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How to deal with 'European gas prices' in Ukraine?

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How to deal with 'European gas prices' in Ukraine?

Executive Summary

In a recent Memorandum of Understanding between the Prime Ministers of Ukraine and the Russian Federation, both side accepted adjustments of gas import prices towards the level of '*European gas prices*' within a transition period of three years, in exchange for '*European fees*' for gas transit through Ukraine. Against this background, this paper argues that '*European gas prices*' in Ukraine should be determined by the replacement value of gas shipments in Europe minus the transit costs from Ukraine to EU markets. Based on this concept and using current prices for Russian gas imports in Germany as well as transit costs that include full '*European fees*' the paper estimates current '*European gas prices*' in Ukraine at a level of 554 USD/tcm. Since '*European gas prices*' typically follow the development of crude oil prices with a time-lag of about five months, this price is likely to increase even further until the end of 2008 before the fall in oil prices that started in August 2008 will also bring down gas prices. With this in mind, we project alternative levels of '*European gas prices*' based on alternative oil price developments. Our estimations yield projected gas prices between 450 USD/tcm and 750 USD/tcm by 2012, the year in which Ukraine has to reach the '*European gas price*' level.

The second part of the paper addresses the current system of domestic gas pricing and assesses its capability to cope with further price increases. Although the system has succeeded in keeping gas prices for residential consumers at rather low levels, there are major drawbacks. Firstly, it induces significant additional taxes on industry prices in order to cross-subsidise privileged consumers. In particular, supplying expensive imported gas to district heating generators causes significant financial losses which will increase even further with rising import prices. Furthermore, the use of domestically produced gas for supplying residential consumers at regulated prices distorts incentives in domestic gas production and distracts investments which are urgently needed to utilize Ukraine's potential. Finally, forcing Naftogaz to supply to privileged consumers endangers the economic viability of the entire holding and thereby risks the functioning of the system as a whole.

Against this background we recommend that the three years transition period which the agreement between the Ukrainian and Russian Prime Minister stipulate must be used for ensuring that necessary price adjustments take place as soon and as smoothly as possible. To this end, we argue that the current pricing scheme can generally be maintained, but that the magnitude of expected adjustments requires fundamental institutional improvements. Overall, four key objectives must be met:

i) To keep price increases for residential consumers at responsible levels

ii) To secure the economic viability of Naftogaz as a key player in the gas sector

iii) To reduce the cross-subsidization of residential consumers by industry

iv) To ensure a long-term sustainable development of Ukraine's gas sector

The main steps that need to be taken to meet those objectives are:

- To assess the fundamental energy needs of residential gas consumers and improve tariff-setting methodologies accordingly.
- To free Naftogaz from the obligation to supply gas to privileged consumers and to transfer this obligation to a legally independent entity that will get its losses compensated from the budget.
- To improve tariff setting for domestic gas production so as to provide sufficient investment incentives.
- To implement a gradual phasing out of additional taxes on industry tariffs in response to lower energy demand of privileged consumers.

- To continue with general structural reforms which aim at strengthening competition and investment incentives in Ukraine's gas sector.

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Appendix 1: Estimating prices of Russian gas imports in Germany

Appendix 2: Modelling domestic gas pricing in Ukraine

1. Introduction

With the signing of a Memorandum of Understanding between the Prime Ministers of Ukraine and the Russian Federation[1] in October 2008, Ukraine has committed itself to accept price increases towards the level of '*European gas prices*' within a transition period of three years. In return, the Russian Federation is willing to accept '*European transit fees*' for its gas shipments through Ukraine. While this agreement marks an obvious compromise between the positions of the two countries, it is unclear what the level of '*European gas prices*' will actually be over the next years and how domestic prices of different gas consumers can and will be adjusted.
Against this background, the objective of this paper is to specify how '*European gas prices*' should be defined and what level they are likely to have, given alternative scenarios of global oil price developments. With this in mind, the paper analysis the current structure of domestic gas pricing in Ukraine and discusses the problems that arise once prices have to be increased further. Based on this discussion, the final section gives recommendations to policy makers of which additional steps should be taken in order to mitigate the hardships of increased domestic gas prices.

2. 'European gas prices' for Ukraine

2.1 The pricing of gas imports in the EU

Gas supplies require the existence of significant infrastructure which has to be built and financed before any delivery can take place. Hence, supply contracts need to include specific provisions which determine how buyers and sellers allocate all market risks. In Europe, gas supply contracts typically include the following major provisions:

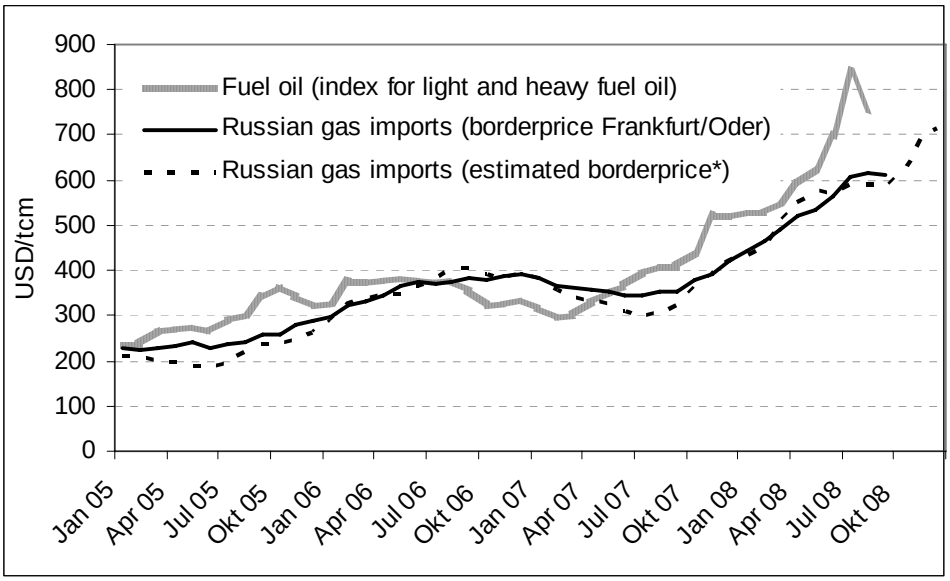
- The seller commits a certain amount of gas supplies and the buyer commits a certain market volume in long-term contracts with maturity of up to 35 years;
- Prices are based on the concept of netback value, i.e. the replacement value of gas at the delivery point based on prices of competing fuels.

Such contracts have first been concluded when the giant Groningen gas field has been developed in the 1960s. Since then, they have been used to govern practically all major gas deliveries into the EU, including from Russia, Algeria and Norway. Recently, Gazprom has prolonged long-term supply contracts with its four major EU partners OMV, Eni, E.ON-Ruhrgas and Gas de France till periods between 2027 and 2036.[2] Hence, long-term contracts based on netback pricing will continue to set the basis for gas pricing in the EU over a medium-term perspective.[3]
The fuel that is most predominantly used to determine the replacement value of gas is (light and heavy) fuel oil. Consequently, prices for Russian gas imports in the EU are significantly determined by price developments of fuel oil. The direct comparison of both prices in Figure 1 suggests that they both follow a similar pattern with a time lag of about five months within which changes in fuel oil prices lead to corresponding changes in prices for Russian gas imports. Indeed, regression analysis of (lagged) fuel oil prices on gas import prices demonstrates that about 94% of the observed variation in the latter can be explained by changes in the former (see appendix 1 for details).

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[1] See http://blogs.pravda.com.ua/authors/leschenko/48e611dcd0b1c/
[2] Energy Charter Secretariat (2008). *Putting a Price on Energy. International Pricing Mechanisms for Oil and Gas*. Bussels, Belgium.
[3] The EU Commission currently revises the legitimacy of long-term gas supply contracts on competition grounds. The outcome of this assessment is unlikely to affect already existing contracts since this would require substantial compensation payments.

Figure 1 Price development for gas imports and fuel oil in Germany (January 2005 – October 2008)



* Estimated as function of fuel oil prices (6-month time lag, see appendix 1) Source: www.energate.de, own calculations

The netback principle also determines the value of gas an any off-take point along the supply route as the replacement value at the point of destination minus the transport costs from off-take point to the point of destination.

2.2. Defining the level of *'European gas prices'* in Ukraine

The netback concept is typically used by Gazprom to determine '*European gas prices*' in Ukraine. Following this concept, the commercial value of gas at the Ukrainian-Russian border equals its replacement value in the EU minus the full costs of transportation. Applying this principle to gas pricing in Ukraine is in line with economic theory. In fact, since EU demand for Russian gas in not saturated, the netback value equals the forgone income (opportunity costs) from gas deliveries to Ukraine.[4]
While the exact value cannot readily be calculated due to confidentiality of the underlying information, an estimate of the netback value of Russian gas in Ukraine can be derived as follows:

- The netback value of Russian exports on EU markets is determined based on prices for Russian gas in Germany, its largest export market, (Figure 1); and
- Transportation costs from the Ukrainian-Russian border are determined by the corresponding transit costs.

When determining the costs of transportation one has to bear in mind that current transit tariffs in Ukraine are still set at rather low levels in exchange for an import price below the netback value. Hence, the estimate of transit costs needs to be adjusted accordingly. Table 1 shows transit fees charged in the countries alongside the route from Ukraine to Germany. At given rates, total transit costs amount to 41.5 USD/tcm.[5] While transit fees are the lowest in Ukraine, other countries charge between 2.42 and 3.52 USD/tcm/100km. Obviously, a '*European transit fee*' for Ukraine

[4] Accordingly, the same principle has already been applied in previous GAG advisory papers such as German Advisory Group (2006). *Ukrainian Gas Imports: Towards secure and economically reasonable transactions*. Advisory Paper V12.
[5] The sum of transit costs through Ukraine, Slovakia and the Czech Republic.

could be as high as 3.5 USD/tcm/100km, which would lead to overall transit costs of 59.5 USD/tcm from Ukraine to Germany.

Table 1 Gas transit fees for selected European countries

	Distance (km)	Total costs (USD/tcm)	Unit costs (USD/tcm/100km)
Ukraine	950	15.2	1.60
Slovakia	350	11.9	3.39
Czech Republic	380	14.4	3.80
Germany	450	10.9	2.42
Belgium	250	8.8	3.52
Transit costs (Ukraine* – Germany, 2008)	1680	41.5	2.5
Transit costs (adjusted, Ukraine – Germany)**		**59.5**	**3.5**

* Transit fee through Ukraine = 1.6 USD/tcm/100km
** Transit fee through Ukraine = 3.5 USD/tcm/100km

Source: Energy Charter Secretariat (2006), own calculations.

2.3 Estimating current and projected 'European gas prices'

As shown in Figure 1, the prices for Russian gas import prices in the EU have – driven by oil prices – increased dramatically, e.g. by 250% since January 2005. Therefore, although gas import prices in Ukraine have increased by more than three times since 2005, they have remained significantly below the corresponding '*European gas price*'. For example, at a price of 614 USD/tcm in Germany in September 2008 the netback value of Russian gas deliveries to Ukraine equals approximately 554 USD/tcm, which is more than three times[6] higher than the current price of 179.5 USD/tcm. However, gas import prices in Ukraine are determined over longer periods, most likely a full calendar year. During such periods, import prices in Germany have changed substantially, e.g. by +40% from January to September 2008. Accordingly, the level of '*European prices*' should also been determined over a longer period. Nevertheless, it remains significantly above the current import price level.

For 2009, the expected level of '*European prices*' depends on expected prices for Russian gas imports in Germany. As laid out above, these in turn are driven by fuel oil prices (with a time lag of six months), which in turn depend on global developments of crude oil prices. Hence, on the basis of expected prices for crude oil and an established relationship between crude oil and fuel oil prices as described in the appendix 1 we can determine the underlying patter for gas import prices in Germany and thus, for '*European price*' levels in Ukraine.

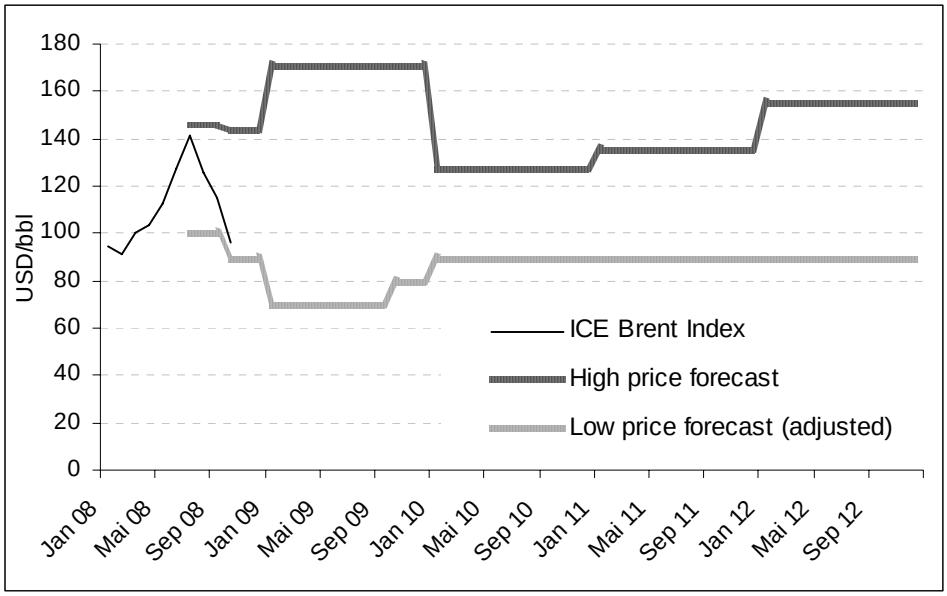
To project the future development of crude oil prices we consider two options, a high- and a low-price scenario:

- Price expectations for the **high-price scenario** are based on bullish market expectations as they have prevailed by mid-2008.[7] The scenario foresees a gradual price increase from 100 USD/bbl in August 2008 to USD 170 in 2009.
- For the **low-price scenario** it is expected that current financial crisis will lead to a global economic downturn with fairly modes oil prices of 80 USD/bbl in 2009.

For subsequent years, both scenarios foresee a slight increase in oil prices with expectations till 2012 in a range between 155 USD/bbl (high-price scenario) and 90 USD/bbl (low price scenario, Figure 2).

[6] See appendix 1 for results of a regression of crude oil on fuel oil prices.
[7] Prices are taken from projections of major international investment banks as summarized in Concorde Capital (2008). *Independent E&Ps. A first look.* Kiev, Ukraine.

Figure 2 Crude oil prices (ICE brent index) and projections (USD / bbl)



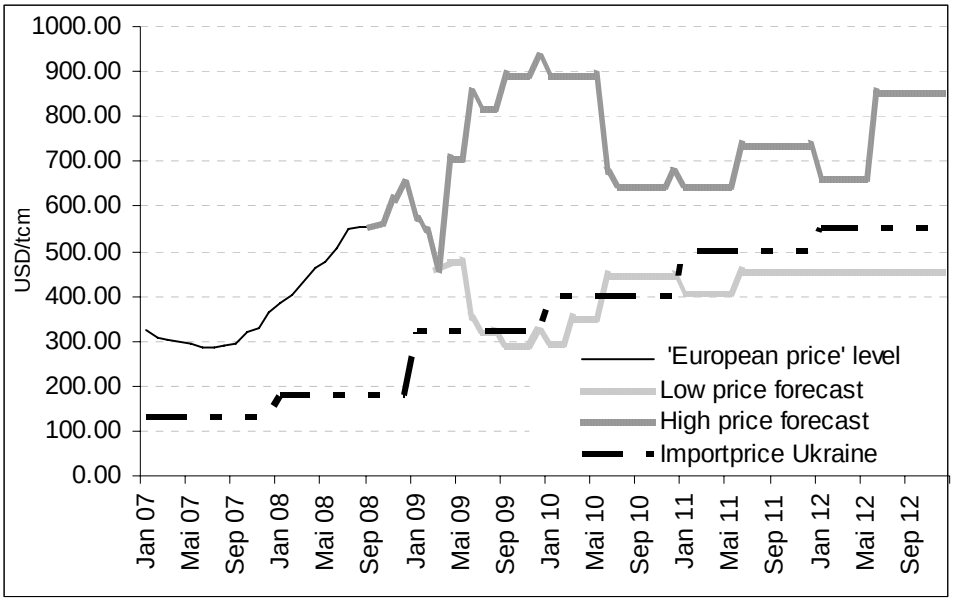
Source: www.energate.de, Concorde Capital, own projections.

In addition to crude oil prices, the identified time lag in the impact of oil on gas prices implies that also changes in the EUR-USD exchange rate have an impact on the USD-level of Russian import prices into the EU and thus, on the level of '*European prices*' in Ukraine.

Figure 3 shows the resulting projection of '*European gas prices*' for Ukraine.[8] Due to the time lag, the reduction of crude and fuel oil prices since July 2008 (Figure 2) will lead to a reduction of gas prices only five months later, i.e. by January 2009. Furthermore, based on October 2008 prices for fuel oil, gas price developments can be rather well projected until March 2008. Only afterwards, the impact of the two different price scenarios becomes visible. Until 2012, Figure 3 show that a projected oil price of 155 USD/bbl corresponds to a gas price between 700 and 800 USD/tcm while oil prices of 90 USD/bbl induce gas prices of about 450 USD/tcm.
Against this background, the final price path in Figure 3 shows a possible adjustment path for gas import prices in Ukraine, starting from 179.5 USD/tcm in 2008, 320 USD/tcm in 2009, 400 USD/tcm in 2010 and 500 USD/tcm in 2011. By 2012, '*European prices*' of 550 USD/tcm will be reached.

[8] In all projections, the transit costs remain constant at 59.5 USD/tcm, which is reasonable since they mainly consist of capital costs, while the share of fuel gas costs in total costs is typically below 10%. Hence, we do not expect that possible increases in European gas prices will have a significant impact on transit fees in European countries.

Figure 3 '*European gas price*' projections for Ukraine



Source: www.energate.de, own projections.

3. Dealing with high domestic gas prices

Ever since gas import prices started to increase strongly in early 2006, the Ukrainian government had to deal with defining pricing schemes that mitigate the impact on different gas consumers by as much as possible while maintaining the economic viability of the Ukrainian gas sector as a whole. In general, current domestic gas pricing schemes do not foresee explicit price regulation on wholesale markets, but impose two additional charges on wholesale prices[9] and use the proceeds for cross-subsidising loss-making gas supplies to privileged consumers, i.e. district heat generators and residential consumers (see Box 1). However, repeated rumors on the solvency of NAK Naftogaz suggest that this system has come to its economic limits.

[9] The two charges are called *Extra Charge* (Revenue to the state budget) and *Realisation Charge* (revenue to Naftogaz).

Box 1 Domestic gas pricing in Ukraine

Current pricing schemes[10] distinguish three types of consumers, (a) industrial consumers (including thermal power generators and gas transportation), (b) generators of district heat, and (c) residential consumers. For each type, a different pricing scheme applies:

(a) Industrial consumers:
- buy gas on the wholesale market at unregulated prices which are determined by *import prices* and *wholesale margins*. Effectively, wholesale prices are capped by those offered by Gaz Ukrainy, the largest trader;
- are charged an additional mark-up on wholesale prices, the so-called '*realization cost*', for covering the losses of Gaz Ukrainy from supplying gas to the other two consumer groups (see below);
- pay an *Extra Charge* of 12% (6% for the chemical industry, respectively)[11] on wholesale price and realization costs; and
- pay *storage fees* as well as (average) *transportation and supply costs*.

(b) Generators of district heat receive gas deliveries from Gaz Ukrainy at regulated prices set by CabMin. They also pay an Extra Charge at a discounted level of 2% as well as average transportation and supply costs. However, since prices for district heat generators are set at below wholesale prices, Gaz Ukrainy faces losses from the obligation to supply to this customer group.

(c) Residential consumers have a special privilege: their annual consumption volume of about 20 bcm approximately matches the volume of domestic gas production. To keep residential gas prices as low as possible, the three Naftogaz subsidiaries that together produce about 93% of domestic volumes[12] are ordered to sell all output at regulated prices to Gaz Ukrainy, which supplies the gas to residential consumers. Prices are set by CabMin so as to cover the costs of gas extracting companies plus a 4% Extra Charge, average transportation and supply costs and VAT. While in theory this scheme should cover all costs, in practice the price at which the three gas producers are obliged to sell fails to cover the full production costs, in particular not a sufficient level of capital costs.[13] Accordingly, Naftogaz also accumulates losses from selling gas to residential consumers, mostly by forgone return on capital.

3.1 Impact of 'European gas prices'

To obtain a better understanding of how capable the present system is to manage domestic gas pricing when import prices are adjusted towards '*European levels*' we set up a pricing model based on the present principles and regulations in Ukraine (see appendix 2 for further details). Results of this exercise are shown in Table 2. Column (a) gives current (as of September 2008) prices for industry including their breakdown into different components, as well as the regulated prices for district heat generators and residential consumers. Moreover, the table shows the implied market income of Naftogaz from supplying industrial consumers, its revenue from the

[10] See appendix 2 for a list of current decrees and regulations.
[11] There are further exemptions on the *Extra Charge*. For example, due to declining global steel prices, the steel industry has been fully exempted during September 2008.
[12] Ukrgazvydobuvannya (14.7 bcm), Ukrnafta (3.2 bcm) and Chernomorneftegaz (1.3 bcm, all in 2007).
[13] For each of the three producers a separate price is specified. With a weighted average of about 200 UAH/tcm these costs levels hardly allow for a sufficient return on capital. In contrast, Troika Dialog estimate average extraction costs (opex + capex) at 300 USD/tcm (quoted from Oxford Institute for Energy Studies (2007). *Ukraine's Gas Sector*. Oxford, UK, p.50).

Realisation Charge – an additional charge on wholesale prices (Footnote *4*) – as well as the losses from supplies to district heat generators and residential consumers. Overall, the indicated net balance of Naftogaz under prices of 2008 is a loss of about UAH 2700bn. However, given almost UAH 5000 revenues from the *Extra Charge* – the other additional charge on wholesale prices (Footnote *4*) – there is sufficient funds available to cover all losses of Naftogaz (initially, *Extra Charge* revenue goes to the public budget). Nevertheless, this requires a significant transfer from the state budget that is not based on clear legislation and thus, adds political uncertainty.

Table 2 Domestic gas prices* (UAH/tcm) and the financial implications for Naftogaz during the transition to '*European gas prices*'

	(a)	(b)	(c)	(d)	(e)
Year	**2008**	**2009**	**2010**	**2011**	**2012**
Import price	**898**	**1600**	**2000**	**2500**	**2750**
In USD/tcm	*180*	*320*	*400*	*500*	*550*
Supplier's margin	37	66	83	104	114
Realisation Charge	87	100	110	120	125
Extra Charge	123	212	263	327	359
Storage, transportation and supply costs	190	258	297	346	370
Price for industrial consumers	**1334**	**2236**	**2753**	**3396**	**3718**
Price for district heat generators	**656**	**1092**	**1396**	**1751**	**1918**
Price for residential consumer**	**442**	**509**	**509**	**531**	**553**
Revenue and losses of Naftogaz					
Market income***	1161	2071	2588	3235	3559
Revenue from *Realisation Charge*	3586	4122	4535	4947	5153
Losses from supplies to:					
district heat generators	-4661	-8551	-10191	-12503	-13764
residential consumers	-2806	-3049	-3773	-4333	-4443
Naftogaz balance	**-2719**	**-5407**	**-6841**	**-8654**	**-9495**
Revenue from *Extra Charge*	**4918**	**8379**	**10350**	**12810**	**14045**

* Prices for residential consumers include VAT, all other are without VAT.

** Weighted average of prices for different consumer types (by consumption volume)

*** The market income of Naftogaz is the product of wholesale margin (e.g. 37 UAH/tcm in 2008) and the relevant trading volume. By assumption, Gaz Ukrainy of Naftogaz is the largest wholesale market trader while a total of 10 bcm is sold by other traders, including Gazprom Sbyt.

Source: own calculations

In columns (b), (c) and (d) we assume that import prices increase over the next three years to 320 USD/tcm in 2009, 400 USD/tcm in 2010 and 500 USD/tcm in 2011. By 2012 we assume that import prices are at 'European levels' which by then equal 550 USD/tcm (column (e)). In response to higher import prices, policy makers react by increasing regulated prices for district heat generators and residential consumers as well as by adjusting the *Realisation Charge*. For each year, those parameters are adjusted so as to keep a positive balance between losses from supplies to heat generators and residential consumers on the one hand, and total revenues from *Realisation* and *Extra Charge* on the other hand.

Naturally, an expected three-fold increase of import prices will induce significant price shocks. Although domestic prices will not exactly follow the strong initial shock, we still expect an increase

by almost 300% for industry prices as well as for prices of district heat generators (so that the latter will remain at about half of the industry price level). In contrast to this development, policy makers will try to keep price increases for residential consumers as low as possible. As the results in Table 2 suggest, an increase of weighted prices by 25% would be sufficient to balance the overall financial flows in the gas sector.
For Naftogaz, the price adjustments can have dramatic consequences. As the calculations in Table 2 indicate, increases in the combined return of market income and *Realisation Charge* are far lower than those of losses from supplying privileged consumers. For example, in 2012 the combined income and revenue of about UAH 8700m (USD 1740m or 1% of GDP) stays against aggregate losses of more than UAH 18000 m (USD 3640m or 2.6% of GDP). Although Naftogaz's corresponding net loss of UAH 1900m could still be financed by *Extra Charge* revenue, the company's dependency on such a redistribution of funds from the budget will strongly increase, adding a significant degree of uncertainty to the company's future. Finally, Table 2 also reveals that the greatest losses will be generated from supplying expensive imported gas to district heat generators, the weakest point in the current pricing scheme.

3.2 Problems

While Ukraine's domestic pricing scheme so far has managed to maintain its main objective – to not expose residential consumers to strong price shocks – the above calculations clearly show the problems it creates:

Firstly, imposing *Extra* and *Realisation Charges* on industries leads to an additional taxation by more than 10%. Hence, industrial consumers carry a substantial burden on top of being already fully exposed to the gas price shock. Moreover, frequently granted privileges to certain industries cause additional distortions and add to the uncertainty concerning future price developments.

Secondly, privileged prices to district heat generators already cause the largest losses within the system. If this practice will be maintained, the transition to '*European prices*' will induce a substantial increase of losses of up to UAH 13800 m in 2012. At the same time, price discounts diminish incentives for structural reforms in district heating, where local authorities have typically set heat tariffs at rather low levels so that heat generators have no possibility to recover their costs.

Thirdly, ordering the Naftogaz subsidiaries to supply domestic gas to residential consumers at regulated prices creates a sequence of further problems. The methodology that determines the level of regulated prices is not well defined, in particular with respect to the types of production cost that it allows for. In fact, comparing available estimates on the costs of gas extraction in Ukraine –e.g. 300 UAH/tcm as estimated by Troika Dialogue[14] – with the current average tariff of about 200 UAH/tcm suggests that the regulated prices do not cover all relevant costs, and in particular that capital costs cannot be recovered. As a consequence, this practice distracts investments from domestic gas extraction in Ukraine. This in turn creates another problem. With proven reserves of more than one trillion cubic meters, Ukraine ranks third in Europe where only Norway and the Netherlands have larger reserves (Table 3). Hence, Ukraine has significant potential in gas production. However, as the ratio of proven reserves relative to annual production volumes (third column in Table 3) indicates, this potential is not intensively utilised.[15] In fact, Ukraine's domestic gas production has decreased from its record level of 68.7 bcm in 1975 to 40 bcm in 1985 and eventually stabilised at between 16 and 22 bcm since the 1990s, mainly due to the depletion of currently developed fields. While there is a sufficient number of new fields that could be developed, the low level of regulated tariffs fails to set sufficient incentives. Until 2007,

[14] See Oxford Institute for Energy Studies (2007). Ukraine's Gas Sector. Oxford, UK, p.50
[15] A lower ratio indicates that reserves are exploited more intensively (larger annual production volumes relative to proven reserves).

increasing wholesale market prices had set strong incentives for independent exploration and production firms to develop gas fields jointly with state-owned entities. However, by obliging all firms that produce in joint agreements with public entities to sell at regulated prices to Gaz Ukrainy, CabMin essentially stopped these activities in 2007. Today, a number of independent producers is still operating in the market, but their production volumes have so far not strongly responded to the substantial price increases on the wholesale market.

The fourth problem caused by the domestic gas pricing system is related to the role of Naftogaz. As a state-owned holding, the company inter alia controls the largest wholesale trader (Gaz Ukrainy), the transport system operator (Ukrtransgaz), the three largest gas extracting companies (Ukrgazvydobuvannya, Ukrnafta and Chernomorneftegaz), a special gas trader for district heat generators (Gaz Teplo) as well as several gas-distributing companies (Oblgazes). As such, the company is of high importance for the reliable functioning of Ukraine's gas system and its potential to invest in large-scale infrastructure modernisation is crucial for future developments. Hence, while structural reforms such as a further unbundling of transmission and distribution system operations can possibly be beneficial, an abrupt disruption of Naftogaz operations should be avoided. However, as demonstrated in Table 2, the generous privileges for district heat generators and residential consumers have created a situation where the company's market income is far smaller than the losses it bears due to its supply obligations. In return, this development has already threatened the financial position of Naftogaz and has required an explicit state guarantee of UAH 12000 m (USD 2400 m) in the 2008 budget to save it from technical default. However, the figures in Table 2 show that Naftogaz's financial situation will not improve in the next years so that the company will increasingly depend on budget transfers.

Table 3 Proved natural gas reserves in Europe and Eurasia

	Trillion cubic meters	Share of total	R/P ratio*
Russian Federation	44.65	75.2%	73.5
Azerbaijan	1.28	2.2%	*
Turkmenistan	2.67	4.5%	39.6
Uzbekistan	1.74	2.9%	29.8
Kazakhstan	1.90	3.2%	69.8
Ukraine	**1.03**	**1.7%**	**54.0**
Denmark	0.12	0.2%	12.6
Germany	0.14	0.2%	9.6
Italy	0.09	0.1%	10.0
Netherlands	1.25	2.1%	19.4
Norway	2.96	5.0%	33.0
Poland	0.11	0.2%	26.4
Romania	0.63	1.1%	54.4
United Kingdom	0.41	0.7%	5.7
Other Europe & Eurasia	0.43	0.7%	39.4
Total	**59.41**		**55.2**

* Ratio of proven reserves over annual production volume

Source: BP Statistical Review of World Energy June 2008

4. Policy recommendations

As stated at the beginning of this paper, the decision to transform to '*European gas prices*' for gas is without alternative. Hence, the three years transition period that the MoU of October 2008 stipulates should be used to ensure that necessary price adjustments can take place as soon and as smoothly as possible. As the discussion in the previous section demonstrates, the current pricing scheme can be used to determine the general proceeding, but it requires fundamental institutional improvements. Overall, the adjusted scheme of domestic gas pricing should achieve four key objectives:

i) To keep price increases for residential consumers at responsible levels

ii) To secure the economic viability of Naftogaz as a key player in the gas sector

iii) To reduce the cross-subsidization of residential consumers by industry

iv) To ensure a long-term sustainable development of Ukraine's gas sector

To achieve those objectives in a balanced way we provide the following recommendations:

Recommendation i)
Given the currently low level of residential tariffs as well as low income levels of significant parts of Ukraine's population, it is evident that an abrupt adjustment to "European gas prices" must be avoided. To this end, the practice of supplying residential consumers with domestic gas at regulated prices should be maintained, but in an improved form. While a price differentiation according to consumption volumes as stipulated by current regulations is good, the consumption thresholds are arbitrarily specified and lack practical relevance. In fact, with an estimated 88% of all urban and 70% of all rural households, most Ukrainian households consume below the first threshold (2.5 tcm) and thus, pay the lowest price.[16] Against this background, necessary measures to achieve objective i include:

- Assess the energy needs of residential gas consumers and specify an appropriate threshold for essential gas consumption!
- Specify a block tariff system[17] that benefits consumption volumes below the essential consumption level while taxing higher ones!

Recommendation ii)
Securing the economic viability of Naftogaz as key player in the gas sector requires the unbundling of loss-making supply obligations into a separate entity. Furthermore, regulation of domestically produced gas prices needs to be improved and privileged consumers be given incentives to reduce their energy consumption. Hence we recommend the following

- Set up a public entity which is fully independent from Naftogaz with the obligation to supply gas to residential consumers and district heat generators at regulated prices, while purchasing

[16] See German Advisory Group (2006). *Household Gas Prices: How to combine economic and social requirements.* Advisory Paper V15. for an analysis of the pattern of residential gas consumption based on the Derzhkomstat household budget survey for 2005. According to this data, more than 99% of all households consume less than 6tcm per year, the second of three consumption thresholds.
[17] See German Advisory Group (2006). *Household Gas Prices: How to combine economic and social requirements.* Advisory Paper V15.

gas from domestic producers at regulated prices and from the wholesale market at market prices! The entity must be legally and economically separate from all existing entities within Naftogaz and its financial losses must be compensated by the state budget.

- To stimulate domestic gas production and investments in existing fields, specify a methodology for assessing the costs of domestic gas production in line with modern regulatory practices, i.e. with explicit consideration of capital costs!
- To stimulate further investments in development of new fields, allow all firms that produce gas in joint cooperation with state-owned entities to sell on wholesale markets at unregulated prices! To ensure a smooth transition there could be a quota for such production volumes which starts from a tight level and is gradually loosened.
- To stimulate the necessary reforms in the district heat sector, shift from compensating the gas supplier to compensating the heat generator for their losses! In this way, there are stronger reform incentives in regulation of this sector, which to a large extend is in responsibility of local authorities.

Recommendation iii)

A reduction of cross-subsidization requires to reduce or even to cancel the *Realisation* and *Extra Charge* on industry prices. However, the funds required for covering all losses from supplying privileged consumers are significant and will increase further. Based on the calculations in Table 2, total losses in 2008 account for an estimated 3.2% of total central fiscal expenditures (without state guarantees). Given price developments and adjustments as proposed for 2012, this can increase to more than 7%. Hence, the losses of the new entity responsible for gas supplies to privileged consumers cannot be entirely financed from 'regular' budget revenue. However, both *Realisation* and *Extra Charge* must be defined as temporary solutions and their cancellation be envisaged. Thus:

- Combine *Realisation* and *Extra Charge* to a single tax and specify criteria under which its level will be reduced, e.g. depending on the extend to which the response of privileged consumers to increased prices reduces their consumption.

Recommendation iv)

In addition to the pressing need of adjusting to '*European gas prices*', Ukraine's gas sector has for a long time suffered from a lack of structural reform. Despite the necessity and priority of the above mentioned measures, the general objective of ensuring long-term economic sustainability in the gas sector must not be forgotten. In general terms, reforms should be oriented as follows:[18]

- Improve the general regulatory framework so as to stimulate competition and investment by following the main reform principles set out in the EU energy directives, i.e. mandatory unbundling of the operation of transportation and distribution systems, legally binding third party access to all networks and the gradual opening of all markets.

[18] For further illustration on these points see e.g. See German Advisory Group (2006). *EU Energy Sector Reforms:A benchmark for Ukraine!*. Advisory Paper V8.

Appendix 1: Estimating prices of Russian gas imports in Germany

The basis for the projections of future import prices for Russian gas in Germany is a two-step regression analysis based on price data for Russian gas imports in Germany, light and heavy fuel oil in Germany and the IPC brent index, the crude oil price index at the London Stock Exchange. The time period for all estimations is January 2000 to September 2008. Monthly prices always refer to the first available daily quotation in the respective month. All prices are converted into Euro based on daily exchange rates as reported by Deutsche Börse, Frankfurt.

Since prices for Russian gas imports in Germany are indexed to prices of light and heavy fuel oil, which in turn depend on crude oil prices we estimate the following equations:

(equation I) $P_{l\&h,t} = a_1 + b_1 P_{IPC,t}$

(equation II) $P_{gas,t} = a_2 + b_2 \, ma(P_{l\&h,t-5\ months})_{3m}$

where $P_{l\&h,t}$, $P_{IPC,t}$ and $P_{gas,t}$ are prices for fuel oil, crude oil and gas imports at time *t* and a_1, a_2, b_1 and b_2 are coefficients to be estimated. The import price of gas in equation II is a function of the three-month moving average with a time lag of five months ($ma(P_{l\&h,t-5\ months})_{3m}$).
As shown in the subsequent tables, both regressions identify strongly significant impacts of the respective exogenous variables, which explain 96% (equation I) and 94% (equation II) of the observed variation in the respective endogenous variable.

Table A-1: Estimation results

Results for equation I:

R Square	0.9624
Adjusted R Square	0.9620
Standard Error	23.3965
Observations	102

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	41.30	5.02	8.22	0.00	31.33	51.26	31.33	51.26
IPC Brent Index	4.93	0.10	50.58	0.00	4.74	5.12	4.74	5.12

Results for equation II:

R Square	0.9399
Adjusted R Square	0.9393
Standard Error	1.5401
Observations	99

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-5.29	0.61	-8.65	0.00	-6.50	-4.07	-6.50	-4.07
$ma(P_{l\&h,t-5\ months})_{3m}$	0.10	0.00	38.96	0.00	0.10	0.11	0.10	0.11

Source: own calculations

Appendix 2: Modelling domestic gas pricing in Ukraine

In accordance with current legal practices in Ukraine, prices are set according to:

$$P = (Pw + Cr) * Ce + T$$

where P is the consumer price net of VAT, Pw is the wholesale market price (= import price + wholesale margin), Cr is a *Realisation Charge*, Ce is an *Extra Charge* and T denotes a storage fee and average transportation and supply costs. For residential consumers, Cr=0 and Pw is given by the regulated sales price for domestic gas.

For the calculations in this paper, the following parameters are kept at constant levels:

- Wholesale supply margins (at their 2008 level of 4.1%);
- Long-run marginal costs of domestic gas production (at 350 USD/tcm, see section 3.3);
- The specific rates of the *Extra Charge* (6% for chemistry, 12% for all other industries, 2% for district heat generators and 4% for residential consumers);
- The storage fee for industrial consumers remains at 33 UAH/tcm.

Average transport costs are endogenously adjusted to the extent that higher import prices increase operational expenses (assuming a 60% share of fuel expenses in total costs).

In response to higher import prices (columns (b) to (e) in Table 2), regulated prices for district heat generators and residential consumers as well as the *Realisation Charge* adjust so as to maintain the (positive) balance between losses from supplies to heat generators and residential consumers on the one hand, and total revenues from *Realisation* and *Extra Charge* on the other hand (in all columns in Table 2, this balance has been kept in a range from UAH 900m-1000-, which is comparable to its level in 2008).

Legal background for price setting of:

- Residential consumers:
  - Cabinet of Ministers' resolution "On Supplying Consumers with natural Gas", No. 1729 as of 27 December, 2001;
  - Resolution of NCRE, About approval of retail prices on natural gas, used for population needs" № 934,of August 8,2008 № 934;
  - Cabinet of Munister's Resolution "About measures directed at the improvement of the mechanism of consumer provision with natural gas" № 1697 of December 8, 2006.
- District heat generators
  - Cabinet of Ministers' Resolution "On Supplying Consumers with natural Gas", No. 1729 as of 27 December, 2001;
  - Cabinet of Munister's Resolution "About measures directed at the improvement of the mechanism of consumer provision with natural gas" № 1697 of December 8, 2006.
- Industry
  - Cabinet of Ministers' Resolution "On Supplying Consumers with natural Gas", No. 1729 as of 27 December, 2001;
  - Cabinet of Munister's Resolution About measures directed at the improvement of the mechanism of consumer provision with natural gas" № 1697 of December 8, 2006;
  - NERC resolution "About approval of Storage fee for Ukrtransgaz NJSC " Naftogaz of Ukraine" № 575 of May 11, 2006.

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