

ACHIEVING ENVIRONMENTAL SUSTAINABILITY IN INDUSTRIAL VALUE CHAINS

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Introduction. The 2030 Agenda for Sustainable Development clearly outlines the need for actions to deliver on changes in consumption and production patterns. For the first time, an independent global goal was identified – Goal 12: Responsible consumption and production, which is designed to create the new type of material basis for the realization of all other the challenges of sustainable development, including targets on economic growth in harmony with nature, social development, protecting the environment and tackling climate change.

As emphasized in numerous forums and in the current UN reports, the conventional growth patterns exploiting natural resources are increasingly ill adapted to new economic challenges of increasingly evident resource constraints, rising cleaner production requirements, and energy management. However, industry remains today the biggest user of natural raw materials and energy among all other economic activities, and in most countries, the wasteful production and consumption patterns are not fundamentally changed.

It is clear that the strengthening of material and technical foundations for sustainable development of society must come through pursuing sustained economic reforms aimed at reducing dependence on limited sources of resources and energy. Generally speaking, production systems must evolve from ‘linear’ to ‘circular’ patterns, reducing the need for natural materials, water and energy, reducing pollutant emissions and discharges, in particular toxic substance and greenhouse gases, and wastes generated.

Taking into account the realities of the context of Ukraine's European integration, the problem of achieving environmental sustainability in industry is not only one of the main political challenges for the country, but also a powerful opportunity to get out of extremely critical situation with the resources and waste.

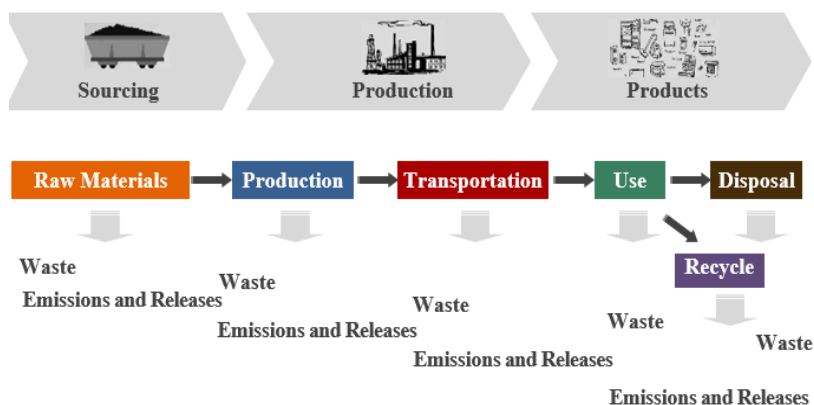
The purpose of the article was to broaden the understanding of sustainability of industry, which goes beyond the traditional production model of Take-Make-Waste. Research proves that Ukraine is included in European industrial value chains, and has a certain responsibility for their environmental sustainability.

Presentation of the main research. According to the UN, the responsibility of production and consumption should cover all global industrial value chains, linking the entire sequence of activities from raw material extraction, production, design, research and development to marketing, delivery and disposal after use.

The greater implementation of the principles and standards of sustainability by all participants in production processes opens up new avenues for increasing the development momentum in and around the value chains. In that process, it is especially important to improve the sustainability of commodity producers that start value chains, and are the most polluting industries (see Figure 1). Obviously, these are mostly developing countries and many new countries with economies in transition such as Ukraine (Palekhov & Palekhova, 2019).

Figure 1

A starting points for responsible consumption and production in industrial value chains



Globalization of business operations and the involvement of companies in international industrial value chains offer some new opportunities for improvement of the economic capacity and structural transformation.

Expanding access of the poor countries to international markets that is currently under way, however, not limited to the trade preferences and concessions accorded to them, but also extended to demands related to the targets of Goal 12. Responsible consumption and production, as we know, in general imply a minimization of the use of natural resources; reduction and caution in the use of toxic materials; as well as reduction the emissions of waste and pollutants over the life cycle of the product.

The UN has defined 11 Targets and 13 Indicators for SDG 12. Targets specify the thematic issues and problems in which the global community intends to produce results from the perspective of sustainable development for a period of 15 years. In addition, indicators represent the metrics for monitoring and reviewing progress on the number and status of their implementation. The metrics for these indicators are detailed and refined by the Inter-Agency and Expert Group on SDG Indicators (UNSD, 2021).

At the same time, not all indicators included into the global SDG indicator framework are fully used for reporting by key international organizations (UN specialized agencies, OECD, EU bodies, etc.). Some of them are used in reporting for OECD countries only. In most cases, the global reports lack explicit indicators for measuring the main environmental problems of the post-Soviet countries, such as environmental efficiency and environmental management, material and energy consumption. Therefore, analysts additionally use a number of other indicators, for example: material footprint; GDP per unit of energy use; the number of ISO 14001 certificates; and Environmental Performance Index (EPI), etc. (Palekhov & Palekhova, 2021).

On the other hand, not all Global Targets for Goal 12 are included in the sustainable development agenda of a number of developing countries and transition economies. Particularly in Ukraine, as shown in the Table 1, there is a lack of a number of targets that would promote the introduction of sustainable production and consumption models, for example - 12.6-12.7, 12.A, 12.C.

Table 1

*Relevance of Ukrainian Targets for SDG12 to Global Targets
(compiled from MEU, 2017)*

Global Targets for SDG 12	Ukrainian Targets for SDG 12
12.2 By 2030, achieve the sustainable management and efficient use of natural resources	12.1 Reduce resource consumption of the economy
12.4 By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks...	12.3 Ensure sustainable use of chemicals through innovative technologies and production
12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse	12.4 Reduce the amount of waste generation, and increase recycling and reuse through innovative technologies and production
12.6 Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle	
12.7 Promote public procurement practices that are sustainable, in accordance with national policies and priorities	
12.A Support developing countries to strengthen their scientific and technological capacity to move towards more sustainable patterns of consumption and production	
12.C Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances....	

At the same time, increasing global integration, industry complementarity and specialization lead to increasing cross-border challenges, as well as to difficulties in achieving sustainability in global value chains and production networks. The dependency between sustainability of global chains and level of responsibility of specific industries can be gauged by viewing local industrial segments in national economies as parts, or 'nodes', of global production chains. In the case of Ukraine, as shown in Table 2, the industries that present the biggest environmental impact in terms of energy consumption and pollution, make up the main share in the export of industrial products of the country, i.e. take part in global value chains (AEC, 2021).

Table 2

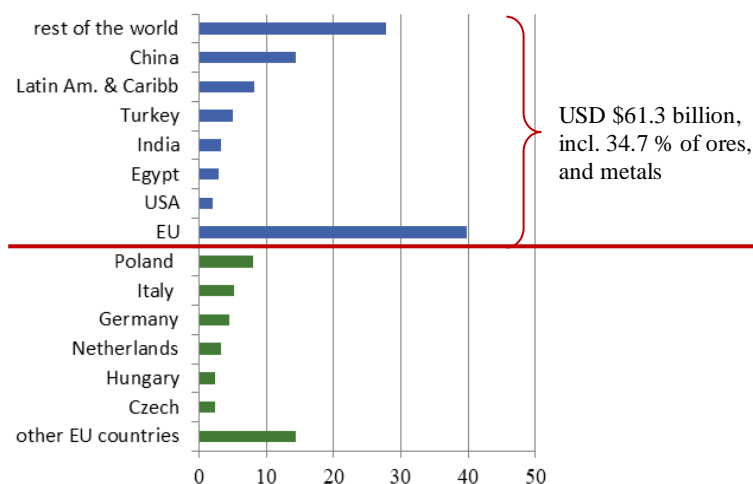
Top 10 export commodities of Ukraine, 2018 to 2020 (compiled from UN Comtrade, 2020)

HS code	Commodities	Value (million US\$)			%
		2018	2019	2020	
All Commodities, million US\$		47 334.7	50 054.4	49 230.8	100
1512	Sunflower-seed, safflower or cotton-seed oil	4 113.4	4 273.5	5 319.9	10.8
1005	Maize (corn)	3 506.1	5 218.3	4 885.1	9.9
2601	Iron ores and concentrates, including roasted iron pyrites	2 869.0	3 397.8	4 239.3	8.6
1001	Wheat and meslin	3 004.4	3 658.4	3 594.2	7.3
7207	Semi-finished products of iron or non-alloy steel	3 002.9	2 860.0	2 746.4	5.6
7208	Flat-rolled products of iron or non-alloy steel	2 193.1	1 943.8	1 599.2	3.2
8544	Insulated (including enamelled or anodised) wire, cable	1 476.6	1 465.1	1 351.0	2.7
1205	Rape or colza seeds, whether or not broken	1 010.9	1 282.4	1 007.1	2.1
2306	Oil-cake and other solid residues	921.4	1 012.4	1 177.8	2.4
7201	Pig iron and spiegeleisen in pigs, blocks or other primary forms	1 052.6	801.8	922.2	1.9

For Ukraine, the mining and metallurgy are the main ones for the country's GDP; in January-November 2021, the products of these industries (ores, and metals and preparations thereof) accounted for 34.7 per cent of the country's total merchandise exports (see Figure 2). And it is these industries that have led to the low ratings of the country on environmental sustainability indicators: 89th place in the ranking of Environmental Performance Index (based on 24 performance indicators across ten issue categories covering environmental health and ecosystem vitality); and 115th place in the ranking of GDP per unit of energy use (Palekhov & Palekhova, 2021).

Figure 2

Geographic structure of Ukrainian merchandise exports, January-November 2021, % (compiled from Ukrstat, 2021)



Note: Excludes statistical data for the Autonomous Republic of Crimea and the city of Sevastopol, Ukraine, temporarily occupied by the RF.

If considering that approximately 34 per cent of Ukrainian mining and metallurgical products are exported to Europe, the significant impact of these industries on the sustainability of the European economy becomes obvious.

Conclusion. Today the development of the Ukrainian industry, especially the mining and metallurgy (steel and non-ferrous metals) encountered the serious challenges in meeting the requirements of SDG 12. As these industries claim sufficient participation in European value chains, they will have to comply with the sustainability demands (i.e. environmental and energy) that made on industrial companies by the EU. It should also be clear that moving towards responsible production and consumption patterns is not just agreed policies at the national level, but consistent interaction with businesses, especially large ones, in order to intensive promote environmental sustainability in key sectors of the country's economy.

References

AEC. (2021). The Atlas of Economic Complexity. <https://atlas.cid.harvard.edu/explore?country=228&product=undefined&year=2019&productClass=HS&target=Product&partner=undefined&startYear=undefined>

MEU. (2017). Sustainable Development Goals: Ukraine. *National Baseline Report*. Ministry of Economic Development and Trade of Ukraine.

Palekhov, D., & Palekhova, L. (2019). Responsible Mining: Challenges, Perspectives and Approaches. *Sustainable Global Value Chains. Natural Resource Management in Transition*. Eds.: Giovannucci D., Hansmann B., Palekhov D., Schmidt M. Vol. 2. Springer-Verlag, Berlin Heidelberg (521–544). https://doi.org/10.1007/978-3-319-14877-9_28.

Palekhov, D., & Palekhova, L. (2021). Environmental sustainability in achieving the sustainable production and consumption: challenges of a Post-Soviet transition economy. *Transposition of the Acquis Communautaire – Migration and Environment*. Umweltrecht in Forschung und Praxis 66. Verlag Dr. Kovač, Hamburg, 60–87.

UN Comtrade. (2020). International Trade Statistics Yearbook. Vol. 1. *Trade by Country*. United Nations, New York.

UNSD. (2021). United Nations Statistics Division. *SDG Indicators: Metadata Repository*. <https://unstats.un.org/sdgs/metadata/>.

Ukrstat. (2022, January). <http://www.ukrstat.gov.ua/express/expr2022/01/03.pdf>