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EU SHOULD TRIPLE REDUCTION SPEED TO REACH CLIMATE GOALS

Analysis by

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MAIN CONCLUSIONS

- The EU has recently agreed to reduce carbon emissions by 55 pct. 2030 compared to 1990. This raises the ambitions considerably, as the former goal was a 40-pct. reduction.
- Across the EU27, carbon emissions have fallen from 4.6 bill. tons in 1990 to 3.4 bill. tons in 2019. This corresponds to a 27-pct. drop, close to half of the 2030 target. However, 12 percentage points of this happened between 2008 and 2013 during the financial crisis and the following European sovereign debt crisis.
- Subsequently, carbon emissions have only deceased by 36 mill. tons per year. For the EU to reach its reduction targets, we need an annual reduction of 118 mill. tons until 2030. Thus, a tripling of the reduction rate is required compared to the previous six years.
- Emissions within the EU ETS have decreased by 22 pct. since 2005, while emissions outside the ETS have decreased by 19 pct. However, emissions outside the ETS have increased by almost 3 pct. after the financial and sovereign debt crisis. This calls for an increased reduction speed particularly in the national efforts concerning emissions outside the ETS.
- Emissions from fossil energy are by far the largest contributors to EU27 emissions. These emissions predominately originate from electricity and heat production as well as transportation.
- This points to two main tasks for the EU: A significant increase in power and heat production using renewable energy and a broad transition to vehicles powered by electricity, hydrogen, e-fuels etc.
- Is the 55-pct. reduction goal really a realistic ambition considering the need for a tripling for the reduction speed? While the green transition and the fight against climate change is both important and the right thing to pursue, there is a risk that European politicians make promises, they cannot keep. Especially if voters are being told that this large-scale transition comes without adverse effects on wage earners, businesses, and consumers.
- The EU has an ambition of carbon neutrality in 2050. Since the green transition depends on technologies not yet developed or in scale for commercial use, this may be a more realistic goal. We can go far during the next ten years, and the efforts are crucial stepping-stones to reach the final goal of climate neutrality in 2050. But to reach this goal, we need to speed up the process.

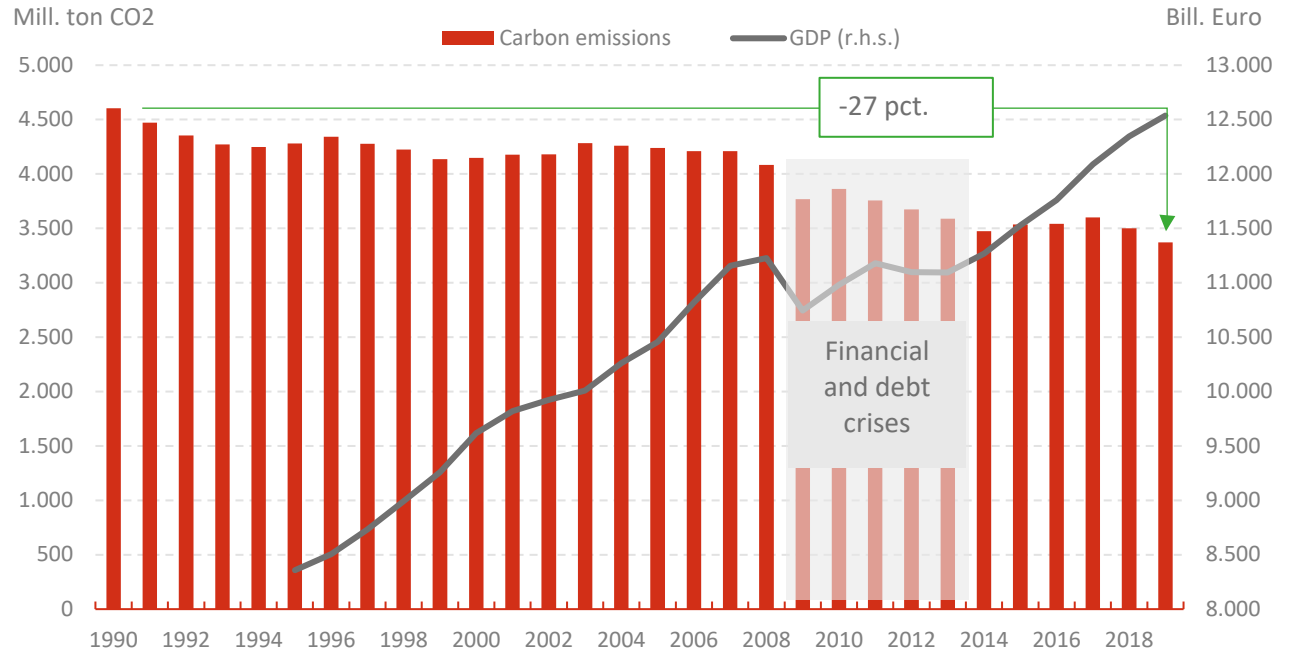
THE EU MUST TRIPLE THE CURRENT REDUCTION RATE IN ORDER TO REACH 55 PCT.

In December 2020, the EU countries approved the EU Commission's target of reducing carbon emissions in the EU by 55 pct. relative to 1990 emissions.[1] Ambitions have thus been raised considerably compared to the previous target of achieving a 40-pct. reduction. In this analysis, we look at the carbon reductions in the EU's since 1990, and the individual countries' ability to reduce greenhouse gas emissions to date.

The EU countries have already come a long way. Since 1990, carbon emissions across the EU27 have decreased from 4.6 bn. tons to 3.4 bn. tons in 2019. This corresponds to a decrease of 27 pct., or almost half of the new target, cf. chart 1.

However, it is striking that as much as 12 percentage points of this reduction took place in the period 2008-2013, when the European economies were hit hard by first the financial crisis and then the European debt crisis. Therefore, the carbon reductions to a large degree took place during a period when the European economies were in a slump, cf. chart 1. Emissions have not increased since then, even though the economies have grown. This indicates an increase in carbon efficiency, which, nonetheless, has only been enough to deliver moderate reductions in recent years.

CHART 1: CO2 EMISSIONS IN THE EU HAVE BEEN REDUCED BY 27 PCT. SINCE 1990



Source: Eurostat and own calculations
Note: GDP measured in volumes. 2019-numbers are estimates based on EU greenhouse gas emissions fell in 2019 to the lowest level (europa.eu).

[1] Throughout the analysis, the terms carbon or CO2 are used for CO2 equivalents.

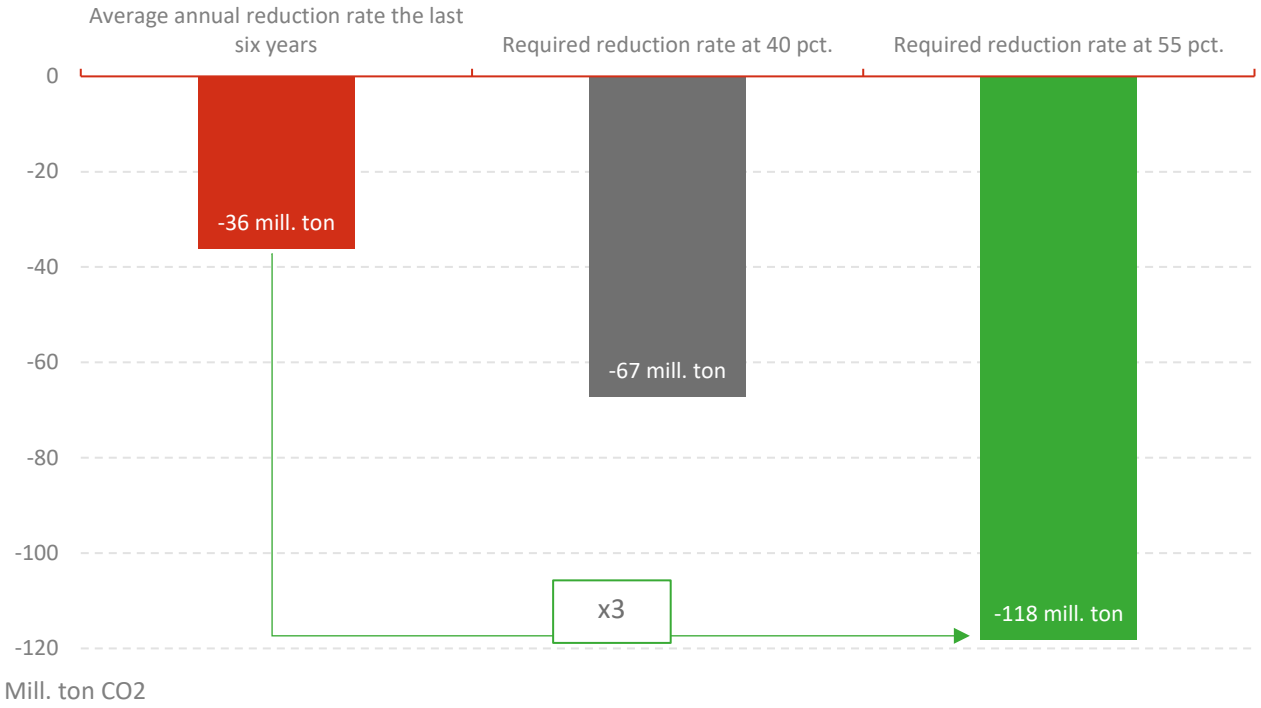
A tripling of the reduction rate is required to reach the 55 pct.

When almost half of the carbon reductions in the EU so far have taken place during a period of economic hardship, we cannot expect reductions of the same magnitude to take place in the coming years. The corona crisis will undoubtedly lower emissions in 2020, but we do not expect that the economic crisis will be as long-lasting as the financial and debt crises. Meanwhile, the current crisis primarily affects service industries, which do not emit significant amounts of carbon. A notable exception is, of course, tourism traffic, which can have a certain long-term effect on carbon emissions in the EU.

If we are to assess the possibility of reaching the new reduction target based on recent years' reductions, it is therefore more accurate to look at the annual reductions after the financial and debt crisis. Specifically, we look at the last six years, where carbon emissions have fallen by an average of approx. 36 m. tons per year.

For the EU to achieve its 55-pct. reduction goal, carbon emissions must be reduced to 2,071 m. tons of CO2 in 2030, which is 1,300 m. tons less than in 2019. This implies a required annual reduction of 118 m. tons of CO2. If the EU is to reach the target by 2030, it is, therefore, necessary to triple the speed of the past six years, cf. chart 2.[2]

CHART 2: WE NEED TO TRIPLE THE CURRENT REDUCTION RATE TO REACH THE 55-PCT. TARGET



Source: Eurostat, https://ec.europa.eu/commission/presscorner/detail/en/IP_20_2182, European Environment Agency and own calculations

[2] The European Parliament has set a target of 60 pct. reduction. If applicable, the reduction rate would have to be increased 4-fold rather than 3-fold.

Since 2005, the reductions have taken place both within and outside the ETS

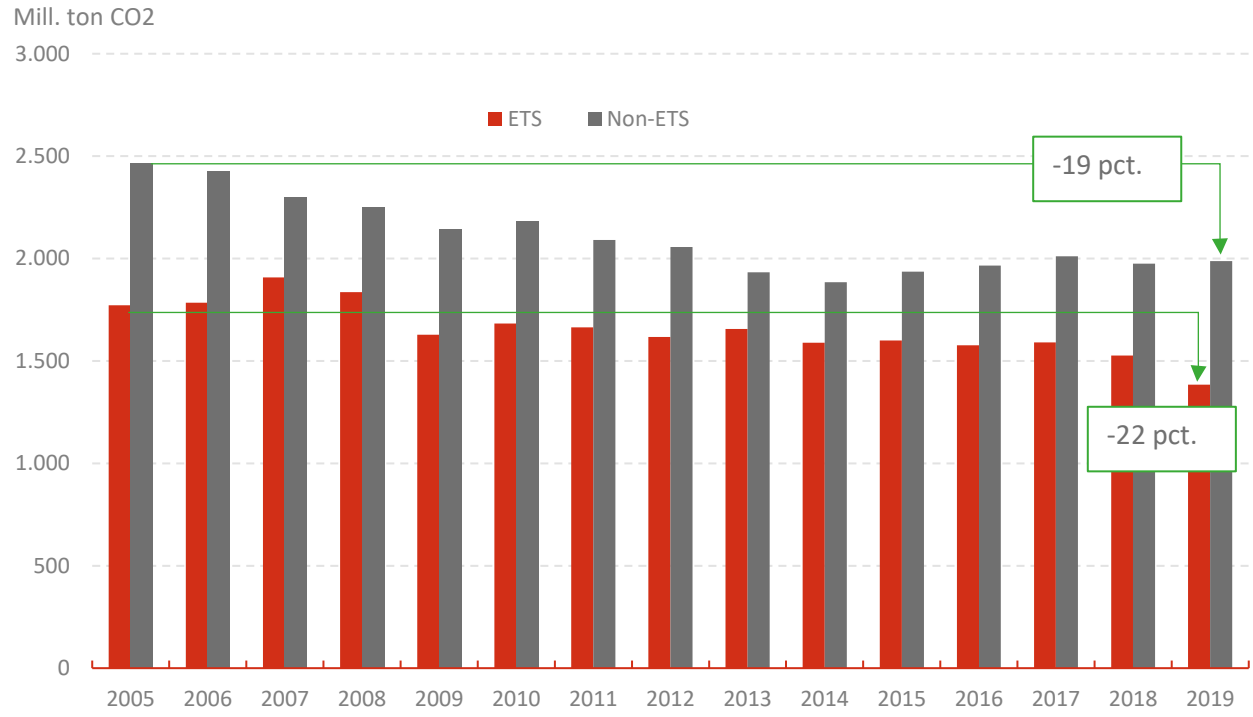
Since 2005, the EU has set a price on companies' carbon emissions through the Emissions Trading System, ETS, which primarily involves energy-intensive manufacturing and energy supply.[3] Thus, there is a pan-European system for reducing emissions in the covered industries, while reductions in other sectors to a greater extent depend on the individual countries' own policies. However, many national policies, such as energy taxes, often also include companies under the EU ETS.

The reductions that have taken place across the EU since the creation of the ETS have been both within and outside the ETS. While ETS emissions have fallen by 22 pct. since 2005, emissions outside the ETS have fallen by 19 pct, cf. chart 3.

Generally, ETS emissions did not fall during the financial and debt crisis. This is partly because the crises had a negative effect on the price of CO2 in the ETS as the lower economic activity meant lower demand for emissions allowances. Without a corresponding reduction in the supply of allowances, this resulted in a very low carbon price and, thus, lower incentive for ETS companies to reduce their emissions. With recent years' revisions of the system, the price mechanism is now effective once again.

Conversely, emissions outside the ETS have increased by almost 3 pct. after the financial and debt crisis. Consequently, it seems that it is mainly the national initiatives that must accelerate if the goal is to be achieved.

FIGUR 3: EMISSIONS REDUCTIONS SINCE 2005 HAVE MAINLY BEEN WITHIN THE ETS



Source: Eurostat, EU greenhouse gas emissions fell in 2019 to the lowest level (europa.eu), European Environment Agency and own calculations

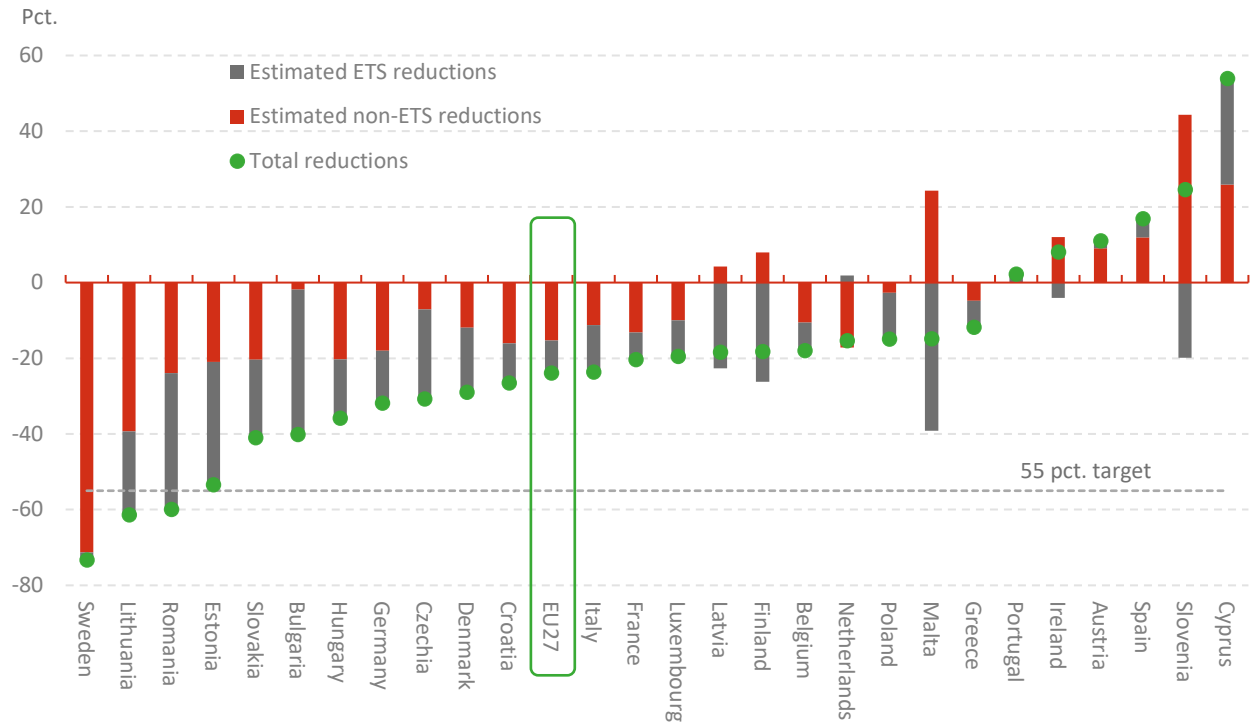
[3] In addition to this is aviation within EU borders, which was included in the ETS in 2012

LARGE DIFFERENCES IN EU COUNTRIES' CARBON REDUCTIONS

There are significant differences in carbon reductions since 1990 between the 27 EU countries, cf. chart 4. Sweden has clearly achieved the most with reductions of 73 pct. This is partially due to a 22-pct. increase from 1990 to 2018 in the large negative emissions that stem from carbon removal in Swedish forests (so-called negative LULUCF emissions). As shown by chart 4, Sweden has, on the other hand, mostly failed to reduce ETS emissions, which in 2018 were only 2 pct. below 1990 emissions.

At the other end of the scale is Cyprus. A country that has increased its emissions since 1990 by 54 pct., roughly equally distributed between the ETS and non-ETS sectors.

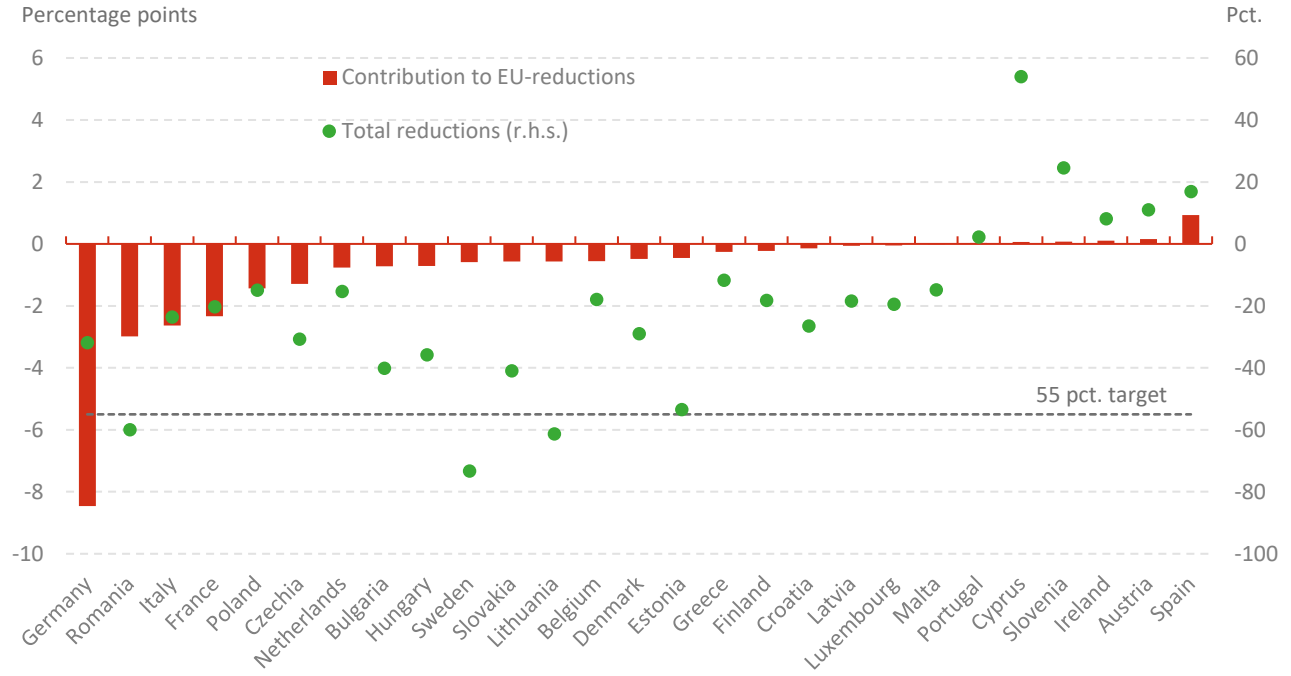
CHART 4: LARGE COUNTRY-DIFFERENCES IN CARBON REDUCTIONS SINCE 1990



Source: Eurostat, European Environment Agency, and own calculations.
Note: There are no data for ETS emissions before 2005. In order to estimate emissions reductions in ETS-sectors since 1990, we assume, that the distribution of emissions between ETS and non-ETS emissions were the same in 1990 as in 2005.

With a reduction of 32 pct., Germany has performed slightly better than the EU average. However, as Germany is also by far the EU's largest emitter, with almost a quarter of the total EU emissions, it has contributed the most to the EU's aggregate reductions. As much as 8.5 percentage points of the EU's 24 pct. reduction from 1990 to 2018 is a result of German reductions, cf. chart 5.

CHART 5: CONTRIBUTIONS TO TOTAL EU-REDUCTIONS FROM 1990-20018



Source: Eurostat and own calculations.

The EU countries' current commitments to reduction are insufficient

As part of the EU's climate objectives, each EU country prepares 10-year climate plans that, amongst other things, show each country's contribution to the reductions outside the ETS under the so-called Effort Sharing Regulation[4]. This tool allows the EU to assess whether the current goals are within reach and assess each country's progress.

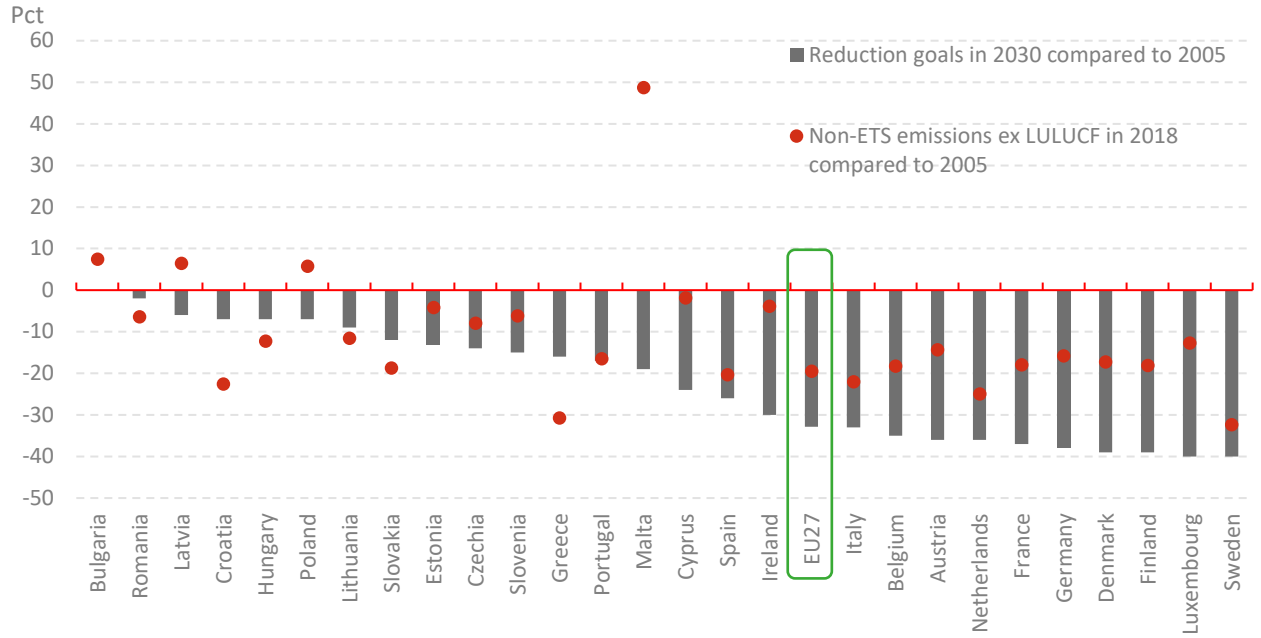
In October 2020, the EU announced each EU country's targets for reductions outside the ETS from 2005 to 2030 under the Effort Sharing Regulation. These targets range from no reductions in Bulgaria to 40 pct. reductions in Luxembourg and Sweden, cf. chart 6.

As also shown in chart 6, several countries have already delivered reductions outside the ETS that exceed their obligations under the Effort Sharing Regulation. However, the two settlements are not completely comparable due to settlement differences.

The target of 55 pct. lower emissions in the EU relative to 1990 corresponds to approx. 51 pct. lower emissions compared to 2005. When the EU countries' current reduction commitments outside the ETS are a maximum of 40 pct., it is necessary that the national contributions outside the ETS are raised significantly, while the bar also needs to be raised for ETS reductions.

[4] Effort sharing: Member States' emission targets | Climate Action (europa.eu).

CHART 6: NATIONAL REDUCTIONS GOALS OUTSIDE THE ETS, 2030 COMPARED TO 2005

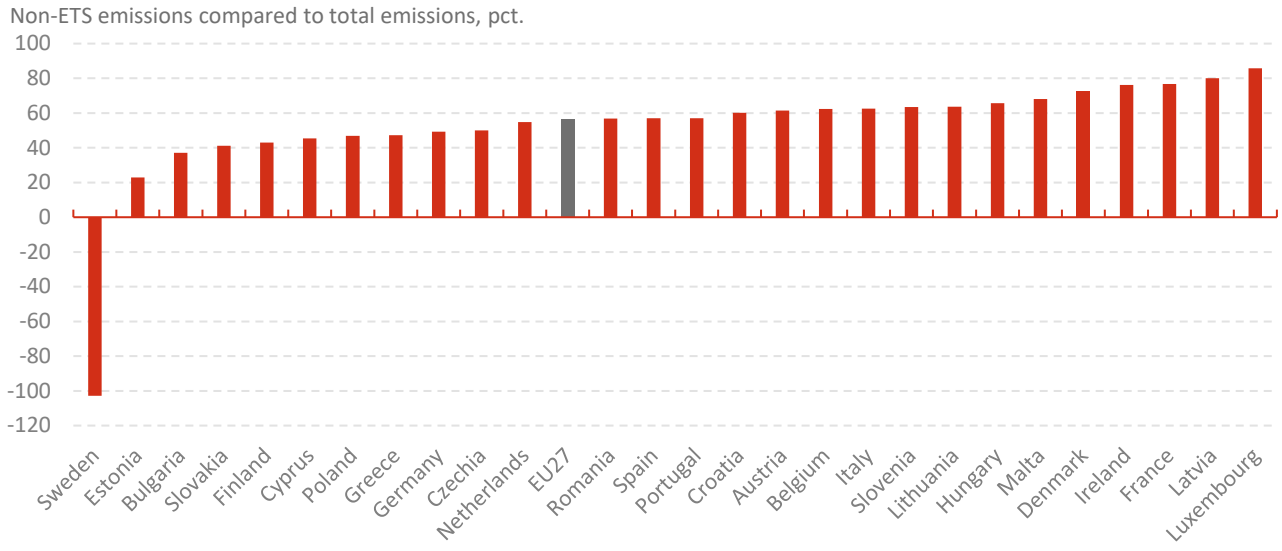


Source: Eurostat, national contributions under "effort sharing regulation" (https://ec.europa.eu/energy/topics/energy-strategy/national-energy-climate-plans_en) and own calculations.
Note: Non-ETS emissions and national contributions under the effort sharing regulation are not completely comparable.

56 pct. of the EU's total emissions are outside the ETS, and approx. half of the countries' share is above 60 pct., cf. chart 7. As we have shown above, emissions outside the ETS have increased over the past six years. Therefore, there is a need for greater reductions outside the ETS than those of the current EU commitments.

In this respect, Sweden is also notable with negative emissions as a whole outside the ETS. This is due to carbon removal in the large Swedish forests. Outside the ETS, Sweden is thus "climate-positive", as carbon removal in forests, etc. (negative LULUCF), is greater than the emissions outside the ETS.

CHART 7: MOST EU EMISSIONS COME FROM OUTSIDE THE ETS



Source: Eurostat, European Environment Agency and own calculations.

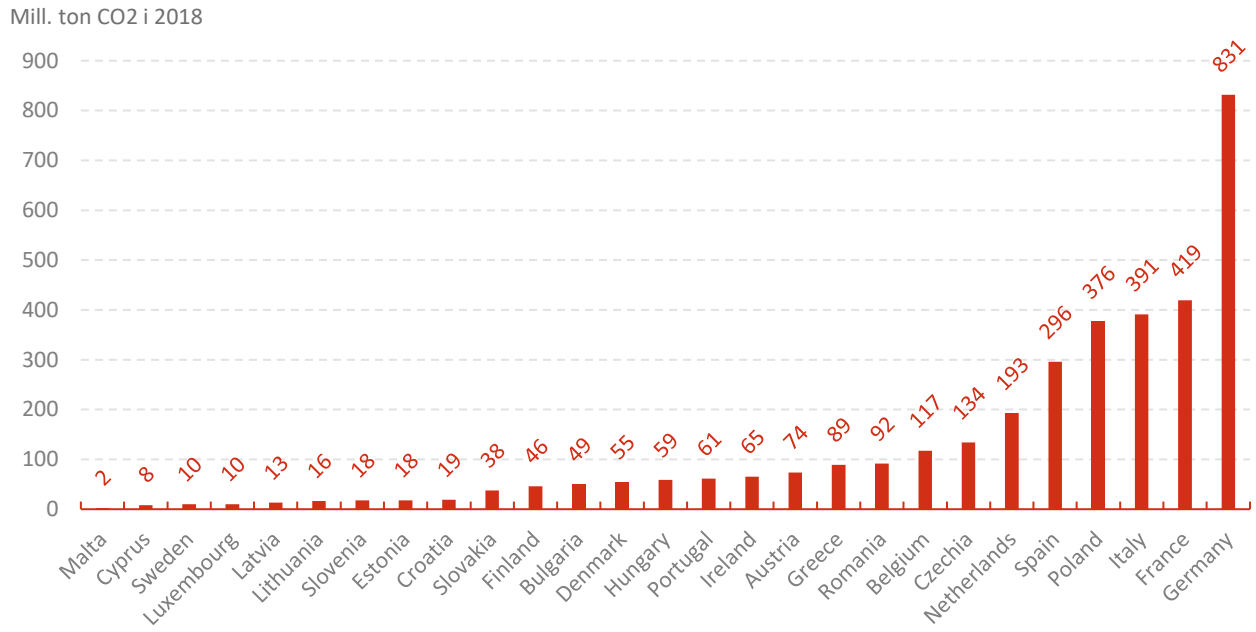
WHERE DO THE CHALLENGES LIE?

As we have shown above, there are clear challenges for the EU in achieving its reduction target. Although it is undoubtedly a shared task to be solved, there are large differences in the individual countries' shares of total EU emissions and the size of reductions that the economies of individual countries can overcome during the next 10 years.

Although Germany is clearly the country that has contributed the most to the overall reductions until now, cf. chart 5 above, they are also still the largest emitter in the EU by far. With 831 m. tons of carbon emissions in 2018, they accounted for 24 pct. of total EU emissions. France came in second with 419 m. tons of CO2 in 2018, followed by, respectively, Italy, Poland, and Spain, cf. chart 8.

On the other end of the spectrum are relatively small countries such as Malta, Cyprus, Luxembourg, and the Baltic countries, but also Sweden, which benefits from substantial negative emissions, cf. above.

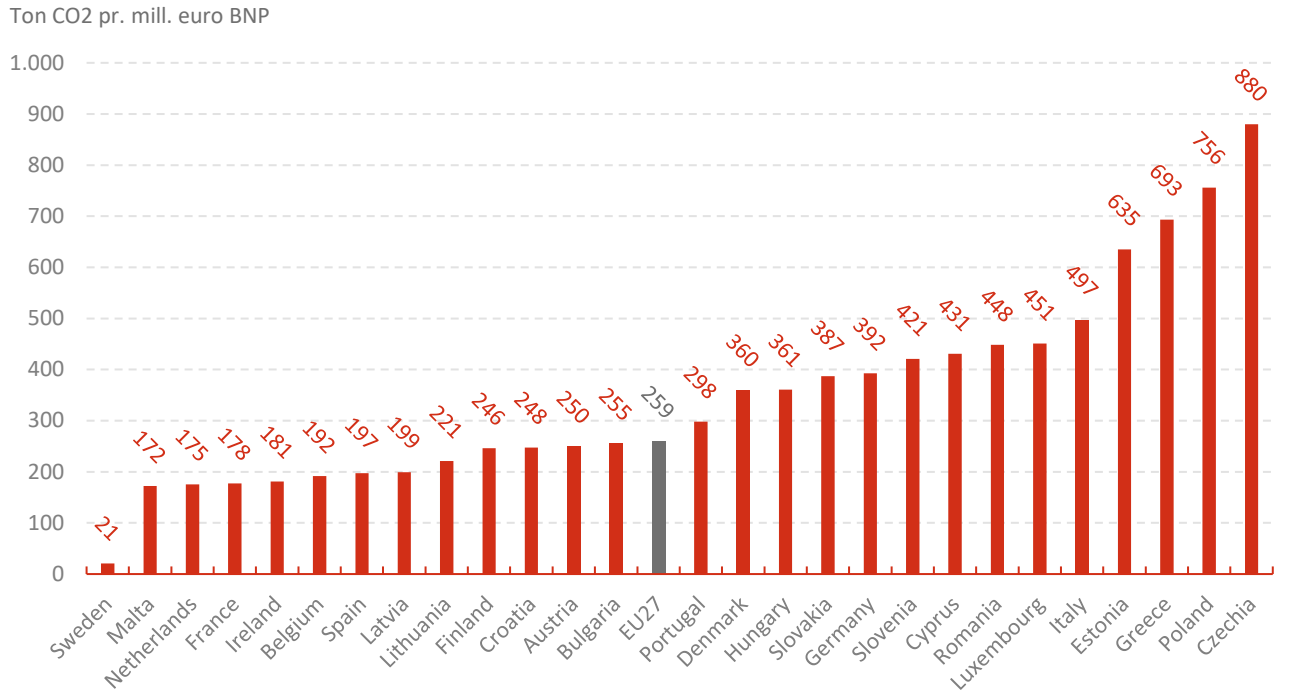
CHART 8: GERMAN EMISSIONS ARE ALMOST DOUBLE THE SIZE OF THE SECONS LARGEST EMITTER



Source: Eurostat

A country's emissions are naturally related to its size, and if we look at the emissions in relation to GDP, we get a slightly different picture. Germany is now only a little above average and Spain somewhat below, cf. chart 9. Czech Republic tops the list with 880 tons of CO2 per million euro GDP, and Poland comes in second. With Italy in fifth place, both Poland and Italy are in the top five when it comes to total emissions as well as emissions in proportion to the size of the economy.

CHART 9: CZECH REPUBLIC AND POLAND ARE THE LARGEST EMITTERS COMPARED TO THE SIZE OF THE ECONOMY



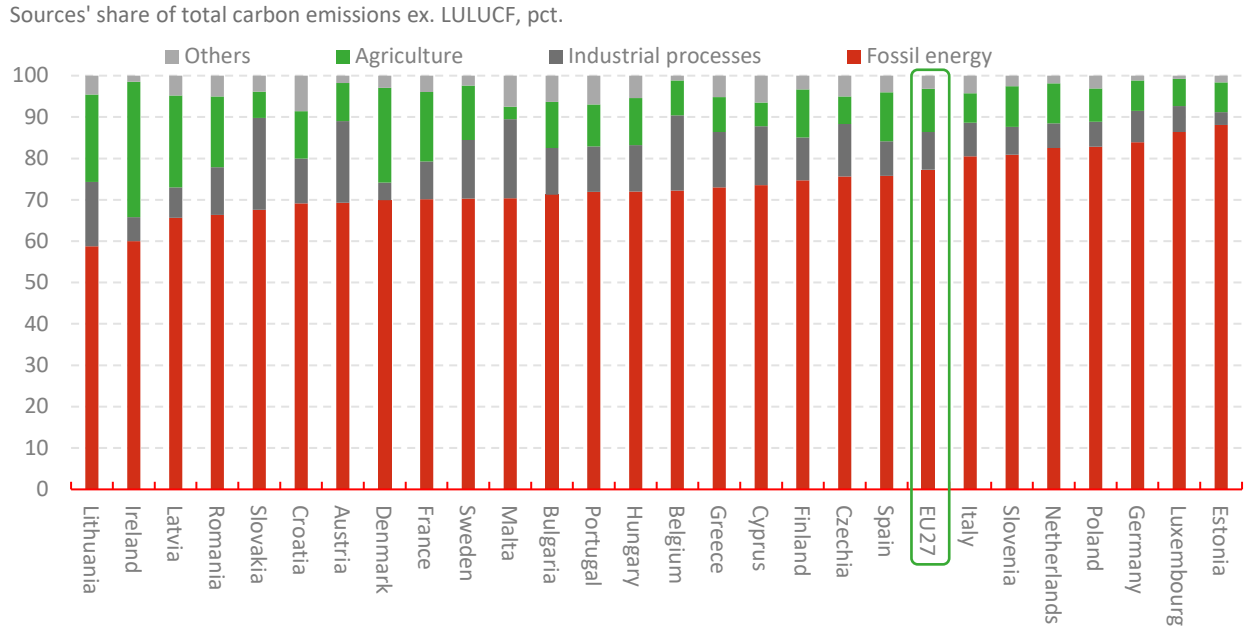
Source: Eurostat and own calculations
Note: GDP in current market prices, Euro

Emissions from fossil energy make up the majority of emissions in the EU

Carbon emissions have various sources such as fuel combustion, agricultural processes, industrial processes, etc. In the EU as a whole, 77 pct. of emissions (excl. LULUCF emissions) stem from fossil energy, while approx. 10 pct. comes from industrial processes and agriculture, respectively, cf. chart 10. Fossil energy emissions take up the most space in countries such as Estonia and Germany, while agriculture is the most important in Ireland and Denmark, where it takes up 33 and 23 pct. of the emissions excl. LULUCF, respectively. In contrast, the part of emissions stemming from industrial processes are relatively larger in countries such as Slovakia and Austria.

In the Czech Republic and Poland, which have the highest emissions in proportion to the economy, a comparatively large part of emissions come from fossil energy. Especially in Poland, where it accounts for 83 pct. of emissions.

CHART 10: FOSSIL ENERGY EMISSIONS TAKE UP ¾ OF TOTAL EU EMISSIONS

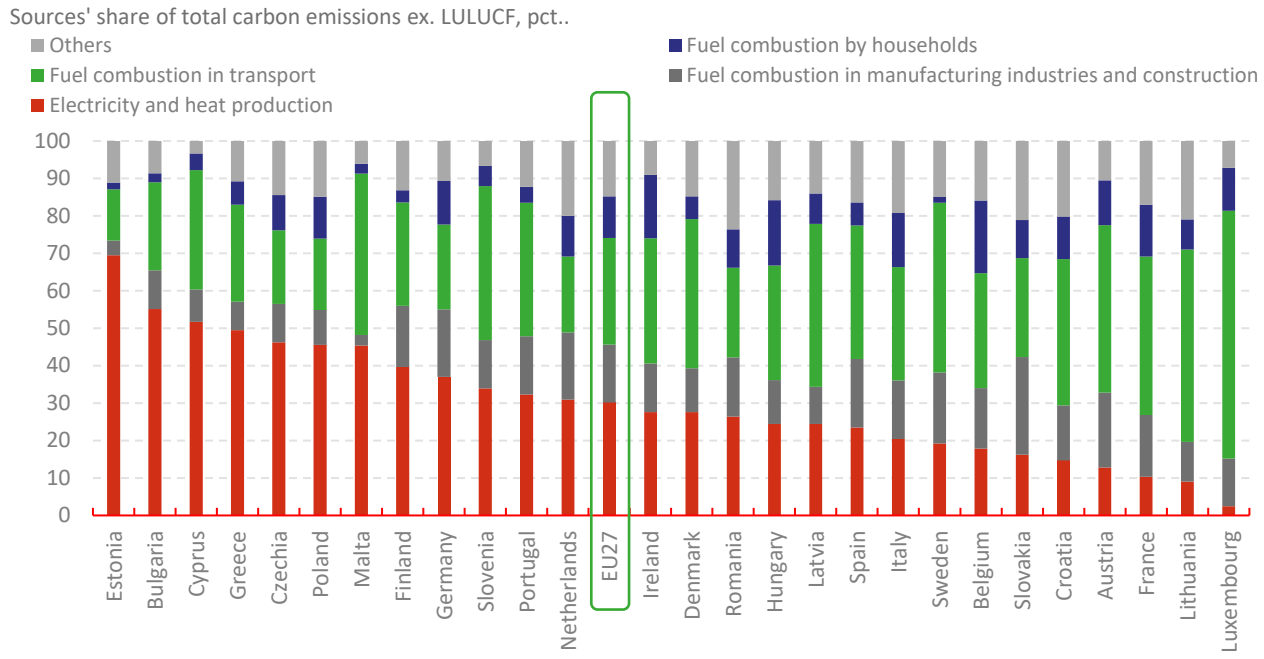


Source: Eurostat and own calculations

Emissions from fossil energy primarily stem from electricity and heat supply and transportation, cf. chart 11. In Germany, which is by far the EU's largest emitter, the electricity and heat supply accounts for 37 pct., whereas it accounts for 46 pct. in the Czech Republic and Poland.

In countries such as France and Italy, energy supply makes up a relatively small part of emissions, while transportation makes up relatively larger part with 42 and 30 pct. of the total emissions being from transportation, respectively.

CHART 11: ELECTRICITY AND HEAT SUPPLY TAKE UP 30 PCT. OF EU FOSSIL ENERGY EMISSIONS



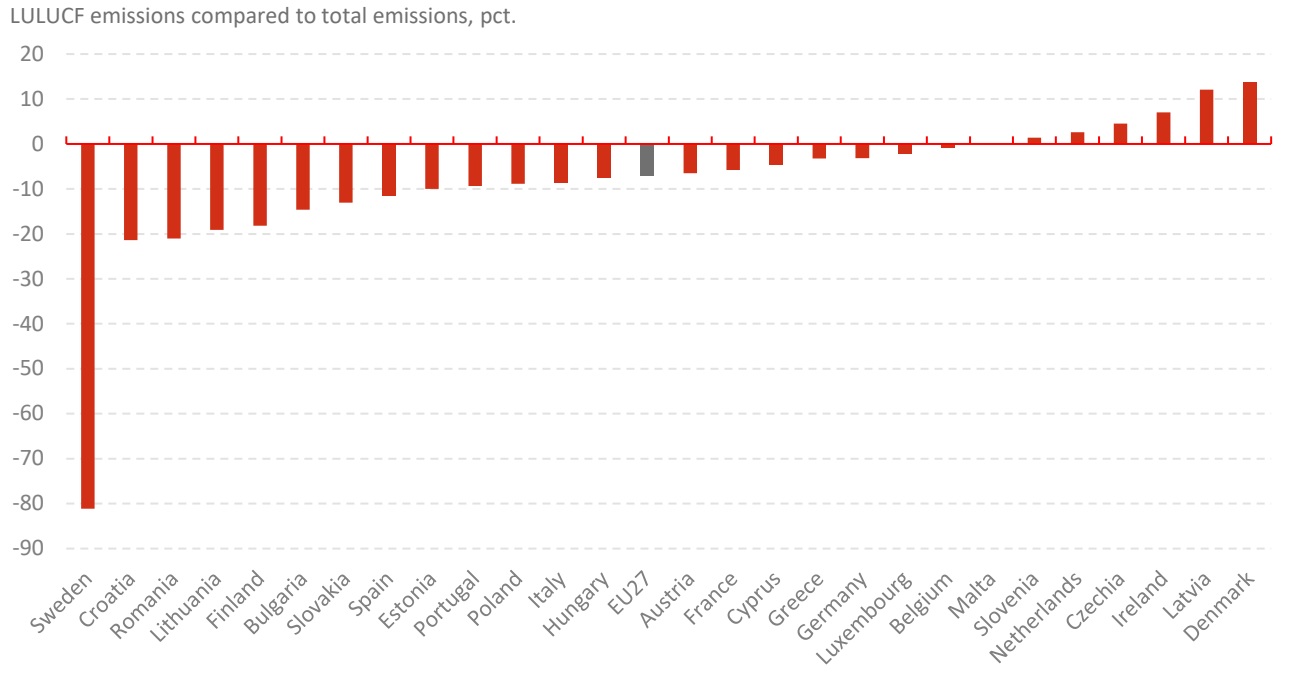
Source: Eurostat and own calculations

Most – but not all – countries have negative LULUCF emissions

Forests and rural areas absorb carbon and thereby lead to negative emissions. Conversely, carbon emissions from agricultural land can occur as carbon is emitted in connection with cultivation. Therefore, use of forests and land can create both positive and negative emissions, the so-called LULUCF emissions. In most EU countries, LULUCF gives rise to negative emissions, cf. chart 12, meaning forests etc. absorb more carbon than is emitted from these areas. This is the case in Sweden, where negative LULUFC-emissions correspond to just over 80 pct. of the total carbon emissions excl. LULUCF. In other words, it does not take much carbon reduction for Sweden to become carbon-neutral by this form of measurement.

Denmark, on the other hand, has the largest positive LULUCF emissions relative to total emissions, which is one of the reasons why the removal of low-lying soil from agriculture is a key tool in Denmark's effort towards lowering carbon emissions.

CHART 12: LULUCF REMOVES CARBON EMISSIONS IN MOST EU COUNTRIES



Source: Eurostat and own calculations.

THE RISK OF CARBON LEAKAGE IN THE HUNT FOR 55 PCT.

When the EU sets an ambitious goal for carbon reductions with a short deadline, part of the solution will be to make it more expensive for companies to emit carbon. This is done through the EU ETS, where prices will rise in the coming years and more industries will be covered and via the national contributions, probably partially through higher domestic carbon taxes.

When we make it more expensive to emit carbon, it can lead to carbon leakage - a situation wherein production moves out of the EU due to lower competitiveness. While it harms the European economies, it does not benefit the climate, as emissions then occur elsewhere. Therefore, the EU must take into account the risk of leakage when reforming the ETS. One solution that the EU is developing a so-called carbon border adjustment mechanism (CBA), which is essentially a form of climate tariff that aims to equalize EU and non-EU companies competitively by imposing non-EU companies a tariff equivalent to the carbon costs of European companies. This has the potential to be a sensible solution, but it also has a number of pitfalls. Axcelfuture has previously analyzed the CBA and set up a model for how it can be designed (Principles+of+CBA.pdf (squarespace.com).

Less industrial production and more carbon-efficient industry have lowered industrial emissions

There are essentially two options for reducing carbon emissions in European business. Either the business community becomes more carbon-efficient, ie. emits less carbon per unit produced, or the carbon-emitting production is relocated outside the EU. There can be many reasons why a given production moves out of the EU - either because European companies choose to place production abroad or because they are outcompeted. One reason is carbon leakage, meaning carbon costs lowering competitiveness, but many other reasons related to competition come into play. It is beyond the scope of this analysis to assess what part of the carbon reductions in the EU are due to carbon leakage. In the following sections, we do, however, take a closer look at the two mechanisms: less production in the EU and higher carbon efficiency.

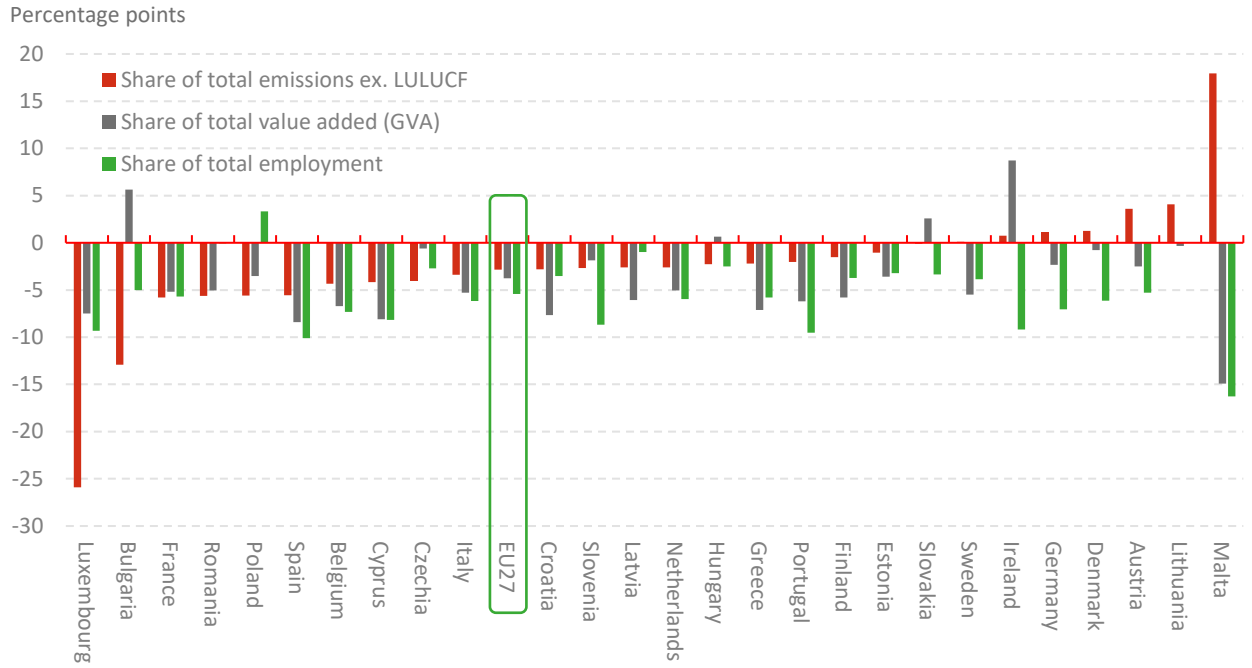
The manufacturing and construction industry[5] employ a smaller proportion of total employment in 2018 than in 1995 in all EU countries with the exception of Poland. Manufacturing also accounts for a smaller share of the economy's total value creation in the vast majority of countries, cf. chart 13. [6] This happened during a period in which the industry's share of total carbon emissions has also fallen, cf. chart 13.

[5] The available data do not allow for a separation of the construction and manufacturing industry in this part of the analysis.

[6] Most countries have experienced declining employment in manufacturing, not just in terms of its share of the economy. Simultaneously, the GVA of manufacturing has increased in all countries except Greece.

This indicates that part of the carbon reductions in the European manufacturing and construction industry is due to the fact that the industries currently take up less space in the economies.[7] If we disregard the transportation sector, the service sectors generally emit less carbon than manufacturing, as the energy demand is smaller, and the production processes themselves do not create emissions either. Therefore, a "servicification" of the European economy in itself results in ongoing reductions of carbon emissions in the EU. It is not necessarily a sign of carbon leakage, as the "servicification" is a result of many other factors besides the rising cost of carbon in the EU. The degree to which this development is caused by leakage cannot be assessed based on these data.

CHART 13: CHANGE IN THE MANUFACTURING AND CONSTRUCTION INDUSTRY'S SHARE OF TOTAL EMISSIONS AND IN THE ECONOMY FROM 1995 TO 2018



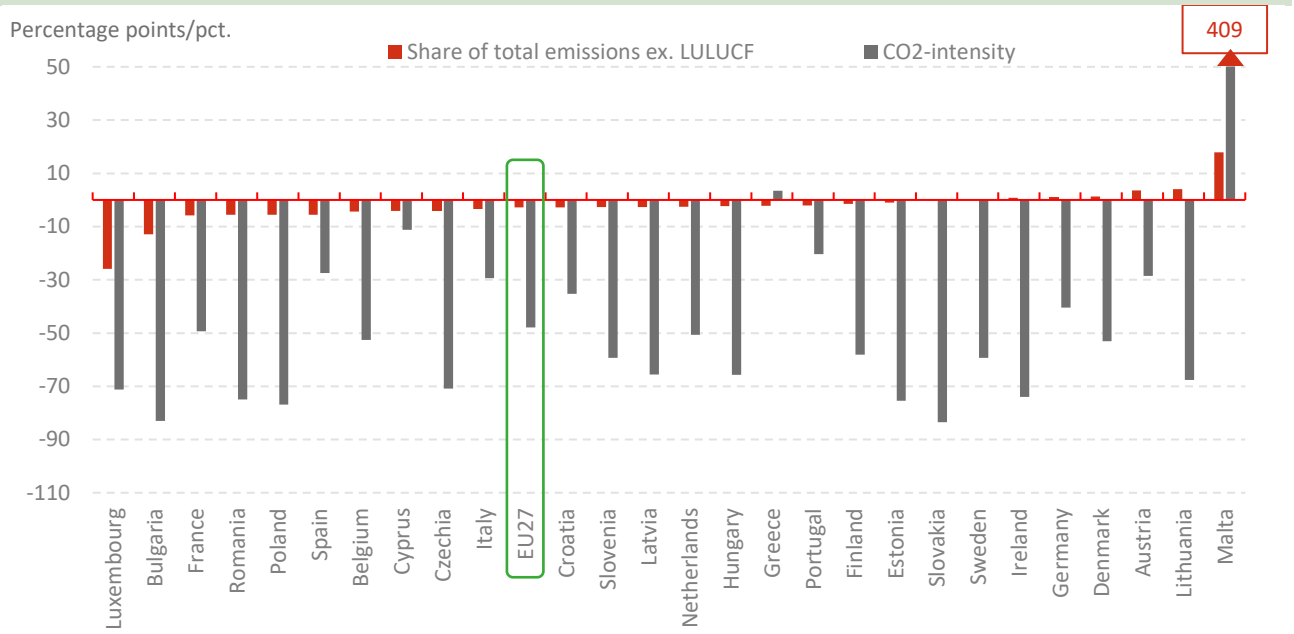
Source: Eurostat and own calculations.
Note: The chart shows the change in the manufacturing and construction industry's share of total carbon emissions (ex LULUCF) and their share in the economy, respectively, from 1995 to 2018. Emissions are fossil fuel emissions as well as emissions from industrial processes.

A part of the carbon reductions so far can thus be attributed to the fact that the manufacturing industry takes up less space in the European economies. At the same time, however, manufacturing has also become more carbon-efficient since 1995. In only two of the 27 EU countries, Greece and Malta, does the manufacturing and construction industry now emit more carbon per gross value added (GVA), cf. chart 14.

Carbon efficiency can essentially be improved in three ways: production becomes greener, productivity increases (so GVA increases), or the most polluting part of production is relocated to other countries. All three methods have surely contributed to the development. To the extent that the pollution-heavy part of production has been offshored to countries outside the EU, it does not contribute to the global carbon reductions.

[7] This is a trend we have also seen in Denmark over many years, cf. https://axcelfuture.dk/s/brancheforskydnigner-pvirker-velstanden.pdf

CHART 14: CHANGE IN THE MANUFACTURING AND CONSTRUCTION INDUSTRY'S SHARE OF TOTAL EMISSIONS AND CARBON INTENSITY FROM 1995 TO 2018



Source: Eurostat and own calculations.
Note: The chart shows the change in the manufacturing and construction industry's share of total carbon emissions (ex LULUCF) and the change in carbon emissions compared to the industries' value added, GVA (carbon intensity). Emissions are fossil fuel emissions as well as emissions from industrial processes. GVA measured in constant prices. Malta measured from 2000 to 2018.

The risk of leakage must weigh in in the EU's climate solutions

The manufacturing and construction industries in the vast majority of EU countries now make up a smaller share of total carbon emissions than they did in 1995. There are many reasons for this development, including the industries becoming greener, economies becoming increasingly service-oriented, and the most polluting parts of the production being moved outside the EU. It is beyond the scope of this analysis to assess which factors predominate and to what extent this development can be attributed to carbon leakage.

However, there is a substantial risk that the relocation of pollution-heavy production will increase if the EU does not factor in this prospect in its path towards a 55-pct. reduction. This risk is even more significant due to the limited time-period available, 10 years, to make the remaining reductions. Therefore, the EU must devise clear incentives to reduce emissions while avoiding eliminating the incentive to keep production in the EU more than absolutely necessary when seeking to achieve its reduction targets in the future. Otherwise, the effects are a worsening of the economies without the benefits for the climate, as emissions will just move with production.

LARGE CHALLENGES FOR THE EU THE COMING 10 YEARS

As the analysis shows, a tripling of the recent years' reduction rate is necessary if the EU is to reach its reduction target of 55 pct. by 2030. Some countries have already come a long way, but so far, we have reached 27 out of the 55 pct. Almost half of this reduction took place during the financial and debt crises, putting the European economies on hold. Simultaneously, emissions outside the ETS have increased in recent years, creating even greater demand for national initiatives in the future.

Renewable energy supply and green transportation are necessary to achieve the goal

The solutions must focus on the areas that provide the most climate in return for the effort. Emissions primarily come from fossil energy in the EU, with Germany and Poland being no exceptions. Out of fossil energy emissions, the largest sources of emissions are electricity and heat supply, and transportation.

This points towards two overall tasks for the EU. Firstly, a significant expansion of renewable energy in the electricity and heat supply. With the EU's Green Deal, there are actually prospects for a substantial expansion of renewable energy in the coming years. For example, the EU will fivefold the current offshore wind capacity from 12 GW to 60 GW in 2030, and then another fivefold increase to 300 GW in 2050.[8]

The second task is a fundamental reorganization of the transportation sector and its energy input, for example with the expansion of electric cars, e-fuels, hydrogen vehicles, etc. A process that is underway but also requires a long time, because charging infrastructure must be built, large parts of the car fleets must be replaced, etc.

Some EU countries, including Denmark and Ireland in particular, also have relatively large carbon emissions from agriculture. A third challenge for the EU is, therefore, to develop ways to reduce agricultural emissions. This challenge is of a different character, as much of the farming emissions come from LULUCF and animal husbandry. Both of these cannot "just" be solved by utilizing renewable energy in production.

The necessary reshuffling of supply and transportation will take many years, so the vast funds in the EU recovery package to kickstart European economies following the Covid 19 pandemic must come to fruition as soon as possible. In Denmark, it takes eight years from the decision to construct an offshore windfarm until the turbines spin, on average. If we are to reach the goal of 55 pct. by 2030, far higher speeds are necessitated.

It is also necessary to reform the EU ETS to allow for it to create even further reductions, for example, by expanding it to include the transportation sector. This reformation is already underway in the EU,

[8] Boosting Offshore Renewable Energy (europa.eu)

including the addition of transportation. Another extension that should be considered is the inclusion of agriculture in the system. A major challenge, however, is to develop bookkeeping that accurately and efficiently measures emissions in the individual agricultural holdings.

Are the goals realistic?

When we have to triple the current reduction rate, the question is whether the 55-pct. goal really is realistic? There is an immediate need to increase the reduction rate significantly across the EU. While the climate goals are both important and valid, there is a risk that European and domestic politicians promise voters more than they can actually deliver. This is especially the case if politicians have given voters the prospect that the enormous change will not imply negative consequences for neither employees, companies, nor consumers.

The EU has an ambition of climate neutrality by 2050. This goal is perhaps more realistic, as the green transition requires the use of technologies that have yet to be developed or are not on a commercial scale.[9] We can go far in the next 10 years, and the effort must provide the groundwork for the central goal of climate neutrality by 2050. But to achieve this goal, the speed must be increased significantly.

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[9] See e.g. (in Danish) https://axcelfuture.dk/s/Klimaplan-for-Danmark-Juni-2020-fnyb.pdf