

Coal mining sector in Ukraine: why it's not effective

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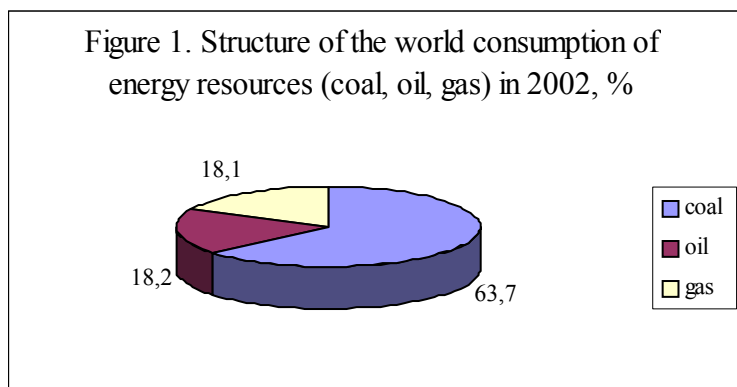
Abstract

This paper is a part of the study on effectiveness of the Ukrainian energy sector. We have based this study on publicly available statistics and data provided by the Ukrainian Ministry of Energy and Fuel. The main results include identification of the existing tendencies in the Ukrainian coal production and their correlations with the world coal market development; and obstacles for further development of this industry.

1. Coal production and use

1.1. Global Trends

The current studies done in the area of energy consumptions show that there is effectively no limit on the availability of coal into the future (F.L. Freme and B.D. Hong, 1999; Domenico Maiello, 2003). This places coal in a unique position in a world where reliable supplies of affordable energy are essential for continuing global development. The existing structure of the world consumption of coal oil, and gas shows that 63.7% is devoted to coal and 3.5 less for oil and gas (Figure 1).¹



1.2. Ukrainian Trends

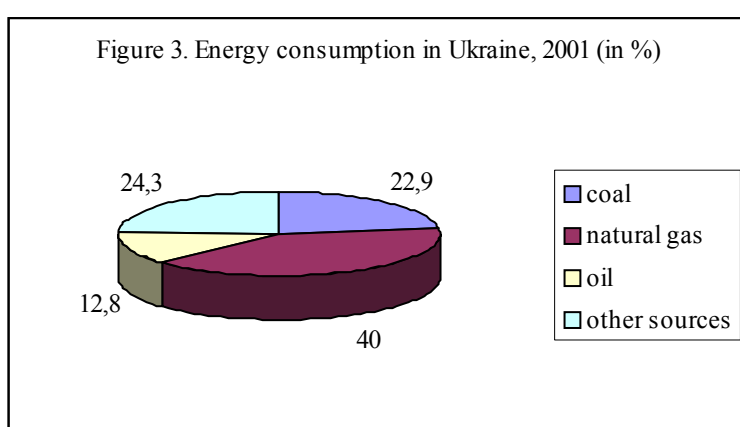
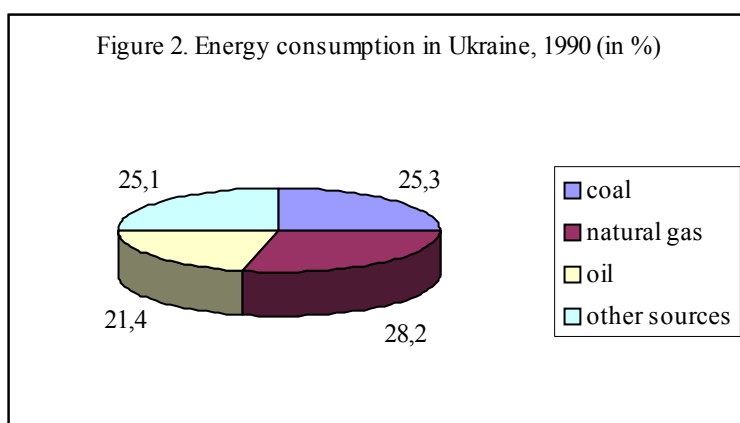
The coal-mining industry of Ukraine occupies a leading position in supplying the country with power and securing its national safety and independence. Such a role is confirmed by the tendencies of world power generation. The current studies show that coal is the second important source of the country's power generation. It provides 22.9% of generation in Ukraine, which is almost twice less than in other European countries, where the share of the coal in the total energy resources consumption is about 41%.² Coal will also be one of the main raw materials for power generation in future. The resources of coal in the world are five times those of oil and gas. The potential resources of coal are 15 times those of oil.³ At the same time, the Ukrainian number one energy source is natural gas. The structures of the Ukrainian energy consumption in 1990 and in 2001 are given in Figure 2 and 3.

Over the last decade Ukraine experienced some changes in the structure of its energy resources consumption. The share of the coal consumption as a preliminary source of energy

¹ Domenico Maiello. International Coal Trade and Price Developments in 2003. UNICEF 2003

² Restructuring the Coal Industry: Central and Eastern Europe and the CIS. World Energy Council, 2002. Also available at <http://www.worldenergy.org/>
Ukraine Annual Statistical Report, 2001.

declined from 25.3% in 1990 to 22.9 in 2001. At the same period of time the share of the natural gas increased by almost 1.5 times from 28.2% to 40%..



The existing in Ukraine tendency of decrease in the coal consumption and increasing in the consumption of natural gas has certain economic disadvantages. The cost of coal at the world market is half that of natural gas. Accession of Ukraine to WTO will affect the level of prices for coal and gas and the existing orientation for gas could negatively affect the effectiveness of the domestic production in Ukraine. Another disadvantage is connected with the energy independence of the country. The main source to meet Ukrainian demand for natural gas is import. But under the existing economic conditions, coal is more economic in comparison with natural gas. At the same time, the experience of the leading countries shows that power generation policy should take into account the country's own natural resources.⁴

The study shows that the main strategically important power generation raw materials in Ukraine are coal and coal gas methane. Real coal extraction potential is estimated at 100 Mt per year.⁵ Coal is the only power resource mined in Ukraine in sufficient quantities to meet the requirements of the country in this type of fuel. This determines the strategic role of coal not

⁴ Restructuring the Coal Industry: Central and Eastern Europe and the CIS. World Energy Council, 2002. Also available at <http://www.worldenergy.org/>

⁵ Data of the Ukrainian Ministry of Energy and Fuel

only in the development of power generation but also in the development of the Ukrainian economy as a whole.

The Ukraine has different kinds of coal: hard coal, bituminous coal, anthracite, etc. Though the amount of coal resources is sufficient, coal mining continually has decreased. As data suggests, coal mining was cut over the decade 1990-2000 by half (164.8 Mt in 1990 and 76.2 Mt in 1999).⁶ The crisis of the coal mining industry in Ukraine was resulted by number of factors. Some of them have historical nature. For example, the investment policy of the former Soviet Union (FSU) supported the idea of reducing investments in the coal-mining operations in the Donbass region. The main reason for such actions was a possibility to develop coalfields in the eastern regions of Russia, containing cheaper coal.

Although geographical re-orientation of the coal production in the FSU was negative for developing Ukrainian mines, it gave some positive effects. The most important was an increase in effectiveness of the coal production in Ukraine. While over this time the nominal production of coal in Ukraine decreased, the level of productivity in Ukrainian mines increased significantly (Table 1). In per worker terms the productivity index in coal industry increased by 25.3%. For mechanized processes of the coal extraction the productivity index raised by 29.7% in 1998 compare to its level in 1996. In 1990 there were 642 mechanized faces, down to 634 in 1991, but since 1992 this number has decreased by half and does not exceed 370-330 units now.

Table 1 Productivity index 1996-1998

	1996	1997	1998
Average per worker (in t/month)	15,8	18,2	19,8
Face productivity (in t/day)	244	289	312
For mechanized faces (in t/day)	357	421	463

⁶ Restructuring the Coal Industry: Central and Eastern Europe and the CIS. World Energy Council, 2002. Also available at <http://www.worldenergy.org/>

1.3. Problems of Ukrainian coal sector

One of the major obstacles to further increase in the effectiveness of the Ukrainian coal production is a current technological and technical state of mines. Our study shows that nearly 40% of all Ukrainian mines have been functioning for more than 50 years, and 14.9% for more than 70 years. Over 35% of the mines have a productive capacity of 300 kt a year, which is lower than the annual productivity of one modern powered face mining system. About 90 mines, characterized by low productivity, mine less than 10% of coal. One fifth of miners are employed at these mines, which absorb about 20% of State investments. In 1998, 211 Ukrainian mines were in operation and 62 of them produced 7.8 Mt of coal, which was even more than expected from these mines by the Ukrainian Ministry of Energy and Fuel Production. At the same time, 149 mines or 70.6% of all Ukrainian mines were not able to fulfill the forecast of coal extraction made by the Ministry. The extraction on these mines was less or equal to 16 Mt less.⁷

Based on the analysis of the current state of the Ukrainian coal production, it can be concluded the following. It is possible to raise the level of coal mining if all non-productive mines were closed and the released funds and material resources were used to re-equip and modernize profitable mines and collieries.

Ukraine has 37.6 billion short tons in proven coal reserves, accounting for over 60 % of the former Soviet Union's total coal reserves.⁸ Most of Ukraine's coal is mined in the Donetsk/Donbas basin in the eastern region of the country. In the mid-1990s, Ukraine's coal production dropped 43 %, from 147.3 million tons to 83.5 million short tons, before inching back up to 90.3 million short tons in 2000.⁹ Through the first five months of 2002, Ukraine produced 31.1 million short tons of coal, 0.4 % less than in the same period of 2001. The decline in Ukraine's coal production during the 1990s was caused in large part by the collapse of domestic demand - which, at 97.2 million short tons in 2000, still exceeds domestic supply -- and the closing of heavy industry as Ukraine's economy contracted. Since Ukraine became independent in 1991, the country's coal sector has fallen into disarray: the industry, which currently counts 193 mines and employs around 450,000 people,¹⁰ suffers from labor strikes, hazardous working conditions, inefficiency and low productivity, corruption, consumer non-payments, unpaid wages and huge debts, and outmoded equipment.¹¹

⁷ Data of the Ukrainian Ministry of Energy and Fuel

⁸ *Given the annual production of even 100 Mt (currently – only 83), this is sufficient for 376 years of production (*

⁹ 2001 Energy Statistics Yearbook, UNDP

¹⁰ World Bank data on 2002

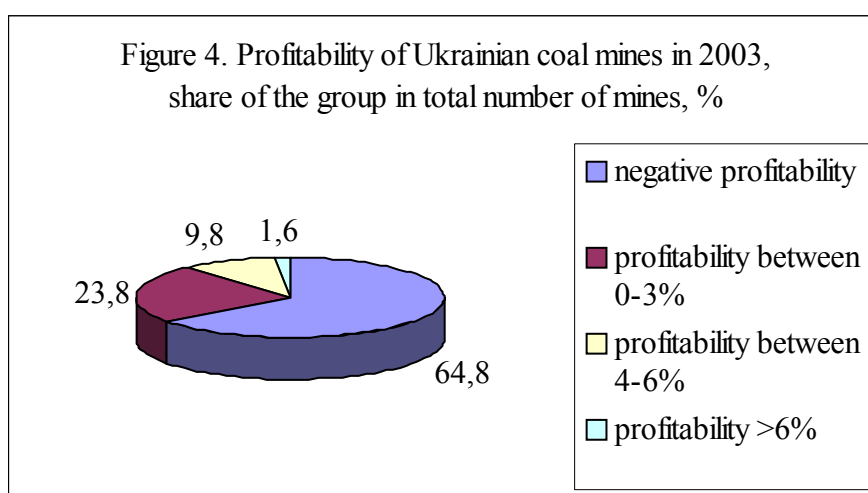
¹¹ For more detail see Transparency International: www.transparency.org

Ukraine's coal mining sector, which remains heavily subsidized by the Ukrainian government, has the world's highest death rate, mostly the result of obsolete equipment and low safety standards¹². The Ukrainian coal industry's debt level has risen significantly over the last decade. In December 2003 it counted for more than \$ 2 billion, which is over 50 % greater than the value of annual production and twice as much as its accounts receivable.¹³

1.4. Attempts to reform the sector

Attempts to reform the Ukrainian coal sector began in 1996 but had little effect as the then-Ministry for Coal concentrated on barter deals, investments and subsidies while lobbying for a ban on coal imports. Although some reforms have begun to take root and wage arrears are beginning to be paid down, coal sector privatization has stalled, and a \$ 300 million World Bank structural adjustment loan that was designed to close down more than 80 loss-making pits between 1997 and 2000 failed to close even half of those mines.

In September 2001, the Ukraine Cabinet of Ministers approved an \$ 8.8 billion program to revive the country's coal sector over the next ten years. The program recognizes that the industry must switch to cash payments, improve mines, budgeting and asset management, seek investment sources, and reduce the mines' high level of debts before proceeding with further privatization. The program also aims to improve mine safety and work practices, as well as providing for a reduction in the number of coalmines to 157 in 2010. The main reason for this strategy in unprofitability of the existing coal mines (Figure 4).¹⁴ About two-thirds of Ukraine's 193 mines are unprofitable.



¹² On July 7, 2002, a fire at the Ukraine mine in eastern Ukraine killed 35 miners, the latest in a series of deadly accidents. Through the end of July 2002, over 150 miners had died in mining accidents in Ukraine this year, following nearly 300 deaths in 2001.

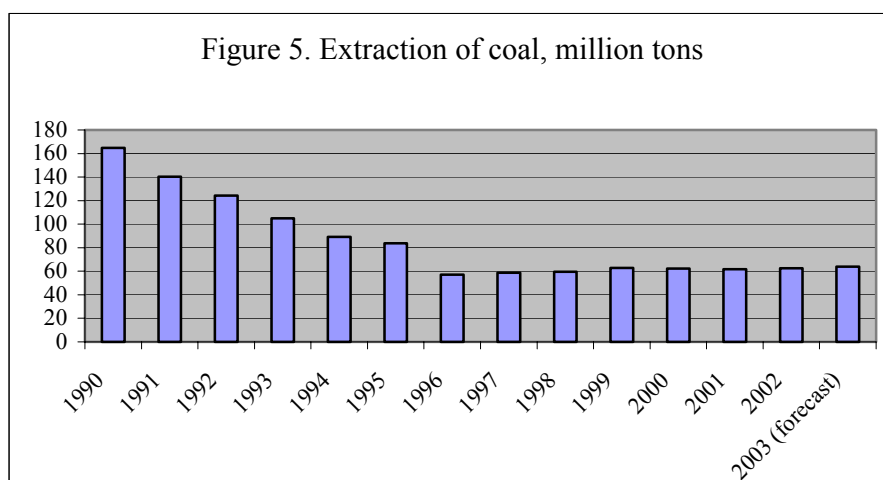
¹³ World Bank data on 2003

¹⁴ Ukrainian Ministry of Energy and Fuel

The analysis of the vision of the leading world institutions on the current state of development in the Ukrainian coal industry sector shows that it's far away from the effective steady state. For example, the World Bank has criticized Ukraine's coal mining strategy, saying that it contains no major mechanisms that would reduce barter and that the plan closes too few mines too slowly. However, the Ukrainian officials have another approach to the existing problems in this sensitive sector of economy. In February 2002, Viktor Yanukovich, the head of administration of the Donetsk coal mining region and now Ukrainian Prime Minister, described the World Bank's suggested plan to close 50 to 60 mines in the next two or three years as "unacceptable" because it would result in a considerable decrease of jobs in the region. Although Ukraine's mines are expensive to operate, the Ukrainian government has been reluctant to reduce the number of mines due to the social costs of closing so many pits in an area with few other jobs. Some experts also argue that in the period of transition it makes sense to regulate the coal price above the average cost level.

Instead, the Ukrainian government plans to hike coal prices for the country's power generators by 10 % before the end of 2002 and reduce state subsidies for the sector. Coal prices are to be increased to approximately \$ 28.20 per ton, up from the current \$ 25.60 per ton. The price hike should help the coal sector raise an additional \$ 165 mln after the government cut state subsidies. The Ukrainian government originally planned to spend \$ 324 mln to subsidize the coal sector in 2002, but due to a financial crunch can provide only \$ 159 mln, according to analysts.

The Ukrainian coal industry has been experienced a significant decline during the first decade of the country's transition to market economy (Figure 5).



The most dramatic decline took place over the first half decade starting from 1990. The extraction of coal in 1995 declined by almost 3 times compare to the level of the Ukrainian steady state while Soviet Union. In absolute value the amount of extracted coal fall down from

164.8 million tons in 1990 to 57 million tons in 1995. Some recovery of the domestic coal industry started in 1997 when the increase of the coal production was 2.8% compare with the previous year level. In the following years such increase was between 1.2% and 5.5%. The 5.5% increase in 1999 corresponds with the recovery from the 1998 crisis, which significantly affected all domestic producers of energy sources. At the same time, the last years' growth was not straightforward. The industry experienced decline about 1% in the coal production in 2000 and 2001. The forecast for the year 2003 shows that some increase will be presented in this industry. It is expected that 63.9 million tons of coal will be extracted, which is 2.2% higher than in 2002 and 12.1% higher compare to the minimum level of extraction in the industry in 1996. The existing of such growth does not mean that the Ukrainian coal industry is about to reach indicators of the before independence steady state. It is still well bellow it. The current production of coal in the country is 38.8% of the 1990-year level.

2. Coal prices

Studies, which were made in the Ukrainian coal sector by different researchers, define the existing system of coal pricing as ineffective (World Bank, 2003). Moreover, many observers consider that historically in Ukraine coal has been under priced for last decade.¹⁵ The main reasons for that are

- existing of subsidies in the coal sector for a long period of time;¹⁶
- state ownership in the sector and as a result ineffective management;
- social issues within the coal industry and on consumption side of the product.

The analysis of the current situation with the prices in coal industry shows that they do not reflect neither the costs of production nor the costs of alternative energy sources that are available (or potentially available) in the country.

The existing system of prices in the Ukrainian coal industry can be defined as inefficient. Current domestic average price for coal in 2003 is \$25 per ton (Figure 6). At the same time, the cost of extracting of 1 tone of coal is \$29. Such situation with a negative profitability of coal production has been remaining on the Ukrainian market since the 1998 crisis.¹⁷ Only in 1997 and 1998 the coal extraction was profitable. In 1997 the level of profitability was 7.7% and in

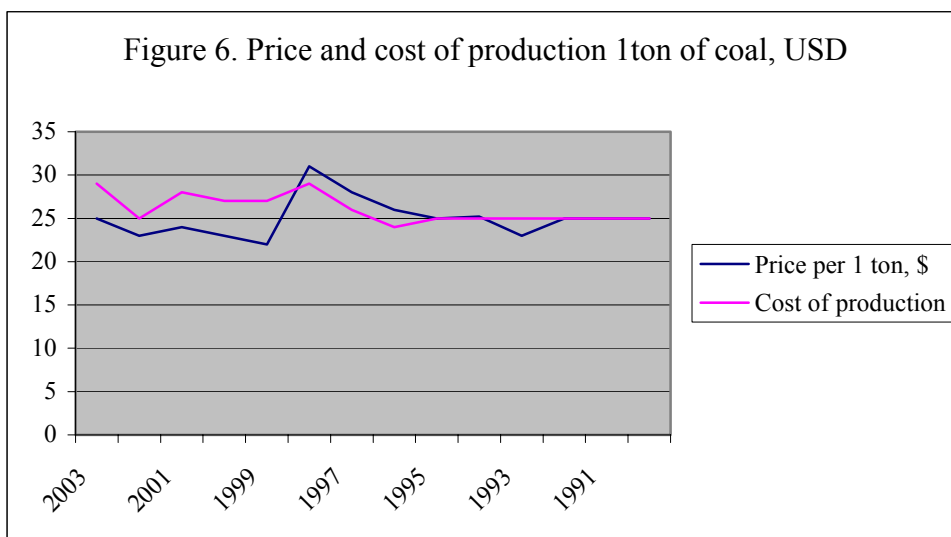
¹⁵ World Bank, 2003; The Fuel and Energy Ministry, 2003

¹⁶ Currently subsidies in different forms (i.e., direct payments, taxes) still exist in the coal industry

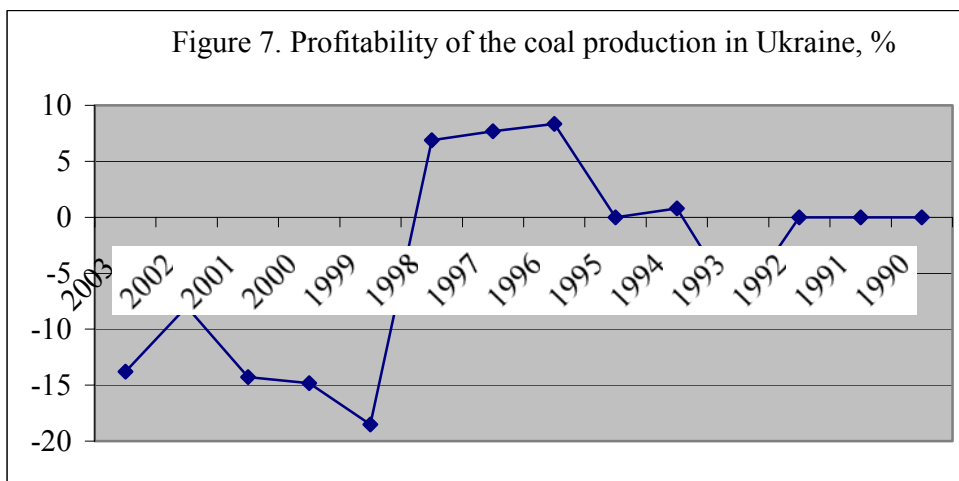
¹⁷ The available data covers period of 1997-2003.

1998 it fall to 6.9%. The negative profitability of coal appeared in 1999. It varies between loosing \$2 or \$5 as a result of higher level of cost of production than price depending on time.

Simultaneously, coal extraction costs are much lower than those of alternative energy sources.

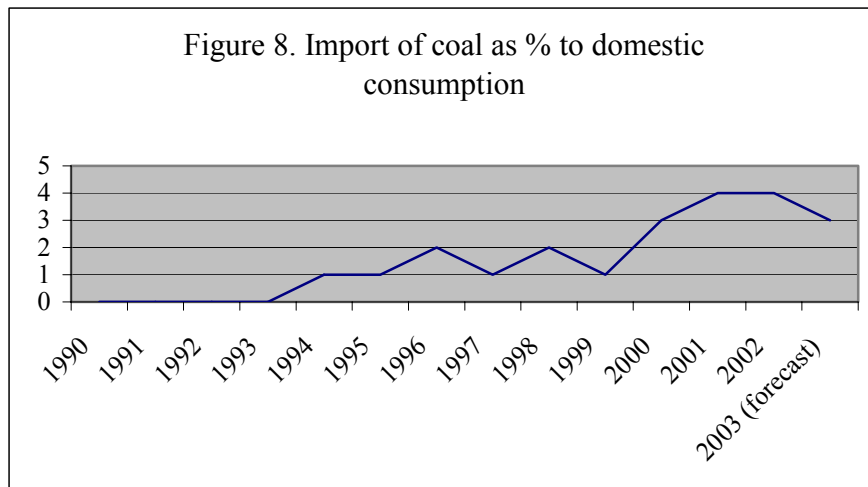


Based on cost of production and price data we analyzed the level of profitability of producing coal in Ukraine (Figure 7). Although such production was profitable before 1998, since that time the profitability became negative and producers started to loose money while producing coal. The lowest level of profitability was in 1999 when mines lost 18.5% of their costs. The maximum level of 8.3% was a positive extreme point in the Ukrainian coal production in 1996.

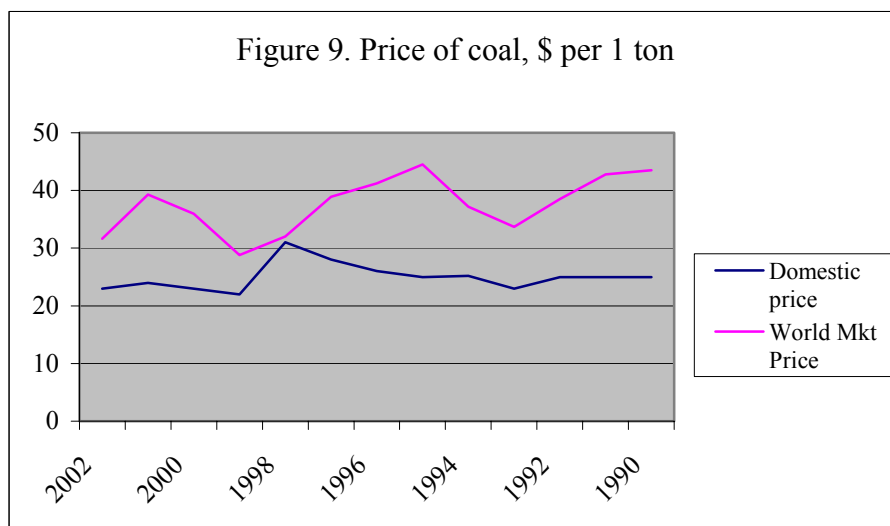


In 1990-1994 Ukraine did not import coal at all. The domestic production of this energy sources was enough to match the existing demand in the country. Starting from 1995 country has started to import coal. At the same time, the share of the imported coal remains insignificant in

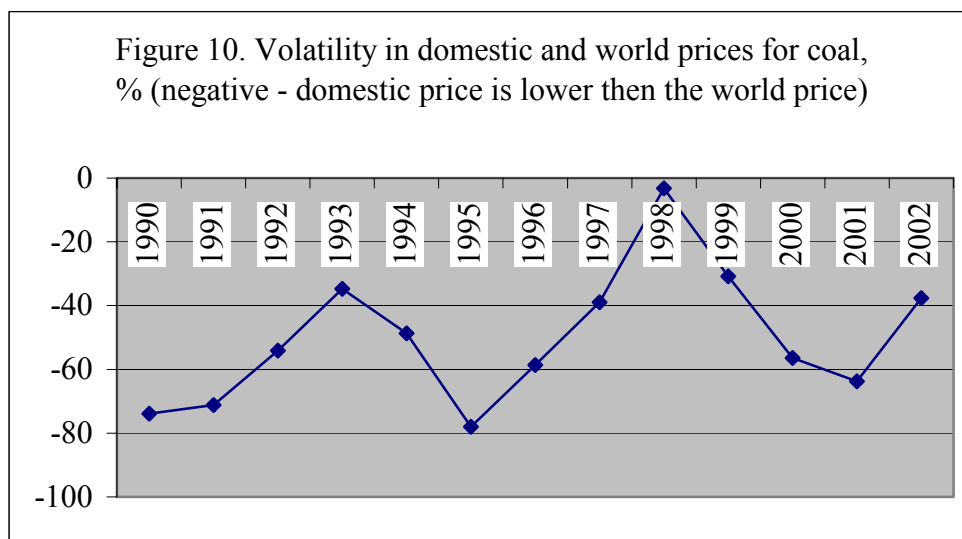
the total coal consumption. In 2002 imported coal reflected 4% of the total country's consumption in it.



Although the world prices of coal are significantly higher than the domestic prices, the import of coal to Ukraine has been existing over the last decade. In Figure 9 we show the comparison of the local and world prices of coal. The peak of the world prices for coal was in 1995 when coal was traded at a price \$44.5 per ton. At the same period of time the domestic corresponded price was \$25. With only exception of 1995 in all other years the Ukrainian market followed the tendencies of the world market for coal. As we can see from the chart the shape of the Ukrainian line is almost identical to the world price line shape. *(To reverse order of years)*



Although the shapes of both lines were the same, the distance between the lines is not identical over the studied period of time. Our study suggests that in 1990-2002 the domestic coal price was on average 50.1% lower than the world price. Over the studied period this difference has been moving in different directions always leaving in a negative numbers (Figure 10).



Embezzlement and corruption are the major causes of the crisis in Ukraine’s coal sector, according to 69.2% of respondents to a survey conducted by one of the leading Ukrainian Center for Economic Policy in the country’s coal mining regions.¹⁸ Consumer nonpayment (32.9%) and inadequate government support (25.9%) have been cited among other reasons for decline in the sector. The majority of those polled (62.8%) are convinced that the coal sector can be reformed without grave social consequences.

At the same time, the World Bank disagreed with the stereotype that the coal sector is unprofitable by definition and said that the root cause of such a situation lies in its pricing policy. “An economically justified price of coal is between its prime cost and the cost of alternative energy sources,” believes Michael Haney, senior power engineering expert with the World Bank. In his view, if it were not for the understated prices, a major part of the sector would be working effectively.¹⁹

¹⁸ Razumkov Center for Economic and Political Studies, 2003. These statistics were released at a September 24 roundtable on the problems of restructuring the coal sector at the Razumkov Center.

¹⁹ World Bank, 2003

3. Microeconomic analysis of Ukrainian mines

We based this part of analysis on our study done in Donetsk region.²⁰ We interviewed 25 coal mines, which were significantly differ on their size, number of employees, and performance.

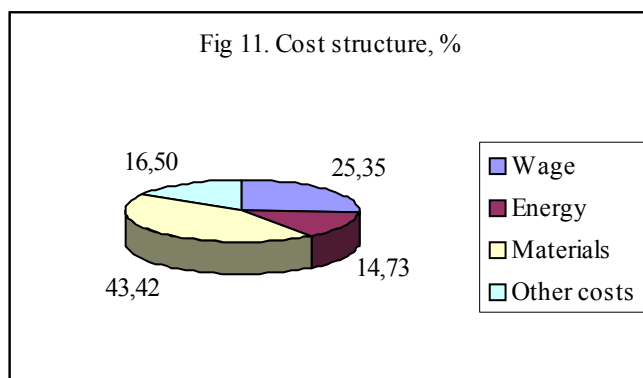
Table 2. Annual production of coal

Annual production, tons	Weight in the group, %
28800-280800	22.7
327600-717600	27.3
780000-1658400	22.7
1819200-4345200	27.3

Sample includes 50% of the coal mines, which produce heating coal, and 50% which produce coke coal. 36% of the mines produce both heat and coke coal. Those which produce heat coal have it on average 53% in the total structure of the total coal production.

The average number of employees in the coal mine is 9378. Average weight of workers in the total number of employees is 80.7%. Average annual productivity per one worker is 178.7 tons.

Our analysis shows that the structure of the costs of production differs from mine to mine. The average structure of the costs is given in Fig. 11. The highest weight has materials – 43.42%. Wages have 23.25% in the total structure of the costs, which is the second biggest cost component. At the same time, if we look at wages in an absolute term we can find that their monthly level in coal production is UHR 538.74 (USD 100), which is 18.76% higher than the average wages in the Donetsk region, were the study was conducted.²¹



²⁰ Southeast of Ukraine. This region is traditionally considered as the main coal reserve of the country.

²¹ Data of the Donetsk Mayor's office. Also available at <http://regions.org.ua/?cat=digest&id=4337&page=4>

Our study shows that the cost of the coke coal production is 30.9% cheaper than heating coal production. At the same time, the price of the heating coal is 21.9% higher than the price of the coke coal.

We found that coal production industry is heavily subsidized by the Ukrainian government. Our analysis shows that the level of subsidies for coke producers is 68% higher than for the energy (heat) coal producers. 16.21% of the total revenue received by the energy coal producers is going through the government subsidies. For coke coal producers the weight of the subsidy is 27.25%.

We found that coke coal producers on average are doing better than heat coal producers. Average financial results adjusted for amount of production (in per 1 ton terms of coal) for coke coal producers is UHR 11.85 (USD 2.22); for the energy coal producers this number is negative (meaning that they are loss makers) and it's -UHR63.55 (-USD 11.92). At the same time, the average profitability for both producers is negative. Obviously, for energy coal producers it is lower than for coke coal producers (-26.44 and -10.27 correspondently).

The specific of the industry requires coal producers to produce only certain type of the coal in a defined quantity. It means that any production optimization is impossible to provide in the coal mining sector. At the same time, it is possible to optimize the government influence in this sector, which should lead to the coal industry recovery.

30% of the coal mines in our sample state that the coal reserves are sufficient enough to provide an operation of the mines for the future 20 years. It means that finding a solution for the existing in this industry problem is a strategic task. In our interviews we asked managers of the Ukrainian coal mines their opinion on what are the reasons for them to have losses (Table 3).

Table 3.

Reason for making losses

Reason for making losses	% of Respondents agree with this statement
Low quality of coal	29.41
Not sufficient level of investments	82.35
Low price of coal	100
Not sufficient government subsidy	82.35
Other reasons	11.76

All respondents pointed out that low price for coal is the main reason for that. 82.35% of coal mines consider both “not sufficient level of investments” and “Not sufficient government subsidy” as a reasons for that. And only 29.41% named “Low quality of coal”.

The representatives of this industry see the solution in making the coal production sector of the Ukrainian industry as a competitive one in different ways (Table 4). 86% of the respondents state that in order to recover this industry two main things are needed to be done. First, government subsidy should be increased. Second, market infrastructure should be developed. Such high weight of the subsidy supporters can be an evidence of the non market orientation of the major part of the Ukrainian coal producers.

Table 4. Ways for the industry recovery (according to the coal mines managers)

What should be done in order to make coal industry more effective	% of respondents
Increase government subsidy	45
Develop market infrastructure	41
Other	14

4. Conclusions

Our study shows that the existing system of subsidies encourages managers of coal enterprises to artificially keep prices low. Having analyzed the experience of subsidies in different countries, it can be concluded that subsidies do harm, since they reduce competitiveness and create unsound economic mechanism.²² Ukraine is no exception. Since the demand for subsidies invariably exceeds those allocated, this sector is suffering from chronic funding shortages. For example, Russia’s experience speaks in favor of discarding subsidies. The Russian coal sector is still afloat, despite the fact that in late 2001 government subsidies for unprofitable mines were discontinued.

The micro level analysis shows that the Ukrainian coal sector is highly inefficient. The coal production is heavily subsidies by the government. In order to make this industry efficient and market oriented the Ukrainian government should undertake certain reforms.

Based on the current situation in Ukrainian coal sector, two possible ways of reforming its pricing policy in the coal sector can be proposed. The first option is to impose temporary coal price controls. However, such step could delay the creation of a market environment. The other

²² World Energy Consumption conference, 2002

option foresees an accelerated development of the market, provided managers discard the practice of selling coal at a price lower than what it costs to produce. For both options, the improvement in management standards in the coal sector the state must win back its authority as both owner and protector of the public interest. The world recognized practice for that is privatization of mines.

5. Literature

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