

# Climate Change Mitigation in the EU – Targets and Achievements

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*Abstract:* - Climate change is one of the greatest challenges of the 21st century. The European Union seeks to become the world leader in combating this phenomenon, setting high objectives, implementing ambitious policies and working closely with the international partners involved. This article aims to analyze the European Union's performance in the fight against climate change. Therefore, in the first part of the article, the EU targets for 2020, 2030 and 2050 will be exposed, and in the second part I will analyze the degree of achievement of the targets for the main indicators, namely greenhouse gases emissions, the share of renewable energy sources in the final energy consumption, the share of renewable energy used in the transport sector and the increase in energy efficiency.

*Key-words:* climate change, greenhouse gases (GHG) emissions, policies, renewable energy sources (RES)

*JEL Classification:* Q28, Q48, Q54

## 1. EU climate change objectives

### 1.1. 2020 climate and energy package

In the 2010 European Commission Communication entitled “Energy 2020. A strategy for competitive, sustainable and secure energy”, the EU aims to reduce greenhouse gases emissions by at least 20% by 2020, to increase the share of renewable energy to at least 20% in the final consumption, to achieve energy savings of 20% or more. All EU countries had to reach a 10% share of renewable energy in their transport sector. By achieving these goals, the EU can help combat climate change and air pollution, reduce dependence on imported fossil fuels and provide reasonable energy to consumers and businesses (EC, 2010).

To achieve these goals, the 2020 Energy Strategy has established five priorities:

- a more efficient EU by accelerating investments in energy efficient buildings, goods and transport.
- building a pan-European energy market through the construction of the necessary power lines, pipelines, LNG terminals and other infrastructures.
- protect consumer rights and achieve high safety standards in the energy sector.
- implementation of the Strategic Plan for Energy Technologies, the EU strategy to accelerate the development and implementation of low-carbon technologies.
- to promote the development of good relations with external suppliers of the EU and energy transit countries.

### 1.2. 2030 climate and energy framework

In October 2014, the European Council agreed on a new climate and energy framework for 2030, including political goals and targets at EU level for the period 2020-2030. These goals were intended to contribute to a more competitive, safer and more sustainable EU energy system in order to achieve its long-term goal of reducing greenhouse gas emissions by 2050 (EC, 2014).

The 2030 targets were as follows:

- a 40% reduction in greenhouse gases emissions compared to 1990 levels;
- a share of at least 27% of renewable energy in the final consumption;
- an indicative target for an EU-wide energy efficiency improvement of at least 27%;
- supporting the completion of the internal energy market by achieving the 10% electricity interconnection target by 2020, with a view to reaching 15% by 2030.

In September 2020 the Commission proposed raising the objective of reducing GHG emissions by 2030 to at least 55%, as part of Europe's Green Deal (EC, 2020). The Commission analyzed the necessary actions in all sectors, including energy efficiency and renewable energy, and began the process of developing detailed

legislative proposals to implement and achieve the new goal. Thus, the new targets for the period up to 2030 are as follows:

- reduction of GHG by at least 55% (compared to the 1990 level);
- share of at least 32% for renewable energy sources;
- increasing energy efficiency by at least 32.5%.

All three aspects of climate legislation will now be updated to meet the net goal of reducing greenhouse gas emissions by at least 55%. The Commission will submit proposals by June 2021.

### 1.3. 2050 Energy Roadmap

The EU had set a long-term target of 80-95% reduction in GHG emissions from 1990 levels by 2050. The 2050 Energy Roadmap examines the transition of the energy system in line with the goal of reducing GHG emissions while increasing competitiveness and security of supply. Achieving these goals requires significant investment in new low-carbon technologies, renewable energy, energy efficiency and grid infrastructure. Since investments are made over a period of 20 to 60 years, policies that promote a stable business climate that encourage investment in reducing carbon emissions should start as soon as possible (EC, 2011).

## 2. Climate change objectives achievement

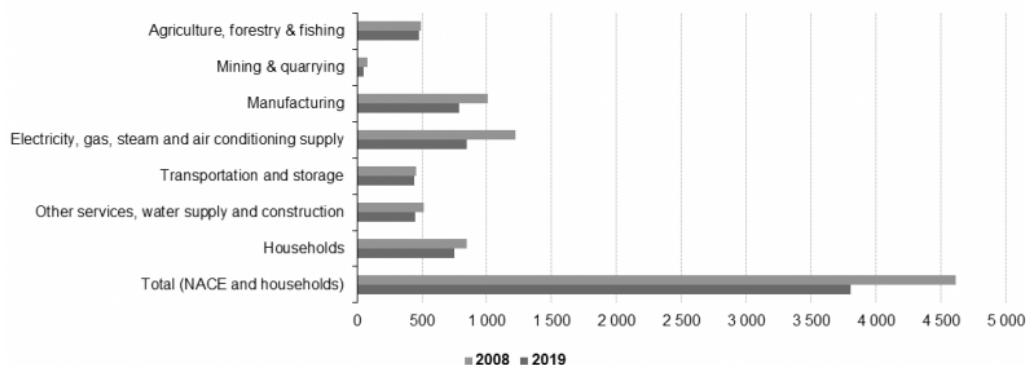
### 2.1. Greenhouse gases emissions

#### 2.1.1. Greenhouse gases by economic activity

In the following, GHG emissions in the EU are analyzed by economic activity (industry and household). The greenhouse gases category includes carbon dioxide, nitrous oxide, methane and fluorinated gases (hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride and nitrogen trifluoride).

In 2019, industrial and household greenhouse gases emissions in the EU-27 amounted to 3.8 billion tonnes of CO<sub>2</sub> equivalent. In the period 2008-2019, GHG emissions from electricity, gas, steam and air conditioning systems decreased by 381 million tonnes of CO<sub>2</sub> equivalent, representing a decrease of 31% in relative terms. In both absolute and relative terms, the greatest decrease was recorded among the studied activity groups. This group of activities is also one of the largest generators of greenhouse gases. It accounted for 20% of total GHG emitted by industry and households in the EU in 2019. During the same period, the second largest reduction in GHG emissions occurred in manufacturing (-220 million tonnes CO<sub>2</sub> equivalent). According to figure no. 1, the second largest relative decline was 30% and was recorded in deep and shallow mine workings. Households in the EU-27 reduced their emissions by 93 million tonnes of CO<sub>2</sub> equivalent (11% reduction) between 2008 and 2019 (Eurostat, 2021a).

**Figure no. 1: Greenhouse gas emissions by economic activity, EU-27, 2008 and 2019**



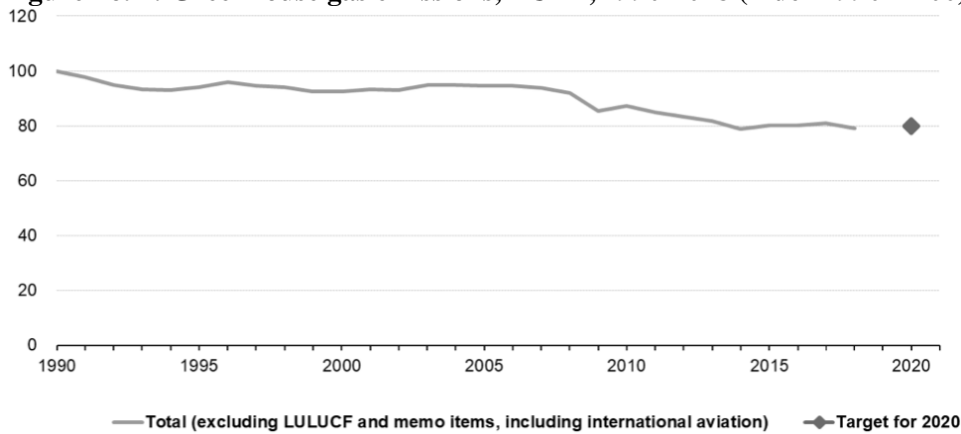
Source: Eurostat, 2021a ([https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Figure\\_1\\_Greenhouse\\_gas\\_emissions\\_by\\_economic\\_activity,\\_EU-27,\\_2008\\_and\\_2019.png](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Figure_1_Greenhouse_gas_emissions_by_economic_activity,_EU-27,_2008_and_2019.png))

#### 2.1.2. Greenhouse gases by country

In 2018 greenhouse gases emissions in the EU-27 have dropped by 21% since 1990. The main reason for the reduction in total greenhouse gases emissions is the increased energy efficiency and improvement of the structure of energy consumption. Thanks to technological change and innovation, less energy was consumed for the production of more goods and services. Furthermore, the energy consumed was relatively less dependent on

carbon-intensive fuels and more on RES. As a result, the EU has managed to disconnect its economic growth from greenhouse gas emissions, as these technological advances drive economic growth while decreasing greenhouse gas emissions. The largest reduction occurred in 2009, when emissions fell sharply by 324 million tonnes of CO<sub>2</sub> equivalent or 7.2%, respectively. This sharp decline is partly due to the impact of the overall economic crisis, as emissions declined across all sectors of activity (Eurostat, 2020a).

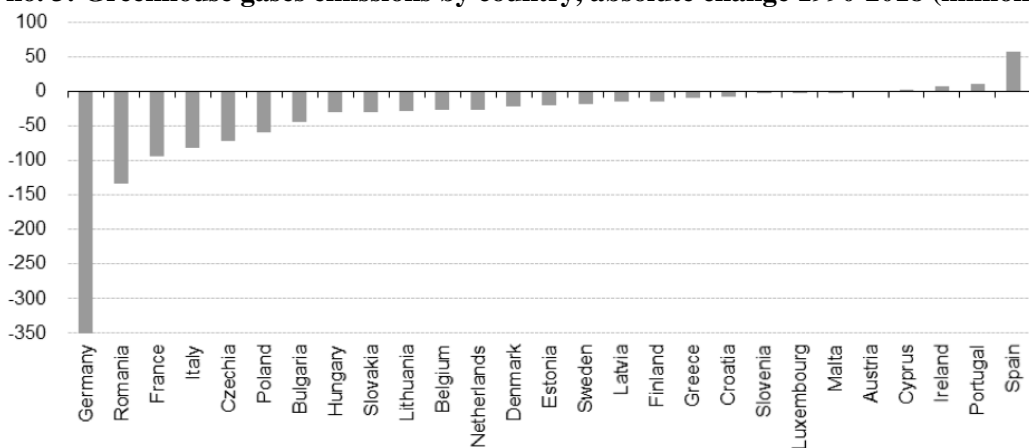
**Figure no. 2: Greenhouse gas emissions, EU-27, 1990-2018 (index 1990 = 100)**



Source: Eurostat, 2020a (<https://ec.europa.eu/eurostat/statistics-explained/pdfscache/9273.pdf>)

The general trajectory of total greenhouse gases emissions is in the right direction. In 2018, total greenhouse gases emissions were 3.9 billion tonnes of CO<sub>2</sub> equivalent, down by 1 billion tonnes or 21% from 1990. Figure no. 2 shows that the European Union is on track to reduce greenhouse gas emissions and has already exceeded its 20% reduction target by 2020. However, achieving a large-scale reduction in the EU by 2030 means that this downward trend has to continue and even intensify. It seems that the permanent reduction in greenhouse gas emissions should not be considered as being certain.

**Figure no. 3: Greenhouse gases emissions by country, absolute change 1990-2018 (million tonnes)**



Source: Eurostat, 2020a (<https://ec.europa.eu/eurostat/statistics-explained/pdfscache/9273.pdf>)

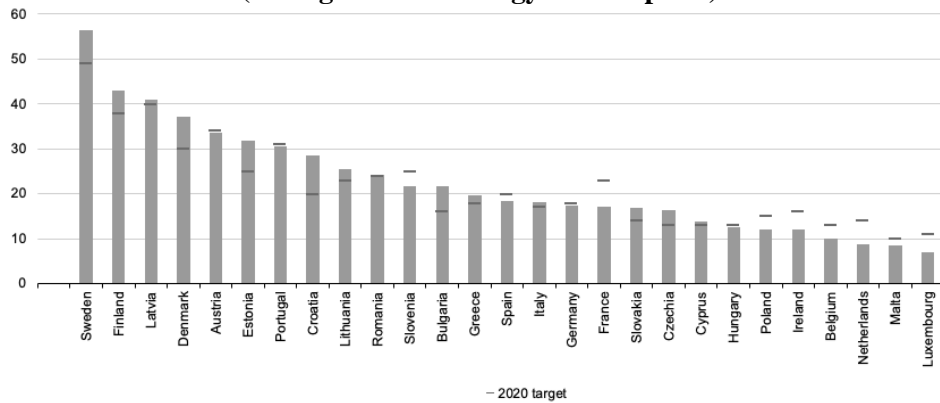
Approximately every five years, there are one to two years during which total greenhouse gases emissions increase slightly over the previous year. In addition, greenhouse gas emissions increased slightly in 2015, 2016 and 2017 compared to the previous year. Although the largest increase in 2015 was only 1.4%, greenhouse gases emissions must be significantly reduced to meet the 2030 and 2050 objectives. The difference between EU Member States in terms of the absolute change in greenhouse gas emissions is presented in figure no. 3, with an indication of the absolute change interval (Eurostat, 2020a).

## 2.2. Renewable energy sources

### 2.2.1. Energy from renewable energy sources in the gross final consumption

The European Union aimed a 20% share in its gross final consumption of renewable energy by 2020, this objective being distributed among the Member States with national action plans aimed at creating a path for the development of RES in each state. Figure no. 4 presents the latest available data on the share of RES in gross final consumption and the objectives for 2020. The share of RES in gross final energy consumption was 19.7% in the EU-27 in 2019 (latest year for which data are available), up from 9.6% in 2004 (Eurostat, 2020b).

**Figure no. 4: The share of energy from renewable sources and the 2020 objectives, (% of gross final energy consumption)**



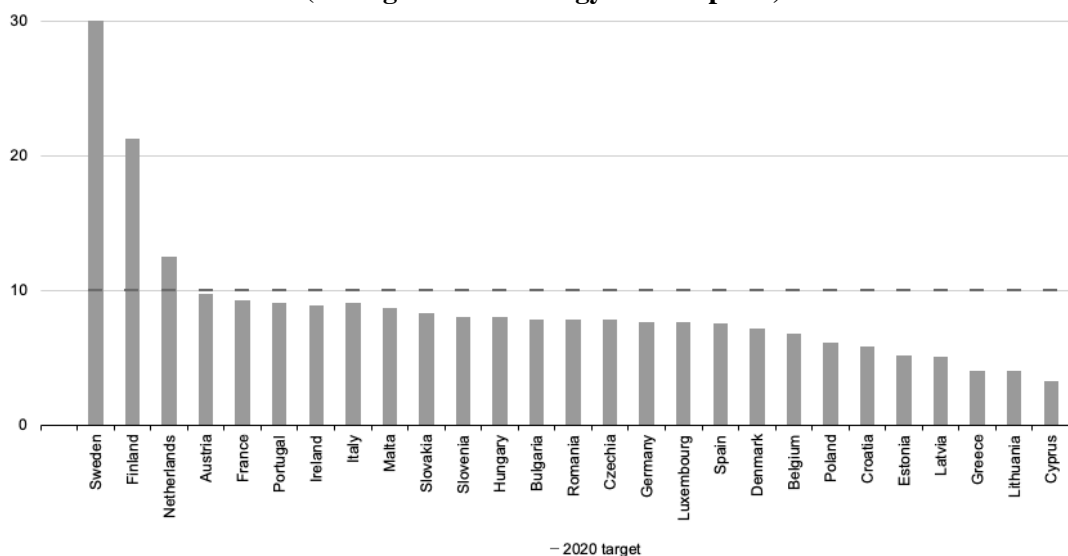
Source: Eurostat, 2020b ([https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Renewable\\_energy\\_statistics#Share\\_of\\_renewable\\_energy\\_more\\_than\\_doubled\\_between\\_2004\\_and\\_2019](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Renewable_energy_statistics#Share_of_renewable_energy_more_than_doubled_between_2004_and_2019))

Sweden had the highest share among EU member states in 2019 with 56.4%, ahead of Finland (43.1%), Latvia (41.0%), Denmark (37.2%) and Austria (33.6%). The lowest share of energy produced from renewable energy was recorded in Luxembourg (7.0%), Malta (8.5%), the Netherlands (8.8%) and Belgium (9.9%). In analyzing national targets, one may observe that 14 of the Member States exceeded their 2020 objectives. Six countries approached their objectives: Hungary, Austria and Portugal with 0.4 percentage points (p.p.) of their national objectives, Germany (0.6 pp), Malta (1.5 pp) and Spain (1.6 pp). On the contrary, France (5.8 pp), the Netherlands (5.2 pp), and Ireland and Luxembourg (4.0 pp each) are still very far from national targets.

### 2.2.2. Renewable energy in transport

The European Union set an overall objective of 10% for the share of RES (including liquid biofuels, hydrogen, biomethane, green electricity, etc.) used in transport by the end of 2020 (Eurostat, 2020b).

**Figure no. 5: The share of energy from renewable sources in transport, 2019 (% of gross final energy consumption)**



Source: Eurostat, 2020b ([https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Renewable\\_energy\\_statistics#Share\\_of\\_renewable\\_energy\\_more\\_than\\_doubled\\_between\\_2004\\_and\\_2019](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Renewable_energy_statistics#Share_of_renewable_energy_more_than_doubled_between_2004_and_2019))

As may be seen in figure no. 5, the average share of RES in transport raised from 1.6% in 2004 to 8.9% in 2019. Among the Member States, the share of RES in fuel consumption in transport varied from 30.3% in Sweden, 21.3% in Finland and 12.5% in the Netherlands to 4% or less in Greece and Lithuania (both 4.0% each) and Cyprus (3.3%). EFTA member Norway also reported a high share of RES in fuel consumption in transport (27.6%).

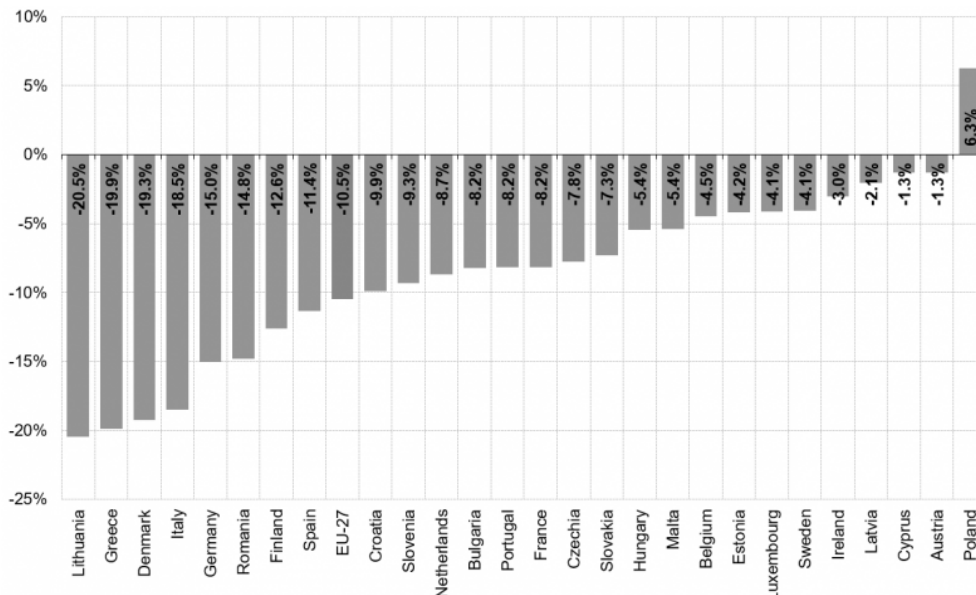
In 2019, 22 Member States saw a growth in the average share of RES in transport in comparison to 2018, with the largest growth recorded in Finland (+3.6 p.p.), Croatia (+3.3 p.p.), Netherlands (+2.9 p.p.) and Slovenia (+2.5 p.p.). Norway also showed significant growth (+6.1 p.p.).

### 2.3. Energy efficiency

The EU is committed to reducing energy consumption by 20% by 2020 from baseline projections. These projections indicated a primary energy consumption of 1,853 Mtoe and a final energy consumption of 1,357 Mtoe in 2020. Therefore, the EU is committed to reducing consumption by 20% compared to these projections, ie to have a primary energy consumption of no more than 1,483 million tonnes of oil equivalent and a final energy consumption of no more than 1,086 Mtoe in 2020. By 2030, the mandatory target is to reduce it at least by 32.5% compared to the baseline projections. This means that the primary energy consumption will not exceed 1273 Mtoe, and the final energy consumption will be up to 956 Mtoe in 2030. With the UK leaving, the Union's energy consumption figures for 2020 and 2030 should be adjusted to reflect the situation. Technical adaptation of the targets leads to primary energy consumption of no more than 1312 Mtoe in 2020 and 1128 Mtoe in 2030, and final energy consumption does not exceed 959 Mtoe in 2020 and 846 Mtoe in 2030 (Eurostat, 2021b).

The consumption of primary and final energy in the European Union reached its peak in 2006. Below we show the evolution from the highest to the most recent year for which data is currently available. In the period from 2006 to 2019, primary energy consumption increased only in Poland (6.3%). In the rest of the Member States, it decreased, with the largest decline recorded in Lithuania (-20.5%), Greece (-19.9%), Denmark (-19.3%), Italy (-18.5%), Germany (-15.0%), Romania (-14.8%), Finland (-12.6%), Spain (-11.4%), EU-27 (-10.5%), Croatia (-9.9%), Slovenia (-9.3%), Netherlands (-8.7%), Bulgaria (-8.2%), Portugal (-8.2%), France (-8.2%), Czechia (-7.8%), Slovakia (-7.3%), Hungary (-5.4%), Malta (-5.4%), Belgium (-4.5%), Estonia (-4.2%), Luxembourg (-4.1%), Sweden (-4.1%), Ireland (-3.0%), Latvia (-2.1%), Cyprus (-1.3%), Austria (-1.3%), and Poland (6.3%).

**Figure no. 6: Changes in primary energy consumption (% , 2006-2019)**

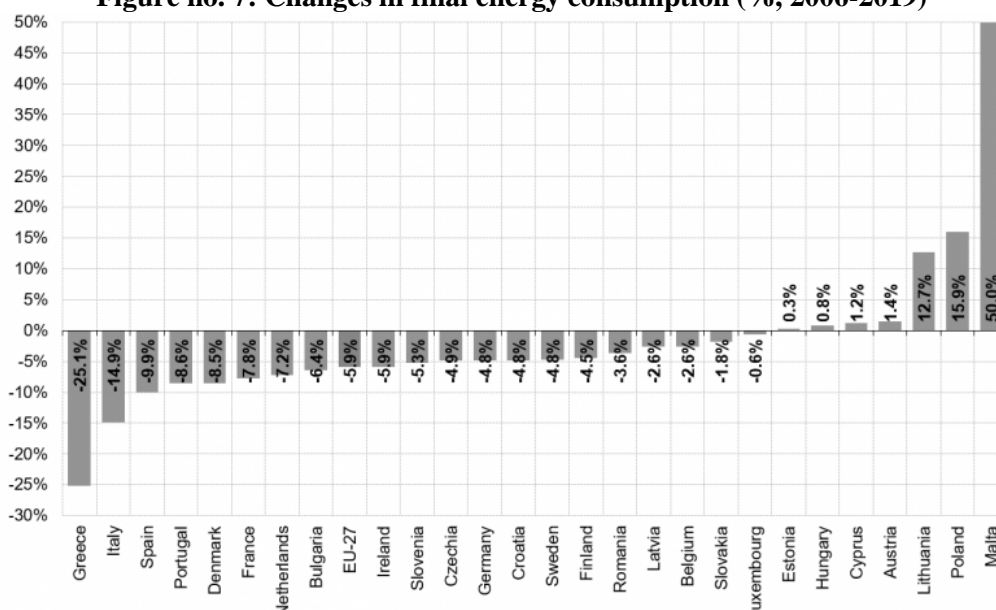


**Source:** Eurostat, 2021b (<https://ec.europa.eu/eurostat/statistics-explained/index.php?title>

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The final energy consumption has increased in seven Member States. The most important growth was observed in Malta (50.0%), Poland (15.9%) and Lithuania (12.7%), and the greatest decrease was observed in Greece (-25.1%), Italy (-14.9%), Spain (-9.9%).

**Figure no. 7: Changes in final energy consumption (% , 2006-2019)**



**Source:** Eurostat, 2021b (<https://ec.europa.eu/eurostat/statistics-explained/index.php?title>

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Diverging trends between primary and final energy consumption are often the result of fundamental changes in the energy system, in particular the shift from fossil fuel and nuclear power generation (low efficiency) to wind and solar photovoltaic power (100% efficiency, according to data). As an example, Lithuania closed a nuclear power plant, and in 2019 Lithuania imported more electricity or produced it directly from RES. The consequence of this is that there are practically no transformer losses in the production of electricity in Lithuania. In terms of final energy consumption, the trend reflects the actual consumption by the final users, excluding energy conversion losses. As an example, final consumption in Malta has increased significantly due to increased energy consumption by road transport, international aviation and the service sector (Eurostat, 2021b).

### 3. Conclusions

The European Union's main objective is to be the world leader in the climate change mitigation. Strategic objectives were set for 2020, 2030 and 2050 for greenhouse gas emissions, renewable energy and energy efficiency, involving investments and financial, technical and technological, management and policy implementation efforts.

The Renewable Energy Directive, together with proposals for the structure and management of the new electricity market, will create a regulatory framework that will give investor confidence and ensure a level playing field for all technologies without compromising climate and energy goals. The Clean Energy Package will also guide national support, setting a framework to promote a cost-effective and market-oriented approach. These principles include openness of cross-border support systems, non-retroactivity, and long-term visibility of support.

The Commission proposes a solid governance of the Energy Union to ensure that the objectives of the Energy Union Strategy are met in all five dimensions, in particular the energy and climate targets for 2030. A partnership has been set up with Member States to monitor progress towards the 2030 target. This system of governance leads to a regular surveillance process, in which the Commission assesses the national energy and climate plans to be drawn up by the Member States. If the Commission finds that there are shortcomings, in particular as regards renewable energy and energy efficiency, it may propose the necessary measures to avoid and fill any such emerging shortcomings.

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