUA / tonne product x €30 / EUA = €3 / tonne product.

Table 1: Example of free allocation to an installation in times of growth and recession based on dynamic allocation rules.

Year	Activity level	Emissions	Dynamic allocation
	t product	tCO2	EUAs
2020	1000	1,100	
2021	1030	1,133	1,000
2022	1070	1,165	1,050
2023	1120	1,207	1,088
2024	1150	1,227	1,136
2025	1100	1,162	1,134
2026	1000	1,046	998
2027	900	932	846
2028	800	820	745
2029	850	863	645
2030	900	904	823
Total	9,920	10,461	9,510

2.4 Equal treatment of new installations and capacity changes

Dynamic allocation provides uniform rules to calculate the amount of allocation to greenfield installations, significant capacity changes and (partially) closing plants. The simplified system provides equal treatment of existing and new plants, thereby removing barriers for new entrants and investments. This contrasts with the complex rules with uncertain outcomes and a complex administrative system currently in place (see Box 3).

New entrants will face the same rules as existing installations and receive allocation based on their actual activity levels.[12] This puts new entrants on the same competitive footing as existing installations. This is not the case in the current allocation methodology because different rules are applied to new entrants as compared to existing installations. With dynamic allocation, new entrants will know in advance how much allowance they can expect to receive, leading to lower risks and lower net carbon costs, thus providing more predictability which is crucial for investment decisions.

The same situation applies to capacity increases, capacity reductions, partial cessations and full cessations. The current allocation methodology includes separate rules for each of these different cases, with different approaches and calculation rules. With dynamic allocation, this complexity is no longer needed: all situations can be treated by the same straightforward formula.

In addition, because allocation is supplied in a harmonised way on the basis of actual production, the New Entrants Reserve is not required any longer.

[12] Because new entrants have no historical production, they could get allocation in the first year based on e.g. 90% of forecasted production, or 90% of nameplate capacity. This amount will be corrected later based on real production.

Box 3: How predictable is the amount of free allocation?

While the intention of the current ETS was that a fixed amount of allocation would provide market participants more predictability, first experiences with current allocation rules show that several uncertainties still remain (see Figure 2).

First, allocation is dependent on a correction factor that is not known well in advance. In the current trading phase (2013–2020), the correction factor was announced after the trading period had already started (by September 2013) and was much more stringent than most companies expected.

The second uncertainty arises when an installation grows its output and exceeds the threshold for a capacity extension. Provided the growth was not within existing capacity, the operator can apply for additional allowances from the New Entrants Reserve (if not yet empty) following a complicated set of rules, which in many cases involve parameters subject to interpretations e.g. "start of changed operation", "physical change", or "relevant capacity utilisation factor". Once understood, the operator will find out that allocation can be determined only after six months of running the additional capacity. A serious risk factor is that the operator may not be able to run the additional capacity at the desired activity levels in the first six months, due to technical, economic or even climatic circumstances. For greenfield installations, the relevant period on which to base the allocation is limited to only three months. Once fixed, the allocation cannot be changed afterwards. Hence, it is unclear upfront which amount of free allocation the operator should take into account when developing a business plan for additional capacity.

The third risk is encountered when the operator recognises that the installation's activity level drops 10% below the historical reference level. The operator now needs to monitor closely whether or not a "physical change" occurs in the installation, as that would trigger a reduction of allowances. As it is not straightforward to identify what qualifies as a physical change, the operator could decide not to demolish inactive equipment, while it may be more efficient from an economic point of view to do so.

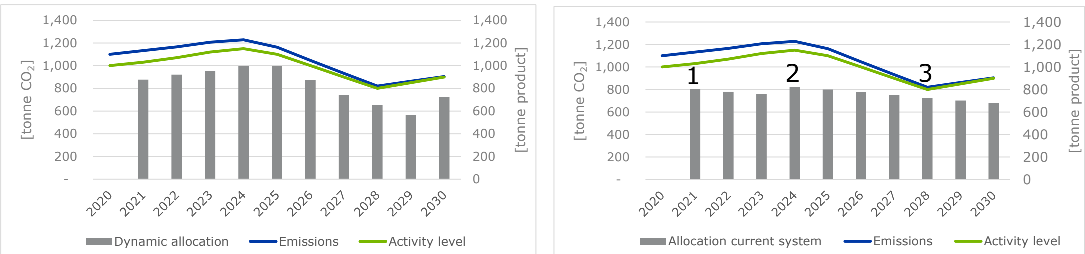

Figure 2: Comparison of the amount of free allocation to a hypothetical single ETS installation in the case of dynamic allocation with realistic, more ambitious benchmarks and without correction factor (left) and the current allocation method with correction factor (right) extrapolated to post-2020. For illustrative purposes, the installation rapidly grows production in 202–2024, shrinks in 2025–2028 and recovers in 2029–2030. In the current allocation method (right), uncertainties manifest themselves early in the trading period due to an unknown correction factor (1) and upon growth (2) or reduction of activity levels (3). In both graphs it is assumed that no electricity is consumed.

2.5 The Allocation Supply Reserve

The Allocation Supply Reserve (ASR) provides the flexibility necessary to combine a fixed (allocation) cap with the need for flexible supply of allocation as a result of uncertain economic conditions. When fewer free allowances are needed than originally foreseen, the surplus is not brought to the auctions, but is stored in the ASR. Similarly, when more free allowances are required than anticipated, due to higher than expected production, the ASR is able to provide these allowances without affecting the auction volume in that period, nor compromising the cap. Consequently, the ASR contributes towards a stronger and more stable carbon price signal and makes the EU ETS more resilient against uncertain and unpredictable economic fluctuations. At the same time it provides certainty about sufficient allowances for free allocation to carbon-leakage-exposed sectors and predictability about auction volumes to governments and other interested stakeholders.

The ASR is not an additional reserve as it replaces the current New Entrant Reserve that becomes obsolete due to the fully harmonised and integrated approach for incumbents and new entrants (see Chapter 2.4).

To make the ASR operational, it would need a start budget. This could be a start budget able to cover multiple years of unexpected high growth, or a smaller start budget which may get automatically supplemented if the ASR volume drops below a certain threshold. In this report a start budget of 900 million allowances is proposed. This amount, originating from the backloaded allowances (European Commission, 2014d), is sufficiently robust to cover multiple years of higher than expected growth and will allow dynamic allocation for a prolonged period of time (as shown in Chapter 3), which provides a crucial long-term signal to investors. In addition, this will prevent a spike in market surplus around 2020 when the backloaded allowances would otherwise return to the market. Thus, putting the backloaded allowances in the reserve will most likely lead to higher instead of lower carbon prices at the end of Phase III (Point Carbon, 2014). This can be experienced as a strengthening of the carbon price and a positive signal for carbon-efficient investments.

The ASR will not get depleted before at least 2035 according to the scenarios shown in Chapter 3 (including an extreme stress test not shown). In case the ASR does get depleted, several options are available to continue dynamic allocation without weakening the EU's climate ambitions, for example: the use of more ambitious benchmarks than anticipated, the possibility to offset emissions by either international offsets or emission reductions in non-ETS sectors (so called domestic offsets) or a more focused carbon-leakage list (in case third countries make comparable climate efforts).

Comparison with the Market Stability Reserve

The EC has already proposed legislation for a Market Stability Reserve (MSR) to introduce flexibility into the supply of allowances at the auction (European Commission, 2014e). The proposed MSR interacts mainly with the auction volumes and is triggered by the amount of surplus allowances in the market. The MSR annually stores 12% of surplus allowances in the reserve if the surplus is above 833 million allowances, while it will supply an annual amount of 100 million allowances to the market if the surplus is below 400 million allowances. The surplus in 2020 is expected to be 2,600 million allowances (European Commission, 2014f).

The main similarities between the MSR and ASR are:

- both reserve types are able to tackle the surplus.
- both reserves are in principle able to provide a more stable carbon price signal.

The main differences between the MSR and ASR are as follows.

- **Purpose** The MSR is focused to improve the supply–demand balance in the market, while the ASR primarily aims to facilitate dynamic allocation in order to prevent carbon leakage and provide incentives for carbon-efficient growth.
- **Interaction** The MSR interacts with the auctioning volumes, while the ASR interacts with the free allocation. As a result the MSR makes the auction volumes dynamic while leaving the allocation to carbon-leakage-exposed sectors untouched. In contrast, the ASR makes the free allocation dynamic and leaves the auction volumes untouched.
- **Trigger** The MSR operates as a function of market surplus, while the ASR is triggered by unpredicted economic developments. Only when EU industry grows beyond expectation do allowances from the ASR enter the market. In the opposite scenario, all surplus allowances are directly put in the reserve.

The functioning of the two reserves separately is depicted schematically in Figure 3.

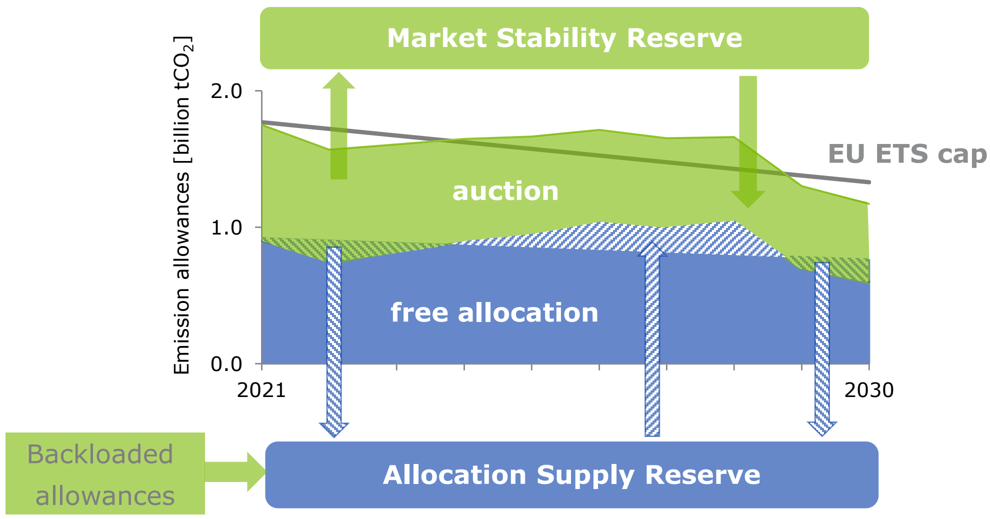

Figure 3: Conceptual design of dynamic allocation in combination with both the Allocation Supply Reserve and the Market Stability Reserve. We assume, for illustrative purposes, an economic recession in 2021–2023. In this period, sufficient surplus is assumed to be available in the market to trigger the MSR to consume allowances. Simultaneously, the ASR consumes allowances as industry needs less free allocation than anticipated (marked by \\). In 2024–2028 a period of higher than expected economic production is assumed. Now the ASR will provide free allowances eligible to industry on top of what was budgeted (marked by //). In this period, the surplus in the market shrinks gradually and at some point the MSR will start releasing allowances to the market. At the end of the decade a new recession kicks in, triggering the ASR to consume allowances, like before, thereby maintaining an effective carbon price.

Would two separate reserves make sense or is a smart integration between ASR and MSR preferred?

In order to maintain a simple and efficient system, at first sight it would make sense to combine the two reserves into one. In other words, one could add the ASR start budget and functionalities to the proposed MSR. Will this lead to a simpler and more efficient reserve? This is a complex question to answer. First, it depends on several design choices, like trigger levels and timing of the MSR, which may need to be revisited to ensure that the purposes of the two original reserves are respected. For example, the MSR-trigger to release 100 million allowances to the market when the surplus is below 400 million allowances implies that fewer allowances are left in the reserve for dynamic allocation over time, which could hamper security of supply of allowances the ASR is aiming for. A second complexity is that the combined reserve will impact market behaviour (e.g. hedging, mitigation actions), which is hard to predict.

Therefore, further consideration is needed in order to develop a combined reserve and understand its impact on the market. If desired, the two reserves could be operated next to each other, because each has a different focus and functionality (similar in spirit to the MSR operating next to a future NER). This would be a transparent option that serves the long-term predictability required in the market with regard to ensuring dynamic allocation for a prolonged period of time.

3 Scenario analysis

In this chapter, several scenarios are presented that assess the long-term durability of dynamic allocation given the declining ETS cap and finite amount of allowances in the system. An important question raised by many people is whether dynamic allocation would compromise the ETS cap. This legitimate question is addressed in this chapter by modelling the impact of dynamic allocation rules on the allocation and auction volumes from 2021 onwards using different scenarios.

3.1 Current ETS design extrapolated after 2020

Before introducing the baseline scenario with dynamic allocation it is instructive to show what would happen if the current legislation including backloading and the allocation cap for industry is extrapolated to the period after 2020, assuming a stronger reduction of the cap from 2021 onwards, as proposed by the EC.

We notice that the industry cap declines in such a way that the cross-sectoral correction factor for industrial allocation, if extrapolated beyond 2020, becomes -20% in 2021 gradually increasing to -40% in 2030, thereby hampering the protection of benchmark installations against carbon leakage.

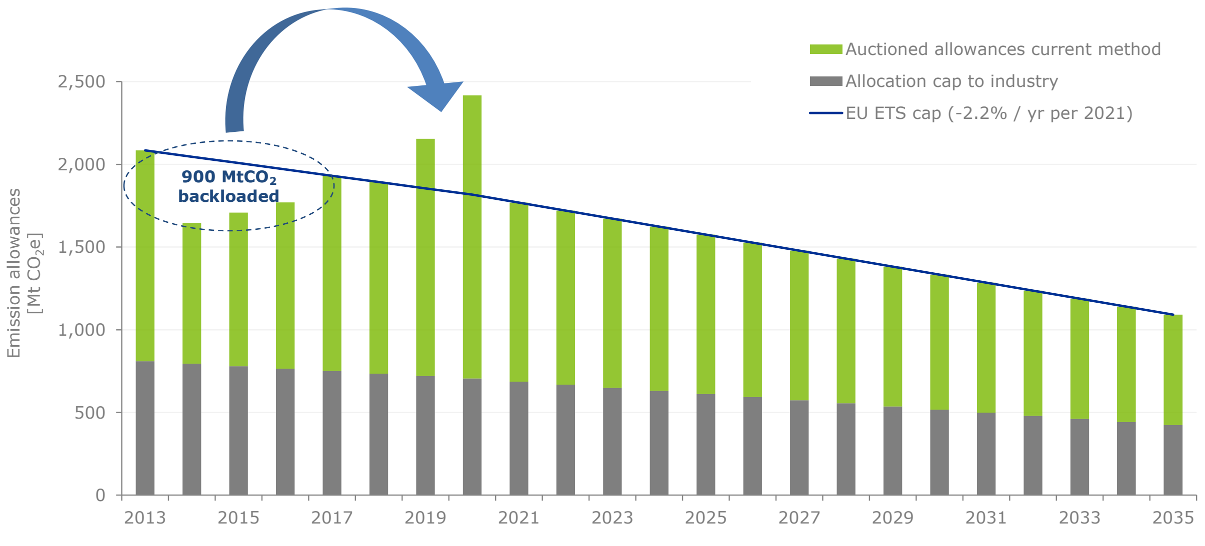

Figure 4: Free allocation to industry and auction volumes as laid down in current legislation (up to 2020) and if extrapolated towards 2035. Note that, according to current implemented legislation, the backloaded allowances return to the market in 2019 and 2020. Although the cap in these years may seem to be exceeded, this is offset by an equally lower cap in 2014 to 2016, making backloading in the end ambition-neutral. Similarly, both the MSR and the ASR are ambition-neutral.

Another point to make it that the total supply of allowances in 2019 and 2020 exceeds the EU ETS cap for these years, due to re-injection of backloaded allowances. However, this is fully compensated for by an equal amount of reduced supply in 2014 to 2016. The total cap (or better: carbon budget) is therefore not compromised and backloading can therefore be called ambition-neutral. In the same way, both the MSR and the ASR are ambition-neutral.

3.2 Baseline scenario

The baseline scenario is bound by the following restrictions.

- Dynamic allocation starts from 2021 onwards (Phase IV of the EU ETS).
- The level of free allocation is not capped by an industry cap.
- The level of free allocation cannot exceed the overall EU ETS cap unless these excess allowances are supplied by the ASR.
- The ASR is filled upfront with allowances from the ETS system, to make it ambition-neutral.
- The ASR can meet the additional demand for free allowances only if it is not empty.

The determination of the industry allocation budget therefore requires an estimation of the expected required free allocation for direct and indirect emissions, which is compared to the overall EU ETS cap. In the baseline scenario this is done using the following core assumptions.

- As starting point, free allocation is calculated as if dynamic allocation was applicable now. No correction factor is applicable.
- This amount is extrapolated over time using a proxy of the economic development of ETS industrial sectors based on industrial growth figures deduced from the PRIMES 2013 model. The annual growth of production used in the calculations is +1.12% in 2012–2020, +0.83% in 2021–2030, and +0.43% in 2031–2040.
- In the simulations a choice is made to assume more stringent benchmarks by 1.0% per year, starting from 2008 onwards (the year current benchmarks are based on). As a result the benchmarks in 2021 are on average 13% more efficient than in 2008 and follow the declining path as of 2021.
- Free allocation for indirect emissions is based on electricity consumption by ETS companies and on an emission factor based on coal-fired power production in 2013, gas-fired power production in 2030 and a fully decarbonised power grid by 2050, and linear interpolations in between.
- The 2013–2014 Carbon Leakage list remains unchanged after 2020. This is based on the conservative assumption that other jurisdictions would not take comparable climate action after 2020.
- The allocation supply reserve contains a start budget of 900 million allowances, which is taken from the backloaded amount of allowances.
- Industrial production grows according to the forecasted scenario (see second bullet point above). As a result the budgeted allocation is sufficient and the Allocation Supply Reserve does not get activated.
- All free allocation is based on dynamic allocation rules.
- The ETS cap declines in a linear fashion by -2.2% over time from 2021 onwards.

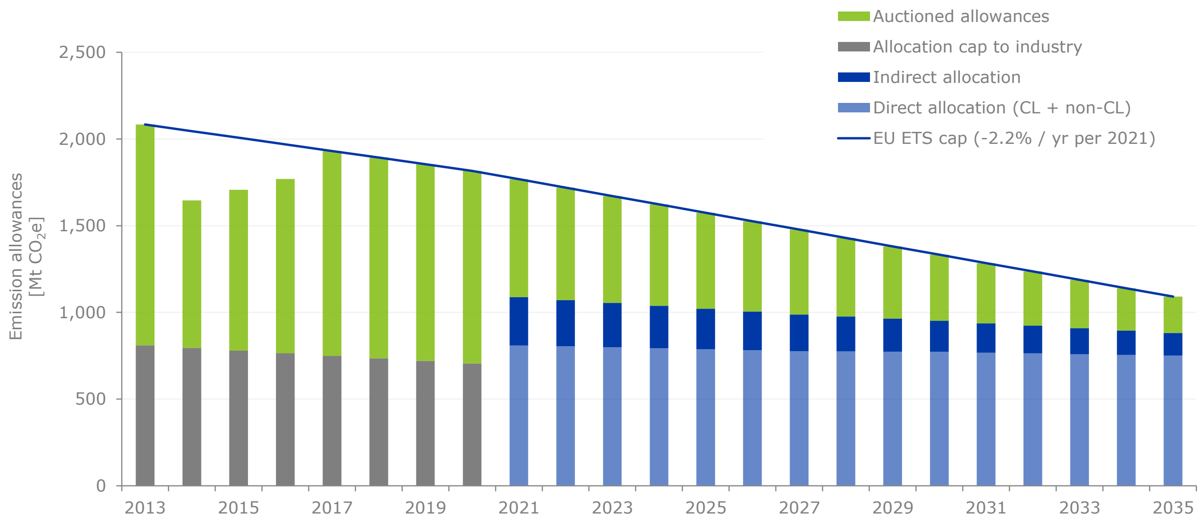

Figure 5: The baseline scenario with dynamic allocation from 2021 onwards. Because the economy grows as expected the 900 million allowances put in the ASR are not supplied to the market. They could be supplied to the market if the free allocation crosses the blue line, which is after 2040. Because these allowances were taken out of the market in 2014-2016, this solution is ambition-neutral.

Figure 5 shows the baseline scenario with dynamic allocation implemented from 2021 onwards. The following observations can be made from the analysis.

- Free allocation stays within the ETS cap until at least 2040.
- By 2030, free allocation for direct emissions consists of 58% of the available allowances, 13% is allocated to compensate for carbon costs in electricity consumption, while 29% of available allowances is auctioned. For comparison, under the current design of ETS, free allocation would consist of around 40% in 2030, while only a partial compensation for carbon costs in electricity prices would be given financially in a limited number of Member States.
- Because no correction factor is applicable, allocation for direct emissions in 2021 is about 100 million allowances higher than in 2020 (in which free allocation is subject to a correction factor of -18%).
- Allocation for direct emissions seems more or less constant over time. This is caused by the increase in required allowances due to economic growth being offset by an increasingly stringent benchmark. A more stringent benchmark means less allowances are freely allocated per production unit to reflect more efficient production processes.
- Allocation for indirect emissions decreases in a linear fashion, as a result of the linearly decreasing emission factor, reflecting a decarbonising power grid over time.
- Compared to a continuation of the current allocation system, including the correction factor, Member States can auction 3,635 million fewer allowances cumulatively in 2021–2030. In addition, 900 million allowances are fed into the ASR to provide a robust reserve at the start of the trading period. As these allowances would otherwise be supplied to the market, this may impact the carbon price.

3.3 Scenario 1: higher / lower economic growth than expected

In the baseline scenario industry will grow exactly according to the PRIMES 2013 forecast. In reality this will unlikely be the case. Figure 6 illustrates the impact of an economic growth of the energy-intensive industry by +0.5 %pts beyond the forecasted growth. This unusually high growth applies to all sectors and happens from 2021 onwards. Under circumstances of higher growth (and hence, higher production) than forecasted, the required allocation is higher than initially budgeted: the difference is supplied by the Allocation Supply Reserve which reduces in size over time.

We can make the following observations:

- Free allocation stays within the ETS cap until at least 2035.
- While the ASR is emptied over time it is able to secure dynamic allocation until at least 2035, at which moment it still contains almost 250 million allowances.
- Although the ETS cap may seem exceeded from 2021 onwards (as the bars exceed the blue line) this is fully offset by the lower supply of allowances in 2014 – 2016 (bars are below the blue line). The total ETS cap (or better: carbon budget) is not changed. Therefore, the ASR is ambition neutral, similar to the proposed MSR and the implemented back-loading provision (see also Figure 4).

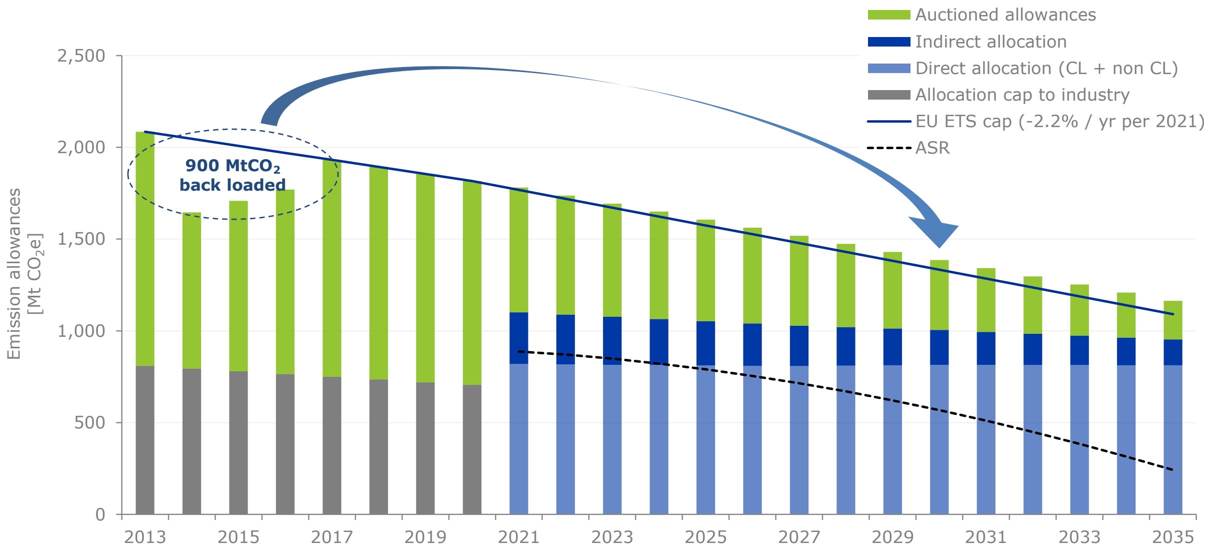

Figure 6: Dynamic allocation from 2021 onwards for the EU ETS industry, assuming higher than expected economic growth. Although the ETS cap may seem exceeded in these years (the bars exceed the blue line), this is fully offset by the lower supply of allowances in 2014–2016 (bars are below the blue line), so the total ETS cap is not exceeded. In other words, dynamic allocation is ambition-neutral, similar to the proposed MSR and the implemented backloading provision.

Figure 7 indicates the impact of an economic growth that is lower (-0.5%) than forecasted. This leads to an increase in the number of allowances held by the ASR, and an ASR holding 1,500 million allowances by 2035.

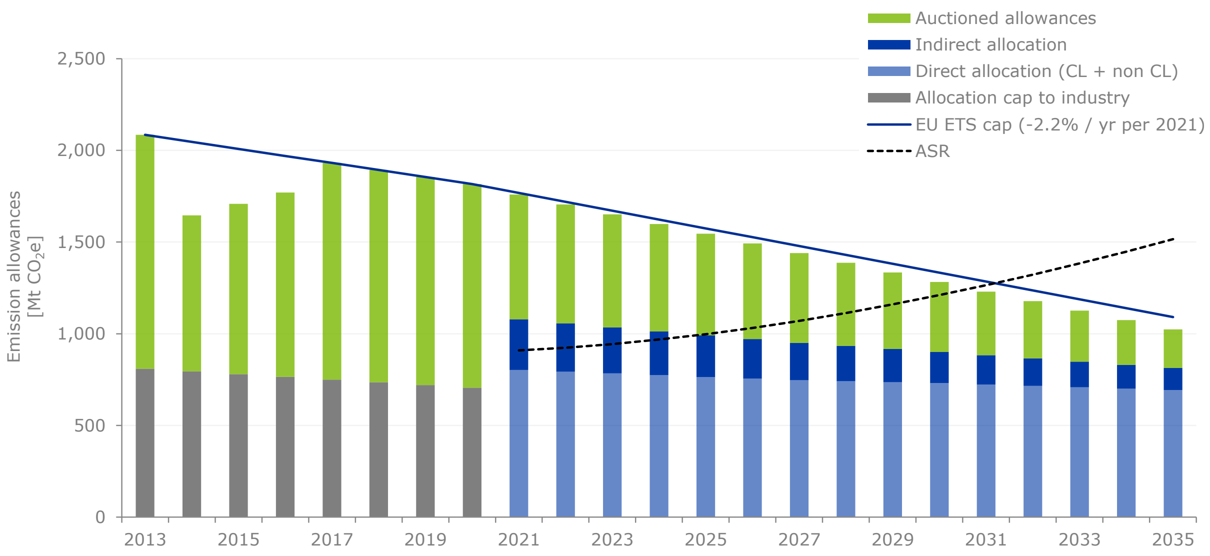

Figure 7: Dynamic allocation from 2021 onwards for the EU ETS industry assuming a lower than expected economic growth. Although the bars are below the blue line, the total ETS cap has not become more ambitious, since the allowances are saved in the ASR for later use.

3.4 Scenario 2: changed ambition level ETS

In case the proposed linear reduction of the EU ETS cap (-2.2% per year from 2021 onwards) is altered by 0.3%, dynamic allocation would still work until at least 2035 (see Figure 8).

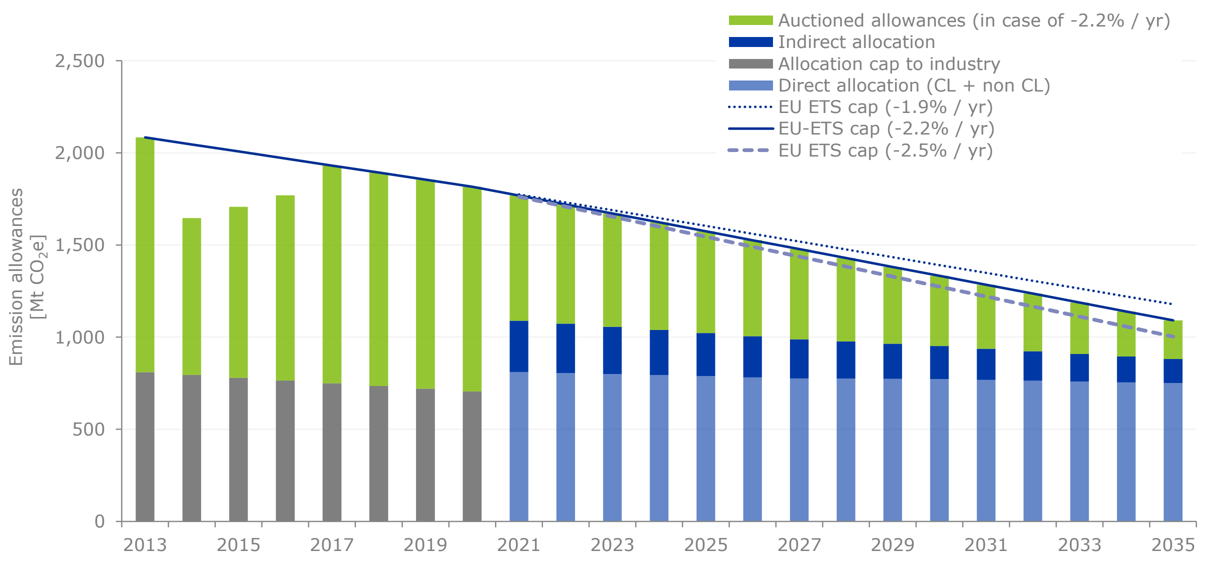

Figure 8: Dynamic allocation from 2021 onwards for the EU ETS industry assuming a changed ETS ambition level. Auctioned allowances correspond to the baseline scenario.

3.5 Scenario 3: changed Carbon Leakage list

In its recent 2030 policy framework for climate and energy, the EC acknowledges that "an improved system of free allocation of allowances with a better focus" is needed (European Commission, 2014a). In particular, it is suggested that the Carbon Leakage list could get more focused, as currently 95% of industrial emissions are assumed to be exposed to a significant risk of carbon leakage (CE Delft, 2013; CEPS, 2014).

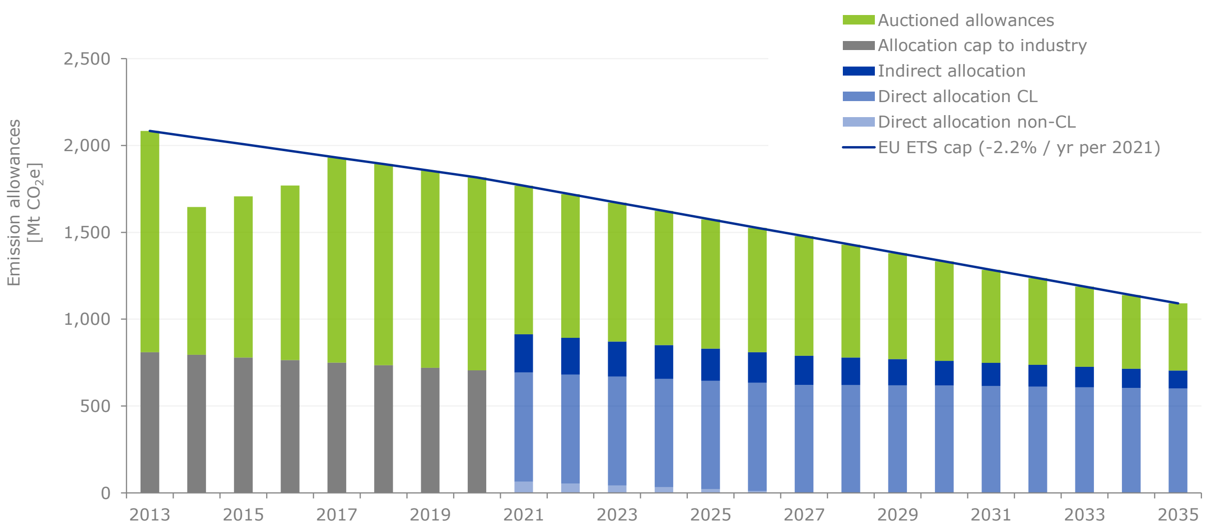

Figure 9: Dynamic allocation from 2021 onwards for the EU ETS industry assuming 75% of industrial emissions are exposed to significant carbon leakage risks and receive 100% allocation up to the benchmark.

Figure 9 shows how dynamic allocation would work if 75% of industrial emissions receive 100% compensation up to the benchmarked level to prevent carbon leakage. The 75% level is chosen purely to illustrate its impact. We observe that dynamic allocation under this scenario accounts for a much smaller share of allowances than in previous scenarios, with the allocation for the direct emissions in 2021 smoothly propagating from the industry cap in 2020. This scenario shows that the determination of the carbon-leakage list is an important design element in determining the allocation budget from 2021 onwards.

3.6 Conclusions

The scenario analysis shows that dynamic allocation is a sustainable allocation method: compatible with the declining ETS cap until way beyond 2035 and robust for different scenarios of critical parameters such as economic growth, ETS ambition level and the Carbon Leakage list. It also shows that in our baseline scenario from 2021 onwards, auction volumes are smaller than in the reference situation of current rules, and the opposite applies to the volume for free allocation. However, this is in line with the objective of ETS: promoting a cost-effective and economically efficient reduction of

CO_2, protecting industrial competitiveness, providing investor confidence and visibility to market participants, whilst facilitating carbon-efficient growth.

It is important to realise that factors that influence the auction volumes and the long-term durability of dynamic allocation are: the level of the benchmarks, the expected economic production (both not changed in the scenarios), the ETS ambition level (scenario 2) and the coverage of the Carbon Leakage list (scenario 3). Once the allocation budget, and hence auction volumes, are determined, they are fixed and not impacted by the actual allocation (scenario 1). Hence, an integrated approach is required as much as possible when determining the allocation budget, taking into account all these elements.

4 Implementation of dynamic allocation

In this chapter, practical aspects related to the implementation of dynamic allocation are addressed: monitoring, reporting and verification requirements, administrative costs for participants and authorities, the time schedule for compliance activities, and the appropriate legislation.[13] The required modifications are limited and therefore do not provide an obstacle for timely implementation before the start of the fourth trading period in 2021.

It is assumed that the steps to implement dynamic allocation are preceded by an impact assessment of costs and benefits which demonstrates that this proposal provides an overall net benefit for the European economy and verifies the intended improvements of the EU ETS.

4.1 Monitoring, reporting and verification requirements

Dynamic allocation requires monitoring, reporting and verification (MRV) of annual activity levels. This is slightly different compared to the current allocation system which requires annual activity levels to be monitored too,[14] but with only limited verification and reporting requirements. Moreover, additional and improved rules related to scope, methodology and accuracy of the relevant activity levels need to be established compared to the current allocation system.[15] This is especially important because MRV has to be carried out within a relatively short time period. As a result, there is a need for clear and unambiguous MRV requirements.

For products with a product benchmark, activity levels are mostly well defined in the current allocation system, although a review would be helpful to identify possible improvements. Relevant activity levels are usually available in companies' internal plant information systems. Of course dynamic allocation requires the willingness of companies to report their actual production levels. This willingness has not been investigated yet, but we note that some companies already report activity data in their annual environmental reports. Also experiences in the Californian cap-and-trade programme prove this not to be a problem, as long as confidentiality issues are taken care of. In California, for instance, the confidentiality of installation-specific allocation data is assured, so that third parties cannot deduce an installation's activity level. In Europe this example could be followed if needed, or, alternatively, a time lag for publishing installation-specific allocation data or clustering of data could be introduced. Care should be taken that the approach is in line with legal requirements.

For products without a product benchmark, currently responsible for roughly 25% of industrial emissions under the EU ETS, the current static allocation approach could be applied, which would mean no impact on current MRV requirements. Alternatively, the coverage of dynamic allocation can

[13] For this chapter we made use of valuable contributions from Alex Pijnenburg and Steven Bank (Dutch Emissions Authority). The content of this chapter remains the sole responsibility of the authors.
[14] Art. 10a(20) of the EU ETS Directive and Art. 23 of the CIMs (Commission Decision 2011/278/EU).
[15] Data collected for the current allocation system also involved activity levels, but because the relevant historical baseline years (2005–2010) had largely passed once the legislation was implemented (2009–2011), operators were required to report "best available data" rather than data fulfilling prescribed accuracies.

be increased, by creating additional product benchmarks, thus allowing the involved sectors to become eligible for dynamic allocation too (see Annex I: Q&A for a more detailed consideration).

4.2 Administrative costs to participants

Dynamic allocation requires verification of annual activity levels which creates additional costs for participants in the order of €4,000 for each EU ETS installation per year.[16] Note that companies are likely to consider these costs acceptable, because they result from a more predictable allocation and a strengthened international competitive position.

For a limited number of participants (i.e. those who experience physical changes to their installations), the additional verification costs will be partly offset by financial savings, because there is no longer any need to monitor monthly or even daily activity levels to check whether a significant capacity change has occurred. It is estimated that these savings apply to a maximum of 5% of the ETS installations per year.

Finally, the cost impact will depend on the type of benchmarks that are subject to dynamic allocation. For example, should the number of product benchmarks increase and the heat benchmark be dropped, participants that are now subject to the heat benchmark will experience a significant decrease in the monitoring costs compared to the current allocation system.[17]

4.3 Administration costs to competent authorities

The current allocation methodology includes separate rules for new entrants, capacity increases, capacity reductions, partial cessations and full cessations (see Chapter 2.4). This complexity is significantly reduced by dynamic allocation: all situations can be treated equally, using the same straightforward formula. In addition, they don't need to be reported separately but can be included in the annual reporting cycle. This will save competent authorities resources in administering, checking and processing these dossiers.

Another administrative cost saving is realised in the initial phase: allocation does not need to be determined for the full trading period, but only for the first year, which is expected to be less complex. On the other hand, a proper forecast is needed to determine the allocation budget for industry, which may need input from competent authorities.

A third saving originates from the integrated approach towards direct and indirect emissions, making separate compensation schemes for indirect emissions obsolete. As a result, separate State Aid rules and related administrative implementations are no longer needed.

[16] This is based on an estimated verification time of two days for the average installation. Complex plants or plants with multiple benchmarks may see higher costs.
[17] Monitoring of annual net heat consumption is not straightforward because not all heat consumption is actually measured.

Dynamic allocation incurs additional costs for competent authorities related to collecting, checking and processing annual activity levels. Also, recovering allowances from bankrupt companies may require additional resources. The exact cost impact depends greatly on specific design features of the system, for example how fall-back benchmarks are treated and whether the heat benchmark is kept or not (see also Annex I: Q&A).

Overall, depending on the final design of dynamic allocation, we expect a slight increase of administrative costs to competent authorities in an optimal case versus a more significant cost increase in a less optimal scenario with dynamic allocation for product benchmarks and the current system for fallback benchmarks kept unchanged.

4.4 Compliance dates

Dynamic allocation adds verification of activity levels to the current MRV activities. Although it is possible to continue applying the current compliance dates of MRV, there may be a reason to adapt the system. In this section we sketch two options for how these compliance dates could change due to dynamic allocation, as well as one option which continues the current scheme.

In the current system the date of allocation for the current year is 28 February, the deadline for reporting verified emissions of the previous year is 31 March and the date for surrendering a corresponding amount of allowances is 30 April.[18] With dynamic allocation it would be most practical if the annual activity levels are verified and reported together with the annual emissions, ultimately 31 March. The allocation for the running year, including the adjustment of the preceding year, can then be handed out a month later, by 30 April, or if this is too ambitious, by 31 May.[19] To maintain the overlap between allocation for the current year and surrendering allowances for the previous year, the deadline for surrendering allowances could then be scheduled for e.g. 30 June (see option 1 in Table 2).

Since this is rather late in the year and three months after emissions have been verified, one could also argue that the aforementioned overlap is not very much needed because allocation is brought in line with activity levels and hence operators can better anticipate expected shortages. Keeping the date of surrender at 30 April would therefore be another option (option 2).

A third option is to stick to the current compliance dates, but this implies that allocation is corrected for realised production of two years rather than one year ago. This would weaken the adaptability of the system to changing economic conditions, but would allow surrendering of allowances by 30 April.

[18] The two-months overlap between allocation for the current year and surrendering allowances for the previous year allows operators to cover their emissions of the previous year by allowances received for the current year.
[19] In the EU ETS, the free allocation is currently granted each year on 28 February, while the deadline for surrendering allowances for the previous year is 30 April.

Table 2: Possible compliance dates under dynamic allocation compared to current situation. In options 1 and 2, allocation for the running year includes a correction for actual production in the previous year, while in option 3 the correction is for actual production of two years back.

	Current system	Dynamic allocation option 1	Dynamic allocation option 2	Dynamic allocation option 3
Allocation for running year	28 February	30 April – 31 May	30 April – 31 May	28 February
Report of verified emissions of previous year	31 March	31 March	31 March	31 March
Report of verified activity levels of previous year	n/a	31 March	31 March	31 March
Surrender of allowances for previous year	30 April	30 June	30 April	30 April

4.5 Modifications of the legislative framework

Dynamic allocation requires some modifications to the current legislative framework for ETS. The timeframe up to the new trading phase in 2021 is sufficient to adequately incorporate the required changes and there are no major hurdles foreseen which would make the transition impossible or risky.

Dynamic allocation affects the following key design elements of the EU ETS (the current key legal documents in which each aspect is covered are shown in parentheses).

1. The introduction of an Allocation Supply Reserve (this can be implemented by a Decision amending the EU ETS Directive).
2. The maximum annual amount of allowances available for allocation (covered in the EU ETS Directive, Article 10a, Paragraph 4).
3. The auctioning of allowances (covered in the EU ETS Directive, Article 10, supplemented by the auctioning regulation).
4. The way emission allowances are allocated (covered in the EU ETS Directive, Article 10a, supplemented by the implementing decision describing the allocation methodology).
5. The financial compensation for costs related to greenhouse gas emissions passed on in electricity prices (covered in the EU ETS Directive, Article 10a, Paragraph 6, supplemented by an implementing decision on the rules for financial compensation).
6. The monitoring, reporting and verification rules (covered in the EU ETS Directive, Article 14, supplemented by the Monitoring & Reporting and Accreditation & Verification Regulations).

In the dynamic allocation methodology, the **Allocation Supply Reserve and the total allocation volume (design elements 1 and 2)** are intertwined, and the rules governing both can adequately be described in a revised or amended EU ETS Directive. Such a revised EU ETS Directive can still start with one clear paragraph on the total emissions cap under the scheme, followed by Articles determining the amount of allowances available for free allocation, the set-up of an Allocation Supply

Reserve and the quantity of allowances that will be auctioned **(design element 3)**. These changes can be part of the scheduled process aimed at structural reform of the EU ETS taking place in the years to come.

The allocation methodology itself (design element 4) needs to be changed to: a) include an annual process to determine the allocation based on actual production; b) include also free allocation for electricity-consumption-related emissions; and c) reflect that separate rules for new entrants, capacity extensions and capacity reductions are no longer needed; d) establish realistic benchmark levels including an improvement factor over time; and e) determine the scope of carbon-leakage-exposed sectors. Experience with developing the current allocation methodology shows that making these new allocation rules will be a time-consuming process involving many stakeholders, but also makes clear that this process is feasible if planned well.[20]

In contrast with the current system, dynamic allocation does not require separate rules for **financial compensation for electricity-related costs (design element 5)**, because indirect emissions are integrated into the allocation methodology. This harmonised Community-wide approach is a simplification of the current system, ensuring a level playing field across the EU. The transition will require concomitant cancellation of the current financial compensation schemes applied by Member States (see also Annex I: Q&A).

A significant change is required in the **monitoring, reporting and verification methodology (design element 6)**. Although the basic legislative framework can be left untouched (i.e. the basic approach included in the Directive supplemented with implementing regulations providing the details), the dynamic allocation methodology requires adding activity data to the monitoring, reporting and verification framework. This will require clear and unambiguous definitions, and monitoring methodologies and verification approaches to ensure the data are accurate. This process can benefit from the valuable experiences using the current allocation methodology based on (historical) activity data. Moreover, there is a growing practice of companies providing activity data in view of the current rules regarding new entrants and capacity changes, as well as the carbon leakage regulations for which this type of data is pivotal.

All the aforementioned changes to the framework are feasible, provided the necessary preparations start on time.

[20] Annual allocation may also imply changes to the European registry and the related Commission Regulation.

Annex I: Q&A

Does dynamic allocation lead to a shift in costs, and who has to bear these costs?
Dynamic allocation leads to more free allocation to carbon-leakage-exposed sectors than the current allocation methodology would do. As a result, these industries have to buy fewer allowances on the market or at the auctions which will most likely reduce their overall carbon costs. This cost reduction is needed to preserve and strengthen the competitiveness of internationally competing firms in Europe. This is fully in line with the signal sent out by the European Commission to call for "immediate action for a European Industrial Renaissance" (European Commission, 2014c). In this context the European Commission calls on Member States to "recognise the central importance of industry for boosting competitiveness and sustainable growth in Europe and for a systematic consideration of competitiveness concerns across all policy areas".

As a consequence of dynamic allocation, substantially fewer free allowances may be sold at the auction (the impact will depend on the assumptions used to calculate the allocation budget, see Chapter 2 and Chapter 3.6). As the subsequent impact on state incomes for Member States will also depend on the carbon price, further assessment is needed to quantify this impact.

On a qualitative note, all else remaining equal, dynamic allocation may have an impact on the carbon price in the following ways.

1. The proposal is to move 900 million backloaded allowances into the ASR. This effectively reduces the short-term supply of allowances at the auctions around 2021. This most likely has an upward impact on the carbon price in the short term, similar in spirit to putting the backloaded allowances into the MSR (Point Carbon, 2014).
2. Dynamic allocation is designed to preserve the competitive position of Europe's industry and prevent carbon leakage. If this works well, it implies that more industry will be maintained in Europe compared to a situation without dynamic allocation. This may lead to more demand for allowances which are partly provided by the ASR, and partly should be bought at the auctions as industry is expected to be a net buyer of allowances.
3. In case of a significant decline of industrial activity in Europe (e.g. due to a recession or because industry moves out of Europe), the current allocation rules prescribe that allowances from (partially) closed facilities are brought back to the auctions. Under dynamic allocation, these allowances flow into the ASR and are not directly available for auctions. The allowances in the ASR become available once industry grows beyond expectation.

It is expected that these effects will most likely create a stronger and more stable carbon price signal. Hence, the lower auction volumes may be (partly) offset by these effects but further quantitative analysis is recommended to confirm this view. If the lower auction volumes are not fully offset by a higher carbon price, this would imply less auction revenue to governments, and hence citizens.

If the carbon price increases, this would in the end mean more carbon costs to consumers of electricity and carbon-intensive products, in particular those not exposed to a significant risk of carbon leakage. This will help society to switch to more carbon-efficient products and production methods, in line with Europe's ambition to become almost carbon-neutral by 2050.

Is the power sector required to take emission-reduction measures as a result of dynamic allocation?

The emission reductions the power sector will realise ultimately depend on the availability of emission allowances in the system (primary and secondary market), which translates into a carbon price, and the marginal costs of carbon abatement.

In principle one could argue that dynamic allocation, as an ambition-neutral policy instrument, will not change the total number of allowances in the system. Also the total marginal cost curve of ETS participants will not change due to dynamic allocation.

Nevertheless, as noted in the previous Q&A, the functioning of the ASR, the proposal to put 900 million backloaded allowances in the ASR upfront, and the impact dynamic allocation has on production and investment decisions of industry, most likely create a stronger and more stable carbon price signal that drives carbon-efficient investments. This would create an incentive to both the industry and power sector to realise more emission reductions in an economically efficient way.

Concerns about the time when dynamic allocation would consist of all allowances available within the cap should be considered carefully. In all studied scenarios, this time turns out to be (far) beyond 2035. It should be noted that this time can be influenced by upfront decisions on several elements, like the carbon-efficiency improvement factor of the benchmarks (not shown) and the coverage of the Carbon Leakage list (scenario 3).

Will dynamic allocation incentivise industry to contribute its share of emission reductions?

The incentive for industry to reduce emissions is provided primarily by the carbon price and the benchmark principle, not by the absolute level of the benchmarks. The benchmark principle gives carbon-efficient producers an economic advantage compared to less carbon-efficient ones. Because any reduction of carbon emissions directly leads to cost savings from handing in fewer emission allowances or from selling surplus allowances, the absolute level of the benchmark is less relevant. This cost saving is proportional to the carbon price, which is therefore the primary driver of emission reductions.

Is a cross-sectoral correction factor still needed in the proposed system for dynamic allocation?

No. With a cross-sectoral correction factor, free allocation will be given to carbon-leakage sectors below best-performers level. In the present system, a possible way out for companies not able to bear these carbon costs is to reduce their production. Under a dynamic allocation system, companies would no longer have this option to solve the shortage position. A combination of dynamic allocation, a cross-sectoral correction factor and high carbon prices would therefore have a significantly adverse impact on carbon-leakage sectors.

How does dynamic allocation stimulate product substitution in the economy?
Under current allocation rules, companies have an incentive to produce less product, because the carbon price signal is present in additional production. As additional production faces the full carbon costs, downstream users of the product who face these costs will look either for options to reduce their consumption level (e.g. build cars with less steel) or they will look for cheaper, more carbon-efficient products with the same functionalities (e.g. build steel buildings instead of concrete buildings). Under dynamic allocation, this incentive for product substitution is lost.

This argument is in principle correct, but in practice not very relevant, for several reasons. First, the argument assumes that producers are able to pass their carbon costs into product prices. In reality, this is hardly possible for products that are exposed to international competition. For many products, global markets impose prices that hinder the pass-through of carbon costs anyway, while for other products there is a risk of losing market share against international competition not subject to carbon costs (i.e. carbon leakage). Second, the argument assumes that consumers look for cheaper substitutes in Europe, but in practice they can also buy cheaper but more carbon-intensive products from outside the EU (i.e. carbon leakage). Also, in more complex products the incremental carbon price of one or more components is so small that it is unlikely to switch consumer choice at this stage.

How applicable is dynamic allocation to the fall-back benchmarks?
Dynamic allocation is in principle directly suitable for the current 52 product benchmarks, which cover around 75% of industrial emissions. For products without a product benchmark, allocation is currently determined based on either a heat benchmark multiplied by net heat consumption, or a fuel benchmark multiplied by fuel consumption, or historical process emissions.

These so-called fall-back benchmarks cover approximately 25% of industrial emissions, with 20% covered by the heat benchmark and 5% by the fuel benchmark (European Commission, 2011). This creates several possibilities regarding how to deal with them, which are introduced below.

1. **Californian model:** leave the current allocation methodology in place for both the heat and fuel benchmark, similar to the approach used in the Californian cap-and-trade programme.
2. **Simplified model:** increase the coverage of dynamic allocation by creating a bit more product benchmarks (for sectors this could be an attractive option, as that would make their allocation dynamic). In addition, the current fall-back approach is simplified by putting the remaining emissions under the fuel benchmark or process-emissions benchmark. Hence, the heat benchmark would not be required any more.
3. **Full dynamic model:** cover all emissions that are eligible for free allocation under a product benchmark, which would make all allocation dynamic.[21] Although at first sight this may seem an unfeasible option, it can be done in two ways.

[21] For this option it is important to realise that dynamic allocation should not be applied to the current fall-back benchmarks. If an operator receives allocation per *actual* TJ of net heat consumption, this would take out the incentive to consume less heat since that would directly translate into less free allocation. Moreover, it would be challenging to develop monitoring requirements for the heat benchmark and potentially very costly for operators to install related heat-metering equipment.

a. One could ask sectors (or activities) that are eligible for free allocation but are not covered by a product benchmark yet, to propose a verified product benchmark. The trigger is that there is no free allocation without a product benchmark. This is the approach taken in Australia.
b. Another idea is to create installation-specific product benchmarks, by relating free allocation currently based on fall-back benchmarks to corresponding activity levels. For example, consider a manufacturer that receives 10,000 allowances based on the process emissions benchmark, based on the median of activity levels in 2005 to 2008. Suppose that in the same period the median annual production of the related product was 20,000 tonnes of product. The installation-specific benchmark is then 0.5 allowances / tonne product, which can be used as benchmark for dynamic allocation.

These different models all have their pros and cons and deserve some further detailing, of which a first step is provided in Table 3.

Table 3: Characteristics of three models that combine dynamic allocation with an ex-ante allocation methodology for the fall-back benchmarks.

	Californian model	Simplified model	Full dynamic
Share of industrial emissions covered by dynamic allocation	~75%	~85–90%	100%
Scope of dynamic allocation	Current product benchmarks	Current + new product benchmarks	Current product benchmarks + new / installation-specific product benchmarks
Ex-ante allocation approach for:	Heat benchmark, fuel benchmark, process-emissions benchmark	Fuel benchmark, process-emissions benchmark	Not used anymore
Pro	- No need to develop new product benchmarks	- No complexities any longer related to the heat benchmark - More product benchmarks	- Fully dynamic = best carbon-leakage protection - Only product benchmarks = system with most incentives to reduce emissions
Con	- Keeps current difficulties related to the heat benchmark	- Developing new product benchmarks takes time	- Feasibility may be limited - Developing new product benchmarks takes time

How to compensate electricity consumers who are not part of the EU ETS but are exposed to a significant risk of carbon leakage?

As explained in Chapter 2.2, it would be consistent to use dynamic allocation to compensate for both direct and indirect carbon costs (i.e. carbon costs transferred in electricity prices), by incorporating both in the benchmarks.

Allocation for electricity consumption is not difficult to realise, especially for products with a product benchmark that includes emissions related to electricity consumption, i.e. one can simply apply these benchmarks and get rid of the corrections applied in the current scheme. Additionally, one can use the benchmarks for electricity consumption that have been developed in the current guidelines on state aid (European Commission, 2012).

These provisions seem to apply only to ETS participants. Fortunately, there are several possibilities for also compensating non-ETS electricity consumers exposed to a significant risk of carbon leakage.

1. Perhaps the simplest and most effective solution is to transfer the allocation for electricity consumption to a carbon account owned by the non-ETS electricity consumer. The non-ETS participant can sell the allowances on the market and in this way recover its carbon costs.
2. Another option is to provide allocation for non-ETS electricity consumption exposed to carbon leakage to the (ETS-covered) electricity suppliers. This may create unfair positions, as the non-ETS participants may not have perfect insight about whether the related value of allowances is made beneficial to them.
3. The third option would be for the non-ETS participant to join the EU ETS by means of a (voluntary) opt-in in order to receive allocation. This comes at the expense of administration costs related to developing a monitoring plan, installing meters, annual verification, etc. Opt-ins should apply via Member States which could also lead to a distortion of the market.
4. The last option, at least on paper, is to keep the current State Aid regulation in place, although it distorts the level playing field between fuel and electricity-driven processes.

What is the impact of dynamic allocation for the power sector?

The volume available at auction will be fixed and predictable from the start of the new system thanks to the Allocation Supply Reserve. In addition, the functioning of the reserve will provide a dampening effect on the carbon price, thus reducing price volatility. The combination of both impacts should provide more predictability and certainty to market participants and may cause a reduction of hedging costs to the power industry.

Allocation for indirect emissions will not impact the scarcity of allowances in the market. Indeed, fewer allowances will be auctioned, but these allowances are brought into the market by the plants that are subject to these indirect costs.

A concern could be that firms may decide to “sit” on these allowances, which they would not need for compliance, and hence reduce market liquidity. Theoretically, it is not expected that industry would sit on allowances from the indirect allocation because selling these allowances is the only way to compensate for higher electricity prices, which already include the carbon price.

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Annex II: Technical background of scenarios

Free allocation in year *i* for both direct and indirect emissions is determined with the following equation.

$$Alloc_{2011}\ Alloc_i = Alloc_{2011} \times growth_{i-2011} \times carbon\ efficiency\ improvement_{i-2011}$$

- $Alloc_{2011}$ is the amount of direct and indirect allocation the industry would have received under dynamic allocation rules in 2011, i.e. $Alloc_{2011} = Alloc_{2011}^{direct} + Alloc_{2011}^{indirect}$.
- The direct allocation in 2011 is calculated as follows:

$$Alloc_{2011}^{direct} = Alloc_{2013}^{direct} \times \frac{VA_{2011}^{ETS}}{VA_{05-08}^{ETS}}$$

- The direct allocation in 2013 uses the 2013 industry cap for the entire EU ETS calculated by the EC as the starting point. This covers the EU28 as well as Norway, Iceland and Liechtenstein (EEA-EFTA) and has been set at 809 million allowances (European Commission, 2013a). Hence, the uncorrected allocation to industry in 2013 is 858 million allowances. Allocation to electricity generators in the EU has been set at 104 million allowances (European Commission, 2013b), to which an estimated 2 million allowances is added to account for the three EFTA states. The total uncorrected allocation in 2013 is therefore 965 million allowances. This can be split into a carbon leakage (CL) part and non-CL part by assuming 95% of allocation to industry is subject to significant carbon leakage risks (CE Delft, 2013) while CL allocation for electricity generators is estimated at 28 million allowances based on discussions with industry experts.
- $Alloc_{2013}^{direct}$ is benchmarked against the median of the value added made by ETS industry in 2005–2008, assuming that the majority of the EU ETS installation-determined allocation for Phase III is based on activity levels in these years. Next, this is multiplied by the historical value added in 2011, the latest year available. Data have been obtained from Eurostat.
- The indirect allocation in 2011 is calculated as follows:

$$Alloc_{2011}^{indirect} = Electricity\ consumption_{2011}^{ETS} \times emission\ factor_{2011}$$

- Electricity consumption is based on net electricity import from the grid by EU ETS sectors which is derived from IEA statistics; 80% of consumed electricity is assumed to be within the benchmark and eligible for free allocation. The marginal electricity emissions factor to turn electricity consumption into allowances is based on a coal-fired power plant in 2013 (=0.8 tCO_2/MWh), a gas-fired power plant in 2030 (0.4 tCO_2/MWh) and renewable energy in 2050 (0 tCO_2/MWh), with linear interpolations in between.
- Growth in any year *i* with respect to 2011 is based on the value added growth per sector of EU ETS sectors as used in the PRIMES 2013 model, weighted with the size of these sectors in terms of CO_2 emissions. This results in an estimated annual growth of production of +1.12% in 2012–2020, +0.83% in 2021–2030, and +0.43% in 2031–2040 (Table 4).

Table 4: Annual CO_2 emissions and growth rates of industry covered by the EU ETS

Sector	ETS share	Average CO_2 emissions			Annual growth value added (%)			Weighted average growth (%)		
		'10-'20	'20-'30	'30-'40	'10-'20	'20-'30	'30-'40	'10-'20	'20-'30	'30-'40
Iron and steel	1	193,499	185,150	167,701	0.80	0.48	0.07			
Non ferrous metals	1	11,225	9,403	8,880	1.31	0.37	0.10			
Chemicals	1	73,556	61,543	52,525	1.72	1.12	0.89			
Non metallic minerals	1	86,474	88,872	91,784	1.34	1.22	0.63			
Paper and pulp	1	30,095	26,841	24,351	0.80	0.90	0.64			
Food, drink and tobacco	0.25	44,262	40,319	38,416	1.12	1.37	1.09			
Engineering	0.25	32,706	34,907	37,015	1.93	1.55	1.23			
Textiles	0	7,433	6,027	4,693	-1.19	-1.53	-1.30			
Other industries	0.25	50,729	47,679	45,846	1.22	0.92	0.71			
								1.12	**0.83**	**0.43**

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