

Gennadiy G. PIVNYAK*

The strategy problem of coal mining industry development in Ukraine

KEY WORDS: coal mining, development strategy, Ukraine

The power production strategy in Ukraine is the strategy of the electric power, atomic power, coal, oil and gas production branches of industry.

It takes into account:

- ♦ global power generation processes;
- ♦ present-day situation in the country with power supply and in its power-saving sector;
- ♦ ecological problems of power industry development and functioning.

It predetermines:

- ♦ the needs of Ukraine in fuel and power resources;
- ♦ the directions of untraditional and restored sources of power development and application;
- ♦ the priority directions of the power saving policy realization and the volume of power consumption reduction;
- ♦ the part and the place of the Ukrainian power generation in global power generation processes;

* Prof. dr, Academician of the National Academy of Sciences of Ukraine, Rector of the National Mining University, Dnipropetrovsk, Ukraine.

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- ◆ long-term fuel-and-power balances, which define import-and-export policy of the state in the sphere of power generation;
- ◆ the development of the electrical engineering complex and the adjacent branches of industry;
- ◆ the principles, sources and mechanisms of power generating industry development financing.

The strategy of coal-mining industry development has been worked out taking into account the analysis of the present-day state of the branch, its raw-material and production base, general directions of the economic and power generation policy of the state for the period of time up to the year 2030, the defined indicators of need in fuel and power resources and general tendencies of the long-term fuel-and-power balances of Ukraine forming.

The strategy of coal-mining development does not reject the previous programs of coal-mining industry and power generating complexes development. Just on the contrary: it develops, corrects and concretizes separate principal proposition of these programs, taking into consideration the present-day state of affairs in the economies of Ukraine and the situation in this sphere, which is formatted for the future as well as general directions of the state fuel-and-power complex development for the period of time up to the year 2030.

The strategy foresees active policy in the sphere of state regulation and liberalization of economic relations, the creation of conditions to legalize “shadow” operations in the branch unification.

The strategy of coal-mining industry development in Ukraine up to the year 2030 and even in the further perspective will provide efficient, stable and reliable supply of the main raw material for power generation — i.e. coal, which is so necessary both for the population and the economy of Ukraine and which will precipitate the economical revival of the country, improve the quality of people’s life and raise the living standard.

The main directions of the strategy:

- ◆ the increase of coal-mining industry role in providing the power safety of the state and adequately make favourable conditions for the development of chemical and metallurgical complexes;
- ◆ further development of mining engineering and the branch science;
- ◆ the reformation of the coal-mining industry enterprises property relations and the efficient control system creation;
- ◆ the improvement of coal market;
- ◆ financial normalizing of the coal-mining industry enterprises;
- ◆ the solution of social and ecological problems and raising the level of labour protection and safety.

The goals:

- ◆ to provide power safety and independence of Ukraine;
- ◆ stable provision of the population and the economy of the country with their own fuel and power resources in economically expedient scales;
- ◆ to raise the efficiency of coal consumption and to create necessary conditions for the problem solution within the branch;
- ◆ to create reliable and safe raw-material base and to provide stable coal-mining industry development as well as the development of the electrical power engineering and metallurgical complex under the conditions of market relations forming;

- ◆ to decrease the coal-mining industry negative influence upon the environment;
- ◆ to raise the labor safety conditions efficiency at the enterprises of coal-mining industry;
- ◆ to minimize negative social consequences of the branch restructurization and mines closing;
- ◆ to form the conditions and the medium, which will provide the achievement of the gains of strategy.

The principles:

- ◆ the improvement of the fuel-and-power balance structure, the decrease of the volumes of natural gas consumption as well as that of coal in power generation;
- ◆ the capability of the coal-mining industry to meet the demands of both home and foreign consumers with the sufficient bulk of coal of the needed quality taking into account economical, social and ecological factors (control for the risk decrease in power supply of Ukraine, taking into consideration possible cancellation of natural gas deliver on schedule and the situation with the atomic power station);
- ◆ raising the level of state control in this branch and creation of the efficient control systems to provide control for the state property (the improvement of the mechanism of pricing, budget support and the system of taxation in coal-mining industry with the aim to stimulate the process of coal mining and the expenditures lowering as well as creating favourable investment climate conditions, obligatory audit with the aim to restore the resources base);
- ◆ stimulating the fulfilment of the home scientific and technical developments and maximum application in coal-mining industry of native technologies and equipment;
- ◆ forming of the rational state investment policy as to the coal-mining branch.

The priorities:

- ◆ raising of the bulk and the efficiency of native coal usage to provide power safety of Ukraine;
- ◆ minimization of the socially necessary expenditures to provide the country with energy;
- ◆ lowering the technogenic influence upon the environment in coal-mining regions of Ukraine;
- ◆ creation of highly technological material resources base of the coal-mining industry and the branches, which serve it;
- ◆ development of information-industrial technologies on the native industrial base for power generating complexes;
- ◆ ensuring the efficient state control of the coal-mining industry development;
- ◆ mining industry labour potential preservation and development.

The ways:

- ◆ the determination of the priority scientific and technical directions and critical technologies in coal-mining industry taking into account their efficiency, which may be forecasted, and world tendencies;
- ◆ the concentration of resources at the priority directions and the use of the effective levers of control for the branch development with corresponding legal and normative ensuring;
- ◆ the state account system organization to control the results of the investigations and scientific developments realization in the sphere of mining geotechnologies;
- ◆ guaranteeing fundamental developments and investigations in the sphere of coal geotechnologies, which are aimed at the search of the principally new ways of realizing coal mining and consumption;

- ◆ the creation of favourable conditions to the new technologies realization, which provide technical and ecological safety of solid fuel production starting with the coal fields geological prospecting and up to the time of the coal complete consumption (from safety engineering and to the safe equipment and machines).

The strategy forms some directions of the state electrical power engineering but the preference is given to coal mining technologies (fig. 1).

Coal as fuel has some advantages, such as great deposits and relatively low stable price, which is 2,5—2,8 times lower at the world market than that for oil and 2,2 times lower than prices for gas. The experts assert that under the conditions of the present-day level of consumption in the year 2035 the world supply of oil and gas will be exhausted. That means that world demand for coal by the year 2015 will become twice as large, i.e. coal as fuel will be of great importance in the XXI century and in future it may even become the main source of power generation. Due to this reason such countries as the USA, Australia, China, Great Britain have come to the conclusion to increase the bulk of coal production. Prices for coal in a number of countries are much lower than those for oil and gas. In the USA at the best electric power stations the price of 1 kW of electric power a year using natural gas as fuel costs 1,4 cents, when the atomic fuel is used — it costs 1,35 cents and when the electric power station uses coal as fuel 1 kW of electric power generated costs 1,02 cents.

The strategy of the so called “gas pause” will soon be completed. Now about 80% of Russian gas is produced at the deposits, which are characterized by the decrease of production. The main deposits are 80—90% exhausted. To exploit new deposits in Zapolyarie and on the Sakhalin island they need the investments. The investments are also necessary to reconstruct the existing and to build new transportation lines. The specialists assert that in 5—10 years prices for gas will become 2—3 times as much. That is why in 2—4 years coal will become a liquidity product and the processes of gas substitution with coal will be more active.

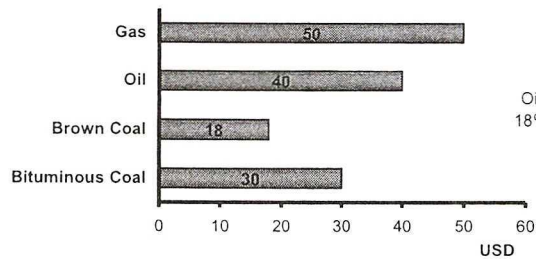
Coal is the most portable fuel, which is available in sufficient quantities and used by all leading countries of the world to strengthen national power generation industry. In the XXI-st century coal-mining industry will have the following prospects:

- ◆ coal production will grow all over the world;
- ◆ coal will be the competitive type of fuel;
- ◆ coal will remain the component part of power generation, metallurgical, cement-producing and other enterprises;
- ◆ the international coal trade will also grow;
- ◆ coal will always be in the center of specialists attention, who deal with the problem of raising the economical efficiency of its usage.

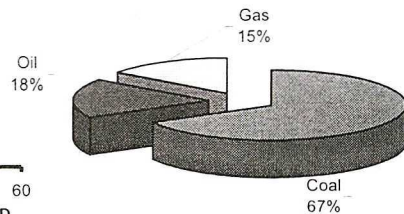
At present bituminous coal is mostly mined, but we have also considerable stocks of lignite, which is widely used in other countries as solid fuel, where corresponding technologies of its burning are applied. The strategy of coal-mining industry development envisages the increase of the bulk and efficient consumption of native coal to provide power safety of Ukraine. It goes about the efficient power generation and the use of solid fuel guarantees its successful creation.

Natural resources make up the important component of the country's life, the potential for its economy development and guarantee the safety of the state. That is why it is so important to exploit home deposits of minerals. The aim of the rational mineral resources consumption is the tendency to decrease the specific weight of the mineral raw material in the structure of the home

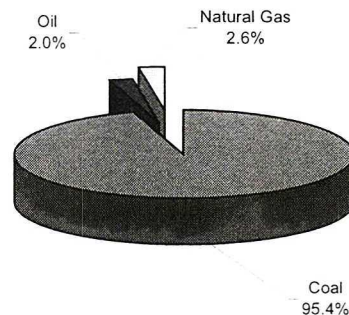
The Cost of 1 ton of the Conditional Fuel



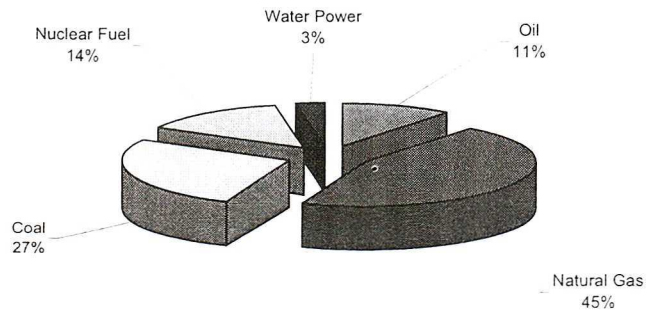
World Reserves of Organic Fuel



The Reserves of the Organic Fuel in Ukraine



The Use of the Primary Types of Fuel in Ukraine



The Use of the Primary Types of Fuel in the World

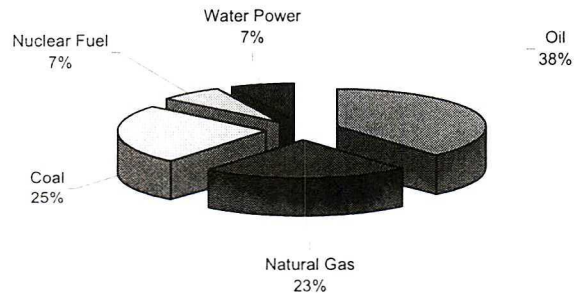


Fig. 1. The role of coal in the economy of the state

Rys. 1. Rola węgla w gospodarce kraju

gross product (HGP) and to save the deposits of mineral resources for future generations, which is of great importance for Ukraine.

Under the conditions of continuous financial deficit coal-mining industry is not able to compensate the lack of state financing to provide capital construction at the expense of its own sources, as it is done at such mines as: “Krasnoarmiyska–Zahidna №1”, “Krasnolimanska”, “Komsomolets Donbasu” and at a mine, named after Zasyadko.

The problem of the total volume of output growth and lowering the expenses for mining is the key one at present.

The subsidies from the state to be used for the mines construction will provide their profitability. The preparation of new production capacities is the strategically important index of stable branch operation in future.

At the same time the state cannot provide the sufficient level of capital investments only at the expense of budgetary appropriations. In the case the investors must help.

It's known that a number of German firms as well as those in Great Britain are ready to invest coal-mining industry of Ukraine. But they need guarantees on the state's side to defend their interests.

The main way to increase the competitiveness of the Ukrainian coal-mining industry and its products both at the home and foreign markets is to increase the quality of products.

So, the main task of the state policy is:

- ◆ to increase the volumes of coal dressing (up to 100%);
- ◆ to produce high quality standardized products, ready for the consumption (sorted coal concentrates, concentrates to be used in heat power engineering and for the production of coke, industrial products, coal dust, briquettes, water-coal fuel, coal briquettes, products, which are produced under the conditions of deep coal and coal rock processing);
- ◆ all dressing plants and concentrating mills must provide deep beneficiation applying modern progressive technologies (wet, screw separation; concentration in cyclones, dry dressing of coal, mechanical dewatering without using vacuum) which are especially necessary when ordinary coal is processed;
- ◆ the decreased use of the traditional technologies (separation in heavy medium, flotation), the limitation of their role by means of using return water cleaning under the conditions of closed water-slurry complex without using silt-accumulating device;
- ◆ the creation of the state control system to define the quality of coal products, the working out and the realization of the system of coal products standards for each rank of coal, which is to be oriented on the consumer and drawn near to European and international norms;
- ◆ to provide organization of coal products certification.

To realize all these tasks means to provide further lowering coal products ash content, that means, it will become possible to obtain about 20% of heat in addition thanks to using coal of higher quality.

Taking into consideration the impending changes in pricing policy it turns necessary to provide the enrichment of the whole mined body as low quality coal products may cause the increase of the coal-mining industry unprofitableness.

But the degree of coal dressing is to be granted. The existing practice of lowering the ash content in coal up to 30% will make it possible to make such coal belong to the 1-st rate of quality.

But the maximum economical and power efficiency is not achieved in this case, though the expenses to provide the beneficiation process are realized.

To ground the level of coal concentrates quality from the point of view of raising the economical efficiency of the production cycle (coal mining — coal dressing) there have been obtained the results of this cycle indexes calculation under the conditions of the now existing standard price-list for coal and coal products.

It is necessary to take into consideration that the cost of coal dressing plant technological possibilities does not change. But the cost of the concentrates produced is inversely proportional to their output, which becomes lower when the ash content decreases.

The dependence of profit, got as a result of concentrates, produced from the ton of common coal, sale, is presented in figure 2.

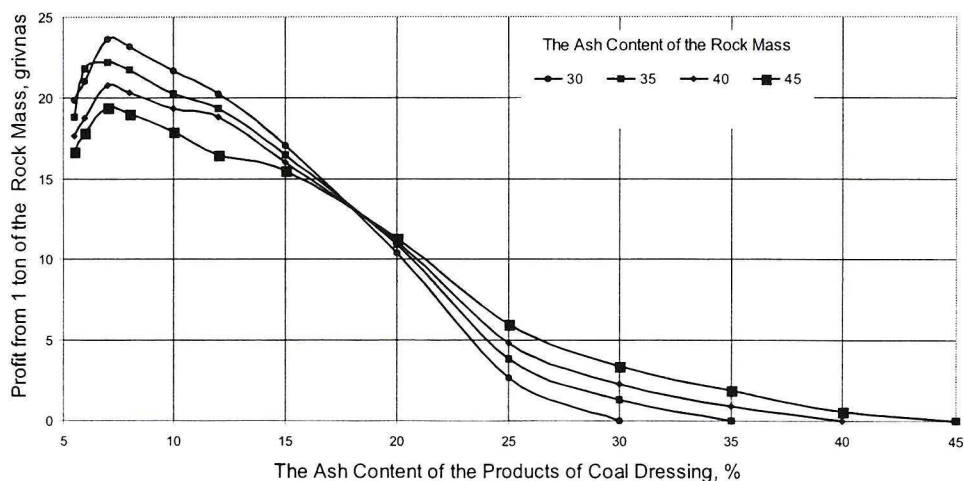


Fig. 2. The economics of coal dressing

Rys. 2. Ekonomika wzbogacanie węgla

It is always profitable to increase the quality of coal under the conditions of the existing standard price-lists. When the ash-content of coal is decreased, its quantity also lowers, but the price grows, that is why profit, which is obtained as a result of product realization, grows and reaches the maximum level when concentrate ash content corresponds to the ash content of rockless mass in coal and may be defined by the inner ash content, connected with the genesis of this useful mineral.

Profit is always obtained by the owner of coal.

Raising the quality of marketable products (coal concentrates and their saling will decrease the losses of coal mining. The main conditions of operation without losses is to achieve the situation when the cost of concentrates is equal to the sale price. In this case the cost of concentrates includes the top cost of coal mining, which in its turn provides the condition of the break-even operations. The values of such top cost under the conditions when the rock mass is characterized by various ash content is given in figure 3.

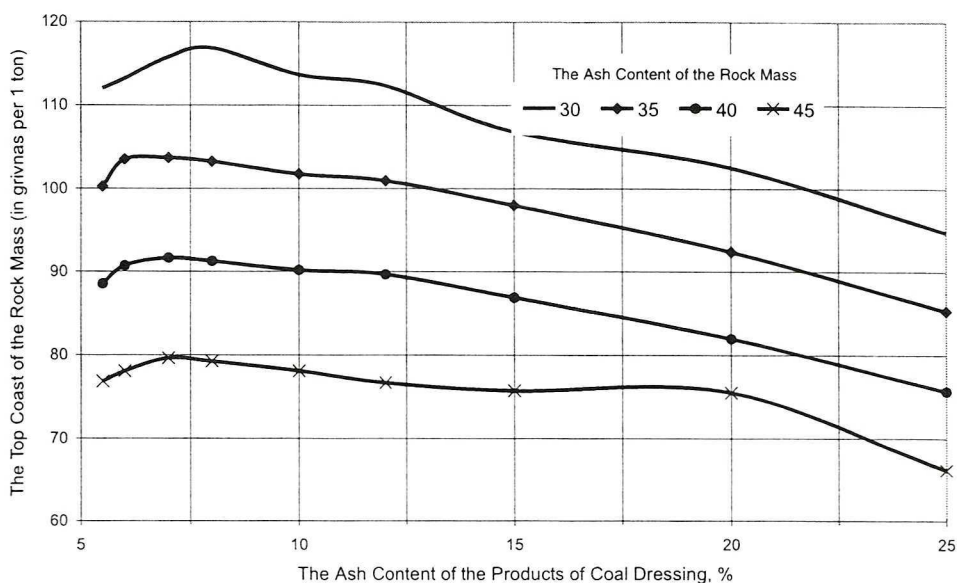


Fig. 3. The condition of the mine efficient operation

Rys. 3. Warunek wzbogacania wydobywania

As to the company “Pavlogradugol”, the cost of 1 ton of marketable coal characterized by the ash content in 30 % and produced from the rock mass, which ash content makes up 40,6 %, in the year 2002 was equal to 107,77 grivnas per 1 ton. See figure 2. This level of cost is marked with the dotted line.

Under such conditions coal mining without losses will be provided if ash content of the produced marketable products is not less then 15%. Further lowering of ash content may even result in getting profit (about 3 grivnas per 1 ton of the rock mass) by a mine.

To decrease the losses in coal mining it is necessary to raise the heat engineering properties of marketable products by means of lowering the ash content and by means of providing beneficiation of the whole bulk of production up to the moment when it reaches the economically justified level. If the ash content of the rock mass is lowered up to 35% the concentrates will be produced of optimal quality and profit will make up 15—17 grivnas per 1 ton of the mined rock mass.

At present the coal-mining industry of Ukraine has the experience of raising the efficiency of coal mining by means of concentrating the mining processes and using modern mining equipment, designed and produced in Ukraine. Home plants producing machines and equipment for the coal-mining industry use modern technologies and their production doesn't yield to the best world analogues during ten years period. We mean cutter-loaders П-110, П-220 produced at Kramatorsky machine-building plant, the equipment for coal mines, produced by the machine-building plant in Gorlivka, lorries and electric locomotives, produced at Druzhkivskiy machine-building plant, the conveyors, produced at the plant “Svitlo Shakhtarya” in the city of Kharkov, etc.

Reliable supports for the mine workings, the anchor systems, the combined supports of AHT, KshPU type, block supports, the supports for vertical shafts, which were designed

15-20 clearing complexes of the MKD type will provide the increase of coal mining in 4-5 mln tons a year

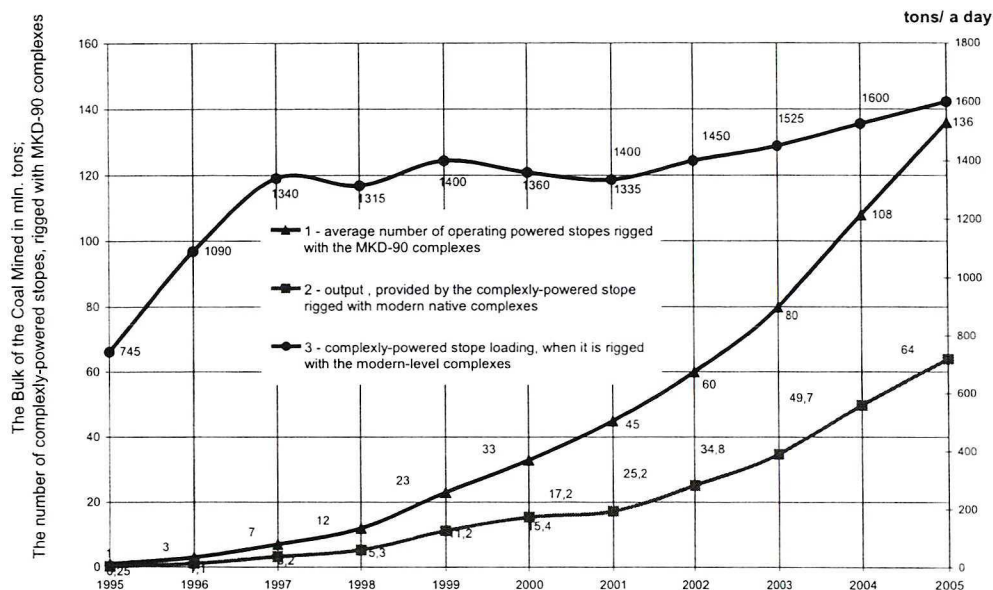


Fig. 4. Complexly-powered stope, rigged with the MKD-90 complexes in Ukraine

Rys. 4. Przodki wyposażone w obudowy ścianowe typu MKD-90 na Ukrainie

taking into account geomechanical properties of the rock mass have also been designed in Ukraine.

The protection facilities and support for the permanent workings and openings, which provide operate reliability of coal mines in Ukraine, producing 100—120 mln tones of coal a year have been developed and are widely applied.

In the coal-mining industry of Ukraine there are 78 mines, characterized by the productive capacity in 85 mln tons of coal, which dispose rather sufficient reserves of coal and relatively favourable mining-geological conditions of coal seams occurrence. These mines as well as those which are to be put into operation in the nearest future are to be equipped with modern machines and facilities to concentrate mining operations, with special “nominal equipment”.

There also exist 125—135 mines and collieries in Ukraine, which have limited possibilities because of the uneliminated technological factors. These mines produce 1000 tons of coal a day and during the period of time in 10—20 years they will play a noticeable part in the branch functioning thanks to their number.

The degree of these mines unprofitableness will depend upon their ability to minimize the expenses, caused by coal products production. The radical way out from this difficult economical situation is the transition to the mode of operation due to the scheme “mine-long wall”.

Thus, the main principles of the state influence upon the scientific and engineering policy in coal mining industry must be as follows:

- ◆ the creation of the law base, which will provide stable development and competitiveness of the coal-mining industry of Ukraine and the efficient and safe operation of its enterprises;

- ◆ the determination of the priority scientific and technical directions and technologies in coal mining industry taking into account their efficiency and world tendencies;
- ◆ the resources concentration on the priority directions of using effective levers of control for the branch development with corresponding law and financial guarantees;
- ◆ the improvement of price formation, the creation of corresponding privileges to raise the material incentive in increasing coal mining and in the coal mining industry investing;
- ◆ the fulfilment of fundamental developments and carrying out scientific investigations in the field of coal geotechnologies which are aimed at the search of new ways of realizing coal mining processes as well as coal consumption and raise the engineering and ecological safety starting with the coalfield prospecting, coal mining and up to the moment of its full consumption (from safety engineering and to the safe equipment and machines).

Abstract

Main directions of Ukrainian coal mining development to the year 2030 is presented in the paper. The key problems — among other things — are: increasing role of coal in fuel and energy balance, improvement of energy safety and independence of the country, security of energy needs of population and the country's economy, improvement of coal utilization effectiveness, power and metallurgical industry development and decreasing the coal-mining industry negative impact on the environment. The role of science and technology development is also emphasized. However, improvement of Ukrainian coal competitiveness is needed both on domestic and international market.

Gennadiy G. PIVNYAK

Strategia rozwoju przemysłu węglowego na Ukrainie

SŁOWA KLUCZOWE: przemysł węglowy, strategia rozwoju, Ukraina

Streszczenie

W artykule przedstawiono główne kierunki rozwoju przemysłu węglowego na Ukrainie w perspektywie roku 2030. Do kluczowych zagadnień należą m.in. wzrost roli węgla w bilansie paliwowo-energetycznym, poprawa bezpieczeństwa energetycznego i niezależności energetycznej kraju, zabezpieczenie potrzeb ludności i gospodarki, poprawa efektywności wykorzystania węgla, rozwój energetyki i przemysłu metalurgicznego oraz zmniejszenie negatywnego wpływu górnictwa węglowego na środowisko. Podkreślono również rolę nauki i rozwoju technologii w przemyśle węglowym. Konieczna jest poprawa konkurencyjności ukraińskiego węgla zarówno na rynku krajowym, jak i międzynarodowym.