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DECARBONIZATION PROCESS IN EASTERN UKRAINE

ANALYTICAL REPORT*

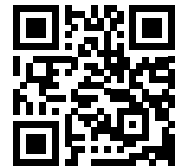
*KEY RESULTS AND RECOMMENDATIONS

ANALYTICAL REPORT ON DECARBONIZATION PROCESS IN EASTERN UKRAINE

(through analysis of scenarios of just transition
and the consequences of restructuring coal mining and
coal processing facilities)

KEY RESULTS AND RECOMMENDATIONS

The full version
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in Ukrainian is available
via QR-code



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This analytical report presents the results of the research and scenario analysis of coal industry restructuring (liquidation, conservation or reorientation of coal mining and coal processing enterprises for other types of economic activity) in the East of Ukraine (in Donetsk and Luhansk oblasts) in the context of decarbonization and just transition.

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TERMS AND DEFINITIONS

Public safety — a social component of the environment, characterised by the level of civil defence, of industrial, fire and technogenic safety (including protection of civil society, life and health, property and peace, integrity and preservation of material values, normal operation of companies, institutions and organisations, etc.);

Public health — a social component of the environment, characterised by the sanitary and epidemiological situation and the level of ensuring the well-being of the population (including the length of active and working age, public health, spread of bad habits, diseases and injuries, etc.);

Public comfort — a social component of the environment characterised by living standards and level of human development (including investment attractiveness and landscaping, life and well-being, education, employment and self-fulfillment of the population, demographic processes, etc.);

Decarbonization — a set of organisational, regulatory, financial, economic, engineering and other measures aimed at ensuring the gradual abandonment of mining, use and consumption of fossil fuels, transition of the economy to a low-carbon growth line based on sustainable development and national priorities;

Depressed area — a mining area or settlement, with coal mining and/or coal processing enterprises liquidated since 1994 and no measures, provided for in the liquidation projects, to mitigate the environmental and socio-economic effects of these enterprises not fully implemented;

Single-industry town — a small town (usually with a total population of up to 50 thousand people), with professional specialisation and employment of the workforce mostly determined by the enterprises of one or two sectors of the economy, forming the city budget revenue and ensuring the social and critical infrastructure;

Restructuring — a set of organisational, regulatory, financial, economic, engineering and other measures aimed at changing the format of the industry, its structure and management, capable of appropriate financial recovery, increasing the volume of competitive products and improving production efficiency;

Just transition — a set of organisational, regulatory, financial, economic, engineering and other measures aimed at establishing (transforming) a model of the regional development, which provides for a decent life and sufficient income for all employees and communities, affected by the process of abandoning fossil fuels;

Sustainable development — development of countries and regions, with the economic growth, material production and consumption, as well as other activities of the society, taking place within the limits, determined by the ability of ecosystems to recover, absorb pollution and support the life-sustaining activity of the present and future generations;

Technogenic and ecological safety — the state of the environment, ensuring prevention of emergencies caused by deteriorating environmental conditions, as well as by accidents, disasters and other dangerous events at hazardous facilities, which threaten or may threaten other facilities, territories, life and health of the population.

ABBREVIATIONS

ATO	Anti-Terrorist Operation
SPD	State Planning Document
Donbas	Donetsk Coal Basin
EU	The European Union
CMU	Cabinet of Ministers of Ukraine
Commission on TES and ES	Commission on Technogenic and Environmental Safety and Emergency Situations
Kuzbas	Kuznetsk Coal Basin
MOH	Ministry of Health of Ukraine
NDC-2	Updated Nationally Determined Contribution of Ukraine to the Paris Climate Agreement
NSDC	National Security and Defence Council of Ukraine
TPP	Thermal Power Plant

MAKING AND IMPLEMENTING THE NATIONAL POLICY OF UKRAINE WITH REGARD TO THE COAL MINING INDUSTRY

A RETROSPECTIVE ANALYSIS OF THE NATIONAL POLICY OF UKRAINE WITH REGARD TO THE COAL MINING INDUSTRY

Large deposits of coal, which in some places almost reached the earth's surface, led to the beginning of a long tradition of its mining in Ukraine — since the discovery of the first coal-field (1721) and industrial mining (1796) in today's Lysychansk (Luhansk Region). For more than 200 years of the history of the coal mining industry in the territory of Ukraine, a powerful infrastructure for coal mining, transportation and processing has been built, with both classical (coal-energy, coal-coke-metal) and other, more complex production chains.

The highest level of development of the country's coal industry (at that time — the Ukrainian Soviet Socialist Republic) was reached in the mid-70s of the previous century: the peak was in 1976 when production amounted to **218.1 million tons**. However, at the end of the same decade, the situation in the energy sector of the Soviet Union was similar to that of the world market 20 years earlier: the discovery of giant oil and gas fields in Western Siberia marked the beginning of a period of priority development of the oil and gas industry, with the coal mining being put on the back burner, which resulted in the reduced funding for the industry (primarily new capital construction and reconstruction of the mine facilities) and, accordingly, in deteriorated production and technical conditions of development of coal

seams, diminished performance, increased accidents and injuries, and ultimately in decline in production and degraded social sphere of coal regions.

Since gaining independence in 1991, Ukraine has inherited an energy imbalance from the USSR — developed gas and nuclear energy sectors, but extremely worn-out mine facilities and the corresponding thermal generation. The country, which was one of the leading coal mining countries in the world, was ahead of many giants of the world economy in terms of natural gas consumption, which was three times higher than its own production. The tactics of the gas pause in terms of the Soviet-era energy strategy for Donbas has turned into an institutional trap — instead of completing the transition to nuclear production and cheap Kuzbas coal, the economy of Ukraine has become a hostage of its own inefficient coal production.

Long-term mining of Ukrainian coalfields has led to the fact that easily accessible coal deposits have already been exhausted. That is why in Ukraine deposits with particularly difficult mining and geological conditions (in particular — with deep-lying and low-thickness coal seams) are being mined, which in most other coal mining countries are considered inexpedient due to various factors. In Donbas, the



share of enterprises which at the best of times produced 1,000 tons per day was only a third of the coal mining facilities inherited from the USSR. Despite their low capacity, these mines mostly had a fully mobilized surface technological complex, which employed more than 20% of the total number of employees. And if we take into account the so-called non-industrial group, even 30% (i. e., 1.5–3 times more than similar mines in the world’s leading coal mining countries).

These conditions, along with the poor quality of coal and outdated and worn-out mine facilities, resulted in the situation where coal mining from unprofitable (in Soviet times), while transiting to the market economy (at the dawn of Ukraine’s independence), turned into so disadvantageous that it needed huge subventions

from the state budget — up to 200% of the wholesale price of the manufactured goods. Accordingly, in 1991–1995, the volume of budget investments rapidly decreased (4 times — from 870 to 217 million UAH), followed by the performances of actual coal production (1.3 times — from 135.6 to 83.6 million tons), the production capacity of the mine facilities (1.3 times — from 192.8 to 143.2 million tons) and the degree of its use (1.2 times — from 70.3 to 58.3%), as well as the total number of employees in the industry (1.25 times — from 939.4 to 741.1 thousand people). At the same time, within the same period, the number of mines changed less significantly (1.1 times — from 283 to 257 mines).

Ukrainian coal mining industry reached the ultimate level of degradation for the entire

peaceful period of independence in 1996, against the backdrop of a steady tendency of reducing the mine facilities and the number of workers employed, coal extraction amounted to only **71.3 million tons** (according to other data — 70.3 million tons), with the degree of

utilizing relevant capacities of 55.6%. The budget investments, which also reached the minimum level (115 million UAH), could no longer ensure, at least, the acceptable functioning of the industry, which needed a decisive but balanced restructuring.

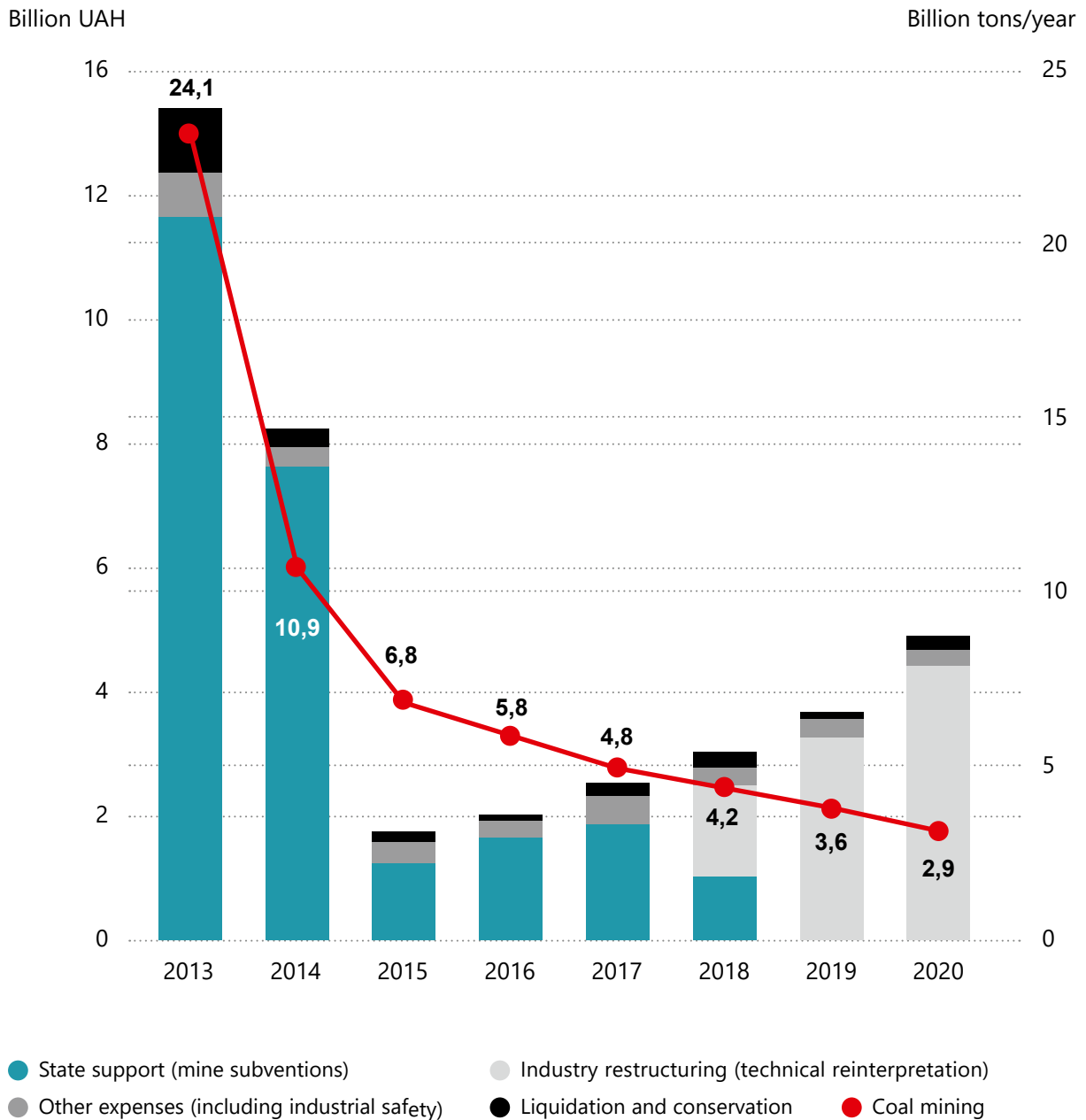
Since the mid-1990s, the Ukrainian government has tried to regulate numerous issues of restructuring the industry, but short-sightedness, inconsistent approaches to reforming, the formalistic nature of sectoral programs, inefficient use of scarce financial resources and other factors made it impossible to mitigate environmental and socio-economic effects of liquidation of mines, as confirmed by numerous reports of state audit bodies. In particular, no systematic and effective measures were taken to prevent (forecast), solve and overcome environmental and hydro-geological problems of the areas of the mass liquidation of mines, diversification and reconversion of the economy of coal-mining regions, social adaptation of terminated workers. International technical and financial assistance projects, aimed at implementing these measures, had little effect, if any, due to imperfect national regulation, inadequate organization by the authorities, and certain specific features of the lifestyles of miners and the population of the mining areas.

ANALYSIS OF THE PRESENT CONDITION OF THE COAL MINING INDUSTRY OF UKRAINE

The coal mining industry is one of the most challenging in Ukraine's economy: on the one hand, it is the main source of the national economy's own energy resources, and on the other — due to difficult natural conditions of field development and low technical level, it is not competitive enough, experiences difficulties in adjusting to the market conditions, as well as needs significant support of the state.

In general, in early 2014, the Ukrainian mine facilities functioned as follows: *30% of private-sector mines provided 70% of the coal mined*. However, even after the start of hostilities, all private enterprises in the industry are profitable (do not receive any subventions), productivity in coal mining is 2–3 times higher, with wages of 20–25% higher than in state-owned mines.

The coal mining industry financing (from the budget)



The situation in the industry after the start of the Anti-Terrorist Operation was particularly threatening, as the railway connections, as well as supply of materials and equipment to coal mining enterprises, were disrupted, with payments for consumed electricity and shipped coal products deteriorated. In general, within the

period 2015–2019, coal production in Ukraine decreased from **39.7 to 31.2 million tons**, both in the *public sector* (from 6.8 to 3.6 million tons) and in the *private one* (from 32.9 to 27.7 million tons). As of the end of 2019, the prime cost of state-owned coal mining enterprises amounted to about 4,000 UAH per ton of finished

commercial coal products, having increased by more than 80% within 6 years. As a result, the loss ratio of state-owned enterprises in the industry, which need increased budget support, is constantly growing — since 2015, budget funding in absolute terms increased from 1.21 to 3.84 billion UAH in 2019 (in qualitative terms, in 2015, 283 UAH of budget funds was spent to produce one ton of coal products, with this amount of 1,484 UAH in 2019).

At the same time, the increased budget support is not able to cover the losses of state-owned coal mining enterprises (29 out of 35 are unprofitable), due to which their accounts payable increase every year. In particular, from 2015 to 2019 it increased by 112% and reached 29.55 billion UAH. In order to repay the wage arrears, which at the end of 2019 amounted to about 1 billion UAH, the government annually decides to amend the state budget annually at the expense of other purposes.

As a result of the liquidation of coal mining and coal processing enterprises in

1996–2013, the number of employees in the industry decreased from *671 thousand to 212 thousand people*. Since 2015, the average annual rate of termination of employment in state-owned mines is 3 thousand people. As of the end of the first half of 2020, the sector employed *35.1 thousand people* (in Lviv Region — 7.86 thousand people, in Volyn Region — 1.37 thousand people, in Luhansk Region — 7.46 thousand people, in Donetsk Region — 18.42 thousand people; in the medium-term period, the rates of termination of employment in the coal mining industry will remain unchanged). At the same time, accounting for about a third of all coal workers, public sector personnel provided just over 10% of the total production.

Despite a significant reduction in the number of mines and employees within the period after 2013, the industry continues playing an important role at the level of regional and local economies due to historical features.

The bodies of state power of Ukraine have understood the urgent necessity for immediate decisions on the liquidation of unprofitable mines simultaneously with the transformation of mining regions, reforming the industry and determining long-term public policy. At the same time, it is obvious that delays in making and implementing decisions to phase out the use of coal for energy purposes, as well as replacing inefficient coal generation with modern environmentally-friendly facilities, hinder the transformation of mining areas and threaten national security. The enormous value of these measures requires international financial assistance, and uncontrolled flooding of mines in the occupied territories necessitates the involvement of international observers, the use of diplomatic channels and negotiating platforms to prevent and resolve the issues of environmental disasters.

ANALYSIS OF PROSPECTS OF THE COAL MINING INDUSTRY OF UKRAINE AGAINST THE BACKDROP OF DECARBONIZATION AND JUST TRANSITION

The long-term critical condition of the domestic coal mining industry turned into disastrous during the military conflict in Donbas. Against the backdrop of environmental threats and the global political tendency towards decarbonization of energy/economy, the situation requires decisive, and in many cases painful, changes. In view of this, the tasks of radical organisational, economic, technical and technological modernization with a focus on achieving break-even and security of the industry are promising, rather than the revival of the industry in the previous format.

A review of the Energy Strategy (until 2050) has been launched by the Ukrainian bodies of state power to address pressing issues and take into account national commitments

to prevent global climate change. Within the framework of the specially created Coordination Centre, the Concepts on Coal Mining Reform and Transformation of Coal Regions (by 2030) have been developed, which *consider several possible public policy options, as well as provide for a set of measures to mitigate the environmental and socio-economic effects of the liquidation of coal mines and reconversion of the mining areas.*

In order to effectively implement the national policy of Ukraine with regard to the reforms of the coal mining industry and the transition of the coal regions, it is to comply with the provisions of the documents, specifying the foundation and principles of the national security, as well as its priorities. In particular,

Draft Concept of Transformation of the Mining Regions (until 2030) provides 3 options for resolution of the problems

1

OPTION

The current situation remains unchanged, with the increased state support to partially cover expenses of coal mining enterprises, but without any state support for the development of coal-dependent areas

2

OPTION

State support for the reforms of the coal mining industry to ensure the transition to a climate-neutral economy, but without economic diversification of single-industry areas and regional development

3

OPTION

Diversification of local economies and increasing the level of socio-economic development of the coal regions through implementing the State Target Program of their just transition

in accordance with Article 107 of the Constitution of Ukraine, due to the introduction of the relevant decision of **the National Security and Defense Council, the Presidential Decree approved the National Security Strategy of Ukraine 'Human Security is the National Security'**, for the purpose of which and in accordance with the Government's Priority Action Plan for 2021, **the Energy Security Strategy** was adopted (the order of the CMU No. 907-r of August 04, 2021).

The adoption of strategic economic documents, recently approved by the National Security and Defense Council and the Cabinet of Ministers of Ukraine — **the Strategy of Economic Security of Ukraine until 2025 and the National Economic Strategy until 2030 — deserves special attention.**

According to the above state planning documents, decarbonization of the economy (energy efficiency, development of renewable energy sources, development of the circular economy and synchronising with the European Green Deal) is one of the basic principles of the economic policy of Ukraine for the next decade, as well as the energy security.

Against the backdrop of significant transformations in Ukraine within the period of independence, geopolitical situation and global trends, the General Area Planning Scheme of Ukraine has remained unchanged for almost 20 years (since 2002) and has already lost its validity (since 2020). Accordingly, a significant part of the relevant draft decisions of the General Scheme have lost their relevance (especially since 2014), with their use in state administration being inappropriate.

Nowadays, the Ministry of Community and Territorial Development is analysing data on the relevance of spatial planning documents at the regional and subregional levels, which is necessary to execute a comprehensive community plan. The results of the research show that about half of the schemes of territories of regions and districts **are no longer relevant and cannot be used to draft comprehensive plans for the development of community territories.** According to the relevant Ministry, the implementation of these plans will enable communities to manage their own resources and attract investment, while **the lack of up-to-date urban planning documents hinders any investment development.** Among other things, it refers to the mining areas and communities involved in the State Program for the Transition of Coal Regions of Ukraine for the period up to 2030.

In the absence of proper assessment and prediction of the ecological condition of the mining areas (in particular, the available General Area Planning Scheme of Ukraine), management decisions regarding the long-term development of relevant communities are mostly inconsistent, imbalanced and unreasonable.

Within the first 20 years of reforming the coal mining industry of Ukraine, several stages were passed on the way to its recovery from the systemic crisis and transition to the functioning of coal mining enterprises in the conditions of the market economy. As a result, before the beginning of the military conflict in Donbas, the industry achieved a certain positive dynamic in the volume of coal production and coal supply, and through related sectors of the economy (e.g., metallurgy) — saving jobs and receiving the necessary foreign exchange earnings.

Stages of the development of the coal industry of Ukraine

1	Until 1996	<ul style="list-style-type: none"> • From the planned economy to the unregulated market (barter schemes) • Mass sporadic liquidation of mines • Uncontrolled processes and lack of legal basis for the liquidation of enterprises in the industry
2	1996 2000	<ul style="list-style-type: none"> • The beginning of the structural restructuring of the coal mining industry • Mass liquidation of mines begins to be systemic (Coal Program) • Total loss of technical assistance and loans from the World Bank • Against the backdrop of the reduction of the number of mines and employees in the industry, there is an increased efficiency of coal mining • The beginning of growth of production performances in the industry
3	2001 2004	<ul style="list-style-type: none"> • The first large-scale negative effects of the mass liquidation of mines • Launch of the Ukrainian Coal Program (for 2001–2010) • The first precedents of privatization of enterprises in the industry • The period of stabilization of production performances of the industry • Consolidation of state-owned coal enterprises in the industry under the management of the Ministry of Coal Industry
4	2005 2009	<ul style="list-style-type: none"> • Adoption of the Coal Mining Industry Development Concept (2005) • Adoption of the first version of the Energy Strategy of Ukraine • The beginning of the systematic privatization of enterprises in the industry • Adoption of the Coal Mining Industry Reform Concept (2008) • The reduction of the mining facilities and termination of employees in the industry continues
5	2010 2013	<ul style="list-style-type: none"> • Preparation of the legal basis for the restructuring of the industry with an emphasis on the social component and investment attractiveness • Continued systematic privatization, introduction of a concession and lease mechanism for the enterprises in the industry • The basic tendency in the industry is attracting private capital • The efficiency of coal mining is maximum after the collapse of the USSR • Termination of subventions for technical re-equipment, modernization and reconstruction of mines • Adjustment of the available Energy Strategy of Ukraine • The number of mines, subject to liquidation/conservation, is the maximum since the beginning of the restructuring of the industry

6

2014
2019

- The industry is in a state of shock
- 2/3 of the mining facilities of Ukraine are located in the territory, not controlled by the government of Ukraine
- The campaign to privatize the coal industry has actually stalled
- Termination of subventions to the industry by the state and its further recovery in 2018 (under the pretext of restructuring, funds are mainly directed to payment of wages and compensation for the electricity costs at the enterprises)
- Adoption of the new version of Energy Strategy of Ukraine and the Concept of Industrial Reform and Development (in 2017)
- Review of the restructuring of the coal mining industry, taking into account decarbonization of the economy and energy sector of Ukraine (NDC-1)

7

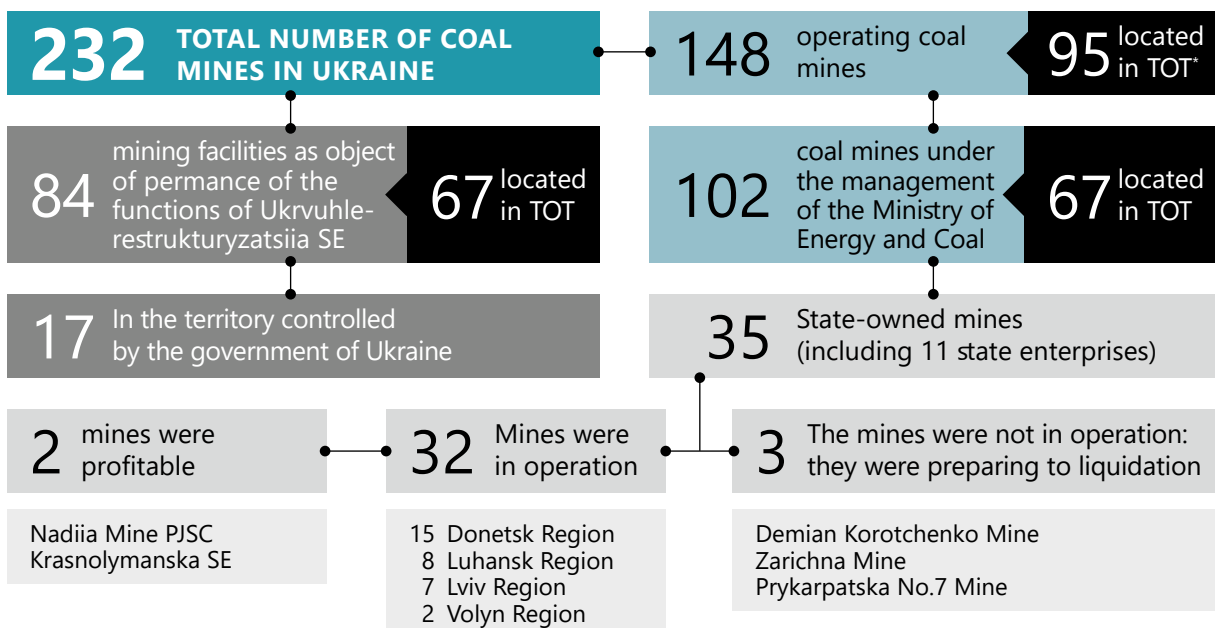
2019
until now

- Development of a resuscitation package for industry management
- Recognition of the necessity for a new concept of reforming the coal mining industry
- Review of the Ukraine’s commitments with regard to decarbonization of the economy and energy sector of Ukraine (NDC-2)
- Development of a new version of the Energy Strategy, taking into account vital aspects
- Recognition of most state-owned coal mining enterprises as unpromising
- Adoption of the concept of transformation of coal regions (through just transition)

For many years, the coal mining industry had been considered as an unalterable guarantee of the energy security of Ukraine. However, with the start of hostilities in the eastern regions of the country in early 2014, which resulted in the destruction of infrastructure, damage

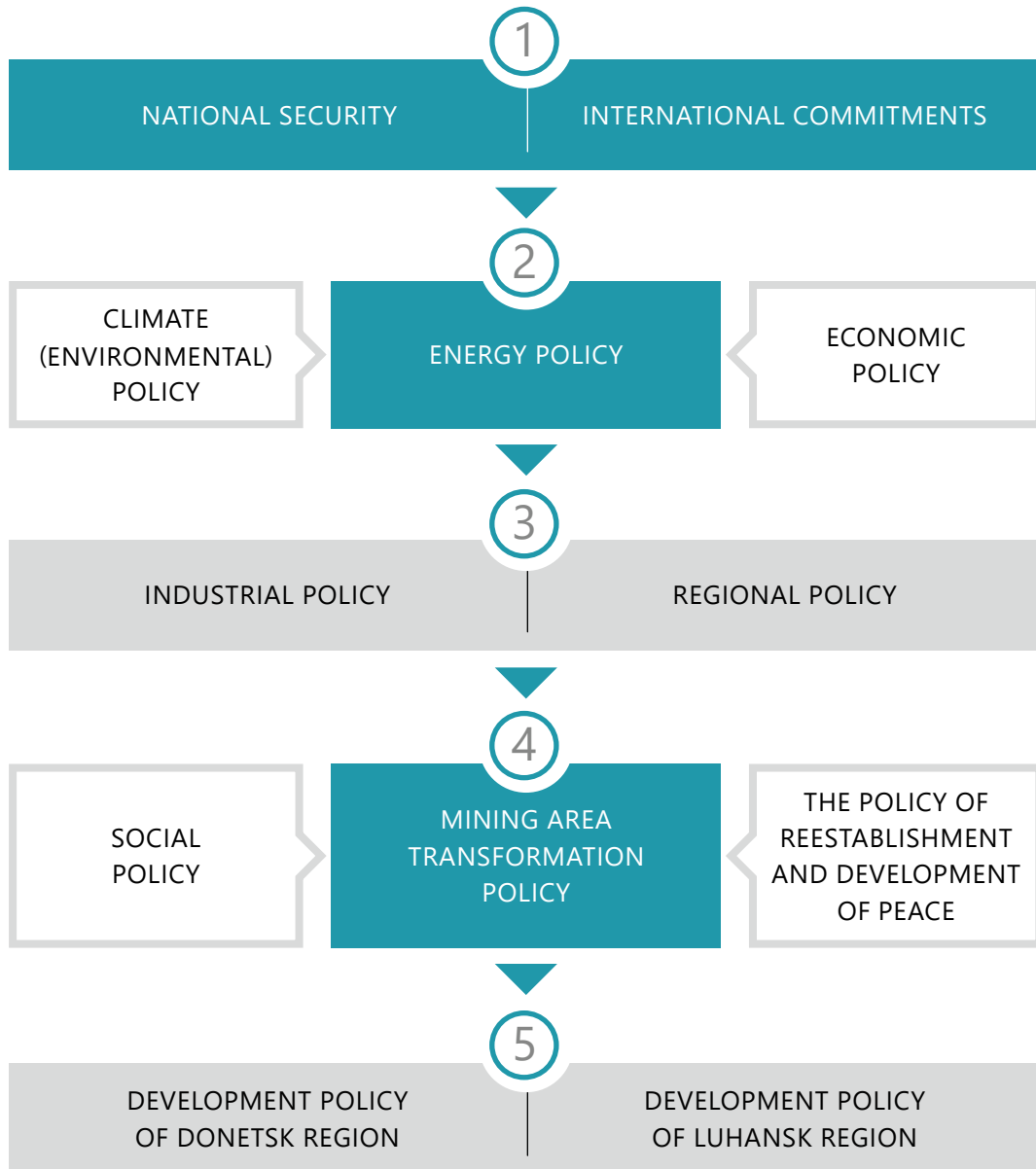
and liquidation of much of the mine facilities, the role of the industry and its structure began changing significantly. Thus, the general structure and the number of enterprises in the country’s coal mining industry as of 2019 is as follows:

Structure of the coal industry (as of 2019)



* TOT — temporary occupied territories

The structure of the national policy



DEFINITION AND CHARACTERISTIC FEATURES OF THE KEY SCENARIOS OF RESTRUCTURING THE COAL MINING INDUSTRY OF UKRAINE

Long-term and intensive subsoil extraction in the coal regions, accompanied by mass liquidation of mines and their predominant flooding, resulted in **the complex of phenomena and processes which are negative in environmental, technogenic and social aspects**. The geological environment has undergone particularly dramatic and mostly irreversible changes, which, within the period of operation of the mining areas, has largely become the main depot of most technogenic factors and a source of further impact on other components of the environment (atmosphere, hydrosphere, soils, biodiversity, landscapes, utilities), as well as the conditions for their use.

Taking into account energy and industrial consumption (as fuel and raw materials), the primary impact of coal mining has significantly increased, with a negative impact on the standard of living, health and safety of the population, including outside the mining areas. Risk levels due to the current impact of the coal mining industry are assessed as high for the vast majority of environmental components (for atmospheric air, soil and geological environment — catastrophic). Thus, **the overall level of the relevant environmental risk is high (unacceptable category) and needs to be addressed nationwide**.



Taking into account the available tendencies and experience of the relevant ministries, **3 scenarios** are considered as options for restructuring

the coal mining industry against the backdrop of decarbonization and the principle of just transition:



The liquidation of mining companies does not guarantee the cessation of their impact on the environmental components, with any improperly calculated intervention (especially flooding of coal mines) resulting in further deterioration of the hydro-geological situation.

According to each of the scenarios of restructuring of the coal mining industry against the backdrop of decarbonization and just transition, significant changes are expected (primarily in eastern Ukraine).

THE INERTIAL SCENARIO, with the current negative tendencies in the industry and life of the mining areas maintained and intensified (the state of almost all components of the environment will deteriorate), will inevitably lead to disastrous effects, including those of national importance. Current mitigation of such effects is not sufficient, with the further one being not effective or possible. As a result, areas of the critical state of utilities will be formed, which will actually turn the mining areas of Eastern Ukraine into ecologically fragmented land with a predominance of dangerous areas or even unfit for life. Accordingly, the overall level of risk in this scenario is extreme in both cases (with/without taking into account prevention/mitigation measures; unacceptable category).

THE ACTIVE SCENARIO, in which negative tendencies in the life-sustaining activity of the mining areas are largely changed for the better, with the relevant environmental and socio-economic effects prevented or mitigated, will improve or stabilise most natural, technogenic and social components of the environment. However, due to irreparable damage to soil, geological environment and subsoil waters, the overall risk level will remain high (unacceptable category), which, provided a set of program measures to prevent/mitigate the effects are used, may be reduced to a significant one (tolerable category).

THE CONSERVATIVE SCENARIO, in which the current negative tendencies in the industry will be mostly changed for the better, with the relevant environmental effects prevented or mitigated, will improve most natural components against the backdrop of stabilising some technogenic ones, and create a basis for further, at least partial, recovery of territories to be involved in the economic activity. Simultaneously, due to the fact that there is no just transition for the mining regions, the level of public comfort will significantly deteriorate, which will result in increased migration flows and a deep demographic crisis. That is why the overall level of risk is extreme (unacceptable category), which can be reduced to a high level, which, provided a set of program measures for prevention/mitigation of the effects is used, may be reduced to a significant one. The unacceptable risk levels in both cases will require additional emergency measures to reach the permissible range of the category.

The scenarios provide for the **necessity for a comprehensive assessment and forecast of the environmental condition** of the mining areas to identify promising and priority areas.

Given the levels of pollution and the degree of hydro-geological changes in the results of such assessment, it is likely that there will be grounds for establishing a regime of severe restrictions on the use of certain sites or their recognition as unfit for economic activities and living (**with granting the legal status of the areas of ecological emergency**).

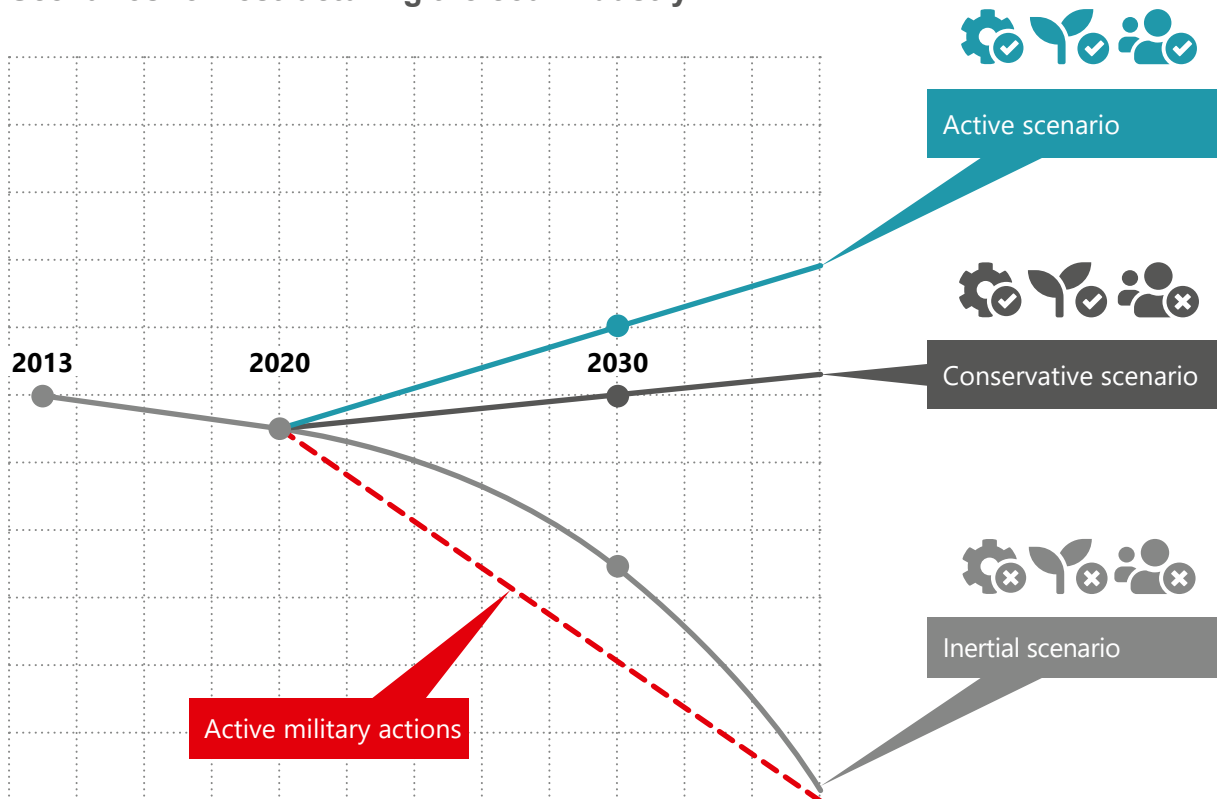
Against the backdrop of decarbonization and just transition, the following factors are of a particular concern:

- inefficiency of the national environmental monitoring system,
- lack of an effective risk management system (in the areas of public health, environmental security, civil defense, etc.),
- lack of a comprehensive forecast of the hydro-ecological situation in the mining areas,
- lack of a clear and coherent vision for the transformation of the mining areas and energy sector reforms,
- uncertain priorities of use and spatial development of the territory of Ukraine.

Due to improper arrangement and unbalanced adjustment of the legal field of Ukraine to the EU laws, these problems have become more sensitive.

In order to reduce the environmental risks due to the impact of the coal mining industry (actual and future, under the prospective restructuring scenarios), it is important to take systematic regulatory, planning and emergency measures at all levels of powers and authority, with the coordinated involvement of international technical assistance and negotiation platforms. At the same time, despite the need to revise, streamline and improve the laws of Ukraine, a significant part of these measures will be taken within the applicable legal field, with their implementation mainly entrusted to the state.

Scenarios for restructuring the coal industry



BASIC RISKS FOR THE KEY SCENARIOS OF THE COAL MINING INDUSTRY RESTRUCTURING IN EASTERN UKRAINE AGAINST THE BACKDROP OF DECARBONIZATION AND JUST TRANSITION

IMPACT OF THE COAL MINING INDUSTRY ON THE NATURAL COMPONENTS OF THE ENVIRONMENT

Assessment tools

The risk-oriented method (using the appropriate matrix) is used to assess the significance of the impact of the coal industry components of the environment.

Risk matrix

		Probability				
Severity	1	1	2	3	4	5
	2	2	4	6	8	10
	3	3	6	9	12	15
	4	4	8	12	16	20
	5	5	10	15	20	25

Categories of effect factors

Severity	Probability	Intensity	Duration	Scale	Grade
Catastrophic	Almost certain	Destructive	Permanent	National	5
Critical	Likely	Strong	Long-term	Superregional	4
Marginal	Possible	Intermediate	Medium-term	Regional	3
Serious	Unlikely	Weak	Short-term	District	2
Slight	Almost incredible	Negligible	Fugitive	Municipal	1

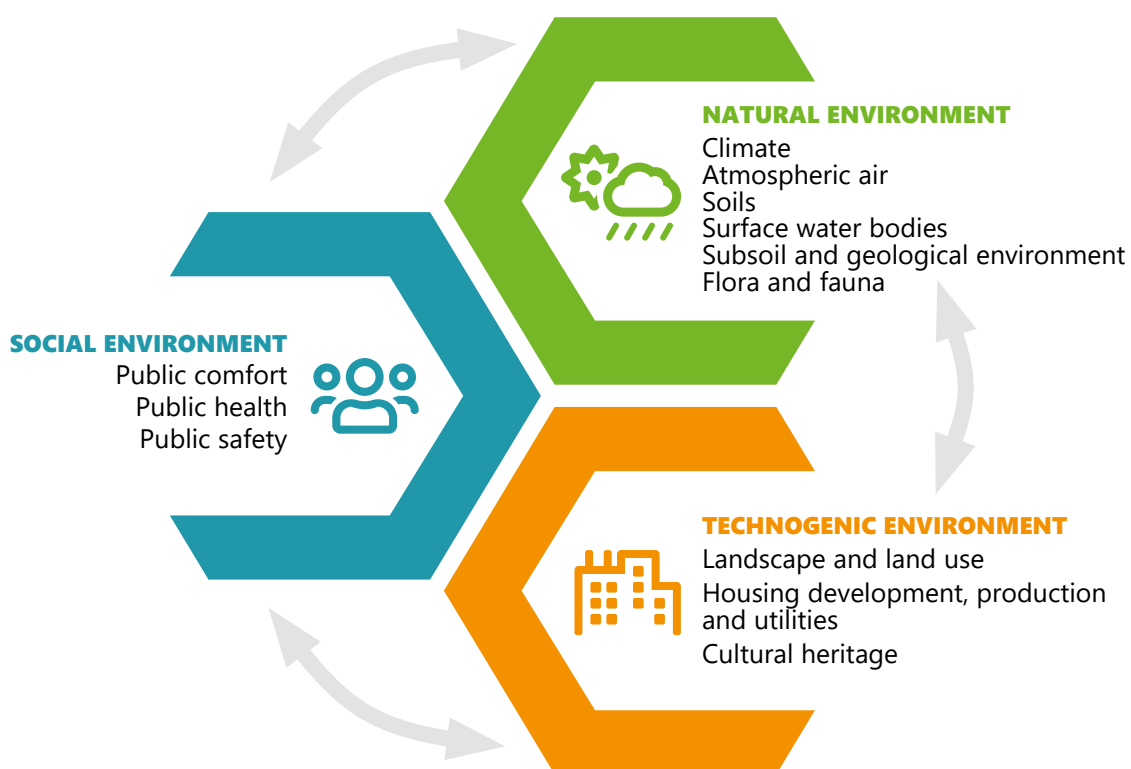
Categories of significance of the effects (levels of risk) of impact

LOW RISK	No or minimal adverse effects on the environment are expected, which do not require detailed assessment and special protection, compensation or control.
MODERATE RISK	Insignificant and controlled adverse effects on the environment are expected, which are mainly limited in scope and in time, reversible and can be identified with sufficient certainty and easily addressed by taking general mitigation measures during the implementation of the SPD.
SUBSTANTIAL RISK	Isolated significant adverse effects on the environment are expected, which are more diverse or complex than those with moderate risk but remain limited in scale and time. High-risk scenarios typically require prevention/mitigation and complex effect management measures (during and after the SPD).
HIGH RISK	Numerous significant adverse effects on the environment are expected which are unprecedented, partially irreversible, may lead to significant environmental degradation and/or contribute to cumulative impacts. High-risk SPD scenarios are mostly rejected or require mandatory prevention/mitigation and comprehensive effect management measures (during and after the SPD).
EXTREME RISK	Numerous significant negative effects on the environment are expected, which are unprecedented, completely or mostly irreversible, and can lead to complete environmental degradation and cumulative effects. Extreme risk SPD scenarios are usually rejected or require mandatory prevention/mitigation and emergency management measures (during and after the SPD).

Significance scale of effects (risk levels) of impact

Effect risk			
Level	Category	Acceptability	Management
21 – 25	EXTREME	Unacceptable	<ul style="list-style-type: none"> • deviation or • emergency risk measures are required; • a management plan is required; • attention of top managers is required
16 – 20	HIGH		<ul style="list-style-type: none"> • deviation or • comprehensive risk measures are required; • a management plan is required; • attention of top managers is required
9 – 15	SUBSTANTIAL	Tolerable	<ul style="list-style-type: none"> • approval under special conditions; • complex risk measures are required; • a management plan is required; • attention of top managers is required
4 – 8	MODERATE		<ul style="list-style-type: none"> • approval under certain conditions; • simple risk measures are required; • periodic monitoring is required; • attention of regional managers is required
1 – 3	LOW	Acceptable	<ul style="list-style-type: none"> • unconditional agreement; • implementation does not require special attention; • usual policies and procedures

The components of the environment for which the impact of the coal industry is determined



NATURAL ENVIRONMENT

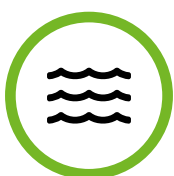


Impact of the coal mining industry on climate

The direct impact of the coal mining industry on the climate occurs during coal extraction but is **largely due to further processes of processing, conversion and consumption of coal** as fossil fuel and raw material (mostly — indirect impact).

Some assessment results show that the significance of Ukraine, as well as its inefficient economy which is highly dependent on coal/energy, is greatly exaggerated in the global dimension.

*Thus, **severe adverse effects of the actual impact of Ukraine's coal mining industry on the global climate are assessed as important** (insignificant intensity, constant duration, maximum scale), **with such effects being probable**. Given the supra-category scale of probable effects, their degree of predictability and manageability, **the overall degree of risk is substantial (tolerable category) and requires the attention of central government officials, as well as complex/comprehensive risk mitigation measures and appropriate management plan.***



Impact of the coal mining industry on surface water bodies

The results of the assessment show that the territories of Donetsk and Luhansk Regions are characterised as the territories with water-scarce resources (referred to the lowest level of water supply — the value per person in the water-scarce year is less than 0.3 thousand m³ compared to the country's average level of 0.58 thousand m³), with an extreme load on the aquatic environment.

*Thus, **severe effects of the actual impact of the Ukrainian coal mining industry on water bodies are assessed as critical** (average intensity, constant duration, nation-wide scale), **with such effects being most probable**. At the same time, **the overall degree of risk is high (unacceptable category) and requires the attention of top-level government officials, as well as comprehensive risk mitigation measures and an appropriate management plan.***



Impact of the coal mining industry on atmospheric air

The results of the assessment show strong and extreme air pollution in about half of the territory of Donetsk and Luhansk Regions, especially in the mining areas. A similar situation of widespread pollution is observed in Dnipropetrovsk and Kirovohrad Regions, and more locally — in the Lviv-Volyn coal basin, around large cities and in areas of large coal-burning thermal power plants.

Thus, severe effects of the actual impact of the Ukrainian coal mining industry on air quality are assessed as critical (strong intensity, permanent duration, national scale), with such effects being most probable. At the same time, the overall degree of risk is high (on the verge of extreme, unacceptable category) and requires the attention of top-level government officials, as well as comprehensive/emergency risk mitigation measures and an appropriate management plan.



Impact of the coal mining industry on the subsoil and geological environment

The results of the assessment show that the most parts of the mining areas have large sections of groundwater pollution. In particular, such an area extends across Donbas (from Oleksandrivka and Dobropillia in the west to Luhansk and Krasnodon in the east, 15–20% of the total area of Donetsk and Luhansk Regions). At the same time, about half of the Donbas territories are characterised as altered by mining (including especially valuable productive lands) and almost all as karstic.

Thus, severe effects of the available impact of the Ukrainian coal mining industry on the subsoil environment are assessed as critical (destructive intensity, permanent duration, superregional scale), with such effects being most probable. At the same time, the overall degree of risk is high (on the verge of extreme, unacceptable category) and requires the attention of top-level government officials, as well as comprehensive/emergency risk mitigation measures and an appropriate management plan.



Impact of the coal mining industry on soils

The results of the assessment show severe and extreme soil (and air) pollution of about half of the territory of Donetsk and Luhansk Regions, especially in the mining areas on the line Kurakhove — Donetsk — Makiivka — Yenakiieve — Horlivka — Kostiantynivka — Kramatorsk — Sloviansk (mines, TPP and metallurgical facilities, a total of 15–20%, with/without taking into account the area of extreme soil pollution of the Mariupol agglomeration).

Thus, severe **effects of the actual impact of the Ukrainian coal mining industry on the soil quality are assessed as critical** (high intensity, permanent duration, national scale), with such effects being most probable. At the same time, **the overall degree of risk is high (on the verge of extreme, unacceptable category) and requires the attention of top-level government officials, as well as comprehensive/emergency risk mitigation measures and an appropriate management plan.**



Impact of the coal mining industry on biodiversity, flora and fauna

The results of the assessment show that one of the largest buffer areas of cities and agglomerations is the area in the central and north-eastern parts of Donetsk Region and the adjacent part of Luhansk Region. At the same time, the core habitat areas (element of the National Ecological Network) on the border of two mining areas near Debaltseve is marked as an area of conflict of the ecological network, with natural corridors, eco-stabilizing areas and territories of nature protection purpose (including those of the nature reserve fund and buffer areas) suffered pollution.

Thus, **severe effects of the available impact of the Ukrainian coal mining industry on biodiversity, flora and fauna are assessed as critical** (average intensity, permanent duration, national scale), with such effects being most probable. At the same time, **the overall degree of risk is high (unacceptable category) and requires the attention of top-level government officials, as well as comprehensive risk mitigation measures and an appropriate management plan.**

TECHNOGENIC ENVIRONMENT



Impact of the coal mining industry on the landscape and land use

The results of the assessment show that approximately two thirds of the Donbas territories are characterised as urbanised with a high or even critical level of industrial and urban use of the territory and with a low level of natural resources of urban development.

At the same time, the central part of Donbas and adjacent areas are recognized as the challenging areas, with the territories being subject to strict (enhanced) regulation of urban development with priority restructuring of the economic basis and environmental restoration.

Thus, severe effects of the available impact of the Ukrainian coal mining industry on biodiversity, flora and fauna are assessed as critical (average intensity, permanent duration, superregional scale), with such effects being most probable. At the same time, the overall degree of risk is high (unacceptable category) and requires the attention of top-level government officials, as well as comprehensive risk mitigation measures and an appropriate management plan.





Impact of the coal mining industry on housing development, production and utilities

The results of the assessment show that about half of the Donbas territories are characterised as urbanised, altered by mining and karstic. At the same time, the central part of Donbas and adjacent areas are recognized as areas with a critical level of industrial and urban development, subject to enhanced or even strict regulation of urban development with priority restructuring of the economic basis and environmental restoration.

*Thus, **severe effects of the available impact of the Ukrainian coal mining industry on housing development, production and utilities are assessed as marginal** (intermediate intensity, permanent duration, superregional scale), **with such effects being most probable. At the same time, the overall degree of risk is significant (tolerable category) and requires the attention of central government officials, as well as comprehensive risk mitigation measures and an appropriate management plan.***



Impact of the coal mining industry on cultural (in particular, architectural and archaeological) heritage

The results of the assessment show that the mining areas of Donetsk and Luhansk Regions are very poor in terms of historical sites, almost devoid of classified areas of concentration of archaeological sites and completely — of areas of natural landscapes of historical and cultural value. At the same time, the central part of Donbas and adjacent areas are recognized as areas altered by mining, and with a critical level of industrial and urban development, subject to enhanced or even strict regulation of the urban development.

*Thus, **severe effects of the available impact of the Ukrainian coal mining industry on the cultural heritage are assessed as marginal** (intermediate intensity, permanent duration, regional scale), **with such effects being most probable. At the same time, the overall degree of risk is substantial (tolerable category) and requires the attention of central government officials, as well as comprehensive risk mitigation measures and an appropriate management plan.***

SOCIAL ENVIRONMENT

**Impact of the coal mining industry on public comfort (employment, investment attractiveness, living conditions and leisure facilities)**

The results of the assessment show that about half of the Donbas territories are characterised as highly urbanised, with partially or completely depressed coal industry facilities, with the protective sanitary zone of the only health resort in the region (Sloviansk health resort) polluted. At the same time, the central part of Donbas and adjacent areas are recognized as areas with a low level of natural (in particular, health resort and recreational) resources for urban development.

*Thus, **severe effects of the available impact of the Ukrainian coal mining industry on public comfort are assessed as critical** (strong intensity, permanent duration, superregional scale), with such effects being most probable. **At the same time, the overall degree of risk is high (unacceptable category) and requires the attention of top-level government officials, as well as comprehensive risk mitigation measures and an appropriate management plan.***

**Impact of the coal mining industry on public safety (industrial safety, civil defence, public order)**

The results of the assessment show that the vast territories of Donetsk and Luhansk Regions have a heightened or high level of technogenic natural hazards disaster, with the entire territory having a high level. At the same time, about half of the highly urbanised areas of Donbas are recognized as areas with a critical level of natural and technogenic danger.

*Thus, **severe effects of the available impact of the Ukrainian coal mining industry on public safety are assessed as critical** (strong intensity, constant duration, supra-regional scale), with such effects being most probable. **At the same time, the overall degree of risk is high (unacceptable category) and requires the attention of top-level government officials, as well as comprehensive risk mitigation measures and an appropriate management plan.***



Impact of the coal mining industry on public health (including sanitary and epidemiological situation)

The results of the assessment show that for many years the mining areas of Eastern Ukraine have been characterized by the unfavourable situation with tuberculosis, alcoholism, mental and behavioural disorders due to drug and other psychoactive substances use, with the suicide rate remaining high. In general, it threatens the society, as the social environment accumulates environmental, economic and other troubles, resulting in psychological discomfort, high crime rate and aggression, protests, which manifest themselves in unpredictable social calamities and confrontation.

*Thus, **severe effects of the available impact of the Ukrainian coal mining industry on public health are assessed as critical** (high intensity, permanent duration, national scale), with such effects being most probable. **At the same time, the overall degree of risk is high (unacceptable category) and requires the attention of top-level government officials, as well as comprehensive risk mitigation measures and an appropriate management plan.***

GENERAL ASSESSMENT OF THE IMPACT OF THE COAL MINING INDUSTRY ON THE ENVIRONMENT

Liquidation of mining enterprises does not guarantee cessation of their impact on the components of the environment, and given the continued energy and industrial use (as fuel and raw materials), the primary impact of coal mining in general is significantly expanded and, in some cases, deepened.

*Taking into account the scaling of the risk levels, resulting from the actual impact of the coal mining industry, they are assessed as high for the vast majority of the components of the environment, and in terms of air, soil and geological environment — as catastrophic. Thus, the **general risk category is HIGH (unacceptable category) and requires the attention of top-level government officials, as well as comprehensive risk mitigation measures and an appropriate management plan.***

RISKS FOR ENVIRONMENTAL COMPONENTS UNDER THE SCENARIOS OF THE COAL MINING INDUSTRY RESTRUCTURING

Long-lasting and intensive subsoil extraction in the coal regions (primarily in eastern Ukraine), which for the previous 25 years has been accompanied by a large-scale liquidation of mines and their predominant flooding, has led to a complex of phenomena and processes, negative in environmental, technogenic and social aspects. **The geological environment has undergone particularly drastic and mostly irreversible changes**, which during the period of operation of the mining areas has largely become the main depot of most technogenic factors and the source of further impact on other components of the environment (atmosphere, hydrosphere, soils, biodiversity, landscapes, utilities, etc.), as well as the conditions of their use.

Taking into account energy and industrial consumption (both fuel and raw materials), the primary impact of coal mining has significantly expanded and deepened, with a negative impact on living conditions, health and safety of the

population, including outside the mining areas. Risk levels due to the actual impact of the coal mining industry are assessed as high for the vast majority of environmental components (and for atmospheric air, soils and geological environment — as catastrophic). Thus, **the general level of the relevant environmental risk is high (unacceptable category) and requires a nation-wide consideration.**

The liquidation of mining enterprises does not guarantee the cessation of their impact on the components of the environment, with any improper interference (especially flooding of coal mines) leading to further deterioration of the hydro-geological situation. **According to each of the studied scenarios of restructuring of the coal mining industry against the backdrop of decarbonization and just transition, significant changes are expected (primarily in eastern Ukraine).**



Expected risks (changes) in the coal mining industry restructuring scenarios against the backdrop of decarbonization and just transition

INERTIAL SCENARIO	ACTIVE SCENARIO	CONSERVATIVE SCENARIO
		
<p>The inertial scenario, which does not provide for any changes in the available approaches and according to which the available negative tendencies in the industry and life-sustaining activity of the mining areas will persist and intensify (the condition of almost all components of the environment will deteriorate), resulting in inevitable adverse effects of the national importance.</p> <p>Current mitigation of such effects is not sufficient, with the further one being not efficient or possible. As a result, areas of the critical conditions of the utilities will be formed, which will actually turn the coal-mining regions of Eastern Ukraine into an ecologically fragmented land with a predominance of areas, dangerous or even unsuitable for life.</p>	<p>Accordingly, the general level of risk in this scenario is extreme in both cases (with/without prevention/mitigation measures, unacceptable category). The active scenario for restructuring the coal mining industry, which involves full and proper application of the principle of just transition, with the negative tendencies in the industry and life-sustaining activity of the mining areas largely changed for the better, with the corresponding environmental and socio-economic effects prevented or mitigated, will improve or stabilize the condition of most natural, technogenic and social components of the environment.</p> <p>However, due to irreparable damage to soil, geological environment and groundwaters, the general level of risk will remain high (unacceptable category), which can be reduced to a significant (tolerable category), provided a set of scheduled measures are taken to prevent/mitigate the effects.</p>	<p>The conservative scenario of restructuring the coal mining industry, in which negative tendencies in the industry will be mostly changed for the better, with the relevant environmental effects prevented or mitigated, will improve the condition of most natural components against the backdrop of stabilizing some technogenic factors, and lay the ground for further restoration of the territories with their use in the economic activity. At the same time, due to the actual absence (negligence or improper and inefficient application) of just transition for the mining areas, the level of public comfort will significantly deteriorate. Reduced tax base and large-scale unemployment will lead to subventions for local budgets, further wear of communal infrastructure and increased migration flows, that is why the general level of risk is extreme (unacceptable category), which can be reduced to a high level, provided a set of scheduled measures for prevention/mitigation of the effects are taken.</p>
<p>Intolerance of risk levels will require additional emergency measures to reach the tolerable level</p>		

Developments in the active and conservative scenarios include the necessity for a comprehensive assessment and anticipation of the environmental condition of the mining areas to determine promising and priority areas. Given the levels of pollution and the degree of hydro-geological changes, according to the results of such assessments, there will be grounds for establishing a regime of severe restrictions on the use of certain sites or their recognition as unsuitable areas for management or living (with granting the legal status of the areas of environmental emergency). Such information will promote reducing technogenic and environmental risks (through improved management), identify long-term priorities and rationally use available resources. Clear spatial planning will contribute to predictable and transparent business conditions, and later — to improving the investment climate, attracting domestic and foreign capital to finance the transition of the mining areas, diversifying the economy of single-industry cities, as well as restoring their outdated economic complex and worn-out infrastructure.

Systemic defects in the regulation of the issues, related to the coal mining industry, are the lack of coordination of relevant public policies and their improper implementation. As a result, numerous planning, regulatory and other documents aimed at preventing/mitigating/eliminating the effects of operation and liquidation of facilities in the industry, creating safe and comfortable living conditions for local people, mostly do not achieve expected results or remain non-compliant.

In the context of decarbonization and just transition, the following factors are of a particular concern: inefficiency of the national environmental monitoring system, the **lack of an effective risk management system (public health, environmental security, civil defence, etc.)**, a **comprehensive forecast of the hydro-ecological situation in the mining areas with regard to their transition, reforms of the energy sector, priorities for use and spatial development of the territory of Ukraine. Due to improper organisation and unbalanced**

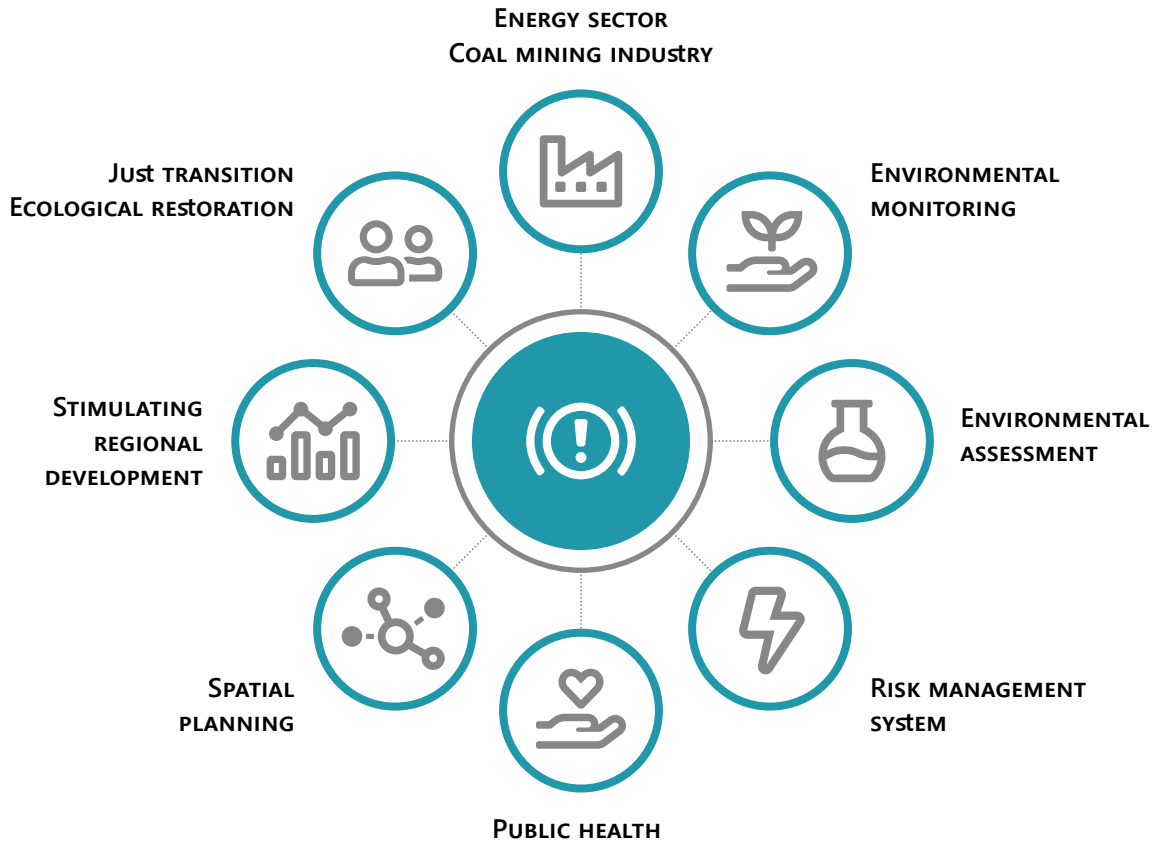
bringing the legal field of Ukraine to compliance with the EU laws, these problems have significantly worsened.

In order to reduce the environmental risks due to the impact of the coal industry (actual and future under the probable restructuring scenarios), it is necessary to take systematic regulatory, planning and emergency measures at all levels of the government, with a coordinated involving of international technical assistance and using of negotiation platforms. At the same time, despite the necessity to revise, streamline and improve numerous provisions of the Ukrainian laws, a significant part of these measures will be taken within the scope of the applicable legal field, with their application **mainly entrusted to the state.**

Environmental impact assessment according to restructuring scenarios

Environmental components	Restructuring scenarios							
	Current situation		Inertial (1)		Active (2)		Conservative (3)	
	Category	Grade	Category	Grade	Category	Grade	Category	Grade
I. Natural environment								
1) Climate	Substantial	8 (+1)	Substantial	8 (+1)	Substantial	8 (+1)	Substantial	8 (+1)
2) Atmospheric air	High	20*	High	20*	Substantial	9	Substantial	9
3) Soils	High	20*	Extreme	25	High	20*	High	20*
4) Surface water bodies	High	20	High	20*	Substantial	12	Substantial	12
5) Subsoil and geological environment	High	20*	Extreme	25	High	20*	High	20*
6) Flora and fauna	High	16	High	20*	Substantial	12	Substantial	12
II. Technogenic environment								
1) Landscape and land use	High	16	High	20*	High	16	High	16
2) Housing development, production and utilities	Substantial	12	High	20*	Substantial	9	High	16
3) Cultural heritage	Substantial	9	Substantial	12	Substantial	9	Substantial	12
III. Social environment								
1) Public comfort	High	16	Extreme	25	Substantial	9	Extreme	25
2) Public health	High	16	Extreme	25	Substantial	12	High	16
3) Public safety	High	16	High	20*	High	16	High	16
Overall assessment								
No warning/mitigation	High	-	Extreme	-	High	-	Extreme	-
Warning/mitigation			Extreme	-	Substantial	-	High	-

Gaps in the system of state regulation and management



To reduce the risks due to the impact of the coal mining industry on the environment (actual and future, under the probable restructuring scenarios, against the backdrop of decarbonization and just transition), it is necessary to take systematic measures at all levels of the government, with the coordinated involvement of international technical assistance and the use of negotiating platforms. Despite the necessity to streamline and update the laws of Ukraine (taking into account the numerous developments of the National Institute for Strategic Studies, state environmental and sanitary institutions), the majority of these measures are focused on the applicable field, with their application mainly entrusted to the state (including, as the owner of mines to be liquidated).

RECOMMENDATIONS FOR IMPROVING THE REGULATORY FRAMEWORK TO REDUCE THE BASIC RISKS RESULTING FROM THE RESTRUCTURING OF THE COAL MINING INDUSTRY IN ESTERN UKRAINE (AGAINST THE BACKDROP OF DECARBONIZATION AND JUST TRANSITION)

THE CABINET OF MINISTERS OF UKRAINE SHALL:

- 1 Develop and submit draft laws to the Verkhovna Rada of Ukraine, in particular:**
 - with regard to the Low-Carbon Development Strategy of Ukraine for the period up to 2050 (taking into account the commitments on NDC-2);
 - with regard to reforming the coal industry (in terms of financial recovery of state-owned coal mining enterprises, prevention of their bankruptcy, preservation of technological and production potential);
 - with regard to amendments to the procedures of strategic impact assessment (in terms of mandatory consideration of projects of the Ministry of Health and the Ministry of Environment with the involvement of expert institutions/groups, and imposition of liability);
 - with regard to augmenting the list of the facilities, subject to environmental audit by administrative and territorial units and their separate parts;
 - with regard to establishing a public health system;
 - with regard to improving the mechanism for approval and implementation of the provisions of the General Scheme of Planning (Spatial Development) of the territory of Ukraine;
 - with regard to the peculiarities of stimulating regional development;
 - with regard to improving the approaches, procedures and practices of declaring certain areas as areas of environmental emergency;
 - with regard to the peculiarities of fulfillment of Ukraine's international obligations in the field of technogenic and environmental safety (against the backdrop of the armed aggression and temporary occupation of the territories).

2 Develop (taking into account the commitments on NDC-2 and substitution of electricity generation from coal sources with other energy sources), ensure strategic environmental assessment, approval and strict compliance with:

- the Energy Strategy of Ukraine until 2050 and relevant National Plans until 2030 (on energy and climate change, on energy efficiency, on the development of renewable energy);
- procedure and sources of financing of environmental measures of the National Plan for Reduction of Emissions from Large Combustion Plants (as well as changes in the terms of implementation of environmental measures and equipment configuration);
- the Concept of reforming the coal mining industry and the Action Plan for its implementation;
- the National Target Program for Just Transition of the Coal Regions of Ukraine until 2030;
- the General scheme of planning (spatial development) of the territory of Ukraine until 2050 (after approval of relevant amendments to the laws);
- the concept, the national target program of stabilization/improvement of environmental situation in the mining areas (with a set of measures to protect communities and aquifers in the areas of liquidation of mining enterprises against harmful effects, caused by the violation of the groundwater regime);
- the concept, the national target program of the development of groundwater supply systems in the mining areas;
- the concept, the national target program of reforming the state environmental monitoring system;
- new version of the Procedure for liquidation of unprofitable coal mining and coal processing enterprises (in terms of proper representation of the parties concerned, guaranteeing conservation of natural resources and compliance with technogenic and environmental safety, addressing post-liquidation issues, namely environmental monitoring, maintenance of utilities, etc.).

3 Establish an Inter-Agency Working Group on the basis of the Ministry of Environment to monitor environmental and technogenic risks in the mining areas.

4 Take measures to involve international organisations (OSCE, UN) in:

- monitoring the condition of the environment and compliance with environmental safety requirements on the delimitation line and the temporarily occupied territories of Ukraine;
- considering and negotiating with regard to prevention of technogenic and environmental disaster, related to flooding of mines in Donetsk and Luhansk Regions (including this issue in the agenda of the Normandy format negotiation process and/or other diplomatic platforms);
- fulfilling of the international commitments of Ukraine with regard to technogenic and environmental safety (ratified conventions and protocols, interstate and intergovernmental agreements).

- 5 Ensure a comprehensive ecological and hydro-geological study of the mining areas (assessment of the condition and forecasting changes in possible scenarios, taking into account the military conflict in eastern Ukraine) and obtaining such data from the temporarily occupied territories of Donetsk and Luhansk Regions through international mediators (OSCE, UN).**
- 6 According to the results of ecological and other studies of the territories of the mining areas:**
 - ensure implementation of the conclusions, in particular — through the relevant national target programs, ecological and hydrogeological maps, schemes of engineering protection of territories and contingency plans;
 - consider the compliance of the environment of the mining areas with the criteria of availability and threat of emergencies (within the State Commission on Energy and Emergency Situations);
 - consider the grounds for declaring territories or separate sections of the mining areas as the areas of environmental emergency and ensure appropriate submission to the President of Ukraine.
- 7 Ensure the efficient functioning of the national environmental monitoring system through:**
 - restoration of the system of observations of the geological environment;
 - material and technical re-equipment of the national hydro-meteorological service;
 - introduction of common approaches to the formation of environmental monitoring information resources on the condition of the environment by the monitoring facilities, creation and maintenance of a single electronic database on the condition of natural and technogenic facilities, unification of methods and equipment for environmental monitoring in accordance with the Association Agreement between Ukraine and the EU;
 - improving comprehensive assessment and forecasting of changes in the environment through the use of modern geographic information systems, remote sensing technologies, geospatial data analysis, thematic mapping and forecasting.
- 8 Establish a mechanism to ensure a national sustainability system and an appropriate governmental coordinating body.**
- 9 Arrange methodological support for risk assessment and management of all types of emergencies (including geological, hydrological and technogenic, related to emission of hazardous chemicals).**
- 10 Ensure unconditional compliance with the requirements of technogenic and environmental safety (taking into account the regional forecast of changes in hydro-geological, engineering, geological and hydro-chemical conditions during liquidation**

of mines closure and ensuring a systematic approach to eliminate adverse effects), while preparing and implementing projects and programs, related to liquidation of coal industry facilities).

THE NATIONAL SECURITY AND DEFENSE COUNCIL OF UKRAINE SHALL:

- 1** Ensure coordination and control over the formation and implementation by the Cabinet of Ministers and other executive bodies of Ukraine of the national policy aimed at effective implementation of priorities of national interests of Ukraine and national security (including, in terms of the energy sector reforms, coal mining restructuring and prevention/mitigation/elimination of the effects of its activities, as well as just transition of the mining areas);
- 2** Consider the grounds for declaring territories or parts of the mining areas as the areas of environmental emergency and ensure submission of the relevant proposal to the President of Ukraine.

THE VERKHOVNA RADA OF UKRAINE SHALL:

- 1** Consider the above draft laws of the Cabinet of Ministers and the decree (decrees) submitted by the President of Ukraine on declaring certain areas of the mining regions as the areas of environmental emergency;
- 2** Take measures of the parliamentary control over the formation and implementation of the Cabinet of Ministers and other executive bodies of Ukraine of the national policy aimed at effective implementation of priorities of national interests of Ukraine and national security, including, in terms of reforming the energy sector, restructuring the coal industry and prevention/mitigation/elimination of the effects of its activities, as well as just transition of the mining regions).

LOCAL STATE ADMINISTRATIONS AND BODIES OF LOCAL SELF-GOVERNANCE OF THE MINING AREAS (ACCORDING TO THEIR POWERS) SHALL:

- 1 Bring regional/local strategies, target and other programs of socio-economic development in compliance with the national documents on energy sector reforms, coal mining industry restructuring, just transition, and the national action plan for environmental protection;**
- 2 Develop/update regional/local plans/spatial development schemes in accordance with the provisions of the new General Scheme of Ukraine;**
- 3 Facilitate the work of regional/local commissions on thermal power plants and emergencies (to assess compliance of the environment with the criteria of environmental emergencies, development of engineering protection schemes and contingency plans);**
- 4 Ensure the functioning of regional units of the state environmental monitoring system;**
- 5 Take measures to involve representatives of administrations and local councils in the composition (work) of state commissions for the liquidation of coal mining and coal processing enterprises.**

BUSINESS ENTITIES OF THE COAL MINING INDUSTRY SHALL:

- 1 Arrange their own activities taking into account national, regional and local plans/schemes of spatial development and engineering protection of territories, documents on energy sector reforms, restructuring of the coal mining industry, regional development and just transition, socio-economic development programs, action plans for environmental protection, emergency preparedness plans, etc.;**
- 2 Take measures to involve representatives of mining facilities and professional associations in the composition (work) of state commissions for the liquidation of coal mining and coal processing enterprises.**