



CONCORDE CAPITAL

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# Ukraine's Gas Issue

## The Way Out

### Companies Mentioned:

#### Base Metals:

Alchevsk Iron & Steel  
(ALMK)  
Donetssk Steel (DOMZ)  
Kryvorizhstal (KSTL)  
Azovstal (AZST)  
Markokhim(MCHI)

#### Utilities:

Kievenergo (KIEN)  
Zakhidenergo (ZAEN)

#### Base Materials:

Stirol (STIR)  
Azot Severodonetsk  
Azot Cherkasy (AZOT)  
Rivneazot (RAZT)

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## Summary

**An increase in Russian gas prices is inevitable.** The only question is how much we should expect them to increase. Gazprom's low prices for Ukraine were politically motivated, and thus – were not sustainable in the long-term. Price increases are coming for all the countries Gazprom delivers gas to, along with the Russian market, which is due to be liberalized shortly. What happens next in Ukraine depends on how both countries plan to play their cards. Russia is Ukraine's main gas supplier, however, it depends on Ukraine's gas pipelines to transport gas to the west. So as it stands, the two countries are holding each other by the throat, though Russia may have a better grip.

According to the scenario, which we consider the most likely, **Russia will increase its gas price for Ukraine gradually to USD 180/1000 cm by 2008.** If we assume that Turkmen gas prices and delivery volumes will remain unchanged, this will bring the price of gas to USD 85/1000 cm for Ukraine's industrial consumers in 2006 – 14% less than Naftogaz Ukraine is pushing for. We forecast that starting from 2008 the internal price will stabilize at USD 116.

**The chemical and steel industries will suffer the most** from the gas price increase. The former uses gas in its production the most intensively (especially, nitrogen fertilizers), while the latter is the largest gas consumer in the country in absolute terms. In the mid-term producers of nitrogen fertilizers will not be threatened significantly, as high world prices for their products will allow them to cover variable costs as long as gas prices do not surpass ~USD 118. However, in the long-term they will not be able to cover variable costs if gas prices exceed USD 98. Coke producers are likely to gain from a increase in gas prices, as metallurgical companies are likely to replace gas used as fuel, for coke.

**Energy-saving operations will spring up on the agenda** of all the industries using gas in their production processes, as many of Ukraine's companies are less efficient than their European and US counterparts. The entire economy will be influenced by the gas price increase indirectly, as it will trigger an increase in electricity tariffs by ~8%.

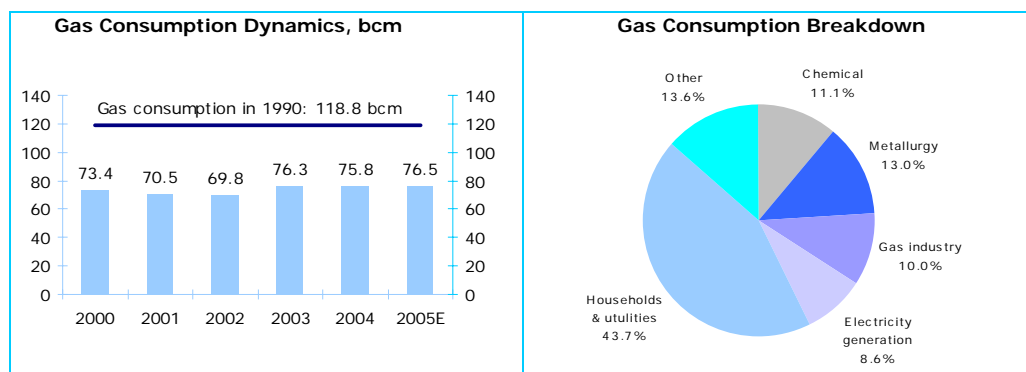
## Hooked On Russian Gas?

Ukraine's chronic dependency on Russian gas surfaced again in June 2005 when Gazprom decided to raise gas prices for Ukraine. Two vital questions that now need to be answered are:

- 1) whether Ukraine is able to diversify its gas supplies if Gazprom decides to cut its gas exports to Ukraine
- 2) whether Ukraine has enough leverage to negotiate acceptable gas prices with Gazprom.

### Consumption Of Gas

Ukraine's current level of gas consumption is usually around 75 bcm annually, which is significantly lower than consumption in 1990, a benchmark year. The chemical industry and metallurgy are by far the largest industrial gas consumers in terms of overall volume consumed. In addition, the chemical industry is the most gas-intensive in terms of the share of gas in production costs. The metallurgy and chemical industries are key for Ukraine's economy, accounting for 27% and 7% of the country's industrial output, respectively.



Source: Nagtogaz Ukrainy; Ukrainian News; Biznes

### Ukraine's Gas Balance

Ukraine currently has three major sources of gas: Russia, Turkmenistan and domestic extraction.

#### Gas Sources And Uses In 2004 - 2005

In 2004, Ukraine's domestic gas output totaled 19.5 bcm, exports of gas from Central Asia comprised 33.8 bcm and gas supplied by Gazprom amounted to 34.1 bcm. This volume (87.4 bcm) was enough to cover domestic consumption (75.8 bcm), export a portion of gas to Europe (~5 bcm) and pump some gas into storage.

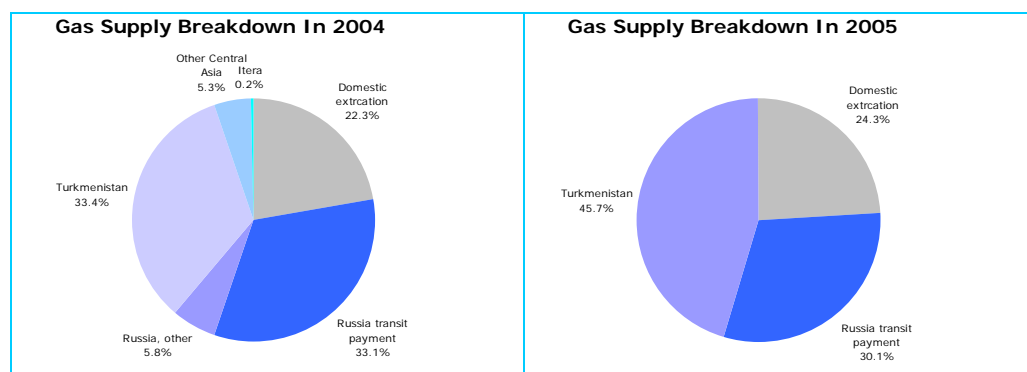
Ukraine's largest gas supplier from Central Asia is Turkmenistan, who sold 29.2 bcm of its gas to Ukraine last year. Apart from Turkmenistan, Ukraine sometimes receives minor amounts of gas from Uzbekistan. In addition, Itera, who was the major exporter of Turkmen gas in Ukraine in 1996 – 2002, still has the ability to sell small volumes of Turkmen gas to Ukraine at unregulated tariffs. In 2004, it supplied 0.133 bcm of gas, although its license allowed sales of only 0.100 bcm.

Ukraine has a special arrangement with Russia, according to which Russia pays for Ukraine's gas transit services with gas, and not cash. In 2004, Gazprom supplied Ukraine's state-owned gas monopoly Naftogaz Ukrainy with 29 bcm of natural gas, or 85% of all Russian gas exports to Ukraine, as payment for transit. The implied price of this gas as stipulated by the agreement between Gazprom and Naftogaz, is USD 50 per 1,000 cm, and the implied transport tariff is USD 1.09 per 1,000 cm per 100 km.

Naftogaz did not disclose the price it paid for the remaining 5.1 bcm it bought from Gazprom in 2004, but according to unofficial information, this price was close to USD

58 per 1,000 cm. This estimate is supported by the fact that in 2004 Gazprom's reported average gas price for CIS countries other than Russia (Ukraine, Belarus, Moldova, Kazakhstan) was USD 50.9 per 1,000 cm, and 73% of the gas supplied to these countries was delivered to Ukraine. Belarus purchases Russian gas for a lower price than Ukraine.

Gas contracted directly from Turkmenistan has become the major alternative to buying from Gazprom. However, the key issue here is not where the gas comes from, but its price, as Gazprom has the ability to buy Turkmen gas and supply it to Ukraine as well. A direct contract with Turkmenistan enables Ukraine to negotiate gas prices bypassing Gazprom, which reduces Ukraine's energy dependency on Russia.



Source: Ukrainian News; Vedomosti; Biznes Newspaper

In 2004, the net price for Turkmen gas was USD 44 per 1,000 cm at the Turkmen-Uzbek border, and comprised USD 61 per 1,000 at the Ukrainian-Russian border. Although this price was higher than for Russian gas, the payment arrangement was extremely beneficial for Ukraine. Namely because Ukraine was allowed to pay half in cash, half with goods and contract works. Within this scheme, non-monetary settlements were also executed on terms favorable for Ukraine.

Ukraine's planned gas balance for 2005 is 20.2 bcm of domestically extracted gas, 38 bcm of gas purchased from Turkmenistan and 25 bcm of gas from Gazprom as a payment for transit on the same terms as in 2004.

### Cross-Subsidization

Gas exports allowed Ukraine to reap profits by simply re-selling the cheap gas, mostly Gazprom's, at market prices. In 2004 Ukraine sold gas to Romania at USD 197 per 1,000 cm. In 2005, Naftogaz Ukrainy planned to export the same amount of gas as in 2004 (~5 bcm), and gas exports in 1H05 totaled 2 bcm. Then the government banned the resale until Naftogaz closed Ukraine's 2005 gas balance with signed contacts and then only allowed it to resume re-export in September 2005. This export opportunity allowed Naftogaz Ukrainy to be a cash cow for the government and subsidize domestic consumers, whose prices are set by the National Electricity Regulation Committee (NERC):

Consumer Segment	Price set by NERC, USD per 1,000 cm
Industry	68.1
Heat utilities	47.8
Budget-funded entities	45.7
Households	36.6
<b>Cost of domestic gas extraction</b>	<b>39.6</b>

Domestic gas is used for household needs and is priced below its extraction cost. Household gas prices have been the same since 1999, and the cross-subsidization of households by industrial consumers has been practiced for years.

## A Time Of Reckoning: Ukraine Faces Gas Price Hike

In June 2005, Russia started to push for an increase in gas prices. Gazprom first threatened to raise the price for its gas to USD 160 per 1,000 starting from 2006, but then raised the target to USD 180 per 1,000 cm. Gazprom also insisted that all payments for gas be made in cash. For its part, Gazprom said that it is ready to do the same for Ukraine's transit services. Negotiations between Ukraine and Russia about gas are currently in progress.

While it is quite likely, that politics may have spurred Gazprom's move, as Ukraine's new political course involves moving away from Russia, we believe that economic reasons were the key factor behind it. Gazprom's previously low gas prices for Ukraine were politically motivated and, thus, non-sustainable in the long run. Gazprom wants to raise its gas prices across the board. It is currently re-negotiating the terms of its gas supply to Georgia from USD 62.5 per 1,000 cm to USD 110 per 1,000 cm, which is market price for this region given its transportation arm. In addition, Gazprom raised the price for its gas exports to Belarus from USD 30 to USD 46.7 per 1,000 cm in 2004 and is planning to increase the price again next year despite being on friendly terms with Belarus. In both cases Gazprom insists on monetary payments for the gas. Russia is also planning on liberalizing its internal gas market as well. Therefore, we believe an increase in the price for Russian gas is inevitable and the only question is whether it will be gradual or crushing.

Turkmenistan raised the issue of gas prices in late 2004, and Ukraine had no choice but to contract Turkmen gas at USD 58 per 1,000 cm at the Turkmen-Uzbek border, a 32% increase from the previous level. Though Ukraine was allowed to pay for this gas according to the 50/50 scheme: 50% with money and 50% with goods. According to the new agreement with Turkmenistan signed on June 25, 2005, Ukraine has been purchasing Turkmen gas at the old price of USD 44 per 1,000 cm since July 1, 2005. However, this time all payments will be monetary with the exception of 5 bcm, which Ukraine will pay for by conducting contract works in Turkmenistan.

## Ways To Diversify Gas Imports

Ukraine can theoretically reduce its dependency on Russian gas by replacing it with Central Asian gas. Turkmenistan, Uzbekistan and Kazakhstan all can export gas, but only Turkmenistan is currently able to provide it to Ukraine in sufficient volumes. Another option is importing gas from Iran, which Ukraine has started to consider lately. However, it will be some time before it will be possible for the country to get gas from Iran.

Ukraine can also avoid signing binding intergovernmental agreements by purchasing gas from independent traders, such as Trans-Nafta who sells Russian gas or Itera who mostly deals in Turkmen gas. However, it is unlikely the prices charged by these traders would be significantly lower than what Gazprom would sell its gas for.

### Turkmenistan

Ukraine has a contract with Turkmenistan for the supply of 36 bcm of gas in 2006. Moreover, Naftogaz Ukrainy stated that in October it will sign a long-term agreement with Turkmenistan on the annual delivery of 50 - 60 bcm of gas in 2006 - 2036. The price for this gas would be negotiated each year separately. However, Turkmenistan signed a similar agreement with Russia in 2003 ending only in 2028, according to which Turkmenistan promised to supply up to 10 bcm of gas to Russia in 2006 and after that, when Turkmenistan's existing contract with Ukraine expires, to increase gas exports to 50 - 60 bcm in 2007, 63 - 73 bcm in 2008 and 70-80 bcm from 2009 to 2028.

Turkmenistan's current gas extraction is estimated at 58-59 bcm a year. The country exports 70% of its gas. Turkmenistan plans to raise its gas extraction to 85 bcm and increase it to 120 bcm starting in 2010. Its known gas reserves are estimated at 1.43 trillion cm, while its overall gas reserves could reach 10 to 22.5 trillion bcm. These numbers suggest that Turkmenistan will not be able to fulfill its long-term agreements with Russia and Ukraine in full volumes simultaneously.

Turkmenistan will not risk violating its contract with Gazprom, as the latter controls the transportation of Turkmen gas. Two pipeline systems service Turkmen gas exports. The pipeline connecting Turkmenistan with Iran has a capacity of ~6 bcm, but Iran has sufficient gas reserves itself that it would like to export. Another outlet is the pipeline system Central Asia - Center which passes through Uzbekistan, Kazakhstan and Russia and is controlled by Gazprom. It covers 1,500 km to Ukraine's border. This is practically the only way to export Turkmen gas to Ukraine and further to Europe. However, the pipeline has a bottleneck in Uzbekistan where its annual capacity is only about 50 bcm. Turkmenistan can increase its gas transport through this system only after its expansion, for which Gazprom's permission is needed.

Therefore, Turkmenistan signing a long-term contact with Ukraine may be a ploy to pit Gazprom and Naftogaz Ukrainy against each other in an effort to raise prices. Naftogaz Ukrainy will probably have to negotiate with Gazprom to for Turkmen gas starting in 2007.

### RosUkrEnerg: A Shady Intermediary

Gazprom's subsidiary, Gazexport, will purchase Turkmen gas and sell it at a 2% commission to the gas trader RosUkrEnerg who is now the exclusive supplier of Turkmen gas to Ukraine. RosUkrEnerg is a non-transparent entity founded in July 2004 as a 50/50 JV controlled by Gazprom and allegedly, Raiffeisen Investment. Given Gazprom will buy Turkmen gas at USD 44 for 1,000 cm in 2005 - 2007, RosUkrEnerg can, in principle, re-sell this gas at prices lower than market prices.

Naftogaz Ukrainy has been co-operating with RosUkrEnerg since January 2005. It has been paying RosUkrEnerg for the transportation of Turkmen gas only, as Ukraine has a contract with Turkmenistan. However, in the future Ukraine may have to purchase gas from RosUkrEnerg. Therefore, Naftogaz Ukrainy is currently negotiating with Raiffeisen for the purchase of its stake in this gas trader. This would give Ukraine more control over Turkmen gas supplies. However, there is a risk that Gazprom, could exit the JV and found a new one without Naftogaz.

Ukraine's agreements with Turkmenistan or any other Central Asian gas supplier are not completely independent from Russia's influence and will remain so until pipelines from Central Asia bypassing Russia are built. However, Ukraine's ability to negotiate terms directly with these countries helps lessen its dependence on Russia.

### **Iran**

Iran is another alternative. Ukraine started negotiations on gas exports with Iran, which has the world's second largest gas reserves. In June 2005, Ukraine and Iran signed a protocol that envisages the supply of 30 bcm of Iranian gas for Ukraine's needs and another 20 bcm for transit to Europe. Currently Iran can only export its gas to Europe by going through Turkey, and the two countries often do not see eye-to-eye. Ukraine has European support for this idea, however, it is a long way from being worked out. Getting Iranian gas will involve negotiations with neighboring countries, Russia being the key.

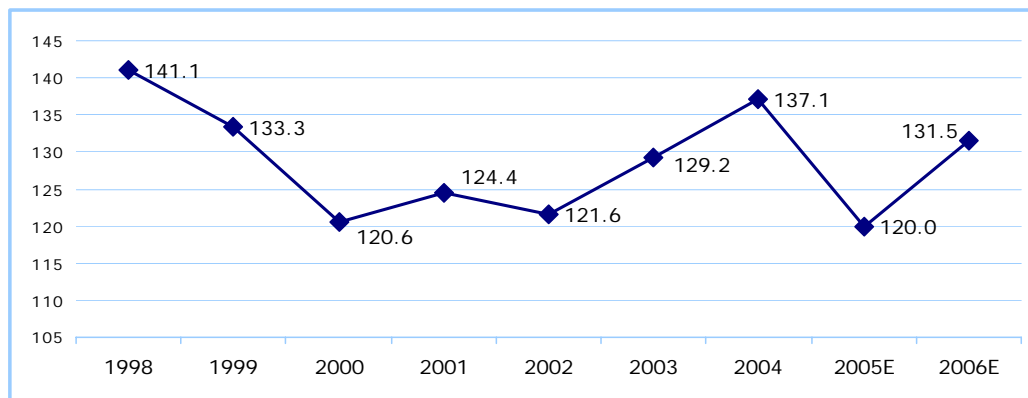
Two options for Iranian gas transportation are currently being considered: through Russia and around Russia. In the first scenario, the pipeline would go through Armenia, Georgia, Russia, Ukraine and all the way to Europe. In the second case a pipeline would extend from Iran to Armenia, Georgia, the Black Sea, Ukraine and finally, Europe. The second option would be much costlier due to the need to construct a pipeline under the sea, but on the other hand, it would not require Russia's involvement.



## Holding Each Other By The Throat

Though it seems Ukraine has no choice but to play by Gazprom's rules, the game is two-sided. Russia currently depends on Ukraine no less than Ukraine does on Russia. In 2004, Gazprom transported 120.4 bcm, or 85% of all exported gas, through Ukraine's pipelines to Europe. With gas pumped to Moldova and Russia's southern regions, Gazprom's gas transit through Ukraine's territory comprised 137.1 bcm last year.

**Transit Of Russian Gas Through Ukraine's Pipelines, bcm**

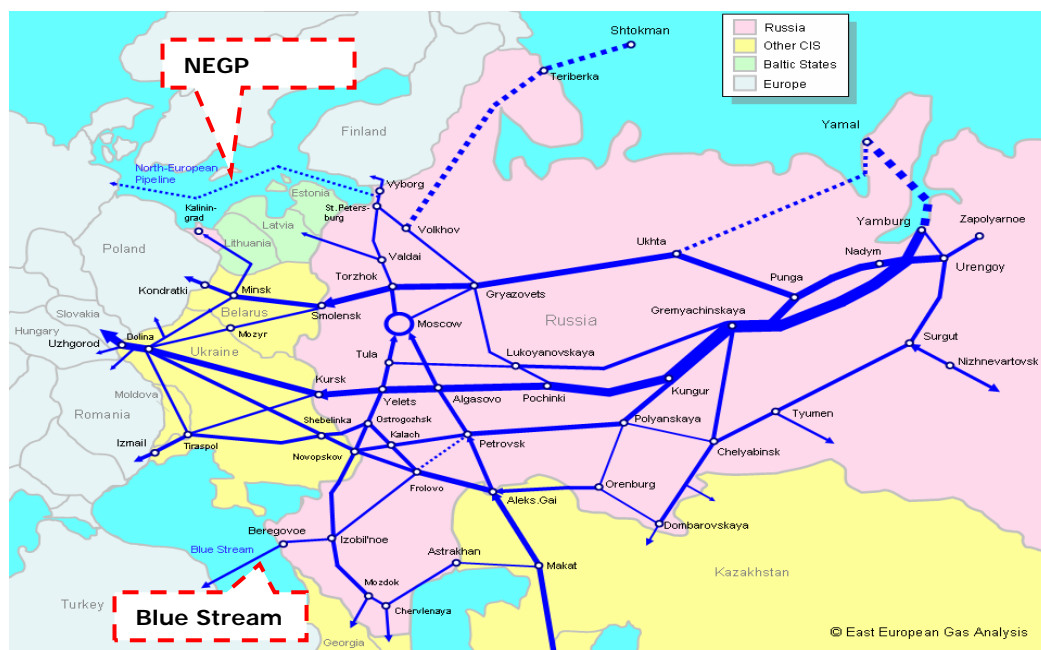


Source: Naftogaz Ukrainy

An intergovernmental agreement between Russia and Ukraine exists, according to which Russia guarantees the transportation of no less than 110 bcm of gas through Ukraine's territory up until 2013. Concrete volumes and terms of payment for transportation services are negotiated each year. This gives Ukraine leverage in gas negotiations with Russia.

## Seeking To Diversify Gas Transportation

Russia is diversifying its gas transit capabilities by engaging in the construction of pipeline systems that will bypass Ukraine's territory. The North European Gas Pipeline (NEGP) project is in progress and the country is also part of the newly completed Blue Stream project.



**North European Gas Pipeline**

Work on the NEGP project will start in fall 2005. In September 2005 Gazprom signed respective partnership agreements with German E.ON AG and BASF. The North European Gas Pipeline (NEGP) will run under the waters of the Baltic Sea from Portovaya bay (near Vyborg) to the coast of Germany (near Greifswald) and bypass Poland, Belarus and Ukraine. The plan is to build two parallel gas pipeline legs each about 1,200 km long. The NEGP's total annual capacity will be 55 bcm. The first leg will be launched in 2010 and have a throughput capacity 27.5 bcm. Eventually a second leg of the same capacity will be added.

We do not expect the new pipeline to tap into gas transit through Ukraine, as by Gazprom's own estimates, Europe's demand for gas will increase by ~100 bcm by 2010. Therefore, the NEGP will pump additional gas to meet this incremental demand. Furthermore, it is likely that gas transit through Ukraine will increase by an amount that the NEGP will be unable to pass (~100-55=45 bcm). However, the alternative pipeline's construction will be used as leverage in Gazprom's negotiations with Ukraine.

**Blue Stream**

Another Gazprom project, Blue Stream, connects Russia with Turkey via a gas pipeline under the Black Sea. The 1,213 km long pipeline was constructed in 2000 – 2002. It has a capacity of 16 bcm of gas annually and supplements Russian gas exports to Turkey through Ukraine-Moldova-Romania-Bulgaria. Currently the pipeline is under-loaded passing only 4.5 bcm a year. This is due to Turkey's attempts to lessen its dependency on Russian gas by considering alternative gas supplies from Azerbaijan and Turkmenistan. Although we expect Blue Stream's utilization level to reach its design capacity in the mid-term, the implications of this for Ukraine will not be significant. An increase in gas consumption by Turkey as well as growing gas consumption in Europe will mitigate the fallout of gas export through the Blue Stream system for Ukraine.

**Conclusions: Ukraine Still Has An Ace In The Hole**

Russia is not able to eliminate its dependency on Ukraine's pipelines for its gas exports. This remains Ukraine's key bargaining tool in its negotiations with Russia about gas supplies. Russia's persistent attempts to gain control over Ukraine's pipelines underscore this fact, as reflected, by Gazprom's attempt to create a consortium with Ukraine for joint management of Ukrainian pipelines in 2004. The longer the negotiations continue the better it is for Ukraine. When Gazprom is spurred by its European partners to sign contracts on future gas supplies it is more likely to accept Ukraine's terms. Ukraine has a history of using this tactic already.

## What To Expect

While the price of USD 180, threatened by Russia, is a frightening prospect, the truth is that it will not be automatically transferred to Ukraine's industrial users. They will pay the weighted average of the Russian and Turkmen prices, plus the margin (estimated as 11%), part of which is used for subsidizing households, which enjoy lower gas prices than the cost of extraction.

### 2005: Moderate Price Growth

In 2005, the gas price for industrial users in Ukraine has been increasing gradually – by 5% starting from May, another increase of 5% will be introduced starting on October 1. On average the price for industrial consumers (transportation and VAT not included) in 2005 has been 11% higher than what we calculated as the average price for imported gas. Internally mined gas has not been taken into account, as its entire amount is used for household consumption.

### Calculation Of Gas Prices On Average For Industrial Users In 2005\*



\*Gas prices include transportation tariffs

### 2006: Sharply Up

Naftogaz has already begun lobbying to increase gas prices by 42% (compared to the present USD 68) starting from January 2006 to USD 97/1000 cm to compensate for potential increase in Russian gas.

In fact, Naftogaz backed its proposal with the assumption of an increase in Russian gas prices to USD 180. Thus, part of the increase will be transferred to Ukraine's industrial consumers. To compensate for the rest, we estimate, the Ukrainian transit tariff for Russia will have to be increased by more than 4 times. Assuming that Russia will increase the transit tariff for Turkmen gas transported through its territory to Ukraine by the same amount, its price at the Russian-Ukraine border will reach USD 86.7 (a 42% increase, compared to the present USD 61), assuming USD 44 at Turkmen-Uzbek border.

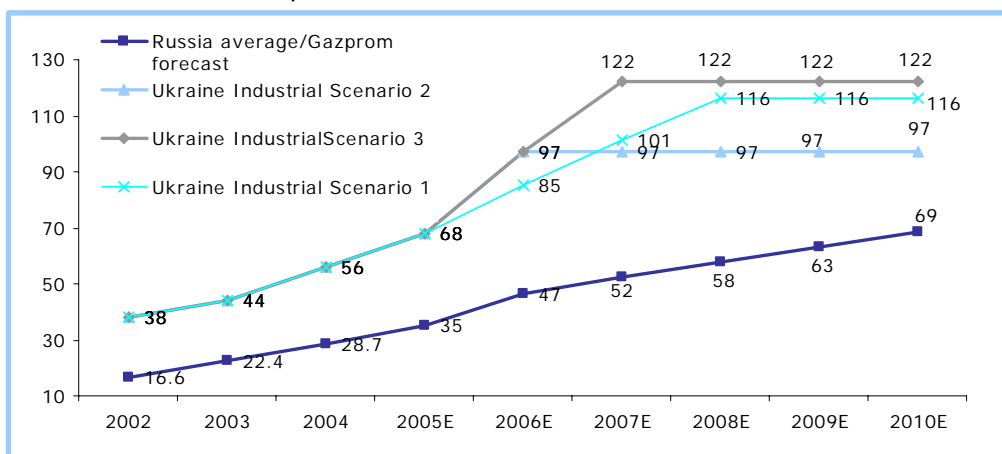
### Gas Price, USD per '000 cm, If A 42% Increase Is Implemented In 2006\*

	2005	2006
Russian	50	180
Turkmen (Ukr.-Rus. Border)	68 (average)	87
Weighted average price of imported gas	61	122
<b>Industrial consumers in Ukraine</b>	<b>68 (average)</b>	<b>97</b>
Markup/subsidy over weighted average gas cost	11%	-20%

\*See Scenario 2 below

Concorde Capital estimations

**Gas Prices Scenarios, USD/1000 cm**



Source: Concorde Capital Estimates

**Scenario 1: (Probability 60%):** Ukraine and Russia agree that price for Russian gas will grow gradually to become USD 180 in 2008, and no transit tariff is increased. The same amount (38 bn) of Turkmen gas at USD 61 (transportation included) as in 2005 is imported in 2006 and the following years. This would increase the price for industrial consumers to USD 85 in 2006 and stabilize at USD 116 starting from 2008. This would be a compromise between Russia, which wants an immediate sharp increase in gas prices, and Ukraine which wants the price increase to happen in 2013. It also implies that Naftogaz Ukraine will only succeed in lobbying for a lower price increase for industrial consumers than it is trying now. Based on the history of the company's previous unsuccessful attempts to increase internal gas tariffs, we consider this scenario as the most probable.

**Scenario 2: (Probability 25%):** Russia sets the price at USD 180 starting from 2006. Nearly 23 bcm of gas are imported from Russia. Ukraine increases transit tariffs for Russian gas by ~4 times, Russia does the same for 38 bn of Turkmen gas heading to Ukraine through its territory. Ukraine's proceeds from the higher transit tariffs are used to subsidize local industrial consumers which receive the gas at USD 97/1000 cm, while the weighted average price for the imported gas is USD 122.

**Scenario 3: (Probability 15%):** The prices and volumes of Ukraine's gas imports stay the same as in Scenario 1. The subsidizing of Ukraine's gas prices for industrial consumers is forbidden after 2006, because of Ukraine's plans to join the WTO. Thus, the gas price for industrial users becomes the weighted average of Russian and Turkmen (including an increase in transportation tariffs through Russian territory), gas prices, USD 122.

## The Victims: The Impact On Industry

### Chemicals

The increase in gas prices will have the most severe influence on Ukraine's producers of chemicals, as this is the industry, where gas is used the most intensively. In particular, gas constitutes ~73% of COGS in the production of nitrogen fertilizers, which make up over 30% of the total output of chemicals in the country.

<b>Production Cost Of Ammonia, USD:</b>	
Gas price for 1000 cm, USD + VAT	81.6
x Gas use, 1000 cm/mt of ammonia	1.2
= Gas cost, USD/mt of ammonia	95.9
+ Other costs, USD	35.5
<b>= COGS/mt of ammonia</b>	<b>131.3</b>
+	
Average transportation cost/mt of ammonia	38
<b>Total variable costs/mt of ammonia</b>	<b>169.3</b>

According to our calculations, Ukraine's producers of nitrogen fertilizers will be able to cover their variable costs (COGS and transportation expenses) in 2006 at a gas price of USD 118/1000 cm (the price closer to our pessimistic scenario), under the assumption that ammonia prices will stay at USD 240 on the world market, as projected.

#### Gas Price Analysis, USD/mt of ammonia

	Spot ammonia price USD/mt	Gas price to cover variable costs USD/1000 cm
2005, Sept. 09	289*	153
2006 average	240**	118
2010 average	210**	98

\*Price at Yuzhnyy, Bloomberg

\*\*Estimate, Concorde Capital

Several companies in the industry, including **Stirol**, **Azot Severodonetsk**, **Azot Cherkasy**, and **Rivneazot**, have an advantage over Ukrainian peers, and will not face the same difficulties, when gas prices increase. This is because their owners possess the ability to secure cheaper gas, mainly due to being associated with Gazprom-owned companies.

#### Energy Saving On The Agenda

The threat of gas price increases will force several companies to put improving gas-saving technologies on their to-do list. The ammonia aggregates, used in Ukraine, are over 20 years old on average, and consume over 1200 cm of gas per mt of ammonia, while new equipment can decrease gas consumption to 800-900 cm.

It is technically possible to introduce gas-saving technologies that would decrease gas consumption by 7% at existing aggregates. The capital expenditures by Ukraine's chemical producers grew by 2.8 times to USD 196 mln in 1H05. Producers of nitrogen fertilizers account for 35% of this amount, and we estimate that a significant part of the total CapEx was used to develop gas-saving technologies.

## Metallurgy

The metallurgical industry is the largest industrial consumer of gas in the country. Steel mills use about 6.6 bn cm annually. Gas accounted for 6.5% of the production costs for metallurgical companies in 2004. If the price goes up by 42% in 2006, gas will represent 8% of their costs.

Investment in energy-saving technologies is inevitable for Ukraine's steel mills to stay afloat on the global market. Ukraine's steel producers consume 750 kg of equivalent fuel per mt of cast iron, while the developed world uses 230-270 kg and does not consume natural gas at all.

In addition, we anticipate that under the threat of significant future increase in gas prices Ukrainian steel mills will start making the transition to oxygen converter and electric arc furnace (EAF) technologies. At present, Ukrainian steel makers employ marten furnaces by and large, while their European and Russian peers have already switched to oxygen converter/ EAF steel-making which does not depend on natural gas.

### Blast Furnace Production

Due to the relatively low price for natural gas, Ukraine's producers were using it as a fuel in the production process instead of coal injection, which is common for most developed countries.

Once the gas price starts to grow, the companies will consider switching to coal. This is possible in several ways: investment in complexes for coal injection, replacing natural gas with coke gas, delivered to the steel mills from coke plants, or replacing it with blast furnace gas, formed during cast iron production.

### Option 1: Coal-Injection Complexes

A coal-injection complex is being used at **Donetsk metallurgical plant**. **Alchevsk steel mill** is installing the equipment presently, and **Kryvorizhstal** bought a complex at the end of 1990's but has not started using it yet. One of the investment obligations for the buyer of Kryvorizhstal is to switch the company from natural gas to coal-injection.

### Option 2: Replacement With Coke Gas

The second option foresees the replacement of natural gas with coke gas – one of the by products of coal coking. It contains H<sub>2</sub>, CH<sub>4</sub>, CO and other gases. Coke gas has to be transported by pipes from the coke producers, thus this option is limited to the steel mills, located close to coke producers, (**Azovstal** and **Markokhim**).

### Option 3: Replacement With Blast Furnace Gas

Natural gas can also be replaced with blast furnace gas from cast iron production. It contains CO<sub>2</sub>, CO, CH<sub>4</sub>, N<sub>2</sub>. Technically its is possible to replace 120 cm of natural gas, used for production of 1 mt of cast iron, with 84 kg of coke without additional CapEx.

### Coke-For-Gas Replacement: Impact On Production Costs, per mt of cast iron

	Consumption kg, cm	Price	Replacement kg, cm	Effect USD
		USD/mt, 1000 cm		
Coke	554	170	+84	14.3
Gas present	120	68	-120	-8.2
Additional Cost of replacement at gas price of USD 68				6.1
Gas, price at which replacement becomes expedient		119	-120	14.3

Source: *Ukrudprom, Concorde Capital calculations*

Presently the change is not practical, but given the current price of coke, the replacement becomes expedient at gas prices pass USD 119, assuming that the price of coke stays at the current level. If natural gas were replaced with coke gas today, this would cause an increase of USD 6.1 for additional production costs per mt of cast iron.

## Electrical Energy

Gas constitutes 8-15% of the total amount of fuel (measured in equivalent fuel units), used by Ukraine's energy generating companies on average, and 34% in the total COGS structure. A 25% increase in gas prices, foreseen by the scenario we consider as most likely to happen, would theoretically raise electricity tariffs by 8.5%. Thus, any increase in gas prices will be indirectly transferred to Ukraine's entire economy.

We believe that the increase in electricity tariffs will be less than 8.5%, due to the uneven consumption of gas in the total fuel structure of Ukraine's generating companies. For example, we believe that for Zakhidenergo, the increase in gas prices may be partially transformed into lower profitability margins.

Gas constitutes the largest share in fuel structure of Kievenergo and Zakhidenergo, accounting for 100% of the fuel of the former and 35% of the latter.

### ***Kievenergo***

As tariffs for Kievenergo are set by the National Commission of Energy Regulation, it is likely that the entire increase in COGS (~by 20%) will lead to increased tariffs, thus leaving the company's profit margins the same. But as Kievenergo accounts for 4% of the entire energy amount on Ukraine's wholesale market, its particular impact on the overall tariff increase will not be significant.

### ***Zakhidenergo***

An increase in gas prices to USD 97/1000 cm will trigger growth in Zakhidenergo's COGS by 10-11%. As the company has an option to partially replace gas in its fuel structure with coal, we believe they will manage to moderate the increase to 8%. We do not expect the company to be able to increase electricity tariffs more than other generating companies, as it is selling its electricity by placing competitive offers on the wholesale market.

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