

First steps towards into the unknown. The possibilities prospects of unconventional gas extraction in Ukraine

Mykhailo Gonchar

Ukraine's deposits of unconventional gas (shale gas, tight gas trapped in non-porous sandstone formations, and coal bed methane) may form a significant part of Europe's gas reserves. Initial exploration and test drilling will be carried out in two major deposits: Yuzivska (Kharkiv and Donetsk Oblasts) and Oleska (Lviv and Ivano-Frankivsk Oblasts), to confirm the volume of the reserves. Shell and Chevron, respectively, won the tenders for the development of these fields in mid 2012. Gas extraction on an industrial scale is expected to commence in late 2018/early 2019 at the earliest. According to estimates presented in the draft Energy Strategy of Ukraine 2030, annual gas production levels may range between 30 billion m³ and 47 billion m³ towards the end of the next decade. According to optimistic forecasts from IHS CERA, total gas production (from both conventional and unconventional reserves) could reach as much as 73 billion m³. However, this will require multi-billion dollar investments, a significant improvement in the investment climate, and political stability. It is clear at the present initial stage of the unconventional gas extraction project that the private interests of the Ukrainian government elite have played a positive role in initiating unconventional gas extraction projects. Ukraine has had to wait nearly four decades for this opportunity to regain its status of a major gas producer. Gas from unconventional sources may lead not only to Ukraine becoming self-sufficient in terms of energy supplies, but may also result in it beginning to export gas. Furthermore, shale gas deposits in Poland and Ukraine, including on the Black Sea shelf (both traditional natural gas and gas hydrates) form a specific 'European methane belt', which could bring about a cardinal change in the geopolitics and geo-economics of Eastern and Central Europe over the next thirty years.

Nevertheless, the Ukrainian unconventional gas extraction project will need to face a number of challenges. The insufficient transparency of government measures when signing the production separation agreements (PSA) with Western companies has served to spur on opponents of shale gas extraction. As shale gas extraction projects continue to develop, we should expect to see ever more frequent attempts by Russia to block them. Moscow wants Ukraine to remain dependent on Russian gas

supplies, and thus it will inspire and support the opponents of shale gas extraction. If Gazprom takes control of the Ukrainian transit gas pipelines, this may become one of the instruments with which Russia will be able to torpedo unconventional gas extraction projects. If a Ukrainian-Russian gas consortium for gas pipeline management is formed or the pipelines are leased to Gazprom, this may prevent larger supplies of Ukrainian gas from entering the market.

Initial estimates of the unconventional gas reserves

Ukraine's unconventional gas deposits are located in the two energy resource basins: the Dnieper-Donets Basin (DDB) in the east of the country and the Lviv-Volhynia Basin (LVB) in the west. Shale gas is found both in the east and west of Ukraine, while tight gas trapped in non-porous sandstone formations and coal bed methane are to be found mainly in the east. According to initial estimates provided in the still unapproved Energy Strategy of Ukraine 2030, gas from non-porous sandstone formations is the most promising form of unconventional gas. Estimated reserves of tight gas range between 2 and 8 trillion m³ and are found at depths of between 4 and 5 km. Estimated shale gas reserves range between 5 and 8 trillion m³. In turn, the volume of potential coal bed methane deposits is expected to range between 12 and 25 trillion m³. These are located predominantly in the DDB, although some are also to be found in the LVB. A serious problem is posed by the fact that coal deposits in Ukraine lie rather deep, at between 0.5 km and 5 km, and are quite thin (0.5–2 m). As a result, production requires considerable financial outlays. The 'shale revolution' in the USA has also given rise to increasing interest in other forms of unconventional hydrocarbons, especially methane hydrates from the Black Sea. Ukraine's government approved a programme called 'Gas Hydrates of the Black Sea' as far back as in 1993. This programme envisaged a broad range of geological and exploration work and the development of production technology¹. Interest in the once forgotten methane hydrates has returned of late. This is an effect of both joint

¹ Seismic surveys have been carried out and several research expeditions have been organised. However, the economic crisis in the 1990s and the government's inability to conduct long-term programmes have slowed down further work. See the report by the presidential National Institute for Strategic Studies of July 2012: Стан і перспективи освоєння видобутку газогідратів в українському секторі Чорного моря; <http://od.niss.gov.ua/articles/492/>

Ukrainian-German research in the Black Sea basin, which was conducted in 2010–2011, and the first successful attempt to extract natural gas from offshore deposits in Japan, which was completed on 12 March 2013.

First projects

In May 2012, Ukraine resolved its two first tenders for exploration and test drilling in the Yuzivska field in the DDB (Shell) and the Oleska field in the LVB (Chevron). Yuzivska is a promising field, with an area of 7,886 km², located in the Kharkiv and Donetsk Oblasts, with deposits of tight gas in non-porous sandstone formations. Its estimated gas reserves² are 4.05 trillion m³.

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This field will be exploited by Shell Exploration and Production Investments B.V., which signed a production separation agreement with the government of Ukraine in January 2013 (see Appendix 1).

In addition to the Yuzivska field, Shell is also the operator as at the six licensed sites nearby (their total area is 1,300 km²) under the joint-venture agreement it signed in 2006 (and updated in 2011) with Ukraine's largest gas producer, the state-owned corporation UkrGazVydobuvannya³. The agreement allowed Shell to make the first test drill on 25 October 2012 at the 'Bilyaivska 400' site without the need to wait until the production separation agreement con-

² Уряд затвердив розробників Юзівської та Олескої газових площ; <http://www.kreschatic.kiev.ua/ua/4084/art/1337021639.html>

³ "УкрГазвидобування" і Shell Exploration and Production Ukraine підписали договір про інвестиції на 800 млн дол; <http://www.rbc.ua/ukr/top/show/-ukrgazdobycha-i-shell-exploration-and-production-ukraine-podpisali-dogovor-01092011103600>

cerning the Yuzivska field is signed. A series of drills are to be made as part of a five-year initial exploration plan for areas rich in gas and oil. Given the fact that first untraditional gas test drills in Poland took place in October 2009⁴, the corresponding process in Ukraine started three years later.

The second gas field offered under tender, **Oleska**, extends over an area of 6,324 km² in the Lviv and Ivano-Frankivsk Oblasts. According to initial data⁵, its forecasted shale gas reserves are 2.98 trillion m³. This field is to be exploited by Chevron (no production separation agreement has been signed as yet). The project conditions are the same as in the case of the Yuzivska field.

Production is expected to start on an industrial scale around 2018–2019, provided that reserves which allow for the commercial production of gas are confirmed.

The winners of the tenders which have already been resolved have been obliged to guarantee investments at the search and exploration phase worth at least US\$200 million in the Yuzivska field and US\$162.5 million in the Oleska field. The tender provides that “the maximum part of the compensation production from which the investor will receive compensation for the costs incurred shall be 70% of the total production volume until the investor’s costs have been compensated completely.” The state’s share in the profitable part of the production will be at least 16.5%⁶ (the Yuzivska field) and 15% (the Oleska field)⁷.

⁴ <http://gazlupkowy.pl/wp-content/uploads/2013/03/ddb8d5bb7a8faa865570ea220ff02386.pdf>

⁵ Уряд затвердив розробників Юзівської та Олескої газових площ; <http://www.kreschatic.kiev.ua/ua/4084/art/1337021639.html>

⁶ <http://zakon4.rada.gov.ua/laws/show/1298-2011-%D0%BF>

⁷ <http://zakon4.rada.gov.ua/laws/show/1297-2011-%D0%BF>

Shell and Chevron were granted a 50% share each in their respective fields. The remaining 50% in each case was acquired by Ukrainian companies: Nadra Yuzivska and Nadra Oleska. These were established by the state-owned company Nadra Ukrayny (90% of the shares) and a small private firm named SPK-GeoService (10%), which offers geological services (see Appendix 2). Each of the investor corporations (Shell and Nadra Yuzivska) received a 50% share in the rights and obligations. The licences for operation at both fields will be valid for 50 years. Production is expected to start on an industrial scale around 2018–2019, provided that reserves which allow for the commercial production of gas are confirmed.

If investors decide to launch industrial production, **investment expenses** should be at least US\$3.125 billion in the case of the Oleska field and US\$3.75 billion in the case of the Yuzivska field⁸. It is difficult to assess now to what extent these investment expenses will be sufficient. The Ministry of Energy and Coal Industry of Ukraine commissioned a report from IHS CERA ‘Natural Gas and Ukraine’s Energy Future’ in 2012. According to this report, industrial production of unconventional gas and the achievement of annual production levels at 25 billion m³ (in aggregate: shale gas, gas from non-porous sandstone formations and coal bed methane) is possible, on condition that investments in the fields reach US\$2–3.5 billion, and in some periods even US\$10 billion⁹. However, this did not refer only the two fields mentioned above; they also took into account the launch of gas production in other areas of Ukraine. Tender documentation is currently being prepared for two more fields in eastern Ukraine. A positive trend has also been observed as regards potential investments in unconventional gas extraction. Austria’s RAG, Italy’s Sorgenia and Ukraine’s

⁸ Mykhailo Gonchar, Unconventional Gas Resources in Ukraine, Review for UGOS, 2012.

⁹ http://www.kmu.gov.ua/control/uk/publish/article?art_id=245244792&cat_id=244277212

Geological Office 'Lviv' are interested in shale gas deposits in the western part of the country. Italy's ENI has purchased 50.01% of the shares in Zakhidhazinvest (a joint venture of Nadra Ukrayny and Britain's Cadogan Petroleum), which holds nine licences on sites in the LVB, with a total area of 3,800 km², and is planning to launch shale gas exploration¹⁰.

The emergence of the anti-fracking movement...

Soon after the tender results were announced officially in May 2012, protests against unconventional gas extraction started. Initially, these were ecological protests, criticising the use of the hydraulic fracturing method since this allegedly poses the threat of a 'second Chernobyl' for Ukraine. In fact, the hydraulic fracturing method has been in use since 1947. In Soviet times, it was also applied in Ukrainian fields. The first fracturing of a coal deposit took place in 1954 in Donbas. In the 1990s, actions were taken every year to boost production at Ukrainian oil and gas drills, and hydraulic fracturing of the deposits was among the methods used. Anti-fracking sentiments have intensified since the Donetsk and Kharkiv Oblast councils approved (respectively on 16 January and 17 January 2013) the draft production separation agreement for the Yuzivska field. The media, the opposition and independent experts have accused by the Ukrainian government and Shell of non-transparent dealings and of concealing the alleged negative ecological consequences of the project's implementation from the public. In the opinion of some of the city councillors, the decisions were "suspiciously hastily pushed through by the majority from the Party of Regions." Actions taken by the government and the corporations, in fact, were not free of errors, especially given the fact that

¹⁰ Італійська Ені видобуватиме сланцевий газ в Україні; http://ipress.ua/news/italiyska_eni_vydobuvatyme_slantsevyy_gaz_v_ukraini_3062.html

the text of the production separation agreement was published on the Internet by one of the city councillors several days after it was signed. The communists immediately capitalised on the atmosphere of public distrust towards shale gas extraction projects. They announced their intention to initiate and hold a referendum concerning a ban on unconventional gas extraction. The government chose not to hold an information campaign in the media and also to not collaborate with local councillors; this was taken advantage of by shale gas opponents. Professional associations, for example, the Association of Ukrainian Geologists,

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the Kyiv International Energy Club (Q-Club) and the Association of Drilling Industry Workers (a well-known and respected, independent and unbiased organisation) are trying to serve as platforms for dialogue.

... and its political aspects

The anti-fracking campaign was instantly turned into a political issue, and unconventional gas became an element of political struggle. UDAR is the only parliamentary opposition party which still supports shale gas extraction in Ukraine¹¹. Batkivshchyna is almost ready to join the informal alliance of the 'fracking-phobes' despite the fact that most Batkivshchyna mem-

¹¹ In an interview for the Interfax Agency, Klitchko said: "We hope that the contracts which have been signed can guarantee that Ukraine satisfies a huge part of its needs in the future. Then many issues, including political ones, will no longer be valid, and our opponents, who are treating gas as a political and not an economic issue, will lose their trumps." <http://ua.interfax.com.ua/news/political/140586.html#.US2T7DC-2So>

bers representing the interests of industrial circles have a positive attitude towards unconventional gas extraction. Svoboda has become the fiercest opponent of fracking. This party controls the Ternopil and Lviv Oblast councils, and therefore is capable of blocking the approval needed for the draft production separation agreement with Chevron concerning the Oleska field. Chevron, fearing an increase in tension and a possible confrontation inside the LVB, has rejected the central government's proposal to enter into the agreement without obtaining consent from local authorities. Instead, Chevron is continuing its information campaign at the regional level. This is the right move, but it was made too late.

Anti-fracking movement is an ideologically eclectic, but all its members share a common goal – to prevent unconventional gas extraction in Ukraine.

Another typical example of an anti-fracking protest is the stance taken by a grouping of marginal significance called 'Ukrainian choice', which is led by Viktor Medvedchuk, who was the head of the presidential administration under Leonid Kuchma¹². In his opinion, hydraulic fracturing technology "is causing catastrophic ecological consequences: the water and air are poisoned, the landscape is destroyed, even earthquakes are possible, and the number of cancer cases is increasing ..."¹³.

Errors made by the government have led to favourable conditions being created for the rapid development of an informal political anti-frack-

ing movement, which is formed by ecological organisations, activists from Svoboda, supporters of Medvedchuk and the communists. This is an ideologically eclectic movement, but all its members share a common goal – to prevent unconventional gas extraction in Ukraine. Its actions are not coordinated at present partly due to political and ideological differences and partly due to personal animosity between its participants. However, a clear behind-the-scenes active external influence can be seen and this may transform this artificial alliance into a mechanism being steered from outside Ukraine. It seems that a financial instrument aimed at lasting and regular anti-fracking activity in Ukraine has already been created. According to unconfirmed reports, its financial foundation is a ten-year contract which envisages sale of 4 billion m³ of Russian gas annually in Europe. This contract is being implemented by a completely unknown company which represents the interests of those who are lobbying against the unconventional gas extraction project and of one of the former managers of Naftohaz, who lives abroad. This firm allocates up to 25% of its income to support promotional and political activity, and primarily for anti-fracking propaganda.

An opportunity for a gas Klondike?

Few people know that Ukraine produced over 60 billion m³ of natural gas annually in the 1970s¹⁴ (a record-high level of 68.11 billion m³ was achieved in 1975), which accounted for approximately 25% of total gas production in the Soviet Union at that time. Before Siberian gas reached Europe, gas from Ukrainian fields had been supplied to Poland, Czechoslovakia, Hungary and Bulgaria. Four decades later, Ukraine has the opportunity to regain its status as a significant gas producer, with all the evident benefits and covert challenges this entails.

¹² Viktor Medvedchuk is seen in Ukraine as a person who has connections in the families of Russia's leaders (President Vladimir Putin and the wife of the former president and current prime minister of Russia, Svetlana Medvedeva, are the godparents of Medvedchuk's daughter).

¹³ О. Анцибор, М. Гончар, Видобуток нетрадиційного газу у Франції: еволюція підходів, *Чорноморська безпека* №4 (26) 2012, с.70; <http://blogs.korrespondent.net/celebrities/blog/viktorvmedvedchuk/a82631>

¹⁴ Нафта і газ України, Під редакцією М.Ковалка, В-во «Наукова думка», Київ, 1997, р. 176.

The draft Energy Strategy of Ukraine 2030 forecasts that the production level of natural gas will range from 30 billion m³ (the pessimistic scenario) to 47 billion m³ (the optimistic scenario) in 2030. This will include shale gas extraction of 6–11 billion m³ annually, tight gas extraction from non-porous sandstone formations at 7–9 billion m³ and coal bed methane at 1–3 billion m³, while traditional gas production will be at 15–24 billion m³. According to the forecast provided by IHS CERA¹⁵, gas production after 2030 may exceed 73 billion m³ annually, mainly owing to gas extraction from unconventional sources and from the Black Sea shelf. Thus it is clear that both forecasts pin the highest hopes on unconventional gas, the deposits of which are located in traditional energy resource production areas.

The cost-efficiency of production and investment protection are important conditions for the success of the unconventional gas production project. In the case of Ukraine, initial cost estimates range between: US\$190 and US\$275 per 1,000 m³ in the case of extraction of gas trapped in non-porous sandstone formations; between US\$263 and US\$350 for shale gas extraction; and between US\$287 and US\$412 for coal bed methane. Although at this moment the costs of sandstone and shale gas extraction suggest that the market price of such gas will be competitive, it is difficult to predict what the situation will be like at the end of the decade, when the indicators calculated using the theoretical model will be verified by real production. The analysis of the possibilities of unconventional gas production in Ukraine gives rise to the question as to whether the government will be able to create the conditions necessary for the influx of multi-billion investments. Considering the experience of the past few years,

¹⁵ See the latest version of the draft Energy Strategy of Ukraine 2030 of 11 June 2012; <http://mpe.kmu.gov.ua/fuel/control/uk/doccatalog/list?currDir=50358>

it is difficult to give a positive answer to this question¹⁶.

Gas geopolitics

Unconventional gas reserves in Ukraine and the Black Sea shelf (both traditional gas and gas hydrates) form a specific 'methane belt of Europe', which has the potential to bring a fundamental change into the geopolitics and geo-economics of the Central Eastern European region within the next two decades. Although this potential

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is in the realm of theory at the present moment, the reaction it causes (in the form of increasingly evident resistance from Russia) is quite real and palpable. It is not a coincidence that over the past few months Moscow has been putting stronger pressure on Ukraine and has intensified its efforts to establish a common management of the Ukrainian gas pipeline system (or to ensure that it is leased to Gazprom), without the EU being involved. If this scenario is realised, control over gas pipelines will also mean control of the gas they carry and Gazprom being able to block supplies from its competitors, including also Ukrainian gas from unconventional sources in the future.

¹⁶ The Commissioner for Energy, Gunther Oettinger, stated that the "production separation agreement signed with Shell is a positive example. Now it is important that Ukraine guarantees conditions for the investors to be able to act according to their plans." See article by Gunther Oettinger: Від Енергетичного співтовариства виграють і Україна, і Євросоюз, in: *Dzerkalo Tyzhnia*, №7/2013; http://gazeta.dt.ua/energy_market/vid-energetichnogo-spivtovaristva-vigrayut-i-ukrayina-i-yevrosoyuz.html

The Ukrainian government has a dilemma – should it relinquish control of the gas pipeline network in exchange for cheap gas from Russia and thus put the future of unconventional gas production in Ukraine at stake, or should it give up its attempts to strike a deal with Russia (which may turn out to be short-lived) and thus gain prospects for the development of this strategic branch of the economy? Beyond any doubt, the Ukrainian government would like to have both (cheaper Russian gas and the development of the Ukrainian unconventional gas project). This is, however, impossible, and a choice will have to be made in the immediate future. This choice will be of a geopolitical quality. A decision in favour of unconventional gas

It can be expected that the unconventional gas issue will give rise to tension on the Ukrainian political scene more than once, especially when the next elections are scheduled.

will 'push' Ukraine towards Europe. However, it is vital that the EU becomes aware beforehand of the significance of this 'methane belt' for the sake of its own energy security and that of the competitiveness of its economy. It must also be aware that, by offering Ukraine a membership perspective, it gradually forces the regime to carry out reforms.

Europe's gas vanguard

It is definitely too early at present to state that unconventional gas extraction projects in Ukraine are a success. This is also true about Poland and other places in Europe. Shale gas projects have not been successful anywhere, with the exception of North America, as yet. It is interesting that Ukraine, hand in hand with Poland, has moved to the forefront of shale gas extraction. The success of unconventional gas

extraction projects in Ukraine will be affected to a great extent by the development of analogous projects in Poland, which is four or five years ahead of Ukraine. This in particular concerns the Oleska field, which is part of the basin which is rich in natural gas and which stretches out through Ukraine and Poland. Chevron's success in Poland will stimulate the development of the Ukrainian project. And *vice versa* – a failure of the Polish project will be reflected in Ukraine. The development of unconventional gas extraction in Ukraine will also affect the situation in Poland to some extent. The fact that ExxonMobil and Canada's Talisman Energy have withdrawn from projects in Poland has adversely affected the prospects for shale gas projects in Europe, and especially in Poland and Ukraine. Over the past few months, Ukraine has made its first steps towards developing an unconventional gas extraction project. These steps can be described as firm and quite effective, but not devoid of errors, since they have provoked a domestic dispute. It may be expected that the unconventional gas issue will give rise to tension on the Ukrainian political scene more than once, especially when the next elections are scheduled. Unconventional gas projects, which are or will be implemented under production separation agreements, will be a regular subject of haggling and political turbulence. Each subsequent government will wish to verify these projects to gain benefits for themselves¹⁷. Time will also show to what extent the production separation agreements concerning unconventional gas extraction – especially in the Yuzivska field – are successful. It is worth remembering the 'contract of the century' signed in 1994 in Azerbaijan. The production separation agreements concerning the Azeri-Chirag-Guneshli fields signed with the international consortium led by BP were seen as

¹⁷ The mistake the government and foreign investors are making is that the production separation agreements have not been ratified by parliament. Although this is not required, the parliamentary procedure would bolster their legal validity.

extremely unbeneficial for Baku. However, it became clear fifteen years later that Azerbaijan had benefited from this in strategic terms (from the economic, political and social point of view). Nevertheless, the presence of Western corporations has not made the regime in Baku more European. However, in contrast to Kyiv's efforts to become integrated with the EU, Azerbaijan has in no way wished for this. Will the

post-Soviet kleptocracy transform into a more elegant form of modern Western plutocracy if the unconventional gas projects succeed in Ukraine? The answer will be known in twenty years' time.

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APPENDIX 1

The production separation agreement with Shell (the Yuzivska field)

The first – and so far the only – production separation agreement was signed with Shell in Davos on 24 January 2013. This contract covers all the sedimentary deposits (gaseous and rare hydrocarbons) located within the plot's perimeter and limited by a depth of up to 10,000 metres below the surface or by the geological foundation (whichever of the levels is reached first). Pursuant to this document, in the first stage, Shell assumed the obligation to invest US\$410 million, which will be spent on a geological survey and exploration work. The first effects of this work are expected to be known before 2015. Confirmed reserves will give a real picture for the prospects of industrial production at this field. According to the optimistic scenario¹⁸, the output after 2020 will reach 20 billion m³ annually, and according to the pessimistic scenario, it will be 10 billion m³. This

production level will be possible to achieve on condition that the total level of investments is US\$10 billion as a minimum upon the launch of production on an industrial scale. It is estimated that the investor will have to spend US\$10 billion on work in the initial stage. The state's share in the distribution of gas production may range between 31% and 60%, depending on the R factor level, which is inversely proportional to the output value¹⁹. This is a key provision, since there are numerous speculations about the asymmetry, unbeneficial for Ukraine, in the production separation agreement. As shown above, the state's minimum share in the incomes was set at 16.5% in the tender. However, pursuant to the agreement, this share will be at least twice as high. This provision was included with the consent of both parties, so that the increased share of the state in the profitable part of hydrocarbon production could compensate for all taxes unpaid by each of the investor firms, including the operator.

¹⁸ See the statement made by the Minister of the Energy and Coal Industry of Ukraine, Eduard Stavytsky in January this year; http://www.kmu.gov.ua/control/uk/publish/article?art_id=246007630&cat_id=244276429

¹⁹ The agreement on the separation of the production of hydrocarbons to be extracted within the confines of the Yuzivska plot, p. 85.

APPENDIX 2

SPK-GeoService and the interests of 'the family'

SPK-GeoService, a firm established by three well-known geologists, has found itself in the centre of public interest. Its participation in the project surprised expert circles and the media, and outraged the public. In turn, the political opposition started to suspect that this is a bogus firm, whose real beneficiaries are oligarchs, and primarily 'the family', who would like to take over part of the future incomes from shale gas extraction²⁰. However, it seems that

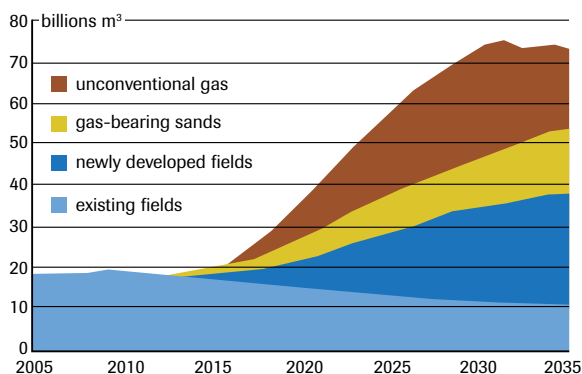
²⁰ M. Gonchar, *Unconventional Gas Resources in Ukraine*, Review for UGOS, 2012.

the role of this firm has been definitely over-rated. 10% is too little to satisfy the appetites of the ruling class. It appears more likely that the potential corruption scheme aimed at taking care of the interests of 'the family' could be linked to the future privatisation of the state-owned corporation Nadra Ukrainy. Although this privatisation is not on the agenda now, it cannot be ruled out that this is just a matter of time. However, this will take place no earlier than in 2018–2019, when it is clear whether these fields contain commercial reserves of gas. It can be assumed now that the private interest of the Ukrainian government has played the role of initiator for the unconventional gas extraction projects.

The Oleska and the Yuzivska fields



Forecast for Ukrainian gas production until 2035 provided by IHS CERA



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