

**ASSESSMENT OF SHADOW ECONOMY IN MOLDOVA  
USING THE INPUT-OUTPUT MODEL IN 2014**

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*The shadow economy is the bane of modern society. Paradoxically, as the community is poorer, the level of the shadow economy is higher, which in turn leads to lower allocations in the budget, and as a consequence reduces social benefits, reducing the real wages of public sector employees, and the decline in living standards. Therefore, evaluation of the shadow economy is actual for any country in the world. The purpose of research is assessment of the shadow economy in the Republic of Moldova for 2014. From the methodological point of view, the authors used input-output balance method to identify and assess non-observed economy. As a result, the authors had identified elements of non-observed economy for a product group, and had calculated the losses of the state budget.*

**Key words:** shadow economy, input-output models, uses, export, import.

*Economia neobservată este maladia societății contemporane. În mod paradoxal, cu cât comunitatea este mai săracă, cu atât nivelul economiei neobservate este mai mare, ceea ce la rândul său duce la scăderea alocărilor în buget și, drept consecință, la reducerea beneficiilor sociale, la reducerea salariilor reale ale angajaților din sectorul public și la scăderea nivelului de trai. Prin urmare, depistarea și evaluarea economiei neobservabile este actuală pentru orice stat din lume. Scopul cercetărilor – evaluarea economiei neobservate în Republica Moldova pentru anul 2014. Din punct de vedere metodologic, autorii au utilizat balanțele interramurale naturale pentru identificarea și evaluarea economiei neobservate. Ca rezultat, autorii au stabilit elementele economiei neobservate pentru un grup de produse și au calculat pierderile bugetului de stat.*

**Cuvinte-cheie:** economie neobservată, balanțe interramurale naturale, resurse, export, import.

*Теневая экономика это болезнь современного общества. Как это ни парадоксально, чем сообщество беднее, тем уровень теневой экономики выше, что в свою очередь приводит к снижению ассигнований в бюджет, и как следствие, к снижению социальных выплат, снижению реальной заработной платы работников бюджетной сферы, а также снижению уровня жизни. Поэтому выявление, оценка и снижение теневой экономики является актуальной для любого государства в мире. Цель исследования – выявление и оценка теневой экономики в Республике Молдова в 2014 г. Авторы использовали натуральные межотраслевые балансы для выявления и оценки теневой экономики. В результате, авторы определили группу товаров с элементами теневой экономики и рассчитали потери государственного бюджета.*

**Ключевые слова:** теневая экономика, натуральные межотраслевые балансы, ресурсы, экспорт, импорт.

**JEL Classification:** C67, H69, P28, Q34, D63.

**Introduction.** Moldova continues to be a country with an economy dependent on geopolitical great powers. Dependence is confirmed by the recent events: the continuous rise in the price of fuels, Russian embargoes for a number of countries, including the Republic of Moldova, economic and military conflicts

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on the territory of Ukraine. The last years are characterized by intensifying natural disasters. All this has a negative influence on the national economy development. If the main factors are of a political reason, then the last ones are of the natural order, and if there have been made the necessary investments in agriculture, then this dependence should not be so obvious.

During the forecasting process of macroeconomic indicators, authors have used macro-econometric models, and input-output models and models based on experts. In addition, the authors have adjusted the input-output model for the assessment of shadow economy.

#### Assessment of shadow economy using the input-output model

Originally, till the elaboration of the inter-branch macroeconomic balance, natural balances are developed; technical coefficients are estimated based on the used technologies in the current period in the Republic of Moldova. The model proposed by the authors is presented in Table 1.

Table 1

Input-output model

Products	Resources				Uses								
	Balance at the beginning of the year	Production volume	Import	Total resources	Internal consumption					Export	Loses	Balance at the end of the year	Total uses
					Population consumption		Intermediate consumption	Totally consumed in Republic	Total				
					Organized trade	Unorganized trade							
1	2	3	4	5	6	7	8	9	10	11	12	13	14

Source: Developed by authors.

Resources, i.e. inputs, include the production volume during the reporting period, import volume and balance at the beginning of the reporting year. Uses, i.e. outputs include intermediate consumption, household final consumption in organized and unorganized trade, export and other outputs (including losses) and the balance at the end of the reporting year. If uses prevail over resources, there is occurred either unobservable production or unnoticed import. If resources prevail over uses resources, unnoticed export takes place. Development of the input-output balance has found lacks in the customs control and elements of shadow economy [1, pag. 126]. In most cases, the fraudulent schemes of foreign trade take place on the border with Ukraine, but the Romanian border is not an exception.

To assess shadow economy in 2014, input-output model balances have been prepared for this year. During the development, sixteen official documents presented by the National Bureau of Statistics of the Republic of Moldova have been used. For example, "Indicators on the movement of industrial production in Moldova in 2014"; "Retail trade, sale and repair of motor vehicles, repair of personal and household goods in 2014, divided by type of goods" etc.

Because data on the delivery of production in the retail sector for 2014 are presented by the National Bureau of Statistics of the Republic of Moldova in aggregate form, then at the development of input-output model balances for 2014, nonspecific methods were used such as: determining the volume of realization by product type (non-aggregated) was performed taking into account their share in aggregate indicators of 2010-2013. Besides this, the number of commodity groups for which the National Bureau of Statistics presents information on the sale of goods through a network of retail and catering network have been reduced.

Input-output model balances were developed in accordance with the System of National Accounts. To calculate the intermediate consumption volume on the main types of production, there was developed a calculation algorithm using technological coefficients, in Excel package. Unorganized market sales volume was calculated as the difference between resources (volume of production, import, and balance at the beginning of the year) and uses (intermediate consumption, sales volume in the retail networks, stock at the end of the year).

The stock at the beginning and the end of the year was evaluated as the sum of stocks both in trade networks from the statistical report “Retail trade, sale and repair of motor vehicles, repair of household and personal goods in the Republic of Moldova in 2014 structured on types of goods” and businesses deposits from the form “Indicators on the movement of industrial production in natural value in 2014”.

#### ***Agro-industrial complex***

Analysis of actual balance of Agro-industrial Complex (AC) for 2014 in natural expression allowed detecting significant deviations at the following items:

1. Unfermented tobacco. Development of the input-output model balance in 2014 for this kind of production showed that the resources account for 3.99 thous. tons, (in production there were used 2.91 thous. tons and the balance at the end of the year accounted for 0.1 thous. tons) and the use – 5.05 thous. tons, meaning that there were used more than there was presented with 1.064 thous. tons. This difference is explained by the fact that unnoticed import took place or that stocks at the beginning of the year were not recorded correctly or the unlawful production took place. Consolidated state budget incurred losses only from customs duties, VAT and customs services in the amount of about 6.65 mil. MDL.

2. Tobacco products. This product in 2014 recorded the following values: resources accounted for 6.16 billion pcs., and its uses in all forms of consumption were higher than the resources with 2.57 billion pcs. (which constitutes 41.7% of resources). There have been sold in retail trade 7.37 billion pcs., 0.44 billion pcs. were exported, the balance at the end of the year amounted to 0.91 billion pcs., not taking into account the unorganized market. Thus, the official import of 3.66 billion pcs. Is not accurate; shadow production or illegal import was at least 2.57 billion pcs. The state budget incurred losses of excise, VAT and missed customs taxes of about 522.86 mil. MDL. In 2014 the import of tobacco products amounted to 51.55 mil. USD (3657 mil. pcs.), representing 81.5% compared to the previous year and with 9.86% more than in 2000 (3328.9 mil. pcs. or 48 mil. USD). *Analysis showed that the measures taken by the government in previous years have led to a slight legalization of the import of tobacco.*

3. Alcohol. This product in 2014 had the following values: resources amounted to 0.907 mil. dal and its uses in all forms of consumption were higher than the resources with 0.82 mil. dal (which constitutes 90.4% of resources) and amounted to 1.73 mil. dal. So, the official import of 0.0334 mil. dal does not correspond to the reality. Actually, 0.853 mil. dal of alcohol were imported. In the result, the state budget missed receipts in the amount of 445.03 mil. MDL as VAT, excise, tax and customs services.

4. Cognac. Resources of this product were about 1.24 mil. dal. in 2014, of which there were used in the production 0.00216 mil. dal, there were consumed 0.701 mil. dal on the domestic market and exported 1.783 mil. dal. Analyzing foreign trade data of the National Bureau of Statistics of the Republic of Moldova and the data form “On the movement of industrial production indicators in natural expression in 2014” there is observed a difference in the amount of 1.794 mil. dal, but we must also take into account that there is also the unorganized market. That shows the existence of the unnoticed import in the volume of more than 1.794 mil. dal. As a result the country’s budget was deprived of 656.18 mil. MDL as VAT, excise, income tax and customs services.

5. Spirits, liqueurs and other spirits. In 2014 resources of this product were about 6.35 mil. dal (of which 0.7 mil. dal are imports) and uses in all forms of consumption were 6.85 mil. dal which represents a volume higher than resources with 0.504 mil. dal (i.e. 8% of resources). Only exports in 2014 were recorded at 3.33 mil. dal, indicating that there were illegally imported 0.504 mil. dal of this product or illicit manufacture has occurred. State budget missed revenues of about 195.02 mil. MDL in the form of VAT, income tax, excise and customs services.

6. Sugar beet. The resources of this product amounted to 1356.2 thous. tons in 2014, of which 1428.23 thous. tons were used in the production. Analyzing data on foreign trade presented by the National Bureau of Statistics of the Republic of Moldova we can note that sugar beet was not imported in the reported year and the difference between resources and uses is 72.03 thous. tons. This fact shows that shadow import took place in the volume of at least 72.03 thous. tons or that there has been illegal production. Therefore, the state budget lost about 9.81 mil. MDL of VAT and custom services.

7. Processed raw wine. This product in 2014 had the following values: resources were 7.29 mil. dal and its uses in all forms of consumption were higher than the resources with 3.47 mil. dal (which constitutes 47.6% of resources) and amounted to 10.77 mil. dal (of which export is about 10.36 mil. dal). So, the official import of 0.035 mil. dal does not correspond to the reality. Actually there were imported 3.51 mil. dal of processed raw wine. As a result the country’s budget has missed receipts in the amount of 104.54 mil. MDL in the form of VAT and customs services.

8. Fodders. The resources of this product amounted to 133 thous. tons in 2014, of which there were used in production 63.57 thous. tons, were exported 108.9 thous. tons and remained in stock 3.458 thous. tons. By analyzing the data of the National Bureau of Statistics of Moldova for foreign trade and form data "Indicators on the movement of industrial production in natural expression in 2014" there was detected the difference in the amount of 39.427 thous. tons, in addition to the unorganized trade. This situation shows that there has been unnoticed import in the volume more than 32.28 thous. tons. As a result, the country's budget was deprived of 96.13 mil. MDL as VAT, customs taxes and services.

9. Pasta products. The resources of this product amounted to 11.33 thous. tons in 2014, of which 0.074 thous. tons were exported, sold in retail trade – 11.08 thous. tons and remained as the balance at the end of the year – 5.79 thous. tons. Analyzing data on foreign trade of the National Bureau of Statistics of the Republic of Moldova is noted that imports of pasta product were in reality much higher than the official one of 5.37 thous. tons, and the difference between resources and uses are 5.615 thous. tons. This speaks on the shadow import in the volume of at least about 5.615 thous. tons or illegal production. This leads to the fact that state lost just to the lack of VAT, tax and customs services the amount of 25.62 mil. MDL.

10. Groats. This product in 2014 registered the following values: resources accounted for 27.27 thous. tons of which the consumption of production was 0.8 thous. tons, 1.56 thous. tons were exported, 40.3 thous. tons were sold in the retail trade and 11.2 thous. tons remained as stock at the end of the year. But its uses in all forms of consumption amounted to 53.88 thous. tons, which is more than resources with 26.61 thous. tons (which means that illegal import is about 97.6% of resources). So, data on official import of 22.54 thous. tons is not accurate. As a result the country's budget did not received receipts amounting to 86.6 mil. MDL in the form of VAT, tax and customs services.

11. Butter. In 2014 this product resources were 5.53 thous. tons of which imports accounted for 7.6% and amounted to 0.42 thous. tons. This product was used in the following directions: production consumption – 1.05 thous. tons, 3.87 thous. tons in organized trade, and balance at the end of the year accounted for 0.74 thous. tons. Analyzing data on foreign trade and production indicators of the movement as a natural expression in 2014 from the National Bureau of Statistics of the Republic of Moldova is observed that in reality, the import of butter was higher than the official (0.42 thous. tons) with 0.53 thous. tons or was produced illegally. The state lost only from the lack of VAT and customs service's the amount of 2.61 mil. MDL.

12. Beer. The resources of this product for 2014 amounted to 12.58 mil. dal of which imports accounted for 0.1916% of resources (2.41 mil. dal). Export of this product reached 0.44 mil. dal. The organized trade accounted for 10.85 mil. dal, in the year-end balance remained 1.72 mil. dal and other outputs were 0.14 mil. dal. Comparing uses (13.14 mil. dal) and product resources we notice a difference of 0.56 mil. dal speaking about the illegal import of this product or illegal production. As a result of the above mentioned, it is clear that the state budget missed revenue of about 27.8 mil. MDL as VAT, excise, tax and customs services.

13. Perfumery and cosmetics. According to the input-output model, resources of this product in 2014 amounted to 1085.3 mil. MDL (production – 30.3 mil. MDL, import – 1054.94 mil. MDL and the stock at the end of the year in retail – 467.1 mil. MDL). This product was used: in retail sector – 1577.57 mil. MDL, 303.73 mil. MDL were exported and at the end of the year were accounted in balance 467.1 mil. MDL. Analyzing data on foreign trade and production indicators on movements in natural value in 2014 from the National Bureau of Statistics of the Republic of Moldova we concluded that the import was much higher than officially with 1263.08 mil. MDL. It speaks that the state lost 338.06 mil. MDL in the VAT and customs services.

14. Fruit and vegetable juices. In 2014 it was produced juices from fruits and vegetables in Moldova accounting for 49059.08 thous. liters and there were imported 267 thous. liters that account for 5.37% of production. Total resources of this production were 68428.11 thous. liters of which in retail – 17565.68 thous. liters, 44955 thous. liters in export and the balance at the end of the year amounted 26798.26 thous. liters. Analyzing statistical data we notice that 89318.94 thous. liters were used, which is with 20891 thous. liters more than the available resources. This speaks of illegally import or illegal production of juices. It follows that the state lost 49.2 mil. MDL that could be collected as income tax and customs services.

Following the assessment of the volume of unnoticed import and export in 2014 and using the official tariffs and import and export prices for the analyzed volume production, there was estimated



the volume of losses of the state budget from the agro-industrial complex in the amount of approx. 2566.28 mil. MDL.

***The complex of machinery industry and heavy industry***

1. Small capacity engines. This product is not produced in Moldova being just imported. In 2014 imports amounted to 341.58 thous. pcs. The resources of this product were leveled to 341.58 thous. pcs., and uses in all forms of consumption were higher than the resources with 484.86 thous. pcs. (this is with 1.42 times higher than the resources). Only exports in 2014 were recorded at the level of 826.44 thous. pcs., indicating that there were illegal imports, and re-exportation of this product. From the re-export there are obtained significant winnings at the level of this product, while the average import price is 155.54 MDL/pcs., while export is made at an average price of 43.26 MDL/pcs., which shows a direct tax evasion. State budget missed revenue amounting to about 19.8 mil. MDL as the VAT and customs services.

2. Household electrical appliances. Unfortunately, this kind of production in recent years is no longer produced in our country, being only imported. In 2014, this product resources were 986.27 thous. pcs. of which 87.6% (864,27 thous. pcs.) are represented by import. These resources were sold in retail sector in the amount of 5310 thous. pcs., there were re-exported 3.673 thous. pcs. and the final balance amounted to 135 thous. pcs. Analyzing statistics we note that in the Republic there were used 5448.47 mil. pcs., which exceeds with 4462.2 thous. units than resources according to data. This proves that imports exceed the official data. As a result, the state lost 390.32 mil. MDL in forms of VAT, tax and customs services.

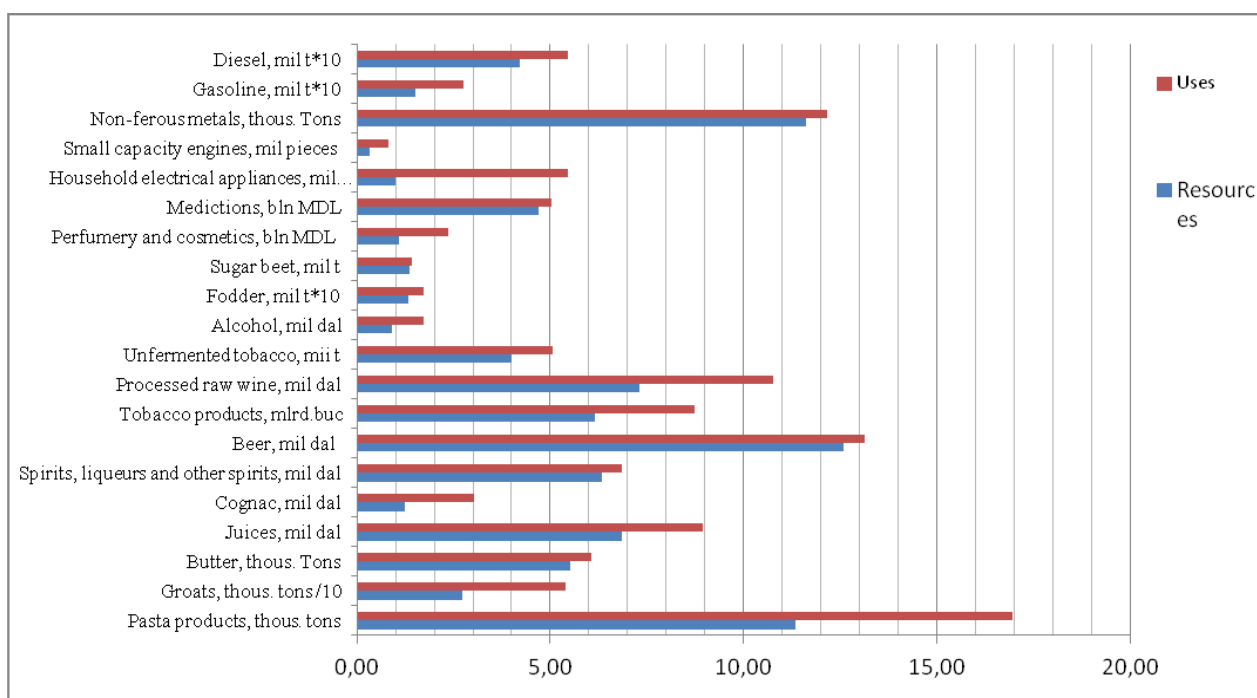
3. Non-ferrous metals. Non-ferrous metals in our Republic have never been produced, just exported. This is due to the continued theft of electricity and irrigation networks, selling of equipments as waste etc. and re-export takes place. In 2014 it was imported 10.32 thous. tons which were the basic resources of which 93.6% were exported (9.66 thous. tons) among which in the production consumption there were used 2.35 thous. tons. In total, 12.01 thous. tons of non-ferrous metals were used, which is more than resources with 1.683 thous. tons. As this product is not produced in the country, it means that unnoted import takes place, following which the state lost 9.8 mil. MDL in the form of VAT and customs services.

4. Medications. According to the input-output model, resources of this product in 2014 amounted to 4688.2 mil. MDL (production – 485.9 mil. MDL, import – 3782.2 mil. MDL and the stock at the end of the year in retail units – 477.7 mil. MDL), but there have been used goods amounted to 5034.21 mil. MDL (sold by retail units – 2800.31 mil. MDL, exported – 1756.2 mil. MDL) and the stock at the end of year at producers and in retail units amounted to 477.7 mil. MDL, which is with 346.031 mil. MDL more than resources (without unorganized market sales). Deviation analysis showed that real import was higher than the official and must reach the level of 4128.231 mil. MDL. According to our calculations, the consolidated budget missed customs duties, VAT and customs services for illegal importation of medications amounting approximately 27.96 mil. MDL.

There was made the indirect analysis of groups of strategic goods, which do not permit the use of input-output models due to lack of regulations and statistical data division. While speaking of diesel imports, there is a significant gap between import and domestic consumption. Only the agricultural sector consumption estimates made on the basis of technological use of diesel on sown areas and statistical data on diesel consumption in transport for population and other services performed, which was collected from the energy balance shows that demand for 2014 accounted for 733.61 thous. tons, for 2013 – 705.51 thous. tons and for 2012 – 674.4 thous. tons.

Even if we take into consideration that some households for purposes of economy, do not meet all technological standards, the calculations show that the necessary minimum in 2014 amounted 615.31 thous. tons, in 2013 – 594.3 thous. tons, and in 2012 – 558.3 thous. tons of diesels. Comparative analysis with real data shows that shadow economy has imported diesel worth at least 160.3 thous. tons in 2012, 139.3 thous. tons in 2013 and in 2014 – 158.31 thous. tons. Such calculations were performed for gasoline which showed that the shadow economy meant values of at least: in 2012 – 60.33 thous. tons, 2013 – 52.33 thous. tons, 2014 – 61.32 thous. tons.

The most significant deviations are presented in Figure 1.



**Fig. 1. A deviation of products balances**

*Source: Made by the authors based on calculations.*

Given the situation created on the diesel market, the state budget has missed about 702.36 mil. MDL in 2014 in the form of excise, VAT and customs services because of illegal import, and on the gasoline market the state budget has lost about 447.87 mil. MDL.

Assessing the volume of unnoticed import and export in these two complexes in 2014 and using official tariffs and import and export prices for volume of production, the losses of the state budget, according to our calculations are approx. 1598.1 mil. MDL.

In conclusion, we mention that by using input-output model, there were detected state losses due to shadow economy worth 4164.39 mil. MDL.

**Conclusions.** The input-output model analysis for 2014 have found the following core areas of the shadow economy: illegal import, illicit production, declaration of a much lower price of the supplied goods, which sometimes constituted about 30% of the real price.

Aimed at combating the gray economy it is necessary to decreased tax burden on domestic producers, to grant a tax holiday to entrepreneurs in sectors that substitute the imported goods, to reduce the number of controlling bodies. Implementation of the last measures would have the following consequences: it reduces transactional costs of local producers, is fighting corruption, there are lowered expenses from the state budget related to the maintenance of these state bodies, etc.

Reducing the tax burden on the one hand leads to the reduction of short-term allocations in the state budget; instead leading to an increase in net profit, therefore the entrepreneur can expand his business. On the other hand, in long-term, the turnover of domestic producers increases, and the state will be paid by increasing the payments in the budget, such as from producers, so from the final consumers, as the business expansion means creating new jobs therefore increase the final consumption, increase of GDP, increase of the welfare of the people.

In the Republic of Moldova, there is a tendency to import meat and offal from the first category at a price lower than the price of domestic producers. In 2014, it was imported 30.2 thous. tons of meat and offal, which constitutes 70% of the production. In this context, it is necessary to attract domestic and foreign investments in order to create favorable conditions for expanding the sector.

In the republic there is the potential for animal breeding, only in 2014 there were exported 108.85 thous. tons (in 2013 – 47.4 thous. tons, in 2012 – 81.2 thous. tons) of animal feed (bran, blocks sunflower seeds and crushed soybeans, etc.) at a discounted price (2.7 MDL/kg) compared to the market.

Currently, remains actual to stimulate the production of goods in the country of import substitute's goods, including *manufacture of perfumes and cosmetics, medicines, confectionery, grits, potatoes, lemon*

*salt, synthetic detergent, essential oil, etc.* Although Moldova is producing perfumery and cosmetics, however, imports of this product are approximately of 34.8 times greater than the volume of production. The same situation occurs in the production of medicines, where import volume is by 7.78 times higher than domestic production.

Availability of raw materials, especially of essential oils, and other products of bee keeping allow the expansion of those sectors.

In Moldova, in recent years has changed the use of mineral fertilizers from 136 kg/ha in 1991 to 19 kg/ha in 2004, then in 2013 it reached 53 kg/ha and in 2014 - 84 kg/ha.

The decrease in the use of mineral fertilizers lowers soil fertility and decrease of the crop yield by 30-50%. World practice shows that in developed countries such as Germany there are used mineral fertilizers in amount of 145 kg/ha, in EU countries – 91 kg/ha, Latvia – 41,3 kg/ha, Romania – 35.3 kg/ha and in developing countries – 10 to 25 kg per hectare are used. Therefore, for increasing the efficiency of agriculture it is necessary to extend the use of mineral fertilizers of about two times.

If the state is interested in the actual development of agricultural households, the mechanisms must be found to reduce fuel prices. The state should solve this problem since the country's energy security should not be affected.

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