【欧州】【Common】

Common - Follow-up on the post Paris agreement: EEA publishes inventory report on the EU’s GHG emission trends in 2018

Andrea Antolini　Former Researcher JTTRI

【概要：Summary】

Under the commitment to the 1997 Kyoto Protocol and the United Nations Framework Convention on Climate Change (UNFCCC) Paris agreement of 2015, the EU and its Member States have agreed to limit their GHG emissions. In this framework, the European Environment Agency (EEA) publishes annual data on the current state of GHG emission development in the EU. According to the EEA’s latest data in the EU’s latest inventory report, the EU Member States plus the UK had total GHG emissions of 4,392 million tonnes in 2018 and managed to cut their GHG emissions of carbon dioxide equivalent (CO2e) by 23.2% from 1990 to 2018. The EU reduction without the UK was 20.7%. Over this period, the EU’s contribution to global emissions is estimated to have decreased from 15% to 8%. In 2018, the EU’s emissions decreased by 2.1% compared to 2017, according to the EU inventory report, which still also includes the UK, until the end of the Brexit transition period. Over the same period of 1990 to 2018, average emissions per EU citizen decreased from 12.2 tonnes CO2e to 8.9 tonnes CO2e. Over the past 28 years, the EU reduced its GHG emissions due to a combination of factors. Main effects are based on EU and national policies and measures, the strong increase in the use of renewables, a switch from coal to gas for power generation, improvements in energy efficiency and structural changes in the EU economies. However, although the EU accounted for less than 8% of global GHG emissions in 2018 and despite the positive trends of GHG emission reductions in industry and the residential sector, fossil fuels are still the largest source of energy and emissions in the EU. Also GHG emissions from road transportation continue to increase, in both, passenger and freight transport. Therefore, despite of the good progress in reducing GHG emissions and decarbonising the EU economy, substantial GHG emission reductions will still be needed for the EU to become a climate neutral economy by 2050.

【記事：Article】

1. Background of annual GHG inventories

Climate change is one of the greatest global environmental, social and economic threats and in order to prevent the most severe impacts, the countries that have signed up to the UNFCCC agreement intend to introduce measures in order to limit the increase in global average temperature and the resulting climate change. The 2015 Paris Agreement sets out a global action plan to keep global temperature rise to well below 2 ° C above pre-industrial levels and to drive efforts to limit the increase to 1.5 ° C. In this context, industrialised countries need to prepare and submit precise and regularly updated annual inventories of GHG emissions.

At international level, the Kyoto Protocol is the

main instrument to limit GHG emissions. The Kyoto Protocol's second commitment period started in 2013 and will end in 2020. At EU level, the EU has set its climate change mitigation objective for 2020 to reduce its GHG emissions by at least 20% compared with 1990 levels. The EU has also adopted a second objective under the 2030 Climate and Energy Framework to achieve a 40% reduction of GHG emissions by 2030. Finally, under the new European Green Deal, the EU plans to achieve net zero GHG emissions by 2050.

The EU, as a party to the UNFCCC and to the Protocol, reports annually on the GHG emissions within the area covered by its Member States.

In order to assess the progress of the EU and its Member States to limit their GHG emissions, the European Environment Agency (EEA) publishes data on the current state of GHG emission development in the EU. The Annual European Union GHG inventory report, which is officially submitted to the UNFCCC Secretariat, is prepared by the EEA and its European Topic Centre for Air and Climate Mitigation (ETC/ACM) on behalf of the European Commission (DG CLIMA) supported by the Joint Research Centre (JRC) and Eurostat. After the EU Member States and the other countries covered submit their annual GHG inventories by 15 January each year to the European Commission (DG CLIMA), the EEA and its ETC/CME, Eurostat, and the JRC perform initial checks on the data submitted. Specific findings from the initial quality assurance/quality control (QA/QC) checks are communicated to Member States by 28 February. In addition, the draft EU GHG inventory and inventory report are circulated to Member States for review and comments by 28 February. The EU GHG inventory report is then reviewed and published.

2. The latest EEA data on GHG emission trends

On 28 May 2020, the EEA published the inventory report for the UNFCCC. The EEA report entitled "Annual European Union greenhouse gas inventory 1990-2018 and inventory report 2020. Submission to the UNFCCC Secretariat" is the EU's official inventory report of 2020. The EU, as a party to the UNFCCC, reports annually on GHG inventories for the years between 1990 and the current calendar year (t) minus two (t-2). Therefore, this latest report analyses the GHG emission and removals within the area covered by the EU Member States in the year 2018. The inventory report was prepared on behalf of the European Commission (DG CLIMA) by the EEA's European Topic Centre on Climate Change Mitigation and Energy (ETC/CME) supported by the Joint Research Centre (JRC) and Eurostat. The report includes also the UK, as the EU law applies also in the UK until the end of the Brexit transition period. Moreover, the EU Member States plus Iceland and the UK fulfil their quantified emission limitation and reduction commitments for the second commitment period to the Kyoto Protocol (KP) until 2020, reflected in the Doha Amendment, jointly. Therefore, the inventory report refers to the EU GHG inventory under the UNFCCC with the scope EU27+UK and the Kyoto Protocol in the scope EU27+ISL+UK = EU-KP. According to the EEA report, the EU GHG inventory comprises of the direct sum of emissions from the national inventories compiled by the countries making up the EU-27 plus Iceland plus the UK. Energy data from Eurostat are used for the reference approach for CO2 emissions from fossil fuels, developed by the Intergovernmental Panel on Climate Change (IPCC).

Furthermore, the report entitled "Trends and drivers of EU greenhouse gas emissions", which was published by the European Environment Agency on 29 May 2020, presents an overview of GHG emission trends in the EU between 1990 and 2018. 1990 is the base year for reporting GHG emission inventories under the UNFCCC and the report provides a summary of the results for 2018 compared to 2017.

3. Total GHG emissions in the EU27+UK in 2018

The total amount of GHG emissions in the EU in 2018 was 4,392 million tonnes CO2e, the lowest level since GHG inventory reporting to the UNFCCC started. This is a 23.2% decrease compared to 1990. The total

reduction, including international navigation emissions, which are not included in the EU's current emission targets, over the 28-year period was 1,291 million tonnes of CO2e or 22.1% less than 1990 emission levels. Over the same period, average emissions per EU citizen decreased from 12.2 tonnes CO2e to 8.9 tonnes CO2e. The EU reduction without the UK was 20.7%. In 2018, the EU's GHG emissions decreased by 2.1%, compared to 2017. Over the 28-year period, the EU's contribution to global GHG emissions is estimated to have decreased from 15% to 8%. Almost all EU Member States reduced emissions compared to 1990 and thus contributed to the overall positive EU performance. The UK and Germany accounted for over 50% of the total net reduction in the EU-KP of the past 28 years.

Germany and the United Kingdom, the two countries with the highest absolute reductions, achieved total domestic GHG emission reductions of 723 million tonnes CO2 equivalent compared to 1990, not counting carbon sinks and the use of Kyoto mechanisms. The main reasons for the favourable trend in Germany were an increase in the efficiency of power and heating plants and the economic restructuring of the five new "Länder" after the German reunification, particularly in the iron and steel sector. Other important reasons include a reduction in the carbon intensity of fossil fuels (with the switch from coal to gas), a strong increase in renewable energy use and waste management measures that reduced the landfilling of organic waste.

Table 1: EU-27 and UK's total GHG emissions in 2018 and compared to 1990

	Total GHG emissions in 2018 ($MtCO_2e$)	Change in total GHG emissions, 1990-2018 ($MtCO_2e$)	Change in total GHG emissions, 1990-2018 (percentage change)
EU-27 plus UK	4391.8	- 1329.5	-23.2%
European Union	3893.1	- 1018.5	-20.7%

Source: EEA Report No 3/2020 https://www.eea.europa.eu/publications/trends-and-drivers-of-eu-ghg, 29 May 2020, retrieved 2 June 2020

The decrease without the UK was 83.6 million tonnes, to reach 3,893 MtCO2e in 2018. The overall EU GHG emission trend is dominated by the three largest emitters, Germany (20%), the UK (11%) and France (11%), accounting for over 40% of total EU-KP GHG emissions in 2018.

There has been a progressive decoupling of gross domestic product (GDP) and GHG emission compared to 1990, with an increase in GDP above 60% alongside a decrease in emissions of 25% over the period (-23%, when including international aviation).

The reduction in GHG emissions over the 28-year period was due to a variety of factors, including the growing share in the use of renewables, the use of less carbon intensive fossil fuels and improvements in energy efficiency, as well as to structural changes in the economy and the economic recession. These have resulted in a lower energy intensity of the economy and in a lower carbon intensity of energy production and consumption in 2018 compared to 1990. Demand for energy to heat households has also been lower, as Europe on average has experienced milder winters since 1990, which has also helped to reduce GHG emissions.

However, the main reduction in the GHG emissions at EU level in 2018 took place in the energy and power generating industries. Emissions from agriculture and waste management have also contributed to the positive trend since 1990. Instead, the GHG emissions from road transportation increased, in both passenger and freight transport. This increase is the result of increased traffic volumes, in spite of climate policies and the deployment of less carbon intensive and more efficient vehicles.

4. The transport sector's GHG emissions

Considering the question which sector achieved a GHG emission reduction, most of the emissions decrease has taken place in energy supply, industry and the residential sector. Two thirds of the 2018 emission reduction took place in the heat and power sector. Here, the emissions from coal burning decreased while the use of renewables in electricity generation continued to grow. However, the EEA report states that several factors have contributed to the GHG emission reductions in the EU since 1990, including the effects of a number of policies, both EU and country-specific.

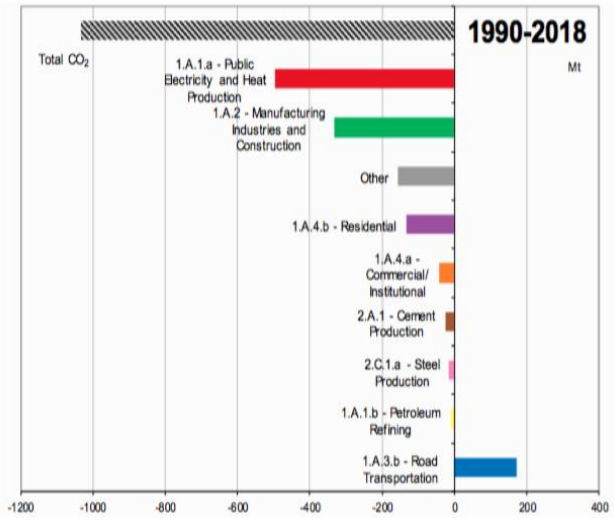

Figure 1: Absolute change of CO2 emissions by key source categories 1990 to 2018, in CO2 equivalents (Mt) for EU-KP

Source:https://www.eea.europa.eu/publications/european-union-greenhouse-gas-inventory-2020, p.71

This included the strong increase in the use of renewable energy sources for heat and electricity, the switch from coal to gas and a general move towards less carbon-intensive fossil fuels in heat and power generation, improvements in energy efficiency, both in transformation and end use.

In contrast, in the transport sector, GHG emissions have increased due to higher demand and despite climate policies and efforts to improve vehicles efficiency and although road transport's GHG emissions remained stable in 2018, compared with 2017. After the temporary decrease in transport emissions resulting from the 2008/09 economic crisis, GHG emissions have continued to increase because of increasing transport demand. Moreover, the CO2 emissions per km for newly registered vehicles have also increased in the last two years in the EU. The reason for this new increase was the increase in sales of gasoline cars relative to diesel, as well as bigger and heavier cars being sold on average in the EU. The transport sector represents a challenge for EU Member States and the achievement of the 2030 targets under the EU effort sharing legislation, since transport accounts for about one third of the EU's total GHG emissions. Registrations of battery electric vehicles are, however, increasing. A typical electric car produces less GHG emissions and air pollutants compared with petrol and diesel combustion engines, when comparing the entire life cycle of a vehicle. Increased use of electric vehicles together with further improvements in the carbon intensity of the fuel mix for electricity generation can lead to substantial reductions in GHG emissions in the transport sector.

Regarding GHG emissions from international aviation, they increased by 141% between 1990 and 2018 and GHG emissions from international shipping increased by 35% during the same period. In 2018 international aviation accounted for 167 million tonnes CO2 equivalent and international shipping for 150 million tonnes CO2 equivalent.

Road Transportation includes all types of light-duty vehicles and passenger cars as well as heavy-duty vehicles such as tractors, trailers and buses, and two and three-wheelers (including mopeds, scooters, and motorcycles). CO2 emissions from Road Transportation is the second largest key source of all categories in the EU-KP accounting for 21% of total GHG emissions in 2018. Between 1990 and 2018, CO2 emissions from road transportation increased by

24% in the EU-KP.

Regarding the GHG emissions from railways, their CO2 emissions account for 0.14% of total EU-KP GHG emissions in 2018. Between 1990 and 2018, CO2 emissions from rail transportation decreased by 56% in the EU-KP.

5. Prospects to reach the EU's 2030 and 2050 GHG emission reduction targets

According to the EEA's reports, the reduction in GHG emissions over the 28-year period was due to a variety of factors, including the growing share in the use of renewables, and improvements in energy efficiency, among others. All the different factors have helped reduce GHG emissions in the majority of sectors between 1990 and 2018, with the exception of the transport sector, as well as refrigeration and air conditioning. Therefore, in order to reach the envisaged net-zero emission target by 2050, decarbonising the EU's economy will require substantial additional GHG emission reductions in the next 30 years, and especially in the transport sector. However, considering the future targets for 2030 and 2050, the main question will be how much more GHG emission reduction will have to be achieved in order to reach the future targets.

The GHG emission numbers in table 2 are based on EEA analysis of the available information regarding climate change mitigation in the EU. The numbers still include the UK, as part of the EU's 2020 GHG inventory submission under the UNFCCC and the Kyoto Protocol. The EU and its Member States are currently discussing an increased level of GHG emission reduction by 2030 towards the objective of climate neutrality by 2050, as net-zero GHG emissions by 2050 could also be achieved by increasing carbon sinks and not only by reducing GHG emissions alone. The EEA's analysis shows that the rate by which GHG emissions will have to decrease significantly in order to reach decarbonisation of the EU's economy and climate neutrality by 2050. Therefore, more substantial and additional GHG emission reduction measures are needed in the EU, beyond GHG emission reduction measures.

Table 2: Necessary efforts to meet EU GHG emission targets, based on 1990 emissions, in MtCO2e

	GHG level	Total reduction from 1990	No. of years from 1990	Annual reduction
Year 1990	5721	-	-	-
Year 2018	4392	-1330	28	-47
Year 2020, 20% target based on 1990	4577	-1144	30	-38
Year 2030, 40% target based on 1990	3433	-2289	40	-57
Meeting the 2030 target including reductions achieved by 2018	3433	-959	12	-80
Meeting climate neutrality by 2050	Net zero GHG emissions	GHG emission reduction or removals	32	-

Source:https://www.eea.europa.eu/publications/trends-and-drivers-of-eu-ghg

The Green Deal of December 2019 also includes the proposal for the first European Climate Law that would make climate neutrality by 2050 legally binding. The 2050 climate neutrality objective is also part of the EU's long-term strategy to the UNFCCC. Improved energy efficiency and carbon intensity, with an increasing role for renewables in the energy mix, and all sectors of the economy, would have to contribute to the objective of climate neutrality by 2050. It would imply an almost tripling of the annual reduction of CO2 emissions between 2018 and 2050 and it would need an annual

reduction of 137,25 MtCO2e, if the target was only achieved by reduction measures. This would imply an enormous, but rather unrealistic effort, if it was only met by reduction measures. Therefore, the EEA report points out the need to also consider emission removal measures like carbon capture and storage. Finally, the current analysis is based on the GHG emission figures of 2018 and does not yet include the effects of the COVID-19 pandemic. It is clearly too optimistic to count on the effect of such a single, although significant, event and its impact on the EU's GHG emissions. However, it could positively influence the further reduction of GHG emissions in the EU, at least temporarily. The preliminary estimates of total GHG emissions in the EU in 2020, based on official reporting by Member States, will be available in the autumn of 2021, as part of the approximated GHG inventories for 2020. The national GHG inventories under the UNFCCC covering the time series 1990-2020 will be available on 15 April 2022. Therefore, it will take at least one and a half years until the more detailed effects of the pandemic on the GHG emissions in the EU can be analysed.

References:

EEA: Annual European Union greenhouse gas inventory 1990-2018 and inventory report 2020. Submission to the UNFCCC Secretariat. In: https://www.eea.europa.eu/publications/european-union-greenhouse-gas-inventory-2020, retrieved 12 June 2020

EEA: Different emission estimates produced by EU institutions. Complementary emission estimates produced by EU organisations. This briefing provides an overview of the key types of greenhouse (GHG) emission estimates that are regularly published by bodies of the European Union (EU). In: https://www.eea.europa.eu/downloads/44144e53e25a4395925a78f4eba5eb9b/1588698990/emission-estimates-produced-by-eu.pdf , 01 Jun 2017, retrieved 15 June 2020

EEA: EU greenhouse gas emissions kept decreasing in2018, largest reductions in energy sector. In: https://www.eea.europa.eu/downloads/ca1b98d013a846468169173a8cfdf10c/1590731318/eu-greenhouse-gas-emissions-kept.pdf, 29 May 2020, retrieved 15 June 2020

EEA: Total greenhouse gas emission trends and projections in Europe. In: https://www.eea.europa.eu/data-and-maps/indicators/greenhouse-gas-emission-trends-6/assessment-3, 19 Dec. 2019, retrieved 15 June 2020

European Environment Agency (EEA): Trends and drivers of EU greenhouse gas emissions. EEA Report No 3/2020. In: https://www.eea.europa.eu/publications/trends-and-drivers-of-eu-ghg, 29 May 2020, retrieved 12 June 2020