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Project BSB1021 CIRCLECON
Project title: Knowing Circular Economy in Black Sea Basin
1.2 ACTIVITY TITLE: Regional Specific Study

BSB-CIRCLECON
Regional Study in Odesa region, Ukraine: processes, effects and challenges

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Programme priority	2. Promote coordination of environmental protection and joint reduction of marine litter in the Black Sea Basin
Programme priority specific objective	2.2 Promote common awareness-raising and joint actions to reduce river and marine litter
Project title:	Knowing Circular Economy in Black Sea Basin
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December, 2021

Contents

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Executive Summary

The Executive Summary should summarize the key findings of your regional study and messages that were considered as the most relevant ones by stakeholders. It should be organized according to the main sections of the regional study.

The current study was drafted in favor of Project partner 4 Municipal Institution "Grant office "ODESA 5T" based on the methodology and specifications developed by VFU which are common for all partners as to insure compatibility of results and comparability of data.

The approach of the study constitutes both quantitative and qualitative methods. The aim is to describe in detail in quality and quantity terms the current situation of waste management and circular economy issues, especially, waste collection – waste treatment - waste recycling – waste reuse main environmental challenges in each area –soil, area and water pollution status - general people behavioral patterns related to waste.

The aim of the current study is to provide up-to-date comparative data of the status of Ukraine and especially the Odesa Region in terms of Circular Economy action.

Ukrainian economy functions largely within the framework of a linear economic model. Only a small part of the waste is reused, recycled or dis- posed of.

The vast majority of waste, including valuable and limited resources, are disposed of in landfills or incinerated. According to the State Statistics Service of Ukraine (2019), in 2018, waste disposal sites accumulated 12.9 billion tons of waste, which is 22.5 thousand tons per 1 square meter of the country's territory or 306.9 tons per person, which is 6.1% higher than in 2010. Statistics show that the extractive industry is the largest pollutant.

The circular economy model focuses on the reuse of materials and aims at: reducing the cost of natural resources and energy for the production of goods; creating reusable goods; the use of materials that are easily recyclable, etc. Due to these principles, the circular economy makes it possible to use natural materials more efficiently, to develop products that will have a longer life cycle, and to increase significantly the profitability of production in the future. In Fig. 1 models of linear and circular economies are compared.

Ukraine faces serious barriers to its transition to a circular economy. These are classical reasons for the slowdown in the country's innovative development, such as the domination of raw material in exports, high levels of corruption, decrease in investment, etc. Also, these are additional socio-cultural and economic obstacles, such as state support for the extractive sector, low confidence in the government, poor awareness of the environmental degradation consequences, as well as inability to negotiate and work together for a long period of time. Among the microeconomic reasons one can emphasize the business' desire to attain quick profits without a thought about long-term negative effects and investment in circular economy projects with low profitability.

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The introduction of circular economy should be based on basic market laws – in the absence of demand for recycled waste and products, it loses its economic viability. Therefore, to justify investment, it is necessary to stimulate market demand and create new value chains within the country. This will inevitably lead to the extinction of certain activities and enterprises that shift from old to new or start businesses. As a result, the system of economic relations within and outside the country will change, and the design of the country's economy will change.

1. Introduction

The main aim of the study should be enlisted. Describe also the structure of the report, indicate the reference period covered by your analysis, shortly enumerate the main methods used and highlight the importance of your work performed for further work.

In the field of waste management, Ukraine is far behind the EU countries, which is, in particular, a consequence of the existing linear model of the economy, and creates significant risks for the environment and the population. The need to search for new sources of sustainable development in the context of qualitative and quantitative constraints on natural resources and environmental problems actualizes the implementation of the circular economy model, which envisages energy conservation, regenerative green consumption and production for sustainable development, following the example of the EU, which is a global leader in its implementation.

The EU Directive 2008/98/EC on waste (2008) enshrined in legislation 5 steps for waste management: from the most desirable (waste prevention, preparing for reuse) through the recycling and recovery to the least desirable – waste disposal. Instead, in Ukraine waste disposal is the most popular waste management measure, – over 7 % of the country's territory is landfilled, and only 3 % of all waste is recycled. At present, Ukraine is ranked 9th in the world by the amount of waste (3.5 billion tons annually). Unfortunately, only 8.6 % of the world economy is circular and worldwide resource utilization is accelerating.

The circular economy model focuses on the reuse of materials and aims at: reducing the cost of natural resources and energy for the production of goods; creating reusable goods; the use of materials that are easily recyclable, etc. Due to these principles, the circular economy makes it possible to use natural materials more efficiently, to develop products that will have a longer life cycle, and to increase significantly the profitability of production in the future. In Fig. 1 models of linear and circular economies are compared. Today, there are many companies that have successfully adopted the principles of circular economy (fig.1).

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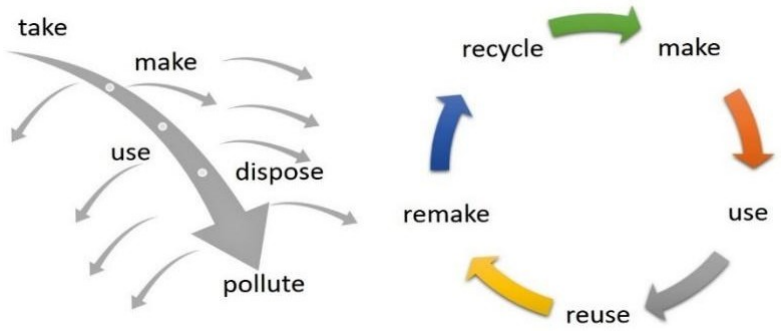

Fig. 1. Linear and circular economy models

Source: N. I. Horbal, M.Ye. Adamiv, A.S. Chumak (2020) SEMI. Volume 4, Number 1: 159-166

The aim of the current study is to provide up-to-date comparative data of the status of Ukraine and especially the Odesa Region in terms of Circular Economy action.

The project BSB-1021 intends to promote the EU CE model, inform on waste prevention, reduction and management and establish a permanent BSB cooperation achieving long-term sustainability of its outputs and results contributing to Priority 2.2. The 5 planned studies will showcase the main findings in a series of environmental challenges related to the Programme's Specific Objective 2.2.

2. Methods

In this section, explain how the study was produced. It should also be enlisted persons and institutions who contributed to the study. What kind of methods were used?

The current study was drafted in favor of Project partner 4 Municipal Institution "Grant office "ODESA 5T" based on the methodology and specifications developed by VFU which are common for all partners as to insure compatibility of results and comparability of data.

The approach of the study constitutes both quantitative and qualitative methods. The aim is to describe in detail in quality and quantity terms the current situation of waste management and circular economy issues, especially, waste collection – waste treatment - waste recycling – waste reuse main environmental challenges in each area – soil, area and water pollution status - general people behavioural patterns related to waste.

In terms of quantitative methods a desktop research was carried out; the main resources are listed below; the full list of sources are shown in Section 7 of the current document.

The main contributors to the current analysis have been:

- *Eurostat*
- *State Statistic Services of Ukraine*
- *Odesa Regional State Statistic Services*
- *Ministry of Environmental Protection and Natural Resources of Ukraine*

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- *Odesa State Administration*
- *Odesa Municipality*

Issues of waste management and circular economy in the context of European integration of Ukraine has recently become the popular subject of domestic scientists research (for example) and legislative initiatives.

The model of circular economy (closed-loop economy), aimed at energy saving, regenerative environmentally friendly consumption and production, has emerged from the concept of sustainable development and has been gaining popularity since the late 1970s. It has been actively researched in scientific sources, both foreign and, in recent years, Ukrainian. Zvarych I. describes goals of the circular economy, the vision of a new plastics economy in Europe, and presents methods for integrating industry into the circular process. Tymoshenko I. and Dronova O. outline features of a circular economy, mechanisms for its introduction, the world successful practices with emphasis on the problem of solid waste recycling in Ukraine on the basis of circular principles. Krisovatyi A., Zvarych R. and Zvarych I. investigate the specifics of the circular economy in the context of globalization , the biophysical environment of the circular system, the integration of resources and the regeneration of the biosystem in the conditions of circular economy and describe the specifics of the extended responsibility of a manufacturer in applying the concept of circularity. Sergienko L. describes the role of a state in the transition to a circular economy. Merkulova T., Kononova K. and Titomir O. analyze applied aspects of a circular economy on the examples of two perspectives Ukrainian markets: renewable energy and waste processing.

Questionnaires

A survey was conducted on key stakeholders that may contribute to the transition to a more circular economy in the region, which was based on the mapping of public authorities, bodies directly involved in the waste sector, sectoral bodies as well as organisations representing the economic and social life in general. The questionnaires were prepared aimed to evaluate the current perception of the CE status as well as to examine the transition potential of the Odesa Region to the circular economy ecosystem. Two questionnaires prepared, one addressing to key-experts and policy makers when the other was addressed to stakeholders.

Policy Makers Questionnaire:

1. *Short description of the organization and its activities*
2. *Does your region implements initiatives in the field of circular economy? What do you expect to be the development in the future?*
3. *Challenges, policies, projects and programmes related to circular economy Does national culture encourage introduction of circular economy principles?*
   How would you describe legal framework for circular economy? Is that one of the top national priorities?
4. *In your region who collects data concerning circular economy? What kind of data is collected or missing?*
5. *Please give us a short overview on how circular economy play a role for your institution?*
6. *Organizational engagement (how the organization the interviewed person represents is affected by circular economy challenges)*

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7. *Recommendations*

Stakeholders Questionnaire:

1. *Short description of the organization and its activities*
2. *Are you aware of the model "Circular Economy" and/or the EU Action Plan?*
3. *Do you know whether Circular Economy policies are deployed in the country and/or in the region? If yes, in which sectors?*
4. *Do you consider as useful a more intensive dissemination on the CE from the Greek Exporters Association?*
5. *DO you think that the National Action Plan for the Circular Economy in Greece will affect you organisation?*
6. *Comments & Recommendations*

Eight questionnaires were collected as from: Governmental Organisations: 4; Academic Institutions: 2; Non-Governmental Organisations: 2

3. General presentation of the country/region

- *Review of the national legislation on circular economy of the country/region*
- *Major institutions relevant from the perspective of circular economy. How the national legislation reflects the European directives on circular economy?*
- *Are there some regional legislation/institutions dealing with the issue?*
- *Is there a circular economy national action plan?*

Insert your text here. The year 2020 was marked by the unprecedented global challenge of the COVID-19 pandemic whose health and socio- economic impacts affected all countries around the world. The drop in remittances due to lockdown measures and increased unemployment in migrant-receiving countries has had a negative impact on Ukraine, where remittances account for 10% of gross domestic product (GDP). Based on International Monetary Fund estimates, GDP of Ukraine was expected to have the steepest decline in the region: -7.2% in 2020 compared to 3.2% in 2019 before reaching 3% in 2021. Unemployment was projected to rise to 11% in 2020 and 9.6% in 2021 compared to 8.5% in 2019 (Table 1).

Table 1

Gross domestic product Ukraine

(at current prices; mln.UAH)

	2016	**2017**	**2018**	**2019**	**Total**
Gross domestic product	**854051**	**875340**	**1163172**	**1301539**	**4194102**
Composition of gross domestic product					
1. Production side					
Agriculture, forestry and fishing	24006	30137	158417	176166	388726

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Mining and quarrying	39810	40325	48149	62059	190343
Manufacturing	85142	97979	113219	128727	425067
Electricity, gas, steam and air conditioning supply	32697	32261	28603	29191	122752
Water supply; sewerage, waste management and remediation activities	3410	4298	4556	4187	16451
Construction	16618	22342	31213	50101	120274
Wholesale and retail trade; repair of motor vehicles and motorcycles	121312	121775	161801	180456	585344
Transportation and storage	64635	55806	67628	74339	262408
Accommodation and food service activities	7630	3925	7881	7471	26907
Information and communication	45852	47291	55347	59937	208427
Financial and insurance activities	31811	30476	36881	33515	132683
Real estate activities	63391	64420	69701	70149	267661
Professional, scientific and technical activities	30733	29701	37629	38769	136832
Administrative and support service activities	15040	13006	15599	15711	59356
Public administration and defence; compulsory social security	66588	71524	77486	87461	303059
Education	42559	47477	41771	49173	180980
Human health and social work activities	22762	26742	29131	34645	113280
Arts, entertainment and recreation	5503	4627	5753	6920	22803
Other service activities	8477	7540	8740	9118	33875
Taxes on products	127758	125795	166206	186801	606560
Subsidies on products	-1683	-2107	-2539	-3357	-9686
2. Income side					
2.1. Compensation of employees	440156	414111	467113	515833	1837213
2.2. Net taxes on production and imports	129825	124789	164839	179480	598933
2.3 Gross operating surplus, mixed income	284070	336440	531220	606226	1757956
3. Expenditure side					
3.1. Final consumption expenditure	898750	847088	976589	1200776	3923203

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of households	731879	648104	788792	910471	3079246
of non-profit institutions serving households	9436	8557	9030	9216	36239
of general government	157435	190427	178767	281089	807718
individual consumption expenditure	81809	100665	81627	155787	419888
collective consumption expenditure	75626	89762	97140	125302	387830
3.2. Gross capital formation	-21510	3651	216009	116876	315026
gross fixed capital formation	96795	117371	134520	198211	546897
changes in inventories	-118680	-114122	81194	-81870	-233478
acquisitions less disposals of valuables	375	402	295	535	1607
3.3 Exports of goods and services	382352	355553	409887	489607	1637399
3.4 Imports of goods and services	-405541	-330952	-439313	-505720	-1681526

In 2017, the Government approved a National Waste Management Strategy that implements European principles for the management of all types of waste: solid household, industrial, construction, agricultural, hazardous etc. Assistance in creating the National Strategy was provided by foreign experts under the auspices of the EBRD. The main tasks are the gradual transition of the country from the dominance of the disposal of solid waste to the sorting and separation for reuse, recycling or disposal at landfills that will meet EU requirements, as well as changing the treatment of waste as a valuable resource. The National Strategy states that by 2023, 23 % of the population will start sorting garbage, and by 2030 this figure should be 48 %. Now in Ukraine only 3 % of all waste are recycled. Instead, according to the National Strategy, by 2023, recycling should increase to 15 %, and by 2030 to 30 % due to the commissioning of waste sorting lines and refineries. 250–300 new waste collection centres and 90 waste sorting lines should be available in Ukraine. And the number of landfills must be reduced from 5.5 thousand to 100–150, which would meet EU standards.

In 2019, the Cabinet of Ministers approved the National Waste Management Plan by 2030. The reform proposed by the Government envisages the introduction of circular economy principles and extended producer responsibility, which should stimulate businesses to minimize and recycle waste, implement the aforementioned five-stage waste hierarchy operating in the EU.

Unfortunately, there are still significant organizational and legislative challenges in implementation of the National Waste Strategy and Plan starting from the garbage sorting stage, not to mention the use of modern recycling technologies and financial resources for construction of specialized lines/enterprises.

However, circular economy is based not only on the improvement of waste management, production technologies and the use of resources, but also on a fundamental change in social values, thinking, and consumer behaviour. And from this point of view, without exaggeration, the role of every citizen of Ukraine and the world is important.

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In general, there is a large role of industry in making Ukraine's GDP, as compared to the low share in the EU Member States. In implementing its economic policy, Ukraine follows the requirements established by international agreements (AA, Protocol of Accession of Ukraine to the World Trade Organization, Extended Fund Facility (EFF), stand-by assistance (SBA) from the International Monetary Fund, etc.), thus it is urged to shape its industrial policy in highly controversial settings.

State of play in the industrial sector in Ukraine can be characterized with the following key features:

- rapid non-compensated de-industrialization of economy since 1991;
- deficit of the qualified workforce;
- critical dependence on raw materials exports;
- prevalence of low added value industries; high level of industrial goods imports;
- an intense geographical concentration of industrial exports;
- low resource efficiency of industry and high load on environment.

Program and strategic documents in the field of industrial policy have been sectorial in the recent years (are not based on a horizontal principle), while the draft Strategy for the Development of Ukraine's Industrial Complex 2025 is mostly oriented on promotion of Ukrainian industrial goods to foreign markets, launching new products and technologies, training the staff, and innovative development of industrial companies.

Recently, an important part of the industrial policy has been to promote 'industrial visa-free' mode with the EU, to eliminate technical barriers to trade with the EU The ACCA may potentially cover up to one fifth of Ukrainian exports to the EU, mostly machine building products. Currently, the priority sectors (most promising) are low-voltage equipment, electromagnetic compatibility, and machinery.

State of play in the 'circular economy' in Ukraine may be assessed as very low or absent. In terms of the fact that the priority for circular economy is on waste management, including also the prevention of waste generation, circular economy is currently only contemplated. An important part belongs to the market of secondary raw materials, where the volume of necessitated import of secondary raw materials for the functioning of operating recycling companies accounts for 400,000 tons per year.

Water supply, sewerage, waste management were included as one of the priorities into the State Program on economic stimulus activities planned for 2020-22 in response to the impact of COVID-19. It prioritises instruments for functional groups (SMEs, international trade, investment and innovation, job creation and labour market development, smart regulation of economic activity) and six sectoral groups (industry, agriculture, energy, information and communication technology, service industries, transport and infrastructure).

Re-establishing the Ministry of Environmental Protection and Natural Resources: This was an important milestone to level-up environmental priorities, which began in June 2020 (following its merger with the Ministry of Energy in the previous government. An ambitious work plan was developed and a team set up. The priority areas include:

1) reduction and control of industrial pollution; 2) reform of waste management, including nuclear waste;
3) rational use of natural resources, including reform of the forestry sector, and sustainable management of water resources and fishery;

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4) conservation of biodiversity and development of NPF; and
5) prevention and adaptation to global climate change.

Assessing progress on greening SMEs: The evaluation, part of the SME Policy Index, showed that Ukraine has made significant improvements in support for greening SMEs, with the SME Strategy 2020 calling for support for greening SMEs and the uptake of green technologies.

Creation of the Climate Fund in Ukraine: EU4Environment has participated in discussions and shared its expertise with the Ukrainian partners related to the creation of the Climate Fund.

Collection of 2010-19 data on fossil fuel subsidies for the OECD-IEA database: The inclusion of Ukraine, along with other EaP countries, in the OECD-IEA database on fossil fuel subsidies is an important milestone in achieving transparency in this area. It also recognises the efforts of EaP governments to disclose information on the size of government support provided to the energy sector in these countries.

Unlocking the potential of the green bond market: The work analyses the possibility of using green bonds to raise additional resources for the transition to a low- carbon and resilient economy.

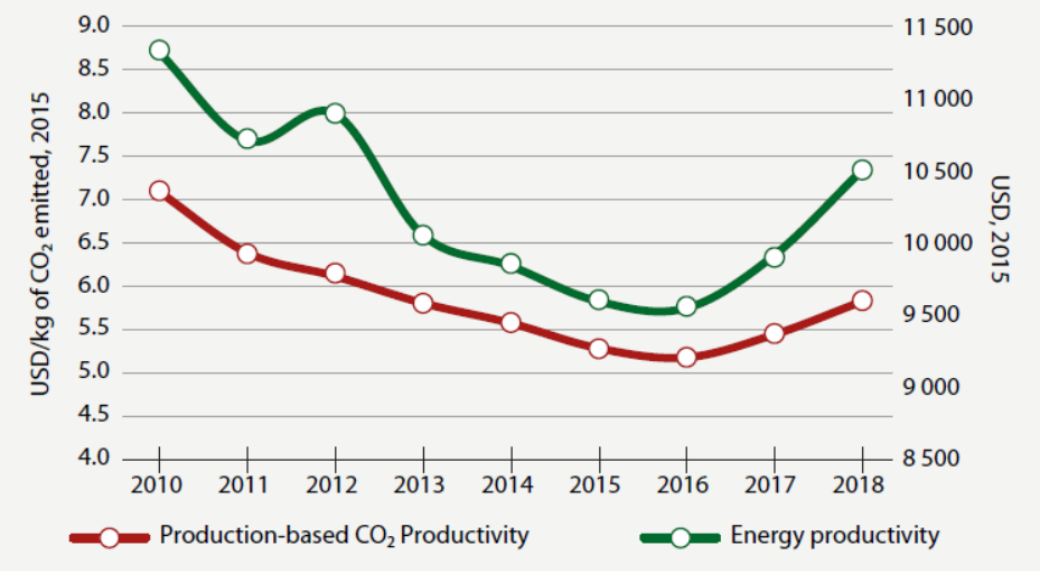

Fig.2 Environmental and resource productivity: Higher CO2 and energy productivity means a less polluting, more resource- efficient economy, and a better climate and environment

Source: EU4Environment, Towards a Green Economy in Ukraine Work in Progress – 2019-20 URL: https://euneighbourseast.eu/news-and-stories/publications/towards-a-green-economy-in-ukraine-eu4environment-work-in-progress-2019-20/

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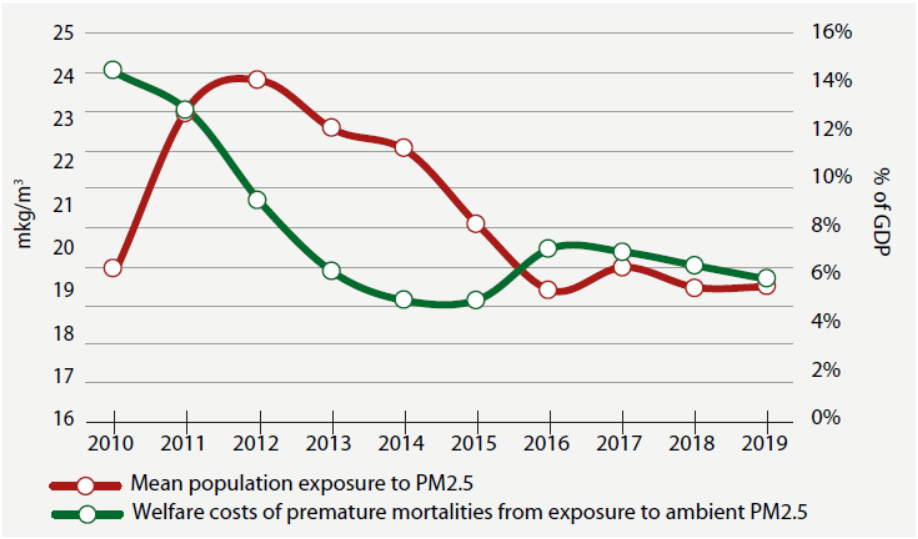

Fig.3 Environmental dimension of quality of life: Lower exposure to fine particles means cleaner air and healthier people, and is less costly for the government

Sourse: EU4Environment, Towards a Green Economy in Ukraine Work in Progress – 2019-20

Updating the national set of OECD-based green growth indicators: Ukraine continues its green transformation. EU4Environment helps with updating green growth indicators to better measure progress.

Strengthening the administrative capacity of the environmental sector: The analysis was launched to assess administrative capacity for greening the economy, identify gaps and recommend reforms.

Updating the national set of OECD-based green growth indicators: Ukraine continues its green transformation. EU4Environment helps with updating green growth indicators to better measure progress.

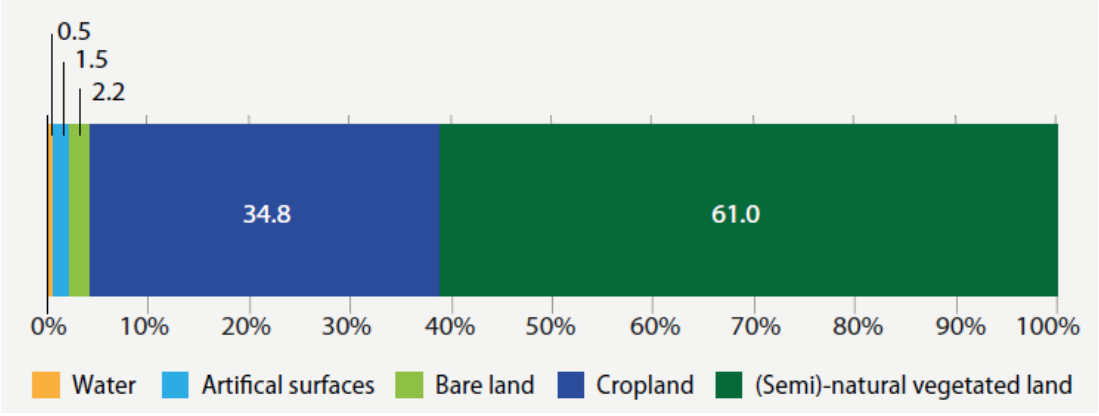

Fig. 4 Natural asset base 2018: Stable stocks of natural resources ensure sustainable use, which is essential for green economy transition

Sourse: EU4Environment, Towards a Green Economy in Ukraine Work in Progress – 2019-20

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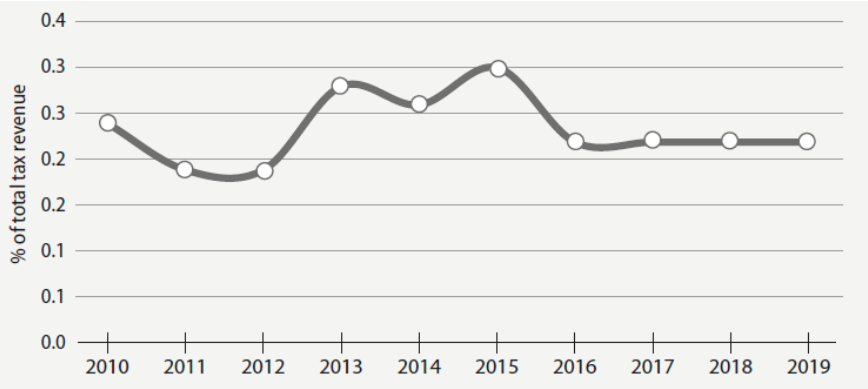

Fig.5 Economic opportunities and policy responses: Removing fossil fuel subsidies can reduce fiscal deficits, make renewable energy more competitive, and lower carbon and air pollution

Sourse: EU4Environment, Towards a Green Economy in Ukraine Work in Progress – 2019-20

At the time of the research, the only waste processing plant in the country has ceased to operate, as had the four incineration plants, of which only the Kyiv-based Energy plant operated until August of 2018. It has been processing up to 25% of the municipal solid waste in Kyiv, all the while creating heat energy for dwellings. During 2017–2018, a number of foreign investors expressed their desire to build new waste processing plants in Ukrainian cities.

However, the stumbling block is the Ukrainian legislation that has many gaps, in particular, in terms of setting tariffs that determine the profitability of production and the rate of return on investment. Despite the adoption of the Law of Ukraine “On Waste” in 1998, which started a new stage of formation of the waste man agreement system and took into account modern global developments, it was a subject to annual changes and additions, and as of 2018, several new alternative draft laws were registered

The EU Directive 2008/98/EC on waste (2008) enshrined in legislation 5 steps for waste management: from the most desirable (waste prevention, preparing for reuse) through the recycling and recovery to the least desirable – waste disposal. Instead, in Ukraine waste disposal is the most popular waste management measure, – over 7 % of the country's territory is landfilled, and only 3 % of all waste is recycled. At present, Ukraine is ranked 9th in the world by the amount of waste (3.5 billion tons annually). Unfortunately, only 8.6 % of the world economy is circular and worldwide resource utilization is accelerating.

The Commission planned for 2020-2021 to approve several documents to provide for zero pollution:

Chemicals for Sustainability Strategy (summer, 2020), Action Plan on Zero Pollution to Waters, Air, and Soils (2021), 7th Environment Action Programme (DECISION No 1386/2013/EU) authorized the European Commission to develop the EU Strategy on Toxic Free Environment by 2018. To implement the commitment, a special study was conducted (Final report. 2017), second Assessment of REACH within the framework of REFIT (COM (2018) 116 final), Fitness Check of the most relevant EU chemicals legislation (except for REACH) (COM (2019) 264 final). However, the strategy was never approved.

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Revision of Pollution Abatement Measures for Large Industrial Installations (2021). Presently, the Commission is developing drafts for the above documents, and running consultations with stakeholders on their content.

The achievement of a zero pollution ambition is closely related to the implementation of other EGD focus areas. For example, in 2021, it is planned to run a series of activities to provide for zero pollution in a new Action Plan on Circular Economy (2020). Notably, it will include development of methodologies to minimize the content of chemical substances in secondary materials, to introduce amendments to annexes to the EU Regulation on Chemical Substances and their Safe Use (REACH), reviewing the directives on sewage water treatment and on industrial emissions.

Approximation of Ukraine's law on the action to abate pollution from large industrial installations has insofar reached the approval of programme documents. A draft law was registered in the parliament on abatement, reduction, and control of industrial pollution, but it was further withdrawn. Assistance to Ukraine in legal approximation and practical implementation of the Directive 2010/75/EU on industrial emissions is provided under technical assistance projects.

There are also certain complexities on the National Plan for Reduction of Emissions from Large Combustion Plants, which practical implementation has been protracted, also for financial reasons.

There is still a high risk on the territory of Ukraine for accidents of natural and anthropogenic origin. One reason for the occurrence of emergency situations is climate change. A combined resolution of issues of accidents and climate change will help prevent a negative impact on environment.

Ukraine has the law regulating rules of conduct in accidents, but it fails to fully account for the EU standards. There are certain difficulties in the implementation of requirements of the Seveso Directive III.* Attempts to adopt the legislative changes failed, the draft laws registered in the VRU have been withdrawn.

According to Annex XXX of the AA, Ukraine shall approximate its legislation to the Directive No 96/82/EU on the control of majoraccident hazards involving dangerous substances (Seveso II). However, it was repealed, and today there is an effective Directive 2012/18/EU of the European Parliament and of the Council dated July, 4, 2012, on the control of major-accident hazards involving dangerous substances (Seveso III). Paragraph 1764 of the Action Plan to Implement the Association Agreement provides for tasks and measures to implement The Seveso III Directive.

The Concept for Raising the Level of Chemical Safety (2008) provides for the improvement of Ukraine's law on chemical safety and chemical substances management through its approximation to the EU standards. The AA (Art. 361 (h)) emphasizes the cooperation of Ukraine and the EU in the sector of chemical substances. However, Annex XXX does not include any EU Regulations on chemical substances management (their registration, assessment, labelling, etc.) that Ukraine shall approximate its national legislation thereto. Notably, the Regulation (EC) 1907/2006 and Regulation (EC) 1272/2008 were not included. At the same time, Ukraine planned to implement the above EU Regulations, by adopting national technical regulations. On November, 20, 2019, the government Action Plan to Implement the Association Agreement was supplemented with the clause 1779. It also sets a task to bring the national legislation in conformity with the EU Regulations 1907/2006 and 1272/2008. Currently, the legislation has not yet been approved, even though the work to develop it had been done within technical assistance projects.

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A key task in the area of industrial strategy and circular economy is "to support industry transition to a sustainable model of inclusive growth." The priority tasks include decarbonization of the energy-intensive sectors (steel, chemicals, and cement), providing reliable information on the 'green' goods to avoid the so-called 'greenwashing' (abuse of the 'green' labelling), legal reform on waste management (including batteries), development of the digital sector (including the reduction of its impact on climate). To enforce the EGD, in March, 2020, New Industrial Strategy, Circular Economy Action Plan, and the Strategy on Shaping Europe's Digital Future were approved.

A new industrial strategy has the following three priorities (drivers): to support global competitiveness of the EU industry, to achieve climate neutrality for Europe in 2050, and to shape EU's digital future. That is why it is closely related to other EGD elements, and was approved in the package with other related policies: An SME Strategy for a Sustainable and Digital Europe, Analysis and Action Plan to eliminate barriers in the single market. Among other things, these policies shall reinforce the EU's single market.

An important element of the New Industrial Policy is protection of the EU internal market from unfair competition from the outside, due to government subsidies in foreign states, low requirements (including also 'climate-related' requirements) to the production of goods and services, enhancing customs control, introduction of a position of the Chief Trade Enforcement Officer. Measures targeting the reduction of industry impact on climate (such as supporting an initiative for zero CO_2 emission in steel production), also include the abatement of 'carbon leakage.' It implies the introduction a carbon border adjustment mechanism in 2021. The New Industrial Policy is also aiming to reinforce the EU autonomy and reduce its dependence on any externals. EU plans to further support industrial 'eco-systems' and associations: the launch of the European Clean Hydrogen Alliance is expected.

Circular Economy Action Plan is aimed at the creation of a holistic policy for sustainable goods and services, mainly to prevent waste generation in the process of their production. In addition, the EU is trying to create an efficient secondary raw materials market.

Within the action plan implementation, the EU will:

- review a Directive on ecodesign: expanding the scope (priority areas will include electronics, in- formation and communication technologies, furniture, steel, cement, and chemicals), including new requirements (such as about the lifetime for goods, content of recycled materials, etc.);
- strengthen control over 'sustainability' of all goods on the EU market. An Industrial Emissions Directive will be reviewed (such as BATs and a new system for EU technologies verification will be implemented).

Much focus will be put to certain value chains (electronics, batteries, plastics, packaging, textiles, construction materials).

Promote circular economy within the neighborhood policy, focusing on priority areas (value chains).

On September 3, 2020, the European Commission presented an Action Plan on Critical Raw Materials68, the 2020 List of Critical Raw Materials and a foresight study on critical raw materials for strategic technologies and sectors from the 2030 and 2050 perspectives. The Action Plan looks at the current and future challenges and proposes actions to reduce Europe's dependency on third

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countries, diversifying supply from both primary and secondary sources and improving resource efficiency and circularity while promoting responsible sourcing worldwide.

The New Industrial Policy of the EU may jeopardize the access to Ukrainian goods and services to the EU market through the creation of a series of new technical barriers related to the increased requirements to their environmental sustainability. In the first place, it concerns the production of steel, chemicals, construction products, and cement. At the same time, the requirements for environmental sustainability are related to the energy intensity of such production, and the associated impact on climate change. There is also a closely related intention to introduce a carbon border adjustment mechanism at the EU customs border.

The New Industrial Policy of the EU may aggravate the cooperation and engagement of Ukrainian producers into the EU manufacturing facilities, since the EU aims to enhance the autonomy of their production by decreasing the dependence on foreign suppliers.

Enhanced requirements to quality for certain types of products will possibly pose extra challenges for the 'industrial visa-free regime', since in this field there will be some active changes which implies a 'moving target' for Ukraine. Consequently, manufacturers shall be prepared to implement more rigid technical requirements to their products, according to how the EU is trying to do in their industrial policy.

Government support to manufacturers in Ukraine may largely aggravate the access to their products to the EU market, since the EU wishes to overcome the external unfair competition related to the government subsidies in foreign countries. Therefore, such manufacturing facilities will require either some internal demand, or other foreign markets.

EU policy in circular economy will lead to stricter requirements of the Directive 2009/125/EC on ecodesign (in scope and substance). It will negatively affect the opportunities to export the goods by Ukrainian producers in the areas of electronics, furniture, steel, cement, and chemicals. In order to have accessto the EU market, business operators will have to modernize their manufacturing facilities.

Enhancing control over 'sustainability' of all goods getting to the EU market may also restrict the opportunities for Ukrainian producers falling under the Industrial Emissions Directive (including machine building, chemicals, thermal power, dairy production, etc.). Special risk zone will cover producers of plastics, packaging, textiles, and construction products.

Strengthening of the secondary raw materials market in the EU will definitely lead to decreased exports of recyclables to Ukraine. It will affect processing companies currently dependent on the imports of such secondary raw materials.

The EU intends to integrate new environmental requirements to goods and services into all trade agreements, and add demands within the framework and in line with WTO demands.

Upon the whole, due to the EU new industrial policy and implementation of circular economy principles, access to its markets for Ukrainian manufacturers will be largely aggravated through stricter requirements to environmental sustainability of products (energy intensity, greenhouse gas emissions, control of waste generation and waste management, requirements to ecodesign, etc.).

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Industrial transformation and alignment with the European Union: The significant drop in economic activities led to a challenging situation in the industrial sector, especially in the chemical and timber processing industries. The government adopted measures to respond to immediate needs of maintaining industrial operations, including the Industrial Support Programme and provision of funds. As part of the on-going process of institutional transformation, the government created a separate Ministry of Strategic Industries in September 2020. The Strategy for the Industrial Complex to 2025, which is under development, contains several items relevant to the EU industrial strategy adopted in 2020, and aims to be aligned with EU developments.

In 2020, Ukraine stepped up its efforts to plan the development of "green" hydrogen as part of the country's ambitions under the European Green Deal. A formal draft government strategy on hydrogen is to be developed in 2021. However, the country has already applied the initial step of the SEA procedure –"scoping" – at the informal "Roadmap" stage of hydrogen development to determine the scope of the future SEA.

4. Circular Economy in quantitative perspective

- *Please, use country`s statistics. Describe the circular economy in terms of a) production and consumption; b) waste management; c) secondary raw materials; d) competitiveness and innovation statistics.*
- *Please, use also relevant regional statistics to describe the situation on the regional level.*

Ukrainian economy functions largely within the framework of a linear economic model. Only a small part of the waste is reused, recycled or dis- posed of.

The vast majority of waste, including valuable and limited resources, are disposed of in landfills or incinerated. According to the State Statistics Service of Ukraine (2019), in 2018, waste disposal sites accumulated 12.9 billion tons of waste, which is 22.5 thousand tons per 1 square meter of the country's territory or 306.9 tons per person, which is 6.1% higher than in 2010. Statistics show that the extractive industry is the largest pollutant (Fig. 6).

In Ukraine, waste management mainly includes recycling, incineration and disposal to designated sites or facilities. According to the statistical data, 1/7 of the whole territory of the country is covered with garbage, and only 4% of garbage is recycled; most of it is disposed into specially designated places (about 70%), a significant part of it is recycled (about 30%) and a small part (< 0.3%) is burned. As of 2017, Ukraine accumulated 12.4 billion tons of waste, including 0.37 billion tons in 2017. And in the structure of waste in 2017, the largest share is still occupied by coal preparation waste and waste generated during demolition works for the construction of mines, open-pit mines, coal mining, sludge and tailings of iron ore preparation, waste of iron ore mining, nickel and limestone mining, scrap (State Statistics Service of Ukraine, 2019). Regarding the partial disposal of this waste, there has been an increase in the reuse of blast furnaces, steelmaking and ferroalloy slags, but the problem remains acute.

Instead, in Ukraine disposal is the most popular waste management measure. Today in Ukraine 95 % of household waste is landfilled where it has been stored for decades (for comparison, in Sweden this amount is less than 1 %). In Ukraine, approximately 5.500 rubbish dumps are currently in operation, and morover 27.000 unauthorized dumps are generated annually. It is shocking that over

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7 % of Ukraine's land is occupied by landfills and only 3 % of all waste is recycled. Most Ukrainian landfills are completely unsuitable for the prevention of environmental pollution, which is caused by unprocessed household waste. Each year, about 350,000 tonnes of waste is generated in Ukraine. At present, 54 mln. m³ of garbage have been accumulated at official and unofficial garbage collection sites in Ukraine.

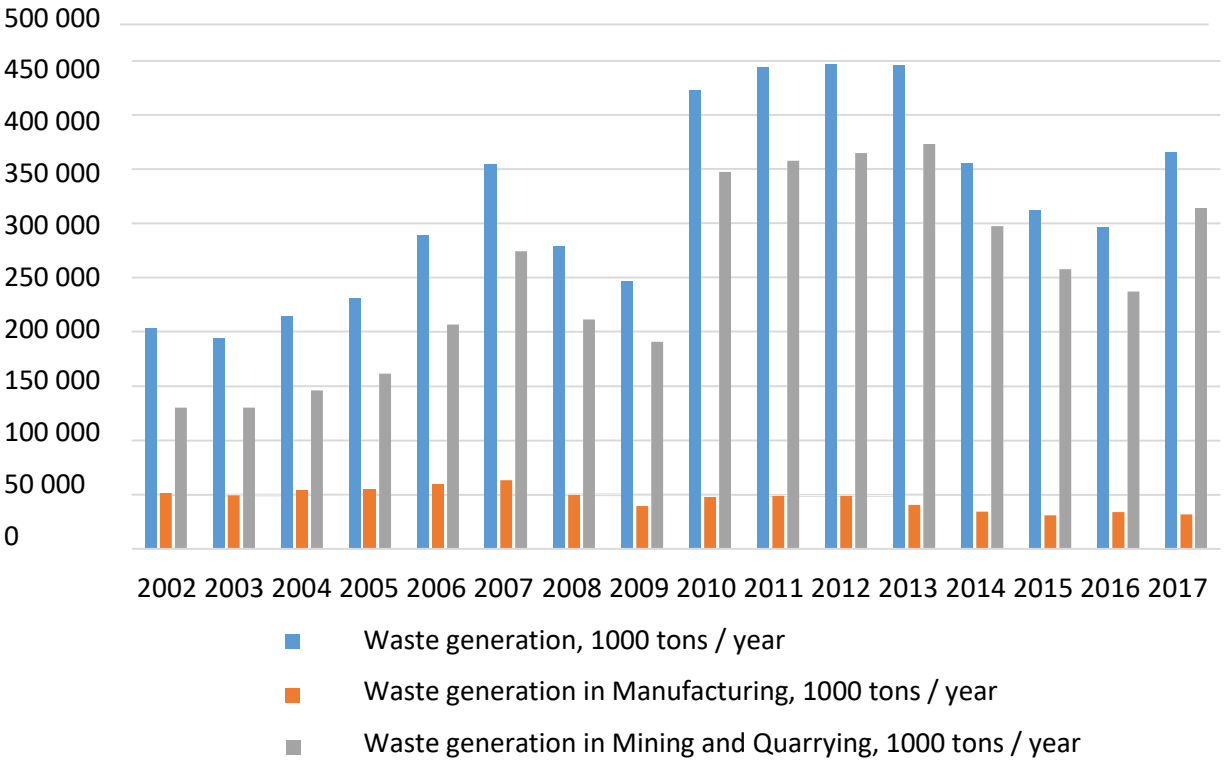

Fig. 6. The waste generation in the Ukrainian economy, 2002–2017
Source: State Statistics Service of Ukraine (2019).

According to the Ministry of Energy and Environmental Protection (Table), the largest pollutant in terms of waste generation is the Dnipropetrovsk region, which accounts for almost 70 % of all waste, as more than 500 industrial enterprises are located there [18]. More than half of the enterprises included in the TOP- 100 pollutants rating are located in the territories of two regions: Dnipropetrovsk – 33 and Donetsk – 22.

The total amount of pollution in 2018 in Ukraine: 1. Emissions of pollutant substances – 2.508 million tons; 2. Discharges – 952.136 million m³; 3. Waste generation – 352.333 million tons. The enterprises belonging to the TOP-100 pollutants formed 1.8 million tons of pollutant subatances emissions; 838.251 million m³ of discharges; 324.497 million tons of waste. At present, Ukraine is ranked 9th in the world among the countries with the highest waste volume.

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Table 3

Rating of the regions of Ukraine which are the largest pollutants of the environment in terms of waste generation in 2018 *

№	Regions	Waste volumes	
		Physical volume, thousand tons	Share, %
1	Dnipropetrovsk	243 598.81	69.14
2	Kirovohrad	37 902.02	10.76
3	Donetsk	24 110.24	6.84
4	Poltava	19 825.70	5.63
5	Zaporizhzhia	5 294.44	1.50
6	Mykolaiv	2 410.15	0.68
7	Lviv	2 139.31	0.61
8	Ivano-Frankivsk	1 969.80	0.56
9	Vinnytsia	1 782.15	0.51
10	Ternopil	1 651.80	0.47
11	Kharkiv	1 628.53	0.46
12	Cherkasy	1 484.59	0.42
13	Kyiv	1 394.00	0.40
14	Kyiv (city)	973.73	0.28
15	Khmelnytsky	900.53	0.26
16	Sumy	852.21	0.24
17	Odesa	728.53	0.21
18	Chernihiv	717.39	0.20
19	Lugansk	557.54	0.16
20	Volyn	555.37	0.16
21	Zhytomyr	486.14	0.14
22	Rivne	484.22	0.14
23	Kherson	392.44	0.11
24	Chernivtsi	308.00	0.09
25	Transcarpathian	186.26	0.05
	Total	352 333.92	100.0

** Excluding the temporarily occupied territory of the Autonomous Republic of Crimea, Sevastopol and part of the temporarily occupied territories of Donetsk and Luhansk regions.*

Source: State Statistics Service of Ukraine (2019).

Among the reasons that led to this are: poor manufacturing processes, the lack of innovative developments and materials in construction, the short product life cycle and the consumer mentality of Ukrainians. Most of these problems are the result of a linear model of the economy that involves: extraction of natural resources, production, use and, subsequently, the elimination of waste. It is

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now being replaced by an alternative model of economy, which is already being actively implemented in the leading countries of the world – circular or closed-loop economy.

Up to 500 thousand tons of solid domestics waste (SDW) are generated annually in Ukraine. The increase in waste generation is explained by increasing living standards, based on the ratio between the dynamics of GDP per capita and specific waste generation levels.

According to various data, the level of solid waste processing in Ukraine ranges from 3 to 8%, while in the European Union – up to 60%. By this, more than 90% of SDW is sent to disposal sites and unauthorized landfills. According to official estimates, 10,000 hectares of land are occupied by about 6,700 disposal sites and landfills, although unofficial figures may be even higher.

However, according to the Ministry of Regional Development, Construction and Housing of Ukraine, there is a need for at least 626 new solid waste landfills.

In 2019, the situation in the field of waste management is a testimony to increasing the volume of waste generation. The dynamics of waste management in recent years is presented in Fig. 7.

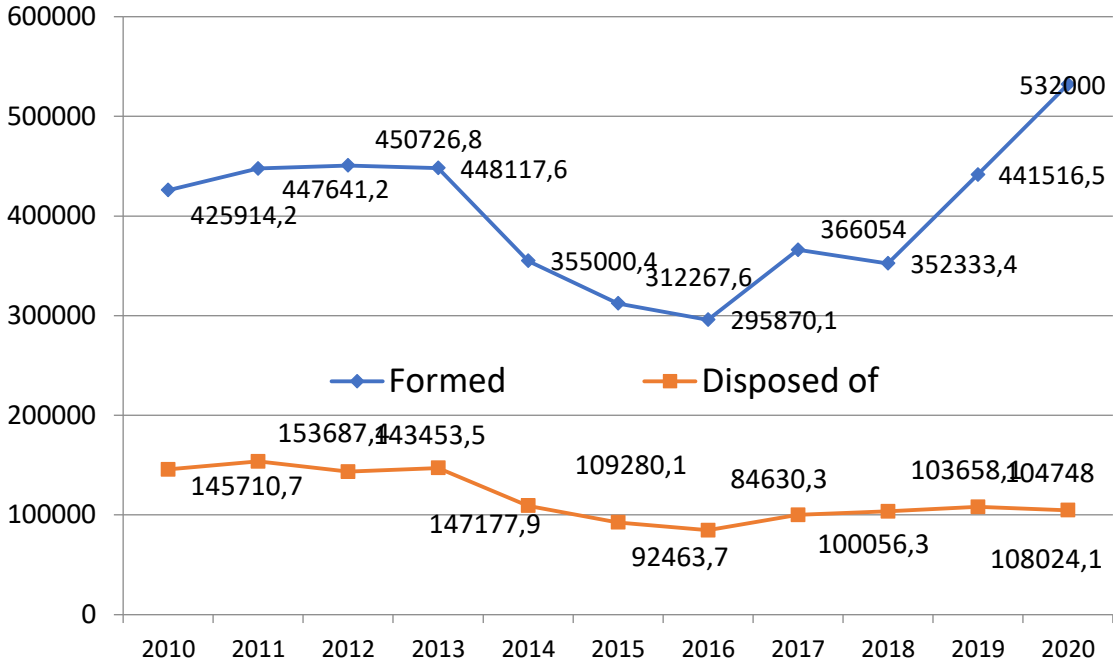

Fig. 7. Dynamics of waste management in Ukraine.

Source: State Statistics Service of Ukraine.

In 2018, according to the State Statistics Service of Ukraine, 352.3 million tons of wastes were generated at 13,544 enterprises covered by statistical surveys and in households, which is 3.7% less than in 2017. Almost 98.4% (346.8 million tons) of the total volume of generated waste falls on waste generated in a result of economic activities of enterprises and organizations, and about 1.6% (5.5 million tons) – in households (Table 4). However, in 2019 - 2020 there is a tendency to increase the volume of waste generation - more than 500 thousand tons (2020).

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The peculiarity of waste generation structure in Ukraine, due to raw- materials based economy, the largest volume of waste is generated at mining and metallurgical, coal, chemical and energy enterprises.

Table 4

Structure of waste generation by types of economic activity and in households (tons)*

	2010	2015	2016	2017	2018	2019	2020
	425,914.2	**312,267.6**	**295,870.1**	**366,054.0**	**352,333.9**	**441,516.5**	**532,000**
Total	**419,191.8**	**306,214.3**	**289,523.6**	**360,196.0**	**346,790.4**	**435,619.8**	**462,373.5**
From economic activity	,8568.2	8,736.8	8,715.5	6,188.2	5,968.1	6,750.5	25,000.7
Agriculture, forestry and fisheries	347,688.1	257,861.9	237,461.4	313,738.2	301,448.9	39,0563.8	n/a
Mining and quarrying	50,011.7	31,000.5	34,093.0	32,176.7	31,523.2	30,751.8	n/a
Processing industry	7,245.4	4,222.2	5,089.8	6,446.5	5,818.4	5,581.4	n/a
including food production	8,641.0	6,597.5	7,511.5	6,191.7	6,322.7	5,959.2	n/a
Electricity, gas, steam and conditioned air supply	1,698.7	594.2	457.4	408.7	397.4	411.8	n/a
Water supply	329.4	376.2	300.2	493.8	378.8	188.7	200.0
Construction	2,254.7	1,047.2	984.6	998.7	751.3	994.0	458,0
Other types of economic activity	**6,722.4**	**6,053.3**	**6,346.5**	**5858.0**	**5,543.5**	**5,896.7**	**4,000.0**

* According to the State Statistics Service of Ukraine

The low-hazardous mineral waste of IV hazard class dominate in the structure of the total volume of waste generation by material categories. The dynamics of waste generation by hazard classes are given in Table 5.

Table 5.

Waste generation by hazard classes, thousand tons*

Hazard class	2010	2015	2017	2018	2019
I class	5.0	2.0	1.9	1.7	1.8
II class	506.6	30.1	35.9	30.9	28.4
III class	1,148.3	555.2	567.5	594.8	522.8
IV class	424,254.3	311,680.3	365,448.7	351,706.5	440,963.5
Total	**425,914.2**	**312,267.6**	**366,054.0**	**352,333.9**	**441,516.5**

* According to the State Statistics Service of Ukraine

Of the total volume of generated waste, IV class hazard waste made up 440.9 million tons, III class – 522.8 thousand tons, II class – 28.4 thousand tons, and I class – 1.8 thousand tons.

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In the structure of the total volume of waste generated in Ukraine in 2019, waste of I-III hazard classes makes up 0.1% of the total amount, but it poses risks to human health and environment. These are dominated by waste categories such as used solvents, waste acids, alkalis or salts, chemicals, chemical catalysts and waste oils, wastes containing polychlorinated biphenyls, chemical sludges and residues, solidified, stabilized or glazed wastes, etc.

According to the state statistical data, 15.3 billion tons of waste, including waste of 1-III hazard classes (12.2 million tons), accumulated in specially designated places or facilities and on the territory of the country's enterprises as of the end of 2019.

A specific group of hazardous wastes consists of unusable and prohibited pesticides and agrochemicals that cannot be used for their intended purpose due to loss of useful properties, expiration date, loss of labeling or mixing. Their destruction remains a difficult problem, since Ukraine lacks adequate capacity and has to export unsuitable pesticides for destruction abroad.

In 4 regions the quantity of unusable pesticides exceeds 500 tons: Vinnytsia – 2778.60 tons, Kherson – 1921.80 tons, Sumy – 563.09 tons, Odesa – 554.26 tons. In general, according to various estimates there were still about 9 – 11 thousand tons of unusable pesticides in the country (it is difficult to accurately define the rates of pesticides accumulation, because they are not recorded, and information from different sources is very different) located in more than 800 warehouses and sites.

According to the Ministry of Regional Development of Ukraine (excluding data from the Autonomous Republic of Crimea and Sevastopol) almost 54 million m^3 of domestic waste, or more than 10 million tons, which are dumped in 6 thousand dump sites and landfills with a total area of over 9 thous. hectares, were generated in Ukraine in 2018. About 78% of the population of Ukraine receive services on household waste removal. The worst indicator of servicing the population with household waste removal is Volyn region – 61%, Cherkasy region and Odessa region – 63%.

The general trend for Ukraine, as compared to European countries, is the low level of processing and utilization of solid waste and a high rate of their dumping in landfills. Waste dumping on dumping sites and landfills causes the process of soil contamination by landfill filtration, which leads to groundwater contamination and adversely affects human health. Most landfills are overloaded and do not meet sanitary and environmental standards. In addition, the removal of solid waste to disordered landfills increased, and unauthorized landfills emerged, especially in the private sector.

In terms of regions, the largest share of waste disposal against the total amount of waste generated in Zaporizhya region – 62.8%, Cherkasy – 53.0%, Khmelnitsky – 55.6, Dnipropetrovsk – 34.9%. Less than 2.5% was utilized against the total number generated in Zakarpattia, Odesa, Kyiv regions and Kyiv city.

For a long time the country has been facing the problem of hazardous waste utilization and processing, which are stored in dumping sites and special landfills and on the territory of enterprises. The issue on construction of waste utilization and disposal facilities and new modern landfills is not solved either. At the same time, the environment pollution with toxic industrial waste has reached the level that negatively affects the health of the country's population.

Domestic waste (SDW). The general trend for Ukraine, in contrast to European countries, is the low level of processing and utilization of solid waste and a high rate of their disposal in landfills.

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A separate collection of domestic waste is being introduced in 1,462 settlements of Ukraine. Disposal of domestic waste is carried out at the waste incineration enterprise in Kyiv.

The Law of Ukraine "On Waste" sets forth the basic principles and priorities, legal, organizational, economic principles of activities related to the prevention (reduction) of waste and its negative impact on the environment, collection, transportation, storage, treatment, disposal, removal, processing and burial. The Law also envisages the powers of state authorities at various levels, local governments, specially authorized bodies in the field of waste management, rights and responsibilities of enterprises.

Table 7.

The main indicators of waste management of I-IV hazard classes for 2017 year, thousand tons (according to the form of statistical reporting № 1-waste)

№ з/п	Indexes	2015	2016	2017
1	Formed	602577	647509	741747
2	Received from other companies	739845	990763	1033475
3	Burned	18391	13983	28349
3.1	including for energy purposes	14919	8861	24226
4	Used (disposed of)	14260	10981	10883
5	Sent to organized warehouses (burial)	509490	679527	557276
6	Transferred to other companies	382190	651117	755975
7	Waste losses due to leakage, evaporation, fires, theft	3	3	5
8	Availability at the end of the reporting year in the warehouses of organized warehouses and on the territory of the enterprise	10233,9	11621,8	11397,2

*Source: Main Department of Statistics in Odessa region

Household waste generated in the city of Odesa and adjacent territories is taken to the Odessa city landfill TPV-1 "Dalnytskyi quarries". The landfill is located on the lands of Novo-Dolyna village council of Ovidiopol district and Velyko-Dalnytsia village council of Bilyaiv district of Odessa region, with a total area of 96.2 hectares. Landfill-1 "Dalnytskyi Quarries" is operated by SOYUZ LLC.

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5. Regional challenges connected to circular economy

Please summarize the results of the interviews with experts and institutional actors, concerning circular economy.

Here you should outline the institutional structure and present the relevant actors concerning circular economy, their role and responsibilities in environmental issues, in particular circular economy

- What do they see as the main regional challenges concerned with circular economy?
- Can you name any obstaclestheyconnect with circular economy?
- What are the different challenges of the project partners 'regionin the context of the BSB?
- Special regional level policies, strategies, services or programs related to circular economy.

Capacities for processing, processing and utilization of hazardous waste have been established in Odesa region. In the Odessa region facilities for utilization and disposal of hazardous industrial waste have been established and are operated.

In total, 1 demercurization unit of NVK LLC is operated in the region

Ukrekoprom and 6 complexes for thermal disposal of hazardous waste (incinerators):

- LLC "Green Port",
- State Enterprise "Izmail Sea Commercial Port",
- LLC "UTILVTORPROM",
- LLC "Research and Production Company" UKREKOPROM ",
- Concern "Ukrspetsekologiya",
- Euroecostandard LLC.

PE (CONCORD) and ECO-SERVICE LLC are engaged in processing (utilization) of waste oil products (oils) on the territory of the region.

However, the existing capacity is not enough. The hazardous waste collection system is not developed in rural areas.

Another serious problem is the storage and safe handling of unsuitable chemical plant protection products (CPPP), which have remained in the Odessa region since Soviet times, and is one of the areas of work of the Department for the implementation of state environmental policy. Currently, the region is implementing a "Comprehensive program for environmental protection, rational use of natural resources and environmental safety in the Odessa region for 2014 - 2019", approved by the decision of the regional council from 21.02.2014 № 1021-VI. According to paragraph 2.1.6. The program, as amended by the decision of the regional council of March 14, 2018 № 663-VII, provides for the implementation of measures to remove from the territory of the region the balance of unusable CPPP in the amount of more than 550 tons. Funding is provided for the implementation of these measures in the amount of UAH 28.778 million, including UAH 26.278 million. from the state budget and UAH 2,500 million. from the regional budget.

Thus, the final export of the balance of the CPPP depends on the allocation of funds from the state budget.

The Ministry of Ecology and Natural Resources of Ukraine shall formulate a plan of appropriate environmental protection measures for the safe treatment of unusable CPPP under the relevant budget program.

According to the latest inventory conducted by the district state administrations of Odessa region (as of May 2018), there are about 533 tons of unusable CPPP in the region, which are stored in 64 warehouses, most of which are in poor condition and need immediate removal.

Currently, work is underway to submit a request to the Ministry of Ecology and Natural Resources of Ukraine regarding the final removal of CPPP residues from the territory of Odessa region.

Threat of secondary pollution of water bodies - sludge sites of biological treatment plants. The problem of detoxification and utilization of sludge sludge from sewage treatment plants does not find an effective solution in the region due to the high content of organic matter, toxic salts of heavy metals, petroleum products, chlorinated and polycyclic hydrocarbons. Annually, each resident of the region's cities has 25-30 kg of sludge in terms of dry matter. More than 35,000 tons of sludge are formed every year at the Pivnichna and Pivdenna sewage treatment plants in Odessa alone.

On the territory of Odessa region about 6.1 million m^3 of solid household waste (hereinafter - SHW) are generated annually. Most landfills have exhausted their potential. In order to solve problems in this direction in the region there was a "Program for solid waste management in the Odessa region for 2013-2017" (approved by the decision of the Odessa regional council from 04.07.2013 № 823-VI).

The oblast had a solid waste management program in Odesa oblast for 2013-2017. Implementation of measures to ensure complete collection, transportation, utilization and disposal of household waste and limit their harmful effects on the environment and human health, as well as expansion and modernization of existing facilities for collection, processing and disposal of solid waste, creating an effective management system in the field of waste management is carried out at a slow pace.

Currently, with the assistance of the regional state administration within the USAID project "Municipal Energy Reform in Ukraine", the US Agency for International Development "International Resources Group" is working on a draft Regional Program for Solid Waste Management in Odessa region for 2018-2022, which is at the stage of approval.

This program is designed in accordance with the requirements of the European Union and international conventions and takes into account all the features of the infrastructure of our region and the need for environmentally sound management of solid waste.

The landfill accepts solid household and industrial waste of 3-4 classes of danger, which are exported from the territory of Odesa, Illichivsk port and adjacent settlements by self-removal.

According to the Procedure for maintaining the register of waste generation, treatment and disposal facilities, approved by the Cabinet of Ministers of Ukraine dated 31.08.1998 № 1360, the register of waste treatment and disposal facilities is maintained. The register of waste generation facilities is formed in accordance with the specified resolution of the Cabinet of Ministers of Ukraine.

The Department of Ecology and Natural Resources maintains a register of waste disposal sites, a total of 495 passports of waste disposal sites have been entered into the register, including 484 landfills.

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In the Odessa region, almost all landfills do not meet environmental safety standards (including the requirements of the State Construction Standards B.2.4-2-2005) and need reconstruction in accordance with regulations.

Most landfills are operated with the following violations, namely:

- the vast majority of landfills operate in overload mode
- improper work on certification and reclamation of landfills
- there are no Passports of waste disposal sites (PWDS), documents on commissioning, instructions for operation of PWDS, annual technological plan for the organization of waste disposal, the design capacity of PWDS is not defined;
- proper acceptance and control of waste has not been carried out;
- there are no facilities for extraction and disposal of biogas and leachate;
- no monitoring of the state of environmental pollution in the area of the landfill;
- there are no data on the actual amount of accumulated waste;
- Lack of a proper system of sanitary cleaning of settlements, which would ensure regular removal and disposal of household waste. Its absence leads to natural dumps.

At the state level, a standard project of a solid waste landfill for a small settlement has not been developed. Namely, in these towns, large settlements, unauthorized landfills are not only quite large, but also accumulate hazardous substances and materials.

One of the side but very urgent problems of landfills is the ingress and accumulation of toxic waste due to violations of the rules of treatment of enterprises.

Today, the priority area in the field of household waste management is cooperation with European organizations, which are offered a list of specialized services that are relevant to the city of Odesa and the region.

6. OUTLOOK, CONCLUSIONS and RECOMMENDATIONS

This chapter should include conclusions drawn from the study regarding the possible future of circular economy.

- Major challenges in the country/region
- Are there any specific services/programmes that you would mention as a good practice?

A possible window of opportunities for Ukraine, in the context of the EU New Industrial Policy, is the integration of Ukrainian production facilities into the new industrial processes of the EU. In other words, they shall become an element in the chain of new industrial processes. It may simply not only the supply of raw materials or localization of industrial processes at the cost of the 'cheap' labour, but also the integration into the high-tech sectors with high added value of the processes. It can all be made possible, provided the industrial policy is implemented in Ukraine, which is currently unavailable. It is clear that a precondition thereto is political integration, as well as conducive regulatory and investment climate in Ukraine.

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Expected limitations related to the sustainability of goods and services to be placed in the EU market may pose new niches for Ukrainian producers due to the EU import phase-out from other countries. Itis obvious that in order to make use of the niches, Ukrainian producers will have to provide for the due quality of goods and services (such as in creating new production facilities), while the government shall provide for their maximum support (such as informational and analytical support).

Many opportunities stem from the development of digital area in the EU: from simplified payment settlements to customs procedures, and improved control over smuggled goods (both ways), further development of IT sector, and access to the EU public procurement. In order to seize the opportunities, Ukraine shall pursue the implementation of digitalization initiatives in all areas of economy, and close cooperation in order to coordinate digital processes with the EU.

In the field of circular economy, there are certain obvious opportunities that open up in the framework of the EU special priority to promote these matters in the framework of neighbourhood policy. The Com- mission's new proposal on priorities of Eastern Partnership directly indicates that the EU will support and promote aspects of circular economy in the neighbour states with a focus on energy-intense sectors (plastics, textiles, and construction products). In order to make the most efficient use of the opportunities, Ukraine shall take a proactive role in the formation of priorities and budgets for the relevant thematic and geographical programs under the European Neighbourhood Policy.

The experience has clearly demonstrated both the positive effects of the circular economy and its challenges (Fig. 8).

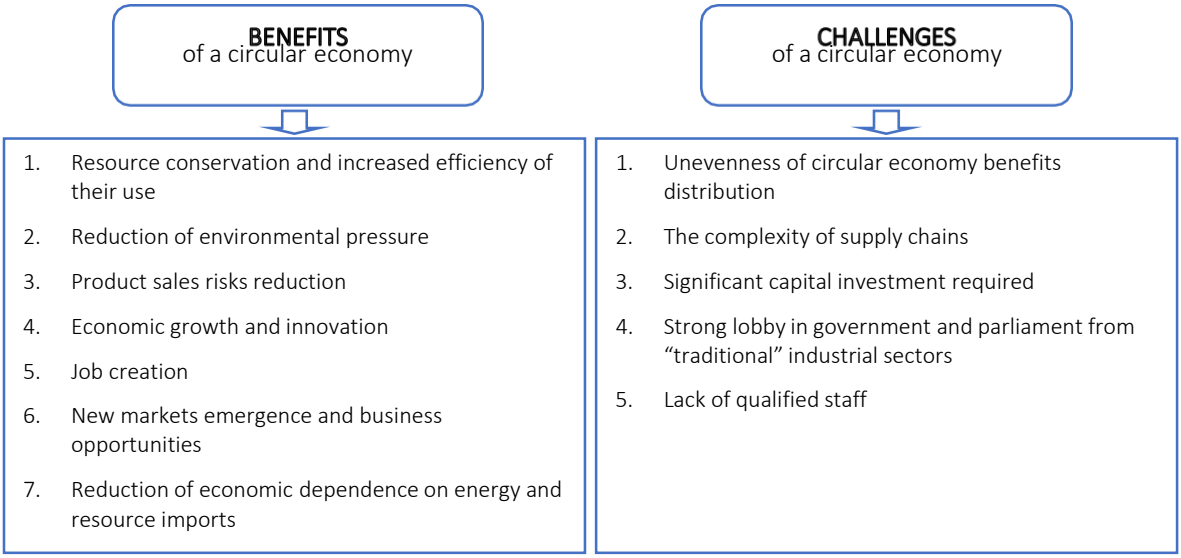

Fig. 8. Benefits and challenges of circular economy for Ukraine

Source: Liudmyla Deineko, Olena Tsyplitska and Oleksandr Deineko (2019). Opportunities and barriers of the Ukrainian industry transition to the circular economy. Environmental Economics, 10(1), 79-92. doi:10.21511/ee.10(1).2019.06

The EU intention is to utterly refuse form the export of wastes and introduce a powerful European market of secondary raw materials. Consequently, it may facilitate the emerging of such market in Ukraine, which in its turn, will create conditions for the segregated waste collection, waste sorting

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and waste processing in Ukraine. The process of implementing a circular economy in a company is quite complicated and requires the involvement of all stakeholders at all stages of value creation. The Boston Consulting Group provides 10 recommendations for the implementation of the circular economy:

1. Involvement of external stakeholders. Most of the companies surveyed state that clients are one ofthe most influential external groups, but government agencies, investors, and public organizations significantly affect the firm. It is important to involve external stakeholders, because the process of implementing a new economic model cannot happen without cooperation with them;

2. Consistent and strong support from senior management. Without it, the company is unable to obtain necessary human and financial resources. In addition, such active support inspires employees;

3. Explaining the concept and discussing the vision. It is necessary to clarify to the middle management what the circular economy will mean for the company, both strategically and operationally. This will create a mutual understanding by all management levels;

4. Development of a business model. Given the high costs associated with the transition to a circular economy, business models are often focused on attracting new customers, strengthening relationships with existing customers, or capturing new markets;

5. Training employees. Before implementation, it is necessary to convey the vision to the staff and support it with training;

6. Engaging and empowering company departments. Departments take responsibility for the project and should be able to implement changes, so they should be involved at the very beginning of it;

7. Process innovations, followed by innovative products or business model innovations. It is least risky to start with the least destructive changes that will allow to form circular thinking, get first successes, and then adapt innovations in the business model;

8. Cooperation with external partners. To develop circular products, it is necessary to have a certain set of skills and new ways of thinking. Successful companies do not try to develop all of them on their own. Instead, they collaborate with various external partners from suppliers to research centers;

9. Identifying key performance indicators. The circular model can greatly improve competitiveness and profitability, but well-defined performance indicators are important;

10. Forming and communicating social benefits. Correct implementation of the circular model creates tangible business and social benefits: more efficient processes, attractive new products and servicesthat increase customer and investor satisfaction.

These recommendations will help systematically and effectively implement the basic principles of circular economy at domestic companies, avoid losses and anticipate risks.

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7. REFERENCES

Please list all references referred to including data sources.

Довкілля України 2020 рік (2021) Державна служба статистики України, К. Державна служба статистики України Регіональна доповідь про стан навколишнього природного середовища в Одеській області у 2017 році. (2018)

Сергієнко, Л. В. (2017). Держава як інститут забезпечення реалізації положень циркулярної економіки. Інвестиції: практика та досвід, № 8, С. 117–125.

Тимошенко І. П., Дронова О. Л. (2018). Циркулярна економіка для умов України. Формування Ужгородського національного університету: серія: Міжнародні економічні відносини та світове господарство, Вип. 25, Ч. 1, С. 93–98.

Циркулярна економіка заснована на логістиці (2018). Available at: https://asstra.com.ua/ukr/noviniasstra/ циркулярної економіки. Вісник Тернопільського національного економічного університету, № 3, С. 74–86.

Avraamidou, S., Baratsas, S. G., Tian, Y., Pistikopoulos, E.N. (2020). Circular Economy A challenge and an opportunity for Process Systems Engineering. Computers & Chemical Engineering, 133, 106629.

Berg, A., Antikainen, R., Hartikainen, E., Kauppi, S., Kautto, P.,… & Saikku, L. (2018). Circular Economy for Sustainable Development (Reports of the Finnish Environment Institute. No. 26). Finnish Environment Institute. Retrieved from https://helda.helsinki.fi/bit- stream/handle/10138/251516/ SYKEre_26_2018.

Boosting circular economy in ukraine through resource efficient and cleaner production. EU4Environment programs. URL: http://www.recpc.org/wp-content/uploads/2022/01/Business-Cases-Results-Brochure-UA-EN.pdf

Cabinet of Ministers of Ukraine. (2019). Natsionalnyi Plan Upravlinnia Vidkhodamy do 2030 roku [National Plan on Waste Management until 2030]. 20.02.2019. No. 117-r. (in Ukrainian). Retrieved from

Circle Economy. (2019). The Circularity Gap (Report 2019). Retrieved from https://pacecircu-lar.org/sites/default/files/2019-03/ CGR%2B20190119%2B-%2BFinal%2BVersion%2B8%20

Circular Economy Package (2018). Available at: http://ec.europa.eu/environment/circular-economy/ index_en.htm.

Commissioner Valean's Speech: 'EU strategy for mobility and transport: measures needed by 2030 and beyond'. 03/02/2020. (https://ec.europa. eu/transport/themes/strategies/news/2020-02-03-commissioner-valeans-speech-eu-strategy-mobility-and-transport_en)

De Jesus, A., Antunes, P., Santos, R., Mendonca, S. (2017). Eco-innovation in the transition to a circular economy: An analytical literature review. Journal of Cleaner Production, 172, 2999–3018.

This material has been produced with the financial assistance of the European Union. The contents of this publication are the sole responsibility of Varna Free University and can in no way be taken to reflect the views of the European Union.

Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:02008L

Druzhynin, P. V. (Ed.) (2009). Modelirovanie vliyaniya razvitiya ekonomiki na okruzhayuschuyu sredu [Modeling the impact of economic development on the environment] (96 p.). Petrozavodsk, Karelsky Scientific Centre of RAS. (In Russian). Retrieved from http://library.asue. am/open/3187.pdf

European Environment Agency. (2016). Circular Economy in Europe. Developing the Knowledge Base (EEA Report No. 2) (27 p.). Copenhagen. Retrieved from https://www.eea.europa.eu/publications/circular-economy-in- europe

European Green Deal: Opportunities and Threats for Ukraine. Policy Paper. Executive Summary (April, 2020) URL: https://www.rac.org.ua/en/our-products/policy-documents/european-green-deal-opportunities-and-threats-for-ukraine-policy-paper-2020

Eurostat. (2019). Database. Retrieved from https://ec.europa. eu/eurostat/data/database

Gahovych, N. G. (2012). Ekologizatsia promyslovogo vyrobnytstva yak neobhidna umova podolannia dysproportsiynosti. Svitogospodarska dysproportsiynist: osoblyvosti, tendentsiyi, tendentsii, vplyv na ekonomiku Ukrainy: naukova dopovid [Greening of industrial production, which is a necessary condition for overcoming disproportionality. Economic disproportionality: personality, tendency, tendency, influence on economy of Ukraine: scientific reference]. L. V. Shynkaruk (Ed.). Kyiv, Institute for Economics and Forecasting of NAS of Ukraine, pp. 94-98. (In Ukrainian).

Geissdoerfer, M. and Savaget, P. and Bocken, N.M.P. and Hultink, E.J. (2017). The circular economy a new sustainability paradigm?, Journal of cleaner production, 143, 757–768.

Ghisellini, P., Cialani, C., & Ulgiati, S. (2016). A Review on Circular Economy: The Expected Transition to a Balanced Interplay of Environmental and Economic Systems. Journal of Cleaner Production, 114, 11-32. Retrieved from https://doi.org/10.1016/j. jclepro.2015.09.007 https://zakon.rada.gov.ua/laws/ show/117-2019-%D1%80

Horbal N. I., Adamiv M.Ye., Chumak A.S. adaptation of circular economy principles to waste management in Ukraine (2020) Bulletin of the National University "Lviv Polytechnic". Series "Problems of Economics and Management" Vol. 4, № 1, URL:https://doi.org/10.23939/semi2020.01.159

Kocheshkova, I. N., & Trushkina, N. V. (2017). Razvitiye logistiki retsyklinga v kontekste tsyrkuliarnoy ekonomiki: zarubezhny opyt [Development of The Logistics of Recycling in the Context of Circular Economy: Foreign Experience]. In Science and Practice: innovative approach. Collection of scientific articles. Paris, Les Editions L'Originale, 19-23. (In Ukrainian). Retrieved from http://conferencii.com/files/ archive/2017-09.pdf

Krysovatyy A., Zvarych I., Zvarych R. (2018). Circular economy in the context of alterglobalization.

Liudmyla Deineko, Olena Tsyplitska and Oleksandr Deineko (2019). Opportunities and barriers of the Ukrainian industry transition to the circular economy. Environmental Economics, 10(1), 79-92. doi:10.21511/ee.10(1).2019.06

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Liudmyla Deineko, Olena Tsyplitska and Oleksandr Deineko (2019). Opportunities and barriers of the Ukrainian industry transition to the circular economy. Environmental Economics, 10(1), 79-92. doi:10.21511/ee.10(1).2019.06

Melnyk O., Obiiukh N. (2019). Pravovi aspekty rehuliuvannia vidnosyn u sferi povodzhennia z pobutovymy vidkhodamy na munitsypalnomu rivni v Ukraini ta YeS v umovakh detsentralizatsii [Legal aspects of regulation of municipal waste management relations at municipal level in Ukraine and the EU in the context of decentralization]. Pidpryiemnytstvo, hospodarstvo i pravo, 3, 127–131.

Merkulova T., Kononova K. and Titomir O. (2017). Development trends of circular economy: Case study of Ukraine. Rivista Di Studi Sulla Sostenibilita', Vol. 2017/2, iss. 2, 51–66.

OECD. (2019). The Circular Economy in Cities and Regions. Retrieved from http://www.oecd. org/cfe/regional-policy/circular- economy-cities.htm

Overview of circular economy in Europe (2019). Available at: https://circulareconomy.europa.eu/ platform/sites/default/files/ecopreneur-circular-economy-update-report-2019.pdf.

redesign, rethink. London, United Kingdom: Kogan Page, p. 25.

Serhiienko, L. V. (2017). Derzhava yak instytut zabezpechennia realizatsii polozhen tsyrkuliarnoi ekonomiky

State Statistics Service of Ukraine. (2019). Retrieved from http://www. ukrstat.gov.ua/

Ten Steps Toward the Circular Economy (2018). Available at: https://www.bcg.com/publications/ 2018/ten-steps-toward-circular-economy.aspx.

The Circular Economy: A Wealth of Flows, Ken Webster, Ellen MacArthur Foundation Publishing, ISBN13: 9780992778422, pp 210 pages, 2015

Valko, D. V. (2018). Tsyrkuliarnaya ekonomika: teoreticheskaya model i effekty realizatsii [Circular economy: A theoretical model and implementation effects].

Voitsikhovska A., Kravchenko O., Melen-Zabramna O., Pankevych M. (2019). Krashchi yevropeiski praktyky upravlinnia vidkhodamy (posibnyk) [Best European waste management practices (guide)].

Weetman, Catherine (2016). A circular economy handbook for business and supply chains: repair, remake,

Zvarych, I. Ia. (2019). Implementatsiia planu dii YeS u sferi tsyrkuliarnoi ekonomiky [Implementation of the EU Circular Economy Action Plan]. Naukovyi visnyk Uzhhorodskoho natsionalnoho universytetu: seriia: Mizhnarodni ekonomichni vidnosyny ta svitove hospodarstvo, 25(1), 93–98.

This material has been produced with the financial assistance of the European Union. The contents of this publication are the sole responsibility of Varna Free University and can in no way be taken to reflect the views of the European Union.