HOLISTICA Vol 14, Issue 2, 2023, pp.43-62 DOI:10.2478/hjbpa-2023-0015

GREEN TRANSITION AND THE BUSINESS SECTOR IN THE EUROPEAN UNION AND ROMANIA

Marioara IORDAN[1]*
Mihaela-Nona CHILIAN[2]
Gabriela CIURARIU[3]

Received: November 2023 | Accepted: November 2023 | Published: December 2023
Please cite this paper as: Iordan, M., Chilian, M.N., Ciurariu, G, (2023) Green transition and the business sector in the European Union and Romania, *Holistica Journal of Business and Public Administration*, Vol. 14, Iss. 2, pp.43-62

Abstract

Increasingly obvious over the last two decades, human society and the economies of all the countries in the world faced and continue to face increasingly accelerated, amplified, diverse and divergent economic, social, political and technological trends and developments, among which three so-called megatrends stand out for intensity and persistence: digitization and automation of production, greening of economies and global economic power shifts. Considering such issues, the paper focuses on a brief analysis of how the green transition affects the business sector (enterprises) in the EU countries, with a focus on Romania - an EU member state that registers a relatively low level of penetration of the circular economy. Indicators of the green economy and eco-innovation and referring to the economic dimension of the circular economy, were used for the analysis. The results show that the EU27 economies generally are leaders in most of the aspects concerning the greening of economies and their business sectors, but Romania reveal certain relative delays of the local business sector in moving towards production and business development methods characteristic of the ecological economy.

Keywords: *green economy, business sector, eco-innovation, circular economy, EU27 countries*

1. Introduction

Especially over the last two decades, human society and the economies of all the countries in the world have faced and continue to face increasingly accelerated, amplified, diverse and divergent economic, social, political and technological trends and developments, among which the so-called *megatrends* stand out for intensity and persistence. In this

[1] *Institute for Economic Forecasting, Romanian Academy, Romania, Email: miordan@ipe.ro*
[2] *Institute for Economic Forecasting, Romanian Academy, Romania, Email: cnona@ipe.ro*
[3] *Technical University "Gheorghe Asachi" of Iași, Romania, Email: gciurariu2016@gmail.com*
** Corresponding author*

sense, Altenburg et al. (2021) define *the megatrends affecting economies* as profound transformations that (1) last for several decades, (2) deeply influence the social as well as economic and political spheres, and (3) have a global impact. There is no consensus in the specialized literature regarding what the main megatrends are, and many ways of defining their content and limits can be identified. In terms of our analysis, we are interested in trends that have a major effect on technological development and economic structural changes, and therefore have a direct impact on the prospects of economies facing economic and/or technological development gaps in order to achieve inclusive and sustainable industrialization. From this perspective, the following three megatrends are particularly relevant (Altenburg et al., 2021 – see Table 1):

Table 1. Key global megatrends from the viewpoint of industrial development and business sector

Megatrend	**Global implications for structural transformation and industrial development**	**Opportunities and threats for delayed ISID**
Digitisation and automation	Lower transaction costs Increasing productivity in a wide range of industries using IT, but also elimination of traditional jobs, leading to labour market segmentation	Efficiency gains in many internal operations
	Reduced demand for labour (especially unskilled and semi-skilled)	Fewer opportunities for industrialization (especially manufacturing) based on labour cost advantages Online job opportunities in the knowledge economy for selected segments of highly skilled workers
	Increased entry barriers (skills, capital costs, winner-takes-all developments)	Risk of global oligopolies in areas where entry barriers are high (Industry 4.0, artificial intelligence, big data), potentially excluding the delayed ISID adopters Areas with lower entry barriers (online commerce, 3D printing) for SMEs and freelancers, semi-informal jobs
Global power shifts	Restructuring trade flows and GVCs, regional agglomeration in Asia	New GVC opportunities for Asia, risk of falling behind for other developing regions

	China's shift to a knowledge-based economy threatens industries in old industrialized regions and reduces China's competitiveness in labour-intensive export industries	New opportunities for labour-intensive export industries as China gradually exits this segment
	Growing middle-class consumers and accelerating urbanization	Domestic demand driven industrialization becomes more important as compared to export driven industrialization Urbanization and middle-class consumption create new incentives for agro-industrial development and diversification
Greening of economies	Decarbonisation of economic systems, especially energy systems, but also of all other industries	New growth opportunities in renewable energies, energy efficiency, green hydrogen and energy-intensive investments if the energy system is green Risk of asset lock-in and economic crises in high-carbon industries
	Taxing emissions, energy consumption and resources can make the use of labour relatively more economical	New opportunities in labour-intensive activities, e.g., organic farming
	Greening GVC through public and private standards, environmental clauses in trade agreements, etc.	The need to adapt to higher standards, raising entry barriers for countries with weak institutions and small businesses
	Incentives for the circularization of economic systems	Reduced demand for virgin materials may affect exporting industries (e.g., minerals, oil for plastics production); new opportunities for labour-intensive economies in repair and recycling activities; must adapt the future reparability and recycling standards in high-income countries

Source: Altenburg et al. (2021).

• *Digitization and automation of production*, as technological innovation in these fields essentially affects all spheres of business sector development and profoundly changes the competitive advantages of companies and nations.

• *The greening of economies*, as a necessity to reduce the environmental footprint, and especially to decarbonize the economies, which requires radically different business models and systemic transformations with far-reaching effects on the positioning in the world economy of economies/countries with delays in technological and economic development.

• *Global economic power shifts*, particularly the emergence of Asia as the dominant centre of the world economy and China's structural transformation towards a high-income, knowledge-based economy, as these developments involve major restructuring of trade flows and global value chains (GVCs). This megatrend is partly correlated with the first two, because the structural transformation, mainly of the Chinese economy, but also of other countries, former, current or emerging centres of economic-financial and/or technological power, is done mainly through the integration of and on the basis of the other two above-mentioned megatrends.

In such a context, the paper presents a brief analysis of how the green transition affects the business sector (enterprises) in the EU countries, with a focus on Romania - an EU member state that registers a relatively low level of penetration of the circular economy in the business sector. Indicators of the *green economy* and *eco-innovation* and referring to the *economic dimension of the circular economy*, were used for the analysis.

2. Economy and business sector developments determined by the impact of green transition

A megatrend with important implications for global manufacturing is the *greening of economies*. This is determined by two general developments; primarily as a result of climate change being increasingly seen as a threat to the growth and resilience of economies. International organizations and governments around the world prioritize sustainable (growth) models to ensure long-term growth. This includes both regulating and providing investment incentives for green technologies. Second, the negative externalities of global production are increasingly seen as problematic. Increasingly, companies are seen as only part of the solution to achieving the goal of greening the economies and generating long-term sustainable growth. Increasing regulations for multinational companies, civil society pressure and improved social and environmental impact monitoring have changed the way the companies operate abroad (UNCTAD, 2020). Even though the social dimension, such as labour rights and gender equality, are important and shape corporate governance, it is the environmental dimension that is supposed to change the international production (UNCTAD, 2020). The shift towards economic greening will have a significant impact on the GVCs, as products and processes along them will continue to move towards sustainability (Falk et al., 2021).

Recent years have witnessed a growing interest among policy makers and the international community, in general, in developing ways to ensure sustainability, i.e., to achieve *sustainable development*. The adoption of the 2030 Agenda for Sustainable Development by the UN General Assembly in September 2015 corroborates the efforts made to integrate the economic, environmental and social aspects of development. These efforts are reflected in the introduction of the *Sustainable Development Goals (SDGs)* and their focus on the environmental and sustainability issues we face, such as climate change (Moll de Alba and Todorov, 2022). Thus, the composite ODD index (Sachs et al., 2020) assesses the performance of 166 countries and comprises 115 indicators – 85 for all countries and 30 for the OECD countries. The Inclusive Sustainable Transformation Index (IST) (Lin et al., 2019), in turn, aims to measure countries' progress towards developing a modern economy that respects the environment and is gender inclusive (Moll de Alba and Todorov, 2022) .

The seminal work of Pearce et al. (1989) introduced the concept of a *"green (ecological) economy"* in the Blueprint for a Green Economy for the Environment Department in the United Kingdom. The UNEP definition of a green economy (UNEP, 2011) is often used as reference: an economy "that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological deficits". In their paper on the green economy and related concepts, Loiseau et al. (2016) introduce a framework to assess the influence of these concepts on the transition to sustainability. UNDESA (2012) reviews the concept of green economy as well as other green-related concepts such as *(economic) green (ecological) growth*. The latter is defined by the OECD (2011) as "encouraging economic growth and development while ensuring that natural assets continue to provide the environmental resources and services on which human well-being is based". The World Bank (2012) definition emphasizes that green growth uses natural resources efficiently and minimizes pollution and environmental impact; therefore, the concept places a strong emphasis on investment and innovation, while Bowen and Hepburn (2014) state that green growth enhances welfare and continuous growth of gross domestic product (GDP), while preserving aggregate natural capital (Moll de Alba and Todorov, 2022).

Altenburg et al. (2021) identified *three main effects* of greening on industrialization and the business sector:

• First, integrating green principles into established industries *shifts the competitive advantage within industries/sectors to firms with greener business models, products and processes* - such as firms betting on green steel, low-carbon cement, organic agriculture and energy efficient buildings and materials. For instance, due to improved energy efficiency and the increased use of scrap steel for more recycled material flows, the energy required to produce a ton of crude steel is by 40% lower than it was three decades ago (Koch Blank, 2020). The EU steel production, which is committed to achieving climate neutrality by 2050, must reduce total emissions to zero, which in turn will boost the commercialization of green steel production. In parallel, complementary market-making policies promote the global diffusion of low-emission primary steel production (Vogl et

al., 2021). Organic food and beverages represent a strongly growing market share of the global food industry (Reganold and Wachter, 2016). Currently, with 71.5 million hectares of agricultural land managed organically by approximately 2.8 million farmers, global sales of organic food and beverages have reached over €96 billion (Willer et al., 2020).

• Second, *growing incentives to greening the economies are leading to creation of entirely new markets and industries*, such as solar photovoltaic panels, wind turbines, lithium batteries, green hydrogen, biofuels, and fuel-free products, electric vehicles and related minerals, as well as recycling processes relevant in this context. Global hydrogen demand, which has more than tripled since 1975, continues to grow (IEA, 2019). Many countries are heavily investing in green hydrogen, and experts expect substantial use of green hydrogen in the next five to 10 years. As an energy carrier, green hydrogen has enormous potential to generate green economies, as it can provide a link between renewable electricity generation and hard-to-electrify sectors such as steel, cement production, chemicals, maritime transport and aviation (IRENA, 2020b). Also, sales of electric cars amounted to 2.1 million in 2019, surpassing those of the previous record year (IEA, 2020a).

• Third, *while shifting the incentives creates new competitive advantages in many areas of the economy, it also erodes the existing advantages in other industries*, for example in oil and gas-related industries and sectors and in large energy-intensive industries such as steel, cement and aluminium production (IEA, 2020b). The cost of writing off such "stranded assets" is huge. In a 1.5° scenario, energy producers would have to leave more than 80% of their fossil fuel reserves in the ground. Even in a 2° scenario, about 50% of reserves would theoretically be worthless (Altenburg et al., 2021). Stranded assets are estimated to amount to a global (discounted) wealth loss of US$1-4 trillion. A considerable part of this loss is driven by ongoing changes in the technological pathways and, therefore, does not depend on the implementation of the Paris Agreement (Mercure et al., 2018). Ansari and Holz (2020) model asset stranding risks for the Middle East, China and Latin America, showing that the oil sectors in the Middle East and Latin America, as well as the coal sector in China, are prone to asset erosion. Although it is difficult to assess these risks, given the considerable uncertainty about the ambition of global climate policies and the development of energy systems, fossil fuel-based economies need to diversify their economies away from such assets (Carbon Tracker, 2021).

3. Issues regarding the evaluation of green transition at economy and business sector levels

Measuring *progress towards green economic growth* is crucial to guide action and focus policy makers and practitioners. For instance, OECD (2017), proposes a framework comprising 26 indicators to measure key components of green growth, such as environmental productivity and an economy's resources, while UNEP (2014) provides guidance on the use of indicators to develop and implement green economic policies at the national level. The Green Growth Knowledge Platform (2013) developed a framework for green growth and green economy indicators that measure the linkages between the

economy and the environment. More recently, a framework for measuring progress towards the green economy, comprising a set of individual indicators and the Green Economy Progress Index, has been proposed by UN Environment (PAGE, 2017a). It covers 105 countries for the period 2004–2014 (PAGE, 2017b) (Moll de Alba and Todorov, 2022).

Moll de Alba and Todorov (2022) focus on SDG-9 and more specifically on *inclusive and sustainable industrial development* (ISID), because this, namely the role of the manufacturing sector in development, with its increasing returns to scale, is essential to stimulate economic growth. Several composite indices explore the *key "green" components of green industry* (Moll de Alba and Todorov, 2022); for instance, the *Green Economy Progress Index* (PAGE, 2017a; PAGE 2017b), which examines the progress of over 100 countries in the period 2004–2014, the *Environmental Performance Index* (Wendling et al., 2020; Wolf et al., 2022), which uses 32 indicators (version 2020) and 40 indicators (version 2022) of performance to rank 180 countries in terms of environmental health and ecosystem vitality, and the *Green Growth Index* (Acosta et al., 2020), which measures and assesses the efficient and sustainable use of resources, protection of natural capital, green economic opportunities and social inclusion in 117 countries based on 36 indicators. In the case of the latter index, as far as European countries are concerned, the best performances were recorded by the Nordic countries, but also by Central European countries (Czech Republic, Slovakia) and Western European countries (Germany, Austria and Switzerland); most of them also registering trends of increasing scores between 2005 and 2019. **Romania** was rated with an average position in the European hierarchy (ranking 18th out of 38 European countries) and with a tendency to improve the general performance in terms of green economic growth (Acosta et al., 2020).

There are also relevant composite indicators that focus primarily on *countries' industrial performance*, such as the *Competitive Industrial Performance Index* (CIP) (UNIDO, 2019), which assesses and ranks the national industrial competitiveness of 150 countries based on 8 indicators or the *Sustainable Development Index* (ISID) (Fang Chin Cheng and Cantore, 2020), which analyses the progress of 118 countries towards the achievement of ISID in the period 2005–2015. The ISID results for 2016 show that only high-income countries and a few upper-middle income countries (e.g., China, Malaysia and Mexico) are included in the top 10 according to different approaches and methodologies. The results presented in Table 2 suggest that the world's countries, on average, need to industrialize in order to move up the development ladder because higher levels of income are also associated with higher levels of industrial competitiveness. The slightly surprising result is that industrialization has many positive impacts on the social and environmental aspects. From a production-specific approach, industrial competitiveness has positive social effects, such as manufacturing employment, and minimizes negative externalities, such as CO2 intensity. At higher income levels, on average, countries tend to produce more value added with the same level of emissions (although total emissions in absolute terms may increase) and generate more jobs through the manufacturing sector. The general economic approach further suggests that these positive effects in the manufacturing sector have a positive spillover effect on the entire economy by eradicating

poverty, creating jobs in manufacturing and other sectors, and increasing the overall environmental efficiency of the economic system through technological change (Fang Chin Cheng and Cantore, 2020).

Table 2. Ranking of countries according to ISID for 2016, depending on the method for computing the composite index

Country	Rank according to CIP methodology with equal weights		Rank according to CIP methodology with geometrical weights		Rank according to CIP methodology with DEA	
	Approach specific to manufacturing	Approach for the entire economy	Approach specific to manufacturing	Approach for the entire economy	Approach specific to manufacturing	Approach for the entire economy
Germany	1	2	3	4	1	1
Taiwan, China	2		6	26	1	
Switzerland	3	1	1	1	1	1
Ireland	4	3	2	2	1	5
China	5	14	21		9	28
Czechia	6	17	8	21	5	11
Republic of Korea	7		5		6	
Japan	8		7		7	
Italy	9		4		8	
Slovenia	10	21	14	18	15	12
Slovakia	12	22	25	19	18	21
USA	13	5	13	8	10	9
Malta	14	15	15	20	32	22
Hungary	15	20	19	17	17	18
Austria	16	9	11	7	14	13
Poland	17	24	22	29	19	16
France	18		12		12	
Sweden	19	4	9	3	11	7
Denmark	20	6	10	5	13	8
Belgium	21	8	26	9	25	3
Mexico	22	35	24	25	23	31
Singapore	23		20		21	
Malaysia	24		33		27	
Türkiye	25	29	31	27	28	30
Romania	**26**	**39**	**32**	**30**	**30**	**37**
Spain	27	12	18	11	20	17
Thailand	28	26	34	33	29	26
Netherlands	29	10	27	10	24	4
Estonia	30	34	30	37	35	24

United Kingdom	31	7	17	6	16	6
Portugal	32	23	29	16	33	23
Finland	34	13	23	13	26	10
Israel	35	16	16	14	22	19
Bulgaria	37	40	51	43	40	41
Lithuania	38	27	28	28	34	29
Belarus	39	36	43	48	37	20
Croatia	42	31	42	35	41	32
Canada	43		35		31	
North Macedonia	44	49	81	49	81	54
Russian Federation	49	33	66	44	49	25
Serbia	50	51	71	51	63	52
Indonesia	51	59	47	47	39	43
Bosnia-Herzegovina	52		88		88	
Latvia	53	28	41	31	47	34
Argentina	56	37	49	34	48	39
Brazil	61	38	53	23	45	33
India	66		80		61	
Chile	68		50		53	
Norway	69	11	38	12	36	14
New Zealand	72		52		50	
Australia	75		57		42	
South Africa	78		85		85	
Ukraine	81	42	100	60	91	40
Greece	82	30	60	32	57	35
Iceland	85		68		77	
Moldova	97	46	104	57	109	61
Albania	98	54	101	50	104	57
Armenia	99	56	93	54	93	58
Luxembourg	100	18	74	15	60	15
Cyprus	101	32	97	41	101	27
Georgia	113	58	110	58	112	60
Montenegro	114		117		121	
Azerbaijan	119		114		117	
Hong Kong	121		119		119	
All countries	127	63	127		127	63

Source: Adaptation after Fang Chin Cheng and Cantore (2020).

Moll de Alba and Todorov (2022) estimated the green industrial output of the world's economies and compared it over time using an *index of green industrial performance* (GIP). Measuring the relative importance of green industrial production, i.e., the share of

green industrial production in the overall production of the manufacturing industry, is of particular importance. Another important concept is that of *green jobs*. The latter can be defined as "work in agriculture, production, research and development, administrative and service activities that contribute substantially to the preservation or restoration of environmental quality" (UNEP/ILO/IOE/ITUC, 2008). These concepts can be encapsulated in a simple, straightforward framework that captures different aspects of a country's green industrial performance through *three key dimensions*: the ability to produce and export green manufactured goods, the role of green manufacturing, and the social and environmental aspects of ecological production (Moll de Alba and Todorov, 2022).

The top five European economies according to the GIP (Table 3), namely Switzerland, Denmark, Germany, the Czech Republic and Austria, were also the best performers worldwide in 2017. In addition, eight European economies are among the top ten in the world as according to GIP. Switzerland ranks 1st in the ability to produce and export green manufactured goods and in the social and environmental aspects of green production. Switzerland is the world's leading economy in organic production value added per capita, organic production value added share and organic production labour share, while Denmark tops the list in terms of role of the ecological production. Switzerland has paid considerable attention to sustainable development and the green economy for many years. The country's fourth sustainable development strategy for the period 2012–2015 (Federal Council, 2012) sought, among other things, to decouple economic productivity from the use of resources and energy, while the Green Economy Plan of 2013 and its extension for the period of 2016 –2019 focused on consumption and production patterns, raw materials and waste, the Cleantech Master Plan and the greening of the fiscal system (Moll de Alba and Todorov, 2022). **Romania** registers a relatively good positioning at the world level (ranked 30th) and average at European level, the best positioning being registered in the case of dimension related to the role of organic production (15th) and the weakest related to the capacity to produce and export organic products (42nd), which signals a relative delay of the local business sector in moving towards production and business development methods characteristic of the ecological economy.

Table 3. GIP rankings of European countries, total and by main dimensions (2017)

Rank at region level	Country	Rank at global level	Rank according to 1st dimension	Rank according to 2nd dimension	Rank according to 3rd dimension	Absolute change as compared to 2012
1	Switzerland	1	1	8	1	1
2	Denmark	2	2	1	4	-1
3	Germany	3	4	3	2	0
4	Czechia	4	6	4	3	0
5	Austria	5	5	7	11	0
6	Hungary	8	12	5	9	-1
7	Slovenia	9	10	11	15	-1

8	Italy	10	11	6	10	1
9	Sweden	11	9	23	16	2
10	Slovacia	12	14	13	6	7
11	Belgium	14	8	41	35	3
12	Finland	19	18	45	8	-10
13	France	20	21	29	23	2
14	United Kingdom	21	24	24	13	0
15	Norway	22	20	33	27	-6
16	Poland	23	30	14	18	2
17	Spain	24	28	28	17	-1
18	Netherlands	25	15	59	26	-1
19	Portugal	26	29	21	33	3
20	Lithuania	27	27	30	41	4
21	Croatia	28	35	18	28	2
22	**Romania**	**30**	**42**	**15**	**34**	**6**
23	Latvia	32	38	36	43	5
24	Estonia	34	32	51	65	-7
25	Serbia	35	50	12	19	7
26	Bulgaria	37	44	37	44	6
27	Belarus	44	48	40	24	6
28	Iceland	47	34	82	58	54
29	Luxemburg	49	31	77	88	-23
30	Greece	52	51	61	55	-3
31	Bosnia-Herzegovina	53	53	44	71	5
32	Russian Federation	60	60	71	30	-4
33	Ireland	61	33	101	87	-21
34	Ukraine	68	67	52	97	31
35	Moldova	76	80	63	70	-2
36	Montenegro	81	81	81	82	-3
37	Malta	88	64	99	105	3
38	Albania	97	92	100	99	-5

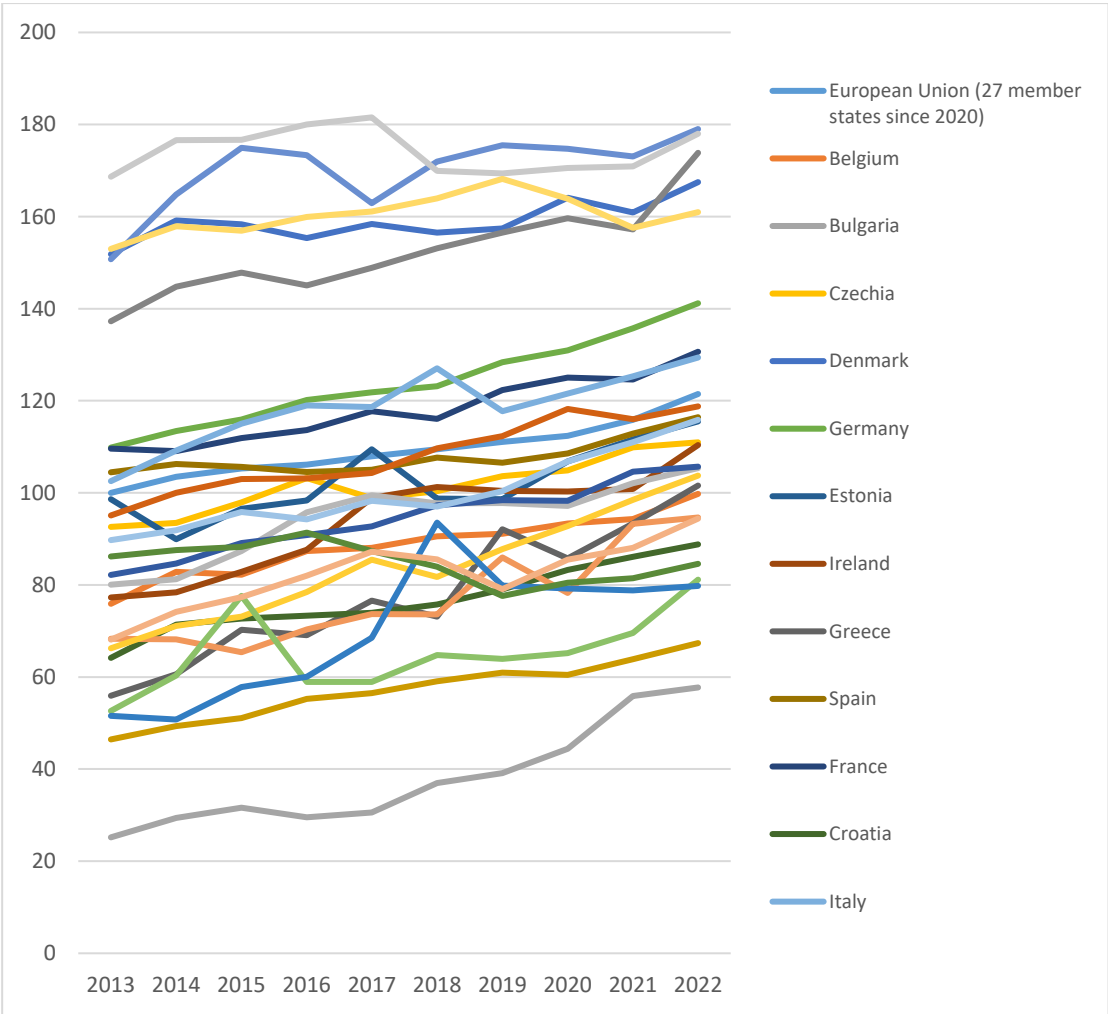
Source: Adaptation after Moll de Alba and Todorov (2022).

The transition to a green/ecological economy is mainly driven by a long-term global trend of diminishing resources and of rising energy and raw material prices, a trend exacerbated by Europe's growing dependence on resource imports. To meet these challenges, the EU has put in place a number of *policies and strategies* aimed at supporting the transition to a low-carbon and resource-efficient economy, while strengthening the EU's competitiveness. One of the most important was the Energy-Climate Package 2020, which sets objectives to be achieved by 2020 for the reduction of greenhouse gas emissions, for

the use of renewable energy sources and for the improvement of energy efficiency (MMJS, 2017).

Eco-innovation refers to any innovation that reduces the environmental impact, increases resilience to environmental pressures or uses natural resources more efficiently. Eco-innovation is key to achieving the goals of the European Green Deal, such as the transition to a climate-neutral circular economy. The EU's performance between 2013 and 2021 has been positive, as shown by the steadily increasing trend of the Eco-Innovation Index score (Figure 1).

Figure 1. Evolution of the eco-innovation index in the EU27 member states in the period 2013-2022



Source: Authors' processing based on data from the European Environment Agency.

Increases were observed in all five dimensions of the index. Most of the increase was due to improvements in the output dimension of resource efficiency, particularly in

greenhouse gas (GHG) emissions productivity (i.e., decreases in GHG emissions generated per unit of gross domestic product (GDP)). However, the greatest improvement was observed in the number of eco-innovation publications, which is included in the eco-innovation output dimension. Index scores improved between 2013 and 2022 for all the EU member states except **Romania**. In addition, 18 EU Member States recorded increases above the EU-27 average, with Greece recording the largest increase, followed by Lithuania, Austria, Ireland, Bulgaria and Germany. The main reason for Greece's improved performance was increased government lending and spending on environment and energy research and development (R&D). The improvement in various indicators related to resource efficiency explains the relatively large increases in Lithuania, Austria, Ireland, Bulgaria and Germany (EEA, 2022).

Romania belongs to the group of eco-innovators that are catching up. Over time, its performance against the EU average has fallen slightly. Romania records performances in the three dimensions of the circular economy (CE) below the EU average (sustainable resource management – 69% of the EU27 average, societal behaviours – 80% of the EU27 average and business activities – only 43% of the EU27 average). Romania's relative strengths are in eco-innovation activities, and its relative weaknesses are in eco-innovation contributions. The strongest indicators of eco-innovation are exports of environmental goods and the service sector and the number of ISO 14001 certificates. The weakest indicators of eco-innovation are material productivity and patents related to eco-innovation. Romania's performance on CE indicators shows its relative strengths in societal behaviours and its relative weaknesses in business activities. The strongest CE indicators are the material footprint: household material consumption and municipal solid waste generation. The weakest CE indicators are the number of eco-labelled products and services and municipal waste recycling rates (Falcan, 2022).

Regarding the involvement of the business sector in the EU member states in achieving the transition to a green economy, even since 2013 the conclusions of the study *SMEs, Resource Efficiency and Ecological Markets* (published in Flash Eurobarometer No. 381 of 2013 and carried out on a sample of 11207 SMEs from 28 EU member states) revealed that approximately 92% of SMEs in the European Union were operating in accordance with the environmental legislation. From the perspective of ecological markets and resource efficiency, the conclusions of the interviews conducted in 402 SMEs in **Romania** highlighted the following aspects (MMSJ, 2017):

- Only 22% of SMEs in Romania offered ecological services or products, as compared to 26% in the EU28; 49% of SMEs did not offer and did not intend to do so in the next 2 years (as compared to 59% in the EU28).

- Regarding the reasons why SMEs did not offer such products or services, the following were ranked first: the absence of importance of this fact for the image of the company (28%, as compared to 22% at the EU28 level); lack of concordance with company values or insufficient demand from consumers (19% versus 25% EU28 average); the

absence of creating a competitive advantage or additional business opportunities (9% versus 17% EU28 average).

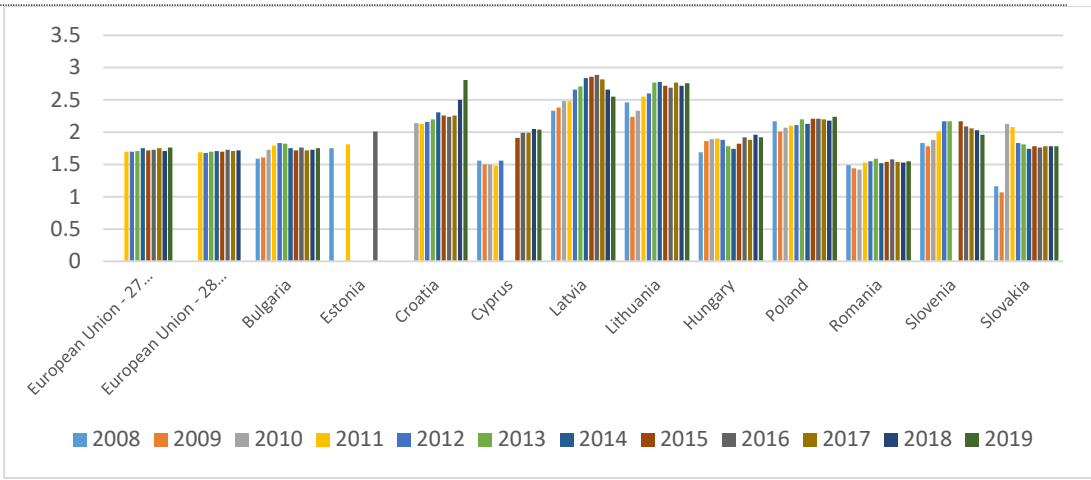
- As regards the type of support that would stimulate launching of the range of green services and products, the financial incentives were ranked first (35% as compared to 29% EU28 average), followed by assistance to identify markets or potential customers (23%, as compared to 17% EU28 average), technical assistance and consultancy for the development of products, services and production processes (18% vs. 17% EU28 average), marketing and distribution services (17% vs. 12% EU28 average).

- Regarding the actions taken by companies to improve the use of resources, first ranks energy saving (72%, as compared to 67% EU28 average), followed by that of materials saving (60% as compared to 59% EU28 average), water saving (57% versus 51% EU28 average) and waste minimization (52% versus 67% EU28 average).

- Among the measures that would support companies in using the measures effectively, the provision of grants and subsidies was mentioned by 31% of SMEs (as compared to 34% EU28 average), followed by improving cooperation between entrepreneurs regarding new processes for reusing waste (24% as compared to 19% EU 28 average), advice on investment financing possibilities for the efficient use of resources (22%, at the same level as the EU28 average), advice on how to improve the efficient use of resources within the company (19% as compared to 25% EU28 average).

In the European Union, the transition to a *circular economy* is one of the cornerstones of Europe's agenda for sustainable growth, namely the *European Green Deal*. Although the focus areas of the European Green Deal do not explicitly address sustainable production, consumption and the establishment of a circular economy, these aspects are cross-integrated across several actions (e.g., agriculture, climate and industry). A circular economy is defined as “a model of production and consumption that involves sharing, renting, repairing, refurbishing and recycling existing materials and products as much as possible. In this way, the life cycle of the products is extended." By encouraging such transitions, the EU intends to reduce pressure on natural resources and create sustainable jobs. Thus, after 2008, the share of employees from sectors related to the circular economy in the total number of employees registered a slight upward trend in the EU27 member states, especially in some of the new member states (Hungary, Poland, Lithuania, Croatia – see Figure 2). **Romania** also recorded small increases in the share of this category of employees, which partially reinforces our previous observation regarding the relative time lag in adapting the domestic business sector to the requirements of greening the economy. Also, the value added created in sectors related to the circular economy revealed a clear growth trend especially after the years 2014-2015 in almost all the EU27 member states (including in the new member states, and also in Romania - Table 4).

Figure 2. Share of employees from sectors related to the circular economy in the total number of employees in the new EU member states, %



Source: Authors' processing based on data from Eurostat.

The establishment of a circular economy is also considered to be a critical point for achieving the EU's goal of climate neutrality by 2050 and halting the loss of biodiversity. In line with the European Green Deal, the European Commission adopted a new circular economy action plan in March 2020. This action plan is a sustainable legislative initiative on product policy to make the right products for a carbon-neutral circular economy climate, resource efficient. The plan introduces a series of actions that address how products are designed, how circular economy processes can be promoted, encouraging sustainable consumption, waste prevention and resource conservation. Seven essential areas for achieving a circular economy are highlighted: plastics; textiles; electronic waste; food, water and nutrients; packaging; batteries and vehicles; buildings and constructions (ECR, 2022).

Table 4. Annual dynamics of value added at factor cost in sectors related to circular economy in the European countries, %

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
European Union - 27 countries (since 2020)				98.9	99.9	104.0	101.6	102.4	106.8	104.1	106.3
European Union - 28 countries (2013-2020)				100.6	100.0	105.8	103.8	100.6	103.9	103.9	
Belgium		112.1			97.6	99.2	105.9	102.9	103.9	99.4	100.3
Bulgaria	70.3	125.3	102.6	101.4	96.0	110.4	107.0	103.5	118.1	98.6	112.9
Denmark	88.2	104.6	106.5	101.2	93.9	109.4	104.4	100.8	102.8	103.3	102.9
Germany				97.9	98.7	107.7	100.9	109.1	102.7	108.5	108.5
Greece						86.6	103.3	96.7	104.5	100.9	113.0

Spain	87.4	108.5	93.7	96.9	115.8	98.7	103.6	103.9	107.3	105.5	106.9
France		108.1	103.6	97.7	102.4	101.7	98.7	91.3	115.1	99.1	101.8
Croatia			88.0	94.9	103.1	101.2	105.3	103.0	109.6	130.1	119.0
Italy	83.3	117.3	101.7	100.6	97.4	103.2	101.3	101.5	103.4	104.4	105.7
Cyprus	102.1	104.4	94.6	97.2				112.9	122.1	111.6	110.8
Latvia	77.8	95.2	92.0	126.8	91.7	104.5	99.4	104.8	116.5	96.0	107.3
Lithuania	64.6	109.0	129.7	109.1	102.9	106.4	102.8	114.4	116.9	110.4	115.8
Hungary	92.8	110.8	103.7	91.4	97.5	114.6	98.0	121.5	117.7	138.1	93.5
Netherlands		103.9	111.7	94.8	91.9	102.3	97.4	107.8	110.7	107.1	99.7
Austria	97.8	106.0	102.3	102.8	106.3	108.7	102.4	104.8	111.8	90.8	100.0
Poland	73.3	116.0	106.3	98.3	100.0	110.1	101.7	101.8	107.7	95.5	114.3
Portugal	99.3	102.3	92.1	93.6	98.5	106.0	108.0	104.2	109.6	108.5	103.7
Romania	**71.0**	**100.0**	**105.7**	**91.4**	**99.5**	**105.5**	**110.3**	**112.9**	**115.9**	**107.8**	**106.1**
Slovenia	86.4	124.6	102.9	104.0	96.3	107.7	102.5	104.6	105.8	103.3	
Slovakia	76.0	194.1	113.1	105.6	70.4	86.0	116.3	106.2	107.3	112.3	100.9
Finland	93.8	115.1					104.7	99.6	98.0		
Sweden	82.0	118.1	113.8	103.4	120.4	83.0	100.7	100.2	102.7	98.2	99.6
Iceland								124.9	113.4	101.6	94.2
Norway	87.6	115.4	104.5	110.6	99.1	97.9	96.8	97.9	105.5	100.3	103.8
United Kingdom	83.6	108.4	111.2	111.2	100.3	114.1	113.7	93.7	91.2	102.9	

Source: Authors' processing based on data from Eurostat.

The concept of circular economy is gaining increasing ground in **Romania**. However, this happens against the backdrop of a systematic lag behind the EU average on most criteria related to transition to a circular economy. Romania finds itself in the early stages of transitioning to a circular economy, as evidenced by the status of its relevant policy framework and more concrete indicators, such as its waste recycling performance. Regarding the *indicators related to transition to the circular economy at the level of the business sector in Romania*, the share of SMEs that do not report difficulties in implementing circular economy activities is 56% of the EU27 score, the share of SMEs that facilitate the recycling of products after use (percentage of the number of innovative enterprises) is only 24.5% of the EU27 score, the share of SMEs that extended the life of products through innovation (percentage of the number of innovative enterprises) is even lower, of only 14% of the EU27 score and the share of SMEs that recycle waste, water or materials for use or sale (percentage of the number of innovative enterprises) is 25% of the EU27 score.

Regarding the circular economy policy framework in **Romania**, it is relatively less advanced as compared to other EU member states. The late start of this transition, together with the delays in legislating a systematic support framework, add to the list of challenges of the green transition in Romania. The lower purchasing power of Romanian consumers inhibits their adoption of products stemming from circular economy practices,

as they are generally perceived as more expensive than the conventional alternatives (Falcan, 2022). Romania only enacted the National Circular Economy Strategy in 2022 (Government of Romania, 2022) and has repeatedly delayed adopting a Waste Management Strategy (adopted only in 2017). However, the concept of circular economy is becoming more and more popular among different interested agents in Romania. As for the private sector, multinational companies in particular engage in events to disseminate knowledge and exchange best practices in the transition to circular production models. In terms of research institutes and non-governmental organizations, Romania has registered an increasing number of organizations dedicated primarily to promoting the transition to a circular economy. Such an example is ROCESP (Romanian Circular Economy Stakeholder Platform), which brings together 130 organizations with the objectives of mapping business initiatives for the circular economy and, in general, promoting relevant activities related to stakeholder engagement and the adoption of good practices. Its members include companies operating in industries such as building insulation materials, specialized waste management (e.g., textiles) or building materials (Falcan, 2022).

4. Conclusions

The *greening of economies* megatrend with important implications for global manufacturing have already had and will continue to have significant impacts on the GVCs, as products and processes will continue to move towards sustainability. Three *main effects* of greening on industrialization and the business sector may be identified: shifting of competitive advantages within industries/sectors to firms with greener business models, products and processes; creation of entirely new markets and industries due to the growing incentives to greening the economies and erosion of the existing competitive advantages especially in the oil and gas-related industries and sectors and in large energy-intensive industries. With such aspects in mind, measuring the *progress towards green economic growth* becomes crucial to guide action and focus policy makers and practitioners, and a large array of specialized indicators have been developed by international organizations such as UNEP, OECD, World Bank, etc., by supra-national political entities such as the European Commission, by national political and/or statistical bodies and by the research community.

Most of such indicators reveal that regularly the high-income countries and a few upper-middle income countries are found in the top 10 according to different approaches and methodologies, and among them we may always find some of the EU27 Member States. That is not surprising, because the transition towards a green/ecological economy is mainly driven by a long-term global trend of diminishing resources and of rising energy and raw material prices, to which in the case of Europe it adds up the growing dependence on imported resources. Thus, in order to meet such challenges, the EU has put in place for decades a number of *policies and strategies* aimed at supporting the transition to a low-carbon and resource-efficient economy, while strengthening the global EU's competitiveness and that of its Member States. In this respect, *eco-innovation* and the transition to a *circular economy* make some of the cornerstones of the current European

agenda for sustainable growth, namely the *European Green Deal*. However, the national performances in greening the EU27 Member States' economies are far from being equal or convergent, and Romania is one of the countries that reveals a relative time lag in adapting the domestic business sector to the requirements of greening the economy, with performances below the EU27 averages in terms of eco-innovation, ecological markets and resource efficiency and introduction of the circular economy. Small advances were, nevertheless, recorded more recently by Romania in all the above-mentioned aspects, and also in adapting its policy and legal framework to speed up the process of greening the economy and in the direct involvement of the business sector in this respect.

References

Acosta, L.A., P. Maharjan, H. Peyriere, L. Galotto, R.J. Mamiit, C. Ho, B.H. Flores, and O. Anastasia. (2019), Green Growth Index: Concepts, Methods and Applications, GGGI Technical report No. 5, Green Growth Performance Measurement (GGPM) Program, Global Green Growth Institute, Seoul.

Ansari, D. and Holz, F. (2020), Between Stranded Assets and Green Transformation: Fossil-Fuel-Producing Developing Countries Towards 2055. *World Development*, *130*.

Chin, F., Cheng, C., and Cantore, N. (2020), The Inclusive and Sustainable Development Index. A Data Envelopment Analysis approach, Inclusive and Sustainable Industrial Development Working Paper Series, Working Paper 9/2020, UNIDO, Vienna.

European Committee of the Regions (2022), Implementing the European Green Deal: Handbook for Local and Regional Governments, Commission for the Environment, Climate Change and Energy

European Environment Agency (2022), Eco-innovation index (8th EAP), https://www.eea.europa.eu/ims/eco-innovation-index-8th-eap

Falk, S., Hernanz, A.R., Seric, A., Steglich, F., Zagato, L. (2021), The future of GVCs in a post-pandemic world, Working Paper 12/2021, UNIDO, Department of Policy, Research and Statistics, Vienna.

Falcan I. (2022), Eco-Innovation Country Profile 2022: Romania, Ecorys.

Federal Council (2012), Sustainable Development Strategy 2012-2015, Bern

Green Growth Knowledge Platform (GGKP) (2013), Moving towards a Common Approach on Green Growth Indicators, A Green Growth Knowledge Platform Scoping Paper.

Guvernul României (2022), Hotărâre pentru aprobarea Strategiei naționale privind economia circulară, Monitorul Oficial Al României, Partea I, Nr. 943 bis/27.IX.2022.

IEA (International Energy Agency) (2019), *The Future of Hydrogen. Seizing Today's Opportunities*. Paris: International Energy Agency.

IEA (International Energy Agency) (2020a), *Global EV Outlook 2020*. Paris: International Energy Agency.

IEA (International Energy Agency) (2020b), *The Oil and Gas Industry in Energy Transitions*. Paris: International Energy Agency.

IRENA (International Renewable Energy Agency) (2020b), *Green Hydrogen: A Guide to Policy Making*. Abu Dhabi: International Renewable Energy Agency.

IRENA (International Renewable Energy Agency) (2020a), *Renewable Capacity Highlights. 31 March 2020*. Available at https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2020/Mar/IRENA_RE_Capacity_Highlights_2020.pdf?la=en&hash=B6BDF8C3306D271327729B9F9C9AF5F1274FE30B.

Koch Blank, T. (2020), *Green Steel: A Multi-Billion Dollar Opportunity*. RMI. Published online 29 September 2020. Available at: https://rmi.org/green - steel - a - multi- billion – dollaropportunity/

Lin, J.Y., Monga, C. & Standaert, S. (2019), The Inclusive Sustainable Transformation Index*, Social Indicators Research*, 143, 47–80.

Loiseau, E., Saikku, L., Antikainen, R., Droste, N., Hansjürgen, B., Pitkänen, K., Leskinen, P., Kuikman, P. and Thomsen, M. (2016), 'Green Economy and related concepts: an overview', *Journal of Cleaner Production*, Vol. 139, pp.361–371, http://dx.doi.org/10.1016/j.jclepro.2016.08.024

Mercure, J.F., Pollitt, H., Viñuales, J.E. et al. (2018), Macroeconomic Impact of Stranded Fossil Fuel Assets*. Nature Climate Change, 8*, pp. 588-593.

Ministerul Muncii și Justiției Sociale (2017), Strategia Națională pentru Locuri de Muncă Verzi 2018 – 2025.

Moll de Alba, Jaime, Valentin Todorov (2022), Measuring and benchmarking the green industrial performance of countries and economies: the GIP index, Working Paper 1/2022, UNIDO, Department of Policy, Research and Statistics, Vienna.

OECD (2017), *Green Growth Indicators 2017*, OECD Green Growth Studies, OECD Publishing, Paris, https://doi.org/10.1787/9789264268586-en

OECD (2011), *Towards Green Growth*, OECD Publishing, Paris, retrieved from https://www.oecd.org/greengrowth/48012345.pdf

PAGE (Partnership for Action in Green Economy) (2017a), *The Green Economy Progress Measurement Framework – Methodology*.

PAGE (Partnership for Action in Green Economy) (2017b), *The Green Economy Progress Framework – Application*.

Reganold, J. P. and Wachter, J. M. (2016), Organic Agriculture in the Twenty-First Century. *Nature Plants, 2*(2), pp. 1-8.

Sachs, J., Schmidt-Traub, G., Kroll, C., Lafortune, G., Fuller, G., Woelm, F. (2020), *The Sustainable Development Goals and COVID-19, Sustainable Development Report 2020*, Cambridge: Cambridge University Press.

Tracker, C. (2021), *Beyond Petrostates: The Burning Need to Cut Oil dependence in the Energy Transition*. Published online 11 February 2021. Available at: https://carbontracker.org/reports/petrostates-energy-transition-report/.

Tilman, A., Brandi, C.,Pegels, A.,Stamm, A., Vrolijk, K., Zintl, T. (2021), COVID-19 – Turning point in the process of industrialization? Working Paper 8/2021, UNIDO, Department of Policy, Research and Statistics, Vienna

UNCTAD (United Nations Conference on Trade and Development) (2020), *World Investment Report 2020. International Production Beyond the Pandemic*. New York and Geneva: United Nations.

UNDESA (United Nations Department of Economic and Social Affairs) (2012), "Issue 1: Green Economy, Green Growth, and Low-Carbon Development – history, definitions and a guide to recent publications" in A guidebook to the Green Economy.

UNEP (2014), Using Indicators for Green Economy Policymaking.

UNEP/ILO/IOE/ITUC (2008), Green Jobs: Towards Decent Work in a Sustainable, Low-Carbon World.

UNEP (2011), Towards a green economy. Pathways to Sustainable Development and Poverty Eradication - A Synthesis for Policy Makers, retrieved from www.unep.org/greeneconomy

UNIDO (2019), *Competitive Industrial Performance Report 2018. Biennial CIP report*, edition 2018, Vienna.

Vogl, V., Åhman, M. and Nilsson, L.J. (2021), The Making of Green Steel in the EU: A Policy Evaluation for the Early Commercialization Phase. *Climate Policy, 21*(1).

Wendling, Z.A., J.W. Emerson, A. de Sherbinin, D.C. Etsy, et al. (2020), Environmental Performance Index 2020. New Haven, CT: Yale Center for Environmental Law and Policy. https://doi.org/10.13140/RG.2.2.21182.51529.

Willer, H., Schlatter, B., Trávníček, J., Kemper, L. and Lernoud, J. (2020), *The World of Organic Agriculture 2020. Statistics and Emerging Trend*s. Frick: Research Institute of Organic Agriculture FiBL and IFOAM.

Wolf, M. J, Emerson, J. W., Esty, D. C., de Sherbinin, A., Wendling, Z. A., *et al*. (2022), *2022 Environmental Performance Index*. New Haven, CT: Yale Center for Environmental Law & Policy. epi.yale.edu.

World Bank (2012), *Inclusive Green Growth: The Pathway to Sustainable Development*, Washington DC: World Bank.