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CARBON FOOTPRINT REPORTING EXAMPLE ON WIG30 INDEX COMPANIES FOR 2021-2022

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ABSTRACT: The purpose of the article is to present the results of the authors' research on the reporting of carbon footprint and carbon emission levels of 30 companies included in the WIG30 index of the Warsaw Stock Exchange for the period 2021-2022. The methodology was based on a literature review on the subject, legal acts and own research, which used non-financial reports of listed companies on information on carbon footprint and emission levels. According to the authors, the article adds value to the literature on the subject, particularly in the collection of source material and its discussion. The topics of the article can form the basis for further detailed empirical research on carbon footprint reporting.

KEYWORDS: carbon footprint, ESG, Greenhouse Gas Protocol (GHG), non-financial reporting

Introduction

In November 2022, the European Parliament adopted the Corporate Sustainability Reporting Directive (SCRD), which requires companies to report on their environmental impact, including the size of their carbon footprint. Sustainability reports prepared in accordance with the CSRD will be based on the so-called double materiality principle. In practice, this means that companies will determine not only financial materiality, as before, but also material environmental impact. The materiality of impact perspective is a look from inside the organisation to the outside, that is, how the company affects the environment.

The CSRD directive aims to standardise and strengthen corporate sustainability reporting requirements. In accordance with the CSRD directive, all large entities and small and medium-sized listed companies will present in their report on activities: environmental, social, human rights and corporate governance issues. This information will be reported according to common European Sustainability Reporting Standards (ESRS). Interested user groups will have greater access to comparable and reliable data on sustainability. Thanks to this, they will also have a tool that will enable them to exert greater influence on business entities operating in their local community.

ESG reports already are mandatory starting January 1, 2024. The non-financial reporting obligation in 2024 is primarily applied to public trust entities (i.e., listed companies, banks, insurance companies, investment funds, etc.) with an average annual number of employees per fiscal year exceeding 500. Sustainability reports are a part of the management report, which means increased responsibility of corporate bodies for this area of reporting.

Sustainability reports will become part of the activity report, which means increased responsibility of the company's governing bodies for this reporting area. Climate change reporting is suggested as a mechanism for mitigating the impact of companies on climate change, particularly their carbon emissions (Baboukardos et al., 2024, p. 1).

In 2024, the European Commission announced a new net greenhouse gas emissions reduction target for the European Union. It calls for a 90% reduction in CO_2 emissions by 2040 compared to 1990. These targets firmly and increasingly direct businesses to use renewable energy, which is expected to result in a lower carbon footprint, and are at the heart of the EU energy policy (Directive, 2003).

Carbon footprint is a very interesting and still not fully understood issue. Investors are paying increasing attention to the carbon footprint as part of their investments. Companies need to provide stakeholders with consistent and complete information that can further assist in investment decisions. As indicated in the literature, the number of social responsibility reports globally and in Poland is growing yearly (Konarzewska, 2020, pp. 24-32).

In practice, a variety of approaches, methodologies and tools are used to calculate carbon footprints, ranging from simplistic online calculators to other more scientific and complex methods. This article presents and discusses the Greenhouse Gas Protocol (GHG) method, which is a global standard for measuring and managing greenhouse gas emissions, and which is used by the listed companies, analysed in the article, to calculate their carbon footprint.

Although carbon footprint reporting has been mandatory since 2024, the authors decided to analyse the reports of companies in the WIG30 index of the Warsaw Stock Exchange. The study was conducted to determine whether these companies reported information on carbon footprint and CO_2 emission levels in 2021-2022. The results are very interesting. The article also explains what a carbon footprint is, describes the methodology for calculating the carbon footprint, and lists examples of ways to reduce it within a company.

Literature Review

The concept of carbon footprint originated in 2005 during the debate on monitoring and controlling greenhouse gas emissions. The origin of the term carbon footprint (CF) is related to ecological footprint (Zarczuk & Klepacki, 2021, p. 86). The ecological footprint indicates how much of the planet's resources are being consumed (Popławski & Rutkowska, 2017, p. 243).

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The devastating impact of climate change on the global economy and local communities worldwide has prompted efforts by governments and international organisations to mitigate these effects. Carbon emissions are now considered the main driver of global climate change, and as a result, companies are now in the spotlight for their efforts to mitigate their impact on climate change by reducing greenhouse gas emissions (Baboukardos et al., 2024, p. 1; Hoffmann & Busch, 2008, pp. 505-520). Due to the extensive attention given to the externalities of environmental issues, the discussion on carbon footprint has gradually risen to the level of national cooperation (She & Yin 2021, p. 1; Hertwich & Peters, 2009, p. 6414).

In this context, reporting regulation of carbon emissions is seen as a mechanism to render firms accountable for their climate change-related externalities and push them to alter their activities (Baboukardos et al., 2024, p. 1). Climate-related reporting has become an integral part of firms' disclosure. Firms greenhouse gas emissions are of major importance to stakeholders and management (Kasperzak et al., 2023, p. 1).

Greenhouse gases are not just carbon dioxide, as is commonly believed. Due to the volume of CO_2 emissions, it has the largest contribution to global warming. According to the GHG Protocol methodology, we can distinguish the following gases that create the greenhouse effect (Załęgowski et al., 2013, p.1): Carbon dioxide (CO_2), Methane (CH_4), Nitrous oxide (N_2O), Sulfur hexafluoride (SF_6), Hydrofluorocarbons (HFCS), Perfluorocarbons (PHCS). Therefore, we can define carbon footprint as the total sum of greenhouse gas emissions caused directly or indirectly by a person, organisation, event or product. The measure of carbon footprint is a ton of carbon dioxide equivalent – tCO_2e. This indicator allows for the comparison of emissions of different greenhouse gases using the same measure, i.e. including their carbon dioxide content (Popławski & Rutkowska, 2017, pp. 245-246).

Fung et al. (2007) indicate that the real effects of corporate reporting are realised through specific channels, both internal and external to the company. They provide motivation to calculate the carbon footprint, mainly the requirements of cooperators (suppliers or recipients) for whom carbon footprint calculation or having an environmental product declaration is a condition for cooperation and accession for the tender (Śliwińska, 2022, p. 14).

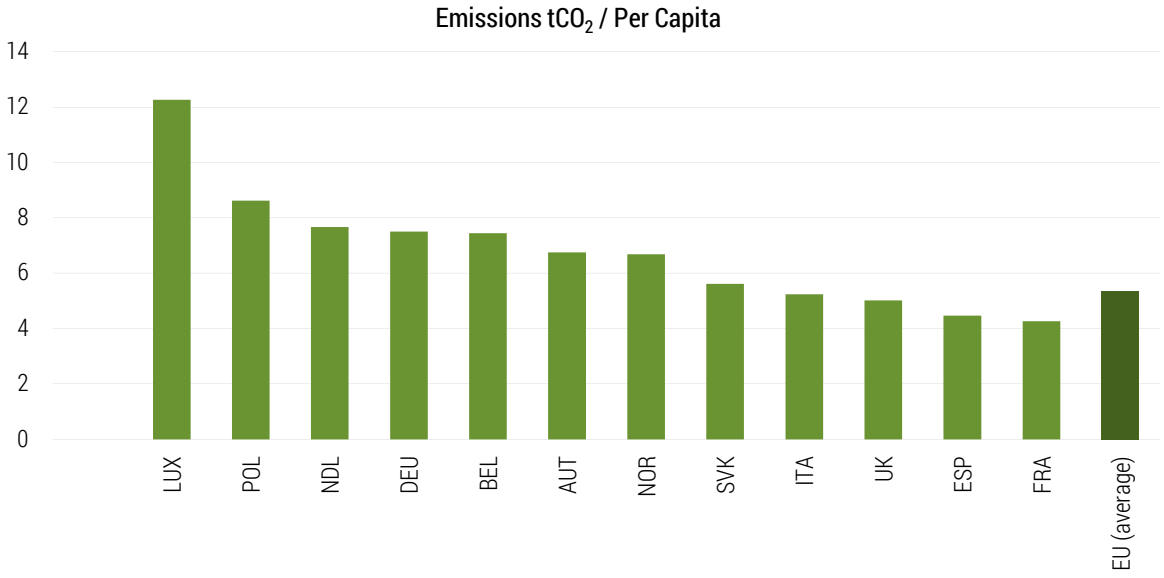

Figure 1. CO_2 emissions per capita, selected European countries, 2021

Source: authors' work based on https://www.iea.org/regions/europe/emissions [01-07-2024].

In practice, companies pay more attention to reducing greenhouse gas emissions. Examples of activities contributing to GHG reduction (Śliwińska, 2022, 19-20): installation of renewable energy sources installations, purchase of certified renewable energy sources, energy saving activities, increasing energy efficiency, optimisation processes, waste heat utilisation, utilisation biogas, thermal modernisation and renovations energy-saving heating and lighting reducing the number of

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materials, e.g. changing caps or packaging, minimising the use of plastic, waste reduction, quantity reduction packaging, use of substitute materials with a lower impact on the climate, use of electronic documents in internal and external communication, digitisation processes and acquisition.

A key issue is the carbon emissions associated with energy generation. On a per capita basis, it tends to be higher in more economically developed countries, but the results can also vary widely depending on the structure of the economy and energy system. Figure 1 shows data on CO_2 emissions per capita in the European Union.

It is also worth noting the evolution of the use of fuels, as an energy source, by European countries. Over the period 2000-2021, European countries began to shift significantly from coal to natural gas, as shown in Figure 2. Unfortunately, the level of use of renewable energy sources still leaves much to be desired.

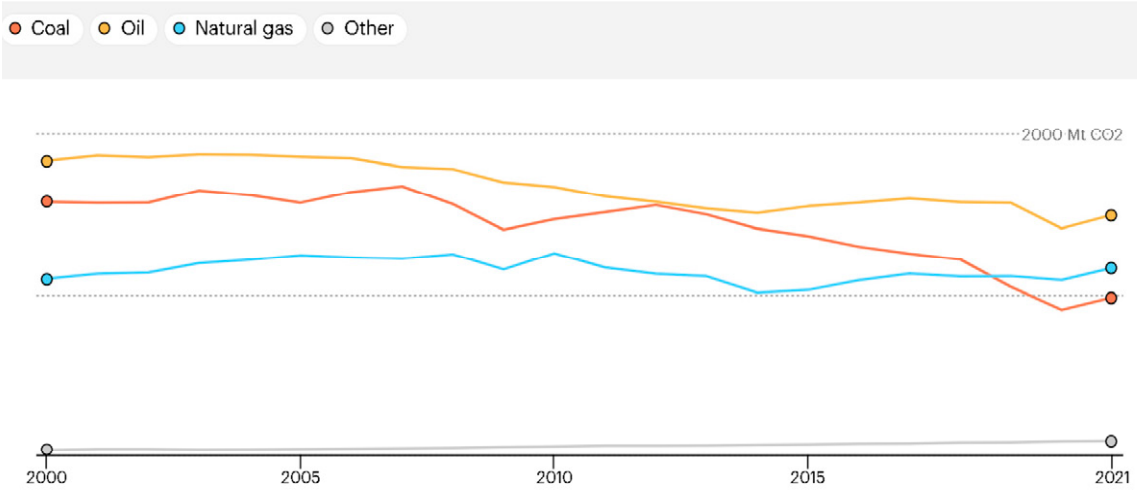

Figure 2. Evolution of CO_2 emissions by fuel in Europe from 2000 to 2021

Source: https://www.iea.org/regions/europe/emissions [01-07-2024].

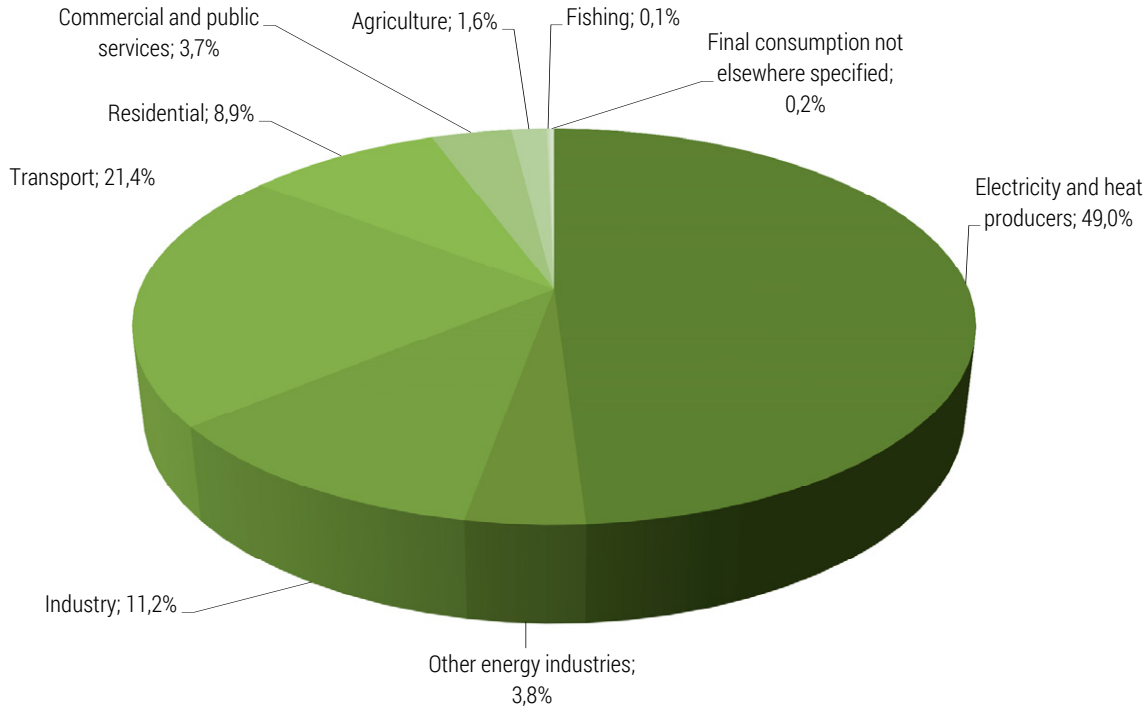

Figure 3. CO_2 emissions by sector, Europe, 2021

Source: authors' work based on https://www.iea.org/regions/europe/emissions [02-07-2024].

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The key role in carbon emissions is played primarily by economic sectors, but also by society itself. The sectoral breakdown of energy-related CO_2 emissions depends on the structure of the economy and the energy system. Power plants generate emissions by burning fuels to generate electricity and heat. In transportation, the vast majority of emissions in most countries come from automobiles, which, despite the rapid development of electric vehicles, are still predominantly dependent on petroleum-based fuels. Fossil fuel heating is the main source of household emissions in most countries. Figure 3 shows CO_2 emissions by sector in Europe in 2021.

The electricity, heat and transport sectors account for 70% of Europe's total CO_2 emissions. Finally, it is also worth mentioning the CO_2 intensity of electricity generation (see Figure 4). Over the period 1990-2023, we can speak of a clear downward trend in Poland in this regard.

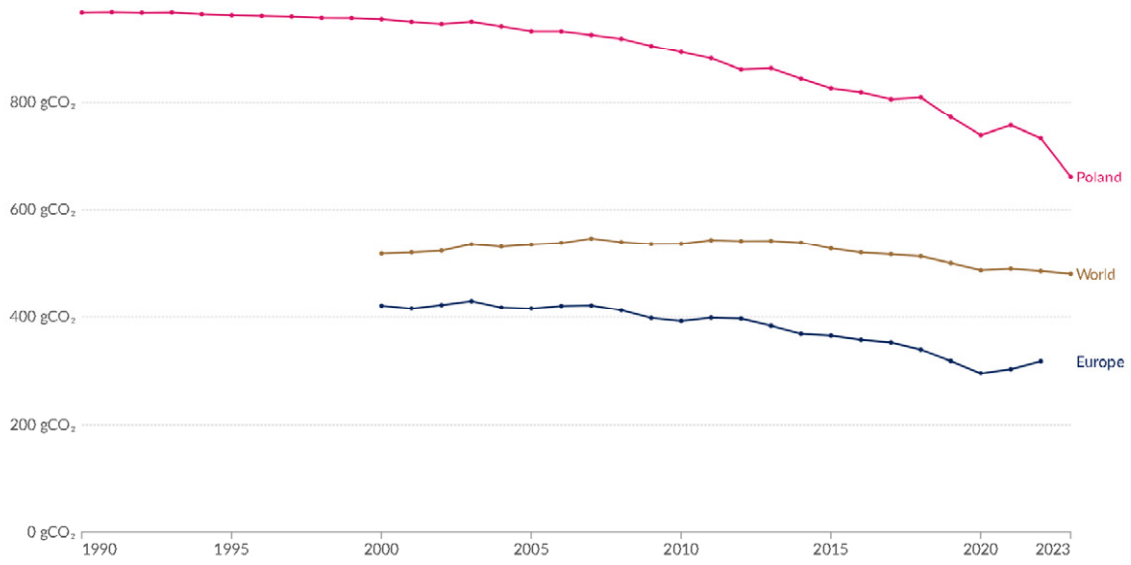

Figure 4. Carbon intensity of electricity generation, 1990 to 2023

Source:https://ourworldindata.org/grapher/carbon-intensity-electricity?tab=chart&region=Europe&country=EU-27~POL~OWID_WRL~OWID_EUR [02-07-2024].

In conclusion, it should be stated, as indicated, among other things, by the literature, that the reporting of information on the carbon footprint, including the level of CO_2 emissions by companies, is becoming an increasingly important element of company reporting. In addition, companies' stakeholders expect and demand increasingly detailed information in this regard.

The primary tool for calculating a company's carbon footprint is the Greenhouse Gas Protocol (GHG Protocol), whose methodology is discussed in the next chapter.

Greenhouse Gas Protocol – methodology

Accounting for greenhouse gas emissions is now an important concern for corporate stakeholders. It should be noted that the technical and scientific aspects of accounting for greenhouse gas emissions are complex. It is a fairly new research area. First, like financial accounting, GHG accounting can be conducted either for voluntary or regulatory purposes. Firms may be required to file financial accounting reports with the government, but they also create them for purposes of planning and management (Green, 2010, p. 3).

The empirical part presents data from companies in their ESG reports on carbon footprint emissions. The presented data on CO_2 emissions by these companies were calculated by them based on the Greenhouse Gas Protocol (GHG Protocol). The Greenhouse Gas Protocol stands out as a specific standard for calculating and reporting carbon emissions. GHG is a standard for calculating carbon footprint with requirements and guidelines for estimating GHG emissions according to the following ranges:

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- Scope 1 Emissions (direct emissions resulting from):
  - combustion of fuels in stationary installations,
  - fuel combustion in cars belonging to the organisation's fleet.
- Scope 2 Emissions (indirect emissions resulting from):
  - generation of electricity and heat supplied to the enterprise by the energy supplier.
- Scope 3 Emissions (other indirect emissions resulting from):
  - extraction or production of raw materials or products,
  - to produce capital goods,
  - commuting of employees or taking business trips,
  - production waste management,
  - use of the products produced by companies,
  - end-of-life use of packaging or products.

Figure 5 shows the concept of a company's total GHG emissions, which make up the GHG methodology.

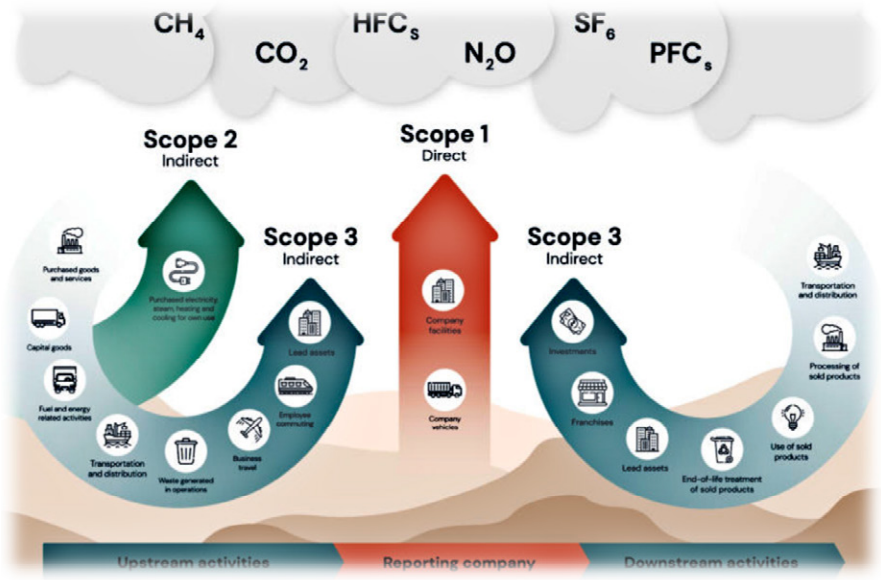

Figure 5. Overview of scopes and emissions across a value chain

Source: https://rheaply.com/blog/scope-1-2-3-emissions/ [02-07-2024].

Scope 1 is carbon emissions under the direct control of the organisation, that is, greenhouse gas emissions from sources owned or controlled by the company.

Scope 2 carbon emissions are emissions that are not directly controlled by organisations, but depend on their operations. These are emissions that a company causes indirectly by producing the energy it buys and uses. These emissions result from energy purchased from external sources for electricity, heating or cooling.

Scope 3 carbon emissions represent the indirect impact of the organisation and emissions at the end of the value chain. All other indirect emissions occurring in the value chain that are not produced by the company itself in all processes related to the production, transportation and use of its products and are not the result of activities arising from assets owned or controlled by the company.

Figure 6 presents the Pathway of the impact of greenhouse gas emissions.

To determine the monetary cost of greenhouse gas emissions (GHG Value Total), companies use the following equation (IFVI, 2024, p. 27):

$$\Sigma\ (Em_{scope} * V_f)\ \text{from Scope 1 – 3} = \text{GHG Value}_{Total} \quad (1)$$

where:
Em_{scope} – represents GHG emissions from each scope category,
V_f – represents the value factor.

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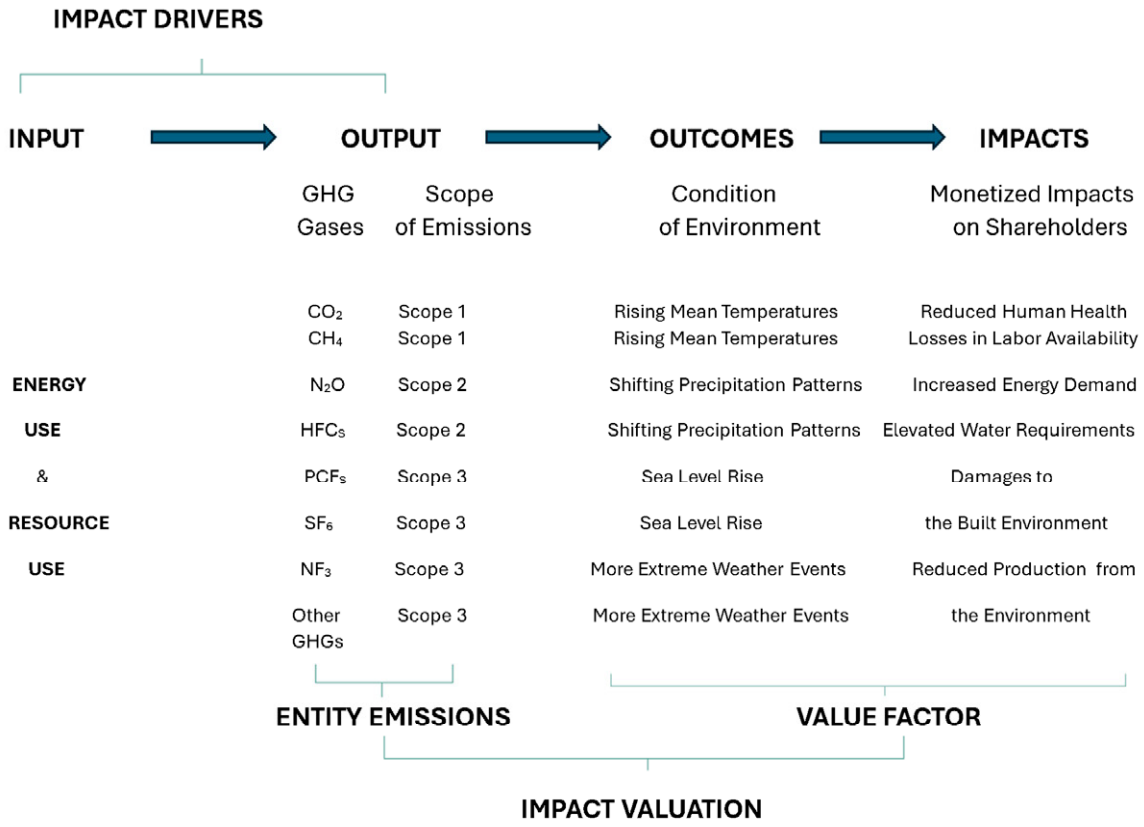

Figure 6. *GHG emissions impact pathway*

Source: authors' work based on International Foundation for Valuing Impacts (2024). Environmental Methodology 1. Greenhouse Gas Emissions. Topic Methodology (Exposure Draft), p. 20.

The scopes considered in the sum include Scope 1, Scope 2, Scope 3 Upstream, and Scope 3 Downstream impacts.

Equation (1) can be broken out into four individual equations (IFVI, 2024, p. 27):

$$Em_{scope1} * V_f = GHG\ Value_{scope1} \quad (2)$$

$$Em_{scope2} * V_f = GHG\ Value_{scope2} \quad (3)$$

$$Em_{scope3up} * V_f = GHG\ Value_{scope3upstream} \quad (4)$$

$$Em_{scope3down} * V_f = GHG\ Value_{scope3downstream} \quad (5)$$

The value factor (V_f) is the same in all equations above. Each range of greenhouse gas emissions should be separated, in order to increase the transparency comparability and usability of the information. When determining the value factor, an approach is used coal (SCC). SCC is calculated using Integrated Assessment Models (IAM) that take into account outcomes and societal impacts of each metric tonne of CO_2e emitted (IFVI, 2024, p. 27).

In addition to greenhouse gas emissions, ESRS E1 obliges companies to disclose other indicators e.g. (GPW, European Bank for Reconstruction and Development, 2023, p. 6): energy consumption and its sources, greenhouse gas removal and gas removal projects greenhouse gases financed by emission credits carbon dioxide, anticipated financial consequences resulting from a significant physical and transition risks and potential opportunities climate-related.

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Research and results

As part of the empirical chapter, the authors analysed 30 companies included in the WIG30 index of the Warsaw Stock Exchange in terms of whether these companies disclosed information about their carbon footprint externally in 2021-2022. The analysis of reports provides grounds for stating that most companies have developed a sustainable development strategy. In their reports, companies strongly emphasise increasing employees' awareness of their impact on the environment. The main actions taken by companies to reduce greenhouse gas emissions include: development of climate policy, expansion of the catalog of environmental indicators, development of a Scope 3 approach to GHG emissions, building an ecological offer that will attract customers, development of local communities, strengthening the transparency of ESG policy.

Table 1 presents basic financial data describing the economic and financial potential of these entities, which is important due to the impact of these entities, among others on the environment in the scope of business operations and market positions on the Polish market of these entities.

Table 1. Important financial data characterising the analysed companies for 2021-2022

Company	Sector	Year's	Sales revenues (in thousands of PLN)	EBITDA (in thousands of PLN)	Balance sheet total (in thousands of PLN)
Alior Bank SA	Financial	2021	3 036 642	-	83 048 372
		2022	5 390 166	-	82 877 172
Allegro SA	Trade	2021	5 352 870	1 993 740	16 869 877
		2022	9 004 916	2 000 536	19 205 795
Asseco SA	IT	2021	14 498 100	2 245 200	18 570 300
		2022	17 370 100	2 686 800	20 130 500
Bank Millenium SA	Financial	2021	2 842 093	-	103 913 908
		2022	4 999 897	-	110 941 969
Benefit Systems SA	Recreation	2021	954 938	205 088	2 180 798
		2022	1 909 120	444 827	2 234 021
Budimex SA	Construction	2021	7 911 192	733 692	6 863 318
		2022	8 619 054	714 814	7 387 208
CCC SA	Trade	2021	5 638 600	56 900	6 647 400
		2022	7 541 700	581 400	7 500 700
CD Projekt SA	Gaming	2021	888 172	337 632	2 158 735
		2022	952 576	494 119	2 276 331
Cyfrowy Polsat SA	Telecommunications	2021	12 444 000	8 258 400	32 237 000
		2022	12 915 300	4 139 800	32 306 600
Dino Polska SA	Trade	2021	13 362 012	1 271 336	7 168 531
		2022	19 801 622	1 837 948	9 003 059
Enea SA	Energy	2021	21 274 589	3 512 748	34 657 143
		2022	30 076 258	2 163 231	37 434 972
Eurocash SA	Trade	2021	26 281 431	708 162	8 487 299
		2022	30 857 665	1 000 301	8 669 823
Grupa Azoty SA	Chemical	2021	15 901 259	1 638 161	23 644 705
		2022	24 657 853	1 621 662	25 865 644

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Company	Sector	Year's	Sales revenues (in thousands of PLN)	EBITDA (in thousands of PLN)	Balance sheet total (in thousands of PLN)
Grupa Kęty SA	Metallurgy	2021	4 794 250	899 720	3 526 815
		2022	5 979 949	1 030 968	3 886 143
JSW SA	Mining	2021	10 629 100	2 482 500	15 961 800
		2022	20 198 500	10 919 200	27 070 800
KGHM Polska Miedź SA	Mining	2021	29 803 000	10 418 000	48 027 000
		2022	33 847 000	9 000 000	53 444 000
Kruk SA	Financial	2021	1 192 664	907 971	5 909 400
		2022	1 474 567	1 094 029	7 681 082
LPP SA	Trade	2021	7 848 079	1 226 069	10 353 768
		2022	11 338 788	2 346 797	14 743 715
mBank SA	Financial	2021	4 454 007	-	198 373 374
		2022	9 265 806	-	209 892 113
Orange Polska SA	Telecommunications	2021	11 928 000	4 941 000	26 157 000
		2022	12 488 000	3 702 000	26 766 000
PEKAO SA	Financial	2021	5 870 356	-	250 566 605
		2022	11 111 000	-	281 139 000
Pepco Group SA	Trade	2021	4 121 801	578 606	3 536 988
		2022	4 822 819	664 915	3 999 328
PGE SA	Energy	2021	52 772 000	9 535 000	89 274 000
		2022	73 435 000	8 661 000	105 778 000
PKN Orlen SA	Petrol	2021	131 341 000	19 211 000	106 754 000
		2022	282 415 000	56 074 000	313 177 000
PKO BP SA	Financial	2021	10 568 000	-	418 086 000
		2022	19 751 000	-	431 447 000
PZU SA	Financial	2021	23 232 000	-	402 129 000
		2022	25 934 000	-	429 186 000
Santander Bank Polska SA	Financial	2021	6 362 285	-	243 017 264
		2022	12 538 584	-	257 517 225
Tauron SA	Energy	2021	25 164 000	3 429 000	40 075 000
		2022	36 311 000	3 157 000	45 320 000
Text SA	IT	2021	179 010	116 895	122 318
		2022	222 515	139 987	137 752
X Trade Brokers SA	Financial	2021	623 487	285 744	3 147 743
		2022	1 444 180	897 679	4 114 323

Source: authors' work based on the consolidated financial statements of the analysed companies, data available on their websites.

Table 2 presents the collected data from the ESG reports of the analysed companies regarding reporting the level of CO_2 emissions in scopes 1, 2 and 3 for 2021-2022. Despite the lack of obligation to report the level of greenhouse gas emissions, in the analysed period, over 90% of companies reported such data, which can be considered a positive aspect.

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Table 2. Reported emission volumes in the analysed companies for 2021-2022

Company	Sector	Year's	Scope 1 (in tons of eCO2)	Scope 2 (in tons of eCO2)	Scope 3 (in tons of eCO2)
Alior Bank SA	Financial	2021	-	-	-
		2022	-	-	-
Allegro SA	Trade	2021	580	11 122	206 039
		2022	1 422	16 440	17 862
Asseco Poland SA	IT	2021	1 353	5 422	116
		2022	1 366	4 344	209
Bank Millenium SA	Financial	2021	2 500	14 183	18 856
		2022	2 441	8 180	13 107
Benefit Systems SA	Recreation	2021	1 601	21 113	4 047
		2022	2 165	34 383	4 064
Budimex SA	Construction	2021	68 361	19 913	-
		2022	61 422	9 958	-
CCC SA	Trade	2021	4 259	43 195	-
		2022	3 858	39 690	1 024 781
CD Projekt SA	Gaming	2021	37	1 664	-
		2022	27,00	1 686,00	321 490,07
Cyfrowy Polsat SA	Telecommunica-tions	2021	8 055	69 484	42 813
		2022	7 514	5 037	84 023
Dino Polska SA	Trade	2021	80 982	162 288	-
		2022	78 739	165 599	-
Enea SA	Energy	2021	22 415 951	292 410	-
		2022	23 084 025	270 244	19 294 758
Eurocash SA	Trade	2021	45 790	116 618	5 436 685
		2022	47 566	95 913	5 539 224
Grupa Azoty SA	Chemical	2021	7 491 000	1 837 000	-
		2022	6 069 541	-	-
Grupa Kęty SA	Metallurgy	2021	38 794	138 924	-
		2022	32 177	104 302	549 826
JSW SA	Mining	2021	7 160 000	760 000	-
		2022	6 610 000	970 000	-
KGHM Polska Miedź SA	Mining	2021	2 440 267	2 326 283	-
		2022	2 261 588	2 359 030	1 848 993
Kruk SA	Financial	2021	2 686	1 915	-
		2022	2 262	1 249	3 374
LPP SA	Trade	2021	4 421	10 267	2 865 953
		2022	13 762	7 827	2 631 555
mBank SA	Financial	2021	3 295	12 650	8 275
		2022	3 554,03	4 565,89	11 069

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Company	Sector	Year's	Scope 1 (in tons of eCO2)	Scope 2 (in tons of eCO2)	Scope 3 (in tons of eCO2)
Orange Polska SA	Telecommunications	2021	32 700	334 000	1 605 000
		2022	30 300	285 000	-
PEKAO SA	Financial	2021	8 104	64 153	-
		2022	8 687	38 762	-
Pepco Group SA	Trade	2021	98 521	-	-
		2022	106 214	-	-
PGE SA	Energy	2021	70 986 410	2 183 395	24 722 424
		2022	70 389 145	2 196 571	25 117 565
PKN Orlen SA	Petrol	2021	20 138 340	1 430 330	84 978 372
		2022	21 095 387	1 560 250	107 508 801
PKO BP SA	Financial	2021	13 388	37 304	3 536
		2022	14 716	33 784	18 277
PZU SA	Financial	2021	25 096	101 900	24 500
		2022	26 296	73 422	20 893
Santander SA	Financial	2021	5 957	15 513	95
		2022	5 265	14 234	870
Tauron SA	Energy	2021	13 702 825	1 680 893	21 349 121
		2022	13 773 702	1 552 932	20 784 008
Text SA	IT	2021	-	-	-
		2022	-	-	-
X Trade Brokers SA	Financial	2021	8	561	-
		2022	12	705	-

Source: the data comes from the ESG reports of the analysed companies for 2021-2022, data available on their websites.

The data presented in Table 2 indicate that 93% of the analysed enterprises reported information on the level of emissions. This certainly proves the management's high awareness. The data from the table also show that companies most often did not report emission data from Scope 3. Table 3 presents aggregate data by sector.

Table 3. Reported emission volumes in the analysed companies for 2021-2022

Sector	Year's	Scope 1 (in tons of eCO2)	Scope 2 (in tons of eCO2)	Scope 3 (in tons of eCO2)
Financial	2021	61 035	248 179	55 262
	2022	63 233	174 903	67 590
Trade	2021	235 534	352 020	9 714 099
	2022	251 562	325 471	9 533 791
Energy	2021	107 105 186	4 156 698	46 071 545
	2022	107 246 872	4 019 747	65 196 331
IT	2021	1 353	5 422	116
	2022	1 366	4 344	209

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Sector	Year's	Scope 1 (in tons of eCO2)	Scope 2 (in tons of eCO2)	Scope 3 (in tons of eCO2)
Telecommunications	2021	40 755	403 484	1 647 813
	2022	37 814	290 037	84 023
Mining	2021	9 600 267	3 086 283	-
	2022	8 871 588	3 329 030	1 848 993
Petrol	2021	20 138 340	1 430 330	84 978 372
	2022	21 095 387	1 560 250	107 508 801
Recreation	2021	1 601	21 113	4 047
	2022	2 165	34 383	4 064
Construction	2021	68 361	19 913	-
	2022	61 422	9 958	-
Gaming	2021	37	1 664	-
	2022	27	1 686	321 490
Metallurgy	2021	32 177	104 302	549 826
	2022	32 177	104 302	549 826
Chemical	2021	7 491 000	1 837 000	-
	2022	6 069 541	-	-

Source: authors' work based on the data in Table 2.

Among the companies included in the financial sector (PKO SA, PEKAO SA, PZU SA, Santander Bank SA, Kruk SA, mBank SA, Alior Bank SA, Bank Millenium SA, XTB SA), one can observe an increase in issuance levels in Scope 1 and 3, with the increase in issuance in Scope 3 being the largest (more than 20%). The banks analysed have adopted a credit policy for carbon-intensive sectors. The policy will aim to gradually reduce lending to entities that base their energy sources on coal and lignite. The banks are conducting intensified work to determine the emissivity of their asset portfolios.

Companies involved in commerce (Dino Polska SA, Allegro SA, LPP SA, Pepco Group SA, CCC SA, Eurocash SA) reported a decrease in Scope 2 and 3 emissions and an increase in Scope 1 emissions. Companies in this group point to the following as the most important measures to reduce CO_2 emissions: increasing the purchase of energy from renewable energy sources, building photovoltaic farms, introducing new packaging, and protecting water resources.

Companies from the energy sector (Enea SA, PGE SA, Tauron SA) demonstrated stable emissions in scopes 1 and 2 and a significant increase in scope 3 (over 40%). The main activities reducing CO_2 emissions include: reducing energy consumption, reducing water consumption, sustainable energy consumption, waste management, and new energy-saving investments.

Companies from the telecommunications industry (Asseco Poland SA, Orange SA) are characterised by a decrease in emission levels at each level from 1 to 3. However, it should be noted that Orange SA did not report scope 3 for 2022, hence the aggregate data for this scope are incomparable.

Companies from the mining sector (KGHM SA, JSW SA) also reduced their emissions in scope 1, while in scope 2 they showed higher emissions. JSW did not report the scope of all three emissions, so no conclusions can be drawn. The companies indicate that protecting the natural environment and the impact of their operations is their priority. The main activities reducing CO_2 emissions include: the use of hydrogen technologies in production processes, the development of electromobility, replacing conventional energy sources with emission-free sources, and the use of CCS/CCU technology for CO_2 management.

Group Azoty SA, representing the chemical sector, was the only one to provide the least amount of information on emission. The worst situation was in 2022, where only scope 1 emissions were reported.

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The surveyed group of companies also included two companies (Alior Bank SA and Text SA) that did not present any data in their emissions reports, with the companies emphasising that they care about environmental impact.

Conclusions

Reporting greenhouse gas emissions is of great importance today, as the amount of emissions has a direct impact on the evaluation of companies' performance. The GHG Protocol is currently the most widely used system for reporting greenhouse gas emissions. Reporting information on carbon footprint and CO_2 emission levels has tangible benefits for the company, which can be divided into three categories: environment, economy and image. Given the policies of the European Union, companies' control of their carbon footprint enables them to access EU funding tools (taxonomy).

The study conducted by the authors has a cognitive aspect. Conclusions formulated as a result of the analysis carried out in this article allow us to conclude that the companies in the research sample analysed, despite the lack of mandatory regulations for reporting information on the carbon footprint in 2021-2022, have overwhelmingly presented such data in their non-financial reports. According to the authors, this may indicate a high awareness on the part of company management of the information needs of external stakeholders on the carbon footprint, as well as on the level of CO_2 emissions of a given company. In the survey sample analysed, only two of the thirty companies did not report information on CO_2 emissions, so the percentage of reporting companies was impressive (93%). Carbon footprint analysis can provide a starting point for maximising efficiency and optimising products and their supply chains for sustainability.

The analysis of the reports of the analysed companies also leads to the conclusion that not all companies have adopted a zero-carbon strategy, undoubtedly depending on external pressures, but also on the internal policies of company management. Analysis of the reports also shows that the vast majority of companies have taken, are taking and also intend to take appropriate measures in the future to reduce CO_2 emissions.

The authors encourage Readers to expand their knowledge of the carbon footprint, and the authors themselves will conduct further research in this area, including how greenhouse gas reporting can be improved.

The contribution of the authors

Conception, B.W., J.P. and S.T.; literature review, B.W., J.P. and S.T.; acquisition of data, B.W., J.P. and S.T.; analysis and interpretation of data, B.W., J.P. and S.T.

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Bogusław WACŁAWIK • Joanna POPŁAWSKA, Sylwester TABOR

RAPORTOWANIE ŚLADU WĘGLOWEGO NA PRZYKŁADZIE SPÓŁEK Z INDESKU WIG30 GIEŁDY PAPIERÓW WARTOŚCIOWYCH W WARSZAWIE ZA LATA 2021-2022

STRESZCZENIE: Celem artykułu jest przedstawienie wyników badań autorów dotyczących raportowania śladu węglowego przez 30 spółek wchodzących w skład indeksu WIG30 Giełdy Papierów Wartościowych w Warszawie za lata 2021-2022. Metodologia została oparta na przeglądzie literatury przedmiotu, aktów prawnych oraz badaniach własnych, w których wykorzystano raporty niefinansowe spółek giełdowych dotyczące informacji o poziomie śladu węglowego i emisji dwutlenku węgla. Artykuł, zdaniem autorów, wnosi wartość dodaną do literatury przedmiotu, w szczególności w zakresie zebrania materiału źródłowego i jego omówienia. Tematyka artykułu może stanowić podstawę do dalszych szczegółowych badań empirycznych w zakresie raportowania śladu węglowego.

SŁOWA KLUCZOWE: ESG, Greenhouse Gas Protocol (GHG Protocol), sprawozdawczość niefinansowa, ślad węglowy.

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