

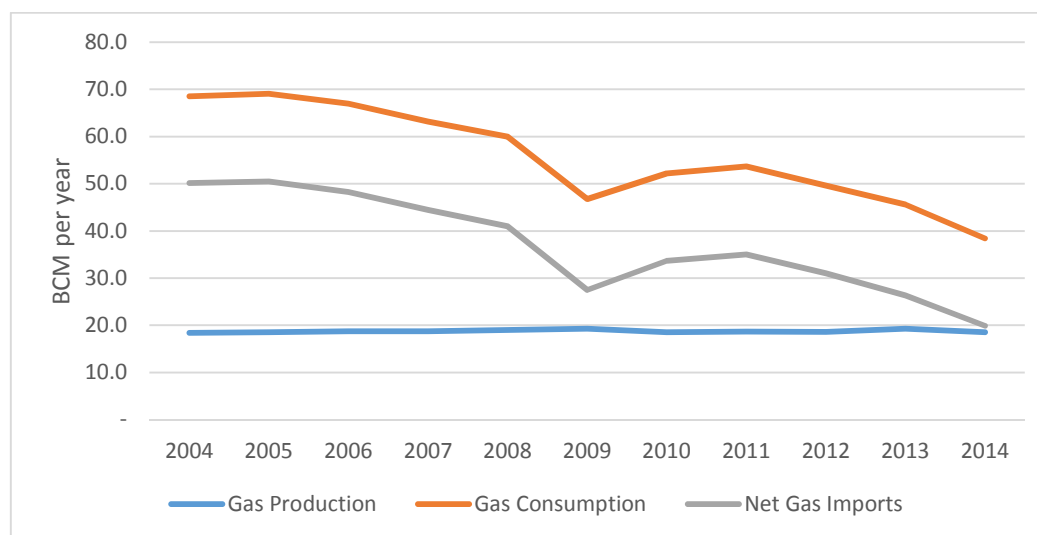
UKRAINE: NATIONAL ENERGY SECURITY INDICATORS AND POLICY CHALLENGES

Country factsheet

UKRAINE'S ENERGY SECURITY COMPONENTS:

- Availability of resources:** Ukraine has been endowed with a diversified energy resource base including abundant oil, gas and coal reserves. However, they had not been enough to make the country energy self-sufficient. Except for coal, in which Ukraine holds some of the largest reserves of high-quality anthracite, Ukraine needs to import all of the other energy sources to satisfy domestic demand. The import dependence is most visible in the natural gas sector, where Kyiv needs to buy half of the locally-consumed gas from abroad. For years, Ukraine has been locked in high-cost energy relationship with Russia, which at times has exported between 40 and 50 bcm of gas per year to Ukraine, making the latter Gazprom's largest client. This could be changing now. Although gas still makes up 35% of the country's final energy demand, the economic crisis and the significant gas price hike after 2009 has gradually put a downward pressure on gas consumption. In 2014, Ukraine consumed almost 45% less gas than in 2004.

Figure 1. Natural gas balance of Ukraine

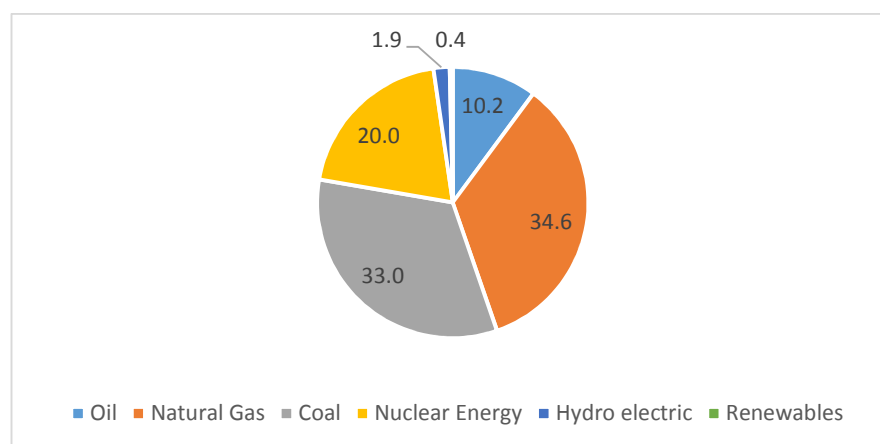


Source: BP Statistical Review of World Energy



While gas production has largely kept in pace over the last ten years, coal output slumped by around 30% in 2014 after the civil conflict broke out in Donbass. Extractable coal reserves there are around 10 billion tonnes, or around 1/3 of the country's total¹. Some of Ukraine's largest coal mines came under separatist controlled or, worse, were destroyed in the heavy artillery shelling. Even though the pro-Russian rebels continued to sell coal to Kyiv-controlled power plants, deficits of around 2 million tonnes started crippling power production in a number of the large TPPs in the eastern part of the country leading to power cuts and expensive electricity imports from Russia. By mid-2015, Ukraine had turned from a net exporter to a net importer of coal that has included a non-transparent coal import deal with South Africa.

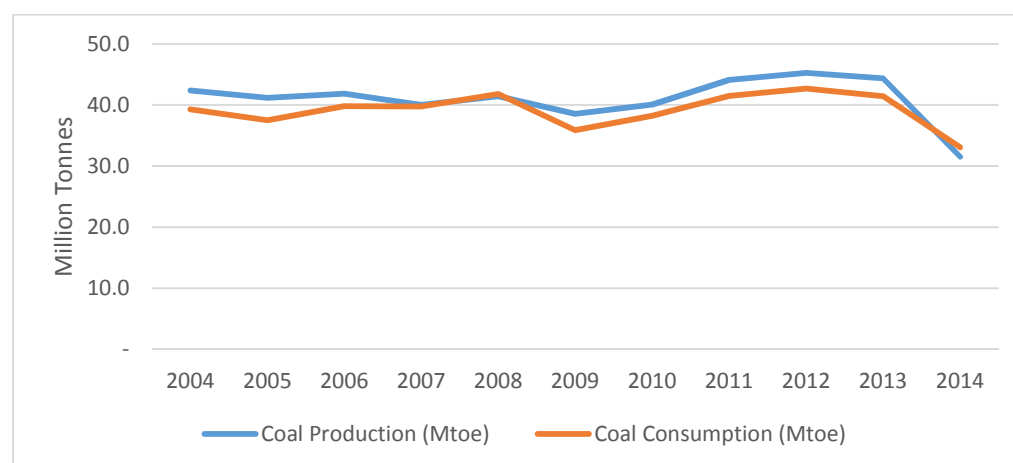
Figure 2. Final Energy Consumption by Fuel in 2014 (%)



Source: BP

In the oil sector, Ukraine is similarly dependent on crude imports from Russia, which contribute 40% of the total crude supply in the country. Small quantities of crude oil are flowing also from Kazakhstan and Azerbaijan. In addition, around 60% of the domestic fuel demand is satisfied by imports from Russia, Belarus and Lithuania. The fuel products' dependence is likely to rise in the short-to-medium term as outdated domestic refineries have mostly halted production except for the Kremenchug refinery, which produce mostly low-quality oil products using heavy Urals crude from Russia and Kazakhstan.

Figure 3. Coal balance deteriorating after the war in Donbass



Source: BP

¹ BP Statistical Energy Review and Ukrainian National Statistics

- **Reliability of supply:** Ukraine's overreliance on one source of natural gas imports in the previous decade has led to two major supply crises in 2006 and 2009 when Russia cut off gas deliveries to Ukraine after a pricing dispute. Gazprom, which is also heavily dependent on Ukraine for gas transits to the EU, has taken advantage of Ukraine's vulnerability to achieve better price terms in the bilateral, long-term contracts. Since 2009 Ukraine has consistently been paying one of the highest gas prices in Europe, which has left Naftogaz financially crippled. The World Bank calculates that Naftogaz' deficit in 2014 equaled 5.5% of GDP due to the subsidized domestic gas tariffs to at least half the market (others estimate the deficit at 7% of GDP)². The annexation of Crimea and the conflict in eastern Ukraine created an important diversification momentum in the post-Yanukovich government. The country's reverse-flow capacities from Slovakia and Hungary were increased to 40 million cubic meters (mcm) per day and 16 mcm/d, respectively. This has allowed Ukraine to significantly cut gas imports from Russia in the first half of 2015, and altogether halt Gazprom's supplies in the summer to pressure the company in providing better terms of the winter gas supply package. Despite achieving better gas price terms amid the embargo, Ukraine's security of supply position remains vulnerable as it is unlikely to be able to fill its underground gas storage facilities at the necessary 19 billion cubic meters enough to cover the country's rising domestic consumption during the winter and the facilitation of the gas transit to Europe. As overall gas demand went down in Europe since 2009 and alternative pipelines from Russia are underutilized, the gas storages are not as vital to the supply security of the continent as it was at the beginning of the 21st century. Nonetheless, large demand spikes in case of a harsher winter could easily lead to supply outages.

Ukraine will be also facing potential power deficits as households begin to gradually switch to electricity for heating and cooking amid the shock gas tariffs hike from 2015. Increased power demand will be difficult to be met as coal power plants do not hold enough coal reserves to last throughout the winter. A return to the use of natural gas is not viable considering the difficult relationship with Gazprom, which means that some of the TPPs might need to switch to heavy fuel or the wholesale supplier, Ukrenergo, may have to boost electricity imports including from Russia. The deficits are likely to be compensated by expanded power generation from the country's nuclear power plants, which, according to the US Energy Information Administration (EIA), make up 45% of the country's total power supply³.

- **Energy Efficiency:** The World Bank reckons Ukraine is among the ten most energy-intensive economies in the world despite significant improvements in efficiency over the past decade. The energy intensity of the economy fell by 35.2% between 2001 and 2011 but still remains 10 times higher than the OECD average⁴. The low energy efficiency level is directly related to the energy security of the country as the economy is highly dependent on energy imports. Also, Ukraine's GDP is heavily reliant on energy-intensive industries such as steel, petrochemicals and fertilizers. In addition to energy security, the high level of energy intensity is directly correlated with level of emissions per capita, where there is still considerable room for improvement despite being below the average OECD and EU levels. Improving energy efficiency is of utmost priority if Ukraine preserves its economic competitiveness after the planned mass liberalization and privatization of key inefficient and heavily subsidized strategic sectors. Outdated residential and energy infrastructure leads to heavy transmission and heat losses causing billions to energy suppliers. At around ¾ of the

² World Bank Group – Ukraine Partnership: Country Program Snapshot, April 2015
Konończuk, Wojciech. (September, 2010). Why Ukraine has to reform its gas sector. *EnergyPost* accessed at: <http://www.energypost.eu/ukraine-reform-gas-sector/>

³ EIA Ukraine country factsheet

⁴ IEA (2012). Ukraine 2012. Energy Policies beyond IEA countries.

total housing stock, residential buildings built before 1970s have not followed any energy efficiency in buildings codes while households find little incentive to invest in wall and windows insulation as energy prices are subsidized by the government. According to the World Bank, almost residential buildings account for 40% of the heat production and 25% of the power consumption⁵. The dilapidation of the residential infrastructure makes any transition to more market-based pricing more difficult as a hike in the energy costs for household could spark social unrest. Hence, Ukraine should take advantage of its enormous energy savings potential by diminishing energy losses and rehabilitating the building stock. One study shows that the country's energy savings' potential is 27 Mtoe or one quarter of the total primary energy supply (TPES)⁶.

- **Affordability** and systemic mismanagement: ever since Ukraine's independence, its energy sector has been the victim of the nexus between energy poverty and systemic mismanagement, in which state-owned energy companies have played the role of a guarantor of social security at the expense of financial stability and investments in infrastructure modernization. The subsidization of gas supply has removed incentives for energy savings, while the gas price has remained a tool for civil unrest management. Well-connected gas intermediaries, on the other hand, have taken advantage of the lack of transparency in the sector to siphon gas to large industrial clients. The effect has been a major decapitalization of the gas sector and the accumulation of crippling deficits covered by the national budget. The civil conflict in Donbass and the gas supply halt in 2014 prompted the government to begin an energy sector overhaul introducing price liberalization and sectoral restructuring. The negative effects of a sudden price hike, together with the dissolution of corrupt schemes in the energy sector benefitting private actors could backfire against the government in the form of mass street protests. Nonetheless, the painful reform is a precondition for the disbursement of critical IMF assistance and could become a stepping stone for a more sustainable future economic development.

The historical trend of the Ukrainian energy security, as measured by the International Index of Energy Security Risk (IIESR), ranks the country at number 72 among all 75 analyzed countries with only Uzbekistan, Turkmenistan and Singapore trailing the country. IIESR tracks the energy security situation in the country since 1992 but its score has remained almost unchanged over the next 21 years with slight improvement in 2013. The latest index score of 2009 puts Ukraine close to 120% behind the OECD average, which is still an improvement from 1992 when Ukraine trailed the OECD by 233%. As mentioned above, the country's overreliance on the imports of coal, gas and oil has translated in high level of energy expenditures as a share of the GDP. Its key position as a transit state has not been used to its advantage as the country is still very dependent on Russia for its gas consumption. With energy intensity remaining at one of the world's worst levels, the government's policy of improving energy efficiency needs to become bolder. Also, the precarious position of the country as still largely dependent on Russian gas needs to push Ukraine's import diversification efforts and the expansion of the domestic production of coal and gas reserves. The conflict in Donbass is likely to impose an even greater strain on the country's energy sector, which would further lower the country's energy security score in 2014.

⁵ International Energy Agency (IEA) databases, Energy Balance for Ukraine – 2012

⁶ Radeke, M. and Naumenko, D. (2012), Towards Higher Energy Efficiency in Ukraine: Reducing Regulation and Promoting Energy Efficiency Improvements, German Advisory Group, Institute for Economic Research and Policy Consulting, Policy Paper Series (PP/01/2012), Kyiv/Berlin in IEA (2012). Ukraine 2012. Energy Policies beyond IEA countries.

UKRAINE'S MAIN ENERGY SECURITY CHALLENGES

1. Persistent natural gas supply insecurity

Although the Ukrainian government has taken important steps to diminish its energy dependence on one supplier, the country would continue to source at least half of its gas imports from Russia directly. The continued importance of Russian gas supply would be felt most acutely in winter times when the capacity of the reverse gas flows from Slovakia, Hungary and Poland would not be able to satisfy domestic consumption. In September, 2014, Slovakia upgraded Vojany-Uzhgorod pipeline to increase its reverse gas flow capacity to 14.5 bcm. The supply from the latter in H1 2015 was able to satisfy 100% of Ukraine's gas demand and was instrumental in pressuring Gazprom to provide a much-needed gas price discount to the state-owned Naftogaz for the 2015/2016 winter gas imports from Russia. Full reverse gas flow on the other major export pipeline, Uzhgorod-Velke Kapusany, would provide Kyiv with full gas independence from Russian imports. However, Gazprom had been able to hinder reverse flows by citing a long-term bilateral gas contract with Slovakia's Eustream gas transmission company⁷.

Since the change in government in 2014, the gas import price fell by almost \$100 per 1000 cubic meters to a little under \$250 in Q4 on the back of lower crude oil prices and increased competition from EU gas imports. In addition, while domestic production was able to cover just a third of Ukraine's gas needs, slowing-down gas consumption and the gradual phasing out of gas in power generation have increased the share of the domestic output to 50%. Subdued economic growth, planned large-scale investment in energy efficiency improvements and gas transmission network modernization could impose further pressure on gas imports. A full gas independence requires also an enhanced investment in domestic natural gas production by developing both the country's conventional reserves and by unlocking its vast coalbed methane (CBM) and shale gas potential. In order to accelerate E&P activities, the government should ease the tax burden for independent drillers and provide market-based royalty regimes that are not prohibitive to investment. Despite the reversal on some tax hikes on production, the tax regime is still very arbitrary, primarily driven to expand budget revenues at the expense of gas producers.

2. Unsustainable energy consumption

The highly inefficient energy consumption in Ukraine has worsened the country's overall energy security. Before the economic downturn that started already in 2012, the government had taken the policy of energy intensity reduction seriously. In 2006, the then *Energy Strategy to 2030* envisioned that energy intensity would decline by 50% in 2030 compared to 2005⁸. Between 2005 and 2011, the energy consumption per a unit of GDP fell by more than 20% mostly on the back of falling natural gas consumption in the public sector, which includes the residential areas. However, households still make up close to 40% of the total gas demand as 75% of them have direct access to natural gas. With few buildings having installed individual gas meters or gone through energy efficiency refurbishment, it is unlikely that the public sector would be able to cut its gas demand in the short-term despite a policy target of a 30% reduction of consumption by 2030⁹. As most of the residential infrastructure is very outdated, there is enormous potential for additional energy savings in buildings. One study points out that heating demand could fall by between 30 and 40% if energy efficiency measures are implemented.¹⁰

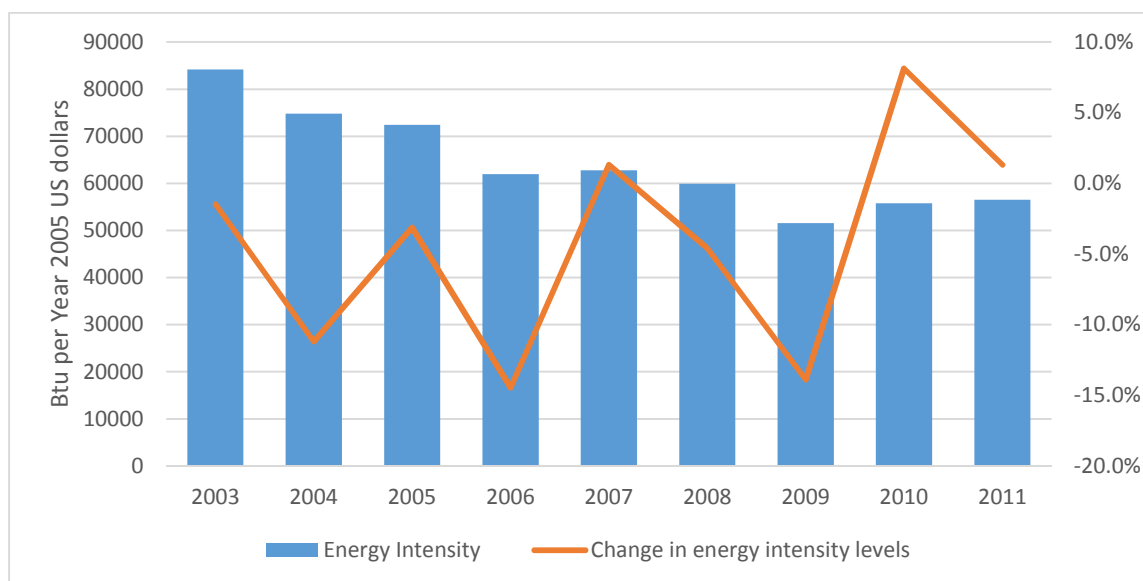
⁷ The information for contractual obstacles imposed by Gazprom came out from a letter by Ukraine's PM Yatsenuk to the EU complaining that the Slovak-Russian gas contracts is against EU's gas liberalization law. For more information see: <http://uk.reuters.com/article/2015/06/23/uk-ukraine-gas-slovakia-idUKKBN0P31W620150623>

⁸ Cabinet Resolution on the Energy Efficiency Increase and Energy Resource Consumption Reduction Programmes, December 2008.

⁹ IEA (2012). Ukraine 2012. Energy Policies beyond IEA countries.

¹⁰ International Finance Corporation, Ukraine Residential Energy Efficiency Project, www.inogateee.org/sites/default/files/news/Leaflet_EN.pdf (accessed 26 March 2012).

Figure 4. Energy intensity levels



Source: World Bank data

Among these policies should be the reversal of costly energy subsidies to households. Before the recent partial liberalization, heating and gas tariffs have been based on the size of apartments and not on actual consumption. This has removed the incentive for households to conserve energy or invest in wall and window insulation. As one of the chief impediments for energy efficiency improvement is the lack of adequate financing, the government could start providing partial financial support to energy efficiency initiatives making them more financially viable. Similar to Bulgaria, where the government created a special fund for energy efficiency investments, the Ukrainian government could directly cover a share or the bank loan and provide a guarantee for the rest making home associations in large residential complexes more lucrative clients for financial institutions. The cost to the budget and the economy in general of continuing to subsidize energy consumption greatly exceeds the direct transfer of public funds for the improvement of the building stock.

Most substantial decline in gas consumption has been visible in the industrial segment, as well as in energy production and transmission, itself. The civil conflict and the economic crisis from 2013-2014 hit the main industrial gas consumer, the chemical sector, especially hard. Severed economic ties with Russia and government attacks against large chemical holdings, controlled by oligarchs close to the former president Yanukovich, led to a significant decline in fertilizer output. A protracted reorientation to new markets in the EU and the abolishment of state subsidies all mean that industrial gas demand is likely to remain subdued in the medium-run. Large potential for energy savings also exist in the steel, manufacturing and agricultural sectors but it is left unused as companies used to benefit from cheap power or have been engaged in illegal schemes for gas and power diversion. Similarly, the gas transmission company, Ukrtransgaz, has been gradually phasing out the use of natural gas in compressor stations and switching to electricity. The gas transmission network's own consumption had fallen by half to 3.3 bcm per year in 2010 and to 1.9 bcm in 2014 while another 0.5-0.7 bcm could be saved in the following years¹¹.

3. Capture and mismanagement of the state-owned energy sector

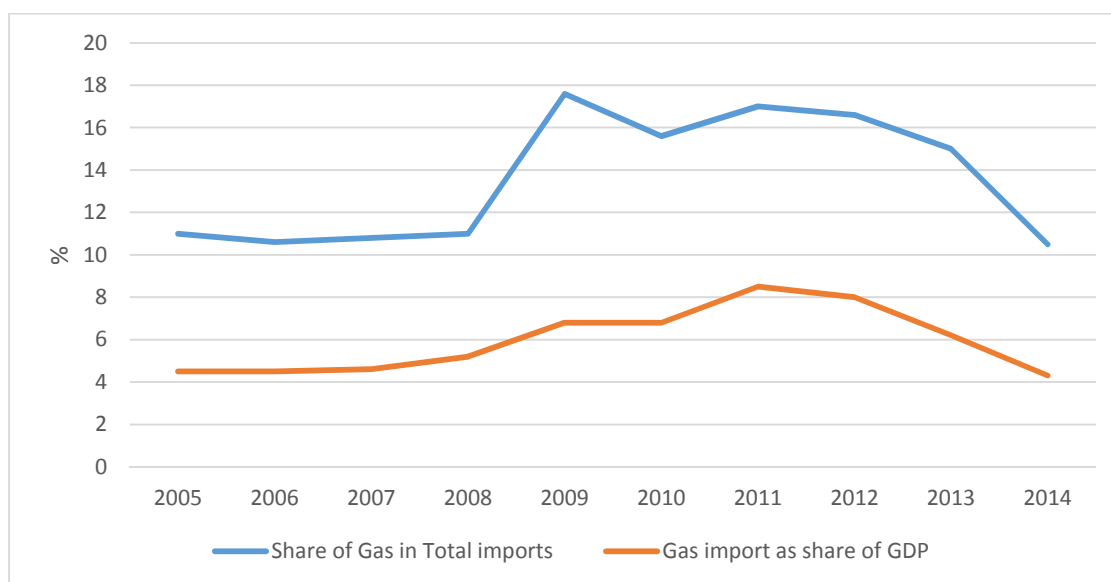
While the energy inefficiency and the high level of import dependence are structural factors related to the economic organization and history of the country, Ukraine faces a more political energy security risk –

¹¹ Ibid

namely systemic corruption and the capture of state-owned energy companies by vested interests. One apt example has been the criminal mismanagement of the Naftogaz gas monopoly. Since independence, Ukrainian politicians have not only tolerated, but also promoted corrupt gas intermediaries, which have used their position to extract illegal rents at the expense of the state. The result is that Naftogaz' loss for 2014 alone reached USD4.12 billion or five times bigger than its loss in 2013¹². The total debt of the company reached around USD7.5 billion by the end of 2014 with around a third, of which is due in the next 12 months. According to the finance minister, the annual company's deficit equals 1.5 times of the overall budget deficit. Not surprisingly, the IMF has maintained that a major overhaul of the natural gas sector is the prerequisite for disbursement of the financial assistance worth USD17.5 billion.

Part of the explanation for the persistent deficits is that Naftogaz has been mandated by subsequent energy regulators to maintain gas tariffs below cost of supply to households and the majority of the state-owned companies and public institutions. This policy has prevented large-scale social discontent and has kept a significant share of the vulnerable population above the poverty threshold. Private businesses, on the other hand, have been able to effectively bribe company and energy sector officials avoid paying for their gas consumption. In this way, the government developed clientelistic regional networks of loyal private businesses, who despite being inefficient and often outright kleptocratic, were able to continue operations and even profitable exports.

Figure 5. Natural gas dependence of the economy

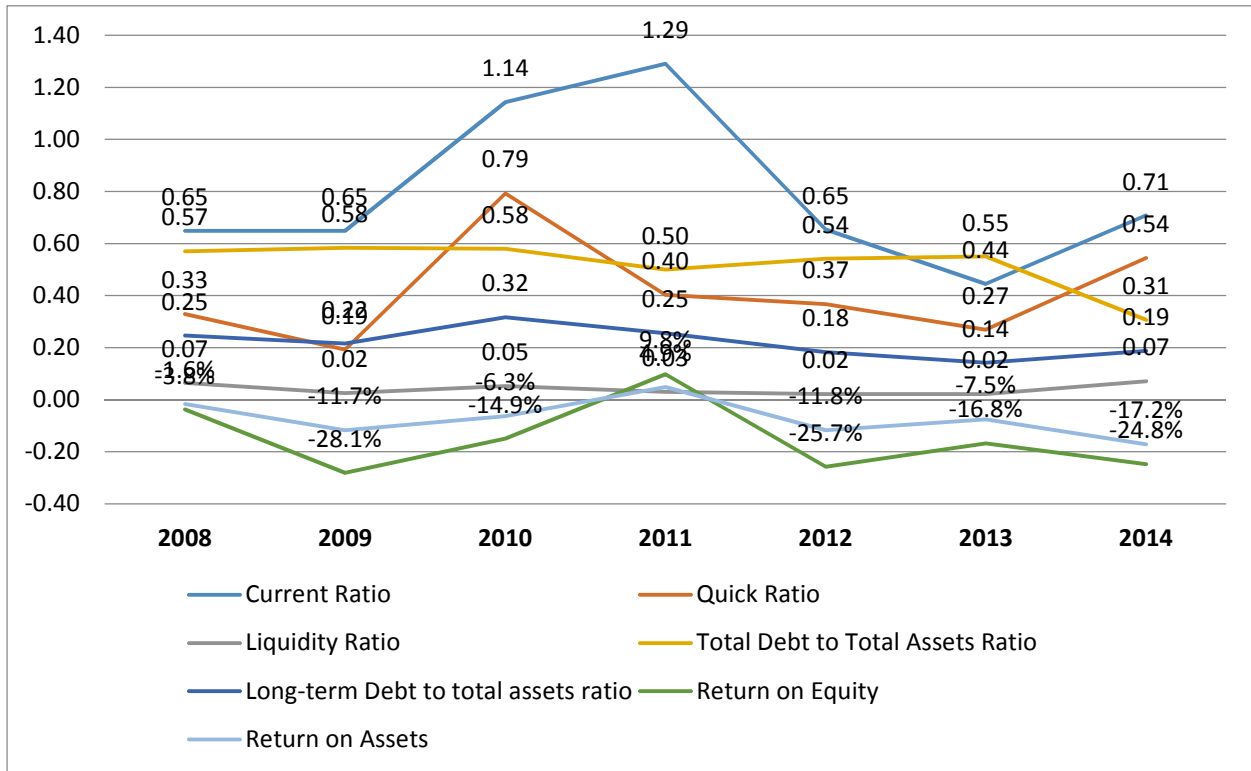


Source: National Statistics

In addition, successive government have placed well-connected intermediary companies for the import of Russian gas. These have been successful in extracting enormous rents by reselling a mix of Russian and Central Asian gas to Naftogaz at above-market prices. Naftogaz, not only tolerated this practice, but in effect supported it, especially after the 2009 gas deal when under the new long-term oil-indexed contract, Ukraine began paying the highest gas prices in Europe. The rising gas prices buried the state-owned gas sector deeper and deeper in debt, which in return increased the budget deficit. In 2011, gas imports made up 17% of the total country's imports and 8,5% of the GDP. Add imports of crude oil and fuel products to the import mix, and Ukraine's energy imports easily make up more than 10% of the GDP. Since then the importance of gas imports for the overall economy, has gradually declined as companies began switching from gas to coal but is still a major determinant of government policy.

¹² <http://www.upstreamonline.com/live/1412574/naftogaz-posts-massive-loss>

Figure 6. Key financial indicators for Naftogaz



Source: Naftogaz annual financial reports

As with the power sector where the government has begun a market liberalization and privatization, the government began to change the natural gas status-quo only in the spring of 2015. After years of artificially defending Naftogaz' monopoly, the parliament passed a series of reform bills aiming to restructure Naftogaz, and the energy regulator liberalized gas tariffs. The latter increased gas tariffs by 2.2 times and heating prices by 40% for household consumers albeit short of IMF's demand for a 280% and 66% hike, respectively. Additionally, on 1 October when the new gas market law comes into force, breaking Naftogaz' monopoly on production, supply and transmission of natural gas. In addition, the legal changes envision the unbundling of the company in separate production, transit, storage and supply entities. To complement the reform, the energy regulator will introduce transmission tariffs to regional private distributing companies, controlled by powerful businessmen with close ties to the former president, Yanukovich. Finally, the new gas law envisions plans for installing gas metering devices on networks of final distribution companies and in industrial and households clients to halt corrupt practices of siphoning gas to large industrial clients, as well as increase the incentive for more household energy savings.