

Article

Sustainable Development in EU Countries in the Framework of the Europe 2020 Strategy

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Abstract: The Europe 2020 Strategy was proposed with a long-term vision to ensure prosperity, development, and competitiveness for the member countries. This strategy is divided into three main areas named “growth”. One of these is sustainable growth. This is an area of sustainability, where the partial targets are referred to as the “20-20-20 approach”, and includes a reduction of greenhouse gas emissions, an increase in energy efficiency, and the sharing of renewable energy sources. However, questions arise, including: How do member states meet these targets? Which countries are leaders in this area? According to these stated questions, the aim of this article is to assess how EU countries are meeting the set targets for sustainable growth resulting from the Europe 2020 strategy and to identify the countries with the best results in this area. We looked for answers to these questions in the analysis of sustainable indicators, which were transformed into a synthetic measure for comparability of the resulting values. Finally, we identified the Baltic states, Nordic countries (European Union members), Romania, and Croatia as the best countries in fulfilling the sustainable growth aims. As sustainable development and resource efficiency are crucial areas for the future, it is important to consider these issues.

Keywords: Europe 2020; sustainable growth; resource efficiency; sustainable development



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1. Introduction

The Lisbon Strategy was launched in Lisbon in March 2000, formulated and agreed to by the heads of state and governments of all European Union (EU) member states. It is a 10-year strategy with an ambitious goal of growth and jobs, at the end of which Europe would become the world's most dynamically knowledge-based economy capable of sustainable growth and able to compete worldwide [1,2]. In 2005, due to the unsatisfactory results of the previous period, this strategy was renamed and innovated as the Growth and Jobs Strategy, or the renewed Lisbon Strategy. This strategy enables the weakest countries to catch up with the living standards of the most developed countries in the EU. Only through rapid and long-term economic growth can such a goal be achieved [3].

The main problems leading to failure included many set goals and insufficient focus on them, the inconsistent pursuit of these goals, the reluctance of some states to meet these goals (as, in some cases, they required unpopular measures), and the fact that not all goals suited all countries, as each country has its own level of economy and reformation. The strategy was better fulfilled by states that already had reforms in place within their country [4]. A major problem that created significant regional disparities at the national level was the ability to adopt new technologies.

This problem is especially true for the new EU member states and lagging regions. The creation of regional disparities hampers the development of the EU as a whole; therefore, it is important to set up the system in such a way that it mainly supports the development of the new EU member states. The ability to adopt new technologies is followed by policies such as science, research, and innovation policies. There is a real concern that more

developed regions, which have better and quantitatively more room to adapt to change, will benefit from the promotion of innovation, the knowledge economy, and electronics.

While less developed countries are devoting resources to attracting investment in new technologies, developed countries will move forward, thus widening the regional disparities. Unfortunately, European policies do not address the specific problems of lagging regions or the possible effects of increasing or decreasing regional disparities [5]. “Following the more or less unsuccessful completion of the Lisbon Strategy, the EU adopted a new strategy in 2010 that aims to improve the European competitiveness of the Union and its Member States” [6].

The new strategy, called the Europe 2020 Strategy, aims to eliminate disparities between member countries. Much research is dedicated to this area and evaluates the achieved results of countries based on individual indicators, such as [1,7–12]. The Europe 2020 Strategy contains several areas for which objectives are specified for improving the current situation in EU member states. But only a few studies, e.g., [13–17], are dedicated to the field of sustainable growth. Therefore, we are interested in how individual countries are meeting their goals in this very specific area, which is linked to many areas of economics and human life. So, our goal is to assess how each country is achieving its goals as the 10-year period is slowly coming to an end and the results should be clear.

In the field of sustainability, the Europe 2020 Strategy has specified an area called 20-20-20, which sets out the priorities and goals that EU countries have to meet by 2020 [18]. They are:

- To increase the share of renewable energy sources in final energy consumption to 20%,
- To reduce greenhouse gas emissions by at least 20% compared to 1990 levels, and
- A 20% increase in energy efficiency, associated with a reduction in energy consumption.

2. Literature Review

The current reform agenda, focusing mainly on growth and jobs, is the Europe 2020 Strategy [9]. This global policy strategy, proposed with a long-term vision, was proposed by the European Commission and subsequently endorsed by the European Council in June 2010. The year 2010 was a new beginning for the European Union. Following the previous Lisbon Strategy and the consequences of the economic crisis, Europe wanted to emerge from this crisis, both financially and economically stronger. This is why the European Union decided to launch a new Europe 2020 Strategy, the main aim of which was to build a highly innovative and competitive economy throughout the EU. The Europe 2020 Strategy was launched by the European Commission as a 10-year plan, the short-term priority of which was to emerge from the crisis and, at the same time, achieve a sustainable future with an ever-evolving world economy. In designing the Europe 2020 Strategy, the lessons learned from the implementation of the Lisbon Strategy were taken into account, inspired by its strengths but also by its weaknesses [7].

This strategy aimed to help Europe recover from the economic crisis and transform it into a smart, sustainable, and inclusive economy with high levels of employment, productivity, and social cohesion, and to re-strengthen the EU's position as a major player in global governance [10]. Sustainable growth consists of efforts to improve countries in the areas of renewable energy, CO₂ emissions and energy consumption [8]. The basic goal of the strategy was to increase the sustainable, inclusive, and smart growth of the European Union; therefore, the European Commission proposed to set five measurable and ambitious goals, which have gradually become national goals, in the following areas: employment, research and innovation, climate change and energy, education, and poverty and social exclusion.

Sustainable growth is made up of three main objectives, as mentioned above. One is to increase the share of renewable energy sources in final energy consumption to 20%. To achieve this goal, certain underlying issues in related areas need to be taken into account, such as objectives in transport, temperature, and electricity regulation; energy policy measures to combine different types of renewable technologies; and the use of

business mechanisms to promote joint support schemes and joint projects between member states [19].

According to Gogkoz and Guvercin [20], geographical mismatches between the main centers of energy production and consumption lead to higher vulnerability of the energy exporting and importing countries to various risks. Wars, political tensions, and technical failures can reduce energy supplies. In this respect, renewable energy is the key to ensuring energy security. Renewable energy is typically provided by local natural resources, which are constantly replenished and environmentally friendly. As a result, renewable energy is available for each region and can take into account its geographical and natural specifics and use them in this area.

Renewable energy sources can be divided into two groups, namely common and emerging energy technologies. Common energy technologies include hydro and wind energy, solar energy, biomass, biofuels, and geothermal energy. The group of emerging energy technologies includes marine energy, concentrated solar photovoltaics, improved geothermal energy, cellulose ethanol, and artificial photosynthesis [21]. In order for renewables to be sustainable, they should be unlimited; however, at the same time it is good to keep in mind that they should not harm the environment. Another typical attribute of renewable energy sources is the price, and so this energy should be cheap in the long run.

Global warming is one of the most significant changes in the world today. Global warming is caused by the increased concentration of greenhouse gases in the atmosphere and leads to a phenomenon commonly known as the "greenhouse effect" [22]. Anthropogenic greenhouse gas emissions disrupt the radioactive balance of the atmosphere, resulting in a change in climatic patterns. Carbon dioxide (CO₂) emissions produce changes that are visible in the natural environment, e.g., they change the alternation and course of individual seasons, and they disrupt the habitats of marine ecosystems.

In addition, we can see the effects of increasing CO₂ emissions on the climate, even with the increase and yield of rainfall. Current policies in this area aim to reduce extreme weather events, and thus avoid the danger of climate change. As climate change caused by carbon dioxide has been predicted to be irreversible for approximately 1000 years, efforts are being made to reduce the concentration of these emissions in the atmosphere [23]. Many countries are taking action against climate change. There are currently approximately 1800 laws and regulations in the world addressing the need to protect the environment. No country in the world does not have at least one law on environmental protection [24]. The Europe 2020 Strategy sets out the priority of reducing greenhouse gas emissions by at least 20% compared to 1990 levels.

Several authors have stated that climate change is occurring with increasing energy consumption. Energy-related activities are the main source of greenhouse gas emissions [25]. Studies have confirmed that two-thirds of greenhouse gases generally come from fossil-energy-related greenhouse gas emissions, and that these emissions are on the rise. Therefore, the first step in reducing greenhouse gas emissions is to reduce energy consumption or increase energy efficiency [26,27]. Various types of primary energy include oil, coal, gas, hydropower, and other renewable energy sources [28].

The authors Bekun, Alola, and Sarkodie [29] suggested an interrelationship between carbon dioxide emissions, economic growth, natural resource rent, renewable energy, and non-renewable energy consumption. The links between these individual elements can be seen in Figure 1. The authors stated that the consumption of non-renewable energy and economic growth increased carbon emissions, while the consumption of energy from renewable sources decreased. Positive effects can be deduced from ecological energy sources, especially considering the goals of sustainable development.

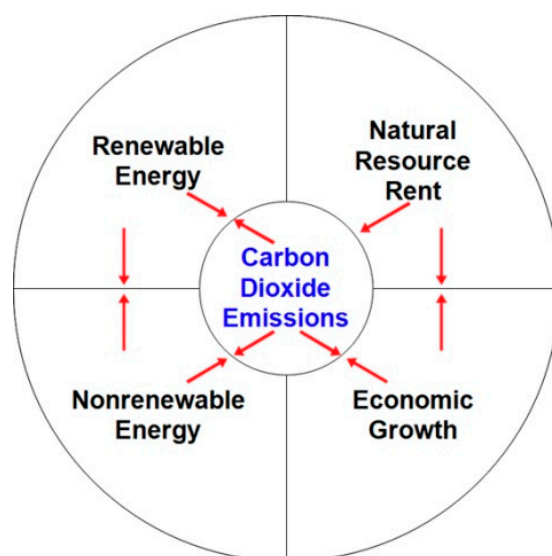


Figure 1. Factors influencing carbon dioxide emissions [29].

Addressing climate and environmental issues is a crucial challenge today with a vision for the years to come. This will be a challenging period that requires interventions in the functioning of an energy self-sufficiency economy. These changes affect all sectors. At the same time, this offers an opportunity to modernize and streamline the economy [18]. The Europe 2020 Strategy is a strategy for smart, sustainable, and inclusive growth that distinguishes the following major factors that contribute to the strengthening of the economy [30,31]. Sustainable growth represents the promotion of a more resource-efficient, greener, and more competitive economy. The specific objectives of this strategy in the area of sustainability are to reduce greenhouse gas emissions by at least 20% compared to 1990 levels; increase the share of renewable energy sources in final energy consumption to 20%; and increase energy efficiency by 20% [18].

The EU's strategic document Europe 2030 follows Europe 2020 for the next decade. According to the nature of the 2030 Agenda issued by the European Commission, creativity and innovation in particular are considered to be key elements of development. They are the driving forces behind the personal, social, and economic development of Europe. The terms "creative solutions" and "innovative practices" are considered to be catalysts for the growth and prosperity of the regions of the European Union.

Agenda 2030 is a plan designed to ensure prosperity for the people of the EU. In today's world of many economic, political, and social challenges, the program supports world peace and also helps to eradicate poverty in all its forms. Poverty is one of the biggest challenges in the world today. Agenda 2030 can be described as a comprehensive approach that fills a gap with a multilateral approach, and is also an important frame of reference for the protection of values, nature, humanity, and human rights. In the current context of Agenda 2030, indicators to monitor the achievement of the sustainable development goals are becoming essential [32].

Innovation is needed to achieve the goals of sustainable development. Green knowledge management processes have a special role to play in sustainable development, especially in the field of the creation, acquisition, exchange, and use of knowledge, as well as its impact on green technologies, eco-innovation, and the socio-economic dimension of sustainable development [30]. Over the last 15 years, the field of sustainability has aroused interest among many authors. Many sustainability concepts are based on the three pillars, namely, environmental, economic, and social [33]. Many authors have different approaches with defining the terms of sustainable development. Jabareen [34] stated that the definitions of sustainable development are vague and that there is a lack operative definition of this term. Daly [35] pointed out the utility for future generations. Development might be better defined as utility per throughput of GDP growth. We can find the ethical concept of this

term in the work of Ebner and Baumgartner [36]. Sustainable development is explained as a balance between the pillars of sustainable development, which are the environmental, social, and economic pillars; however, some authors also add a fourth cultural pillar, or a pillar of good governance [37].

To ensure the benefits of sustainable growth, the entire world economy must grow. This is mainly due to the fact that if rich countries do not grow rapidly, they will not have a surplus to invest in poor countries, nor any additional income that can be used to buy exports from poor countries [35].

Every economy that wants to be successful and competitive must pay attention to its performance. The country's competitive position in a sustainable environment is a key element. Competitiveness in today's world is an important aspect of every country. In the case of long-term periods, it is important to build a sustainable economy. Based on this, we set out the main aim of the article as follows: to assess how EU countries are meeting the set targets for sustainable growth resulting from the Europe 2020 Strategy and to identify the countries with the best results in this area.

3. Materials and Methods

The sustainability of the overall development of the EU community is emphasized by the Europe 2020 Strategy. This strategy has set priorities and targets that EU countries are scheduled to meet by 2020. One of them is sustainable growth. This is a summary term for three targets, named 20-20-20 [18].

We divided these goals into two groups according to the nature of their consequences, where the first group is formed by the stimulating factor (share of renewable energy) and the second group is formed by non-stimulating factors (the remaining two goals).

As a sample of countries, we chose the countries forming the EU. The selection was also conditioned by the commitment of the EU member states to the Europe 2020 Strategy. The current contribution also includes the United Kingdom within the EU, as we evaluated a period of 14 years, i.e., from 2005 to 2018. During this period the UK was a full member of the EU and had the resulting obligations.

Methods of multicriteria analysis originated in the 1960s. They were used as a decision tool. Today, these methods are becoming more popular [38]. Multicriteria analysis provides a systematic approach to combining different information inputs to rank project alternatives. It is also used to quantify decision makers to compare alternatives. There are many approaches that fall under the multicriterial decision analysis, each of which includes different structures for their representation, algorithms for their combination, and processes for interpretation [14,39].

We have a set of data related to our research problem. We analyzed data on Europe 2020 indicators from the field of climate change and energy. For the needs of our analyses, we worked with this data: share of renewable energy [40], greenhouse gas emissions [41], and primary energy consumption [42]. This data was obtained mainly from Eurostat databases. In the first step, we ordered the data into a matrix, where we have m values in n objects [43–45].

$$X = \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1m} \\ x_{21} & x_{22} & \dots & x_{2m} \\ \dots & \dots & \dots & \dots \\ x_{n1} & x_{n2} & \dots & x_{nm} \end{bmatrix} \quad (1)$$

The indicators represent the different units; therefore, it is a problem to compare them in various units, and they should be normalized into standardized values (SV). We chose different formulas for stimulating and non-stimulating factors [46], which take into account their specificities.

$$SV_{ij} = \frac{x_{ij} - \min\{x_{ij}\}}{\max\{x_{ij}\} - \min\{x_{ij}\}} \text{ for stimulating factors} \quad (2)$$

$$SV_{ij} = \frac{\max\{x_{ij}\} - x_{ij}}{\max\{x_{ij}\} - \min\{x_{ij}\}} \text{ for non-stimulating factors} \quad (3)$$

where SV_{ij} represents the standardized value of x_{ij} ; x_{ij} represents the actual value of the i th value in j th country; and max and min refer to the maximum and minimum value [47].

The evaluation and comparison of various indicators respecting countries to each other is an important issue in recent years [48]. Regions are compared according to several criteria to determine the most successful one. This topic will continue to be an important challenge for the coming years. In this context, the calculation of the synthetic measure is one of the offered options. The advantage is that this is one of the most recognized alternatives, because the output is very simple and clear [49,50] and ultimately supports the comparability of the examined objects. This index is based on the taxonomic distances of a chosen indicator from the best object, where the best object has the highest parameters according to the character of the indicator [51,52].

The aim of the research of the synthetic measure is to measure complex groups of variables [53] that are determined to describe the state from several perspectives [54]. This method has recently gained popularity, especially in applied sciences such as economics. Synthetic measures use a statistical methodology equipped with the necessary mathematical formalization to define a synthetic measure from a group of ordinal and dichotomous variables [49].

Based on the above knowledge of the benefits of this approach, we also decided to use this synthetic measure for our research. The construction of the synthetic measure (SM) was as follows:

$$SM_i = \frac{1}{m} \sum_{j=1}^m SV_{ij} \quad (4)$$

Finally, the results of the synthetic measure are comparable and complex, because they create a picture of the country on the basis of a summary of several facts or indicators. They represent the summary data of the country in a given year.

According to obtained values in the synthetic measure, the four groups were created. The individual groups were formed with respect to the methodology used by Stec and Grzebyk [46]. They analyzed, in their study, the fulfillment of all five fundamental objectives of the Europe 2020 Strategy in a period of six years, specifically 2009–2014. Molina, Fernández, and Martín [55] divided the countries into three groups, according to results of their synthetic measure. However, we determined that a four-group division was more effective. It contains several groups that can take into account the fine specifics in the obtained results, and thus more accurately divide the analyzed countries. Based on Stec and Grzebyk [46], the groups are as follows:

$$\text{Group I: } \mathbf{SM} \geq \text{oSM} + \text{STD} \quad (5)$$

$$\text{Group II: } \text{oSM} + \text{STD} > \mathbf{SM} \geq \text{oSM} \quad (6)$$

$$\text{Group III: } \text{oSM} > \mathbf{SM} \geq \text{oSM} - \text{STD} \quad (7)$$

$$\text{Group IV: } \text{oSM} - \text{STD} > \mathbf{SM} \quad (8)$$

where \mathbf{SM} is the synthetic measure obtained by countries, oSM is the overall synthetic measure, and STD is the standard deviation.

The clarity, ease of processing, and classification of the results, and thus the countries, and last but not least the use in research similar to ours, have convinced us to use this approach rather than a cluster analysis. We also did not use cluster analysis due to its negatives, which are mentioned by several authors, such as indistinctness, measurability [56], a large diversity of clustering algorithms [57,58], and the fact that clustering always provides groups, even if there is no group structure [59]. When using clusters, groups are assumed to exist. But it is this assumption that may be wrong or weak. Now, we will analyze the development of countries based on sustainable growth indicators. In con-

clusion, based on the recalculations and synthesis of the obtained data into a synthetic measure, we shall evaluate how the countries have done in this area. Finally, we identify the countries that are the strongest EU economies in this area and investigate how their positions have changed over time.

The share of renewable energy is a stimulating factor. It is desirable for EU countries to obtain the highest values in this indicator. In the table below (Table 1) [40], the highlighted values in bold and italics represent the status in which the countries have met the target. There are, of course, differences between countries in the target values. The lowest target value was set in Luxembourg, in the amount of 11%, and the highest was in Sweden, at about 49%. If we average the target values of the individual countries, we have 21%, which is slightly above the level of the set target of this indicator in the Europe 2020 Strategy. We can see that certain countries obtained the target value only in the last years (Greece, Cyprus, and Latvia). Croatia was the only country that obtained the target values in the whole analyzed period. The target value for this country was 20%. The remaining countries that met the target values did so mostly in the period 2011–2018.

Table 1. Share of renewable energy in gross final energy consumption.

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
BG	9.173	9.415	9.098	10.345	12.005	13.927	14.152	15.837	18.898	18.5	18.261	18.76	18.701	20.592
CZ	7.115	7.363	7.895	8.674	9.978	10.514	10.945	12.813	13.926	15.073	15.067	14.924	14.796	15.138
DK	15.956	16.334	17.748	18.544	19.949	21.889	23.39	25.466	27.174	29.323	30.866	32.052	34.677	35.413
EE	17.429	15.972	17.056	18.672	22.941	24.599	25.347	25.521	25.321	26.141	28.528	28.715	29.168	29.993
EL	7.277	7.458	8.249	8.183	8.731	10.077	11.153	13.741	15.326	15.683	15.69	15.39	17.3	18.051
HR	23.691	22.668	22.161	21.986	23.596	25.103	25.389	26.757	28.4	27.817	28.969	28.267	27.28	28.047
IT	7.549	8.328	9.807	11.492	12.775	13.023	12.881	15.441	16.741	17.082	17.525	17.415	18.267	17.775
CY	3.131	3.263	4.004	5.134	5.925	6.173	6.261	7.137	8.456	9.172	9.929	9.859	10.503	13.898
LV	32.264	31.141	29.615	29.811	34.317	30.375	33.478	35.709	37.037	38.629	37.538	37.138	39.019	40.029
LT	16.77	16.889	16.482	17.825	19.798	19.64	19.944	21.438	22.69	23.594	25.75	25.613	26.039	24.695
HU	6.931	7.433	8.575	8.564	11.673	12.742	13.972	15.53	16.205	14.618	14.495	14.377	13.543	12.535
RO	17.571	17.096	18.195	20.204	22.157	22.834	21.186	22.825	23.886	24.845	24.785	25.032	24.454	23.875
FI	28.814	30.043	29.561	31.235	31.198	32.294	32.664	34.341	36.728	38.78	39.321	39.013	40.917	41.16
SE	40.265	42.04	43.551	44.288	47.476	46.595	48.135	50.027	50.792	51.817	52.947	53.328	54.157	54.651
BE	2.332	2.633	3.101	3.59	4.715	6.002	6.275	7.088	7.65	8.043	8.026	8.752	9.113	9.478
DE	7.167	8.466	10.039	10.072	10.851	11.667	12.453	13.543	13.76	14.385	14.906	14.889	15.476	16.673
IE	2.822	3.073	3.519	3.992	5.246	5.781	6.57	7.006	7.582	8.568	9.044	9.165	10.465	10.888
ES	8.442	9.155	9.669	10.749	12.978	13.831	13.247	14.314	15.347	16.156	16.259	17.423	17.563	17.454
FR	9.599	9.337	10.242	11.189	12.216	12.672	10.858	13.274	13.908	14.422	14.861	15.501	15.904	16.444
LU	1.402	1.469	2.725	2.809	2.929	2.85	2.856	3.114	3.499	4.469	4.987	5.361	6.198	8.973
MT	0.123	0.149	0.177	0.195	0.221	0.979	1.85	2.862	3.76	4.744	5.119	6.208	7.219	7.968
NL	2.478	2.778	3.298	3.596	4.266	3.917	4.524	4.659	4.691	5.415	5.668	5.802	6.456	7.34
AT	24.355	26.277	28.145	28.79	31.041	31.207	31.553	32.736	32.666	33.553	33.502	33.374	33.141	33.806
PL	6.9	6.888	6.93	7.711	8.699	9.3	10.354	10.97	11.463	11.614	11.888	11.4	11.117	11.477
PT	19.526	20.794	21.914	22.934	24.411	24.155	24.607	24.578	25.703	29.511	30.518	30.868	30.614	30.206
SI	19.773	18.369	19.615	18.569	20.661	20.95	20.773	21.304	22.855	22.125	22.428	21.454	21.105	20.912
SK	6.36	6.584	7.766	7.723	9.368	9.099	10.348	10.453	10.133	11.713	12.882	12.029	11.465	11.896
UK	1.281	1.488	1.734	2.814	3.448	3.862	4.392	4.461	5.524	6.737	8.385	9.032	9.858	11.138

Where BG—Bulgaria, CZ—Czech Republic, DK—Denmark, EE—Estonia, EL—Greece, HR—Croatia, IT—Italy, CY—Cyprus, LV—Latvia, LT—Lithuania, HU—Hungary, RO—Romania, FI—Finland, SE—Sweden, BE—Belgium, DE—Germany, IE—Ireland, ES—Spain, FR—France, LU—Luxembourg, MT—Malta, NL—Netherlands, AT—Austria, PL—Poland, PT—Portugal, SI—Slovenia, SK—Slovakia, UK—United Kingdom.

Now, we focus on the situation in the EU. Data regarding greenhouse gas emissions [41] are presented in Table 2. Highlighted values in bold and italics represent the status in which the countries have met the target. In the case of this factor, all EU member states set the same value. It is highly desirable for each EU country to reduce greenhouse gas emissions by 20% to 80% compared to 1990. This aim is equal for all countries. Compared to the development of the previous indicator, we can see that the countries have been meeting this target for several years. There were no exceptions for countries reaching the required value in the whole monitored period. We can see this fact in Bulgaria, Czech Republic, Estonia, Latvia, Lithuania, Romania, and Slovakia. Even large economies, such as Germany, the UK, and Sweden have met the required values of the indicator for several years.

Table 2. Greenhouse gas emissions, base year 1990.

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
BE	100.19	98.38	96.17	96.33	87.61	92.63	85.76	83.61	83.48	79.77	82.81	81.96	82.14	82.67
BG	63.1	63.63	67.42	66.12	57.18	59.74	64.88	59.93	54.78	57.74	60.93	58.52	60.88	57.16
CZ	75.13	75.76	76.68	74.28	69.75	71.07	70.28	68.14	65.46	64.41	65.13	66.06	65.56	64.82
DK	95.48	106.07	99.77	94.84	90.58	90.89	83.78	77.52	79.88	74.35	70.66	73.74	70.67	70.69
DE	80.56	81.24	79.2	79.44	74.05	76.64	74.73	75.25	76.68	73.49	73.8	74.17	73.22	70.44
EE	47.42	45.67	54.98	49.72	41.18	52.3	52.48	49.89	54.46	52.5	45.22	48.98	52.26	49.98
HR	93.22	94.41	98.85	96.19	88.77	87.51	86.55	80.99	76.7	74.34	75.62	76.15	78.71	75.23
LV	43.7	45.6	47.48	45.89	43.38	47.6	44.62	43.97	43.76	43.26	43.41	43.55	43.94	45.95
LT	47.38	48.03	52.63	50.82	41.68	43.44	44.67	44.59	42.09	42.02	42.64	42.77	43.24	42.64
HU	80.69	79.38	77.63	75.56	69.04	69.43	67.72	63.62	60.64	61.33	64.95	65.48	68.25	67.82
RO	61	61.33	62.32	60.42	51.64	50.11	52.03	50.66	46.83	46.96	47.08	46.29	47.39	46.84
SK	69.87	69.76	67.4	68.13	62.24	63.25	62.3	58.85	58.39	55.6	57.04	57.72	59.31	59.16
FI	98.59	114.53	112.53	101.51	96.18	107.11	96.8	89.12	89.8	84.01	79.06	83.16	79.59	81.41
SE	94.55	94.13	92.85	89.94	83.56	91.82	86.07	82.01	79.79	77.4	77.11	76.99	76.52	75.28
UK	89.73	88.89	87.38	84.8	77.67	79.33	73.68	75.63	73.97	69.03	66.9	63.76	62.7	61.59
IE	127.69	126.82	125.74	124.38	113.15	112.47	104.76	105.23	105.41	105.34	109.56	113.34	113.29	113.6
EL	131.44	127.92	130.56	127.41	120.39	114.48	111.82	108.44	99.42	96.53	92.98	89.74	93.62	90.84
ES	154.68	152.43	156.4	144.77	130.96	126.21	126.38	123.77	114.87	115.77	119.83	116.51	121.49	119.74
FR	102.48	100.44	98.67	97.32	93.64	94.78	89.76	89.78	89.96	84.41	85.28	85.44	86.35	83.1
IT	114.36	112.59	111.37	108.88	98.19	100.44	98.12	94.43	87.63	83.71	86.3	85.8	85.05	84.41
CY	159.6	162.99	168.15	171	166.42	161.52	156.65	147.73	135.68	141.56	142.01	151	155.75	153.81
LU	108.82	106.9	103.13	102.29	97.71	102.38	100.82	98.04	93.98	91.21	88.67	87.98	90.88	94.16
MT	117.04	119.32	123.35	121.73	114.59	118.84	119.43	126.67	115.91	118	94.18	83.84	93.45	96.14
NL	99.72	97.55	96.93	96.71	93.84	99	92.95	91.04	90.96	87.73	91.63	91.57	90.78	88.58
AT	118.92	116	112.78	112.05	103.39	109.19	106.41	102.82	103.25	98.68	101.6	103.05	106.17	102.66
PL	85.21	88.49	88.45	87.17	83.13	87.1	86.9	85.35	84.64	82.02	82.73	84.56	87.7	87.42
PT	146.22	138.51	134.95	131.1	125.57	118.96	116.78	113.69	110.69	110.82	118.01	115.32	123.78	118.9
SI	109.96	110.92	111.92	115.86	105.09	105.2	105.23	102.21	98.51	89.22	90.18	94.69	93.47	94.35

In Table 3, the highlighted values in bold and italics represent the status in which the countries have met the target. It is desirable for all EU countries to reduce their consumption [42]. In percentage terms compared to 2005, the average values should decrease

to 80%. In Table 3, there are set data in million tonnes of oil equivalent. Three countries, namely, Estonia, Croatia, and Latvia, met the specified values during the whole monitored period. The Czech Republic, Denmark, Cyprus, Malta, Austria, Sweden, and the UK met the specified values only in one or two years. The remaining countries managed to reach the target in recent years. The Europe 2020 Strategy has set target values to be met by 2020. Therefore, it is very desirable to identify the countries that in recent years have grown closer to meeting the specified values. Almost all achieved values in EU countries had a declining trend. If we look at the aggregate values of the indicators for all 28 countries, the values already achieved in 2018 were close to the set target amount.

Table 3. Primary energy consumption in million tonnes of oil equivalent.

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
CZ	42.51	43.49	43.65	42.5	40.14	42.66	41.03	40.59	40.94	39.16	39.74	40.04	40.35	40.39
DK	19.45	20.84	20.37	19.91	18.91	20.2	18.52	17.82	17.84	16.93	16.92	17.57	17.85	17.96
EE	5.5	4.93	5.54	5.37	4.74	5.58	5.6	5.42	5.98	5.7	5.33	5.9	5.65	6.17
IE	14.95	15.12	15.98	15.65	14.9	14.7	13.53	13.7	13.8	13.24	13.92	14.61	14.39	14.54
EL	30.17	30.14	30.18	30.35	29.32	27.11	26.55	26.39	23.28	23.14	23.23	22.9	23.12	22.42
ES	136.56	136.74	139.35	134.44	123.38	123.34	122.98	123.41	116.06	114.2	118.6	119.29	125.79	124.63
HR	9.14	9.11	9.44	9.2	8.95	8.86	8.65	8.18	8	7.6	7.96	8.5	8.33	8.18
IT	180.83	178.95	178.67	176.12	164.08	167.28	162	156.56	152.05	142.66	149.12	147.97	148.95	147.24
CY	2.48	2.57	2.7	2.85	2.77	2.68	2.65	2.5	2.18	2.22	2.28	2.43	2.53	2.55
LV	4.49	4.66	4.77	4.58	4.43	4.56	4.28	4.44	4.36	4.36	4.27	4.29	4.47	4.69
LT	8.5	7.89	8.1	8.26	7.82	6.17	5.91	5.98	5.8	5.75	5.79	6.4	6.16	6.33
LU	4.77	4.69	4.61	4.61	4.34	4.61	4.53	4.42	4.3	4.19	4.14	4.15	4.29	4.46
HU	26.35	25.99	25.39	25.16	23.95	24.62	24.39	23.13	22.41	21.99	23.3	23.74	24.5	24.49
MT	0.92	0.92	0.95	0.96	0.88	0.93	0.93	0.97	0.87	0.88	0.75	0.71	0.81	0.82
AT	32.71	32.62	32.18	32.47	30.64	32.86	31.97	31.64	32.11	30.8	31.62	31.9	32.81	31.8
PL	87.96	92.35	91.9	93.09	89.53	96.56	96.55	93.1	93.53	89.49	90.06	94.83	99.16	101.06
PT	24.85	24.4	23.85	23.59	23.62	22.64	22	21.4	21.3	20.68	21.64	21.76	22.82	22.64
RO	36.01	37.53	37.44	37.32	32.66	32.97	33.55	33.26	30.41	30.5	30.73	30.62	32.37	32.48
SI	7.1	7.2	7.3	7.49	6.8	7	7.8	6.81	6.63	6.37	6.32	6.54	6.73	6.67
SK	17.41	17.24	16.43	16.98	15.52	16.66	15.97	15.59	15.69	14.83	15.22	15.37	16.15	15.79
FI	33.56	36.67	36.03	34.57	32.39	35.5	34.25	33.02	32.04	32.7	31.15	32.43	32.09	32.99
SE	49.26	47.96	47.65	47.49	43.33	48.59	47.62	47.59	46.44	46.03	44.32	45.41	46.45	46.78
UK	223.48	220.41	214.5	211.8	195.99	205.09	190.09	195.15	191.63	180.72	183.11	179.01	176.87	176.27
BE	51.56	51.41	50.32	51.13	50.47	54.14	50.52	47.78	49.34	45.7	46.06	49.18	49.09	46.84
BG	19.22	19.85	19.51	19.02	16.91	17.4	18.57	17.84	16.51	17.27	17.96	17.68	18.34	18.36
DE	321.62	332.75	315.79	320.76	299.92	315.15	297.8	301.12	308.29	293.6	295.93	297.63	298.12	291.75
FR	260.92	256.17	252.66	255.39	246.32	254.45	249.19	249.15	250.37	239.77	244.4	240.11	239.15	238.91
NL	70.11	69.52	69.37	69.88	67.63	71.72	67.05	66.75	66.21	62.32	63.74	64.77	65.08	64.71

4. Results and Discussion

4.1. Evaluation of the Performance of EU Countries in the Context of Sustainable Indicators

The share of renewable energy is a stimulating factor. Renewable energy sources are currently unevenly and insufficiently exploited in the European Union [60]. Energy is crucial for economic progress. The current growth of the world's population requires more

energy. The transition to renewable energy produced from renewable natural sources is an opportunity to meet growing demand, promote energy security, and contribute to tackling global warming and climate change [21].

It is desirable for all countries to obtain the highest values of this indicator. The target for all EU countries is to reach 20%. In addition to this goal, all member states have set their own specific goal in this area. The aim is higher than the overall set value of 20%, in the case of 10 countries.

Overall, we can say that the values of the share of renewable energy in gross final energy consumption are increasing every year. This is true in the case of countries that already meet the set values and in the case of countries that still lack a few percentage points to reach them. If we examine the average values for all EU countries, there is also an increase in the shares of renewable energy in gross final energy consumption. In the last analyzed year, the value of the EU average was over 18%, which is close to the set target value of 20%.

Many scientists assume that increasing the share of renewable energy will lead to a reduction of CO₂ emissions [61]. The current situation in the area of greenhouse gas emissions is as follows. The six largest producers of greenhouse gases in the world together account for 62% of total production. These are China (26%), the United States (13%), the European Union (about 9%), India (7%), the Russian Federation (5%), and Japan (almost 3%). Three of them showed a decrease in greenhouse gas emissions in 2019, namely the European Union (−3.0%), the USA (−1.7%), and Japan (−1.6%) [62].

In the case of this factor, all EU member states set the same value. It is highly desirable for each EU country to reduce greenhouse gas emissions by 20%. This aim is equal for all countries. Compared to the development of the previous indicator, we can see in Table 2 that 15 countries have been meeting this target for several years.

Primary energy consumption was a non-stimulating factor. For this reason, it is desirable for each country to reduce the achieved values of this indicator to at least the set target value, possibly even below this level. Even for this indicator, each country has its own target value, taking into account its specificities and capabilities. We can notice that in the case of this indicator, compared to the previous ones, most of the EU countries met the set values. The lowest volume of primary energy consumption was given for Malta, while the highest was for Germany.

In Tables 1–3 we marked the names of the selected countries in colour. In this case, these are countries that reached the target values in at least one year in all three analyzed sustainable development indicators. These countries are the Czech Republic, Denmark, Estonia, Croatia, Latvia, Lithuania, Hungary, Romania, Finland, and Sweden.

4.2. Evaluation of the Results of EU Countries

As the data on individual indicators are of a different nature (stimulating and non-stimulating factors), and the countries reached different values in the observed period, it is problematic to compare countries on the basis of such data. In addition, for some indicators, countries had individual targets [13,63]. Thus, the evaluation of absolute values does not allow us comparability. To resolve this issue, we had to convert this data to a standardized value for each indicator.

The question is how to compare countries with each other if we consider all the analyzed indicators. We used a synthetic measure to solve this problem. It is calculated as follows:

$$SM_i = \frac{1}{3} \sum_{j=1}^3 SV_{ij} \quad (9)$$

This synthetic measure can reach the values [0,1]. The results obtained with the synthetic measure in the analyzed countries are below, in Table 4.

Table 4. Synthetic measure.

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
BE	0.4776	0.4842	0.4939	0.4956	0.5256	0.5169	0.5398	0.5530	0.5552	0.5708	0.5626	0.5660	0.5679	0.5710
BG	0.6471	0.6466	0.6353	0.6467	0.6820	0.6866	0.6736	0.6974	0.7307	0.7171	0.7095	0.7190	0.7120	0.7330
CZ	0.5803	0.5792	0.5799	0.5920	0.6140	0.6113	0.6176	0.6350	0.6483	0.6598	0.6573	0.6538	0.6540	0.6579
DK	0.6052	0.5789	0.6042	0.6222	0.6428	0.6527	0.6816	0.7111	0.7155	0.7437	0.7626	0.7613	0.7850	0.7893
DE	0.2865	0.2815	0.3134	0.3080	0.3475	0.3305	0.3576	0.3596	0.3501	0.3769	0.3769	0.3741	0.3797	0.4005
EE	0.7521	0.7478	0.7299	0.7535	0.8021	0.7828	0.7869	0.7948	0.7813	0.7916	0.8253	0.8162	0.8108	0.8212
IE	0.4467	0.4503	0.4550	0.4617	0.4989	0.5042	0.5300	0.5312	0.5349	0.5410	0.5324	0.5227	0.5310	0.5326
EL	0.4491	0.4592	0.4573	0.4648	0.4872	0.5128	0.5268	0.5514	0.5874	0.5971	0.6062	0.6130	0.6145	0.6270
ES	0.2897	0.2997	0.2900	0.3314	0.3916	0.4090	0.4054	0.4182	0.4547	0.4592	0.4450	0.4600	0.4415	0.4465
FR	0.3060	0.3144	0.3280	0.3345	0.3593	0.3510	0.3581	0.3729	0.3751	0.4031	0.3989	0.4067	0.4078	0.4197
HR	0.6687	0.6594	0.6445	0.6505	0.6797	0.6922	0.6967	0.7198	0.7388	0.7439	0.7473	0.7416	0.7287	0.7424
IT	0.3433	0.3545	0.3670	0.3862	0.4336	0.4261	0.4365	0.4671	0.4971	0.5186	0.5082	0.5100	0.5161	0.5165
CY	0.3792	0.3712	0.3624	0.3618	0.3785	0.3927	0.4058	0.4342	0.4735	0.4627	0.4661	0.4425	0.4341	0.4598
LV	0.8529	0.8410	0.8267	0.8322	0.8663	0.8312	0.8582	0.8733	0.8820	0.8931	0.8861	0.8833	0.8936	0.8944
LT	0.7451	0.7444	0.7299	0.7425	0.7785	0.7747	0.7737	0.7829	0.7972	0.8029	0.8145	0.8131	0.8143	0.8075
LU	0.4967	0.5022	0.5196	0.5223	0.5350	0.5223	0.5264	0.5352	0.5481	0.5613	0.5710	0.5751	0.5726	0.5810
HU	0.5811	0.5879	0.6000	0.6054	0.6424	0.6473	0.6594	0.6807	0.6932	0.6822	0.6708	0.6683	0.6553	0.6503
MT	0.4717	0.4660	0.4558	0.4600	0.4786	0.4723	0.4761	0.4636	0.4969	0.4975	0.5611	0.5943	0.5757	0.5734
NL	0.4611	0.4691	0.4740	0.4759	0.4896	0.4701	0.4940	0.5001	0.5010	0.5176	0.5077	0.5077	0.5134	0.5248
AT	0.5831	0.6024	0.6225	0.6281	0.6659	0.6498	0.6599	0.6767	0.6747	0.6932	0.6845	0.6798	0.6694	0.6835
PL	0.5075	0.4945	0.4954	0.5022	0.5222	0.5086	0.5156	0.5268	0.5312	0.5429	0.5422	0.5297	0.5156	0.5166
PT	0.4913	0.5197	0.5359	0.5523	0.5755	0.5918	0.6009	0.6096	0.6242	0.6475	0.6342	0.6431	0.6188	0.6290
RO	0.6870	0.6817	0.6860	0.7033	0.7424	0.7502	0.7346	0.7484	0.7676	0.7735	0.7721	0.7758	0.7677	0.7654
SI	0.6039	0.5928	0.5978	0.5809	0.6220	0.6233	0.6220	0.6333	0.6525	0.6721	0.6716	0.6538	0.6546	0.6512
SK	0.6144	0.6162	0.6303	0.6276	0.6542	0.6489	0.6596	0.6695	0.6686	0.6863	0.6894	0.6823	0.673 9	0.6773
FI	0.6617	0.6251	0.6280	0.6680	0.6836	0.6591	0.6891	0.7203	0.7341	0.7609	0.7785	0.7648	0.7859	0.7818
SE	0.7263	0.7395	0.7524	0.7645	0.8045	0.7727	0.7978	0.8198	0.8314	0.8442	0.8535	0.8551	0.8603	0.8662
UK	0.3254	0.3320	0.3433	0.3592	0.3973	0.3864	0.4192	0.4095	0.4238	0.4549	0.4680	0.4842	0.4941	0.5054

where BE—Belgium, BG—Bulgaria, CZ—Czechia, DK—Denmark, DE—Germany, EE—Estonia, IE—Ireland, EL—Greece, —Spain, FR—France, HR—Croatia, IT—Italy, CY—Cyprus, LV—Latvia, LT—Lithuania, LU—Luxembourg, HU—Hungary, MT—Malta, NL—Netherlands, AT—Austria, PL—Poland, PT—Portugal, RO—Romania, SI—Slovenia, SK—Slovakia, FI—Finland, SE—Sweden, UK—United Kingdom.

Based on the calculated synthetic measure (SM), we already had comparable data available for the analyzed countries. As we analyzed 28 EU member states over a period of 14 years, we decided to classify the calculated values into groups. We determined the groups with regard to the achieved results of the country. We created four groups, where group I represents the formation of the most developed countries, which concerns the indicators we examined. Conversely, group IV was formed of the weakest countries, or countries that had the greatest difficulty in meeting the targets and individual targets for sustainable growth set out in the Europe 2020 Strategy.

For better comparability, with respect to sketching the progress between the individual countries, we classified the countries into the four groups mentioned in 2005, 2010, and 2018. That is, in the first analyzed year (2005), as a reference to the starting point situation, in the year 2010, as the first year of implementation of the Europe 2020 Strategy, and in the last analyzed year (2018), where we wanted to point out the progress of some countries. Countries that improved their positions in 2010 and 2018 by moving to a higher group are highlighted.

The individual groups were formed with respect to the methodology used by Stec and Grzebyk [46]. This four-group division contains several groups that can take into account the fine specifics in the obtained results, and thus more accurately divide the analyzed countries. Based on Stec and Grzebyk [46] and the obtained results from our research, the groups are as follows:

$$\text{Group I: } \mathbf{SM} \geq 0.7386 \quad (10)$$

$$\text{Group II: } 0.7386 > \mathbf{SM} \geq 0.5926 \quad (11)$$

$$\text{Group III: } 0.5926 > \mathbf{SM} \geq 0.4467 \quad (12)$$

$$\text{Group IV: } 0.4467 > \mathbf{SM} \quad (13)$$

where **SM** is the synthetic measure obtained by countries.

Table 5 provides us with a clear order of countries according to defined groups, namely in 2005 as the first analyzed year, in 2010 as the first year of implementation of the Europe 2020 Strategy, and in 2018 as the last analyzed year.

Table 5. Distribution of countries into individual groups according to the performance of the synthetic measure.

Group	2005	2010	2018
I. High level	Estonia Lithuania Latvia	Estonia Lithuania Latvia Romania Sweden	Estonia Lithuania Latvia Romania Sweden Croatia Finland Denmark
II. Medium-high level	Bulgaria Denmark Croatia Romania Slovenia Slovakia Finland Sweden	Bulgaria Denmark Croatia Slovenia Slovakia Finland Czech Republic Hungary Austria	Bulgaria Slovenia Slovakia Czech Republic Hungary Austria Greece Portugal
III. Medium-low level	Belgium Ireland Greece Portugal Luxembourg Hungary Malta Netherlands Austria Poland Czech Republic	Belgium Ireland Greece Portugal Luxembourg Malta Netherlands Poland	Belgium Ireland Luxembourg Malta Netherlands Poland Cyprus Italy United Kingdom
IV. Low level	Germany Spain France Italy Cyprus United Kingdom	Germany Spain France Italy Cyprus United Kingdom	Germany Spain France

In 2005, there were only three Baltic countries in group I of the high level countries. After 14 years, this group grew by five other countries, namely the Nordic countries, Croatia, and Romania. The last two countries may come as a surprise for many readers,

as they are not significantly strong EU economies. However, these countries deserved their position, because they met the required values in the monitored indicators in the area of sustainable growth. In addition, their individual targets were set at approximately the same levels as the EU average targets. Romania entered group I after five years, together with Sweden, while Croatia achieved this in 2018.

Group II, the medium-high level countries, consisted of the same number of countries in 2005 and 2018. However, there were changes in the representation of countries within this group. Some countries that were included in this group in 2005 improved their position in 2010 and 2018 and moved to group I. They were Romania and Sweden in 2010, and Denmark, Croatia, Finland in 2018.

The representation of the largest number of countries is in group III. In the years 2005, 2010, and 2018, Belgium, the Netherlands, Luxembourg, Malta, Ireland, and Poland entered this group. These are countries with both smaller and larger populations and, therefore, different goals. However, these countries met the set targets only in some years for selected indicators, and mostly had difficulty meeting the set quotas of the Europe 2020 Strategy.

Finally, in the last analyzed year, group IV was reduced to three countries, compared to six in 2005 and 2010. This is a good development. There were the same countries in 2005 and 2010. We can divide this group into two parts in the years 2005 and 2010. First, these countries include some of the EU's largest economies, which also have targets set at higher levels than other countries. On the other side are the weakest economies, including countries with more problems and lower economic performance.

The trend of the decreasing number of countries in the weakest group is desirable. It provides a positive report in moving of individual countries in terms of fulfilling and ensuring sustainable growth. In this regard, we can see the considerable progress that countries have made in the 14 years. Not only was there a decrease in the number of countries belonging to the weakest group in the last year, but there was also a consistent shift upward between the individual groups to higher groups. A shift in the opposite direction was not found.

5. Conclusions

The area of sustainable growth is a very important issue that has been addressed intensively for several years. This is an area that has an impact on the future, whose challenges have recently become very urgent. We can usually observe changes in the climate that will certainly have an effect on virtually everyone. Therefore, it is very important that countries also work together as a whole to minimize the negative impacts and try to pay attention and take measures to improve the future situation.

When we started the analyses, we were concerned about how the countries would cope with the ambitious goals arising from the Europe 2020 Strategy. Over a period of 14 years, we can see a significant improvement in individual countries, which also contributes to meeting the goals of this strategy. It is advisable to focus on a longer period of time, because the processes are demanding, and we cannot expect to see results after a year or two. We can see that countries are attempting to take these concerns seriously. Many countries can be admired for meeting the strategy's stated objectives in recent years only on the basis of a systematic approach over several years.

In the analysis of individual indicators, we identified countries that met the set criteria throughout the period. There were countries that met the required targets only in some years. In the end, there were countries that did not meet the set values for a single year, although they were constantly approaching them. These countries had another two years to meet the set targets, at least at the end of the set period, in 2020.

For some targets (e.g., primary energy consumption), the required values were reached by more countries than other targets. Setting goals is also important. In the case of greenhouse gas emissions, there was a single goal for all countries, while in other cases, the goals were adapted to the conditions of a given country, of course with regard to the fulfillment of the overall EU goal. The countries that reached the target values in at least

one year in all three analyzed sustainable development indicators were the Czech Republic, Denmark, Estonia, Croatia, Latvia, Lithuania, Hungary, Romania, Finland, and Sweden.

Based on the synthetic measure, we comprehensively evaluated the resulting performances of the countries in the entire period. After the subsequent division of the countries into development stages, we identified the most successful countries in the area of strategy implementation. In the last year they were Latvia, Lithuania, Estonia, Denmark, Finland, Sweden, Croatia, and Romania. Except for the Czech Republic and Hungary, these were all countries that reached the target values in all three indicators simultaneously. As far as individual groups are concerned, a shift can be seen from 2018 compared to 2005.

Significantly more countries reached higher groups, and at the same time, the number of countries in the weakest group decreased. This trend of a decreasing number of countries in the weakest group is desirable. It provides a positive report in the moving of individual countries in terms of fulfilling and ensuring sustainable growth. In this regard, we can see the considerable progress that countries have made in 14 years. Not only did the number of countries belonging to the weakest group in the last year decrease, but there was also a consistent shift upward between the individual groups to higher groups. A shift in the opposite direction was not found.

An important area for further research in continuing this work may be analyses of changes in the Europe 2030 Strategy in the area of sustainable growth. What are the other specific targets for this area for the next 10 years? What are the other, new targets in this area? How will individual countries continue to succeed in meeting the set goals and improving the overall situation in this area? How will these improvements help companies and individuals, and how this will affect a country's overall performance? All these suggestions are possible directions for future research in this area. It is still necessary to examine this area and pay close attention, as this will provide the foundation for the future of humanity and future generations.

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