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# DIVERSIFICATION PROJECTS IN UKRAINE'S ENERGY SECTOR: PROGRESS, PROBLEMS, AND WAYS OF IMPLEMENTATION

Ukraine, seeking to back future sustainable development of the national economy with energy resources, is interested in their reliable deliveries. Since large volumes of energy resources are imported from one country (or through the territory of one country) – Russia, Ukraine logically and reasonably tries to diversify their sources and in that way minimise risks for its energy security, including political ones.

The plans to diversify sources of energy supply, first of all, to reduce energy dependence on the Russian Federation, for years have been declared in official documents of different levels (e.g., the Energy Strategy of Ukraine through 2030). Meanwhile, those questions caused most acute discussions in the Ukrainian political community and in society, which hindered implementation of diversification projects.

The current stage of such projects' development bears traits endangering their implementation. *First*, the global economic crisis that substantially complicated normal functioning of the Ukrainian economy also strongly affected operation of the national energy sector: in the conditions of foreign credits shortage and reduction of budget allocations on specific energy projects and the energy sector as a whole, investments in the energy sector go down, hindering its development. So, the global economic crisis adjusts plans that even before were not zealously implemented.

*Second*, another “gas war” (January 2009) again complicated the uneasy relations of Ukraine with its strategic partner in the energy sector – Russia. And any economically unsound decisions may not only destabilise supply of energy resources but lead to their cut.

Third, aggravation of home political confrontation on the eve of the presidential elections, unfortunately, extends to diversification projects in the energy sector. This greatly undermines the effectiveness of Ukraine's international cooperation with foreign governments and transnational companies, since diversification projects are international, their implementation requires huge investments and import of advanced technologies.

An economic choice of diversification projects should make that area of the energy sector reform the core of Ukraine's energy strategy, concentrate funds on priority directions of development, cease excessive politicisation of that issue in society, making those projects nation-wide. At the same time, it is clear that irrespective of the diversification projects implementation time, Russia will remain the main partner for Ukraine in the energy sector in the long run.

The pause in the “race” of international diversification projects caused by the global economic crisis enables Ukraine and its partners in implementation of said projects to defer for some time, without particular losses, passage of final decisions for all-round analysis of the goals they face and search of the most effective and acceptable for all actors ways of their attainment.

## The analytical report consists of five sections.

- Section one** analyses the energy resources supply diversification principles in the EU and Russia, and outlines the relevant tasks for the Ukrainian energy sector.
- Section two** reviews issues of diversification of sources of natural gas supply to Ukraine in the context of new gas pipelines plans emerging on the European gas market.
- Section three** analyses the prospects of implementation of the oil supply diversification project using the Odesa-Brody oil pipeline system for transportation of Caspian oil to European countries.
- Section four** examines issues of diversification of nuclear fuel supply for Ukrainian NPPs and construction of a plant for nuclear fuel fabrication in Ukraine.
- Section five** presents conclusions on the discussed issues on the basis of comparative analysis of the diversification projects progress in Ukraine's gas, oil and nuclear power engineering sectors, and proposes a set of measures for their sooner implementation.

# 1. DIVERSIFICATION OF ENERGY SUPPLY IN THE EUROPEAN UNION, RUSSIA AND UKRAINE: GENERAL APPROACHES, INTENTIONS AND PROBLEMS

Diversification of sources and routes of energy resources supply is an issue that in the recent decades attracts growing attention in Europe. Growth of demand for energy resources combined with exhaustion of domestic reserves in the Old World makes it strongly dependent on imports of energy resources. The energy balance of European countries is dominated by hydrocarbons – natural gas and oil. Exactly those energy resources are most often hit by the crisis of delivery cuts, aggravated by the very short list of suppliers.

So, the task of diversification primarily applies to gas and oil supply, but implementation of plans of “nuclear renaissance” may also actualise the problem of nuclear fuel sources diversification, if the problem is not resolved in another way.

In the Eurasian region, the EU-Russia-Ukraine triangle is decisive for the energy security. However, in that triangle, the EU and/or some member states, alongside with Ukraine (as importers and transit countries), on the one hand, and Russia (as an exporter), on the other, have similar but often opposing interests.

Their common interests include: (1) enhancement of security and reliability of energy facilities operation as complex and hazardous technical systems; (2) a decrease of political influence on energy supply.

However, the consumer is primarily interested in market terms of supply of energy resources and, as a result, acceptable prices, while the supplier seeks monopoly and no competition on the market. By contrast, the transit country is most of all interested in proceeds from transit of energy resources, while the exporter and consumer – on the contrary, in reducing the transit cost.

In such situation, complicated by the far from constructive Ukraine-Russian relations in the energy sector, the problem of diversification of sources and routes of energy supply further aggravates for all parties to the “triangle”.

The EU is pursuing a logical and clear energy security policy backed on all levels that incorporates projects of diversification of energy supply sources. Feature of Ukraine is the lack of political will, poor state governance, unpredictable policy. Russia demonstrates not only merger of political and economic motives of the energy policy but repeated instances of policy outbalancing economy. This is a negative factor complicating relations in that triangle.

In some segments of the energy policy (gas, oil, nuclear energy), those relations bear specific traits attributed to particular kinds of energy resources and their criticality for the energy security of specific countries or their union – the EU.

This section briefly outlines the general approaches of the EU, Russia and Ukraine to diversification of energy supply, reviews problems of their interests coordination, sets tasks for the Ukrainian energy sector, proceeding from the current situation in Ukraine’s energy relations with the EU and Russia in the context of Eurasian diversification trends.

## 1.1 EUROPEAN UNION

The EU is one of the biggest importers of energy resources in the world: in 2008, dependence of the EU on imports of coal reached 58%, hydrocarbons – 53.8% (Table “Consumption of energy resources by EU member states, their net imports and dependence in 2008”<sup>1</sup>). Due to the prevalence of coal deposits, dependence on coal imports does not pose a problem for the energy security, but the situation with hydrocarbons is different.<sup>2</sup> Their

**Consumption of energy resources by EU member states, their net imports and dependence in 2008**

No.	EU member states	Gross energy consumption, million tons of oil equivalent*	Net imports**	Energy dependence, %***
1	Cyprus	2.6	3.0	100.0
2	Malta	0.9	0.9	100.0
3	Luxembourg	4.7	4.7	98.9
4	Ireland	15.5	14.2	90.9
5	Italy	186.1	164.6	86.8
6	Portugal	25.3	21.6	83.1
7	Spain	143.9	123.8	81.4
8	Belgium	60.4	53.5	77.9
9	Austria	34.1	24.9	72.9
10	Greece	31.5	24.9	71.9
11	Latvia	4.6	3.2	65.7
12	Lithuania	8.4	5.5	64.0
13	Slovakia	18.8	12.0	64.0
14	Hungary	27.8	17.3	62.5
15	Germany	349.0	215.5	61.3
16	Finland	37.8	20.9	54.6
17	EU-27	<b>1825.2</b>	<b>1010.1</b>	<b>53.8</b>
18	Slovenia	7.3	3.8	52.1
19	France	273.1	141.7	51.4
20	Bulgaria	20.5	9.5	46.2
21	Netherlands	80.5	37.2	38.0
22	Sweden	50.8	19.8	37.4
23	Estonia	5.4	1.9	33.5
24	Romania	40.9	11.9	29.1
25	Czech Republic	46.2	12.9	28.0
26	Great Britain	229.5	49.3	21.3
27	Poland	98.3	19.6	19.9
28	Denmark	20.9	8.1	36.8****

The largest deliveries of oil and of gas were from Russia (33% of oil and 40% of gas imports) and Norway (16% and 23%, respectively).

\* Defined as the aggregate of domestic production and imports less exports.

\*\* Net imports: imports minus export.

\*\*\* Imports divided by gross consumption.

\*\*\*\* Denmark is a net exporter of energy resources.

main suppliers to the EU in the past decade have been Russia and Norway.<sup>3</sup>

Meanwhile, deliveries from Russia are becoming ever more questionable, in particular, due to regular Russian-Ukrainian and Russian-Belarusian “gas wars”. Such situation undermines energy security, so, the EU is insistently pursuing a diversification policy on sources and routes of supply of hydrocarbons (primarily, gas), reducing its dependence, first of all, on Russia.

For instance, in 2008, the European Commission proposed to the EU its Energy Security and Solidarity Action Plan, envisaging five lines of energy security guarantee, topped by diversification of energy supplies.<sup>4</sup>

Diversification is viewed as a common task for all Community members, since solidarity in the issue of energy security is a basic principle of the Union membership. I.e., in the domain of diversification and wider – provision of energy security – the main principles of the EU include, *first*, risk sharing and joint use of the aggregate weight of the EU in international relations, which is much more effective, compared to the weight of separate member states.

*Second* – a strategic approach to solution of energy security problems in terms of both integrity of the relevant measures and their long-term character. Such is the foresight of the ambitious EU strategy through 2020 (Strategy “20-20-20”)<sup>5</sup> that envisages, in particular, reduction of energy consumption by 20% by 2020. Nevertheless, the decline of domestic extraction can be offset, and existing flows of energy supply can be partially substituted with others only through long-term diversification projects.

*Third*, rather a flexible approach to correlation of political and economic arguments at substantiation of the choice of one or another diversification project.

The feature of the EU (and the whole Eurasian market of energy resources, where it is the largest consumer) is the strong dynamic dependence of economic and political priorities at different stages of diversification projects. Dependent on the criticality for energy security, political priorities may dominate on all stages of a project, when the influence of the main political actors (both suppliers and consumers) is strong, or yield to economic priorities at the stages of business plan development and conclusion of contracts, when market competition mechanisms begin to be employed. Under such circumstances, energy security relies on policy foresight, political will, proper state governance and good project management.

**Thus, the priority line in implementation of energy security enhancement plans in the EU presumes diversification of energy supplies, and preconditions for their implementation include solidarity of the member states and logical integrity of all energy security domains.**

<sup>1</sup> Source: Energy Dependency. – Europe’s Energy Portal, <http://www.energy.eu/#dependency>

<sup>2</sup> The EU calculated the world reserves of energy resources as of January 1, 2009: oil – 165 trillion tons; gas – 174,436 trillion cu.m; coal – 841 trillion tons; uranium – 18,096 tons (calculated as uranium-235). Under the present level of consumption, reserves will be exhausted: of oil – in October, 2047; gas – in September, 2068; coal – in May, 2140; uranium – in October, 2144. See: Europe’s Energy Portal. Depletion, <http://www.energy.eu>

<sup>3</sup> For instance, in 2008, the Russian share in the EU imports of oil made 33%, gas – 40%; Norwegian – 16% and 23%, respectively.

<sup>4</sup> EU Energy Security and Solidarity Action Plan: Second Strategic Energy Review. MEMO/08/703. – Brussels, November 13, 2008, <http://ec.europa.eu>. The other four lines were: improvement of external energy ties; creation of reserves of oil (petroleum products), gas and mechanisms of crisis settlement; enhancement of energy effectiveness; maximum use of domestic resources.

<sup>5</sup> Furthermore, by 2020, the EU plans to reduce discharge of greenhouse gases by 20% and to raise the share of renewable energy sources in the end consumption balance to 20%. See: Securing your energy future: Commission presents energy security, solidarity and efficiency proposals. – EUROPA, November 13, 2008, <http://europa.eu>



**Diversification in the gas sector.** Issues of diversification in the gas sector are regimented by a document binding on all EU members – Council Directive 2004/67/EC concerning measures to safeguard security of natural gas supply, listing diversification of sources and routes of gas supply among the attainment tools of uninterrupted gas deliveries standards.<sup>6</sup> In particular, the Directive recommends diversification of gas supply through construction of terminals for acceptance of liquefied natural gas (LNG).

Meanwhile, neither the directive, nor any other EU document sets the required minimum number of sources and/or routes of supply. For supply to be reliable, it is deemed sufficient to have three sources of delivery.

As one may see from Table “Balance of natural gas in EU member states in 2008”, in practice, not all EU

countries have several sources. However, they seek to acquire them, in particular, by building terminals for LNG admission.

The latest Russian-Ukrainian gas war (January 2009) made the European Commission to work out new documents on preventive and extraordinary measures to secure gas supply to the EU, not approved yet.<sup>7</sup> The documents provide that each EU country should establish a competent authority responsible for formulation and implementation, in particular, of a response mechanism to emergency situations in gas supply, and the European Commission will have the right to announce an emergency situation in gas supply, if at least one EU member state reports a decrease in daily imports (or growth of demand) of gas by 10%, or on a request of at least two EU member states. It also sets the risks assessment terms for the security

**Balance of natural of gas in EU member states in 2008,  
BCM**

	Primary production			Imports			Resources*			Stock change**		Exports			Gross inland consumption***			Energy dependency****	
	2007	2008	2008/2007%	2007	2008	2007/2008%	2007	2008	2008/2007%	2007	2008	2007	2008	2008/2007%	2007	2008	2008/2007%	2007	2008
Denmark	10.92	11.76	7.69%	0	0	0.00%	10.92	11.76	7.69%	-0.12	0	5.4	6.36	17.78%	5.4	5.4	0.00%	-100.00%	-117.78%
Netherlands	73.2	81.84	11.80%	24.67	23.57	-4.68%	97.87	105.41	7.70%	0	0	53.4	57.36	7.42%	44.47	48.05	8.04%	-64.60%	-70.33%
Cyprus	0	0	0.00%	0	0	0.00%	0	0	0.00%	0	0	0	0	0.00%	0	0	0.00%	0.00%	0.00%
Malta	0	0	0.00%	0	0	0.00%	0	0	0.00%	0	0	0	0	0.00%	0	0	0.00%	0.00%	0.00%
Great Britain	86.28	83.64	-3.06%	34.92	41.64	16.14%	121.2	125.28	3.37%	0.6	2.76	12.72	12.48	-1.89%	109.08	115.56	5.94%	20.35%	25.23%
Romania	12.72	12.48	-1.89%	5.4	4.92	-9.76%	18.12	17.4	-3.97%	-0.12	-1.32	0	0	0.00%	18	16.08	-10.67%	30.00%	30.60%
<b>EU-27</b>	<b>223.34</b>	<b>227.04</b>	<b>2%</b>	<b>434.78</b>	<b>457.64</b>	<b>5%</b>	<b>658.13</b>	<b>684.68</b>	<b>4%</b>	<b>6.24</b>	<b>0.6</b>	<b>91.54</b>	<b>97.2</b>	<b>6%</b>	<b>572.83</b>	<b>588.08</b>	<b>3%</b>	<b>60%</b>	<b>61%</b>
Poland	5.16	4.92	-4.65%	11.04	12.24	9.80%	16.2	17.16	5.93%	0.36	-0.36	0	0	0.00%	16.56	16.8	1.45%	66.67%	72.86%
Latvia	0	0	0.00%	1.8	1.44	-25.00%	1.8	1.44	-20.00%	0.12	0.36	0	0	0.00%	1.92	1.8	-6.25%	93.75%	80.00%
Germany	17.16	15.6	-9.09%	95.28	99.72	4.45%	112.44	115.32	2.56%	2.64	0.72	12.96	13.56	4.63%	102.12	102.48	0.35%	80.61%	84.07%
Austria	2.16	1.8	-16.67%	10.92	11.52	5.21%	13.08	13.32	1.83%	-0.36	-0.48	3.12	3.24	3.85%	9.6	9.6	0.00%	81.25%	86.25%
Hungary	2.64	2.76	4.55%	11.4	13.44	15.18%	14.04	16.2	15.38%	0.6	-0.84	0.12	0.96	700.00%	14.52	14.4	-0.83%	77.69%	86.67%
Ireland	0.6	0.6	0.00%	5.16	5.52	6.52%	5.76	6.12	6.25%	0	0	0	0	0.00%	5.76	6.12	6.25%	89.58%	90.20%
Italy	10.56	9.96	-5.68%	80.76	83.88	3.72%	91.32	93.84	2.76%	1.44	-1.08	0.12	0.3	150.00%	92.64	92.46	-0.19%	87.05%	90.40%
Belgium	0	0	0.00%	16.8	15.72	-6.87%	16.8	15.72	-6.43%	0	1.44	0	0	0.00%	16.8	17.16	2.14%	100.00%	91.61%
Slovakia	0.14	0.12	-16.67%	6.12	6.17	0.78%	6.26	6.29	0.38%	0	0.12	0.22	0.18	-16.67%	6.05	6.23	2.98%	97.62%	96.15%
Lithuania	0	0	0.00%	3.96	3.41	-16.20%	3.96	3.41	-13.94%	-0.12	0.12	0	0	0.00%	3.84	3.53	-8.12%	103.13%	96.60%
France	1.2	1.08	-10.00%	52.08	53.28	2.25%	53.28	54.36	2.03%	0.6	0.12	2.76	1.44	-47.83%	51.12	53.04	3.76%	96.48%	97.74%
Czech Republic	0.24	0.24	0.00%	9.36	10.32	9.30%	9.6	10.56	10.00%	0.24	-0.12	0.48	1.08	125.00%	9.36	9.36	0.00%	94.87%	98.72%
Bulgaria	0.36	0.24	-33.33%	3.6	3.72	3.23%	3.96	3.96	0.00%	-0.12	-0.24	0	0	0.00%	3.84	3.72	-3.12%	93.75%	100.00%
Estonia	0	0	0.00%	1.02	0.96	-6.25%	1.02	0.96	-5.88%	0	0	0	0	0.00%	1.02	0.96	-5.88%	100.00%	100.00%
Luxembourg	0	0	0.00%	1.57	1.44	-9.17%	1.57	1.44	-8.40%	0	0	0	0	0.00%	1.57	1.44	-8.40%	100.00%	100.00%
Portugal	0	0	0.00%	5.04	5.52	8.70%	5.04	5.52	9.52%	0.12	0	0	0	0.00%	5.16	5.52	6.98%	97.67%	100.00%
Slovenia	0	0	0.00%	1.2	1.13	-6.38%	1.2	1.13	-6.00%	0	0	0	0	0.00%	1.2	1.13	-6.00%	100.00%	100.00%
Finland	0	0	0.00%	4.92	5.28	6.82%	4.92	5.28	7.32%	0	0	0	0	0.00%	4.92	5.28	7.32%	100.00%	100.00%
Sweden	0	0	0.00%	1.2	1.09	-9.89%	1.2	1.09	-9.00%	0	0	0	0	0.00%	1.2	1.09	-9.00%	100.00%	100.00%
Spain	0	0	0.00%	42	47.04	10.71%	42	47.04	12.00%	0.48	-0.48	0.24	0.24	0.00%	42.24	46.32	9.66%	98.86%	101.04%
Greece	0	0	0.00%	4.56	4.68	2.56%	4.56	4.68	2.63%	-0.12	-0.12	0	0	0.00%	4.44	4.56	2.70%	102.70%	102.63%

\* Resources equal the aggregate of domestic production and imports.

\*\* “+” reduction of reserves, “-” increase in reserves.

\*\*\* Gross domestic consumption is the aggregate of domestic production, imports and change of reserves less exports.

\*\*\*\* Energy dependence = 100×(imports export)/gross domestic consumption. A negative level of energy dependence is specific of countries where exports exceed imports. A positive level of energy dependence, above 100%, means an increase of reserves in the period under review

<sup>6</sup> Council Directive 2004/67/EC of April 26, 2004, concerning measures to safeguard security of natural gas supply. – EurLex, Official Journal L 127, 29/04/2004, 0092-0096.

<sup>7</sup> The Commission adopts new rules to prevent and deal with gas supply crises. – Europe, Press Releases. Brussels, July 16, 2009, <http://europa.eu>. In case of approval by the Council of the EU Heads of States and the European Parliament, the documents are to enter into force on March 31, 2010.





of gas supply, measures at actions coordination of all EU members in a crisis situation, etc.<sup>8</sup>

So, in the short and middle run, the guarantee of energy security in the conditions of strong dependence on imports comes to prevention and prompt settlement of crises in energy supply observed today.

Meanwhile, as we noted above, in the long run, large-scale infrastructural projects are considered and implemented, envisaging fundamental changes among the main suppliers of energy resources (first of all, gas) to the Community member states.

At that, the EU energy policy should concentrate on promotion of competition on the European gas market and creation of equal conditions for all gas supply projects. Economics is one of the main criteria for political support of the EU for specific projects – they should be cost-effective. Only after the interested energy companies assess the prospects of transportation projects and assume all risks of their implementation, the EU institutions may partially fund their implementation (priority infrastructural projects on the EU level). Strict abidance by that position might bar further eastward expansion of the vital for the EU *Nabucco* gas pipeline project – from Iran to Azerbaijan and further to Turkmenistan – in search of raw materials, that nevertheless remained questionable.

To be sure, as the EU, possessing the funds, can support disputable from the viewpoint of economy and availability of raw materials projects, Russia, too, can use funds of state energy companies for political projects. However, less rich countries (e.g., Ukraine, Georgia, the Baltic States) cannot effectively compete in the “race of diversification projects”.

**Diversification in the oil sector.** After the price shock of 1973 on the oil market, the share of oil in the world balance of primary energy, previously exceeding 46%, steadily went down and is now close to 39%. Even despite the most optimistic scenarios of alternative kinds of energy development, oil is expected to retain its priority importance for the world power engineering till 2030, although its share in the world balance will drop to 30%.<sup>9</sup> So, oil deliveries reliability is treated by governments of most countries of the world short of own reserves as one of the top energy security priorities.

Among all large importers of oil, the EU is the most dependent on foreign sources, and that dependence is growing to nearly 85% in 2008.<sup>10</sup> The problem of diversification of oil deliveries, although less acute than of gas, still remains vital for the EU energy policy and is solved by conclusion of new contracts of oil supply and participation in its production in other countries.

Noteworthy, the levels of oil delivery diversification to the EU countries notably differ. While West European states, as a rule, get oil from not less than four sources,<sup>11</sup> each not exceeding 30% of consumption, Central European countries are critically dependent on Russian oil – 60-100%, due to the following factors: their refineries (built yet in the Soviet times) using *Urals* oil blend, the extended

oil pipeline system connecting those countries with oil fields in Western Siberia and the Volga region, discounts envisaged by long-term delivery contracts, and attempts of the Russian authorities to keep Central European countries within their sphere of interests.

An example of successful creation of an alternative to deliveries of Russian oil is presented by the oil pipeline Ingolstadt-Kralupy-Litvinov built in the Czech Republic in 1996, that connected Czech refineries with the Transalpine oil pipeline and let the country get up to 10 million tons of oil a year from the Middle East, Caspian region and North Africa via the port of Trieste in the Adriatic Sea. Resolute concerted efforts of the Czech authorities seeking energy security seriously weakened Russia's political influence on that country, which strategically largely offset commercial costs of the oil pipeline construction project.

Hence, issues of oil sources diversification in the EU are not regimented by legal acts or solved by means of elaboration of some priority projects list and its implementation, as in the gas sector, due to the possibility of oil delivery by tankers and railways, as well as by creation of strategic reserves of oil and petroleum products, and the main factor – the existence of a developed global oil market.

**Diversification in the nuclear sector.** The world nuclear energy sector is rather conservative and subject to international restrictions, since a great deal of its products and equipment has dual use (besides power engineering they can be used to produce nuclear weapons). Meanwhile, the world nuclear market witnesses emergence of new ties that can seriously rearrange political and economic cooperation formed over decades. In one of the key segments of that global market – supply of nuclear materials and nuclear fuel – the recent years have brought important changes, first of all, a rise of the Russian nuclear sector.

In absence of a common EU legislation on diversification of sources of nuclear fuel, the EU member states (or, rather, national and transnational nuclear companies) mainly resort to regional diversification of sources of raw uranium and uranium enrichment services, guided by purely economic considerations and creation of a competitive environment.

Given the varied approaches of the EU member states to nuclear power engineering and limited ability of the EU to influence the nuclear market (raw materials, fuel, technologies, equipment, etc.), one may hardly expect the emergence of a common policy in the nuclear power engineering sector.

Meanwhile, the EU protects its own market of nuclear materials. A few years after the USSR break-up – in June, 1994 – it passed a document regimenting EU imports of nuclear materials. In particular, the quota of imports of uranium from Russia and the CIS states was limited by 20% for enriched and 25% – for crude uranium. The document titled the Corfu Declaration intended to defend

<sup>8</sup> European Commission, Energy. European Strategies. Second Strategic Energy Review Securing our Energy Future (followup), July 2009, [http://ec.europa.eu/energy/strategies/2009/2009\\_07\\_ser2\\_en.htm](http://ec.europa.eu/energy/strategies/2009/2009_07_ser2_en.htm)

<sup>9</sup> World Energy Outlook 2008. Basic provisions. – IEA, [http://www.worldenergyoutlook.org/docs/weo2008/WEO2008\\_es\\_russian.pdf](http://www.worldenergyoutlook.org/docs/weo2008/WEO2008_es_russian.pdf)

<sup>10</sup> Calculated by Razumkov Centre experts on the basis of data of BP Statistical Review of World Energy, June 2009, <http://www.bp.com>

<sup>11</sup> Meaning permanent sources of supply. There may also be variable sources, created, as a rule, by intermediary companies.



European producers, first of all, enriching companies, from foreign production. The share of European suppliers of enriched uranium in the EU should be not below 80%. Since Russia possesses 40% of the world uranium enrichment capacities, this restriction in the first place applies to Russian enriched uranium. According to some reports, the Declaration expired on December 1, 2007, and there was no information of its extension.<sup>12</sup>

Therefore, issues of diversification of nuclear fuel deliveries for NPPs are actually not addressed in the EU *acquis*, first of all, due to the operation specificity of the energy sector's nuclear subsection.<sup>13</sup>

**From the economic viewpoint, it is more beneficial to upgrade the existing energy facilities (e.g., pipelines) than to build new ones. However, the diversification must be paid for. The acceptable cost of diversification is decided by governments and participants of the concerned projects after the analysis of all possible options and thorough feasibility study of every specific project. The world practice proves that the economic factor not always prevails – sometimes, political expediency dominates. Anyway, the cost of diversification projects is paid by citizens of the member states.**

## 1.2 DIVERSIFICATION APPROACHES IN RUSSIA'S ENERGY POLICY

Russia's diversification policy is of a point nature – concentrating on large-scale infrastructural projects – and becomes systemic only in the issue of reduction or complete barring of transit countries' involvement in projects of new oil and gas pipelines. This primarily refers to the former Soviet republics and Poland, with which Russia insistently curtails transit relations.

In August, 2009, the Russian Government approved (in general) a draft of the new Russian energy strategy through 2030. The Strategy envisages implementation of large-scale infrastructural projects aimed at **diversification of export routes** and promotion of Russian energy resources at new markets. First of all, this refers to the oil pipeline system Eastern Siberia-Pacific, Baltic Pipeline System, Burgas-Alexandroupolis, and Trans-Caspian, Nord Stream, South Stream gas pipelines.

In particular, Russia is evidently trying to keep the share of primary energy resources in Russian exports below 70% and simultaneously raise the weight of the eastern direction in exports of liquid hydrocarbons (oil and petroleum products) from the current 6% to 22-25%, in exports of gas – from 0 to 19-20%.<sup>14</sup>

Russia often views EU projects of energy supply sources diversification (for instance, the *Nabucco* gas pipeline project) as a threat to its energy security, and in response develops counter-projects for their disruption.

Such intentions may be seen as an attempt to produce the impression of tough competition between Europe and

Asia for Russian energy resources (or trigger it). It is not the first time that Russia resorts to this device. For instance, it actively pushes projects of Russian energy resources supply to China (Russian oil is already delivered there). However, promotion of the eastern direction in the new Russian strategy so far looks only as a threat.

Such counter-projects include the Russian plans of supply of energy resources (first of all, gas) to the EU by new routes (bypassing some or all “unfriendly transit countries”), and those supported by some EU states (e.g., the *South Stream* project). At that, Russia tries to win potential partners in the EU by large financial proceeds from gas transit, industrial orders, participation in profits from sale of gas, etc.

Finally, Russia is trying to concentrate all flows of energy resources from the CIS states on its territory for their further transportation by its pipeline systems (*Gazprom's* attempt to outbid Azeri gas is especially interesting, given the excess of domestic and Central Asian gas). Respectively, it strongly opposes any projects of independent access of CIS states to the world energy markets.

The “race of diversification projects” between the EU and Russia results in the growth of mutual mistrust. Meanwhile, *first*, the practical capabilities of diversification for both parties are more limited, in terms of resources (meaning both funds and energy deposits), than presented by officials and in public discussions. *Second*, in any case, the most of Russian oil and gas will be supplied to the EU, while its dependence on the Russian oil is not critical.

The uneasy relations between Russia and the EU in the energy sector are witnessed by the official refusal of the Russian Federation from joining the Energy Charter Treaty (ECT). As we know, yet in 2006, Russia's President Putin openly said that joining the Energy Charter was disadvantageous for Russia, since it envisaged mutual access of the parties to the infrastructure of extraction and transportation of energy resources.<sup>15</sup>

Russia's non-accession to the ECT, in particular, barred adequate solution of conflict situations arising at supply and transit of energy resources. The impracticability of the ECT principles application was latest proven by another “gas war” of early 2009 between Russia and Ukraine. However, long-standing hopes that Russia would ratify the ECT might keep the EU from harsh assessments of “oil and gas wars” it waged.

Meanwhile, in April, 2009, Russia proposed to the EU an alternative draft of an international agreement on energy – “Conceptual approach to a new legal framework of international cooperation in the energy sector (goals and principles)”. Even brief analysis of that project shows that it brings nothing new to approaches to international energy cooperation.<sup>16</sup> That is why representatives of the EU met the Russian initiative rather sceptically.

<sup>12</sup> See: Senators see extension of Corfu Declaration inadmissible. – REGNUM News Agency, October 30, 2007, <http://www.regnum.ru>

<sup>13</sup> For instance, the Corfu Declaration of June 1994 – adopted as an internal EU document (not published) and actually intended to restrict export of nuclear materials from Russia to the EU – is examined in section 4 of this report.

<sup>14</sup> Russia's Government approved draft Energy Strategy of Russia through 2030. – Rosinvest, August 27, 2009, <http://www.rosinvest.com/news/587721>

<sup>15</sup> Russia – EU: Diplomacy in the zone of energy law vacuum. – *FK Novosti*, August 11, 2009, <http://www.fcinfo.ru/themes/basic/materialsdocument.asp?folder=4005&matID=221881>

<sup>16</sup> Conceptual approach to the new legal framework for international cooperation in the energy sector (goals and principles). – Official web site of the Russian President, April 21, 2009, <http://kremlin.ru/text/docs/2009/04/215303.shtml>



In response, at the May (2009) Russia-EU summit in Khabarovsk, Moscow decided to unilaterally put an end to the discussion. "Russia is not a party to the Energy Charter and is not going to join the Energy Charter in its current wording, – Dmitri Medvedev said at the summit. – Russia is not a party to the Energy Charter Treaty and will not employ it, of which, relevant international communications were also made". In April, 2009, Prime Minister Putin said in Sofia that "the Energy Charter has not played its role", so, "Russia sees no sense in keeping [its] signature under the Energy Charter".

On July 30, 2009, the Russian Prime Minister signed a Directive to notify foreign states of Russia's decision to withdraw its signature under the Energy Charter Treaty. Such was the end of many years of discussion on the Charter underway in Russia since December 17, 1994, when Russia signed it. The tough dialogue between Russia and the EU about Russia's accession to the ECT, underway since January, 2000, also came to nothing.

So, currently, Russia's energy cooperation with the EU actually stays beyond any legal framework, and further intentions of the EU (or some of its member states) to promote the energy dialogue with Russia may lead to concessions on the part of the Community, so that whole sub-sectors of the energy sector in separate countries may fall its victim.

### 1.3 DIVERSIFICATION PROJECTS IN UKRAINE'S ENERGY SECTOR

By contrast to the EU countries (including post-socialist), Ukraine is dependent on monopoly supply of energy resources from the Russian Federation. Noteworthy, such situation has arisen recently: while in early 1990s, Ukraine had direct contracts of gas supply from Central Asian states, obtained Kazakh oil for refining (nearly 20%), now, its energy supply is 100% made up of Russian gas, oil and nuclear fuel. The situation with the latter is especially tough, since, by contrast to oil and natural gas produced in Ukraine, on a small scale though, it produces no nuclear fuel (although still preserves the potential necessary for creation of its own nuclear fuel cycle elements).

In view of the tangled Russian-Ukrainian relations in all sectors (and first of all – in the energy sector), plans of reduction of energy dependence on Russia have been declared actually since Ukraine gained independence. However, the lack of funds, foreign political support, experience of transnational energy projects implementation, absence, in some cases, of raw hydrocarbons deposits within economic reach and other factors hindered implementation of Ukrainian diversification projects.

The main negative factors hindering implementation of diversification projects also include existence of strong lobbyist groups in Ukraine defending Russian interests in public discussions and on different levels of state governance. Meanwhile, even the most ambitious diversification projects declared in the years of independence by all governments and separate state institutions did not envisage complete refusal of Russian energy resources. More than that, diversification of "flows" in such projects did not exceed even half of Russian deliveries, and it is traditionally considered that a new source of supply should not exceed 30% of total deliveries.

Diversification measures in the energy sector are considered in Ukraine's Energy Strategy through 2030 (hereinafter – Energy Strategy).<sup>17</sup> For instance, the section "Provision of energy security" mentions among the main measures of country's energy dependence reduction "the diversification of external energy resources supply (natural gas, oil, nuclear fuel)" noting the need to provide "not less than three sources of supply of each kind of energy resources at 25-30% of the total volume".

Similarly, the document "Guidelines of the state policy in the field of provision of Ukraine's energy security" reads that reduction of energy dependence of the state is to be attained, in particular, through "diversification of external sources of supply of energy resources (first of all, natural gas, oil and nuclear fuel), proceeding from the need to supply such resources from not less than three main sources...".<sup>18</sup>

Tasks and plans of energy sources diversification are contained in many other presidential and governmental documents.

However, the overwhelming majority of them remains unaccomplished. Ukraine's Energy Strategy is obsolete and requires revision, which became especially evident during the global economic crisis.

Of course, supply diversification projects of hydrocarbons and nuclear fuel of non-Russian production and creation of nuclear fuel cycle elements requires huge investments in construction of pipelines and auxiliary infrastructure, enterprises producing nuclear fuel and so on.<sup>19</sup> Apart from significant financial resources, one should solve complex technical tasks, train relevant specialists, introduce new technologies meeting environmental requirements, etc. Meanwhile, Ukraine's energy sector actually has no own funds for development: in the recent years, *Naftogaz Ukrainy* NJSC has been on the brink of default,<sup>20</sup> current rates of electricity generated by Ukrainian NPPs ensure minimum profitability.<sup>21</sup>

<sup>17</sup> The Energy Strategy was approved by the Cabinet of Ministers Directive No.145 of March 15, 2006.

<sup>18</sup> President of Ukraine Decree «On National Security and Defence Council of Ukraine Decision of December 9, 2005 «On State of Energy Security of Ukraine and Main Principles of State Policy in the Field of Its Provision» No.1863 of December 27, 2005.

<sup>19</sup> Funds are also needed for: an increase of uranium extraction; development of enterprises that will supply component parts for the fuel fabrication plant; possible participation of Ukraine in operation of the uranium enrichment enterprise in Angarsk, etc.

<sup>20</sup> According to the press service of the Accounting Chamber of Ukraine that audited *Naftogaz Ukrainy* NJSC, as of May, 2009, the company debts exceeded \$4.4 billion. In 2009 alone, it will need \$2.2 billion to repay overdue credits and interests on them, making more than half of the company equity capital, which may bar repayment of its debts. See: *Naftogaz* must pay half of its capital for credits. – *Media International Group*, May 12, 2009, <http://www.mignews.com.ua>

<sup>21</sup> The deficit of NNEGC *Energoatom* funds in 2009, on the condition of the current electricity rate conservation, will be close to \$250 million, while its current backlog to the Russian supplier of nuclear fuel (*TVEL* company) for previously delivered fuel makes some \$80 million. See: *Energoatom* will take credit to pay to Russians. – *Ekonomichna Pravda*, June 09, 2009, <http://www.epravda.com.ua>





As a result, the national energy sector has actually lost the potential not only for development but largely even for maintenance of the existing capacities. The main problems of Ukraine's energy sector (including its investment "hunger"<sup>22</sup>) include:

- wide use of archaic and obsolete equipment that requires replacement;
- large arrears of energy enterprises;<sup>23</sup>
- low domestic prices and tariffs of energy resources;
- exhaustion of exploited deposits of hydrocarbons and resultant need of development of new oil and gas fields, including on the shelf of the Black Sea and the Sea of Azov, which is much more costly than development of land deposits.

Now, these and other problems are aggravated by the world economic crisis that seriously delays almost all large-scale projects requiring significant foreign investments.

However, despite all negative circumstances, Ukraine partially implemented two diversification projects:

- **in the oil sector** – the project of the Eurasian oil transportation corridor using the Ukrainian oil transportation system "Odesa-Brody" (already built but operated in the reverse mode);
- **in the nuclear sector** – the project of supply of nuclear fuel produced by *Westinghouse* company (experimental fuel is now tested at power unit 3 of South-Ukraine NPP). Proposals of the Russian side and *Westinghouse* company concerning construction of a nuclear fuel fabrication plant in Ukraine are being considered.

In the gas sector, the issue of LNG supply to Ukraine is only being considered now.

Despite very slow implementation of those projects and tough opposition of lobbyist groups, they need to be implemented, to reduce 100% dependence on Russian deliveries.

In the recent years, strategic and current energy interests of Ukraine sometimes conflicted at implementation of

specific measures in the energy domain of the Russian-Ukrainian relations. Meanwhile, both the EU and Russia experience relations problems in energy sectors and propose projects advantageous first of all for them.

So, *first*, Ukraine, as an energy bridge between the EU and Russia, should not just not cause conflicts between them but conciliate and take into account the interests of all parties.

*Second*, although Ukraine's diversification policy is intended to reduce energy dependence on Russia, the Russian Federation was and remains Ukraine's strategic partner in next to all energy issues. Energy relations are vital for both countries. For Ukraine – to provide the national economy with energy resources, for Russia – to preserve and multiply proceeds from sale of hydrocarbons in the EU and Turkey using Ukrainian transit pipelines, despite Ukrainian and Russian stand on other issues, first of all, political, may be different.

The main task of the Ukrainian energy sector, at least in the middle run, lies not in implementation of large-scale international projects (e.g., projects of production of hydrocarbons in other countries, as proposed by the Energy Strategy) but in enhancement of its energy security by introduction of market principles in the energy sector on the basis of the EU experience and legislation, structural reforms and enhancement of energy effectiveness of the energy sector enterprises.

**International cooperation in the energy sector, including implementation of energy resources supply diversification projects, gives an effective tool to oppose new challenges and threats, overcome the global economic crisis, ensure energy security. Since power engineering is of key importance for successful development of the economy and creation of fundamentals for enhancement of the life quality in any country, further development of mutually advantageous international cooperation in that sector on the basis of equality and partnership, ensuring effective, reliable, environmentally clean and safe energy supply, should provide the basis for dealing with those threats and challenges.** ■

<sup>22</sup> The economic crisis caused a three-fold decline of investments in Ukraine in the 1<sup>st</sup> quarter of 2009: foreign direct investments (FDI) totalled \$1.18 billion, falling three-fold over the year – to 36.2% of the FDI in the 1<sup>st</sup> quarter of 2008. FDI mainly came to the finance sector – \$284.4 million, and real estate – \$236 million; industry received only \$78.3 million (6.7%). See: Full FDI. – *UANEWS.BIZ*, May 18, 2009, <http://uanews.biz>

<sup>23</sup> Foreign debts of energy enterprises subordinated to the Ministry of Fuel and Energy Ukraine as of May 1, 2009, totalled \$947 million, total debts with account of indebted loans – \$1.5 billion. For more detail see: Information-analytical study of the state of Ukraine's energy sector of. No.366. – Scientific-Technical Union of Powermen and Electricians of Ukraine, Centre of Public Information on Fuel and Energy Sector Problems, Kyiv, 2009, p.7.

## 2. DIVERSIFICATION OF SOURCES OF NATURAL GAS SUPPLY IN EURASIA

Diversification of sources and routes of gas supply in Eurasia as a factor of energy security pursues the goals of: (a) reduction of risks and minimisation of accidents effects at gas infrastructure facilities; (b) promotion of competition among exporters through the establishment of the gas market; (c) a decrease of political influence of the monopoly or large supplier and/or transit countries.

Currently, the Eurasian gas market is developing, implementing new gas supply projects under the influence of a number of global (external) and internal negative factors.<sup>1</sup> The main external factor is the current global economic crisis; internal factors include political and economic contradictions between the main actors of the Eurasian gas market – Russia and the EU, and a certain conflict of interests among some EU countries regarding the dependence on deliveries of Russian energy resources. In the Eurasian gas space, Ukraine is playing rather a passive role, due to the lack of political will and resources.

This section briefly describes the positions of the Eurasian gas market actors regarding diversification of sources and routes of gas supply and the main diversification projects touching the interests of Ukraine.

### 2.1 SPECIFICITY OF SOURCES AND ROUTES OF NATURAL GAS SUPPLY DIVERSIFICATION

Diversification of sources and routes of gas supply has a number of specificities stemming from its physical and process properties and conditioning prevalence of its transportation by pipelines (by contrast to oil). This is one of the reasons for difficulties in establishment of not only the global but also the common European or Eurasian gas market.

The gas infrastructure in general and transnational gas pipelines in particular require much higher investments, compared to the oil pipeline infrastructure and oil pipelines. So, as we noted above, to minimise risks for large investments, the gas industry rests on long-term commitments of the consumer – which, in turn, closely ties it to the supplier.

Development of liquefaction/regasification technologies at the end of 1950s paved up the way for production of liquefied natural gas (LNG) and its transportation by sea. Hence, LNG gives an additional opportunity of sources and routes of gas deliveries diversification, usually used by coastal countries that develop the relevant infrastructure for LNG shipment/acceptance and build (freight) methane carriers for its transportation.

Now, despite the rather high value of liquefaction/regasification technologies and equipment, LNG provides an economic alternative to gas transportation by pipelines, first of all, at large distances. Pipelines remain the main and most common method of gas transportation.

Diversification of sources and routes of gas supply was the core principle of rapid growth of gas consumption in Western Europe (Insert “*Diversification of sources and routes of gas supply to Europe*”). West European governments encouraged consumption of gas because of its high process and environmental properties as a fuel and a raw material. So, the EU agreed to gradually raise gas imports, first, from the USSR, and then – from Russia, under long-term contracts. Now, there is no document in the EU or an EU member states limiting the share of the Russian gas in their balances. Spain alone legislatively established the ceiling of gas imports from one source at 60%.<sup>2</sup> Nevertheless, it may be assumed that the requirement of diversification of gas supply sources began to be formed amidst fears in the West of growing influence on the USSR on the EU gas supply. Next, development of market relations prompted development of new sources and routes of supply.

The past decade saw several conflicts of European countries with gas suppliers.<sup>3</sup> Especially acute was a series of gas crises in 2004-2009, involving partial or full stoppage

<sup>1</sup> “Eurasian gas market” – a conventional term that enables analysis of the correlation among the key projects of new gas pipelines, including in Ukraine’s sphere of interests. As we know, there is no world market of gas (except liquefied natural gas), only regional gas markets are active.

<sup>2</sup> Differentiating Reality from Rumours: Some Considerations on the Alleged Restrictions on Natural Gas Imports from Russia. Paper based on input from Member States. – European Commission, 2003 December 18, [http://ec.europa.eu/energy/international/bilateral\\_cooperation/russia/doc/issues/gaz\\_import.pdf](http://ec.europa.eu/energy/international/bilateral_cooperation/russia/doc/issues/gaz_import.pdf)

<sup>3</sup> For instance, in 2007, Spain and Algeria had a price dispute in connection with deliveries of Algerian gas under a contract signed yet in 1995 that did not take into account dependence of changes in the world gas prices on prices of oil. See: Spain and Algeria close to solving energy dispute. Report. – M&G, Jul 30, 2007, <http://www.monstersandcritics.com>



of Russian gas deliveries via Belarus and Ukraine (that also hit the EU countries). Such developments prompted the EU countries to focus their policy of energy supply security, i.e., search for new sources of gas supply, development and implementation of new gas pipeline projects.

**So, it may be concluded that diversification processes in Europe were taking place over past 40 years, but became one of the main elements of the energy security and lines of the energy policy mainly in the current decade.**

#### DIVERSIFICATION OF SOURCES AND ROUTES OF GAS SUPPLY TO EUROPE

In 1960-1970s, the demand for gas in Germany, France and Italy far exceeded their domestic production, making them to import it. The Netherlands, after the discovery of the gigantic Groningen field,<sup>4</sup> began exporting gas in significant volumes, mainly to Germany.

That period saw growth of gas production and large-scale construction of national and transnational gas networks. The first transnational gas transportation systems were laid from the Netherlands; later, the world largest gas transit system from the USSR to Central and West European countries was built.

From late 1960s, Soviet gas was supplied to the former socialist countries. The first gas was delivered from the USSR to Czechoslovakia by *Bratstvo* gas pipeline in 1967; later, the gas pipeline was extended to Austria (Baumgarten, 1967) and France (1984). That gas transportation system carried 1 BCM of gas in 1969, and nearly 80 BCM 30 years later. Simultaneously with *Bratstvo*, the Northern corridor was built to supply gas to Romania and Bulgaria (1974), later – to Turkey (1987) and Greece (1988).

Other gas pipelines from the USSR followed. For instance, Yamal-Europe transcontinental gas pipeline supplied gas via Belarus to Poland (1996) and further to Germany (1997). Starting from 1985, the West European market of gas became the main source of incomes from gas exports for the USSR (surpassing the East European).

Reduction of the EU gas dependence on the USSR, sought by the USA,<sup>5</sup> was facilitated by the discovery of *Troll* field in Norway (1977), followed by deliveries of gas from Algeria and Great Britain. It may be suggested that the first limitations of gas volumes supplied from one source were imposed against “Soviet” gas deliveries to the EU countries.

The consumer countries widely used available possibilities for diversification of gas supply sources. For instance, France in 1960s signed contracts of gas supply from Algeria and the Netherlands, in 1970s – from the USSR, in 1980s – from Norway.

Introduction of LNG technologies widely expanded the geography of Western Europe gas suppliers and gas trade in general. The first methane carrier with LNG arrived in Great Britain in 1959 from the Gulf of Mexico;<sup>6</sup> five years later, Algeria started to supply LNG to France. With time, Egypt, Libya, Oman, Qatar and Nigeria joined the club of LNG suppliers to Europe.

However, pipelines remained the main method of supply. In 1981, Italy was the first to lay a long-distance deep sea gas pipeline by starting construction of *Transmed* gas pipeline from Tunisia to Italy (completed in 1983).

## 2.2 INTERESTS OF EURASIAN GAS MARKET ACTORS REGARDING DIVERSIFICATION OF SOURCES AND ROUTES OF GAS SUPPLY

As we mentioned above, many EU countries announced and are implementing projects of sources and routes of gas delivery diversification – by gas pipelines and LNG terminals. The main actors of the Eurasian gas market are the countries – large consumers, suppliers (producers) and transmitters of gas on the continent. They include, first of all: the EU and West European countries as a whole (mainly, consumers and transmitters of gas); Baltic, Central and East European countries (transmitters and consumers); the largest Eurasian suppliers of gas – Russia and countries of the Caspian region and Central Asia (Azerbaijan, Iran,<sup>7</sup> Kazakhstan, Turkmenistan, Uzbekistan).

Analysis of the interests of those Eurasian gas market actors in new gas pipeline projects shows that those interests lie mainly in the promotion of their own projects, not always backed with resources (raw materials) and commercially the most attractive, compared to alternatives. The latter proves excessive politicisation of gas supply issues, so, it may be assumed that quite a few of the proposed diversification projects are only elements of a political play and will not be implemented even in a remote future.

**Ukraine’s position regarding diversification of gas supply sources has its specificity.** *First*, despite the world largest reserves of gas in the neighbour countries (first of all – Russia) and a ramified network of main pipelines for its supply to the Ukrainian territory, the Russian-Ukrainian relations in the gas sector were and remain problem-hit. The “gas factor” is used by Russia for solution of other problems of bilateral relations and has become a “classic” means of political pressure on Ukraine. Meanwhile, possessing (theoretically) the best conditions for cooperation with Russia in the gas sector and some transit commitments to the EU, Ukraine should cherish mutually advantageous and partner Russian-Ukrainian cooperation.

*Second*, so-called “gas wars” of Russia with Ukraine and Belarus make the EU and Russia alike to study and implement projects of bypass gas pipelines going around the territory of Ukraine and Belarus (the main transmitters of Russian gas supplied to the EU). To be sure, in such conditions, the overwhelming majority of projects developed in Eurasia proceed from the interests that may run contrary to the interests of Ukraine as a transmitter of Russian gas.

*Third*, among many gas pipeline projects implemented or proposed to be implemented in Eurasia, there are actually no projects Ukraine could join to diversify sources of its delivery for domestic needs.

<sup>4</sup> The field of 2.6 trillion cu.m of gas was discovered in 1959 in the province of Groningen. See: Development of Competitive Gas Trading in Continental Europe. How to achieve workable competition in European gas markets? – IEA Information Paper, May 2008, p.11, [http://www.iea.org/textbase/papers/2008/gas\\_trading.pdf](http://www.iea.org/textbase/papers/2008/gas_trading.pdf)

<sup>5</sup> In early 1980s, the Government of the Federal Republic of Germany limited the share of Soviet gas in the national gas balance by 30%. See: Development of Competitive Gas Trading in Continental Europe. How to achieve workable competition in European gas markets? – IEA Information Paper, May 2008, p.17, [http://www.iea.org/textbase/papers/2008/gas\\_trading.pdf](http://www.iea.org/textbase/papers/2008/gas_trading.pdf)

<sup>6</sup> Later, after discovery of significant reserves in the North Sea, Great Britain refused from imports of gas and resumed it only a few years ago.

<sup>7</sup> Iran, possessing second world largest gas reserves, is a potential large supplier.





In the period of independence, several diversification pipeline projects were proposed in Ukraine (deliveries of Iranian gas, the *White Stream*, etc.), but for different reasons they were not seriously treated by potential partners. This is mainly attributed to reasons beyond reasonable control – the remoteness of deposits, complexity and high value of pipeline projects, lack of the country's resources, lack of political and economic support abroad.

*Fourth*, supply of LNG – now, a traditional for the EU way of gas supply sources diversification – is not practiced in the CIS states, including Ukraine, on the one hand, due to the existence of a ramified network of main pipelines, on the other – because of the absence of the required technologies and equipment. Meanwhile, today, LNG and regasification technologies are readily available on the market, and any country can use them – if it has the funds (in the conditions of Ukraine, also the political will) (Insert “LNG supply to Europe”).

*Fifth*, diversification of gas supply sources without solution of other problems of the energy sector dealing with gas supply will not substantially enhance Ukraine's energy security. The following lines of structural reforms are relevant here: a large decrease in gas consumption by all categories of consumers at the expense of energy-saving technologies and equipment introduction; an increase in domestic production of gas through creation of a favourable investment climate in the branch; diversification of the energy balance at the expense of partial replacement of gas with coal and electricity, use of renewable and alternative sources of energy, etc.

**European Union.** Currently, the EU is the largest importer of gas seeking to diversify the sources and routes of supply, in particular – to reduce dependence on Russian gas. Meanwhile, there are different approaches in the EU as to the expediency of implementation of some gas pipeline projects, witnessing differences in the national interests in the energy sector. So, the EU intention to enhance reliability of gas deliveries in the conditions of Russian-Belarusian and Russian-Ukrainian gas conflicts may be undermined by the desire of some EU members to get orders for its industry and/or proceeds from transit of Russian gas. For instance, Germany supports the Russian project of the *Nord Stream* gas pipeline, opposed by the Baltic countries and Poland (and some other states) that propose, instead of *Nord Stream*, building a gas pipeline from Russia across their territory (for instance, the *Amber* gas pipeline project).

#### EU interests in gas supply sector:

- enhancement of gas supply reliability using existing sources and routes;
- **diversification of sources and routes of gas supply** with access to gas sectors of Central Asian states, to reduce gas dependence on Russia;<sup>8</sup> implementation

of a project of gas deliveries from the Caspian region;

- development of LNG admission infrastructure;
- further liberalisation of the gas market and extension of some requirements to market actors to third countries active on the EU gas market.

**Ukraine.** Ukraine is one of the largest consumers and transitors of Russian gas (first of all, bought by Russia in Central Asian countries<sup>9</sup>). At that, it is short of funds and foreign political support for implementation of new projects of gas supply from alternative sources.

#### Interests of Ukraine in the field of gas supply:

- diversification of sources and routes of gas deliveries;
- preservation of volumes of Russian gas transit to the EU countries, Switzerland, Moldova, Bosnia and Herzegovina, Croatia, Serbia, Albania and Turkey, and in case of Russia's refusal from construction of bypass gas pipelines – growth of gas transit with upgrade of the Ukrainian gas transportation system (GTS);
- preservation of competitive advantages of the Ukrainian GTS on the Eurasian market of gas transportation services;
- integration in the EU gas market;
- renegotiation of contracts with Russia (*Gazprom OJSC*) in the gas sector on fair market, mutually advantageous conditions, including *ship or pay*, in the contract of transit services;
- development of the domestic gas production sector through pursuance of an effective tax and investment policy.

Noteworthy, those interests can be secured only on the condition of effective and reliable operation of the Ukrainian GTS by means of its reconstruction and modernisation, adoption of the EU legislation (standards) in the Ukrainian legislation and establishment of mutually advantageous and effective cooperation with Russia and other countries possessing substantial deposits of gas.

**Russia.** Russia, possessing the strongest gas production potential in Eurasia, is pursuing a policy of reduction of dependence on transit countries (and costs of transit services) through implementation of gas pipeline projects, including by sea – several times more expensive than land gas pipelines. The complexity and length of most of the new gas pipelines question the economic return and witness domination of political considerations in those projects.

As regards the plans of new gas pipelines construction, they are inconsistent with the present financial capabilities

<sup>8</sup> After many years of hesitation, the EU took a course to cooperation with Turkmenistan that has problems with observance of human rights, but also substantial hydrocarbon reserves. In particular, after 11 years of hot debate, European Parliament on April 22, 2009, approved a new trade agreement between the EU and Turkmenistan. 459 MPs voted for the document giving EU companies access to the domestic energy sector of Turkmenistan (162 MPs voted against because of violations of human rights in Turkmenistan). The EU and EC leadership hopes that this step will improve relations with Turkmenistan, and it will after all join *Nabucco* project as the main raw material base for the project. See: EU agreed with Turkmenistan gas deliveries bypassing Russia. – *Izvestia*, April 23, 2009, <http://www.izvestia.ru/>

<sup>9</sup> In 2009, after an accident at a gas pipeline in Turkmenistan, Ukraine consumes mainly Russian gas.





## LNG SUPPLY TO EUROPE

Currently, LNG accounts for 7.5% of the world gas consumption, and according to IEA estimates, its share will grow to 16% by 2030.<sup>1</sup> LNG price is traditionally somewhat higher than that of pipeline gas, first of all, due to the employment of energy-consuming and expensive low-temperature technologies and equipment. In the past 10 years, declining costs of LNG infrastructure construction and growing prices of natural gas turned LNG into a global energy resource that can unite countries not connected by gas pipelines. In 2008, LNG deliveries totalled 27.8% of all gas sales.<sup>2</sup>

LNG provides an economic alternative to pipeline transportation of natural gas, first of all, at large distances. Fall of gas extraction in the North Sea, growth of the cost of gas extraction, deregulation of the EU gas market created new, more favourable conditions for LNG imports to the EU. All those factors, along with LNG suppliers practicing a mixed model of trade in LNG that became more flexible thanks to producers allowing free sale, alongside long-term contracts, pave the way for further development of that sub-sector of the gas industry in Europe.

In the EU, as of mid-2009, 13 LNG terminals were operated in seven countries (two in Turkey), five terminals were being built or planned, construction of 29 terminals was considered. The share of LNG in total imports of gas to the EU makes almost 13%.

All in all, construction of 33 terminals is considered in Europe, including one in Ukraine (Map "LNG terminals in Europe").

The main suppliers of LNG to Europe are Algeria, Libya, Australia and UAE, deliveries grow from Qatar.<sup>3</sup> Meanwhile, growth of LNG imports

LNG terminals in Europe



to countries obtaining significant volumes of gas by pipelines does not mean complete refusal from pipeline deliveries but only their partial replacement.

## LNG SUPPLY TO UKRAINE

Creation of the LNG admission infrastructure in Ukraine has both positive and negative preconditions. The positive ones include:

- possibility of cooperation with neighbouring countries (to share gas deliveries and, respectively, costs);
- possibility of a gradual increase in the LNG plant capacities at the expense of phased construction (for instance, the first phase of the LNG project can have the annual capacity of 1.5 BCM, the second – another 1.5 BCM);
- LNG offers and technologies, and availability of services of gas carriage by tankers;
- possibility to employ the experience of creation of the EU legislation and standards in the LNG sector;
- availability of specialists in allied low-temperature technologies who only need some retraining.

The negative are:

- lack of industrial LNG technologies usage experience;
- absence of the legislation and standards in the sector;
- lack of specialists;
- absence of deep sea ports for admission of methane carrier super tankers with large deadweight (deadweight is important for transportation costs),
- necessity of deepening operations in the selected sea port.

In the recent years, Ukraine have realised that in absence of realistic projects of pipelines diversification, deliveries of LNG remain the only alternative.<sup>4</sup> On July 14, 2009, the Ministry of Fuel and Energy hosted a meeting devoted to construction of an LNG terminal that gathered representatives of *SNCLavalin International Inc.*, *Mitsubishi Corporation*, *Chalyk Holding*, *Gap Insaat*, *Sancakli Group* and other companies. It was decided to set up a working group for coordination of the LNG project activities in Ukraine, to study the issues of the business plan development, drawing funds and ways of the project implementation.<sup>5</sup>

Construction of a terminal (plant) for LNG admission does not require political support, as transnational gas pipeline projects do. Only funds for construction are needed (their amount depends on the capacity), agreements with companies supplying LNG and equipment, freight or purchase of methane carrying tankers. There are many market proposals of LNG sale, terminal construction services, freight (or construction) of tankers, especially now, at a time of crisis.

The project can be implemented beyond strategic prospects (over 15 years), only because of the lack of funds in Ukraine.<sup>6</sup>

<sup>1</sup> BP Statistical Review of World Energy, June 2009, p.22-30, <http://www.bp.com>

<sup>2</sup> *Ibid.*, p.30.

<sup>3</sup> LNG in Europe. An Overview of European Import Terminals. King&Spelding International LLP, 2008, p.124, [http://www.kslaw.com/library/pdf/LNG\\_in\\_Europe.pdf](http://www.kslaw.com/library/pdf/LNG_in_Europe.pdf)

<sup>4</sup> LNG is obtained by cooling natural gas to 162°C. In the liquid form, the volume of gas is 600 times smaller, which provides much higher effectiveness of its storage and transportation. LNG is transported in the same way as oil, by special tankers – methane carriers. In importer countries it is kept in tanks, and at special terminals, LNG is heated, returning to the gaseous state, and then pumped to the gas transportation system.

<sup>5</sup> Ministry of Fuel and Energy and *SNC Lavalin* determined priority lines of cooperation. – Information-analytical portal *Energobiznes*, July 21, 2009, <http://www.eb.com.ua>

<sup>6</sup> Implementation of an LNG admission project in Ukraine will also pose an obstacle for the Russian-Ukrainian contract of gas supply through 2019, with its far overstated volumes of deliveries of Russian gas and tough economic sanctions envisaged for its non-admission.



of the country and development of gas fields, while the decline of gas consumption in Eurasia (including Russia<sup>10</sup>) due to the global economic crisis questions not only the planned terms of implementation of ambitious Russian projects but also the economic rationale of some of them, for instance, *Blue Stream 2* and *South Stream*.

In the years to come, one should expect a strong decline of gas sales, both inside and outside the country; the figures of 2008 may be surpassed only in 5-7 years (Table “*Gas sales by Gazprom in 2008-2012*”<sup>11</sup>).

Gas sales by Gazprom in 2008-2012, BCM					
	Actual	Forecast			
	2008	2009	2010	2011	2012
Total deliveries, including:	565	497	512	529	538
• in Russia	327	292	302	311	314
• for export	238	205	210	218	224

In the conditions of the world economic crisis, the EU plans of fundamental reduction of all energy resources consumption, possibility of greater utilisation and expansion of the existing gas pipeline systems, first of all, Ukrainian (as the most economic way to increase gas deliveries), impracticability of participation in joint management of the Ukrainian GTS (due to the legislative ban and unreadiness of Ukrainian society), Russia is pursuing rather an adventurous, in the present conditions, and aggressive policy in the gas sector, to a large extent aimed against Ukraine.

Furthermore, the sharp reduction of Russian gas consumption, re-export or resale of imported gas (from Central Asian states, later – from Azerbaijan) inflict serious losses on *Gazprom*, making it to reduce production of gas that brings real revenues to it and proceeds to the Russian state budget (through payment of duties).

Despite all that, the Russian leadership, pursuing its geopolitical goals, is trying to solve three strategic tasks:

- a) promotion of the *South Stream* and *Nord Stream* projects, including by defamation of Ukraine in the eyes of the EU leadership, attempts to present it as a state unable to ensure reliable transit of Russian gas to Europe;
- b) participation of *Gazprom* in one or another organisational-legal form in the management of the Ukrainian GTS;
- c) growth of influence on the Ukrainian authorities for attainment of its political and economic goals in the European space.

Now, Russia is trying (with Italian and, possibly, French support) to turn *South Stream* into a Eurasian mega-project of the century and have it on the list of the EU priority projects. For instance, the draft document “General scheme of gas sector development through 2030” formulates one of the goals of that gas pipeline as follows: “...to minimise volumes of transportation of Russian natural gas by the territory of foreign states at the expense of possible transfer of export deliveries of gas from the “Ukrainian corridor”<sup>12</sup>.

Commissioning of the *South Stream* gas pipeline will reduce pumping of Russian gas via Ukraine more than two-fold, and with implementation of the *Nord Stream* project, can totally stop gas transit via Ukraine.

However, full-scale implementation (regarding gas volumes and terms of commissioning) of Russian bypass gas pipelines seems unlikely. Nevertheless, in the long run, Ukraine may face a serious decrease in the transit of Russian gas – unless a mutually acceptable compromise in the EU-Ukraine-Russia gas triangle is found.

**Interests of Russia in the field of gas supply:**

- **diversification of gas export routes for reduction of transit risks;**
- guarantee of unconditional state sovereignty over national energy resources;
- preservation of monopoly of procurement and transportation of gas from the CIS states (first of all, Turkmenistan, Kazakhstan and Uzbekistan; also from Azerbaijan) to Europe;
- growth of influence on gas sectors of the CIS states;
- growth, in a longer run, of imports of gas from Central Asian states by means of upgrade of the existing and construction of new gas pipelines;
- control of transit (first of all, gas transportation) systems carrying Russian gas and gas from the CIS states;
- outstripping competing gas pipeline projects through implementation of its own, despite even the lag in preparation of the raw material base for their filling;
- access to the gas transportation infrastructure of the countries transiting and importing Russian gas;
- promotion of the eastern direction of gas supply (including LNG).<sup>13</sup>

**Turkmenistan.** Turkmenistan possesses the second largest gas reserves in the CIS and has agreements of

<sup>10</sup> In January-March, 2009, Europe reduced gas consumption by 5.4%, compared to the first quarter of 2008, decreasing imports by 13.7% and exports – by 0.9%. *Gazprom*, with its inflexible pricing policy and gas wars, lost most of all – its losses in that timeframe hit 38% on the West European and 43% – Central and East European markets. *Gazprom* yielded to Norwegian *StatoilHydro*, German *E.ON Ruhrgas* and *Wintershall*, and French *GDF Suez*. See: Hryb N., Havrysh O. Europe switched to itself. *Gazprom* is losing markets. – *Kommersant Ukraina*, June 15, 2009, <http://www.kommersant.ua>

<sup>11</sup> Source: Tighten belts. – *Vedomosti*, April 27, 2009, <http://www.vedomosti.ru>

<sup>12</sup> General scheme of the gas sector development through 2030 (draft). – Moscow, 2008, p.333.

<sup>13</sup> On February 19, 2009, the first tanker with LNG left Russia for Japan. Russia became the 15<sup>th</sup> LNG producer in the world.



different levels for gas supply to the EU, Russia, Iran, China (a gas pipeline being built), Pakistan and India (via Afghanistan).<sup>14</sup>

The uneasy “gas” relations with Russia prompted Turkmenistan and the EU to step up efforts for promotion of the *Nabucco* gas pipeline, bypassing Russia (Insert “*Consequences of accident at Central Asia-Centre-4 gas pipeline*”).

On April 16, 2009, the Turkmenistan President Agency for Use of Hydrocarbon Resources and the German concern *RWE AG* signed a Memorandum of Long-Term Cooperation.<sup>15</sup> The document provides for: (a) signing of a product sharing agreement with respect to block 23 of the Turkmen shelf of the Caspian Sea; (b) conclusion of a long-term contract for direct procurement of Turkmen gas; (c) sale and transfer of German technologies to Turkmen enterprises active in the sector; (d) assistance with the development of the Turkmen GTS and geological prospecting.

*RWE* will be the second (after *Wintershall*) German operator working on the Turkmen shelf of the Caspian Sea.<sup>16</sup> Meanwhile, *RWE AG* cannot supply gas for *Nabucco*

yet (commissioning planned for 2014), since this will require 7-8 years of preparatory work.<sup>17</sup>

**Interests of Turkmenistan in the field of gas supply:**

- development of the gas sector for its establishment as a state – large international supplier of gas;
- **diversification of gas consumers in all possible directions;**
- minimisation of dependence on Russia in export of Turkmen gas;
- an end to international isolation thanks to multinational cooperation in the gas sector;
- creation of a capacious channel of export to China;
- expansion of the export channel to Iran;
- transition to market prices on sale of domestic gas;<sup>18</sup>
- conclusion of direct contracts of gas supply with consumers;
- raising foreign credits for the gas sector.

**Azerbaijan.** Azerbaijan has recently ceased imports of Russian gas, become a net exporter of domestically

**CONSEQUENCES OF ACCIDENT AT  
“CENTRAL ASIA – CENTRE 4” GAS PIPELINE**

On April 9, 2009, Turkmenistan fully stopped gas deliveries to Russia due to an explosion at the Central Asia – Centre 4 gas pipeline (CAC-4). According to the Turkmen side, the explosion was caused by sudden cessation of gas admission by *Gazpromexport* company (a subsidiary of *Gazprom*). The Russian side insisted that it had sent a notice, and did that timely (a letter of April 7).<sup>19</sup>

In any case, stoppage of deliveries and preservation of the situation in the short and even middle run are economically favourable for *Gazprom* whose leadership had previously said that due to the drop in demand abroad and in Russia itself, production of gas in the forthcoming years would go down. In particular, on April 9, 2009, *Gazprom* Deputy Chairman of the Board V.Golubev reported that because of the financial crisis, *Gazprom* would reduce gas production by 10% in the next 4-5 years (60-70 BCM/year), which only a little exceeds traditional volumes of imports from Turkmenistan (approximately 42 BCM).

*Gazprom*, reducing its production and importing Turkmen gas, in the 1<sup>st</sup> quarter of 2009 lost over \$1 billion, since sale of its own gas gives more profit, compared to “formula-based” sale of Turkmen gas.<sup>20</sup>

So, stoppage of deliveries from Turkmenistan let it significantly increase domestic production of gas. The Central Dispatching Office of the energy sector of the Ministry of Energy of Russia reported that

within three days – from the 9<sup>th</sup> till the 11<sup>th</sup> of April – *Gazprom* increased production from 1.099 million to 1.186 million cu.m per day, or by 8%.<sup>21</sup>

By contrast, Turkmenistan in the result of the accident had to stop gas extraction at 195 wells, its consequences were removed only on June 1, 2009.<sup>22</sup>

The accident brought to light a number of long-standing problems in the Russian-Turkmen relations, namely:

- *Gazprom*, in the conditions of domestic gas excess caused by the drop of demand in Europe, is not interested in purchases of Turkmen gas in the contracted volumes;
- the Turkmen policy of equal remoteness from the main geopolitical actors does not meet the interests of Russia, seeking domination in Central Asia;
- Turkmenistan is more interested in cooperation with the EU (*Nabucco* project) and China (Turkmenistan-China gas pipeline project) than in implementation of the pro-Russian project of construction of the Trans-Caspian gas pipeline, falling into greater transit dependence on Russia.

The accident and related events might have prompted the Turkmen leadership to join *Nabucco* project, despite even the difficulty of the Caspian Sea allotment.

<sup>14</sup> It should be noted that reserves of Turkmenistan are not finally determined.

<sup>15</sup> *RWE* company is a shareholder of *Nabucco* pipeline consortium, *Caspian Energy Company* building the Trans-Caspian gas pipeline and partner of Austrian *OMV* company (agreed to finance construction of trans-Turkmen gas pipeline “East-West” to connect the gigantic South Iolotan-Osman field to European networks).

<sup>16</sup> Concern *RWE AG* ranks among five largest European energy supply, power generation and gas sale companies. The concern seeks to replace Russia as the main strategic partner of Turkmenistan in the energy sector.

<sup>17</sup> Geological prospecting – 3-5 years; field infrastructure development and preparation for industrial production – 2 years; construction of the gas transportation network – 1-2 years, etc.

<sup>18</sup> This is already done for Russia, and transfer to market prices is planned at sale of gas to Iran and with time – to China.

<sup>19</sup> See: Dubnov A. Undermining atmosphere. Explosion of CAC-4 gas pipeline evidently damages the image of Ashgabat. – *Centrasia*, April 12, 2009, <http://www.centrasia.ru>

<sup>20</sup> See: Hryvach A. Price of Middle Asian partnership. *Gazprom* lost on gas procurement in the first quarter more than a billion dollars. – *Vremya Novostei*. April 14, 2009, <http://www.vremya.ru>

<sup>21</sup> Kulikov S. *Gazprom* reaps the fruits of accident. Ashgabat and Moscow reassess prospects of bilateral cooperation – *Nezavisimaya Gazeta*, April 15, 2009, <http://www.ng.ru>

<sup>22</sup> See: Turkmenistan stopped extraction at 195 wells because of an accident. – *Oilcapital.Ru*, May 29, 2009, <http://www.oilcapital.ru>



extracted gas and plans to turn from a regional supplier of gas into a European.<sup>23</sup> The country receives many bids for its gas extracted at the Shah Deniz field and is choosing the best commercial proposal.<sup>24</sup> The relevant projects include:

- supply of gas to Russia by the existing gas pipeline Mozdok - Kazi-Magomed with the designed capacity of 10 BCM a year (built in the Soviet times, now non-operational);
- Turkey-Greece-Italy gas pipeline;
- *Nabucco* gas pipeline.

Recently, Azerbaijan has been inclined to export gas to Russia. According to President I. Aliev: "Cooperation with *Gazprom* will enable Azerbaijan to diversify gas deliveries and enter new markets".<sup>25</sup> On June 30, 2009, an Azerbaijan-Russian contract of purchase and sale of Azeri gas was signed in Baku.

This direction has the undisputed advantage of transit costs absence and no need of a new gas pipeline construction (using Mozdok - Kazi-Magomed line).

So, Azerbaijan's choice of the Russian direction of export, despite the difficult political relations with Moscow, is the most economic and easy project in the conditions of the world economic crisis.

Meanwhile, the low capacity of the gas pipeline enables supply of small volumes of gas (up to 1 BCM in 2010) also to the EU (first of all, to Greece and Italy) via Turkey. The latter plans not only to buy Azeri gas but to re-export it, prompting Azerbaijan's leadership to shift approaches in cooperation with Turkey and look for other transit routes.

#### Interests of Azerbaijan in the field of gas supply:

- strengthening of its export position and **diversification of gas consumers in all possible directions, including to Europe;**
- employment of gas from other countries for transit flows;
- formulation of commercial approaches in the gas policy;<sup>26</sup>
- transformation of the country into a node of export and transit of hydrocarbons.

**Uzbekistan** is a large regional producer, exporter and transitor of gas. Its interests in the field of gas supply include: priority development of the gas sector; employment of gas from other countries for generation of

revenues from transit; enhancement of regional influence on Central Asian states using gas deliveries; transition to market prices at sale of domestic gas.

**Kazakhstan.** The country possesses significant gas reserves and is a regional transitor of gas, but actually remains a gas appendage to Russia. Main interests: furtherance of a common gas policy with Russia; employment of new volumes of Turkmen gas for transit (transportation to Russia and China); transfer to market prices at sale of domestic gas.

**Correlation and analysis of interests of the Eurasian gas market actors witness that today, planning and implementation of new gas pipeline projects are in most cases controlled by the owner of gas deposits or the supplier (producer). However, the sharp decrease in demand for gas due to the global economic crisis can not only limit the dictate of the seller (producer) but also give significant advantages to buyers (consumers) of gas. The most powerful market actors – the EU and Russia, trying to diversify ways and sources of gas deliveries, often neglect economic principles and reliance of projects on the raw material base.**

## 2.3 GAS PIPELINE PROJECTS INFLUENCING UKRAINE'S INTERESTS

In the recent decades, power engineering and geopolitics have merged so closely that any project of a transnational gas pipeline is viewed through the political prism. As a result, projects with evident economic advantages were often delayed, while purely political ones, whose economic rationality was questionable, met support and were even implemented (for instance, the *Blue Stream*). The world economic crisis makes its adjustments, making economic pragmatism a higher priority, compared to political expediency.

Therefore, one may expect a comprehensive comparative economic assessment of competing projects, taking account of potential gas demand, availability of its deposits, acceptability of prices and tariffs, etc. before implementation of new gas pipeline construction plans.

Described below are major gas pipeline projects in one or another way influencing Ukraine's interests in the gas sector (Insert "*Russian projects of gas supply influencing Ukraine's interests*", Map "*Projects of gas supply influencing Ukraine's interests*", p.18-19).

<sup>23</sup> Till 2007, *Gazprom* supplied gas to Azerbaijan (in 2006 – nearly 4.5 BCM for \$110/1 thousand cu.m). Starting from 2007, Azerbaijan refused from imports, due to, *first*, production of significant volumes of gas at its Shah Deniz field, *second*, a sharp rise of the price of Russian gas – to \$235/1 thousand cu.m. Now, Azerbaijan fully provides itself with gas and supplies it to Georgia and Turkey that resells part of Azeri gas to Greece.

<sup>24</sup> Partners in Shah Deniz development are: *British Petroleum* (operator, 25.5%), Sweden's *Statoil* (25.5%), *SOCAR* (State Oil Company of Azerbaijan Republic) (10%), Russian *LUKoil* (10%), Iranian *NICO* (10%), French *TotalFinaElf* (10%) and Turkish *TPAO* (9%). Reserves of the field are estimated at 0.625 trillion cu.m of gas. Phase 1 of the field development envisages production of 178 BCM of gas (maximum – 8.4 BCM/year).

Within Phase 1 framework, agreements were signed of gas sale to Turkey (6.3 BCM/year), Azerbaijan itself (up to 1.5 BCM) and Georgia (up to 0.8 BCM). Gas is carried by the South Caucasus pipeline (Baku-Georgia-Turkish border); its capacity is up to 20 BCM; length – 690 km (442 km – in Azerbaijan, 248 km – in Georgia).

At Phase 2 (commencement preliminarily set for 2014), production of up to 16 BCM a year is planned.

<sup>25</sup> On March 27, 2009, *Gazprom* and *SOCAR* signed a memorandum of understanding on sale of Azeri gas to *Gazprom* starting from 2010 See: Not by Turkmen gas alone. – *Finansovye Izvestia*, April 20, 2009, <http://fin.izvestia.ru>

<sup>26</sup> According to *SOCAR* President S. Abdullaev, Azerbaijan will prefer commercially the most beneficial project of gas transportation from Shah Deniz field. See: Azerbaijan will prefer commercially the most beneficial project of gas transportation from Shah Deniz field. – *Oilcapital.ru*, April 20, 2009, <http://www.oilcapital.ru>





## RUSSIAN PROJECTS OF GAS SUPPLY INFLUENCING UKRAINE'S INTERESTS

**Nord Stream** (prior name: North European gas pipeline) – a joint project of four companies: *Gazprom* (51%), German *E.ON Ruhrgas* (20%) and *Wintershall Holding AG* (20%),<sup>27</sup> Dutch *Nederlandse Gasunie* (9%). The project has been planned since 2005; partially implemented on the Russian territory.<sup>28</sup> However, its full-scale implementation is hindered by a number of factors:

- disinterest of Poland and the Baltic states in growth of Russia's energy influence on North-West European countries;
- high risks of emergency situations when laying the underwater segment of the gas pipeline, due to conventional and chemical weapons left in the Baltic Sea since World War II;
- technical difficulty of gas transportation by a 1200 km long sea gas pipeline without intermediate compressor stations.

The project can be implemented in the long run (5-10 years) on the condition of said problems solution (first of all – risks of emergency situations in the Baltic Sea).<sup>29</sup>

**Trans-Caspian gas pipeline.** Implementation of the project is hindered, *first*, by deterioration of the Russian-Turkmen relations in the gas sector (in particular, Turkmen plans to minimise dependence on Russia); *second* – reliance on resources of the Caspian Sea shelf, the development of which requires much time and funds.<sup>30</sup>

It is planned that in 2010, fields of the Caspian Sea will supply to the gas pipeline up to 2.5 BCM of gas, in 2012-2013 – 5 billion, in 2014-2030 – 10 BCM a year.

The rest is to be provided with the development of one of the largest fields in the world – South Iolotan-Osman.<sup>31</sup> In the forthcoming years, it is planned to implement a large-scale development project that envisages drilling of 120 operational wells, construction of eight units for preliminary processing of gas and two plants for removal of sulphur with the aggregate capacity of 40 BCM/year. A tender for the field development was announced. *Petrofac*, *Termodesign*, *Zarubehgazstroj* and the Chinese National Oil and Gas Company are ready to take part.<sup>32</sup>

The project can be implemented in the strategic future (in 11-15 years).

**South Stream.** A gas pipeline designed to supply Russian gas to South European countries. The sea segment of the gas pipeline is to run from Russia (*Beregovaya* compressor station on the Russian coast) to the Bulgarian coast across the Black Sea. Two routes from Bulgaria are considered – to Austria and to Italy. The total length of the sea segment is 900 km, land routes are not elaborately planned. The gas pipeline is to pass across the zones of economic interests of Ukraine and Romania, which requires relevant governmental construction permits. Meanwhile, movement of the gas pipeline to the zone of economic interests of Turkey, despite raising the project cost, will be supported by Istanbul.

On May 18, 2009, *Gazprom* and Italian *ENI* signed the second annex to the memorandum of understanding on the project implementation that envisaged an increase in the capacity of the sea segment of the gas pipeline from 31 to 63 BCM/year<sup>33</sup> and a simultaneous decrease in the project cost (from €25 billion to €8.6 billion). This step may be commented as follows.

*First*, doubling of the designed capacity of the gas pipeline in the conditions of a demand for gas decline may be viewed as political bluff.

*Second*, in absence of a definite raw material base (new fields or groups of fields) for the gas pipeline, it may be interpreted as a form of political

pressure, first of all – on the EU, to a lesser extent – on Ukraine. The main goals of the sudden increase in the gas pipeline capacity are to make the competing EU project – *Nabucco* – unnecessary, and to involve in its project more EU countries, attracting them by potential high proceeds from the transit of Russian gas.

*Third*, rhetoric of the Russian side regarding the project cheapening thanks to the increase of its capacity does not look serious, let alone fundamental technical complication of laying many strings of the underwater segment of the gas pipeline.

*Fourth*, the extremely large capacity of the gas pipeline requires construction of an additional, rather long gas pipeline network in Russia itself: close to Ukraine's borders (in case the gas is taken from the Ukrainian direction) or in places of gas extraction (in case of the pipeline reliance on a new raw material base).

The project can be implemented in the strategic future (11-15 years) only in case of a sharp growth of demand for gas in the EU and solution of the problems of the pipeline laying on the continental shelf of Ukraine and Romania.<sup>34</sup> It may be built beyond strategic prospects (over 15 years).

**Blue Stream 2.** The gas pipeline can be laid parallel to the *Blue Stream*, with branches to Egypt, Lebanon and Israel. When planning and implementing the *Blue Stream* project, *Gazprom* made many mistakes (understated cost of the gas pipeline; overstated forecasts of demand for gas in Turkey and errors in the text of the contract with the latter, which led to its revision and deterioration of its terms for *Gazprom* (a decrease of the price and volumes of gas, refusal from the principle "take or pay"). By and large, predominant orientation of a large-scale gas pipeline project to one country (Turkey) was erroneous, since no country can rapidly boost gas consumption. This is witnessed by the figures of gas deliveries to Turkey by that gas pipeline: 2006 – 7.5 BCM; 2007 – 9.5; 2008 – 10.1 BCM (against the designed capacity of 16 BCM).

Reasoning of *Blue Stream 2* by the presence of a new potential consumer – Israel – is below criticism. *First*, Israel consumes only some 2 BCM of gas, and no leap is expected. *Second*, risks are high that the gas pipeline already at the construction phase turns a target for terrorist attacks. *Third*, the project requires construction of a 610 km underwater segment (on the Mediterranean Sea bed) for connection to the Israeli gas distribution network (under construction), which will greatly increase both the project value and the gas price (the tentative value of the Turkish-Israeli segment of the gas pipeline is \$1.5 billion).<sup>35</sup> *Fourth*, in June, 2009, Israel began implementation of a project of construction of an LNG terminal.<sup>36</sup>

It may be assumed therefore that the return of *Gazprom* to the project of mid-1990s is only an attempt to exert pressure on the main importer of Russian gas – the EU, incomparable to Turkey and Israel by the consumption volumes.

The project may be built beyond strategic prospects (over 15 years) in case of a sharp growth of demand for gas in Turkey and some EU member states.

**Yamal-Europe 2.** The project is similar to the Yamal-Europe gas pipeline and can be laid in parallel to the existing one. Russia's reluctance to lay the gas pipeline on the territory of Belarus and Poland (due to tangled political relations) is the main obstacle for the project implementation.

The project may be implemented beyond strategic prospects (over 15 years) on the condition of the Russian position change.

<sup>27</sup> Daughter companies of *BASF* chemical concern.

<sup>28</sup> The main gas pipeline Griazovets-Vyborg, currently under construction, is intended for gas delivery not only to the *Nord Stream* gas pipeline but also to consumers in North-Western Russia.

<sup>29</sup> The gas pipeline is to cross the economic interests zones of Finland, Denmark and Sweden, which requires relevant governmental permits for its construction.

<sup>30</sup> Russia counted on South Iolotan-Osman field as the raw material base for the Trans-Caspian gas pipeline, but this is not specified in any bilateral document. Meanwhile, Turkmenistan manipulates that field as a "prize" in a contest of gas pipeline projects. The latest example – agreement with China on extension of a target credit to the amount of \$3 billion for industrial development of that field with further preferences of gas supply from it. See: China will give Turkmenistan a credit for development of South Iolotan. – *EnergyLand.info* media portal, June 6, 2009, <http://energyland.info>

<sup>31</sup> Other options of the field use for supply to *Nabucco* and delivery of gas to Iran are also discussed, witnessing political manoeuvring of the Turkmen leadership.

<sup>32</sup> See: Gas industry of Turkmenistan: prospects of development. – *TURKMENinform*, April 23, 2009. <http://www.turkmeninform.com>

<sup>33</sup> See: *Gazprom* and *ENI* signed second annex to the South Stream project implementation memorandum. – *Oilcapital.Ru*, May 18, 2009, <http://www.oilcapital.ru>

<sup>34</sup> According to Article 79 of the UN Convention on the Law of the Sea, pipeline routing on the continental shelf is made with consent of the coastal state.

<sup>35</sup> See: Chernov M. Pipes of Zion. – *Expert Online 2.0*, July 23, 2007, <http://www.expert.ru>

<sup>36</sup> On June 15, 2009, Israel announced a tender for construction of an LNG regasification terminal, making deliveries of Russian gas unnecessary. See: Israel announced a tender for construction of an LNG regasification terminal. – *Oilcapital.Ru*, 18 May 2009, <http://www.oilcapital.ru>

**Nord Stream**

**Route:** Viborg (Russia)-Baltic Sea-Greifswald (Germany), possible branches to Great Britain, the Netherlands, France, Denmark and other countries  
**Gas owner:** Russia  
**Capacity:** 55 BCM, including phase one – 27.5 BCM  
**Length:** 1220 km  
**Cost:** \$25 billion\*  
**Commencement of construction – 2010**  
**Commencement of gas deliveries – phase one in 2011**  
**Full-scale commissioning of pipeline – 2012**  
**Project status:** priority for the EU, partially implemented on the Russian territory  
**Project support:** Germany, France, Denmark, the Netherlands, Great Britain, Russia  
**Correspondence to Ukraine's interests:** runs contrary to Ukraine's national interests – transit of gas via Ukraine may decrease due to its redirection to the Nord Stream  
**Term of accomplishment:** 5-10 years, on the condition of environmental problems settlement

\* EU plans no financial support.

**Yamal-Europe 2**

**Route:** Russia-Belarus-Poland-Germany  
**Gas owner:** Russia  
**Capacity:** 33 BCM  
**Length:** unspecified  
**Cost:** unspecified  
**Commencement of construction – unspecified**  
**Commencement of gas deliveries – unspecified**  
**Full-scale commissioning of pipeline – unspecified**  
**Project status:** a project of common European interest  
**Project support:** Belarus, EU  
**Correspondence to Ukraine's interests:** runs contrary to Ukraine's interests – transit of gas via Ukraine may decrease due to its redirection to Yamal-Europe 2  
**Term of accomplishment:** over 15 years\*

\* At the current stage, not supported by Russia.

**South Stream**

**Route:** Russia-Black Sea-Bulgaria-Serbia-Hungary-Austria; branch to Bulgaria-Greece-Ionian Sea-Italy  
**Gas owner:** Russia  
**Capacity:** 63 BCM  
**Length:** unspecified  
**Cost:** over €25 billion  
**Commencement of construction – 2009-2010**  
**Full-scale commissioning of pipeline – 2015**  
**Project status:** separate bilateral agreements and contracts  
**Project support:** Russia, Serbia, Greece  
**Correspondence to Ukraine's interests:** runs contrary to Ukraine's interests – transit of gas via Ukraine may decrease due to its redirection to the South Stream  
**Term of accomplishment:** over 15 years\*

\* In case of a sharp increase in demand for gas in the EU and settlement of problems with pipeline laying in the Ukrainian and Romanian territorial waters.

**Nabucco**

**Route:** Turkmenistan-Caspian Sea-Azerbaijan-Georgia-Turkey-Bulgaria-Romania-Hungary-Austria  
**Gas owners:** Azerbaijan, Turkmenistan\*  
**Capacity:** 31 BCM  
**Length:** 3300 km  
**Cost:** \$10-11 billion  
**Commencement of construction:**  
 phase one – 2011;  
 phase two – 2017  
**Commencement of gas deliveries – 2014**  
**Full-scale commissioning of pipeline – 2019**  
**Project status:** priority for the EU  
**Project support:** EU member states, except Germany  
**Correspondence to Ukraine's interests:** runs contrary to Ukraine's interests – diverts resources from Ukraine's traditional or potential raw material base  
**Term of accomplishment:** 11-15 years\*\*

\* Potential project participants are Iran, Kazakhstan, Iraq, Egypt, countries of the Persian Gulf.  
 \*\* 3-4 years in case of provision with raw materials and an agreement on the Caspian Sea status.

**Turkey-Greece-Italy**

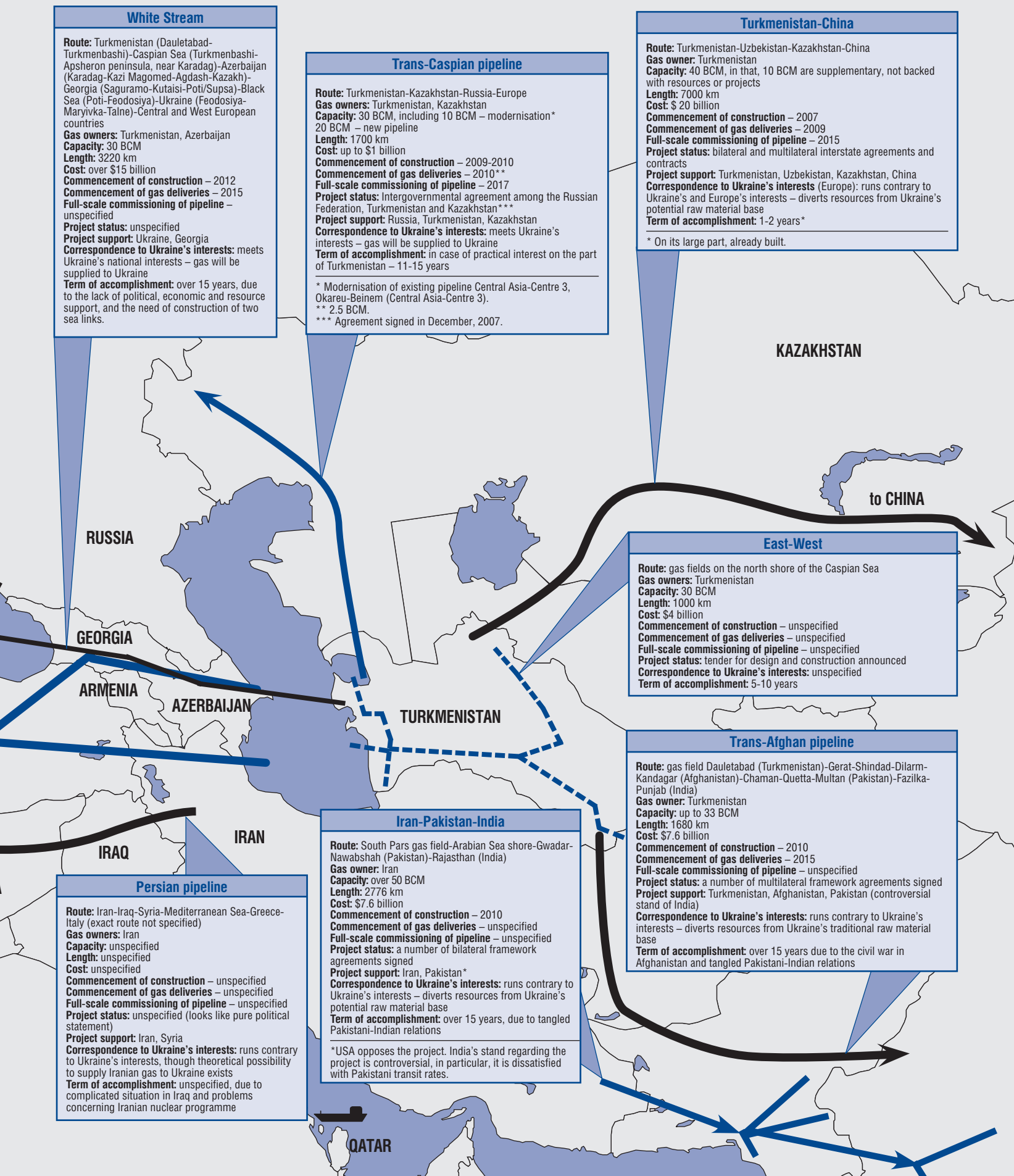
**Route:** Azerbaijan-Georgia-Turkey-Greece-Adriatic Sea-Italy  
**Gas owner:** Azerbaijan  
**Capacity:** 11.7 BCM, in that: 8 BCM – for Italy; 2 BCM – for Greece; 1.7 BCM – for Turkey  
**Length:** 805 km, including 600 km by land, 205 km underwater\*  
**Cost:** €2 billion\*\*  
**Commencement of construction – 2009**  
**Commencement of gas deliveries – 2010**  
**Full-scale commissioning of pipeline – 2013**  
**Project status:** priority for the EU (partially implemented)  
**Project support:** EU  
**Correspondence to Ukraine's interests:** runs contrary to Ukraine's interests – diverts resources from Ukraine's potential raw material base  
**Term of accomplishment:** 3-4 years\*\*\*

\* 295 km have already been laid – Turkey-Greece.  
 \*\* The EU plans allocation of €200 million to the project funding.  
 \*\*\* Turkey conditions construction of the pipeline by its admission to the EU.

**Blue Stream 2**

**Route:** Russia-Black Sea-Turkey-Syria-Lebanon-Israel  
**Gas owners:** Russia  
**Capacity:** unspecified  
**Length:** unspecified  
**Cost:** unspecified  
**Commencement of construction – unspecified**  
**Commencement of gas deliveries – unspecified**  
**Full-scale commissioning of pipeline – unspecified**  
**Project status:** a project of common European interest  
**Project support:** Russia, Turkey  
**Correspondence to Ukraine's interests:** runs contrary to Ukraine's interests – transit of gas via Ukraine may decrease due to its redirection to Blue Stream 2  
**Term of accomplishment:** over 15 years\*

\* In case of a sharp increase of demand for natural gas in Turkey and some EU countries.



**White Stream**

**Route:** Turkmenistan (Dauletabad-Turkmenbashi)-Caspian Sea (Turkmenbashi-Apsheron peninsula, near Karadag)-Azerbaijan (Karadag-Kazi Magomed-Agdash-Kazakh)-Georgia (Saguramo-Kutaisi-Poti/Supsa)-Black Sea (Poti-Feodosiya)-Ukraine (Feodosiya-Maryivka-Talne)-Central and West European countries  
**Gas owners:** Turkmenistan, Azerbaijan  
**Capacity:** 30 BCM  
**Length:** 3220 km  
**Cost:** over \$15 billion  
**Commencement of construction** – 2012  
**Commencement of gas deliveries** – 2015  
**Full-scale commissioning of pipeline** – unspecified  
**Project status:** unspecified  
**Project support:** Ukraine, Georgia  
**Correspondence to Ukraine's interests:** meets Ukraine's national interests – gas will be supplied to Ukraine  
**Term of accomplishment:** over 15 years, due to the lack of political, economic and resource support, and the need of construction of two sea links.

**Trans-Caspian pipeline**

**Route:** Turkmenistan-Kazakhstan-Russia-Europe  
**Gas owners:** Turkmenistan, Kazakhstan  
**Capacity:** 30 BCM, including 10 BCM – modernisation\* 20 BCM – new pipeline  
**Length:** 1700 km  
**Cost:** up to \$1 billion  
**Commencement of construction** – 2009-2010  
**Commencement of gas deliveries** – 2010\*\*  
**Full-scale commissioning of pipeline** – 2017  
**Project status:** Intergovernmental agreement among the Russian Federation, Turkmenistan and Kazakhstan\*\*\*  
**Project support:** Russia, Turkmenistan, Kazakhstan  
**Correspondence to Ukraine's interests:** meets Ukraine's interests – gas will be supplied to Ukraine  
**Term of accomplishment:** in case of practical interest on the part of Turkmenistan – 11-15 years

\* Modernisation of existing pipeline Central Asia-Centre 3, Okareu-Beinem (Central Asia-Centre 3).  
 \*\* 2.5 BCM.  
 \*\*\* Agreement signed in December, 2007.

**Turkmenistan-China**

**Route:** Turkmenistan-Uzbekistan-Kazakhstan-China  
**Gas owner:** Turkmenistan  
**Capacity:** 40 BCM, in that, 10 BCM are supplementary, not backed with resources or projects  
**Length:** 7000 km  
**Cost:** \$ 20 billion  
**Commencement of construction** – 2007  
**Commencement of gas deliveries** – 2009  
**Full-scale commissioning of pipeline** – 2015  
**Project status:** bilateral and multilateral interstate agreements and contracts  
**Project support:** Turkmenistan, Uzbekistan, Kazakhstan, China  
**Correspondence to Ukraine's interests (Europe):** runs contrary to Ukraine's and Europe's interests – diverts resources from Ukraine's potential raw material base  
**Term of accomplishment:** 1-2 years\*

\* On its large part, already built.

**KAZAKHSTAN**

to CHINA

**East-West**

**Route:** gas fields on the north shore of the Caspian Sea  
**Gas owners:** Turkmenistan  
**Capacity:** 30 BCM  
**Length:** 1000 km  
**Cost:** \$4 billion  
**Commencement of construction** – unspecified  
**Commencement of gas deliveries** – unspecified  
**Full-scale commissioning of pipeline** – unspecified  
**Project status:** tender for design and construction announced  
**Correspondence to Ukraine's interests:** unspecified  
**Term of accomplishment:** 5-10 years

**Trans-Afghan pipeline**

**Route:** gas field Dauletabad (Turkmenistan)-Gerat-Shindad-Dilarm-Kandagar (Afghanistan)-Chaman-Quetta-Multan (Pakistan)-Fazilka-Punjab (India)  
**Gas owner:** Turkmenistan  
**Capacity:** up to 33 BCM  
**Length:** 1680 km  
**Cost:** \$7.6 billion  
**Commencement of construction** – 2010  
**Commencement of gas deliveries** – 2015  
**Full-scale commissioning of pipeline** – unspecified  
**Project status:** a number of multilateral framework agreements signed  
**Project support:** Turkmenistan, Afghanistan, Pakistan (controversial stand of India)  
**Correspondence to Ukraine's interests:** runs contrary to Ukraine's interests – diverts resources from Ukraine's traditional raw material base  
**Term of accomplishment:** over 15 years due to the civil war in Afghanistan and tangled Pakistani-Indian relations

**Iran-Pakistan-India**

**Route:** South Pars gas field-Arabian Sea shore-Gwadar-Nawabshah (Pakistan)-Rajasthan (India)  
**Gas owner:** Iran  
**Capacity:** over 50 BCM  
**Length:** 2776 km  
**Cost:** \$7.6 billion  
**Commencement of construction** – 2010  
**Commencement of gas deliveries** – unspecified  
**Full-scale commissioning of pipeline** – unspecified  
**Project status:** a number of bilateral framework agreements signed  
**Project support:** Iran, Pakistan\*  
**Correspondence to Ukraine's interests:** runs contrary to Ukraine's interests – diverts resources from Ukraine's potential raw material base  
**Term of accomplishment:** over 15 years, due to tangled Pakistani-Indian relations

\*USA opposes the project. India's stand regarding the project is controversial, in particular, it is dissatisfied with Pakistani transit rates.

**Persian pipeline**

**Route:** Iran-Iraq-Syria-Mediterranean Sea-Greece-Italy (exact route not specified)  
**Gas owners:** Iran  
**Capacity:** unspecified  
**Length:** unspecified  
**Cost:** unspecified  
**Commencement of construction** – unspecified  
**Commencement of gas deliveries** – unspecified  
**Full-scale commissioning of pipeline** – unspecified  
**Project status:** unspecified (looks like pure political statement)  
**Project support:** Iran, Syria  
**Correspondence to Ukraine's interests:** runs contrary to Ukraine's interests, though theoretical possibility to supply Iranian gas to Ukraine exists  
**Term of accomplishment:** unspecified, due to complicated situation in Iraq and problems concerning Iranian nuclear programme





So, Eurasia is the scene of many gas pipeline projects, some countries (Russia, Turkmenistan) plan implementation of a few. However, those ambitious plans were drawn up yet before the world economic crisis. And now, one can hardly predict future demand for gas and expected potential of production. Most of those projects are pushed “by inertia”, or to “bind” potential partners by signed agreements and remove rivals. The volumes of gas deliveries under the cited list of gas pipeline projects far exceed both the forecasts of its demand and the potential of its production. More than that, some gas producing countries (Azerbaijan, Turkmenistan) are still to prove the claimed gas reserves.

Therefore, the majority of the new projects of gas pipelines face substantial risks:

- **political:** uneasy political relations among potential projects partners; armed conflicts on the territories where gas pipelines are planned (Afghanistan, Iraq); sanctions, restricting cooperation (Iran);
- **investment:** shortage of investments in field development and construction of gas pipelines in the conditions of the global economic crisis; freezing of investments in creation of additional gas transportation capacities, in view of slow growth of production);
- **marketing:** a decrease in the rate of demand growth for gas; an unfavourable pricing situation, including

the pace of basic materials and equipment prices growth, greater than that of gas prices;

- **branch:** low effectiveness of geological prospecting, e.g., in Yamal or in the Turkmen deserts.

Aggravation of traditional and emergence of new risks for implementation of gas pipeline projects during the global economic crisis will lead to “natural selection” of the most economically sound projects, but even they will be implemented late (as compared to the planned terms) – after economic growth resumes in most of the EU countries. One may predict a general, approximately five-year long “pipeline pause”, or a period of freezing of most projects whose international implementation has not commenced yet.

As regards Ukraine, it has meagre chances, even in the long run, to implement a project of gas supply alternative to Russian deliveries – first of all, due to lack of support from both suppliers and consumers of gas, and lack of funds sufficient for such a project.

## 2.4 WHITE STREAM GAS PIPELINE PROJECT

The *White Stream* gas pipeline project is designed to supply gas from the Caspian region (Turkmenistan, Azerbaijan) via the Caspian Sea, South Caucasus, Black Sea to Ukraine, and further by existing Ukrainian gas pipelines to the EU countries.<sup>43</sup>

### WHITE STREAM GAS PIPELINE: HISTORIC BACKGROUND

The idea of gas transportation from the Caspian states to Europe (using the Trans-Caspian gas pipeline), bypassing Russia, arose in mid-1990s. In May, 1999, Turkey and Azerbaijan signed a 30-year agreement of transportation of 30 BCM of gas, followed by the intergovernmental agreement among Azerbaijan, Georgia, Turkey and Turkmenistan in support for the Trans-Caspian gas pipeline to supply gas via South Caucasus to Turkey and Europe.<sup>37</sup> Later, the project was suspended due to disputes among its participants (first of all, Azerbaijan and Turkmenistan) about the prices and quotas of gas, and funding problems.

Some elements of the project (for instance, those dealing with the trans-Black Sea gas pipeline and planned transportation of Iranian gas to the Ukrainian territory) were also considered in Ukraine.<sup>38</sup>

Among the first, the gas pipeline project titled *White Stream* was developed by an international expert consortium (*GUEU/White Stream – Georgia-Ukraine-EU-White Stream*), that founded London-based *White Stream Pipeline Company*.<sup>39</sup>

At the end of 2005, preliminary feasibility study of the project was accomplished with financial support from the EC, and the project was inaugurated on March 16-17, 2006, at the 5<sup>th</sup> International conference on oil, of gas and power engineering *GIOGIE 2006* (Tbilisi). The feasibility

study suggested two options of the project implementation: via Ukraine, and via Romania (the latter option was not considered as more expensive and technically complex – a longer underwater gas pipeline and sea pumping stations need to be built). The project of supply to Ukraine envisaged the gas pipeline length of 1235 km, capacity – up to 32 BCM (1<sup>st</sup> phase – 8 BCM), cost – €3.8 billion.

At a meeting of the European Parliament Foreign Affairs Committee in Brussels on January 28, 2008, Ukraine's Prime Minister Yu. Tymoshenko invited the EU to take part in construction of the *White Stream* gas pipeline from Turkmenistan via the Caspian Sea to Azerbaijan, Georgia, Ukraine and Europe. The EU Energy Commissioner said that the EC would thoroughly consider the proposal.<sup>40</sup>

In 2008, Ukraine prepared and presented the preliminary feasibility study of the *White Stream* gas pipeline.<sup>41</sup>

On April 3, 2009, Georgia's Minister of Energy O. Khetaguri and *GUEU-White Stream Pipeline Co. Ltd* CEO R. Pirami signed a memorandum of cooperation at implementation of the *White Stream* project. The project feasibility study is now underway and is to be completed in 12-18 months. The pipeline is to be built at the expense of private investments; a joint stock company may be established to raise shareholder funds. Construction of a gas pipeline with the capacity of 8 BCM/year at the first stage and possible upgrade to over 24 BCM are planned for 2012-2015.<sup>42</sup>

<sup>37</sup> For implementation of that project, companies *Bechtel* and *General Electric* established joint venture *PSG*; later, *Royal Dutch Shell* joined the project. See: *Cutler R.M. Another trans-Caspian pipe dream. – Asia Times*, Oct 24, 2007, <http://www.atimes.com>

<sup>38</sup> See: Saprykin V. Life of gas pipelines: South Caucasus goes from Russia to Iran? – *Dzerkalo Tyzhnya*, January 22-28, 2005, No.2.

<sup>39</sup> See: Official web site of *White Stream Pipeline Company Ltd*, <http://gueuwhitestream.com/main.php?id=1&lang=eng>

<sup>40</sup> See: Prime Minister of Ukraine proposed *White Stream* to the EU. – European space. Portal of pro-European civil society of Ukraine, January 29, 2008, <http://eu.prostir.ua>

<sup>41</sup> The most elaborate preliminary feasibility study of the *White Stream* project was performed by *Naftogaz Ukrayiny* and *Naftohazbudinformatyka*. See: Presentation of a project of natural gas transportation in the direction: Turkmenistan-Caspian Sea-South Caucasus-Black Sea-Ukraine-countries of Central and Western Europe. Presented at International Energy Forum, Kyiv, May 22, 2008.

<sup>42</sup> See: Georgia joined gas pipeline via Ukraine. – *Ekonomichna Pravda*, April 6, 2009, <http://www.epravda.com.ua>

<sup>43</sup> The project proceeds from the fact that the Ukrainian GTS annually carries up to 120 BCM of gas in the western direction and technically can increase transit to the EU countries by 30-40 BCM without construction of new gas pipelines.





**Goals of the project** – diversification of sources and routes of gas supply from Turkmenistan and Azerbaijan to Europe, including: for the EU countries – alternative sources of supply<sup>44</sup> and diversification of gas supply routes; for Ukraine – diversification of gas supply routes, procurement of gas under (conventionally) direct contracts with suppliers from the Caspian region and growth of revenues from gas transit through greater utilisation of its GTS.<sup>45</sup>

### Potential resource base for gas pipeline

The resource base for the gas pipeline is provided by deposits of Turkmenistan and Azerbaijan (Table “Reserves and forecasts of gas production and export from Turkmenistan and Azerbaijan”<sup>46</sup>). Official data of gas reserves in both countries are usually overstated; furthermore, actual reserves of Turkmenistan far exceed Azeri, and no large-scale project (*Nabucco* or *White Stream*) can rely on Azeri gas alone.<sup>47</sup>

**Reserves and forecasts of gas production and export from Turkmenistan and Azerbaijan**

	Turkmenistan	Azerbaijan	Total
<b>Proved reserves, trillion cu.m</b>	7.94*	1.20**	9.14
Forecasted production, BCM:			
2008 (actual);	70.4	14.7	85.1
2010;	120.0	NA	NA
2015;	160.0	NA	NA
2020;	175.0	30	205.0
2030	250.0	NA	NA
Forecasted export, BCM:			
2008 (actual);	Up to 50***	4.6	54.6
2010;	100.0	6.9	106.9
2015;	125.0	13.0	138.0
2020;	140.0	30.0	170.0
2030	200.0	NA	NA

\* 7.94 trillion cu.m – internationally recognised proved reserves of gas in Turkmenistan as of the end of 2008.

\*\* 1.20 trillion cu.m – internationally recognised proved reserves of gas in Azerbaijan as of the end of 2008. According to Azeri estimates, proved reserves of gas amount to 3.5 trillion cu.m (including 1.2 trillion cu.m of proved reserves of Shah Deniz gas condensate field on the Caspian Sea shelf).<sup>1</sup> However, those data are not fully backed by exploration drilling.

\*\*\* Requires verification. Exports to Russia amount to up to 42 BCM.

<sup>1</sup> See: Published data of gas reserves in Azerbaijan. – *Oilcapital.Ru*, April 21, 2009, <http://www.oilcapital.ru/>.

**Azerbaijan.** According to the latest official statements, proved reserves of gas in the country are close to 3.5 trillion cu.m, including at Shah Deniz gas condensate field in the Azeri sector of the Caspian Sea –

1.2 trillion cu.m.<sup>48</sup> However, the total proved reserves, recognised internationally, amount to only 1.2 trillion cu.m.

**Turkmenistan.** According to *Turkmengeology* State Company, as of 2007, geological reserves of gas amounted to 22.5 trillion cu.m of gas; there are over 150 discovered gas fields with the total reserves of up to 6 trillion cu.m (without South Iolotan-Osman field), in that, 140 on shore and over 10 on the Caspian Sea shelf. 54 fields are being developed (with proved reserves exceeding 2.6 BCM), 12 prepared for exploitation, 73 are at the exploration phase, 11 – shut down.<sup>49</sup>

So, it is more correct to speak of the total proved reserves of gas about **7.9 trillion cu.m, according to internationally recognised data.**

### Production and export of gas

Detailed analysis and forecast of these two indices are complicated by the lack of correct data. In the Turkmen case, stoppage of gas export to Iran in the recent years and to Russia in 2009 complicates calculation. For Azerbaijan – incorrect calculation of extracted gas (instead of marketable production, extracted gas figures include some 12 BCM of the gas pumped to beds to raise the production of oil) and lack of basic data for forecast of production, since the second phase of gas production at Shah Deniz gas field has not been authorised yet.

**Azerbaijan.** According to governmental forecasts, in 2008, gas production was to total 27.4 BCM, against almost 20 BCM in 2007. The budget forecast of the Government set the following targets for 2009: 31.5 BCM of total gas production, including by *SOCAR* (State Oil Company of Azerbaijan Republic) – 8 BCM, Azerbaijan International Operating Company (*AIOC*) – 13.9 BCM, at Shah Deniz gas field – 9.6 BCM.<sup>50</sup> However, those plans are unlikely to be met due to overstated effective production capacities.

In 2008, 14.7 BCM of marketable gas was extracted (+50% to 2007), in 2009, this figure is expected to reach 17.6 BCM (in that: production at Shah Deniz field – to 8.6 BCM; *SOCAR* production – 7 BCM; assist gas at the Azeri-Chirag-Guneshli oil field block (*AIOC*) – 2 BCM);<sup>51</sup> under the optimistic scenario – 18 BCM.

According to forecasts for 2009-2012, in 2009, export of gas may rise by more than 50%, compared to 2008 – from 4.6 BCM to over 7 BCM. In 2009, Baku plans to export from Shah Deniz 6.3 BCM of gas to Turkey, 0.5 BCM – to Georgia. Small volumes of gas may also be supplied to Greece (bought by Turkey for re-export).<sup>52</sup>

<sup>44</sup> This assertion is not quite true, since *Gazprom* even now sells to the EU gas from Central Asian states, but it is considered Russian.

<sup>45</sup> See also the article by L.Unihovskiy *et al.* “Diversification of sources and routes of gas supply: the choice for Europe and Ukraine” published in this magazine.

<sup>46</sup> Table compiled on the basis of the following sources (data adjusted by Razumkov Centre experts added): Oil and gas of Turkmenistan 2007. – *Neftegazovaya Vertikal*, 2008, No.7, p.50-53; BP Statistical Review of World Energy, June 2009, p 24, <http://www.bp.com>

<sup>47</sup> It should be added that due to the uncertain status of the Caspian Sea, some fields are disputed (for instance, the field known in Azerbaijan as Kyapaz, in Turkmenistan – Serdar).

<sup>48</sup> Gas reserves in Azerbaijan amount to some 3.5 trillion cu.m. See: *Energobiznes*, April 28, 2009, p.31.

<sup>49</sup> See: Lukin O. To the four corners of the earth. – *Neftegazovaya Vertikal*, 2008, No.7, p.54-57.

<sup>50</sup> See: In January-February, production of natural gas in Azerbaijan fell by 1.1% – to 3.8 BCM. – ABC.AZ, March 17, 2009, <http://abc.az>

<sup>51</sup> BP Statistical Review of World Energy, June 2009, p 24, <http://www.bp.com>

<sup>52</sup> See: Production of energy resource in Azerbaijan in 2008 substantially increased. – *Fuel Alternative*, January 19, 2009, <http://www.fuelalternative.com.ua>



At Shah Deniz, gas is extracted under Project Phase 1, commenced at the end of 2006; within its framework, nearly 12 BCM of gas were extracted. In 2009, it is to produce up to 8 BCM of gas<sup>53</sup> (maximum expected production – over 9 BCM).

Substantial growth of gas export is mainly associated with Project Phase 1 of Shah Deniz development (not authorised yet), to be launched after 2014. Then, the aggregate production at the field will rise to 20 BCM. The cost of implementation of Phase 2 of the project, according to different estimates, will make \$16-20 billion.<sup>54</sup>

Gas extracted at Phase 1 is exported to Turkey and Georgia by the South Caucasian trunk line Baku-Tbilisi-Erzurum (a part of gas is bought from the international consortium by Azerbaijan). The designed capacity of the gas pipeline is 32 BCM/year, current – up to 20 BCM/year.

**Turkmenistan.** Turkmenistan has much greater export capacities than Azerbaijan (Diagram “Production and export of gas in Turkmenistan”), but they are restrained by insufficient development of new transportation projects.

Turkmenistan annually exported 7-8 BCM of gas to Iran (in 2007 – 8.3 BCM), but at the beginning of 2008, deliveries were suspended due to disputes over the new prices for 2008.

On July 10-11, 2009, Turkmenistan and Iran held negotiations in Ashgabat, where they agreed to increase exports of Turkmen gas to Iran from the current

8 to 14 BCM/year, and in the future – to 20 BCM/year. Next day, Turkmenistan’s Foreign Ministry press service reported the two countries’ intention to build a new gas pipeline to Iran and signing of the relevant documents.

Eight BCM are planned to be supplied from Korpedzhe field (in Western Turkmenistan), the rest – from Dovletabad, one of the main fields in the country located in its south-eastern part, now being the main source of gas supply to Russia. To deliver gas to Iran from Dovletabad field, a new gas pipeline is planned to be built before the end of 2009.<sup>55</sup>

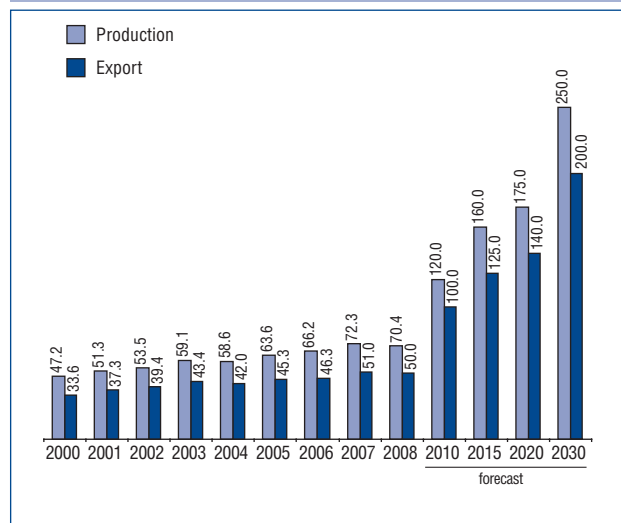
However, given the uneasy relations between the two countries and international sanctions against Iran, it may be predicted that in the next 3-4 years Turkmenistan will only be able to increase gas deliveries to Iran by the existing gas pipeline.

Several foreign oil producing companies extract or plan to extract gas on the Turkmen shelf of the Caspian Sea and in its coastal zone. Forecasted production may total 6 BCM as early in 2010, and 14 BCM/year by 2014<sup>56</sup> (Table “Planned volumes of gas production by foreign companies operating in Turkmenistan”<sup>57</sup>).

**Planned volumes of gas production by foreign companies operating in Turkmenistan, BCM**

Company	2009	2010	2011	2012	2015	2020
Petronas	0.0	2.5	5.0	10.0	10.0	10.0
Dragon Oil	0.0	1.5	2.0	2.0	2.0	2.0
Burren	1.5	2.0	2.0	2.0	2.0	2.0

**Production and export of gas in Turkmenistan, BCM**



That gas may be supplied both towards Russia and by the planned *Nabucco* gas pipeline. Although such companies as *Petronas* and *Burren* got consent from Turkmenistan and Kazakhstan to use of the existing state gas transportation systems, currently, there are no idle capacities. Hence, admission of that gas to gas networks requires creation of the appropriate infrastructure. Furthermore, the opinion of Turkmenistan will be decisive for the choice of the gas transportation direction.

**White Stream and competing gas export projects**

Of course, every country possessing gas reserves has the right to decide the direction of transportation of its gas to other countries. Currently, both Azerbaijan and Turkmenistan are interested in diversification of the routes. Meanwhile, despite declarations of polivariance of the energy policy and support for different gas pipeline projects, neither Turkmenistan, nor Azerbaijan pin hopes to the *White Stream* project.

<sup>53</sup> See: Gas production in Azerbaijan will rise to 30 BCM a year by 2020. – OilcapitaL.Ru, 28 April 2009, <http://www.oilcapital.ru>  
<sup>54</sup> Implementation of Shah Deniz 2 project in Azerbaijan depends on gas transit via Turkey. – OilcapitaL.Ru, April 28, 2009, <http://www.oilcapital.ru>  
<sup>55</sup> See: Serveev M. Turkmenistan found a substitute to Russia. – *Nezavisimaya Gazeta*, July 14, 2009, <http://www.ng.ru>  
<sup>56</sup> Lukin O. While gas is expensive. – *Neftegazovaya Vertikal*, 2009, No.3, p.59.  
<sup>57</sup> *Ibid.*, p.61.



**Azerbaijan.** By 2020, production of marketable gas is to grow to 30 BCM/year, in that, approximately 65% may be exported.<sup>58</sup> Hence, Azerbaijan alone cannot provide enough gas for the southern corridor, in which the EU includes gas pipelines *Nabucco* (31 BCM/year) and *IGTI* (8-12 BCM). References to potentially significant growth of gas production at the promising block Umid-Babek (not developed yet) and undiscovered gas fields require practical proof.<sup>59</sup> The complex “arithmetic” of reserves calculation and volumes of gas production in Azerbaijan does not add clarity to the forecasts of the gas sector operation and seriously complicates forecasts of export. However, the potential of large-scale supply of Azeri gas to Europe (Bulgaria, Greece and Italy) is beyond doubt.

By and large, now there are four directions of gas transportation from Azerbaijan:

- Baku - Tbilisi - Erzurum (to Turkey; capacity – 20 BCM/year);
- Kazi-Magomed - Gardabani (to Georgia; 3 BCM/year);
- Kazi-Magomed - Mozdok (to Russia; 10 BCM/year);
- Kazi-Magomed - Astara-Binand (to Iran; 2 BCM/year).

The first direction, being the main project for Azerbaijan, on the condition of connection to Turkmenistan and construction of the Trans-Caspian gas pipeline, is transformed into the *Nabucco* project.

On March 27, 2009, *Gazprom* and *SOCAR* signed a Memorandum of understanding for the purchase of Azeri gas, starting from 2010, which lays the basis for implementation of the second large-scale project of gas supply to Russia. The parties agreed to negotiate conditions of Azeri gas purchase, to be delivered starting from January 2010, on the Azerbaijan-Russian border.

After Russian President D. Medvedev met his Azeri counterpart I. Aliev on June 30, 2009, *Gazprom* and *SOCAR* CEOs signed the contract “Basic provisions of Azeri gas purchase and sale contract”, whereby the Russian company is to buy 0.5 BCM of Azeri gas in 2010, with gradual growth of volumes. The price of gas will be determined by a formula linking the gas cost with that of petroleum products at European exchanges. A potentially attractive basic price (not announced) for *SOCAR* will create advantageous commercial conditions for sale of gas to *Gazprom*. Azeri gas is to be used at Russia’s domestic market, while the released volumes of Russian resources will be used for export to European

countries. The contract also formalised the agreement (as reported by the Russian media) of priority sale of gas extracted during Phase 2 of Shah Deniz development to Russia.<sup>60</sup>

**So, Russia is trying to slow down implementation of the priority gas pipeline project *Nabucco* by the contract of Azeri gas procurement, designed to create a deficit of resources. *Nabucco* is competing with *South Stream*, that is why Russia is ready to buy Azeri gas even at a commercially disadvantageous price, to undermine the *Nabucco* resource base.**

The Azeri energy policy does not envisage redirection of the main flows of gas export to Russia, but signing of that contract will create advantageous preconditions for bargaining during sale of gas obtained at Phase 1 of Shah Deniz development to European companies, and preserve the solid basis of Russian-Azeri relations, strategically important for Azerbaijan, in particular, in the context of the Nagorno-Karabakh problem.

Meanwhile, given the small volumes of Azeri gas sale to Russia and uncertain commitments of gas extracted at Phase 1 sale, it may be predicted that the contract will not bar implementation of the *Nabucco* project. On the other hand, it again proves that currently, the *Nabucco* project is not provided with gas resources.

In the near future, *Gazprom* and *SOCAR* plan to perform technical audit of the gas pipeline segment Baku – Novo-Filya with the purpose of its modernisation. By that segment, Azeri gas will be delivered to Russia. Furthermore, *Gazprom* and *SOCAR* plan to consider and perform the feasibility study of gas exchange operations.<sup>61</sup>

Therefore, Azerbaijan can perform small deliveries of gas to Russia as early as 2010, as long as the *Nabucco* gas pipeline remains unoperational. At that, it will continue deliveries to Georgia and Turkey, and in case of a substantial increase in gas production – also to Europe (first of all, to Greece).

To ensure its energy security, the EU pays growing attention to countries of the Caspian region, including Azerbaijan, seen as the key actor to deliver Caspian energy resources to western states (first of all, under *Nabucco* project<sup>62</sup>).

Azerbaijan repeatedly confirmed (before and after signing documents with Russia<sup>63</sup>) its desire and ability to provide Europe with gas, in particular, by *Nabucco*

<sup>58</sup> See: Gas production in Azerbaijan will rise to 30 BCM a year by 2020. – OilcapitaL.Ru, 28 April 2009, <http://www.oilcapital.ru>

<sup>59</sup> Oils and gas of Azerbaijan. – *Neftegazovaya Vertikal*, 2008, No.7, p.36.

<sup>60</sup> Biriukova L., Batanova K. Dmitri Medvedev bought gas from Azerbaijan. – *Gazeta.ru*, 30 June 2009, <http://www.gzt.ru>

<sup>61</sup> Documents signed in Moscow by the CEO of the Russian concern A. Miller and *SOCAR* President R. Abdullaev. See: Annex: *Gazprom* and *SOCAR* signed memorandum of purchase and sale of Azeri gas, with deliveries from January, 2010 – *RosBusinessConsulting*. Quote, March 27, 2009. <http://www.quote.ru/>. Baku - Novo-Filya – segment of Azeri GTS from Baku to the Russian border on the Caspian Sea coast; length – up to 200 km.

<sup>62</sup> “We consider this project important for the whole region and Europe. I hail the hard but courageous decisions passed by Azerbaijan in the energy policy sector. In our opinion, this sector is so important that it can bring Azerbaijan and the EU concrete benefits”, – EC President J.M. Barroso said at briefing in Brussels following the meeting on April 28, 2009. See: Mamedov S. Polyvariant Baku. Aliev reaffirmed interest in implementation of *Nabucco* project. – *Nezavisimaya Gazeta*, April 30, 2009, <http://www.ng.ru>

<sup>63</sup> Talks with Russia are underway on two issues – supply of small volumes of gas to Dagestan (up to 1.5 BCM/year), and purchase of gas extracted at Shah Deniz field by *Gazprom* at market prices. See: *Ibid.*





gas pipeline.<sup>64</sup> At an international oil and gas trading and transportation conference in Baku on April 27, 2009, the Minister of Industry and Energy of Azerbaijan N. Aliev said that “despite many different gas transportation projects – Russian, Iranian direction, *White Stream*, *Nabucco*, Turkey-Greece-Italy, – strategically, we consider one main direction, abiding by diversification of deliveries. It is unimportant to which market gas is delivered. The main thing is the long-term prospects of procurement and stable financial standing of the consumer. For Azerbaijan, with account of international financial institutions forecasts, such market is Europe”.

Meanwhile, Azerbaijan's leadership builds its long-term policy of gas export on pragmatic economic decisions, proceeding from the principle of routes of gas delivery to the world markets diversification.<sup>65</sup>

**Turkmenistan.** As we mentioned above, on January 28, 2008, Ukraine's Prime Minister Yu. Tymoshenko speaking at a meeting of the European Parliament Foreign Affairs Committee proposed the EU to build a new gas pipeline, *White Stream*, to supply Turkmen gas to the EU countries via the Caspian and Black Seas.<sup>66</sup> Turkmen Foreign Ministry reacted to that proposal with the following statement: “Official reports of previously unknown projects of main pipelines are unclear for the Turkmen side. According to the international practice, official reports of international pipeline systems construction projects originate from states producing energy resources, after relevant negotiations and consultations with other stakeholders”.<sup>67</sup>

Therefore, Turkmenistan did not consider the Ukrainian initiative, since it was not even officially presented. There are no documents signed by potential project participants – Turkmenistan, Azerbaijan, Georgia and Ukraine. Similarly, there is no evidence of official negotiations of those countries on said project.

There exist the following promising lines of delivery of Turkmen gas:

- North-Eastern (conventionally **Eastern**): Turkmenistan-Uzbekistan-Kazakhstan-China (Asian gas pipeline);
- North-Western (**Northern**): Turkmenistan-Kazakhstan-Russia (Trans-Caspian gas pipeline);
- **Western**: Turkmenistan-Caspian Sea-Georgia-Azerbaijan-Turkey-Europe (*Nabucco*);
- South-Western: Turkmenistan-Afghanistan-Pakistan-India (Trans-Afghan gas pipeline);
- **Southern** – Turkmenistan-Iran (expansion of the existing gas pipeline Koperdzh-Kurt-Kui and construction of a new gas pipeline, South Iolotan-Osman-Serakhs);

- auxiliary internal gas pipeline “East-West”, to become the main element of the system exporting new volumes of gas from Turkmenistan, both to Russia and by the Trans-Caspian gas pipeline (and further, *Nabucco*), and connecting large fields in the north-east of Turkmenistan with the infrastructure to be built on the Turkmen coast of the Caspian Sea (capacity – 30 BCM/year; length 800-1000 km; end of construction – by 2012. At the initial phase, 6 BCM/year will be pumped; in 2013 – up to 14 BCM/year; the project capacity to be achieved in 2014<sup>68</sup>).

Therefore, Turkmenistan is trying to implement new gas pipeline projects in all directions, but only one project effectively goes ahead and will be implemented soon enough – to China.

## CONCLUSIONS

**The trends and risks of the world power engineering require from all countries of the world without exception the revision of operation and development plans of energy sectors and energy policies in general. In the future, this may lead to significant changes on Eurasian energy markets. Correlation and analysis of interests of the Eurasian gas market actors show that at present, planning and implementation of new gas pipeline projects in most cases are controlled by the owner of reserves or supplier (manufacturer) of gas.**

**In the conditions of a sharp decrease in energy resources consumption, the consumer has a choice of best employment of specific capacities, which lays down preconditions for growth of influence of the buyer (consumer) of energy resources, compared to their seller (producer).**

**The most powerful actors on that market – the EU and Russia – in chase for diversification of ways and sources of gas delivery sometimes neglect economic principles and reliance of projects on the raw material base.**

**So, separate countries and their unions in Eurasia put forward a long list of gas pipeline projects, some states plan implementation of a whole set of projects (Russia, Turkmenistan). However, those ambitious plans were drawn up yet before the global economic crisis, and now, no one can predict the future demand for gas and expected potential of production. Hence, most gas pipeline projects are pushed “by inertia”, or to “bind” potential partners by signed agreements and remove rivals. Volumes of gas that can be supplied by all listed projects of gas pipelines far exceed the expected demand for it and the potential of its production. More than that, some countries – producers of natural**

<sup>64</sup> In particular, during negotiations with EC President J.M. Barroso within the framework of the Eastern Partnership Programme (April 2009, Brussels), I. Aliev said: “I once again expressed support for projects discussed in Europe. Azerbaijan was the country that began construction of pipelines from the Caspian Sea to the West. Thanks to our initiative and work, today, we can talk about gas pipelines *Nabucco*, Turkey-Greece-Italy, Trans-Adriatic gas pipeline and other projects, because we have already made all necessary preliminary work”. See: *Ibid.*

<sup>65</sup> At the Davos Economic Forum in the end of January, 2009, President I. Aliev said that Baku planned utmost use of capacities of all export gas pipelines available in Azerbaijan. See: *Ibid.*

<sup>66</sup> See: Tymoshenko proposed to the European Union to build a gas pipeline bypassing Russia. – *Fokus*, January 29, 2009, <http://fokus.in.ua>

<sup>67</sup> See: Turkmenistan did not understand what Ukraine wanted from it. – *Fokus*, January 31, 2008, <http://fokus.in.ua>

<sup>68</sup> Lukin O. East-West: gas freely available. – *Neftegazovaya Vertikal*, 2009, No.14, p.71-73.





gas (Turkmenistan, Azerbaijan) are yet to prove the claimed gas reserves.

Therefore, the majority of the new projects of gas pipelines face substantial risks: *political* (uneasy political relations among potential projects partners; civil wars on the territory of some states where gas pipelines are planned, for instance, in Afghanistan, Iraq; sanctions imposed, in particular, on cooperation with Iran, etc.); *investment* (shortage of investments in development and construction of gas pipelines in the conditions of the global economic crisis; freezing of investments in additional gas transportation capacities, in view of slow growth of production); *marketing* (a decrease of the demand for gas growth rate; an unfavourable pricing situation, including the greater growth rate of basic materials and equipment prices, than that of gas prices); *branch* (low effectiveness of geological prospecting, e.g., in Yamal or in the Turkmen deserts), etc.

Aggravation of traditional and emergence of new risks for implementation of gas pipeline projects during the global economic crisis will lead to “natural selection” of the most economically sound projects, but even they will be implemented late (as compared to the planned terms) – after economic growth resumes in most of the EU countries. Meanwhile, one may predict a general, approximately five-year long “pipeline pause”, or a period of freezing of most projects whose international implementation has not been started.

Active promotion of the *South Stream* and *Nord Stream* projects by Russia is intended to make

the EU to refuse from *Nabucco* project and to win support of more EU member states for Russian projects.

For Ukraine, commissioning of the *South Stream* gas pipeline will reduce pumping of Russian transit gas across the territory of Ukraine more than two-fold, and together with the *Nord Stream*, can actually stop transit of gas via Ukraine. However, full-scale implementation (regarding gas volumes and terms of gas pipeline commissioning) of Russian bypass gas pipelines seems unlikely. Nevertheless, in the long run, Ukraine may face a serious decrease in the transit of Russian gas – unless a compromise in the EU-Ukraine-Russia gas triangle is found.

Ukraine has meagre chances, even in the long run, to implement a project of gas supply alternative to Russian deliveries – first of all, due to lack of support from both potential suppliers (such as Azerbaijan and Turkmenistan that do not even consider participation in the *White Stream* gas pipeline project) and consumers of gas in other countries (potential partners of Ukraine), as well as lack of funds for such a technically complex and costly project.

On the condition of partner-like, mutually advantageous cooperation, Russian natural gas (or gas pumped from the Russian territory) by the existing gas pipelines could be the most economically acceptable for Ukraine. Meanwhile, construction of an LNG regasification terminal in Ukraine, restrained by the lack of funds (which will determine the construction terms), looks rather attractive, from the viewpoint of independent (without foreign political incentives) decision-making. ■

# 3. DIVERSIFICATION OF OIL DELIVERIES TO UKRAINE: TOPICALITY, PROBLEMS, WAYS OF SOLUTION

Ukraine consumes oil and petroleum products in large volumes, operates a high-performance oil transportation system with vast transit capacities, hosts six large oil refineries that potentially can not only meet the domestic demand for quality fuel but export it to third countries.

But today, the oil sector is in a critical state: low domestic production of oil is insufficient for utilisation of domestic refineries in the required volume; oil processing capacities are loaded by 20%, oil transportation – by 36%; imported petroleum products account for up to 50% of the domestic market, making it and, respectively, the entire national economy extremely vulnerable to world price fluctuations.

One of the main reasons for this state of affairs lies in non-diversification of sources and routes of oil supply. Covering the demand with domestic production by only a third, possessing the potential capability of transit to Europe nearly 40 million tons/year, Ukraine in fact has only one source of foreign supply – the Russian Federation.

Now, Ukrainian refineries are 70% dependent on Russian oil deliveries, transit capacities – over 80%. Over seven months of 2009, the Russian share in oil imports amounted to 99%.

The negative experience of Ukrainian refineries privatisation by Russian companies, the overall character of the Russian energy policy towards Ukraine give no grounds to hope for fundamental improvement of the situation. Ukraine badly needs new sources of oil for its refining and transport capacities.

Seeking to diversify sources and routes of oil delivery both for domestic needs and for transit to the rest of Europe, Ukraine has already spent financial, labour, material and time resources on construction of the Odesa-Brody oil pipeline system that can be used for implementation of the idea that has a long history in the EU: creation of the Eurasian Oil Transportation Corridor (EAOTC) to supply European countries with oil from the new promising oil producing region – Caspian.

This section reviews issues of oil supply to Ukraine diversification; formulates problems and assesses prospects of creation of EAOTC using the Ukrainian oil pipeline system “Odesa-Brody”. The main features of the transport, transit, refining capacities of the domestic oil sector are presented in “Ukraine’s oil sector” insert.

## 3.1 SPECIFICITIES OF SOURCES AND WAYS OF OIL SUPPLY DIVERSIFICATION IN THE CONTEXT OF UKRAINE’S OIL SECTOR

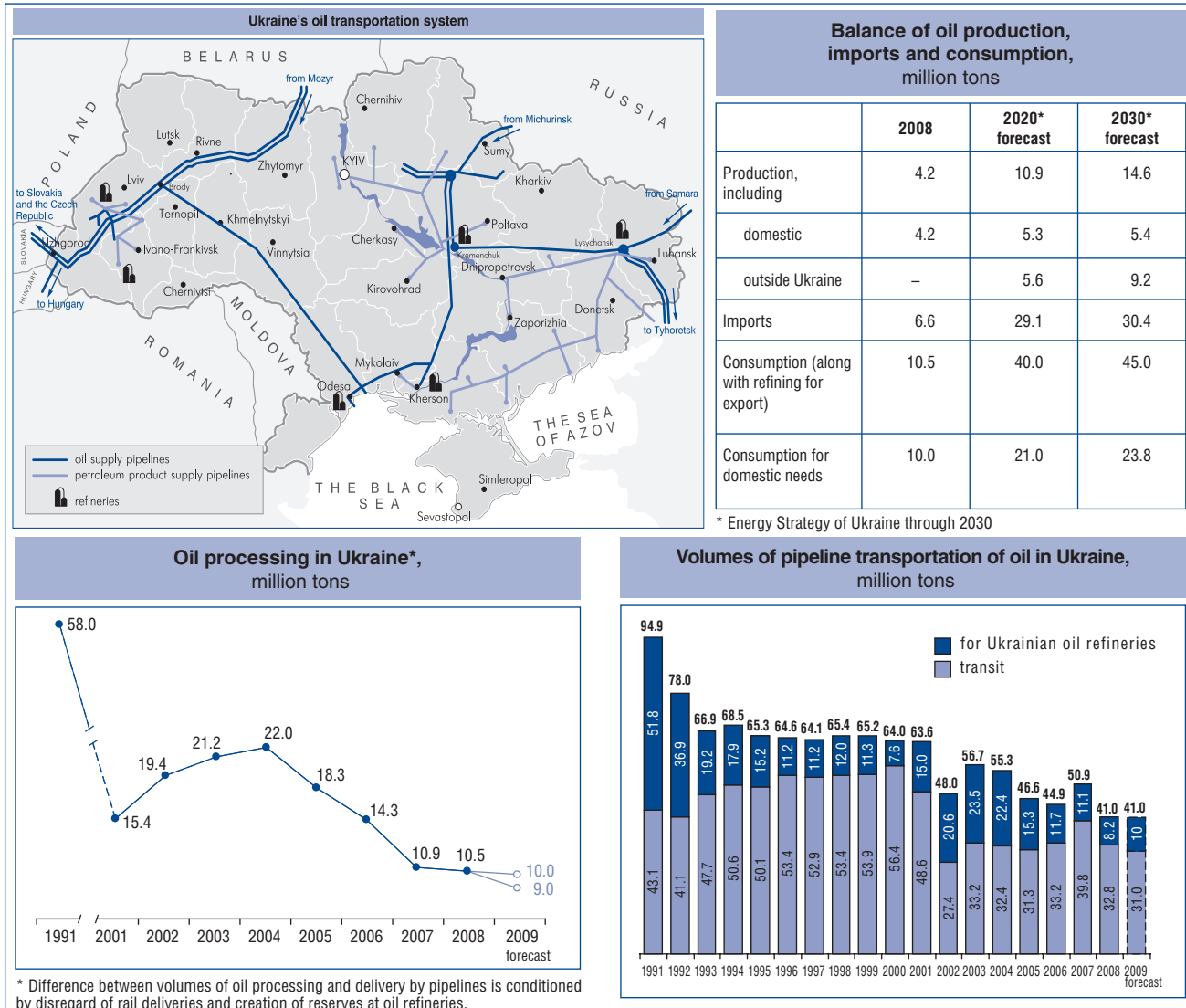
In the world practice, oil, by contrast to natural gas, is mainly transported not by transnational pipelines but by the tanker fleet – the world oil market exists thanks to that fact. Even the bulk of the Russian oil (over 60%) is supplied to end consumers in Europe by tankers, despite a capacious system of transnational oil pipelines *Druzhba*. National oil pipelines in most countries are used mainly

as auxiliary means of oil delivery from sea terminals to refineries.

Speciality of Ukraine’s oil sector is absolute dominance of the pipeline transport. Tankers are used only for subsequent transit of oil supplied to oil terminals by pipelines of *Ukrtransnafta* OJSC. One case of oil supply to Ukraine by tankers in small volumes (in 2008 – nearly 300 thousand tons from Iraq) did not grow into regular deliveries due to the low return from that operation because of exorbitant transportation costs associated with freight of vessels and rail carriage of oil from the sea terminal to the Kremenchuk refinery.



UKRAINE'S OIL SECTOR



Russia is in fact the only source of oil for the Ukrainian oil transportation system. As we noted, the Russian share exceeds 80% of total transit (some 20% falls on Kazakhstan, but that oil is pumped to the Ukrainian border by Russian pipelines). Actually complete dependence on oil deliveries from one source is unacceptable for Ukraine in terms of reliability of deliveries, energy security of the economy and Russia's ability to use that dependence as a tool of political influence.

Meanwhile, orientation of the Ukrainian oil transportation system to transit makes western countries – consumers interested in its operation (i.e., under certain conditions may promote inflow of investments in its modernisation) and integration in the European energy system.

Problems of the oil transportation system utilisation are closely related with the low effectiveness of Ukrainian refineries operation and non-competitiveness of their production, first of all, due to their traditional orientation to Russian *Urals* oil (with its high sulphur content) and low depth of processing – 75%, against European 90%.<sup>1</sup>

Hence, there is an urgent need of Ukrainian refineries modernisation. At that, provision of two West Ukrainian refineries with Caspian oil of a better quality (in particular, *Azeri Light*, similar to Ukrainian<sup>2</sup>), in principle, might simplify the process of refining and exert positive influence on the volumes and cost of their modernisation.

Viewed as an alternative to the Russian sources of oil supply to Ukraine are Azerbaijan, Kazakhstan and

<sup>1</sup> The depth of processing at Ukrainian refineries is cited according to the Ministry of Fuel and Energy data. Many experts consider it overstated by 10-15% due to the method of assessment adopted in Ukraine, substantially different from international.

For more detail on the state of oil processing in Ukraine see: Oil refining in Ukraine: the state and problems: Razumkov Centre analytical report. – *National Security & Defence* No.3, 2006, p.15-31.

<sup>2</sup> Russian *Urals* oil blend contains 1.3% of sulphur, Caspian oil blend *CPC* – 0.54%, *Azeri light* – 0.14%. So, Caspian oil is also more acceptable for European refineries that previously used *Brent* oil blend from the North Sea containing 0.54% of sulphur.



Turkmenistan, to the Russian oil transportation system – creation of a new route of its transportation bypassing the Russian territory. Commercial attractiveness of an alternative project can be ensured on the condition of acknowledgement of the forecasted figures of Caspian oil utilisation and its consumption on Ukrainian and European markets, as well as introduction of competitive transport rates. Other lines of diversification of oil supply sources for Ukraine now look either unrealistic, or involve negative side effects (Insert “*Some options of sources of oil supply to Ukraine diversification*”).

#### SOME OPTIONS OF SOURCES OF OIL SUPPLY TO UKRAINE DIVERSIFICATION

Diversification of oil supply can be achieved at the expense of alternative sources and routes of supply usage, and supplemented with imports of finished petroleum products and an increase in the share of alternative motor fuel on the market.

**Oil production abroad.** To find alternative sources of oil supply, the Energy Strategy of Ukraine envisages active *development of foreign resources* of oil and their processing at Ukrainian refineries. According to forecasts, they (along with the use of domestic oil reserves) might cover over 32% of the domestic market of petroleum products by 2030. But in view of the difficult financial standing of *Naftogaz Ukrayiny NJSC* and its poor corporate management, it may be assumed that the targets of oil production beyond Ukraine will not be met, and the international sector of the company activity, without its fundamental reformation and financial recovery, will not seriously contribute to diversification of oil deliveries.<sup>3</sup>

**Substitution of oil imports with imports of finished petroleum products.** The effectiveness of that way was demonstrated in Ukraine in the last four years, when the shortage of raw oil and inability of domestic refineries to meet domestic demand were offset by rather diversified imports of petroleum products from Lithuania, Romania, Belarus, Russia, Kazakhstan and Poland. Over that period, the share of imports on the domestic motor fuel market rose from 10% to 45%.<sup>4</sup> However, that way of diversification involves a number of negative factors: dependence on imports makes the market of petroleum products more sensitive to changes in the situation on foreign markets; toughening of competition on that market, on one hand, is to encourage development of domestic refineries, but on the other – in view of the difficult technological and financial state of the sector, makes enterprises unprofitable, leaving the market (Kherson refinery) and dismissing workers.

**Alternative to petroleum products.** The main *alternatives to petroleum products* (mainly, motor fuel) are liquefied and compressed gas, biofuel and accumulated electric energy. The segment of compressed gas got an impetus in Ukraine as well. Its share on the market of light motor fuels is close to 15% – the level that with time, in view of the current pricing, tax policy and technological specificity of consumption, has a limited potential of growth.

**Due to the small proved reserves of oil and difficulty of raising investments, in the middle run, Ukraine will**

**not be able to seriously increase domestic production and fundamentally modernise Ukrainian refineries. Encouragement of finished petroleum products imports is restrained by the extreme dependence of the domestic market on fluctuations of world prices of oil and petroleum products.**

**Domination of Russian oil in the employment of Ukrainian oil transportation and oil processing capacities is fraught with Ukraine's oil dependence being used for political pressure by Russia.**

**The critical state of Ukraine's oil sector requires urgent and all-round measures for diversification of sources and routes of oil delivery. The need of diversification is caused both by optimistic assessments of long-term prospects of Ukraine's oil processing sector development and the need to reduce the energy dependence on Russia.**

**The main tasks of the state policy of diversification should include: first, meeting the demand of the national economy and domestic market in oil and petroleum products at the expense of Caspian oil deliveries; second, provision of an alternative route of oil supply from the Caspian region to Europe; third, coordination of diversification activities with measures at modernisation of the oil processing sector.**

### 3.2 PROJECT OF DIVERSIFICATION OF OIL SUPPLY TO UKRAINE: PROGRESS AND PROBLEMS

Diversification problems can be resolved with implementation of the Odesa-Brody-Płock-Gdańsk project<sup>5</sup> on the condition of consideration of Ukraine's actual capabilities, assessment of the oil producing potential of the Caspian region, situation on markets of Caspian oil, and requirements to routes of its transportation and effects of implementation of competing oil transportation projects in the Eurasian region.

**Project of Eurasian oil transportation corridor (EAOTC) involving Ukraine.** The idea of EAOTC arose in mid-1990s within the framework of the European Commission Programme of Technical Assistance to CIS states (TACIS) and the Programme of Transport Corridor Europe-Caucasus-Asia (TRACECA). The programmes envisaged construction of a new corridor (routes) for oil transportation from the Caspian region to West and Central European countries bypassing the Russian territory.

One of the possible options of EAOTC is presented by the so-called Black Sea-Baltic route – Odesa-Brody-Płock-Gdańsk, relying on the oil transportation system Odesa-Brody built by Ukraine<sup>6</sup> that enables transportation

<sup>3</sup> In particular, in 2004, *Naftogaz Ukrayiny NJSC* and the *National Oil Company of Libya* made an agreement of product sharing at three oil and one gas blocks in Libya, but due to the passivity of the Ukrainian company and lack of its funds, it ceded three out of four planned blocks. In 2006, *Naftogaz Ukrayiny* made a concession agreement with the *Egyptian General Petroleum Corporation* for exploration and development of oil and gas fields in Egypt. However, the project went no further than the exploration stage – as of July, 2009, two exploratory wells were drilled. Similar are the results of *Naftogaz Ukrayiny* surveying four blocks in United Arab Emirates jointly with *Al Jazirah Enterprise for Project Development & Trading*.

<sup>4</sup> According to the Ministry of Fuel and Energy, in 2008, oil production fell by 4.9%, refining – by 24.1%. Meanwhile, the share of imported petroleum products on the Ukrainian market reached 45% (in 2004 – some 10%).

<sup>5</sup> The project is now known as the Eurasian Oil Transportation Corridor (EAOTC), this name is often used, including in official documents, and treats the project extensively, including options of its development (in official documents – Euro-Asian Oil Transport Corridor).

<sup>6</sup> The oil transportation system “Odesa-Brody” includes Pivdennyi sea oil terminal and Odesa-Brody pipeline. The oil transportation system was built within the framework of a project that was not implemented for some reasons, while its initial concept was changed. See: Cabinet of Ministers Directive “On Approval of the Concept of State Policy in the Field of Supply and Transit of Crude Oil” No.187 of April 5, 2002.





of Caspian oil from the Black Sea basin and its carriage both for domestic needs and to the EU countries (Map “*Transit routes of Caspian oil*”).

Such transportation was made possible with construction of oil pipelines Baku-Supsa and Tengiz-Novorossiysk.<sup>7</sup> Up to 5 million tons of Caspian oil a year can be supplied to two west Ukrainian refineries (*Halychyna*, *Naftokhimik Prykarpattya*); up to 8 million tons – to Slovakia and the Czech Republic (by *Druzhba* oil pipeline).

Meanwhile, there is a potential of supply of up to 40 million tons/year of Caspian oil to Poland, Slovakia, Austria, Germany and other countries, if the project is extended in the directions: Brody-Bratislava-Schwechat, Brody-Kralupy-Ingolstadt-Karlsruhe, and Brody-Płock-Gdańsk (Schwedt)-Wilhelmshaven.

In view of the Ukrainian oil transportation system Odesa-Brody construction completion in 2002 and appearance of said capabilities to supply Caspian oil via Black Sea ports, Ukraine, Poland and the European Commission in 2003 signed the joint declaration in support for the EAOTC project.<sup>8</sup> The project was termed important for enhancement of the EU energy security. The declaration said that the oil pipeline Odesa-Brody-Płock-Gdańsk would provide alternative routes of oil supply to the EU markets, ensure reliability, effectiveness and transparency of its transit between the basins of the Black, Baltic and North Seas.

Proceeding from the declaration, Ukraine and Poland on November 26, 2003, signed an intergovernmental agreement of the Odesa-Brody oil transportation system capacities use and its integration with Polish oil transportation capacities.<sup>9</sup>

**Participants of EAOTC project.** In 2004, *Ukrtransnafta* OJSC and Polish *PERN Przyjazn* set up *Sarmatia* joint venture to develop the business plan of the project and arrange for investment in construction of the oil pipeline segment Brody-Płock (490 km). Now, *Sarmatia* unites companies of five countries: *SOCAR* (Azerbaijan), *GOGC* (Georgia), *Klaipedos Nafta* (Lithuania), *PERN Przyjazn* (Poland) and *Ukrtransnafta* (Ukraine).<sup>10</sup>

However, Kazakhstan, possessing the greatest oil reserves in the Caspian region, refused to join the consortium, which was a serious blow for the employment of oil and investments for the project. The trend towards

a decrease in Kazakhstan’s interest in EAOTC became especially evident after *KazMunaiGas* company in 2007 made an agreement of purchase of 75% share of the Romanian *Rompetrol Group NV*. This gave Kazakhstan access to oil processing capacities in Romania (up to 4 million tons/year) and the possibility of annual distribution of over 7 million tons of petroleum products (via networks in Bulgaria, Moldova, Romania and France), and Romania – Kazakh oil and investments for its own oil sector.<sup>11</sup>

Azerbaijan will not be able to counterbalance said negative factor – despite the participation of Azerbaijan’s *SOCAR* in *Sarmatia* and support for the project from President I. Aliev at the Baku Energy Summit on November 14, 2008, the oil now produced in Azerbaijan is not enough even to fill the oil pipeline Baku-Tbilisi-Ceyhan (BTC). Hence, ***SOCAR will use the Ukrainian route only if it is more economic, compared to others*** – that was repeatedly said by official managers of Azerbaijan’s oil sector.

So, given the need of greater support for the project, required volumes of oil and investments, involvement of the leading international oil companies working in the Caspian region might help it a lot.<sup>12</sup>

#### **Problems of EAOTC project implementation.**

Despite the project’s prospects, its progress is hindered by a number of external factors beyond Ukraine’s control. However, the main reasons for the project delay are of the domestic origin.

#### **External negative factors:**

(a) intensification of activities within the framework of projects competing with EAOTC, bypassing the Black Sea straits;

(b) construction of own or takeover of foreign refineries by oil producing countries in the Caspian region. For instance, Kazakhstan, in addition to purchase of shares of the above-mentioned *Rompetrol Group NV*, plans the construction of a refinery on its territory in the middle term. Azerbaijan, in partnership with Kazakhstan, considers construction of refineries in Ceyhan (Turkey) or Constanța (Romania). Construction of refineries is planned in Armenia and Iran;

(c) Caspian countries performing or planning oil transportation in the southern direction. For instance, Kazakhstan, taking into account the experience of oil transportation by Azerbaijan via Iran (swap deliveries),

<sup>7</sup> Baku-Supsa oil pipeline is operated by the Azerbaijan International Operating Company (AIOC), Tengiz-Novorossiysk – by the Caspian Pipeline Consortium (GPC).

<sup>8</sup> Joint Declaration of the Cabinet of Ministers of Ukraine, the Council of Ministers of the Republic of Poland and the European Commission on the Support of the Euro-Asian Oil Transport Corridor Project of May 23, 2003. – Official web site of the Ministry of Fuel and Energy of Ukraine, <http://www.mpe.com.ua>

<sup>9</sup> Agreement between the Cabinet of Ministers of Ukraine and the Government of the Republic of Poland concerning use of capacities of Odesa-Brody hydrocarbon transportation system and its integration with Polish capacities. Signed on November 26, 2003, approved by the Cabinet of Ministers Resolution No.38 of January 14, 2004, effective from February 16, 2004.

<sup>10</sup> The decision to extend the list of *Sarmatia* participants to five was passed during the energy summit in Vilnius in October, 2007.

<sup>11</sup> The Romanian experience of employment of Kazakh oil by refineries provides a good example of coordinated and transparent actions of the authorities for prompt diversification of oil deliveries on the basis of the mutually advantageous balance of interests of the state and oil producing, oil processing and oil transportation companies.

Instead, in Ukraine, *Ukrtransnafta* OJSC and Azeri *SOCAR* in June, 2006, agreed a model of raising investments and drawing oil necessary for EAOTC development, similar to the Romanian – but due to the influence of some lobbyist groups, that model was not implemented.

<sup>12</sup> On August 29, 2009, *Ukrtransnafta* sent applications to 30 companies – owners of oil resources in the Caspian region, consumers, oil transportation companies, oil traders that could take part in supply of Caspian oil by the Odesa-Brody oil pipeline. Positive responses were obtained from *LOTOS Group*, *MOL*, *KazMunaiGas*, *SOCAR* and *Sarmatia* companies. *TengizChevroil* company so far does not consider participation in the project but wishes to be informed about its progress.

## TRANSIT ROUTES OF CASPIAN OIL

### PROPOSAL OF GRADUAL DEVELOPMENT OF EAOTC

**PHASE I** – delivery of Caspian oil to refineries in Kralupy (Czech Republic), Wogburg and Ingolstadt (Germany).

**Routes:**

1. Sea oil terminal Pivdennyi-Brody-Levice (Slovakia)-Kralupy (Czech Republic).  
Employment of Druzhba oil pipeline capacities using the batching technology.
2. Kralupy-Ingolstadt-Wogburg.  
Envisages reverse use of the Ingolstadt-Kralupy-Litvinov oil pipeline.

Enables Czech and German refineries to use both Russian and Caspian oil.

**PHASE II** – delivery of Caspian oil to refineries in Schwechat (Austria) and Karlsruhe (Germany).

**Routes:**

1. Sea oil terminal Pivdennyi-Brody-Bratislava-Schwechat.  
Envisages:  
- employment of Druzhba oil pipeline capacities using the batching technology;  
- construction of Bratislava-Schwechat oil pipeline (55 km, 10 million tons/year).
2. Ingolstadt-Karlsruhe.  
Envisages employment of the Transalpine oil pipeline.

**PHASE III** – delivery of Caspian oil to refineries in Płock (Poland), North Germany and the port of Wilhelmshaven (Germany).

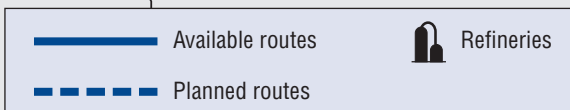
**Routes:**

1. Sea oil terminal Pivdennyi-Brody-Płock.  
Envisages construction of Brody-Płock oil pipeline (550 km, 17 million tons/year).  
Enables connection of the northern and southern branches of Druzhba oil pipeline for delivery of Caspian oil to Polish refineries.
2. Płock-Schwedt-Wilhelmshaven.  
Envisages construction of Schwedt-Wilhelmshaven oil pipeline (414 km, 26 million tons/year).



OIL PIPELINE PROJECTS BYPASSING TURKISH STRAITS

Routes	Raw material base	Length	Capacity	Project cost	Term of accomplishment	Parties
Burgas-Alexandroupolis	West Siberia, Kazakhstan	285 km	28-35 million tons/year in the future – 50 million tons/year	€700 million	2009-2011	Russia ( <i>Rosneft</i> , <i>Gazpromneft</i> , <i>Transneft</i> ) – 51% shares. Bulgaria, Greece – 24.5% each
Constanța-Trieste	Caspian region	1400 km	40-60 million tons/year	\$2.0-3.5 billion	2009-2012	Romania, Serbia, Croatia, Slovenia, Italy
Samsun-Ceyhan	Caspian region	555 km	50-70 million tons/year	\$2 billion	2007-2011	Transanatolian Pipeline Company ( <i>TAPCO</i> ): <i>Calik Group</i> (Turkey), <i>ENI</i> (Italy)
Burgas-Skopje-Vlorë	Caspian region	900 km	35 million tons/year	\$1.5 billion		Albania, Bulgaria, Macedonia



Sources: web sites of *PricewaterhouseCoopers*, *Channoil*, *Granherne*; *Eurasian Oil Transportation Corridor*, – *International Energy Forum*, Kyiv, May 22, 2008.

Capacity of oil pipelines for transportation of Caspian oil, million tons/year

Oil pipeline	Capacity in 2008	Rate of load	Potential capacity
Caspian Pipeline Consortium (CPC)	32.0	Full	67.0
Baku-Tbilisi-Ceyhan (BTC)	50.0	80%	80.0
Atyrau-Samara	15.0	Full	20.0
Baku-Novorossiysk	5.0	50%	5.0
Baku-Supsa	7.5	Full	7.5
Atasu-Alashankou (China)	10.0	60%	20.0
<b>Total</b>	<b>119.5</b>		<b>199.5</b>





considers a project of the Kazakhstan-Turkmenistan-Iran oil pipeline, and began transportation of oil of *TengizChevrOil* company by the Baku-Tbilisi-Ceyhan (BTC) pipeline;

(d) planning of transit routes via territories with increased risks: in the South Caucasus – zones of “frozen conflicts” (Nagorno-Karabakh, breakaway republics of Abkhazia and South Ossetia); in the south of Turkey – areas of activity of the Kurdistan Workers’ Party, committing terrorist attacks (the latest – explosion at the BTC oil pipeline on August 5, 2008).

**Internal negative factors:**

(a) **uncertainty of the project implementation prospects** – by contrast to the international practice, whereby a pipeline project is first backed by suppliers and consumers, and then implemented, Ukraine, possessing actually a ready oil transportation system, has to search for suppliers and consumers.

Furthermore, effectiveness of EAOTC for Ukraine itself is compromised by the modernisation plans disruption of the Drohobych and Nadvirna refineries<sup>13</sup> and introduction of the most favoured status for petroleum product importers by the Government in 2005.

(b) **controversy of state decisions** – in July, 2004 (after Ukraine signed the above-mentioned documents with the European Commission and Poland), the Cabinet of Ministers of Ukraine took a decision on operation of the Odesa-Brody oil pipeline in the reverse mode,<sup>14</sup> which let the potential project participants and official representatives of the EU question the invariance of Ukraine’s resolve to use the oil pipeline in line with its declared intentions.

In 2008, the oil pipeline use caused disputes between the Cabinet of Ministers and the President of Ukraine. After the management of *Halychyna* and *Naftokhimik Prykarpattya* got a commercial proposal from *Millbert Ventures* company for deliveries of up to 5 million tons of Caspian oil a year, the President issued a decree ordering operation of the oil pipeline in the designed direction in 2008.<sup>15</sup> In her turn, Ukraine’s Prime Minister Yu. Tymoshenko said that the leadership of the Presidential Secretariat was trying to make “another deal concerning the Odesa-Brody oil pipeline”<sup>16</sup> and banned *Ukrtransnafta* to fulfil that Decree.

Inconsistency in passage and implementation of state decisions, on one hand, creates unfavourable conditions for implementation of the EAOTC project. On the other – instances of diametrically opposing decisions witness the

oil pipeline system readiness for a prompt change of the operation mode;<sup>17</sup>

(c) **vulnerability to lobbying Russian interests.** The controversy accompanying the project clearly witnessed contradictions among political elites and their vulnerability to foreign influence. In particular, the political motives of the Government are witnessed by the above-mentioned July decision and the contract of November 16, 2004, between *Ukrtransnafta* and the Russian companies *Transneft* and *TNK BP* of oil transportation in the reverse direction, by the route Mozyr-Brody-Pivdennyi – since this route is the most expensive for *TNK-BP*.<sup>18</sup> Its lobbying by that company can only be explained by Moscow’s pressure intended to hinder implementation of the EAOTC project and remove competition on the market of oil supply. Furthermore, Russian companies did not fulfil contractual provisions. Over five years of its validity, only in 2007, the system transported nearly 9 million tons of oil, in other years, figures were much lower, so that Ukraine annually sustained tens of millions of dollars of losses (Table “*Oil transmission volumes by Odesa-Brody system in reverse mode*”).

Year	2004*	2005	2006	2007	2008
Transported volume	1.00	5.75	3.42	9.00	7.75
Fulfillment of contractual commitments, %	-	63.93%	37.98%	100.00%	86.11%

\*Oil was transported in September-December.

This makes even less logical the additional agreement made on December 26, 2006, that provides for a two-fold decrease of the oil transit rate by the pipeline and oil handling at Pivdennyi, as well as extension of the term of reverse operation till December 31, 2009.<sup>19</sup>

In absence of the political factor, it would have been more beneficial for all parties to the agreement to direct the Russian oil by other routes: Samara-Velykotsk-Kremenchuk-Pivdennyi and Samara-Holovashivka-Kremenchuk-Pivdennyi. This would release the Odesa-Brody system for deliveries of Caspian oil and save funds of Russian companies.<sup>20</sup>

(d) **drawbacks of corporate management.** A separate problem is presented by the poor state management of *Ukrtransnafta* OJSC. Its subordination to *Naftogaz Ukrayiny* NJSC is not conducive to the project implementation, as the latter concentrates on entirely

<sup>13</sup> In 2000-2007, plans of modernisation of the Drohobych and Nadvirna refineries were implemented by only 7.1% and 19.9%, respectively. See: Ryabtsev H., Sapehin S., Lir V. Petroleum products in Ukraine: present and future, – Kyiv, Psyche Scientific Technology Center, 2008, p. 245.

<sup>14</sup> Cabinet of Ministers Resolution “On Amendment of Item 1 of the Cabinet of Ministers of Ukraine Resolution of February 4, 2004 No.114” No.831 of July 5, 2004. On November 16, 2004, *Ukrtransnafta* and Russian companies *Transneft* and *TNK BP* made an agreement of pumping 9 million tons of oil a year by the oil pipeline Odesa-Brody in the reverse mode till 2007.

<sup>15</sup> The Decree lost validity with issue of the Decree “On Immediate Measures at Provision of Implementation of Project of the Euro-Asian Oil Transport Corridor” No.329 of May 14, 2009.

<sup>16</sup> See: Trubchynskiyi O. New conflict of Tymoshenko and Yushchenko: now, Odesa-Brody. – *Forpost*, July 17, 2008, <http://www.4post.com.ua>

<sup>17</sup> Conditions of the additional agreement to the contract of November 16, 2004, between *Ukrtransnafta*, *Transneft* and *TNK BP* companies made on December 26, 2006, regarding transportation of 9 million tons of oil a year in the direction of Pivdennyi sea oil terminal allow the oil pumping station to reverse the mode three months after signing contracts of the oil pipeline use in the direction of Brody. So, today, there are neither technological nor legal problems of redirecting oil flows to the north.

<sup>18</sup> For Russian companies, it would be cheaper (by approx. \$3/ton) to use the underloaded route Kremenchuk-Snihurivka-Pivdennyi.

<sup>19</sup> From May, 2009, *Transneft* and *Ukrtransnafta* work under direct agreement; before that, the route Brody-Pivdennyi was operated by *TNK BP* through *Skilton Ltd.* offshore company.

<sup>20</sup> However, this requires additional construction of a parallel segment of Odesa-Brody oil pipeline (52 km) and development of the infrastructure for oil admission at Pivdennyi sea oil terminal (construction of the second berth and increase of the tank capacity by 240 thousand cu.m).





different problems, first of all, related with settlements for gas and reliability of operation of Ukraine's GTS in the conditions of a multibillion deficit of funds. Greater financial and economic independence of *Ukrtransnafta* would help "release" *Naftogaz Ukrayiny* NJSC and raise the promptness of the EAOTC project management by *Ukrtransnafta*.

**Therefore, EAOTC project did not lose its topicality, but to be competitive, it needs greater support from the oil companies working in the Caspian region. Much more attention should be paid to oil marketing, enhancement of the quality of management and commercialisation of the project, with containment of the political (lobbyist) component.**

### 3.3 FACTORS OF MARKET SITUATION IN EAOTC PROJECT

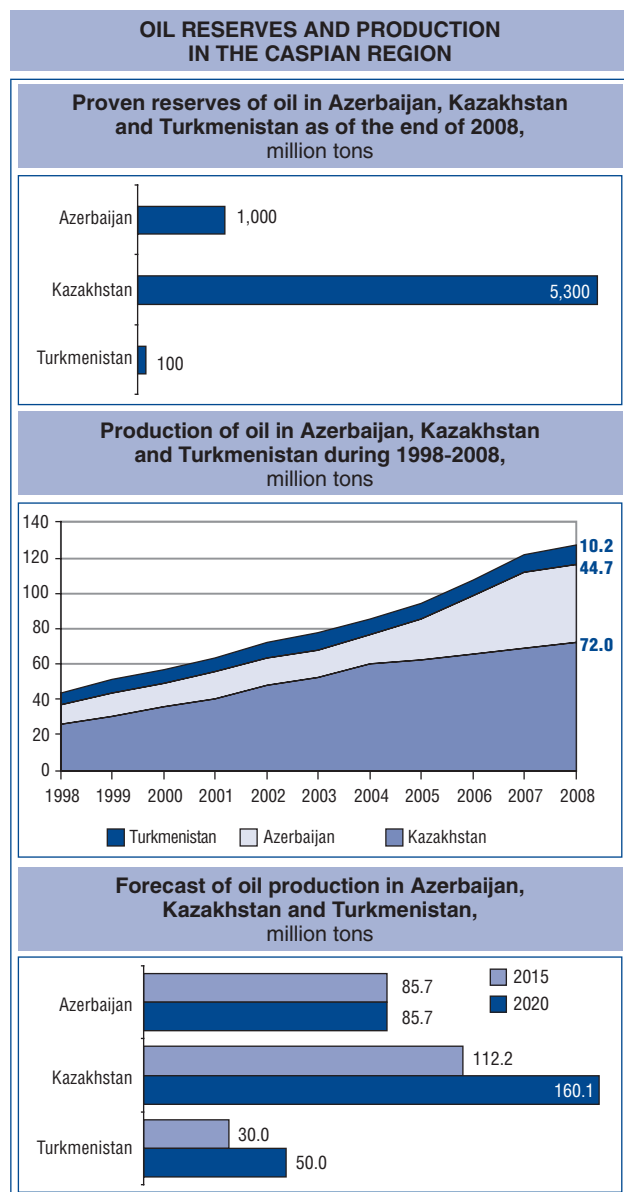
Commercialisation of the project first of all requires accurate analysis of the oil producing potential of the Caspian region, demand for Caspian oil on the European markets, as well as advantages and disadvantages of routes of its transportation to European countries – for identification of the economic attractiveness of EAOTC.

**Reserves and production of Caspian oil.** A practical possibility of the Caspian region becoming one of the most promising oil producing regions of the world arose after Kazakhstan in 1993 jointly with *Chevron* company (USA) established *TengizShevrOil* joint venture for the development of the large Tengiz field, while Azerbaijan in 1994 made a product sharing agreement with world leading international oil companies led by *British Petroleum (BP)* for the development of large deep-water fields (*Azeri-Chirag-Guneshli* project). Those prospects became a reality with the discovery of the gigantic *Kashagan* field in the Kazakh sector of the Caspian shelf in 2000.

The aggregate proved reserves of oil in Azerbaijan, Kazakhstan and Turkmenistan are estimated at 6,400 million tons, in that, Kazakhstan – 5,300 million tons, Azerbaijan – 1,000 million tons, Turkmenistan – 100 million tons<sup>21</sup> (Diagram "Proven reserves of oil in Azerbaijan, Kazakhstan and Turkmenistan"). They provide a reliable basis for achievement of the oil production targets in the region.

Over the past 10 years, oil production in those countries has been growing at an extremely high rate: in 1998-2008, in Azerbaijan – almost four-fold, in Kazakhstan – almost three-fold<sup>22</sup> (Diagram "Production of oil in Azerbaijan, Kazakhstan and Turkmenistan during 1998-2008"). It is expected to further rise from 126.9 million tons in 2008 to 295.8 million tons in 2020<sup>23</sup> (Diagrams "Oil reserves and production in the Caspian region").

Achievement of the targets of oil production and export will decisively depend on commissioning of the *Kashagan*



field, planned, as per an agreement of the project operator *Agip KCO* with the Government of Kazakhstan, for 2013 – while for the time being, Azerbaijan seems to be the most promising source of raw materials for EAOTC.<sup>24</sup>

The world economic crisis led to a noticeable decrease in the demand for oil and a sharp drop in its prices, which decreased the attractiveness of investment in the oil production sectors of many countries and complicated access of oil companies to credit funds. Those factors question the realism of oil production forecasts in the Caspian region. However, if the world oil prices do not fall below

<sup>21</sup> See: BP Statistical Review of World Energy, June 2009, p. 8, <http://www.bp.com>

<sup>22</sup> *Ibid.*

<sup>23</sup> The forecast of production depends on many factors, including scenarios of oil prices, the rate of transit capacities growth and cost of oil transportation to markets by the chosen routes. See: Purvin & Gertz Global Petroleum Market Outlook 2008, <http://www.purvingertz.com>; Oil and gas of Turkmenistan. Guidelines of the Programme of development of the oil and gas industry of Turkmenistan through 2030. – *Neftegazovaya Vertikal*, 2008, No.7, p.53.

<sup>24</sup> At a meeting of the Council of Presidents of Ukraine and Azerbaijan (April 9, 2009, Baku) I.Aliev confirmed that Azerbaijan could provide up to 5 million tons of oil a year for the Odesa-Brody oil transportation system. This oil can be of domestic production from *SOCAR* (in 2008 – 7.4 million tons) and 1.9 million tons the company gets as the co-owner of the JV and operating companies. See: In April, *SOCAR* increased total production of oil by 1.4% and reduced its own production by 3.3%. – *Azerbaijan Business Center*, May 15, 2009, <http://abc.az>.

Export batches of Azeri oil are sold at regular open tenders arranged by *SOCAR*'s Marketing and Economic Operations Department.



\$40/barrel, the probability of development of oil production projects in the region under the forecasted scenario will remain rather high. After all, the cost of production of 1 barrel of oil at most Caspian fields does not exceed \$25-30, and the governments of Azerbaijan, Kazakhstan and Turkmenistan, by contrast to those of OPEC countries, do not pursue a policy of cartel agreements and are interested in growth of oil production and creation of the favourable investment climate for that.

Development of new fields on the Caspian region gives investors higher economic effectiveness and bears a potential for longer supply of oil, compared to Russia, Great Britain, Norway, Mexico and the USA. Hence, production projects in the Caspian countries are less vulnerable to the world financial crisis.

**Therefore, production of Caspian oil will continue to steadily grow, with orientation to export markets. By 2020, oil production in Azerbaijan, Kazakhstan and Turkmenistan is expected to grow more than two-fold. Kazakhstan will remain the largest producer and exporter of oil in the region.**

**So, countries of the Caspian region in the long run may play a great role for oil deliveries to Europe, and therefore, will need reliable routes of oil export.**

**Markets for Caspian oil.** Currently, the Caspian oil is delivered mainly to the Mediterranean and West European markets. The rest is transported to Israel, India, Canada, China, the USA, Thailand, Japan and South American states.

Despite the forecast of the European Commission, envisaging growth of oil imports to the EU countries alone by 20 million tons by 2020 at \$61/barrel (at the price of \$100/barrel, imports may even decline by 21 million tons<sup>25</sup>), the Caspian oil may win a greater share on that important market (Diagram "Forecast of the EU oil imports").

The reasons include not only the rapid growth of oil production in the Caspian region and its high process and commercial properties but also the downward trend in oil production in the North Sea by Norway and Great Britain, starting from 2002<sup>26</sup> (Diagram "Production of oil in the North Sea by Norway and Great Britain").

As we noted above, Caspian oil by its properties is more acceptable for European refineries; additionally, introduction in the EU of even tougher environmental requirements to petroleum products prompts higher demand for low-sulphurous oil blends.

Now, the European market (in particular, the countries – potential users of EAOTC: the Czech Republic, Germany and Poland) accounts for nearly 60% of deliveries of *Azeri Light* from the resources of *SOCAR* – the company that steadily expands its commercial activity.<sup>27</sup> The rest 40% of deliveries falls on the markets of Canada, the USA, East Asian and South American countries.<sup>28</sup> In the long run, the European market will remain among the most capacious for Caspian oil.

<sup>25</sup> An EU Energy Security and Solidarity Action Plan. – Commission of the European Communities, Brussels, 2008 Nov 13.

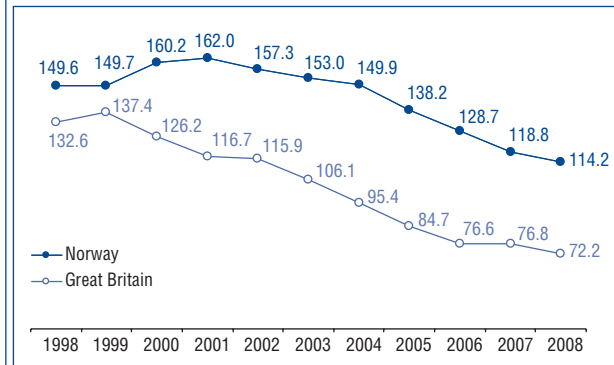
<sup>26</sup> BP Statistical Review of World Energy, June 2009, p.8., <http://www.bp.com>

<sup>27</sup> From 2008, *SOCAR* intensified its trade in oil on international markets, having registered in Switzerland its subsidiary *Socar Trading S.A.*, which enhanced the role of the state oil company as the main exporter of Azeri oil and petroleum products. The company also opened an office in Singapore; in 2008, an oil terminal was commissioned in the Georgian port of Kulevi with the capacity of 10 million tons/year, owned by *SOCAR*.

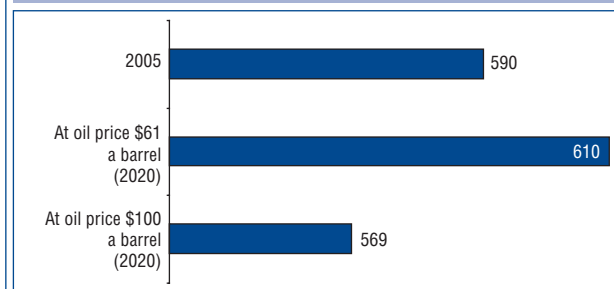
<sup>28</sup> See: New Zealand company acquired a batch of 1 million barrels of crude Azeri Light oil. – *Newsazerbaijan* international information agency, July 21, 2008, <http://newsazerbaijan.ru>

### IMPORT AND EXTRACTION OF OIL IN THE EU

Production of oil in the North Sea by Norway and Great Britain, million tons



Forecast of the EU oil imports in 2020, million tons



**Therefore, the European oil market looks promising for Caspian oil. Growth of its deliveries by the EAOTC oil pipeline system is economically justified.**

**Azeri company *SOCAR* is one of the main operators promoting Caspian oil on the European market. Cooperation with it within the EAOTC framework requires a high degree of the project commercialisation and observance of the agreements made by partners (including Ukraine).**

**Routes of Caspian oil transportation.** The key problem for oil production growth in the Caspian region lies in creation of economically profitable and reliable routes of its delivery to international markets. For optimisation of deliveries, international oil companies are interested in diversification of transit routes. For many of them, transportation costs are the main factor influencing the profitability of investment projects, so, investors pay priority attention to this factor.

The existing oil pipeline routes go west (oil pipelines via Russia and Turkey or tankers via the Black Sea straits) and can transport 119.5 million tons/year. But proceeding from production forecasts, as soon as 2020, the capacity of export oil pipelines should reach 199.5 million tons/year.



Passage of tankers from the main Black Sea ports of Novorossiysk, Supsa, Batumi, Odesa and Tuapse via the Black Sea straits remains a “bottleneck” of the Caspian oil supply to international markets.

The acuteness of the problem was mitigated for some time, after commissioning of the largest regional BTC oil pipeline system in 2006 with the capacity of 50 million tons/year. In 2006, the Kazakh-Chinese oil pipeline Atasu-Alashankou was commissioned, with the designed capacity of 20 million tons/year, which not only released the Black Sea straits but enabled pipeline transportation of Caspian oil in the south-eastern direction.

After the expected increase in the CPC oil pipeline capacity from 32 to 67 million tons/year, the problem of the Black Sea straits will again be aggravated. Furthermore, Turkey continuously toughens regulations of the straits transit over environmental and security concerns.

The EAOTC project will help solution of the Black Sea straits problem.

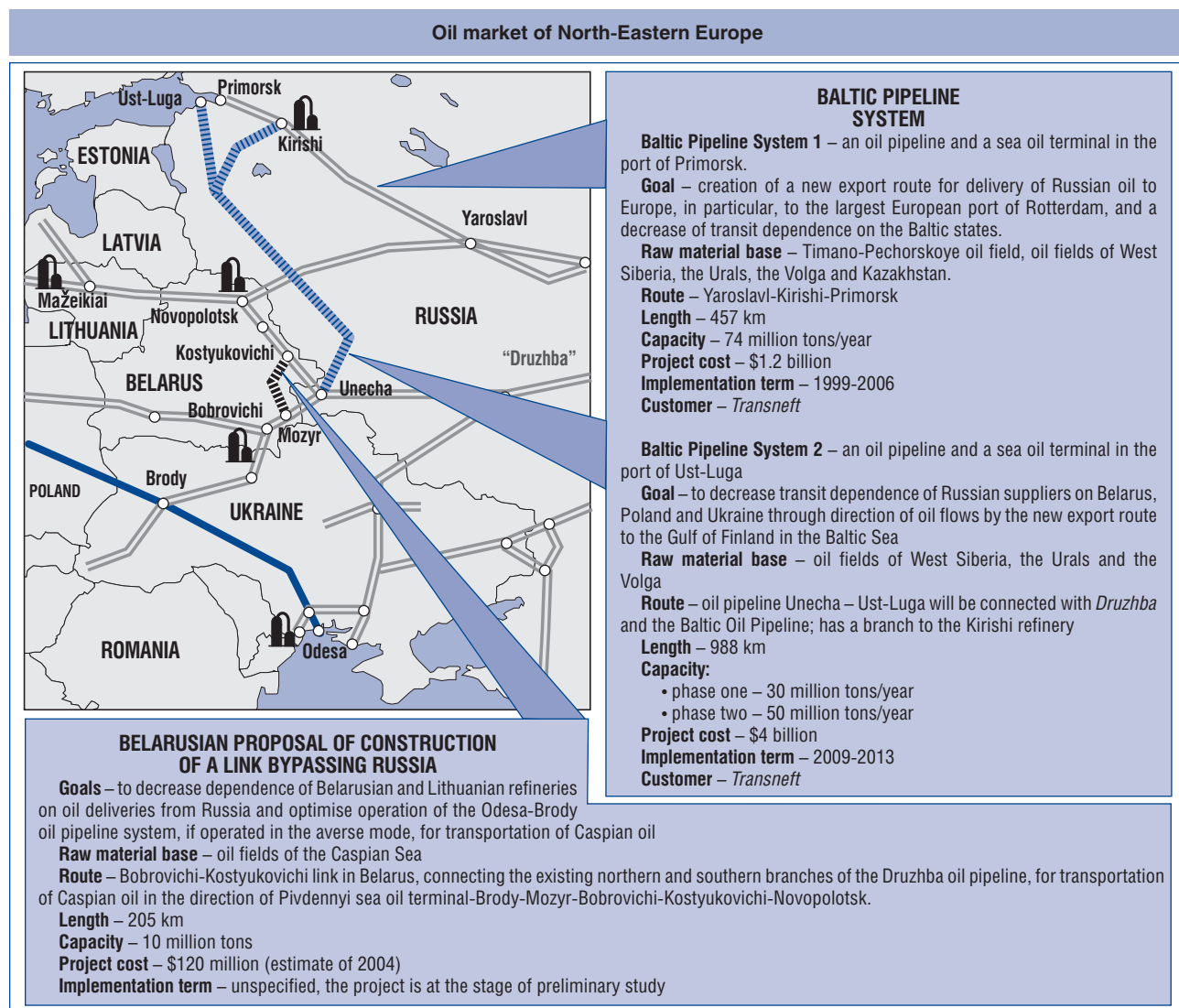
However, oil companies active in the Caspian region are interested in implementation of not more than two new oil pipeline projects bypassing the Black Sea straits: to release the straits, bypass oil pipelines with the capacity

of 50-70 million tons/year would be enough – while the aggregate forecasted capacity of all planned oil pipelines exceeds 160 million tons/year. In this context, EAOTC competes with the projects Burgas-Alexandroupolis, Samsun-Ceyhan, Constanța-Trieste and Burgas-Skopje-Vlorë.<sup>29</sup>

**So, delay of EAOTC construction may result in the loss of its competitive advantages and relevance.**

**Influence of the Baltic Pipeline System on implementation of the EAOTC project.** Construction of bypass oil transportation routes, Baltic Pipeline System 1 and Baltic Pipeline System 2, by Russia creates unfavourable conditions for Ukraine and East European states on the oil market and therefore gives an additional reason for implementation and perfection of the EAOTC project (Map “Oil market of North-Eastern Europe”).

Baltic Pipeline System 1 made it possible to increase transportation of Russian oil from 12 million tons in 2001 to 74 million tons in 2006, which boosted supply of oil on markets of the Baltic states and reduced the commercial attractiveness of the Odesa-Brody-Płock project due to the growth of difference between the cost of delivery of *Urals* and *CPC*<sup>30</sup> oil blends in favour of the former.



<sup>29</sup> Sources: official web sites of companies *PricewaterhouseCoopers*, *Channoil*, *Transneft*, *CERA*, the Energy Charter Secretariat and subject materials in journals *Neft i Kapital*, *Netfegazovaya Vertikal*.

<sup>30</sup> Oil export blend (from Kazakh and Russian fields), supplied by the Caspian Pipeline Consortium.





The Russian leadership conceived Baltic Pipeline System 2 during the Russian-Belarus conflict in January 2007, when in response to Belarus introducing a duty on oil transit, *Transneft* suspended oil transportation by the northern branch of the *Druzhba* oil pipeline. The final decision on the project implementation was passed by the Russian Government in November, 2008.<sup>31</sup>

According to the *Transneft* proposal, 19 million tons of oil a year are to be supplied via Baltic Pipeline System 2 at the expense of termination of deliveries via Ukrainian ports, 12 million tons a year are planned to be taken from export routes of *Surgutneftegaz* company, 10 million tons a year – from Kazakhstan. It is also planned to decrease oil transit via Poland by 10 million tons a year, and by 2 million tons a year reduce rail carriages to Belarus from Unecha oil pumping station. The source of supply of another 7 million tons of raw materials is to be decided later.

The main goal of the project is to reduce Russia's transit dependence on Ukraine, Belarus, Poland and strengthen political influence on those countries, along with Slovakia, the Czech Republic and Hungary, by making them compete for oil flows from Russia. But due to the poor prospects of significant growth of oil production in Russia in the forthcoming decade, construction of Baltic Pipeline System 2 cannot rely on sufficient extra volumes of oil, which poses a risk of an oil supply deficit to refineries in those countries.<sup>32</sup>

**Therefore, Russia's pushing of bypass oil transportation routes prompts Central and East European states to step up joint efforts promoting the EAOTC project, to offset the potential danger of an oil deficit.**

**Growth of oil production in the Caspian region requires an increase in export oil pipeline capacities and is critical for the prospects of EAOTC.**

**The multi-vector policy of Kazakhstan and Azerbaijan in creation of oil supply routes and efforts of countries of the Black Sea basin and large oil companies at implementation of oil pipeline projects bypassing the Black Sea straits encourage competition among the routes of transit of Caspian oil.**

**The EAOTC project implementation delay adds to the risks of loss of the advantage of being the only oil pipeline built in Ukraine, designed for supply of Caspian oil to European markets.**

### 3.4 ASSESSMENT OF EAOTC PROSPECTS

The EAOTC project pursues two main tasks: to meet the needs of the national economy and domestic market in oil and petroleum products at the expense of supply of Caspian oil, and to provide an alternative route of oil supply from the Caspian region to Europe.

In this respect, the route using the Odesa-Brody oil transportation system already offers serious **advantages, compared to competing routes:**

- the oil pipeline is actually completed and can be prepared for operation in the averse mode within a three-month term;
- the route gives a potential capability for oil deliveries from the Caspian Sea to European sea ports and at the same time enable substantial reduction of tanker traffic by the Black Sea straits and in the European seas;

#### EAOTC PROJECT BUSINESS PLANS

**1999.** Business plan of the Odesa-Brody-Płock-Gdańsk project drawn up by companies *Gulf Interstate Engineering* and *PP Limited*,

Concludes that oil carried by the pipeline cannot compete with Russian oil at refineries in Central Europe, including Poland.

**2002.** Business plan of EAOTC drawn up by companies *CERA* and *Halliburton Kellogg Brown&Root*.

Found no commercial benefits of the Ukrainian oil pipeline. Analysis of the difference between the cost of supply and transportation shows that the Black Sea consignors of Caspian oil have no economic incentives to use the Odesa-Brody oil transportation system, since that difference is so large that no tariff discount from *Ukrtransnafta* will be enough to make them interested.

**2003.** Business plan of EAOTC drawn up by *PricewaterhouseCoopers* company jointly with *Channoil*; the most elaborate.

Covers various aspects of the project development, in particular – forecasts of oil production in the Caspian region and marketing study of the key oil consumption markets in Europe. Economic analysis of the existing oil pipelines operation – Odesa-Brody, *Druzhba*, *TAL* (Transalpine), *IKL* (Ingolstadt-Kralupy-Litvinov), and new ones: Brody-Płock and Schwedt-Wilhelmshaven, – for supply of Caspian oil to refineries in Austria, Germany, Poland and the Czech Republic.

Proposes a programme of commercialisation of the project, envisaging its implementation in three phases – starting from creation of new routes that require minimal investments, with subsequent creation of more costly ways of supply of Caspian oil to the European market. *PwC* company proposes funding of every following phase partially at the expense of profit obtained at the previous phase.

**2004.** Business plan of EAOTC drawn up by *Energy Solution* company.

Its indices are generally consistent with those of the *PwC* business plan and prove EAOTC viability in the long run. It recommends transportation

of oil by the Odesa-Brody system in the reverse mode for three years, provided this does not prevent conclusion of contracts of supply and transit of Caspian oil to European refineries (by the routes specified in *PwC* proposals).

**2006.** Business plan of the Odesa-Brody-Płock-Gdańsk project drawn up to the European Commission order by the consortium uniting *SWECO PIC* (Finland), *ILF GmbhH* (Germany) and *KANTOR* (Greece).

Several options of the routes were considered. It was recommended to extend the oil pipeline to Orzechowo (Poland), since that route is the shortest (among five alternative options), which can save nearly \$100 million. Furthermore, the route crosses no rivers or nature conservation areas and faces no problems of land allotment.

As of April 1, 2008, concrete figures of economic effectiveness of the project specified in the business plan were not published in open sources.

**2008-2009.** Business plan of the EAOTC project drawn up to the order of *Sarmatia JV* by companies *Granherne*, *Purvin&Gertz* and *Greengate LLC*.

The business plan conclusions prove the good prospects and commercial attractiveness of the project for all its participants.<sup>33</sup> It notes the demand in Europe for not less than 30 million tons of Caspian oil a year along the EAOTC route and availability of resources to meet it in Azerbaijan, Kazakhstan and Turkmenistan. The amounts of oil exceeding said volumes may be transported via the Gdańsk oil terminal to foreign markets.

The business plan envisaged phased implementation of the EAOTC project. The first phase does not require construction of the new oil pipeline infrastructure, which minimises costs of its implementation, and will ensure transportation of 5-10 million tons of Caspian oil a year to refineries in Ukraine and Central/East European countries. Subsequent phases of EAOTC development require \$28 billion for construction of new oil pipeline system facilities, to transport additionally up to 40 million tons of Caspian oil a year.

<sup>31</sup> Russian Government Directive No.1754 of November 26, 2008. See: Official web site of Baltic Pipeline System 2 project, <http://bts2.ru/arrangement>. Baltic Pipeline System 2 was solemnly started on June 10, 2009.

<sup>32</sup> Maslov O. Five views of oil production decline in Russia. – *Yezhenedelnoe Nezavisimoe Analiticheskoe Obozrenie*, September 5, 2008.

<sup>33</sup> Source: President held a meeting on issues of practical implementation of the Euro-Asian Oil Transport Corridor on the basis of the Odesa-Brody oil pipeline. – Official web site of the President of Ukraine, May 5, 2009, <http://www.president.gov.ua>





- the oil pipeline can supply to two West Ukrainian refineries and refineries in Central and West European countries Caspian oil, of a higher quality than Russian, and therefore raise the effectiveness of the energy sectors and enhance the energy security of the EU and Ukraine;
- the project's potential can be raised at the expense of the standard batching technology employment, enabling supply of different oil blends by the northern branch of the *Druzhba* oil pipeline;
- involvement of European countries (companies) in the project would give partners access to a new, rather capacious source of oil, and Ukraine – to investments and revenues from transit.

These conclusions are confirmed by the business plans of the project (Insert “*EAOTC project business plans*”). In 1999-2009, six business plans of the project were developed. The first two deny its economic soundness, the last four generally confirm the potential commercial attractiveness of the project.<sup>34</sup> Noteworthy, another promising option of EAOTC, not considered yet in any of the business plans, is offered by its extension to Belarus and Lithuania (Insert “*Proposals of EAOTC extension...*”).

#### PROPOSAL OF EAOTC EXTENSION TOWARDS BELARUS AND LITHUANIA

This option was proposed after Russian company *Transneft* in the winter of 2007 suspended oil transit to the EU countries by the northern branch of the *Druzhba* oil pipeline following a Russian-Belarusian conflict. The same year, the Russian side ruled the use of the Unecha-Polotsk oil pipeline segment with the capacity of 15 million tons a year inexpedient, which resulted in stoppage of oil deliveries via Belarus to the Mazeikiiai refinery.<sup>35</sup>

After those events, in November, 2007, the State Comprehensive Programme of Modernisation of Basic Production Assets of the Belarusian Energy System through 2011 was approved, admitting supply of 20% of oil from alternative sources – in particular, possible deliveries of Caspian oil to Belarus using the Odesa-Brody oil transportation system, by the route Brody-Mozyr-Bobrovichi-Kostyukovichy<sup>36</sup> (Map “*Oil market of North-Eastern Europe*”, p.35).

In October, 2008, the First Deputy Prime Minister of Belarus expressed interest in the option of averse use of the Odesa-Brody oil pipeline with a branch to the Mozyr refinery.<sup>37</sup> In August, 2009, the Ukrainian Ambassador to Belarus confirmed Ukraine's readiness to consider the Belarusian proposal of possible participation in the EAOTC project.<sup>38</sup> Currently, the Belarusian side remains undecided with the project participation.

By and large, the variant of Caspian oil supply in the Belarusian direction can connect all branches of the *Druzhba* oil pipeline and deliver up to 10 million tons of Caspian oil a year to refineries in Belarus and Lithuania, bypassing the Russian territory. However, that option of EAOTC development should be viewed only as a potential possibility of its extension. The reason is that Belarusian refineries get Russian oil at preferential prices, and the Belarusian authorities are very sensitive to the Russian policy.

Implementation of the EAOTC project in a longer run requires consideration of not only the current market situation but also its strategic forecasts. Indeed, EAOTC may give Europe an additional route of oil deliveries from the Caspian Sea, despite even that purely commercial

aspects of the project so far have not been attractive enough, due to the favourable pricing situation at the European oil markets. For instance, at the end of February, 2009, the price of *CPC* oil blend in a Black Sea port near Novorossiysk was \$1.3/barrel higher than of Russian *Urals* blend in Adamowa Zastawa (Poland) – and this is without the cost of tankers for oil carriage to Pivdennyi port handling and transportation by oil pipeline for over 1,150 km. Meanwhile, on the South European market, the price difference made only \$0.25 a barrel.<sup>39</sup>

The cited figures witness the lack of commercial incentives to supply Caspian oil by the Odesa-Brody-Płock route for the time being, even on the condition of operational readiness of a pipeline from Brody to the Polish segment of the northern branch of the *Druzhba* oil pipeline. It seems more economic to transport Caspian oil by the Odesa-Brody route and further by the southern branch of the *Druzhba* oil pipeline via Slovakia to the Czech refinery in Kralupy. This option is commercially more attractive for oil traders, requires smaller investments and targets the market more interested in Caspian oil.

**The main advantage of the Odesa-Brody oil pipeline as a key segment of EAOTC is that by contrast to other planned competing oil pipelines, it already exists and can promptly begin transportation of Caspian oil to markets of the EU countries bypassing the overloaded Black Sea straits.**

**EAOTC envisaged several implementation options, using branches in Ukraine and European countries. As a result, the project may be considered flexible enough, and adaptive to the market situation, which enhances its competitive advantages.**

#### CONCLUSIONS

**Therefore, successful implementation of the EAOTC project can substantially reduce political and economic consequences of Ukraine's oil dependence thanks to replacement of Russian oil with Caspian, making it possible to decrease oil imports from Russia by 25-30% and raise utilisation of refineries. From this viewpoint, the success of the state policy will depend on modernisation of Ukrainian refineries.**

**The realism and benefits of the project are proven by steady growth of oil production in the Caspian region, involvement of producer countries and growing demand for Caspian oil on European markets. Meanwhile, requirements of payback cause tough competition among projects of oil transportation corridors in Eurasia.**

**The main conditions of employment of competitive advantages of EAOTC and its further extension include a political factors influence decrease, better management, conclusion of oil supply and transportation contracts with oil companies working in the Caspian region, and expansion of the project investment base.** ■

<sup>34</sup> Business plans rest on economic and technical assumptions that require continuous correction of results, in particular, dependent on the change of rates, load on the Black Sea straits, fluctuations of demand and supply on oil markets, production figures, etc.

<sup>35</sup> *Rostekhnadzor* admitted that that segment did not meet industrial safety requirements right after Phase 1 of Baltic Pipeline System 1 reached the designed capacity.

<sup>36</sup> Decree of the President of the Republic of Belarus “On Approval of State Comprehensive Programme of Modernisation of Basic Production Assets of the Belarusian Energy System, Energy Conservation and Increase in the Share of Use of Domestic Fuel and Energy Resources in the Republic through 2011” No. 353 of June 29, 2009, <http://pravo.by>

<sup>37</sup> Belarus ready to take part in implementation of Odesa-Brody project in averse mode. – *RBC Ukraine*, October 7, 2008, <http://www.rbc.ua/ukr/newslines/2008/10/07/443834.shtml>

<sup>38</sup> Ukraine proposes Belarus to join Odesa-Brody project. – 24 news TV channel, August 21, 2009, – <http://www.24tv.com.ua/economics/20090821/28851.htm>

<sup>39</sup> Calculated by Razumkov Centre experts on the basis of data from: Review of world oil market. – *Argus Neftepanorama*, February 26, 2009, Issue 9, No.7, p.22.

# 4. DIVERSIFICATION OF NUCLEAR FUEL SUPPLY TO UKRAINIAN NPPs

The goal of diversification also refers to supply of nuclear fuel – first of all, in view of 100% dependence on supply of fuel from Russia, the large share of nuclear power engineering in electricity generation (nearly 50%), and the prospects of its development outlined by the Energy Strategy of Ukraine.

Currently, there are four NPPs working in the country, running 15 power units with the total rated power of 13.8 million kW; two power units – No.3 and 4 of Khmelnytskyi NPP – are planned to be commissioned in 2016. The Energy Strategy provides for an increase in rated nuclear capacities by 29.8 million kW by 2030 through construction of new nuclear power units and lifetime extension beyond designed period of operation (at least by 15 years) of 13 operational power units whose planned service life expires in 2011-2026.

So, the demand of domestic nuclear power engineering for nuclear fuel is large enough and in the long run will grow. Meanwhile, Ukraine still depends on the only supplier – Russian *TVEL* company – which poses certain risks, first of all, political.

Their minimisation requires both diversification of nuclear fuel supply sources and creation of a domestic nuclear fuel cycle elements. Relevant programmes were initiated in Ukraine yet in 1990s, but their main goals remain unattained. In fact, the only practical step towards diversification of supply sources of nuclear fuel has been made – a contract signed with *Westinghouse* transnational company for supply of nuclear fuel for three power units – in case of successful completion of its qualification, to last till 2014.

This section briefly outlines features of diversification of nuclear fuel supply sources, as well as the progress of implementation of projects and programmes of diversification of its deliveries to Ukrainian NPPs and creation of elements of the domestic nuclear fuel cycle. The main features of Ukrainian nuclear power engineering are presented in “*Ukraine’s nuclear energy sector*” insert.

## 4.1. Specificity of nuclear fuel supply for NPPs sources diversification

Diversification of sources of nuclear fuel has a number of specific features that should be taken into account at passage of the relevant political decisions, ensuing from the specificity of that kind of fuel and its production (Insert “*Nuclear fuel cycle: world capacities by elements*”).

*Firstly*, nuclear fuel contains fissile materials, and therefore belongs to the group of dual use goods (for peaceful or military purposes). Respectively, its international transfers are performed under special procedures, pursuant to agreements with IAEA on assurances in connection with the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), and are subject to state export control. Meanwhile, the Treaty recognises the inalienable right of every member state “to develop research, production and use of nuclear energy for peaceful purposes”.<sup>1</sup> Technologies of enrichment of natural uranium and processing of spent nuclear fuel are considered the most sensitive for non-proliferation.<sup>2</sup>

Ukraine has a relevant agreement with IAEA, which allows it to develop nuclear power engineering, perform scientific research in that sector and have on its territory nuclear facilities, subject to the mentioned assurances.<sup>3</sup>

*Secondly*, the list of countries possessing the full range of nuclear technologies is rather short: first of all, the countries of the so-called “nuclear club” – Great Britain, China, Russia, the USA, France.<sup>4</sup> In fact, only those countries can on their own organise production of nuclear fuel (however, they prefer to produce it in international cooperation).

*Thirdly*, as a rule, producers of nuclear fuel are at the same time developers and suppliers of equipment for NPPs or closely tied with them. That is why they produce fuel, first of all, for reactors of their design. This involves two effects. *First*, different reactor types require different kinds of fuel, due to substantial differences in nuclear technologies used in modern nuclear power engineering. *Second*, fuel assemblies of different manufacturers for similar technologies differ by some properties

<sup>1</sup> Treaty on the Non-Proliferation of Nuclear Weapons, Article IV. – Official web site of Verkhovna Rada of Ukraine, [www.rada.gov.ua](http://www.rada.gov.ua). The Treaty was signed in July, 1968. Ukraine acceded to the Treaty as a nuclear-free state in December, 1994, conditioning this step by security guarantees from nuclear states. Such guarantees were provided by Great Britain, Russia, the USA, France (at an OSCE Meeting in Budapest 5 December 1994), later – by China.

IAEA – International Atomic Energy Agency, established in 1956. NPT relies on the system of IAEA guarantees.

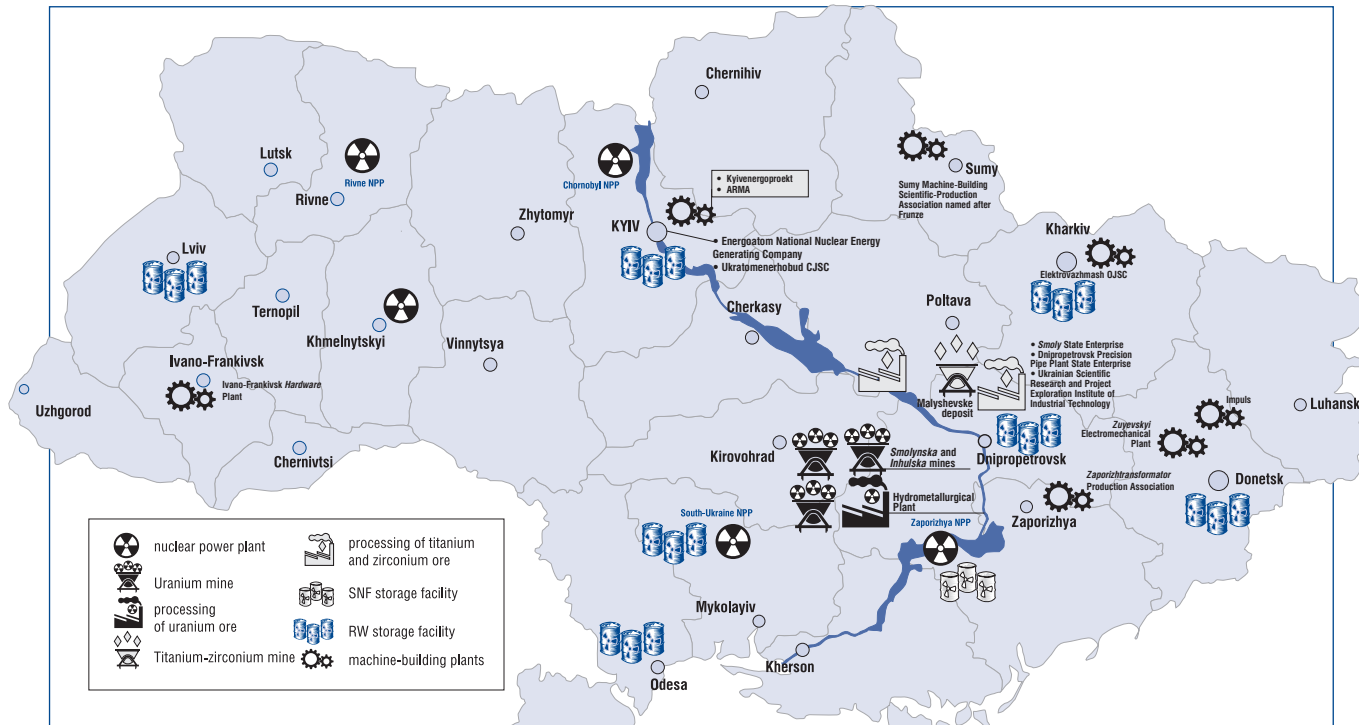
<sup>2</sup> In June, 2005, the Group of Eight (G8) summit approved the Action Plan on Non-Proliferation that, in particular, envisaged a year-long moratorium on export of discussed sensitive technologies. Then, the USA stood for a complete ban on export of nuclear fuel cycle technologies.

<sup>3</sup> Agreement between Ukraine and IAEA for the Application of Safeguards in Connection with NPT ratified by the Verkhovna Rada in 1997. Additional protocol to the Agreement signed in August, 2000.

<sup>4</sup> The “nuclear club” denominates the countries that possess nuclear weapons and are parties to NPT. India, Pakistan, North Korea, Israel possess nuclear weapons but are not parties to NPT.



Ukraine's nuclear energy sector



**UKRAINE**

- ranks sixth in the world and first in Europe by explored uranium reserves (1.8% of the world explored reserves)
- possesses unique, Europe-largest deposits of zirconium; Ukrainian enterprises in fact monopolised supply of raw zirconium to the world market
- has uranium and zirconium ore processing enterprises
- possesses research and industrial facilities and advanced technologies of production of nuclear-pure zirconium, hafnium and rolled zirconium
- is the third country in the world, after the USA and France, producing pure hafnium
- ranks seventh in the world and fifth in Europe by electricity generation at NPPs
- in the future, can effectively create its own nuclear fuel, employing foreign capacities only for enrichment of uranium

Active power units

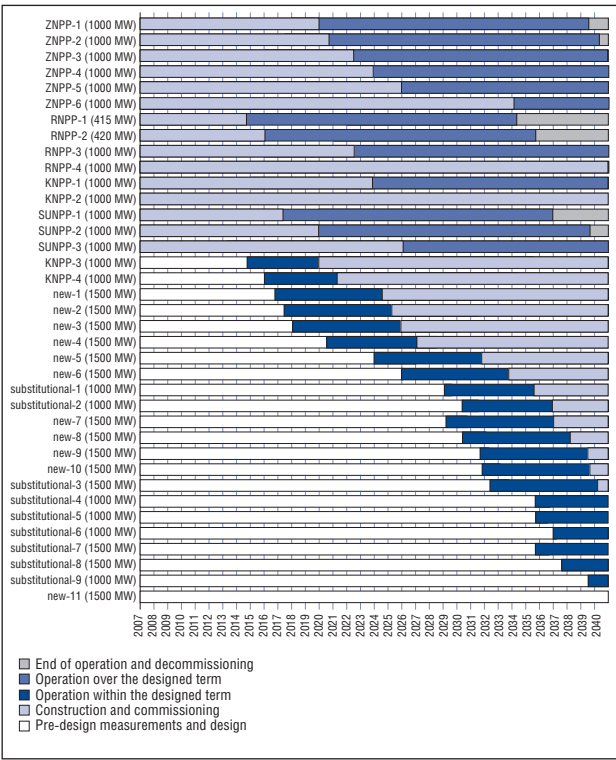
NPP	Power unit number	Electric power, MW	Reactor unit type	Date of commissioning	Last year of designed operation term
Zaporizhzhya NPP	1	1,000	VVER 1000	December 1984	December 2014
	2	1,000	VVER 1000	July 1985	July 2015
	3	1,000	VVER 1000	December 1986	December 2016
	4	1,000	VVER 1000	December 1987	December 2017
	5	1,000	VVER 1000	August 1989	August 2019
	6	1,000	VVER 1000	October 1995	October 2025
South-Ukraine NPP	1	1,000	VVER 1000	December 1982	December 2012
	2	1,000	VVER 1000	January 1985	January 2015
	3	1,000	VVER 1000	September 1989	September 2019
Rivne NPP	1	420	VVER 440	December 1980	December 2010
	2	415	VVER 440	December 1981	December 2011
	3	1,000	VVER 1000	December 1986	December 2016
	4	1,000	VVER 1000	October 2004	October 2034
Khmelnitskyi NPP	1	1,000	VVER 1000	December 1987	December 2017
	2	1,000	VVER 1000	August 2004	August 2034

See: Official web site of NNEGC Energoatom – <http://www.energoatom.kiev.ua>

Planned power units

NPP	Power unit number	Electric power, MW	Reactor unit type	Date of commissioning (planned)
Khmelnitskyi NPP	3	1,000	V320	Studies are underway
	4	1,000	V320	

Construction and commissioning of power units (1,000 MW or 1,500 MW power units)



**Nuclear fuel cycle: world capacities by element**

**NUCLEAR FUEL**

Nuclear fuel is used in nuclear reactors in the form of fuel assemblies, composed of fuel elements. A fuel element is a uranium pellet, several centimetres large, in a hermetic container made from zirconium alloy.

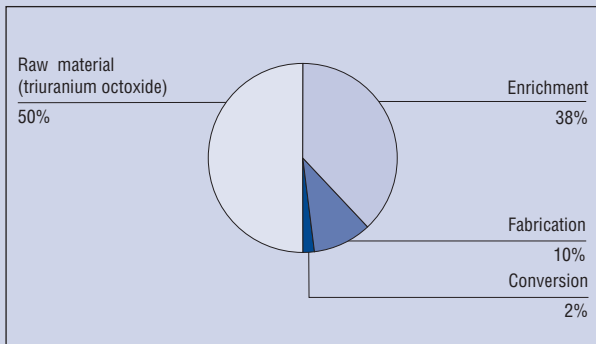
A fuel assembly is a high-tech product whose development and production involve implementation of scientific and research projects being intellectual property of the designer company. Operational reliability of a fuel assembly is critical for overall safety of a nuclear unit, so, they are subject to obligatory licensing.

Loaded to a VVER1000 reactor core are 163 fuel assemblies, used during the fuel campaign – the period of power unit operation till the next planned reloading. Presently, a fuel campaign at Ukrainian NPPs lasts 270-300 days. Upon the campaign completion, a quarter of fuel assemblies (42 sets) are reloaded.

**Nuclear fuel production stages**

1. Extraction and processing of uranium ore into uranium concentrate containing triuranium octoxide U3O8 ("yellowcake");
2. Conversion: transformation of uranium concentrate into a gaseous compound with fluorine – uranium hexafluoride (UF6);
3. Enrichment of uranium: uranium hexafluoride (UF6) is enriched with U235 isotope; i.e., concentration of U235 isotope is raised from 0.7% in natural uranium to 3.5-4.5% necessary to use uranium for production of nuclear fuel (or to 90% – for military purposes)<sup>1</sup>;
4. Fabrication of fuel
  - reconversion: UF6 gas enriched with U235 isotope is transformed into uranium dioxide UO2,
  - pelleting: uranium pellets are made from uranium dioxide UO2;
  - production of fuel elements: uranium pellets are put into tubes made from zirconium alloy;
  - production of fuel assemblies: a number of fuel elements are assembled into structure of the designed geometric configuration.

**Share of production services at discussed stages in the end cost of nuclear fuel, %**



<sup>1</sup> Until recently, enrichment of uranium was the most expensive portion of the nuclear fuel cycle. However, after a sharp rise in prices of uranium concentrate, the share of enrichment in the price of nuclear fuel is close to 40%.

**World uranium enrichment capacities, thousand SWU /year**

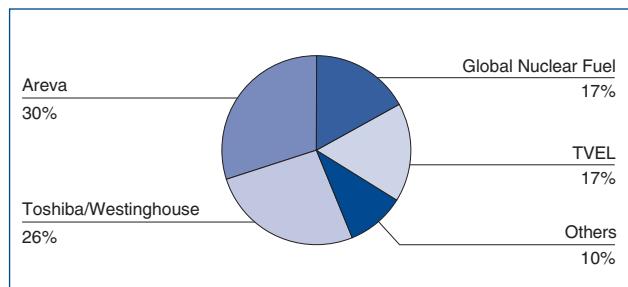
	2002	2006	2015
France – Areva	10,800*	10,800*	7,500
Germany-Netherlands-Great Britain – Urenco	5,850	9,000**	15,000
Japan – JNFL	900	1,050	1,500
USA – USEC	8,000*	8,000*	3,500+
USA – Urenco	0	0	3,000
USA – Areva	0	0	1,000
Russia – Tenex	20,000	25,000	33,000+
China – CNNC	1,000	1,000	2,000
Other	5	300	300
<b>Total</b>	<b>46,500</b>	<b>54,150</b>	<b>66,800+</b>
Needs (WNA)***	–	48,428	57,000 – 63,000

\* Employ the gas-diffusion technology of uranium enrichment; the rest of companies employ gas-centrifugal technology

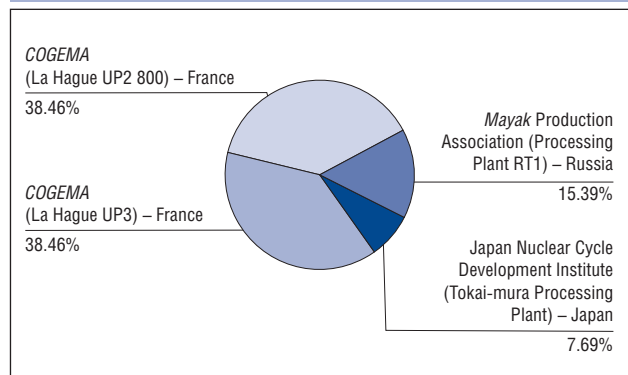
\*\* Urenco enriched 10,000 thousand SWU in June, 2008. With account of the US enrichment plant, 15,000 thousand SWU are expected in 2012.

\*\*\* Estimate of the World Nuclear Association.

**Largest companies, by share of the world market of nuclear fuel production, %**



**World capacities for processing spent nuclear fuel from light-water reactors as of the end of 2005, MTHM/year, %**



Source: Fedchenko V. Multilateral control of the nuclear fuel cycle (Table 13C.3), *SIPRI Yearbook 2006: Arms, Disarmament and International Security*. Stockholm International Peace Research Institute. – Oxford University Press, 2007, p.702.





complicating their interchangeability, which often results in the monopoly of one supplier.<sup>5</sup> Meanwhile, some NPP operators from time to time change suppliers or extend their list for diversification of supply sources and/or promotion of competition on the world market.

As a rule, countries that develop nuclear power engineering but have no domestic enterprises producing nuclear fuel seek to organise its production on their territory and obtain relevant design documentation. Actually all serious designers of reactors license their production in the purchasing countries.

The issue of diversification of sources and procurement of fuel from one or another supplier is also closely related with such issues of nuclear power engineering development as the choice of the reactor type and, respectively, equipment (so-called “reactor islands”) for new nuclear power units.

The countries not possessing all technologies of the nuclear fuel cycle can provide their NPPs with nuclear fuel, either producing it in international cooperation (China, North Korea), or buying on the world market (Bulgaria, Slovakia, Hungary, Ukraine, Finland, the Czech Republic, etc.).

Respectively, sources of supply to those countries can be diversified in two ways: either by procurement of ready nuclear fuel on the world market from **three suppliers**, or by procurement from **two suppliers and simultaneous fabrication of fuel on the own territory** in cooperation with countries possessing the relevant technologies (also presenting a line of diversification).

From early 1990s, Ukraine chose the second option of diversification, which was later declared in its Energy Strategy through 2030.

#### 4.2. Supply of nuclear fuel for Ukrainian NPPs and problems of diversification of its sources

All active Ukrainian NPPs were equipped with reactors of the Soviet (Russian) design – VVER, with nuclear fuel supplied from Russia, where once united nuclear industry of the USSR organised its production. Therefore, after the USSR break-up, Ukrainian nuclear power engineering found itself 100% dependent on deliveries from the Russian manufacturer of nuclear fuel – *TVEL* company.

Such situation posed risks for the national energy security. That is why in mid-1990s it was decided to find an alternative supplier of nuclear fuel.

So far, said decision has not been ultimately implemented yet. Important but not final steps to diversification of sources of nuclear fuel have been made with establishment of cooperation with the transnational company *Westinghouse*. Meanwhile, those measures met strong criticism in Russia and Ukraine and triggered an information war against the relevant decisions of the Ukrainian state bodies and the operator of Ukrainian NPPs – National Nuclear Energy Generating Company (NNEGC) *Energoatom*.

**Cooperation with *TVEL* corporation.** As we noted above, 100% of Ukrainian NPPs’ need for nuclear fuel is met by deliveries of fuel assemblies from *TVEL* company.

Till 1996 inclusive, fuel was supplied on a compensation basis – in consideration for weapon-grade uranium contained in nuclear warheads that Ukraine, having refused from nuclear arms, transferred to Russia for subsequent disassembly (Insert “*Supply of nuclear fuel for Ukrainian NPPs on a compensation basis*”).

#### Supply of nuclear fuel for Ukrainian NPPs on a compensation basis

At the beginning of 1990s, Ukraine repudiated from nuclear arms inherited from the former Soviet Union. On January 14, 1994, the Presidents of Ukraine, the USA and Russia made a trilateral statement where they recognised the need of reimbursement to Ukraine of the value of highly enriched uranium contained in nuclear warheads removed to Russia for disassembly and processing weapon-grade uranium for power engineering. The statement spoke of “delivery of compensation to Ukraine in the form of fuel assemblies for nuclear power stations”.

At that, the USA and Russia undertook to “promote the elaboration and adoption by the IAEA of an agreement placing all nuclear activities of Ukraine under IAEA safeguards, which will allow the unimpeded export of fuel assemblies from Russia to Ukraine for Ukraine’s nuclear power industry”.<sup>6</sup> In particular, it was decided that to start compensation, Russia would supply to Ukraine within 10 months fuel assemblies containing 100 tons of low enriched uranium.

Transfer of strategic arms from Ukraine to Russia was completed in 1996. Deliveries of fuel in consideration for transferred arms continued till 1998, but starting from 1997, they were insufficient to power Ukrainian NPPs, and the demand for fuel was ever more met at the expense of commercial deliveries.

In 1996, *TVEL* won an international tender for fuel supply to Ukrainian NPPs on a commercial basis, and in 1997, signed a contract providing for supply of nuclear fuel for 13 power units of Ukrainian NPPs till 2010 inclusively. Power units No.4 at Rivne NPP and No.2 at Khmelnytskyi NPP, commissioned in 2004, are subject to a contract whereby *TVEL* is to supply fuel till the end of their service life (including the lifetime extension beyond designed period, if any).

#### *TVEL* Corporation

**Established in 1996.** It has a structure where the parent company – *TVEL* OJSC – manages subsidiaries: enterprises of the Russian nuclear fuel cycle. As of the beginning of 2009, the corporation united 14 enterprises and employed nearly 17 thousand people.

Belongs to the integrated company – *Atomenergoprom* OJSC, that consolidates civilian assets of the Russian nuclear sector and ensures the full production cycle in the nuclear power engineering sector, from uranium ore mining and milling to NPP construction and power generation. That company, in turn, belongs to *Rosatom State Corporation*, established in 2007 for consolidation of all Russian nuclear (military and civilian) assets.

*TVEL* has two nuclear fuel production plants, fabricating fuel assemblies for VVER reactors and, in cooperation with *AREVA* NP company, for PHWR and BWR reactors:

- *Machine-Building Plant* OJSC, city of Elektrostal (supplies fuel assemblies for two VVER440 power units of Rivne NPP);
- *Novosibirsk Plant of Chemical Concentrates* OJSC (supplies fuel for 13 VVER1000 units of three other Ukrainian NPPs).

By and large, the corporation’s fuel powers 74 power units of NPPs (17% of the world market) and 30 research reactors in 14 countries of the world, as well as ship reactors of the Russian Navy. However, currently, fuel assembly fabrication capacities are loaded by a little bit more than half.

On international markets, the corporation pursues a policy of active expansion and enjoys political support of the Russian Government.

Currently, Ukraine’s participation in production of nuclear fuel for domestic NPPs lies mainly in uranium

<sup>5</sup> E.g., production of Russian and western nuclear fuel involves different zirconium alloys, and fuel assemblies have different shape.

<sup>6</sup> Trilateral Statement by Presidents of Ukraine, the USA and Russia, January 14, 1994. – Official web site of the Verkhovna Rada of Ukraine.



and zirconium ore mining and processing, and supply of uranium and zirconium concentrate to Russia (30% and 100% of the demand, respectively). Spent nuclear fuel from Khmelnytskyi, Rivne, South-Ukraine NPPs is also moved to Russia for storage and processing.

Prices and volumes of Russian fuel supply, annually agreed in relevant annexes to contracts, were not officially made public. However, the 1997 contract provided that Ukraine would buy fuel with a large discount. In the early years, the discounts made 20-25%, but with time, were gradually reduced, drawing the price closer to the "basic", to be reached by the parties before the contract expiry.

In 2005, NNEGC *Energoatom* and *TVEL* company signed a document whereby the fuel price till 2010 was to be set with account of spot market prices for services related with different stages of the nuclear fuel cycle.

According to experts, prices of Russian fuel and services of storage and processing of spent nuclear fuel were going up actually every year and over the past 10 years nearly doubled.<sup>7</sup>

Meanwhile, recently, one of the company's executives, V.Rozhdstvenskyi, admitted that relations with Ukraine in the field of nuclear fuel supply had been built "in an exceptional manner, and the price of fuel was influenced by personal factors".<sup>8</sup>

**Cooperation with Westinghouse Electric company.** As noted above, Ukraine now has a chance to get a second supplier of nuclear fuel for *VVER1000* power units – *Westinghouse* company (Insert "*Transnational company Westinghouse Electric*").

The company has been active on the Ukrainian market of nuclear power engineering since 1994. Then, it established with *Khartron JSC* (Kharkiv) – the Ukrainian designer and manufacturer of automated process management systems for NPPs – a joint venture known as *Westron* and transferred to it relevant technologies under a licensing agreement. Now, that enterprise not only steadily takes part in overhaul and modernisation of Ukrainian NPPs but exports automated process management systems for NPPs (e.g., *Vulkan* hardware and software suits) and services of their maintenance to many countries of the world, including the USA.

After signing of the Cooperation Agreement in peaceful uses of nuclear energy between the Government of Ukraine and the Government of the USA (hereinafter – Ukraine-US Bilateral Agreement) in 1998, *Westinghouse* company was employed by the US side for implementation of joint Ukraine-US projects in nuclear power engineering.<sup>11</sup>

Proceeding from the Ukraine-US Bilateral Agreement, the Governments of Ukraine and the USA in June, 2000, signed the Executive Agreement on the Ukraine Nuclear Fuel Qualification Project (*UNFQP*). In 1999, *Westinghouse* became a co-founder of the Core Design Centre on the basis of the National Scientific Centre

### Transnational company *Westinghouse Electric*

**Established in the USA in 1886.** Till 2006, owned by British Nuclear Fuels company (BNFL, Great Britain). In October, 2006, *BNFL* sold 77% of *Westinghouse* shares to the Japanese electrical engineering company *Toshiba*, 3% – to the Japanese industrial company *Ishikawajima-Harima Heavy Industries*, 20% – to the *Shaw Group* of the USA.<sup>9</sup> In August, 2007, *Toshiba* sold 10% of *Westinghouse* shares to the Kazakh state company *Kazatomprom*.<sup>10</sup>

The company has seven enterprises in the USA, Great Britain and Sweden; produces NPP equipment and nuclear fuel, reactor elements and pressurised water reactors; has branches in 60 countries of the world.

Production of nuclear fuel employs over 4,500 workers.

The company has a nuclear fuel fabrication plant in Sweden (*Westinghouse Electric Sweden AB*; Nuclear Fuel Factory, active since 1971), producing fuel assemblies for pressurised water reactors; components are manufactured at factories in the USA, the Czech Republic and Sweden.

Furthermore, the company delivers 60% of fuel for BWR reactors in Sweden, for BWR and PWR reactors in other European countries, and the bulk of fuel for PWR reactors in the USA.

By and large, *Westinghouse* now occupies 26% of the world market of nuclear fuel. As of January, 2006, its fuel assemblies powered over 50% of nuclear reactors in the USA (56 out of 104) and more than 40% – in Europe (86 out of 205).

"Kharkiv Physical-Technical Institute". The Core Design Centre was set up as a structural unit of the Nuclear Fuel Cycle scientific-technical complex, working, in particular, on implementation of the Programme of Scientific, Engineering and Design Support for Ukraine's nuclear fuel cycle.<sup>12</sup>

In its pursuance, NNEGC *Energoatom* and *Westinghouse* commenced a project of the company's nuclear fuel qualification to study the possibility of its use at power units of Ukrainian NPPs (Insert "*Ukraine Nuclear Fuel Qualification Project (UNFQP)*").

### Ukraine Nuclear Fuel Qualification Project (*UNFQP*)

The project envisaged:

- technologies transfer of nuclear fuel and reactor core design, security assessment, licensing and use of nuclear fuel to Ukraine by the USA;
- design, production and delivery to Ukraine of alternative nuclear fuel for power units employing *VVER1000* reactors;
- creation of an organisation in Ukraine possessing the licence and the required scientific-technological base for nuclear fuel and reactor core design;
- training of Ukrainian specialists in design of nuclear fuel, reactor core, security assessment and licensing methods.<sup>13</sup>

The Project is funded within the framework of the International Nuclear Security Program, sponsored mainly by the US Government.<sup>14</sup>

Coordination and management of the project on the Ukrainian side rest with the State Department of Nuclear Power Engineering

<sup>7</sup> At different times, open sources gave different expert assessments. For instance, in late 1990s, procurements of fresh nuclear fuel were estimated at up to \$250 million/year, admission of spent nuclear fuel – up to \$50 million; currently – up to \$600 million and \$100 million, respectively.

<sup>8</sup> See: Zaika A. Not a candle factory. – *Biznes*, June 27, 2009, p.18.

<sup>9</sup> See: Sale of *Westinghouse Electric* accomplished. – *Radio Liberty*, October 17, 2006, <http://www.svobodanews.ru>

<sup>10</sup> Kazakhstan bought from *Toshiba* 10% of US nuclear holding *Westinghouse*. – *Centrasia*, August 23, 2007, <http://www.centrasia.ru>

<sup>11</sup> Agreement of Cooperation in peaceful uses of nuclear energy between the Government of Ukraine and the Government of the USA – signed on May 6, 1998, ratified on March 19, 1999, effective from May 28, 1999.

<sup>12</sup> The Core Design Centre was established pursuant to a decision of the plenipotentiary commission for selection of basic orientation for creation of the Fuel and Reactor Unit Core Design Centre in Ukraine and in pursuance of the Ukraine-US Intergovernmental Agreement.

<sup>13</sup> Nedashkovskiy Yu. Contract with *Westinghouse* logically completes the Nuclear Fuel Qualification Project. – Official web site of NNEGC *Energoatom*, [www.energoatom.kiev.ua](http://www.energoatom.kiev.ua)

<sup>14</sup> US International Nuclear Safety Program (US INSP) is implemented pursuant to the 1992 Agreement between the US and Ukrainian Governments on enhancement of operational safety, decrease of operational risk and improvement of regulation systems of civilian nuclear facilities in Ukraine. Under the Programme, in 1992-2004 alone, 72 projects were commenced, funds totalling \$270 million were provided.



of the Ministry of Fuel and Energy. Contractors on the US side are *Westinghouse* and *Pacific Northwest National Laboratory* – advisors to the US Department of Energy.

The project is to be implemented in two phases.

Phase I involved preparation (including personnel training) for trial operation of six fuel assemblies produced by *Westinghouse* at power unit No.3 of South-Ukraine NPP. All stages of nuclear fuel production (procurement of uranium concentrate, conversion, enrichment, reconversion, pelletting, assembling of fuel assemblies) rested with *Westinghouse*.

Phase II envisages pilot operation of fuel assemblies from *Westinghouse* company in the quantity sufficient for power unit recharge (42 units).

In August, 2005, six fuel assemblies from *Westinghouse* (produced at a company factory in the USA) were loaded to the core reactor of power unit No.3 at South-Ukraine NPP for trial operation.

The State Nuclear Regulatory Committee granted a permit to trial operation following review and expert examination of documents proving safety of the “mixed” core operation.

Licensing of trial fuel assemblies operation is performed pursuant to the document “Approaches to nuclear safety regulation within the framework of projects of introduction in Ukraine of new modifications of nuclear fuel”. The key requirements to fuel assemblies produced by *Westinghouse* included their compatibility with Russian-made nuclear fuel.

Preparatory work and development of hardware and software for monitoring of the core of power unit No.3 at South-Ukraine NPP were performed by the above-mentioned Core Design Centre and *Westron JV*.

During trial operation in 2005-2008, after three fuel campaigns, fuel assemblies produced by *Westinghouse* demonstrated high operational properties.

A batch of fuel assemblies (42 units) intended for pilot operation has already been delivered to Ukraine, to be loaded in January, 2010. Those assemblies have improved design (in particular, greater rigidity).

Therefore, the overall results of the project of the *Westinghouse* nuclear fuel qualification will be known in 2013, after completion of four fuel campaigns using the second batch of fuel assemblies. In case of a positive conclusion of the State Nuclear Regulatory Committee, Ukraine may get the second supplier of nuclear fuel.

In pursuance of the NSDC decision and the relevant Decree of the President of Ukraine, NNEG *Energoatom* and *Westinghouse Electric Sweden* on March 30, 2008, signed a contract of nuclear fuel supply in 2011-2015 for annual planned recharge of three power units *VVER1000* at Ukrainian NPPs.<sup>15</sup> The contract provides for supply of approximately 630 fuel assemblies in course of five years. If necessary, deliveries may be increased to three additional charge batches annually, with the price going down proportionally to the growth of deliveries.

The insistence on the contract with *Westinghouse*, first of all on the part of Ukraine’s President, led to a mismatch between the State Nuclear Regulatory Committee plans to

sum up the results of nuclear fuel pilot operation and issue or hold back a permit to industrial operation, and execution of the fuel supply contract by *Westinghouse*.

Meanwhile, the contract has a number of reservations, since, as we noted above, trial operation of fuel assemblies is not completed. If after the trial operation NNEG *Energoatom* does not get the State Nuclear Regulatory Committee permit to industrial operation of the *Westinghouse* fuel for reasons beyond its control, it may terminate the contract without extra costs for it. NNEG *Energoatom* also might terminate the contract and stop supply in case of mass technical failure of the company’s fuel.

The contract provides that *Westinghouse* will perform only fabrication of fuel, making some 10% of the fuel assembly value. Enrichment of uranium is to be performed at the International Uranium Enrichment Centre in Angarsk (Russia).

The contract signing caused rather a nervous reaction of the *TVEL* company and Ukrainian lobbyists of its interests and was accompanied with an information war not only against *Westinghouse* but also against the Government of Ukraine and executives of NNEG *Energoatom* (Insert “*Information war over the contract...*”).

Opponents of the contract (and Ukraine’s cooperation with *Westinghouse* company in general) mainly used three arguments.

**1. Negative experience of the use of the *Westinghouse* fuel at the Czech Temelin NPP.** In 2005, the NPP faced problems using fuel assemblies produced by *Westinghouse*; as a result, they were removed ahead of time, and the tender for supply of fuel announced later was won by *TVEL* (Insert “*Westinghouse and TVEL at Temelin NPP*”).

#### ***Westinghouse and TVEL at Temelin NPP***

The Czech NPP Temelin operates two power units *VVER1000*, commissioned in 2000 and 2002 and modernised according to recommendations of missions of IAEA and the World Association of Nuclear Operators in line with EU standards for pressurised water-cooled reactors. According to an agreement valid till 2009, nuclear fuel was supplied to power units by *Westinghouse* company. The first two fuel campaigns revealed no deformations of fuel assemblies, but problems arose during the third fuel campaign (2005-2006).

As a result, in May, 2006, a tender for supply of nuclear fuel for the NPP in 2010-2020 was held, and won by the *TVEL* company.

In September, 2007, the Czech national nuclear and radiation safety regulator *SUJB* published a special report “Degradation of fuel elements in Temelin NPP” that cited data of mechanical deformations of fuel assemblies (fuel assemblies *W*), revealed in 2005-2007.<sup>16</sup>

Meanwhile, from April 2007, after *Westinghouse* enhanced the rigidity of the fuel assembly design, the incidence of their mechanical deformations fundamentally dropped. In the summer of 2008, media reported that the NPP Temelin operator, seeking diversification of fresh nuclear fuel supply, did not rule out return of *Westinghouse* company to the Czech market.<sup>17</sup>

**Therefore, it may be concluded that the Czech operating company a bit hastened to conduct the tender.**

<sup>15</sup> The Decree instructed the Government by the end of 2008, “with the purpose of nuclear fuel supply sources diversification... against state guarantees”, to enter into agreements of supply for Ukrainian NPPs, starting from 2011, of nuclear fuel from an alternative supplier “in volumes not less than required for recharging three power units with *VVER1000* reactors”. – President of Ukraine Decree “On National Security and Defence Council of Ukraine Decision of February 1, 2008 “On Safety of State Nuclear Power Engineering” No.156 of February 25, 2008.

<sup>16</sup> See: Degradation of Fuel Elements in Temelin NPP. – *SUJB*, September 3, 2007, [http://www.sujb.cz/?c\\_id=624](http://www.sujb.cz/?c_id=624)

<sup>17</sup> Czech Republic reserves possibility of return to *Westinghouse* fuel. – *AtomInfo.ru*, June 2, 2008, <http://www.atominfo.ru/news/air4231.htm>





### INFORMATION WAR OVER THE CONTRACT BETWEEN NNEG C ENERGOATOM AND WESTINGHOUSE COMPANY

The brutality of the information war unleashed over the contract was beyond comprehension from its very beginning, since, *first*, negotiation of the contract for supply of Russian fuel after 2010 was underway since mid-2007, when a special joint Russian-Ukrainian Working Group was established in the Subcommission for nuclear power engineering and nuclear materials (under the Economic Cooperation Committee of the Ukraine-Russian Interstate Commission). It included: from Russia – officials and experts of *Rosatom* corporation, *TVEL*, *Tekhsnabexport* OJSC, from Ukraine – representatives of the Ministry of Fuel and Energy, *NNEGC Energoatom*, *JV UkrTVZ* CJSC. **From the very beginning of its work, it discussed supply of Russian fuel for 12 power units, or even fewer.**

In roughly the same time – July, 2007 – the Ministry of Fuel and Energy by its order set up a joint working group to negotiate the terms of a commercial contract between *NNEGC Energoatom* and *Westinghouse* (made up of representatives of the Ministry of Fuel and Energy, NSDC, the State Nuclear Regulatory Committee and *NNEGC Energoatom*). The Russian side knew about the establishment of that group and preparation of the contract.

Second, the Ukrainian side always publicly recognised that it had no complaints about *TVEL* company and continued to see it as a strategic partner, but wanted to minimise risks and for that purpose established cooperation with *Westinghouse*.<sup>1</sup>

However, an information attack on Ukraine's cooperation with *Westinghouse* company started right after the contract signing.

Dozens of materials appeared in Russian and some Ukrainian media claiming non-safety of the use of assemblies produced by *Westinghouse* in reactors of the Russian design.<sup>2</sup> There were threats of an increase of the price of fuel supplied by *TVEL* to Ukraine in 2009-2010, under the 1997 contract,<sup>3</sup> of financial sanctions against Ukraine on the basis of violation of the copyright of Russian nuclear scientists.<sup>4</sup> The Government of Ukraine was accused of violation of the legislation on state procurements, although the Law "On Procurement of Goods, Works and Services for State Funds" clearly provides that "procedures of procurement envisaged by this Law **do not apply in cases where procurement covers: nuclear fuel, new fuel elements for nuclear reactors**" (Article 3).<sup>5</sup>

Finally, on April 9, 2008, on a demand of the Party of Regions, parliamentary hearings on the issue of the contract conclusion were held. The Ministry of Fuel and Energy report said: "dependence on one monopoly supplier of fuel bears elements of a threat to the national energy security. Not because Russian suppliers of nuclear fuel are unreliable or problem partners. On the corporate level, they are a reliable, predictable and very comfortable partner for Ukrainian nuclear engineers, with which we have many joint programmes of long-term cooperation. Other risks are meant. First of all, political, technogenous and environmental. So far, the world found no other recipes of their removal or minimisation than diversification of sources of supply".<sup>6</sup> After the hearings, the Ukrainian "opposition" for some time ceased the information war.

The second wave of the information war fell on the beginning of 2009. On January 23, several reports appeared in the Internet dealing with the State Nuclear Regulatory Committee letter to the First Vice Prime Minister of Ukraine O. Turchinov of September 30, 2008, regarding the impracticability of industrial use of nuclear fuel in pursuance of the contract between *NNEGC Energoatom* and *Westinghouse* starting from

2011, published by the Russian Internet publication *REGNUM*.<sup>7</sup> The letter was actively commented on by Russian experts and politicians who expressed concern over the safety of use of non-resident nuclear fuel in reactors of the Russian design, and were indignant that Russian experts had not been invited to survey the state of fuel assemblies of *Westinghouse* company during the planned preventive repair of power unit No.3 at South-Ukraine NPP in the summer of 2008, after the third year of operation in the reactor core.

The letter read that upon the results of four years of trial operation of six fuel assemblies located in the peripheral part of reactor core, no conclusion could be made regarding the acceptability of *Westinghouse* fuel for industrial operation. According to O. Mykolaychuk, the issue may be resolved only upon the results of trial operation of 42 fuel assemblies in course of four years, i.e., in 2013, since "as the experience shows, problems with fuel assemblies, as a rule, arise at the third and fourth years of operation".<sup>8</sup>

Information attacks were further stirred up by the differences between the Premier and the President, who supports cooperation with *Westinghouse* company (for instance, the NSDC Decision "On Immediate Measures at Guarantee of Energy Security of Ukraine" spoke of "successful conduct of negotiations under the supervision of the head of state and signing of contracts with the American side of supply by *Westinghouse* company of nuclear fuel for 3 nuclear power units, starting from 2011"<sup>9</sup>).

Of course, Russia used this as a pretext to claim political rather than economic grounds of the signed contracts and suspect Ukraine's President of lobbying US interests.

All this affects negotiations between *NNEGC Energoatom* and Russian companies not only on the issues of nuclear fuel supply for Ukrainian NPPs but also on other possible joint projects, for instance, construction of new nuclear power units.

Accusations were also heard within Ukraine. For instance, an application by National Deputies of Ukraine "On Initiation of Issue of Removal of President of Ukraine Yushchenko Viktor Andriyovych from the Post under the Procedure of Impeachment in Connection with Commitment of Crimes" accused the President of lobbying interests of a foreign commercial company: "...V. Yushchenko repeatedly, using his powers, made steps that give grounds for accusations of corruption. In particular:... lobbying supply of nuclear fuel assemblies produced by *Westinghouse* company, much more expensive and not fit for reactors with which Ukrainian NPPs are equipped..."<sup>10</sup>

This gives grounds for the following assertions.

- The Russian side always uses the media during negotiations to influence the public opinion and influence the Ukrainian partner. Unfortunately, the Ukrainian side not always responds adequately.
- Ukrainian politicians using the same arguments as used by the Russian side fighting for preservation of their position on the market of nuclear fuel in Ukraine, in that way defending Russian interests in Ukraine.
- Contradictions between Ukraine's President and Prime Minister in solution of nuclear fuel for Ukrainian NPP sources diversification problems weaken the position of the state at negotiations with any foreign partners not only in the field of use of nuclear energy.

<sup>1</sup> Nedashkovskiy Yu. Contract with *Westinghouse* logically completes the Nuclear Fuel Qualification Project. – Official web site of *NNEGC Energoatom*.

<sup>2</sup> See: Yuri Stuzhnev: *Westinghouse* still cannot make fuel assemblies as good as Russian *TVEL* – *AtomInfo.Ru*, March 31, 2008.

<sup>3</sup> See: *TVEL* will take contract of *Energoatom* with *Westinghouse* in consideration when discussing price of fuel for Ukrainian NPPs. – *RBC Ukraine*, April 1, 2008, <http://www.rbc.ua>

<sup>4</sup> See: Transfer to the *Westinghouse* fuel will involve multibillion sanctions for Ukraine. – *AtomInfo.Ru*, April 1, 2008.

<sup>5</sup> The Law of Ukraine "On Procurement of Goods, Works and Services for State Funds" (2000) lost validity pursuant to the Law "On Invalidation of the Law of Ukraine "On Procurement of Goods, Works and Services for State Funds" of March 20, 2008.

<sup>6</sup> See: Records of 15<sup>th</sup> session of the Verkhovna Rada of Ukraine. April 9, 2008.

<sup>7</sup> State Nuclear Regulatory Committee of Ukraine against employment of *Westinghouse* fuel at Ukrainian NPPs. – *REGNUM*, January 23, 2009, <http://www.regnum.ru>

<sup>8</sup> *Ibid.*

<sup>9</sup> Enacted by Presidential Decree No.82 of February 11, 2009.

<sup>10</sup> Ukraine does not need President Yushchenko! – *Holos Ukrayiny*, May 13, 2009, <http://www.golos.com.ua>





It may be assumed from media reports that, *first*, *TVEL* won the tender not because of technical problems “rather successfully resolved” by *Westinghouse*, according to the Czech energy company *ČEZ* spokeswoman E. Novakova. The price seemed the main argument.<sup>18</sup>

According to Czech sources, “the agreement was part of a wider package” covering not only nuclear fuel, which made it possible to offer “large discounts” to it.

Furthermore, Czech security analysts came to the conclusion that in case of “big problems in Czech-Russian relations” Russia will not be able to exert pressure on the Czech Republic in this field, since “nuclear fuel can be ordered from other sources within a few months”. Meanwhile, Czech observers admit that after the agreement with *TVEL* company, energy dependence of the Czech Republic on Russia increased.<sup>19</sup>

*Second*, technical problems do and can arise at use of fuel not only of *Westinghouse* company but also of other manufacturers, including *TVEL*.

For instance, in September, 2008, experts of the Scientific-Technical Centre of NNEGC *Energoatom* presented at the 6<sup>th</sup> International Forum “Fuel And Energy Complex of Ukraine: the Present and the Future” in Kyiv a report<sup>20</sup> that for the first time released data of the number of untight and deformed fuel assemblies of the *TVEL* company, revealed during their operation at Ukrainian NPPs.

The peak of fuel assembly defects fell on 1998 – the first year of use of improved fuel assemblies (fuel assembly modification *M*). In 1998-2003, 145 fuel assemblies of all modifications were removed ahead of schedule, 40 of them could be reloaded to the core after repair, 105 were unreparable.<sup>21</sup> In 2003-2007, when a new modification – fuel assembly *A* – was introduced, 119 fuel assemblies were removed early.<sup>22</sup>

Meanwhile, the experience of operation demonstrated that in 2003-2007, the incidence of failures of improved Russian fuel assemblies went down (from 41 incidents in 2003 to nine in 2007).

However, because of problems associated with design defects of fuel assemblies *M* revealed in 1999-2000, NNEGC *Energoatom* refused from their use at Ukrainian NPPs.

**So, during introduction of new modifications of fuel assemblies in pilot operation, problems were faced by both companies – *Westinghouse* and *TVEL* alike. Both**

**companies improve the design of fuel assemblies with account of practical experience of their operation, which usually gives a positive effect.**

Specifically, according to experts, *Westinghouse* company remedied design defects of fuel assemblies *W* revealed during *Temelin* NPP operation and implemented all technical solutions in the fuel assembly design, with six sets now in pilot operation at energy unit No.3 of South-Ukraine NPP.<sup>23</sup> Similarly, the experience of improved Russian fuel assemblies operation (fuel assemblies *A*) at Ukrainian NPPs in 2003-2007 showed the downward dynamic of failures (from 41 incidents in 2003 to nine in 2007). Now, those assemblies are operated successfully.

**2. Exorbitant price of nuclear fuel.** Russian media regularly report that the fuel of *Westinghouse* is much more expensive than the fuel of *TVEL* company. The difference allegedly makes from 25% to 50%.

As we noted above, pursuant to the contract, *Westinghouse* company will perform only fabrication of fuel assemblies. According to experts, that service of *Westinghouse* costs more than 10% higher than similar *TVEL* services. However, experts note that the difference in the price of fuel itself may decrease or even change not in favour of the Russian company. In particular, NNEGC *Energoatom* Vice President Yu. Kovryzhkin suggests that “by 2011, the prices will be roughly equal, and by 2015, they will surely be higher at *TVEL*”.<sup>24</sup> In any case, with the growth of production, the price of fuel will go down – just as envisaged by the contract of its supply to Ukrainian NPPs.

It should also be noted that the emergence of an effective competitor makes the company to pursue a more moderate pricing policy. Anyway, an increased value of just one stage of nuclear fuel production, making approximately 10% of the fuel value, by no means can raise its end price by 50%.

**3. Risks of operation of a “mixed” core** (i.e., simultaneous use of different types of fuel assemblies).

Employment of different types of fuel assemblies in the reactor core is a common practice, since manufacturers of nuclear fuel regularly modify the assembly design for enhancement of the reliability and effectiveness of operation. For instance, in 2003-2006, Ukrainian NPPs adopted improved Russian nuclear fuel – fuel assemblies *A*. In this connection, most power units used fuel assemblies of two types – old and modernised. Therefore, the Russian experience also witnesses the possibility of simultaneous use of different fuel assembly types.

<sup>18</sup> Many experts attribute *TVEL* victory over *Westinghouse* not only in the Czech Republic but also in Finland (2005) and Slovakia (2008) to the price factor. In the latter case, Russian proposals could be presented “in a package”, as practiced by Russian companies – fuel assembly deliveries might be considered in connection with construction of a nuclear fuel fabrication plant in Slovakia with Russian assistance.

The suggestion that the Russians might have proposed an attractive prices ensues from the statement by Yu. Chernilin, an advisor to the *Kurchatov Institute* Scientific Centre Directorate: “Our prices have always been moderate, as compared to other suppliers. Today, the trust of the Slovaks was manifested in the signed contract of fuel supply for two NPPs and, especially important, in an unprecedented agreement that documentarily names the only supplier – Russian company *TVEL* as “lifelong” supplier of fuel for Slovak NPPs”. See: Nuclear power engineering is the most stable to crisis influences: expert. – *REGNUM* News Agency, November 18, 2008, <http://www.regnum.ru>

<sup>19</sup> See: Yarmoshchuk T. Nuclear race: what nuclear fuel is better for Ukraine – Russian or American? – *Radio Liberty*, July 14, 2009, [www.radiosvoboda.org](http://www.radiosvoboda.org)

<sup>20</sup> Vlasenko N, Hodun O. Needs of Ukrainian NPPs in modernisation of nuclear fuel. Participation of Ukrainian scientific research institutes in international programmes of design of future reactors units and nuclear fuel. – 6th International Forum “Fuel And Energy Complex of Ukraine: the Present and the Future”, September 25, 2008, presentation.

<sup>21</sup> Seven out of 40 fuel assemblies modification *M* had failures of mechanical integrity without damage of fuel elements (slightly torn spacer grids); eight – qualified following shell rightness control; 17 removed early for repair.

<sup>22</sup> In that: 24 did not pass shell rightness control without fuel element damage or were rejected due to direct contact of fuel with coolant; 17 – returned to the core; 75 were worn by more than 60%; three – removed early but could be returned after reactor repair (1 fuel assembly *A*, 2 fuel assemblies *M*).

<sup>23</sup> Sun Kaichao “*MCNP modeling of hexagon VVER fuel*”. – Master of Science Thesis Reactor Physics Department Royal Institute of Technology, Stockholm, Sweden, 2008, <http://clio.neutron.kth.se/publications/library/KaichaoMSc.pdf>

<sup>24</sup> See: Riasnoi D. Contact group. Ukraine tackled diversification of nuclear fuel supply sources. – *Delovaya Stolitsa*, April 7, 2008.



#### 4.3. Creation of nuclear fuel cycle elements in Ukraine

The decision to create nuclear fuel cycle elements in Ukraine was taken by the Cabinet of Ministers in pursuance of the above-mentioned 1994 Trilateral Agreement of the Presidents of Ukraine, Russia and the USA. It was to be implemented by means of domestic capacities development of industrial mining and processing of uranium, creation of capacities for production of zirconium alloy and rolled zirconium, production of stainless and zirconium elements of fuel assemblies for *VVER1000* and final assembling of fuel assemblies.

**Comprehensive Programme of nuclear fuel cycle elements creation in Ukraine.** In pursuance of that decision, in April, 1995, the Comprehensive Programme of nuclear fuel cycle elements creation in Ukraine was adopted (hereinafter – Comprehensive Programme), planned for 1995-2004. It consisted of six branch programmes and envisaged:<sup>25</sup>

- raising production of uranium concentrate to 100% of Ukrainian NPPs need for uranium;
- development of zirconium production meeting the needs of nuclear power engineering of Ukraine and Russia;
- organisation of metal zirconium and component parts for fuel assemblies production meeting the needs of Ukrainian NPPs.

Meanwhile, it does not envisage creation of enterprises for uranium enrichment and processing of spent nuclear

fuel, since, *first*, such enterprises are sensitive from the viewpoint of their possible military use, *second*, the Comprehensive Programme was approved in the conditions of a deep economic crisis, *third*, creation of the full nuclear fuel cycle is considered reasonable if the country possesses not less than 26 GW of rated NPP power<sup>27</sup> – while at that time, Ukraine had 11 GW (now – 13.7 GW). On this basis, experts of the State Committee of Ukraine on Use of Nuclear Energy came to the conclusion that Ukraine neither economically nor technically can create such enterprises.<sup>28</sup>

The year of 1995 also saw an international tender to choose the technology of nuclear fuel production, i.e., a partner for construction of a plant producing nuclear fuel for all active *VVER1000* power units in Ukraine. *TVEL* company won the tender, having proposed creation of a Ukrainian-Kazakh-Russian JV for nuclear fuel production for *VVER1000* reactors operated at Ukrainian NPPs and transfer to Ukraine of the production technology of fuel assembly components and programme codes necessary for design of and support for fuel campaigns at NPP power units.

That JV – Ukraine-Kazakh-Russian joint venture for production of nuclear fuel *UkrTVZ* CJSC – was established only in 2001, but for a number of reasons has not commenced operation.<sup>29</sup>

Meanwhile, by contrast to Ukraine, Kazakhstan, having passed the decision of the nuclear fuel cycle elements creation on its territory, is successfully implementing it (Insert “*Kazakhstan’s experience of nuclear fuel cycle elements creation*”).

#### KAZAKHSTAN'S EXPERIENCE OF NUCLEAR FUEL CYCLE ELEMENTS CREATION

Since mid-1990s, Kazakhstan has embarked on the path of strategic alliances for attraction of investments, creation of joint ventures with leading actors of the world nuclear market, exchange of shares of their enterprises. Thanks to steadfast implementation of that policy, *Kazatomprom* in 2008 became a transnational vertically integrated company trading in finished nuclear fuel, not raw uranium. The company can take part in all elements of nuclear fuel cycle except processing of spent nuclear fuel and disposal of radioactive waste.

**Uranium ore processing.** *Kazatomprom* initiated a programme of commissioning 16 uranium mines and significant growth of uranium concentrate mining – from 3,000 tons in 2003 to 15 thousand tons by 2010.

In 2007, 6,637 tons were extracted, in 2008 – 8,521 tons (growth by 28.8%). In 2009, 11,900 tons are planned to be extracted.

Joint ventures for uranium mining have been created and are operating with Canadian *Cameco (Inkai)*, French *Areva (Katco)*, Russian *Tekhsnabexport*, Japanese *Sumitomo Corporation* and *Kansai Electric Power Co. Inc.*

**Conversion.** In June, 2008, an agreement was signed with *Cameco* (Canada) for creation of a new JV – *Ulba-Conversion LLC (Kazatomprom – 51%, Cameco – 49%)*. *Cameco* provides the uranium hexafluoride production technology. Production capacity – 12 thousand tons/year, making 17% of the world capacities.<sup>26</sup>

**Enrichment of uranium.** In May, 2007, the International Uranium Enrichment Centre was established on the basis of Angarsk Electrolysis Chemical Plant (city of Angarsk, Irkutsk region, Russia); 90% of shares belongs to Russia, 10% – to Kazakhstan.

**Reconversion.** Reconversion of enriched uranium hexafluoride into uranium dioxide is performed at *Ulba Metallurgical Plant (Kazakhstan)*.

**Fuel pellets.** Fuel pellets from uranium dioxide have been produced at *Ulba Metallurgical Plant* since the Soviet times. For 40 years, the plant supplied fuel pellets for reactors of the Russian design – *VVER* and *RBMK*.

*Kazatomprom* is a certified supplier of uranium dioxide powder for the US *General Electric* company to produce fuel assemblies for *BWR* type reactors.

*Kazatomprom* intends to enter the world markets with fuel pellets for reactors of *PWR, BWR, CANDU* types, as well as Russian *VVER* operated beyond Russia's borders.

With that purpose, efforts are underway for qualification trials and certification of fuel components, jointly with partners – world-leading nuclear companies, designers of reactors and suppliers of NPP fuel: *Areva NP* (France), *Westinghouse EC/Toshiba* (USA-Japan), *CGNPC, CNNC* (China), *Nuclear Fuel Industries* (Republic of Korea), *Kansai Electric Power Co., Sumitomo Corporation* (Japan), State Scientific Centre – Scientific Research Institute of Nuclear Reactors OJSC (Russia).

**Fabrication.** In July, 2008, *Kazatomprom* and the French company *Areva NP* signed an agreement of joint activities in the field of the nuclear fuel cycle, whereby *Areva* is to provide technical support for creation of facilities for production of fuel assemblies with the capacity of 1,200 tons/year at *Ulba Metallurgical Plant*.<sup>30</sup> The JV (*Kazatomprom – 51%, Areva – 49%*) will have a special production line producing fuel assemblies for reactors of the French design (400 tons uranium/year), at that, fuel pellets will be supplied by *Kazatomprom*. The rest of the production capacities – 800 tons of uranium/year (*Kazatomprom – 100%*) – will be used to produce fuel for reactors of other designs.

Construction of the plant is planned for 2009-2012, commencement of production – for 2013; the JV will market produce on its own.

In 2007, *Kazatomprom* also made an agreement with China *Guangdong Nuclear Power Group (CGNPC)*. According to the Agreement, *Kazatomprom* will supply nuclear fuel for Chinese NPPs operated by *CGNPC*.

Currently, Kazakhstan also takes efforts for development, qualification trials and licensing of advanced fuels for different reactors (modified uranium-gadolinium, uranium-nitride and uranium-beryllium fuel).

<sup>25</sup> Approved by the Cabinet of Ministers Resolution No.267 of April 12, 1995; later, the main targets of the Programme were reviewed, a new wording of the Programme was approved by Resolution No.6348 of June 6 2001 (the Resolutions are classified as “*For official use only*”). The Comprehensive Programme was incorporated in the National Energy Programme of Ukraine through 2010, approved by the Verkhovna Rada in 1996.

<sup>26</sup> See: Smirnov S. Uranium renaissance of Kazakhstan. – *KAZAKHSTAN* international business journal, 2008, No.3, <http://www.investkz.com/journals/56/554.html>

<sup>27</sup> The Economics of the Nuclear Fuel Cycle. – Nuclear Energy Agency OECD, 1994; <http://www.nea.fr/html/ndd/reports/efc>

<sup>28</sup> State Committee of Ukraine on Use of Nuclear Energy – at that time, the central executive body in charge.

<sup>29</sup> For more detail on implementation of branch programmes “Ukrainian Uranium” and “Ukrainian Zirconium” and the activity of the Ukraine-Kazakh-Russian joint venture for production of nuclear fuel *UkrTVZ* CJSC, that never commenced full-scale operation, see: Nuclear energy in the world and in Ukraine: State and prospects of development. Razumkov Centre analytical report. – *National Security & Defence*, 2008, No.3, p.25-29.

<sup>30</sup> See: Fuel assemblies. – Official web site of *Kazatomprom*, [http://www.kazatomprom.kz/ru/pages/Teplovydelyayuschie\\_sborniki](http://www.kazatomprom.kz/ru/pages/Teplovydelyayuschie_sborniki)



**Progress of Comprehensive Programme implementation.** During the Comprehensive Programme implementation, actual funding of its separate sections made, according to different estimates, from 20% to 40% of the plan.<sup>31</sup> Furthermore, since 2000, prices leaped: of equipment and construction materials – more than three-fold, of construction and assembly works – four-fold. As a result, funds were enough to keep enterprises afloat and pay wages. None of the tasks set by the Comprehensive Programme was effectively implemented in full volume.

The Law on the State Budget for 2009 appropriated UAH 888.7 million to measures of the Comprehensive Programme and State Programme of Bringing Hazardous Facilities of Prydniprovsky Chemical Plant Production Association into an Environmentally Safe State and Guarantee of Protection of the Population against Deleterious Effects of Ionising Eradiation (against 229.9 million in 2008).

Therefore, planned funding of the nuclear fuel cycle elements creation increased four times. Furthermore, for the first time, funds were appropriated to creation of the reserve of nuclear fuel and nuclear materials – UAH 450 million.<sup>32</sup>

However, as of August, 2009, out of the appropriated almost UAH 889 million, only UAH 130 million were spent, or some 15% of the year plan.<sup>33</sup> Meanwhile, the Cabinet of Ministers by its resolution of August 19, 2009, channelled part of the funds appropriated to implementation of the above-mentioned programmes to current needs of other sub-sectors of the energy sector.<sup>34</sup> The situation gives grounds to state that the measures at creation of the nuclear fuel cycle elements in Ukraine, planned for the current year, will not be implemented.

It should be added that regular disruption of the Comprehensive Programme measures implementation has already prompted its revision in 2001. After the adoption of the Energy Strategy of Ukraine in 2005, the need of development of a new, realistic state programme of the nuclear fuel cycle elements creation became evident. The Concept of the State Target Programme “Nuclear Fuel of Ukraine” has been passed, setting 2009–2013 as the programme implementation term.<sup>35</sup> However, the concept itself was approved only in February, 2009, so, the programme that covered the current financial year could not be adopted.

**Construction of a nuclear fuel producing plant in Ukraine.** As we noted above, *UkrTVZ* enterprise, established in 2001 for organisation of nuclear fuel production in Ukraine, in fact remained inactive. So, the problem of organisation of such facilities remains on the

agenda, as does the problem of choice of the partner for construction and operation of the plant – since Ukraine does not possess all required technologies. In particular, it is interested in a potential partnership agreement for the technologies transfer of:

- reconversion of uranium and production of fuel pellets;
- production of component parts for fuel assemblies from rolled zirconium and stainless steel;
- production of fuel elements and assemblies.

Under the current plans, a nuclear fuel fabrication plant is to be commissioned before the launch of power units 3 and 4 at Khmelnytskyi NPP (to use fuel of domestic fabrication for their first loading) – that is, before 2015–2016.

At the first stage, the plant is to make fuel assemblies. Simultaneously, for production of component parts from rolled zirconium, it is planned to:

- specify and negotiate conditions of the zirconium alloy and tube stock production technology transfer, and to buy necessary equipment;
- upgrade technologies of cold deformation and buy equipment necessary for production of rolled zirconium;
- perform reconstruction and technical re-equipment of the *Zirconium* State Scientific Production Association, *Dnipropetrovsk Precision Pipe Plant* State Enterprise, pilot production facility at *Titan* Scientific Research Institute.<sup>36</sup>

**Therefore, the primary task at preparation for nuclear fuel production in Ukraine is to choose the partner for construction of a fabrication plant. This is an uneasy task for the Nuclear Fuel of Ukraine Concern, since, first, on top of economic factors, the choice is influenced by political ones. Second, the passed decision will influence the future of nuclear power engineering in Ukraine as a whole, first of all, the choice of the reactor type for new power units – western or Russian design.**

#### 4.4. Diversification of nuclear fuel sources for Ukrainian NPPs: progress of problem solution

Currently, Ukraine in fact has two potential partners for subsequent supply of nuclear fuel for its NPPs and construction of a fabrication plant on its territory – the Russian *TVEL* company, and transnational company *Westinghouse*.<sup>37</sup>

According to press reports, each company enjoys support of some supreme state officials in Ukraine.

<sup>31</sup> For example: construction of Novokostyantynivske mine, planned by the “Ukrainian Uranium” programme, in 2007 was funded by 12.9% of the plan (UAH 83.1 million instead of UAH 643 million), in 2008 – 14.4% (UAH 146.8 million instead of 1,019 million). All in all, uranium production in 2007 was underfunded by UAH 1,161.2 million, in 2008 – by UAH 1,571 million.

<sup>32</sup> Law “On State Budget of Ukraine for 2009” (December 26, 2008). In particular, it specified as the source of funding measures at creation of nuclear fuel cycle in Ukraine: “duty in the form of a special surcharge on the current electricity and heating rates, including UAH 160 million of accrued and unpaid liabilities of *Enerhorynok* state enterprise to the State Budget of Ukraine of that duty in the previous years” (Part 5, Article 6).

<sup>33</sup> See: Sokolovskyi: CMU generates new threats to Ukraine energy security. – UNIAN, August 26, 2009.

<sup>34</sup> Cabinet of Ministers Resolution “Issue of cheapening credits for creation of solid fuel reserves for thermal power plants” No.883 of August 19, 2009.

<sup>35</sup> Approved by the Cabinet of Ministers Directive No.216 of February 25, 2009.

<sup>36</sup> “International cooperation in provision of Ukrainian NPPs with nuclear fuel” – record of presentation by NNEGC *Energoatom* President Yu.Nedashkovskiyi at the Round-table “International cooperation on the market of nuclear fuel as a factor of delivery guarantees enhancement” at *ATOMEXPO* 2009 forum. – Official web site of NNEGC *Energoatom*, May 27, 2009.

<sup>37</sup> In 2007, an Interdepartmental Working Group was set up to study the expediency of use of deuterium-uranium reactors *CANDU* (*Canadian Deuterium-Uranium*) of Canadian state company *AECL*. However, no conclusions or recommendations of that Group were officially presented.

In March, 2008 Yu.Tymoshenko spoke of the readiness of the French *AREVA* company to discuss a possibility of a uranium conversion plant construction in Ukraine, as a joint or a Ukrainian venture, operating on the basis of technology and equipment licences. However, nothing has been reported about preparation of agreements.





Specifically, Ukraine's Prime Minister Yu.Tymoshenko stands for cooperation with *TVEL* company (as was reported, in particular, during her Moscow visit in April, 2009). By contrast, Ukraine's President prefers cooperation with *Westinghouse*.<sup>38</sup>

**Positions of *TVEL* and the Russian side.** Since Ukraine signed the above-mentioned contract of nuclear fuel supply for three power units of South-Ukraine NPP with *Westinghouse* company and is interested in diversification of future supply, after the end of qualification (expected in 2014), it is interested to enter with *TVEL* into a mid-term contract – for instance, for 2011-2015.

However, seeking to keep hold of the Ukrainian market of nuclear fuel, the Russian company, supported by the supreme Russian leadership, binds issues of future supply of fresh nuclear fuel for Ukrainian NPPs with other issues of cooperation in nuclear power engineering in one package and conditions implementation of joint projects in the nuclear industry (construction of power units 3 and 4 at Khmelnytskyi NPP;<sup>39</sup> of a nuclear fuel fabrication plant in Ukraine) by the parameters of the would-be contract, first of all – the volumes of deliveries: minimum for 12 power units, and the contract term: 15 years (2011-2025).

Such requirements are based on economic considerations. *TVEL* executives repeatedly said that only in case of supply of its fuel for 90 reactors of the Russian design, it is economically sound to build a plant for fabrication of Russian fuel on the territory of other countries. *TVEL* Vice President V.Konstantinov commented on the above proposals as follows: "Russia proposed not just long-term relations of fuel deliveries but their qualitatively new level – production integration. Hence, we view creation of the plant in inseparable connection with the long-term contract... Without long-term relations with Ukraine in the nuclear power engineering sector, projects become economically ineffective for us".<sup>40</sup>

Issues of the contract of nuclear fuel supply, construction of the plant and power units 3 and 4 at Khmelnytskyi NPP were discussed on April 29, 2009, during the Moscow visit of Ukraine's Prime Minister Yu.Tymoshenko for a meeting of the Ukraine-Russian Commission for Economic Cooperation. At the closing news conference, Russia's Prime Minister V.Putin said that Russia was ready to provide a \$4 billion credit for construction of the mentioned power units on the condition that it would be used for production of equipment at Russian factories. It was also mentioned that contracts of nuclear fuel supply for Ukrainian NPPs were to be concluded through 2020. However, no documents were signed.<sup>41</sup> There have been no official reports of agreements.

On the other hand, the Russian side is trying to exert pressure on Ukraine, stirring negotiations with Slovakia on construction of a nuclear fuel fabrication plant on its territory – which will question the expediency of a similar plant construction in Ukraine, with or without Russia.<sup>42</sup>

***Westinghouse* proposals.** The company is interested in supply of nuclear fuel for Ukrainian NPPs and in participation in construction of a plant for its fabrication. In particular, the US Ambassador to Ukraine W.Taylor in February, 2009, confirmed its interest in the plant construction.<sup>43</sup> In his opinion, organisation of domestic production of fuel assembly components in Ukraine will reduce the cost of fresh nuclear fuel for Ukrainian NPPs.

Furthermore, according to the terms of the nuclear fuel qualification project, in case of its successful completion, *Westinghouse* will transfer to the Ukrainian side technologies of: nuclear fuel and core design; nuclear fuel licensing; safety assessment of nuclear units using it. According to representatives of *Pacific Northwest National Laboratory*, during the following stage of the nuclear fuel qualification project, some components of fuel may be produced at the plant of the NNEGC *Energoatom* division – *Atomenergoprom*.<sup>44</sup>

**Advantages and risks.** As we see, competition between *TVEL* and *Westinghouse* extended not only to the market of fresh nuclear fuel for Ukrainian NPPs but to the right to take part in construction of a nuclear fuel fabrication plant.

The choice of the partner is of strategic importance for the future of nuclear power engineering. If in the future new power units are built only of the Russian design, it makes economic sense, but will make Ukraine dependent on one supplier of reactor technologies, since, as we noted above, owners of reactor technologies simultaneously produce nuclear fuel for their reactors.

On the other hand, if the plant is built jointly with Russian companies, and *Westinghouse* supplies fuel only for three Ukrainian power units, it may quit the Ukrainian market, since such volumes of deliveries are economically disadvantageous.

Meanwhile, there is a threat that after *Westinghouse* quits the Ukrainian market, the Russian side may drop cooperation for construction of a fabrication plant, since *TVEL* wishes to preserve monopoly on the fuel for its reactors and produce it on its territory. In such case Ukraine will remain 100% dependent on the *TVEL* monopoly.

Such threat of monopolisation of the Ukrainian market of nuclear fuel by Russia is dealt with in the

<sup>38</sup> In particular, at an NSDC meeting in June, 2009, President V.Yushchenko said: "I am concerned about the situation formed on the market of nuclear fuel. I can say that our traditional partners in that issue today actively take steps for monopolisation of the uranium isotope enrichment services market". According to the President, such an approach in fact repeats the scenario of the gas blackmail tested in January, 2009. The principle of diversification provided in the Energy Strategy is the only target in such situation. Meanwhile, V.Yushchenko stressed that the issue entirely lay within the competence of the Government. See: Head of state concerned by the situation on the market of nuclear fuel. – Official web site of the President of Ukraine, June 5, 2009, <http://www.president.gov.ua>

<sup>39</sup> In October, 2008, the Ministry of Fuel and Energy announced Russian *Atomstroyexport* company with *V-392B* project the winner of the tender for power unit construction. The total project value is UAH 15 billion. The Russian side also proposed a 85% commodity credit of the total value of deliveries, with only 15% to be provided by the Ukrainian side.

<sup>40</sup> See: Osadcha Ya. Production of nuclear fuel will take not less than seven years. – *Holos Ukrayiny*, April 24, 2009, <http://www.golos.com.ua>

<sup>41</sup> See: Russia and Ukraine will sign a long-term contract on nuclear fuel on July 15. – *Gazeta.ru*, April 29, 2009, <http://www.gazeta.ru>

<sup>42</sup> According to the Corporation's Vice President P.Lavreniuk, at negotiations in November, 2008, Slovak partners "presented rather serious arguments for the plant to be located in Slovakia. Indeed, it is a politically stable state, a full member of the EU that maintains constructive contacts with Russia on the top political level, plans development of nuclear power engineering... and took a decision to complete power units 3 and 4 of Mohovce NPP using Russian technologies". See: Slovakia can intercept NPP fuel producing plant from Ukraine. – <http://www.ogo.ua>, July 17, 2009.

<sup>43</sup> See: US Ambassador to Ukraine: *Westinghouse* ready to help Ukrainian atomic engineers to organise production of fuel elements. – *AtomInfo.Ru*, February 11, 2009.

<sup>44</sup> South-Ukraine NPP hosts a seminar on acceptance control of US fuel assemblies. – Official web site of NNEGC *Energoatom*, March 18, 2009.





NSDC decision of February 10, 2009 “On Immediate Measures at Guarantee of Energy Security of Ukraine”: “The progress of negotiations with the Russian side on supply of nuclear fuel for Ukrainian NPPs, in particular, an attempt of the Russian side to bind conclusion of nuclear fuel supply contracts for Ukrainian NPPs in 2009 and 2010 with conclusion of a long-term agreement through 2020, witnesses the relevance of a number of risks for the Ukrainian side, related with monopolisation of the nuclear fuel market in Ukraine”.<sup>45</sup>

Regarding Ukraine’s partnership with *Westinghouse*, implementation of the project in such partnership gives the substantial advantage that after its completion and full utilisation of production capacities of the Ukrainian plant, Ukraine will be able to enter the world market of nuclear fuel as an exporter – since the *Westinghouse* technology enables production of fuel for different reactor types.<sup>46</sup>

Given the plans of many states to develop nuclear power engineering, reactors designed by *Westinghouse* company, with their high operating properties and safety, will be built in quantities all over the world (according to IAEA forecasts, by 2030, half of NPP reactors in the world will be made by that company). In this sense, cooperation with *Westinghouse* gives hope that with time, nuclear fuel that will be needed for that type of reactors can be produced at the Ukrainian plant for delivery to the world market of nuclear fuel. Strategically, cooperation with the *Westinghouse* company in construction of a nuclear fuel fabrication plant is advantageous for Ukraine.

For the time being, the problem of Ukraine’s choice of a strategic partner in development of its nuclear power engineering remains unresolved. Next to all issues dealing with diversification of nuclear fuel sources for Ukrainian NPPs cause heated discussion both at home and internationally. Terms of the partner selection for construction of a nuclear fuel fabrication plant and signing of a contract with *TVEL* reported by officials have passed,<sup>47</sup> but discussions go on and, naturally, affect negotiations between *NNEGC Energoatom* and *TVEL* company.

The main reasons of the said issues solution delay include not only their importance for Ukraine’s national interests and difficulty of conciliation between two large companies competing on the world nuclear markets in Ukraine’s interests. Unfortunately, one of the reasons lies in the lack of consensus on those issues within Ukraine’s top state leadership. Meanwhile, choice of only one partner has its benefits but also poses significant risks.

Ukraine is interested in cooperation with both companies, since, *first*, the essence of diversification lies in extension of the list of partners, and *second*, such cooperation meets the need of the energy and, therefore, national security of the country.

## CONCLUSIONS

The Ministry of Fuel and Energy, Nuclear Fuel of Ukraine State Enterprise, *NNEGC Energoatom* should thoroughly examine all options and forecast possible consequences for successful further negotiations with *TVEL*, since *TVEL* now insists on deliveries of its fuel for not less than 12 Ukrainian power units after 2010 and binds this with the prices of fresh nuclear fuel in 2009-2010 and other nuclear power engineering projects.

In the conditions of uranium concentrate prices fluctuations and large-scale plans of nuclear power engineering development all over the world, which may result in the growth of prices of nuclear fuel, creation of nuclear fuel cycle elements should be a priority for Ukraine’s nuclear industry. Despite the economic crisis, the Government should concentrate material and financial resources in that sector.

Over 14 years, not a single objective of the Comprehensive Programme of nuclear fuel cycle elements creation in Ukraine has been achieved. The main reasons are the lack of political will and funding problems.

One practical step to nuclear fuel sources diversification for Ukrainian NPPs would be to implement the project of qualification of nuclear fuel produced by *Westinghouse* company and sign a contract, whose fate depends on the results of pilot operation of fuel assemblies produced by that company, to be known in 2013.

Signing of the contract triggered an information war in the Russian media against Ukraine’s plans to find a second supplier of nuclear fuel. Trying to keep hold of the Ukrainian market of nuclear fuel, Russian companies supported by the supreme Russian leadership bind implementation of other joint projects in the nuclear industry (construction of power units 3 and 4 at Khmelnytskyi NPP, construction of a nuclear fuel fabrication plant) with parameters of the would-be contract of nuclear fuel supply by *TVEL* company to Ukraine after 2010.

In such situation, a reasonable compromise should be found at negotiations with the Russian side about the contract of nuclear fuel supply of *TVEL* company to Ukraine – on the condition of best protection of Ukraine’s national interests. However, it may be suggested that before the end of the presidential elections, in the conditions of permanent sharp contradictions between the President and Prime Minister, the Ukrainian side, most probably, will not be able to adequately respond to joint efforts of all branches of the Russian authorities and state corporations promoting their interests on the Ukrainian market of nuclear materials and technologies. ■

<sup>45</sup> President of Ukraine Decree “On the National Security and Defence Council of Ukraine Decision of February 10, 2009 “On Immediate Measures at Guarantee of Energy Security of Ukraine” No.82 of February 11, 2009.

<sup>46</sup> Meeting with Vice President of *Westinghouse* company (USA) Michael Karst was held in the President of Ukraine Secretariat. – Official web site of the President of Ukraine, June 25, 2009.

<sup>47</sup> For instance, on March 13, 2009, Deputy Minister of Fuel and Energy N.Shumkova said: “Choice of the partner for construction of a nuclear fuel fabrication plant in Ukraine is to be made before the end of May. The term was set with account of the period of the feasibility study of the plant construction, to be presented to the Government in the 1<sup>st</sup> quarter of 2010”. See: Klynetskyi O. Nuclear project to be decided by summer. – *Rynki&Biznes*, March 13, 2009, <http://www.rynok.biz>

In April, 2009, Ukraine’s Prime Minister Yu.Tymoshenko said that contracts would be presented for discussion before June 15, 2009. See: Russia and Ukraine will sign a long-term contract on nuclear fuel on July 15. – *Gazeta.ru*, April 29, 2009, <http://www.gazeta.ru>

# 5. CONCLUSIONS AND PROPOSALS

## CONCLUSIONS

The analysis presented in the analytical report testifies to the following. *First*, dependence of Ukraine on imports of natural gas, oil and nuclear fuel from Russia is close to 100%, i.e., being the monopoly dependence.

*Second*, in connection with critical dependence of Ukraine on Russian deliveries of natural gas, oil and nuclear fuel, the issue of diversification projects implementation in those sectors remains on the agenda.

*Third*, readiness of diversification projects, as assessed by Razumkov Centre experts, looks as follows: actually “zero” in the gas sector; significant (up to 50%) – in the oil sector, thanks to building the larger part of the oil pipeline system; close to 100% (thanks to the readiness to start deliveries of nuclear fuel from a new source (at least for trials) – in the nuclear sector. This is witnessed by the data cited in Table “*Comparative analysis of energy resources and nuclear fuel deliveries to Ukraine diversification projects readiness*”.

*Fourth*, one may note the general uncertainty of diversification projects prospects, first of all, oil and gas, and unpredictable prospects of getting the State Nuclear Regulatory Committee permit to industrial operation of nuclear fuel of *Westinghouse* company. The decision on the expediency or in expediency and setting at least tentative terms of implementation of gas and oil delivery projects will most probably be taken after the presidential elections in Ukraine.

*Fifth*, it may be said that by and large, Ukraine has no regular approaches to implementation of diversification projects. The technological cycle of development and implementation of an investment project (such as any diversification project) consists of some phases (stages), including obligatory, whose absence endangers implementation of the project. The minimum set of an investment project implementation cycle elements, according to recommendations of the World Bank and the UN Industrial Development Organisation (*UNIDO*), is as follows:<sup>1</sup>

- *pre-investment phase*: analysis of investment capabilities, preliminary feasibility study, final feasibility study and preparation of a business plan;
- *investment phase*: negotiation and signing of contracts, design, construction, marketing, training;
- *operation phase*: acceptance and commissioning, replacement of equipment, expansion, innovation;
- *liquidation phase*: liquidation or deactivation of the facility (especially important for nuclear power engineering enterprises).

**Breach (non-observance) of this technology at state decision-making, in formulation of the diversification policy of the energy sector make that policy controversial and inadequate to the internal and external situation, causes uncertainty and gaps in planning and implementation of projects, which seriously impedes their progress.**

**Therefore, the Cabinet of Ministers of Ukraine should jointly with concerned ministries, agencies and other state structures examine and review the progress of planning and implementation of all diversification projects (in the gas, oil, nuclear sectors), abiding by the described technology of planning and implementation of investment projects.**

## PROPOSALS

For passage of final decisions on preparation and implementation of natural gas, oil and nuclear fuel deliveries to Ukraine diversification projects (including creation of a domestic enterprise for fabrication of nuclear fuel), and establishment of advantageous international cooperation in those sectors, the following measures are needed to be taken.

### To the Verkhovna Rada of Ukraine:

- to arrange parliamentary hearings on issues of planning and implementation of projects of natural gas, oil and nuclear fuel deliveries to Ukraine diversification.

### To the Cabinet of Ministers of Ukraine:

- **to formulate conceptual fundamentals of the state policy** of hydrocarbons (oil, natural gas) and nuclear fuel sources diversification, and creation of nuclear fuel cycle elements, resting on resources available to the state;
- jointly with concerned ministries and agencies, **to review and update the Energy Strategy of Ukraine through 2030, including with respect to diversification of oil, natural gas and nuclear fuel deliveries.**

### To the Ministry of Fuel and Energy of Ukraine:

- **jointly with Naftogaz Ukrayiny NJSC, Ukrtransnafta OJSC, NNEGC Energoatom, to arrange public discussion of supply diversification projects** of natural gas, oil and nuclear fuel to Ukraine through partial publication of feasibility studies results, conduct of international and Ukrainian expert conferences involving representatives of transnational energy companies and financial institutions, domestic experts, presentation of separate projects.

<sup>1</sup> Phases of development and implementation of an investment project. – *Investitsii*, January 20, 2009; <http://pacug.org/?p=21>


**COMPARATIVE ANALYSIS OF ENERGY RESOURCES AND NUCLEAR FUEL DELIVERIES TO UKRAINE DIVERSIFICATION PROJECTS READINESS**

Item	Natural gas (liquefied)	Oil	Fresh nuclear fuel ( <i>Westinghouse</i> )
<b>1. Presence of feasibility study</b>	<b>None</b> Only a preliminary technical-economic assessment of a regasification terminal construction project has been performed by <i>Naftohazbudinformatyka</i> LLC for <i>Naftogaz Ukrainy</i> NJSC funds	<b>Present</b> Seven feasibility studies of Odesa-Brody-Plock-Gdańsk project have been performed, results of the latest one were not released	<b>NA*</b> No preliminary estimates of <i>Westinghouse</i> nuclear fuel cost, compared to fuel of the Russian company <i>TVEL</i> , have been released <sup>1</sup>
<b>2. Presence of contracts</b>	<b>None</b> No signed contracts or agreements	<b>None</b> No signed contracts or agreements	<b>Contract signed with <i>Westinghouse</i> company</b>
<b>3. Cost</b>	<b>\$1.52 billion</b> (with account of the port deepening, creation of auxiliary infrastructure, freight (purchase) of LNG tankers. However, total costs will largely depend on capacities of the LNG plant and the port selected in Ukraine)	<b>\$0.5 billion</b> (with account of auxiliary infrastructure in Ukraine and Poland. Meanwhile, change of the route (for instance, to Germany) will require new calculations)	<b>NA</b> Creation of experimental nuclear fuel for VVER reactors by <i>Westinghouse</i> was funded by the US Government, procurement of fresh nuclear fuel by Ukraine – included in electricity rates, so, fresh nuclear fuel is procured at the expense of proceeds from sale of electricity generated by Ukrainian NPPs. The hypothetic higher price of fresh nuclear fuel supplied by <i>Westinghouse</i> , compared to Russian fuel, may be offset by a higher electricity rate
<b>4. Foreign support (political)<sup>2</sup></b>	<b>None</b>	<b>EU, Azerbaijan, Poland, Baltic states, Georgia</b>	<b>US Government, EU</b>
<b>5. Domestic support (consensus of elites)</b>	<b>None</b> Elites are insufficiently aware of the option of diversification, the project is discussed only by experts. One of the reasons lies in the absence of industrial technologies of gas liquefaction and regasification in the USSR and the CIS (a project of gas liquefaction was implemented only on Sakhalin Island in Russia, jointly with foreign companies)	<b>None</b> In addition, it faces strong opposition, first of all, by the pro-Russian lobby in Ukraine, and a fierce campaign aimed at project disruption	<b>None</b> In addition, it faces strong opposition, first of all, by the pro-Russian lobby in Ukraine, and a fierce campaign aimed at project disruption
<b>6. Presence of funds</b>	<b>None</b> Not envisaged by the state budget or state programmes. No agreements of loans for funding of those projects were signed either	<b>None</b> Not envisaged by the state budget or state programmes. No agreements of loans for funding of those projects were signed either	<b>Electricity rate</b> The cost of nuclear fuel is included in the rate of electricity generated by NPPs
<b>7. Legislative support<sup>3</sup></b>	<b>None</b>	<b>None</b>	<b>None</b>
<b>8. Presence of a business plan</b>	<b>None</b> There are no approved comprehensive business plans (or action plans) on the governmental, branch (Ministry of Fuel and Energy of Ukraine), or sub-branch ( <i>Naftogaz Ukrainy</i> NJSC) level	<b>None</b> There are no approved comprehensive business plans (or action plans) on the governmental, branch (Ministry of Fuel and Energy of Ukraine), or sub-branch ( <i>Naftogaz Ukrainy</i> NJSC) level	<b>NA</b>
<b>9. Total readiness of the project</b>	<b>0%</b> An LNG supply project is to be started from scratch	<b>To 50%</b> This assessment of the degree of the project implementation proceeds from the following: (a) Odesa-Brody oil pipeline and oil Pivdennyi terminal have been built; (b) oil pipelines Brody – West border of Ukraine and West border of Ukraine – Plock (with auxiliary infrastructure) are absent. Change of the direction of Caspian oil supply to Europe will require complete revision of the project	<b>Close to 100%</b> 42 fuel assemblies produced by <i>Westinghouse</i> company (already brought to Ukraine) are to be loaded to the core of reactor No.3 at South-Ukraine NPP in January, 2010. Since this means the beginning of pilot operation, this point may conventionally be termed as the start of implementation of the diversification project. However, pilot operation may be stopped in case of serious problems, or if following pilot operation in 2013 the State Nuclear Regulatory Committee does not give NNEGC Energoatom a permit to industrial operation of the <i>Westinghouse</i> fuel
<b>10. Forecasted implementation term</b>	<b>Beyond 2025</b> No exact forecast can be done due to absence of contracts	<b>2012-2014</b> No exact forecast can be done due to absence of contracts	<b>2011-2015</b> Implementation of the project is to start in 2010, and the State Nuclear Regulatory Committee plans to draw its conclusion in 2013. Meanwhile, the contract of fuel supply between NNEGC Energoatom and <i>Westinghouse</i> was signed for 2011-2015, contrary to the State Nuclear Regulatory Committee plans

\* Data unavailable.

<sup>1</sup> The feasibility study and, first of all, contracts dealing with diversification projects present a commercial secret, but at least the key economic parameters of those documents must be published.

<sup>2</sup> The EU supports any diversification projects in Europe, including Ukraine. Russia flatly opposes supply of Caspian oil and nuclear fuel produced by *Westinghouse* company to Ukraine. LNG deliveries do not meet such opposition, due to the unreadiness of the project.

<sup>3</sup> Ukraine has no law promoting or documenting international agreements on diversification projects.



## IN THE GAS SECTOR

### To the Cabinet of Ministers of Ukraine:

- to hold negotiations with governments of countries whose companies produce liquefied natural gas, first of all, with Qatar and Libya;
- to provide for revision and extension of effective ten-year contracts of deliveries and transit of gas between *Naftogaz Ukrainy* NJSC and *Gazprom* by 10-15 years for correction of some items of the contracts;
- to work out regulatory acts regimenting activity of enterprises dealing with liquefied natural gas.

### To the Ministry of Fuel and Energy of Ukraine:

- jointly with *Naftogaz Ukrainy* NJSC and concerned structures, to perform feasibility study of the project of liquefied natural gas supply to Ukraine.

## IN THE OIL SECTOR

### To the Ministry of Fuel and Energy of Ukraine:

• jointly with *Naftogaz Ukrainy* NJSC and *Ukrtransnafta* OJSC, to plan implementation of the EAOTC project (operation of the Odesa-Brody oil pipeline in the “South-North” direction) on the basis of the following three basic modules of development, to be implemented in a phased manner:

- supply of up to 5 million tons of light, low-sulphur Caspian oil a year to two West Ukrainian refineries and 3 million tons a year by the southern branch of *Druzhba* oil pipeline to the Czech refinery in Kralupy; transportation of 5 million tons of Caspian Sea oil a year to two refineries in South Germany, in Vohburg and Ingolstadt. This stage requires application of oil batching technology at *Druzhba* pipeline and reverse operation of *IKL* pipeline;
- transportation of 20 million tons of oil a year to the refinery in Płock (Poland) and the sea port of Wilhelmshaven (Germany). Implementation of that phase requires construction of Brody-Płock oil pipeline, to connect the northern and southern branches of *Druzhba* oil pipeline system and Schwedt-Wilhelmshaven oil pipeline;
- transportation of up to 7 million tons of oil a year to the Austrian refinery in Schwechat and the German refinery in Karlsruhe. That phase will require construction of Bratislava-Vienna oil pipeline.

The main mechanisms of implementation of that model of EAOTC development should include:

- creation of an international consortium on the basis of the Odesa-Brody oil pipeline system involving the leading international oil companies developing Caspian fields;
- tax exemptions for West Ukrainian refineries to invest in their technical modernisation;
- signing of a package of oil purchase and pumping contracts under any option of Caspian oil transportation.

## Legislative, regulatory and organisational support

### To the Verkhovna Rada of Ukraine:

- to pass the Law “*On Encouragement of Development of Euro-Asian Oil Transport Corridor*”

Objectives of the law – to create organisational, legal and economic conditions for development of the Odesa-Brody oil pipeline system and supply Caspian oil to oil refineries in Ukraine and Central and Western European countries;

### to amend the Laws of Ukraine:

- “*On Pipeline Transport*”, “*On Concessions*” and other regulatory acts enabling long-term concession of the oil pipeline Odesa-Brody and Pivdennyi sea oil terminal to an international oil consortium;
- “*On Taxation of Enterprise Profit*”, “*On Value Added Tax*”, “*On Customs Tariff*” for exemption of costs associated with reconstruction and modernisation from the base of enterprise profit taxation, exemption of import of equipment intended for those goals from the import duty and value added tax.

### To the Cabinet of Ministers of Ukraine:

- to provide for implementation of the project of a parallel segment of the Odesa-Brody oil pipeline (52 km from Odesa) construction and development of infrastructure in the port of Pivdennyi (construction of the second berth, expansion of the tank capacity by 240 thousand cu.m) to create optimal conditions for transportation of Caspian oil by redirecting Russian oil from the Pivdennyi-Brody route to Samara-Velykotsk-Kremenchuk-Pivdennyi and Samara-Holovashivka-Kremenchuk-Pivdennyi;
- to set competitive tariffs and duties of oil transportation by the route Pivdennyi-Brody and oil handling in the port of Pivdennyi over the entire period of operation of EAOTC;
- to calculate economic effectiveness of petroleum products production from Caspian oil of *Azeri Light* and *CPC* blends at Ukrainian oil refineries, compared to petroleum products produced from Russian *Urals* oil and imported from other countries;
- to develop a programme of Ukraine’s oil processing sector development through 2020, envisaging amendments to the legislation to promote innovative technologies, enhance the degree of oil processing and quality of petroleum products in line with the norms accepted in the EU countries, in order to provide for the high competitiveness of Ukrainian petroleum products;
- to work out proposals for coordination of joint efforts of Central European countries to oppose the potential deficit of oil in those countries following Russia’s plans of Baltic Pipeline System 2 construction. Development of the Odesa-Brody





project should be the key element here, since it can make up for the deficit of oil expected after Baltic Pipeline System 2 commissioning in 2012;

- **to hold negotiations** with *Halychyna* OJSC and *Naftokhimik Prykarpattya* OJSC oil refineries shareholders to agree the terms of reconstruction and modernisation of the factories, or sale to a strategic investor, e.g., the consortium participants. Meanwhile, to enhance the synergic effect, the Cabinet of Ministers of Ukraine should help the future consortium participants with purchase, on a mutually advantageous basis, of a large block of shares of one of the leading Ukrainian retail chains trading in petroleum products;
- **to provide for adaptation and introduction** of regulatory-technical documents for construction and operation of main oil pipelines in line with requirements of international standards *ISO 9000*, *ISO 1400* and *TQM*;
- **to provide for the shift** from administrative methods of oil transportation system management to corporate management, economic and antimonopoly regulation. To take *Ukrtransnafta* OJSC out from subordination of *Naftogaz Ukrayiny* NJSC and transfer it into state management, under the Ministry of Fuel and Energy.

#### IN THE NUCLEAR SECTOR

#### Legislative, regulatory and organisational support

##### To the Verkhovna Rada of Ukraine

- **to pass the Law “On Procedure of Foreign Investment in Enterprises of Strategic Importance for National Economy and Security”**

The goal of the law is to specify the lines of business of strategic importance for the for national security of Ukraine (including in the nuclear sector) and regiment participation of foreign investors in authorised funds of

enterprises active in that sector, to protect the national interests and national security of Ukraine.

##### To the Cabinet of Ministers of Ukraine:

- **jointly with the Ministry of Fuel and Energy, the State Nuclear Regulatory Committee, NNEGC *Energoatom*, other interested ministries and agencies, to remove the time gap** between the contract of nuclear fuel supply in 2011-2014 signed by NNEGC *Energoatom* with *Westinghouse* company and the programme of pilot operation of that fuel and summing up the results of pilot operation in 2013 (in four years), for NNEGC *Energoatom* to issue a permit for industrial operation of the *Westinghouse* fuel;
- **to consider possible cooperation** in the field of the nuclear fuel cycle with such states as China, India, Japan and Kazakhstan and to step up efforts for conclusion of intergovernmental agreements of cooperation in peaceful uses of nuclear energy with those states;
- **to establish a central executive body for management of nuclear power engineering and nuclear industry**, to enhance the effectiveness of the state policy in the nuclear sector.

##### To the Ministry of Fuel and Energy of Ukraine:

###### To closely monitor:

- operation of the Nuclear Fuel of Ukraine State Enterprise, and to strengthen the concern’s management;
- abidance by the terms of development and adoption of the State Target Programme of nuclear fuel cycle elements creation.

##### To the State Nuclear Regulatory Committee of Ukraine:

- **to step up efforts** for development of regulatory acts regimenting the nuclear and radiation safety of the nuclear fuel cycle enterprises operation (nuclear fuel fabrication plant in Ukraine). ■

# DIVERSIFICATION OF OIL SUPPLY TO UKRAINE



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The problem of overcoming Ukraine's dependence on one source of supply of oil arose on the agenda after the country gained independence. It was prompted by the sharp decline of oil production in Russia and reduction of deliveries of Russian oil to Ukrainian refineries, whose aggregate capacity in 1991 amounted to 54 million tons.<sup>1</sup>

However, at the beginning of 1990s, diversification of sources and ways of supply energy resources, including oil, was not recognised as a state priority. Then economic reforms focused on privatisation that also covered the national oil processing facilities. This and other circumstances undermined the processes of removal of energy dependence of the national economy.

This article briefly outlines the factors that, against the background of endless official declarations of intentions to diversify the sources and ways of supply of energy resources, made Ukrainian oil imports 100% dependent on one source – the Russian Federation.

So, the progressing negative trend in oil delivery to Ukrainian processing capacities determined the course towards creation of technical capabilities for acceptance of oil from other than Russian sources, to make up for the deficit of raw materials and make the refineries work (Table “Changes in Russian oil production...”<sup>2</sup>).

**Changes in Russian oil production, supply and processing in Ukraine, million tons**

Year	Oil production in Russia	Supply from Russia to Ukrainian refineries	Processing at Ukrainian refineries with account of domestic production
1990	515.9	51.7	58.2
1991	461.1	46.5	52.9
1992	399.0	33.3	37.5
1993	354.1	19.5	23.0
1994	317.8	13.8	17.8
1995	307.0	10.9	16.4

As soon as 1992, relevant projects were worked out, and on February 15, 1993, Prime Minister L.Kuchma's Decree gave green light to construction of a marine oil handling complex Pivdennyi in the port of Yuzhnyi, Odesa region. It was intended to create technical capabilities to accept oil from the sea. Later, *PivdenDIPRONaftoprovid* institute (now – Oil Transportation Institute) proposed a large-scale project of building a system of interconnected oil pipelines from the Pivdennyi oil handling complex in the direction of the main Ukrainian refineries in Kremenchuk, Kherson, Drohobych and Nadvyrna. It prioritised the project of an oil pipeline from the Pivdennyi oil handling complex to Western Ukraine, that later got the working name of

Odesa-Brody and was designed to ensure oil supply to two Ukrainian refineries: in Drohobych and Nadvyrna.

## Factor of privatisation of oil processing industry

The first such factor was presented by privatisation of Ukrainian oil processing facilities, started in mid-1990s. In the oil sector, it was performed in isolation from the tasks of modernisation of refineries and diversification of supply. It was expected that the new refinery owners – Russian companies – would secure resumption of oil processing in pre-crisis volumes and modernisation of enterprises. However, this was not the case, since the new owners who non-transparently obtained processing facilities for a song and vague investment commitments wanted maximum revenues at minimum cost at the expense of utmost use of the remaining technical potential of the Ukrainian oil processing industry.

Therefore, in early 1990s, the triune goal of “privatisation – modernisation – diversification” was transformed into the single goal of privatisation, with its other components ignored. This actually led to the poor state of the Ukrainian oil processing industry, oil transportation system, and deformed development of the domestic market of petroleum products, ever more dominated by imported finished petroleum products.

In the post-crisis period, oil processing, having reached its peak in 2003-2004 (21.2 million tons and 22 million tons, respectively), began to decline down to 10.5 million tons in 2008.<sup>3</sup> Not going into the analysis of the reasons for that process, it should be noted that the subject of

<sup>1</sup> *Nafta i Haz Ukrayiny*. – Kyiv, 1997, p.246.

<sup>2</sup> *Source: Nafta i Haz Ukrayiny*. – Kyiv, 1997, p.276.

<sup>3</sup> *Sources: Oil and gas sector of Ukraine: transparency of operation and revenues*. – Kyiv, 2008, Annex 22 “Key operation indices of Ukrainian oil and gas sector”; Memorandum of the key development indices of Ukrainian energy sector branches in December and 12 months of 2008 – Ministry of Fuel and Energy of Ukraine, January 20, 2009, <http://mpe.kmu.gov.ua/fuel/control/uk/publish>



diversification recedes into the background in the result of such reduction. Since oil processing is not developing, processing facilities are actually not modernised, the interest in diversification of sources of raw materials, creation of technological mixtures of different oil types automatically goes down. Moreover that Russian oil companies and traders remain the main suppliers, acting via a chain of subsidiaries. In fact, provision of Ukrainian refineries with oil depends on the corporate policy of Russian oil companies – refinery owners.

Therefore, Ukraine witnesses a trend towards decay of oil processing, irrespective of the colours of the governments (there were five of those in the period of 2003-2008).

“Russian factor”

The Russian strategy in the post-Soviet space was always intended to preserve, and where possible to strengthen the dependence of post-Soviet states with simultaneous minimisation of Russia’s dependence on the new independent states. This primarily refers to the infrastructural dependence. Overcoming of the crisis in the Russian oil producing industry at the end of 1990s prompted Russia to stir up its oil policy. Yet before the passage of the Energy Strategy, Russia began to implement the projects of bypass pipelines construction. In particular, in 2000-2001, it built the bypass oil pipeline Sukhodolnaya-Rodionovskaya, with which *Transneft* JSC omitted Velykotsk-Lysychansk-Luhansk segment of the Ukrainian system of the Dnieper main oil pipelines by the Russian territory. This led to a sharp decrease in the volumes of transit – from 48.6 million tons in 2001 to 27.4 in 2002.

Russia’s energy strategy through 2020, approved by the Russian Government in 2003, officially proclaimed Russia’s course of creating an alternative oil pipeline infrastructure: “With the purpose of maintaining energy and economic security, it is necessary to try to diversify directions of export of energy resources with the development of the northern, eastern and southern directions... With the purpose of reducing dependence of the country on external risks... it is expedient to extend state support to projects aimed at creation of the transport infrastructure in the direction of Russian sea terminals for export of energy resources”.

Therefore, the Strategy specified the main lines of development of the oil transportation industry:

- construction of own terminals for sea deliveries of oil in traditional and promising directions of export;
- formation of new oil and petroleum products export directions bypassing transit states;
- maximum possible linkage of oil flows from the Caspian region to the system of Russian oil pipelines for their transit.

As the main lines of oil transportation system development were chosen: North Baltic, Caspian-Black Sea-Mediterranean (bypassing Ukraine), East Siberian-Far Eastern.

The updated Russia’s energy strategy through 2030 adopted on August 27, 2009, specifies a number of priority pipeline projects whose implementation will substantially change the regional oil transportation map. According to an official report of the Russian Government: “It is necessary to implement large-scale infrastructural projects

Strategic directions of oil export and Russian pipeline system development



aimed at diversification of export routes and access to new markets. First of all, this is the oil pipeline system “East Siberia – Pacific” and the Baltic Pipeline System-2, oil pipeline Burgas-Alexandroupoli... The share of the European direction in total exports of Russian fuel and energy resources will steadily go down, and by the end of implementation of the Energy Strategy, the share of the eastern direction in exports of liquid hydrocarbons will rise from the present 6% to 22-25%. Growth of the capacities of pipelines leading beyond the CIS will make 65-70%”.<sup>4</sup>

Russia is quite successfully implementing the provisions of its Strategy. The draft of the updated strategy developed by the Institute of Energy Strategy (Moscow) contains the assessment of implementation of the provisions of the previous version: “New main oil pipeline systems have been built, including the Baltic, with the capacity of 65 million tons a year, port capacities for handling and sea transportation of liquid hydrocarbons have been created (Primorsk, Varandei)”.<sup>5</sup>

The draft presumes further implementation of politically motivated projects: “Development of **pipeline transportation of oil and petroleum products** will go on adequately to the growth of volumes and diversification of domestic and external deliveries of liquid hydrocarbons. This will solve the tasks of further increase in the share of pipeline transportation of liquid hydrocarbons in total transportation of oil and petroleum products, and reduction of Russia’s dependence on transit of oil and petroleum products across the territory of neighbouring states.

The key projects in the field of oil and petroleum products transportation development are:

- construction of the oil pipeline East Siberia – Pacific with the capacity of 80 million tons of oil a year;
- construction of the oil pipeline Unecha – Ust-Luga (Baltic Pipeline System-2);
- development of export terminals in the cities of Primorsk, Murmansk, Nakhodka”.<sup>6</sup>

<sup>4</sup> “On a Meeting of the Government of the Russian Federation on August 27, 2009”, Press release of August 26, 2009; <http://www.government.ru/content/governmentactivity/kzp/2c5cc904-030b-4b2e-b4e2-898bb0569ad4.htm>

<sup>5</sup> Energy Strategy of Russia through 2030 (draft). – Moscow, 2008, p.79.

<sup>6</sup> *Ibid.*, p.83.





Implementation of the outflanking energy transportation strategy by Russia conditions the general trend towards the decrease in volumes of oil transportation and transit across Ukraine. While in 1991, transportation of Russian oil across Ukraine amounted to 94.9 million tons, in 2008 – 41 million tons. Some growth in transportation and transit (to 50.9 million tons) was observed in 2007, but it was caused by the unprecedented dumping – almost two-fold reduction in *Ukrtransnafta* OJSC tariffs of oil transit and handling at Pivdennyi oil handling complex.

After the completion of construction of the above-mentioned oil pipeline systems Russia can minimise the use of the oil transportation infrastructure of Ukraine and Belarus for transit of Russian oil. This will lead to reappearance of the situation caused by construction of the segment of Sukhodolnaya-Rodionovskaya oil pipeline bypassing Ukraine, now on the Ukraine-wide scale.

The draft Russia’s Energy Strategy includes a number of targets that are worth examining from the viewpoint of the Ukraine’s need to implement the diversification policy (Table “*Targets of strategic development...*”<sup>7</sup>).

Targets of strategic development of Russian oil sector through 2030			
Targets/lines	Phase I (2012-2014)	Phase II (2020-2022)	Phase III (2030)
<b>Oil transportation</b>			
Growth of main pipeline and sea export terminal capacities, by 2005, million tons	78-83	93-98	108-113
Redundant export capacities, including for transit deliveries, million tons	37-38	52-66	88-94
<b>Oil processing</b>			
Growth of oil processing volumes, compared to 2005, %	19-24	30-49	32-61
<b>Export of oil</b>			
Growth/decline of exports, compared to 2005, %	0.0-1.0	0.0-5.0	Decline of exports by 3-7%

The table data prove the forecast that hopes for an increase in the transit of Russian oil across Ukraine were deceiving and led to the deadlock. In the conditions of growing redundant pipeline capacities, growth of oil processing in Russia and reduction of its exports, the *Transneft* JSC need for services of the Ukrainian oil transportation system is approaching zero.

Said trends were seen in Russia’s policy yet in early 2000s. Those risks and threats might logically prompt implementation of a policy of diversification in Ukraine – to guarantee both alternative oil supply and employment of new oil flows for transit by the national oil transportation system, the load of which is falling every year.

Furthermore, the European Commission encouraged diversification projects – on May 13, 2003, it prioritised the Odesa-Brody project with its further extension to Polish Plock. Before signing the Brussels Declaration of March 23, 2009, on modernisation of the Ukrainian GTS it was the only Ukrainian project awarded such a high status.

However, subsequent events not just failed to accelerate, but on the contrary – slowed down the diversification. Russia put forward the principle of single operation by *Transneft* JSC at oil transportation by the territory of Russia, Belarus, Kazakhstan, Latvia and Lithuania. This was reasoned by that main oil pipelines of said countries were technologically integrated, oil is being transported under one schedule approved by the Russian Government’s Commission for use of the system of main pipelines of oil, gas and petroleum products, and that the oil pipeline

systems of the CIS and Baltic states *de facto* were also managed from one centre in Moscow.

Having signed an agreement with *Transneft* JSC on November 16, 2004, *Ukrtransnafta* OJSC ceded not only control of the volumes and lines of oil transportation across Ukraine, but also current management of the system of main oil pipelines. The very fact of such an agreement gave *Transneft* JSC grounds to base all its further actions regarding *Ukrtransnafta* OJSC on its right of exclusive operation, it got automatically after the Ukrainian partner signed the agreement. Therefore, by way of accomplished fact, the sovereignty of Ukraine’s Government over main oil pipeline transport was partially transferred to *Transneft* JSC.

### Hindrance of diversification by blocking the European direction of Odesa-Brody operation

The Cabinet of Ministers Resolution No.831 of July 5, 2004, on reverse use of the Odesa-Brody oil pipeline was a showy example of torpedoing the policy of diversification of oil supply to Ukraine using behind-the-scene mechanisms of strategic decision-making.

The rationale of the Odesa-Brody project after 2001 lies in use of a cheaper route of transportation of new oil volumes, compared to traditional – via the Bosphorus and Trieste. It had to be implemented through the employment of the potential of oil companies operating in the Caspian region, to which the Odesa-Brody pipeline gave access to German refineries by a cheaper route (Odesa-Brody-Uzhhorod-Budkovce (Slovakia)-Kralupy (Czech Republic)-Ingolstadt (Germany). Concentrated work of *Ukrtransnafta* OJSC jointly with Ukrainian ministries and agencies on the project of the Eurasian Oil Transportation Corridor (EAOTC) in 2003 ended in signing a number of agreements with both suppliers and consumers of Caspian oil, in particular:

- agreements with the Kazakh state oil and gas company *KazMunaiGas* and oil trading company *SOM Petrol* on provision of raw materials for the Odesa-Brody oil pipeline in the amount of not less than 7.6 million tons (4 and 3.6 million tons, respectively) in 2004;
- letters of intention with Polish *PKN Orlen* and *Grupa Lotos* to use the oil transportation system Odesa-Brody to supply light low-sulphur oil in the amount of up to 7 million tons a year;
- a memorandum with the Czech holding *Unipetrol Rafinerie* on provision of the Kralupy refinery with light low-sulphur oil (up to 2.5 million tons).

Guarantees were also obtained from Nadvirna and Drohobych refineries to supply up to 2 million tons of oil a year for their needs by the Odesa-Brody pipeline system, starting from 2004.

Diplomatic efforts concentrated on creation of the legal framework for continuation of the EAOTC project in the Polish direction. On November 26, 2003, the Governments of Ukraine and Poland acting in pursuance of the Joint Ukraine-Poland-EU Declaration signed an Agreement of use of the Odesa-Brody hydrocarbon transportation system and its integration with Polish capacities, which meant readiness of the Polish side for construction of a pipeline link Brody-Plock.

*PwC* Company worked out the business plan of the EAOTC project. According to estimates, the route Odesa-Brody-Uzhhorod-Central Europe offered an economic

<sup>7</sup> Source: *Ibid.*, p.86.





alternative for refineries of the Czech Republic, Austria and South Germany, that from early 2000s consumed light low-sulphur oil from the Caspian Sea. Deliveries to those refineries are traditionally made via the Bosphorus or from the Ceyhan terminal to Trieste and further by oil pipelines *TAL* and *IKL*. The main advantage of Odesa-Brody is its economy, proven with calculations. For instance, supply of 1 ton of oil using Odesa-Brody to *Česká Rafinérská* refinery in Kralupy (Czech Republic) in 2004 prices saved \$0.95-1.0, compared to the traditional route. Figures of the business plan convincingly demonstrated the benefits of direct use of the oil pipeline.

In May, 2004, Vice Prime Minister A.Kliuyev in a letter on behalf of Ukraine's Government was convincing the European Commissioner for Transport and Energy Loyola de Palacio of the invariability of the Government's position regarding the European direction of Odesa-Brody. The Vice Prime Minister received acknowledgements of guarantees from companies working in the Caspian region that undertook to fill the pipeline with oil.

In a letter to A.Kliuyev dated January 26, 2004, *SOM Petrol* President S.Ayan wrote: "*SOM Petrol* company has rich experience of operation on the market of oil and petroleum products, and today, we dare say that we are one of the main exporters of oil produced in Kazakhstan and Turkmenistan. Due to the tough requirements of passage of the straits of Bosphorus and Dardanelles and growth of their workload, our company, as well as other oil traders, sustains significant losses... Today, we again acknowledge and are ready to promote the agreements achieved earlier in line with contracts signed with *Ukrtransnafta* OJSC concerning:

- supply of over 3.6 million tons of Caspian oil a year to Europe by the Odesa-Brody oil pipeline;
- participation in filling the Odesa-Brody oil pipeline with process oil in the amount of 360 thousand tons;
- investment in construction of a rail overpass at Pivdennyi terminal".<sup>8</sup>

On June 17, 2004, a letter came from another oil trader – the *Baltic Petroleum* company. It read: "...Our company is ready for conclusion of a crude oil transportation agreement by the capacities of the Odesa-Brody oil pipeline in the amount of 5-7 million tons over the first 18 months, starting from September 2004". Having received no official response, the company turned to the Minister of Fuel and Energy S.Tulub. A letter of July 6 from the company President J.Eklund: "We once again testify our readiness to sign a contract of oil transportation by the route Odesa (Pivdennyi) – Brody in the amount of 5-7 million tons over the first 18 months for further shipping by railway to EU consumers. Oil necessary for filling the pipeline will be supplied for *Ukrtransnafta* OJSC **free of charge**, starting from September-October this year".<sup>9</sup>

A letter from *Chevron-Texaco's* CEO D.O'Reilly to Ukraine's President of January 29, 2004, was left unattended. "We are ready to further active cooperation with *Ukrtransnafta* and other pipeline companies en route for implementation of that project and transit of

oil by Odesa-Brody to Central Europe" – read the letter. Similarly, there was no answer to the letter of *YUKOS* CEO M.Khodorkovsky dated May 30, 2003, in which he, by contrast to the *TNK* management, proposed cooperation "without negative effects for strategic aspirations of the parties", i.e., using for transit of Russian oil not the Odesa-Brody but the Dnieper oil pipeline system. "In our opinion, on the condition of further minor mutual efforts and without negative influence on strategic aspirations of the parties, stable pipeline supply of oil from Russia in the direction of Kremenchuk-Snehirivka-Pivdennyi terminal can be arranged, in the volume of 3-4 million tons a year, with a view of its further expansion".<sup>10</sup>

By contrast, a *TNK* letter concerning the reverse use of Odesa-Brody signed by G.Khan on August 15, 2003, was inscribed personally by the President: "Boiko Yu.A. Please consider urgently", as soon as August 16, yet before the letter was officially registered at the President of Ukraine Administration on August 18.<sup>11</sup> 2003 saw very frequent meetings of Ukraine's President with executives of Russian state and private oil companies. On July 5, 2004, Ukraine's Government Resolution No.831 amended their own Resolution No.114 of February 4 on the European direction of use of the Odesa-Brody oil pipeline, turning on green light for the reverse.

In this connection, Slovak *Trend* magazine in 2004 wrote: "Transportation of Caspian oil across the territory of Slovakia dropped off the agenda, since Ukraine is again changing its priorities. Although the project of transportation of Caspian oil from Odesa to Brody and further to Slovakia was officially approved by the Government in February, in early July, right after his Moscow visit, Prime Minister V.Yanukovich reported an unexpected change of priorities. It meant the plan of reverse direction of the oil pipeline, to transport heavy Russian oil from *TNK-BP* concern deposits via Brody to Odesa and further by tankers. Therefore, Ukrainians accepted the Russian proposal they had rejected several times before".<sup>12</sup>

After the commencement of the reverse use in 2004, representatives of Russian companies unofficially told foreign oil companies in the Caspian region that they should no longer view the Ukrainian route as fit for transit of Caspian oil to the EU market. They recommended seeing it not as temporary reverse use but as another permanent export route for the delivery of Russian oil to the Black Sea.

Further attempts of the Ukrainian side to convince the Russian counterpart of economic unsoundness of reverse use and benefits of another (then idle) route (Nikolskoye-Kremenchuk-Pivdennyi oil handling complex) were not apprehended.

Despite the evident economic attractiveness of that route as an alternative to reverse, *Transneft* JSC continues to ignore proposals of the Ukrainian side, trying to maintain the reverse use of Odesa-Brody at any cost.

### Current state of the oil supply diversification policy

The current phase of the diversification policy is deemed to begin in the end of 2006, when the Programme of Diversification of Sources of Oil Supply to Ukraine through 2015<sup>13</sup> was approved. The programme reads: "As the experience of the developed countries, e.g., Germany, France, Italy, Japan, shows, abundance by the principle of diversification of sources and routes of energy resources delivery presents an additional factor that guarantees

<sup>8</sup> Oil and gas sector of Ukraine: transparency of operation and revenues. – Kyiv, 2008, p.24.

<sup>9</sup> *Ibid.*

<sup>10</sup> *Ibid.*

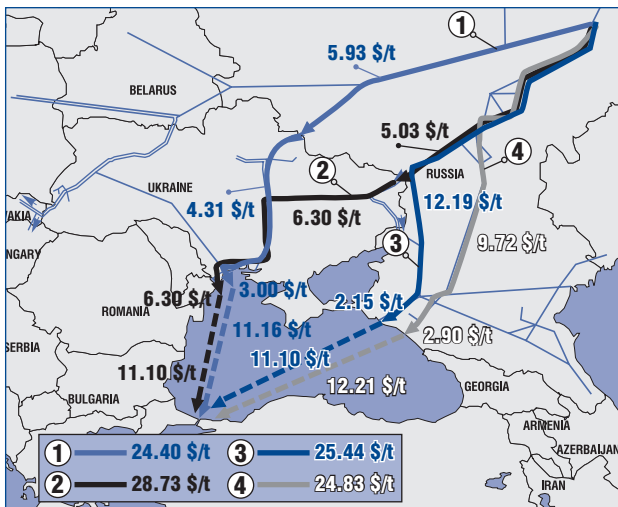
<sup>11</sup> *Ibid.*, p.25.

<sup>12</sup> Cabinet of Ministers Resolution "Programme of Diversification of Sources of Oil Supply to Ukraine through 2015" No.1572 of November 8, 2006.

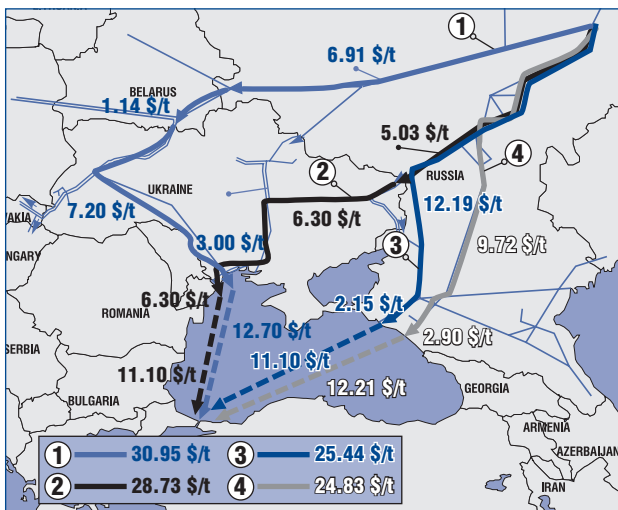
<sup>13</sup> *Ibid.*



**Proposal of a competitive route (counter-reverse)  
Samara-Nikolskoye-Kremenchuk-Pivdennyi-Augusta  
(as of 2006)**



**Comparison of transportation tariffs for Russian oil through Ukrainian pipeline system on the example of Samara (Russia) – Augusta (Italy, Sicily Is) route (as of 2006)**



deliveries and economic independence of importing countries. The EU sees availability of at least three sources of supply of primary energy resources as a criterion of diversification of energy supply systems.

Ukraine hosts six refineries. The controlling stakes in most of them belong to foreign companies, mainly Russian. The total capacities of primary oil refining, equalling 51 million tons/year, are used by 35-40%, on the average.

Refineries mainly rely on Russian raw materials, exceeding 85% of processing. Domestic oil production covers the needs of the national economy by only 10-12%. Strong dependence on Russian deliveries is fraught with crisis situations. However, incomplete employment of refinery capacities gives an opportunity to import oil from other sources without the change of existing suppliers<sup>14</sup>.

There is also a plan of measures at development of the Eurasian Oil Transportation Corridor, approved by

the Cabinet of Ministers Directive No.545 of November 8, 2006, there are relevant NSDC Decisions enacted by a Presidential Decree.<sup>15</sup> However, that Decree was actually ignored by the Government and *Ukrtransnafta* OJSC. On May 14, 2009, the President issued another Decree, No.329, “On Immediate Measures at Guarantee of Implementation of Eurasian Oil Transportation Corridor Project”. Its implementation actually stalled. The developments since late 2006 may be termed as “round rings”, or imitation of activity. After the establishment of a special position of the Commissioner for International Issues of Energy Security at the Presidential Secretariat in early 2008, despite the diplomatic efforts of the official, solution of the task of practical diversification of oil supply to Ukraine moved not a single step forward.

The changes that took place in *Ukrtransnafta* in June-August, 2009, witness that the state enterprise was trapped in the system of a non-transparent private corporate structure implementing a project of vertical integration in the national oil sector. In fact, **since mid-2009, the diversification policy was transferred to the private and corporate level.** The effectiveness of such transfer will be tested by the fulfilment of the Presidential Decree on beginning of the designed operation direction of Odesa-Brody. It assumes that by the end of 2009, the oil pipeline can be operated in the direct mode, although the chances of success look miserable.

By and large, the **private and corporate level of solution of strategic state tasks means that the state has lost tools of attainment of national priorities, including creation of a diversified system of oil supply to Ukraine.** The corrupt and inert state machinery stays under alternate influences of political-oligarchic groups, is unlikely to implement the diversification policy. In such situation, corporate priorities will always outbalance state ones.

If this year’s attempt to commence direct use of the oil pipeline fails, the option of “forced diversification” may be the only remaining one. It will be prompted by *Transneft* JSC commissioning Baltic Pipeline System 2 and redirection of export flows of Russian and Kazakh oil solely to Russian oil pipelines and terminals in 2012. Under such scenario, Ukraine’s oil transportation system may only partially preserve the transit function for delivery to refineries in Slovakia and Hungary.

And if the approaches related with privatisation of the oil transportation system for deceptive promises of increase of its use by Russian consigners prevail, the issues of diversification will lose their relevance. Although in the case of creation of transit-free energy transportation systems by Russia, its interest in the Ukrainian oil transportation system will be minimal, shaped mainly by the desire to bar the possibility of diversification of oil supply to the Visegrad states.

**Finally, it should be noted that Ukraine has sufficient regulatory support for diversification. There are no economic, technical and technological problems related with commencement of the designed use of the Odesa-Brody oil pipeline. There is still some trust in Ukraine, although lowest over the entire term of the project implementation. What is lacking is the political will, locked by metastases of corruption and political grovelling of the Government before the neighbouring state.** ■

<sup>14</sup> *Ibid.*

<sup>15</sup> President of Ukraine Decree “On Decision of Ukraine’s National Security and Defence Council of July 28, 2008 “On Immediate Measures at Guarantee of Operation of Oil Pipeline Odesa-Brody in Planned Direction” No.716 of August 15, 2008.

# DIVERSIFICATION OF SOURCES AND ROUTES OF GAS SUPPLY: THE CHOICE FOR EUROPE AND UKRAINE

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The steady growth of the world oil prices in the previous years, the global financial crisis of 2008, and recession of the world leading economies in 2009 made the leading energy agencies to revise plans and forecasts of the world energy consumption. Meanwhile, another annual crisis of Russian gas supply to the European countries that occurred at the beginning of 2009 prompted the European Union members to resume or commence projects of energy supply routes diversification, to which €4.5 billion were allocated.

The EU countries that even previously well realised the need of diversification of gas supply routes did not hurry to develop the solution plans of that problem, but a new impetus to implementation of those projects was given by the world financial crisis and, especially, the depth of the “gas conflicts” in the Russian-Ukrainian relations that regularly reappears in the recent years.

So, despite the economic crisis, recently, gas consumers and suppliers alike have stepped up efforts promoting various projects of diversification of gas supply. In particular, there was heated debate, including international, on the Ukrainian proposal of construction of the White Stream gas pipeline.

This article examines some of the European countries steps intended to reduce energy dependence on the Russian Federation and outlines the trends to be considered by Ukraine, whose dependence on deliveries of Russian gas has come close to 80%.

## EU focuses on liquefied gas

So, the gas crisis made the EU to again pay attention to one of the most promising methods of natural gas delivery to consumer markets – supply of gas in the liquefied form (liquefied natural gas, LNG), since this method enables diversification of both sources and routes of supply.

It is no wonder that economically developed countries of the world are gradually implementing their own LNG projects: make contracts to that end with producers/suppliers and are building terminals for LNG admission.

Construction of several terminals (*Adriatic, Brindisi, Livorno* LNG terminals) is underway in Italy, another five are planned; France is building *Fos Cavaou* LNG terminal and plans construction of *Le Havre* LNG terminal. The largest European LNG consumer, Spain, has five and plans construction of two new terminals. In the spring of 2009, Great Britain put in operation *Dragon* and *South Hook* LNG terminals. The Netherlands are building *Gate* LNG terminal and plan construction of *LionGas* LNG terminal.

New EU members, relatively small countries consuming not much gas, also care about terminal construction to enhance their energy security. Despite the “prejudice” of difficulty for methane carriers to pass the straits of Bosphorus and Dardanelles, countries of the Black Sea basin, such as Romania and Bulgaria, are planning construction of terminals.

The majority of LNG projects is implemented with support of LNG producers, interested in access to new markets and expansion of the existing ones. Other countries and institutions possessing the relevant experience, too, attain their interests.

Some projects (for instance, of the Baltic states) may be funded by the EU. The European Union has prioritised the Baltic Connector project, to give the Baltic states access to the EU energy networks. Estonia does not rule out implementation of a terminal project by joint efforts of the Baltic states and Finland, after construction of a gas pipeline connecting it with Estonia.

Implementation of European LNG projects is supported by the USA as well. In September, 2008, the US Trade





and Development Agency (USTDA) preliminarily agreed to provide a grant for construction of LNG admission terminals in Romania and Lithuania.<sup>1</sup>

The summary data cited in Insert “LNG projects in new EU member states and Croatia” show that **almost all European gas importing countries that have access to the sea use or plan to use their geographic location for LNG supply. Construction of LNG terminals is planned even by those EU countries that have meagre, compared to Ukraine, volumes of gas consumption, which witnesses economic expediency of such construction. There are clear prospects of LNG appearance on the new market – the Black Sea basin, that shows an upward trend.**

### Will an LNG project be implemented in Ukraine?

It seems that Ukraine alone disregards those trends and still cannot make a step closer to energy independence that may be secured by the project of an LNG terminal. Meanwhile, the concurrence is more than favourable for implementation of an LNG admission terminal construction project, namely:

- the urgent need to reduce dependence on import of Russian gas;
- the need of diversification of sources and resources of gas transportation;
- favourable time for implementation of large-scale projects employing domestic enterprises and personnel;
- lead LNG producers seek markets and are ready to invest in their construction;
- favourable time for employment of the world experience and capital.

*Naftohazbudinformatyka* LLC performed a set of activities related with development of the Concept and conduct of feasibility studies of LNG supply to Ukraine. The results of those activities prompt the following conclusions.

Comparison of the volumes of production, consumption and import of gas by separate European countries that plan construction of terminals with similar properties with Ukraine shows that to effectively diversify gas supply to Ukraine and reduce its dependence on gas imports from Russia to below 30% of the demand, Ukraine should buy up to 10 BCM of LNG a year (Table “*Volumes of production, consumption and import of gas by separate European countries planning construction of LNG terminals*”<sup>2</sup>).

### LNG PROJECTS IN NEW EU MEMBER STATES AND CROATIA

#### Romania (Constanța LNG Terminal project)

The terminal will be situated in the port of Constanța. The author of the feasibility study will be obliged to calculate the regional demand, determine the type and required capacity of the terminal and other infrastructural facilities, in particular, decide on the necessary upgrade of the national GTS, etc.<sup>3</sup>

According to a Romanian source, the value of the feasibility study may amount to €20 million.<sup>4</sup>

At the end of 2008 USTDA announced allocation of over \$1 million to preparation of the feasibility study. The grant was provided to *Romgaz S.A.* – the Romanian state gas company, one of the largest producers of gas in Europe.

#### Lithuania LNG project

The issue of LNG import has been considered since March, 2008. It was planned to build in 2010-2013 a terminal for up to 2 BCM/yr, the project value was estimated at €500 million.<sup>5</sup>

In mid-September, 2008, USTDA announced its plans to fund preparation of the terminal feasibility study under an interstate agreement between the USA and Lithuania that envisaged the allocation of a grant in the amount of \$800 thousand.<sup>6</sup>

According to the basic data, the feasibility study should examine the possibility of terminal construction for admission of 1.5-2 BCM of gas a year in one of the three proposed cities, with an option of building the terminal offshore. The feasibility study is to be completed in 2010.

A 80% share in the LNG terminal will belong to the state, the remaining 20% – to *AB Achema* (a private company – producer of nitrogenous fertilisers and chemical products).

#### Latvia

In 2006, Latvia, consuming only 1.6 BCM of Russian gas a year, examined the feasibility of creating LNG facilities, but so far, the project has not found the necessary support.<sup>7</sup>

#### Estonia

Estonia, that consumes 0.85 BCM of Russian gas a year, considers construction of an LNG terminal.

In 2008, *Ramboll Eesti AS* that belongs to the international consulting company *Ramboll Group* (engineering, construction, etc.) performed the preliminary feasibility study of construction of an LNG terminal in Estonia.<sup>8</sup>

In mid-April, 2009, *Estonian Balti Gaas* company planned to commence construction of an LNG terminal on the Pakri peninsula,<sup>9</sup> that may be included by the Estonian authorities in the list of territories protected by the state. The developers worry about possible strict environmental requirements. According to preliminary plans, the terminal will be built near the city of Paldiski on the area of 7.6 hectares.

The project of the terminal also includes plans of building a gas pipeline from Pakri to Finland to connect the country with the Baltic gas pipeline (from Russia to Germany, via the Baltic states and Poland). The gas pipelines of Estonia, Latvia and Lithuania are already interlinked.

So, implementation of the idea of the LNG terminal depends on its environmental assessment.

In late April, 2009, the Government of Estonia re-indorsed construction plans of the terminal that will reduce dependence on supply of gas from Russia.<sup>10</sup> However, the Government remains reluctant to fund the project from the budget, hoping for the EU assistance.

#### Croatia (Adria LNG Terminal)

In March, 2008, Croatia's largest energy company *Ina Industrija Nafta d.d.* announced the need of establishment of a group of foreign investors for design and construction of an LNG terminal on the Adriatic Sea coast.<sup>11</sup>

<sup>1</sup> Data of the US Department of State. – Washington, September 16, 2008; [http://www.ustda.gov/news/pressreleases/2008/europeeurasia/romania/romaniaLNG\\_091608.asp](http://www.ustda.gov/news/pressreleases/2008/europeeurasia/romania/romaniaLNG_091608.asp)

<sup>2</sup> Source: *Natural Gas information (2008 Edition)*. – International Energy Agency (IEA), OECD, September 2, 2008, p.77.

<sup>3</sup> *Romania - LNG Import Terminal Project*. – FedBizOpps.gov, November 14, 2008; [https://www.fbo.gov/index?s=opportunity&mode=form&tab=core&id=00e80a0340609954a87b1432336756ec&\\_cview=0](https://www.fbo.gov/index?s=opportunity&mode=form&tab=core&id=00e80a0340609954a87b1432336756ec&_cview=0)

<sup>4</sup> *News in Brief*. – Nine o'Clock, May 16, 2008; <http://www.nineoclock.ro/index.php?page=detalii&catégorie=business&id=20080516-512598>

<sup>5</sup> Source: *The Baltic Times*, March 26, 2008.

<sup>6</sup> *Lithuania gets U.S. funding for LNG terminal study*. – Forbes.com, September 15, 2008; <http://www.forbes.com/feeds/afx/2008/09/15/afx5423607.html>

<sup>7</sup> Zeyno Baran “*Lithuanian Energy Security: Challenges and Choices*”. – Center for Eurasian Policy, Hudson Institute, in cooperation with Center for Strategic Studies and Ministry of Foreign Affairs of the Republic of Lithuania, December 2006; <http://www.hudson.org/files/publications/LithuanianEnergySecurityDecember06.pdf>

<sup>8</sup> *RAMBOLL*. – Ministry of Foreign Affairs of Denmark, Embassy of Denmark, Tallinn, November 18, 2008; <http://www.ambtallinn.um.dk/en/menu/Energy/Partners/Ramboll>

<sup>9</sup> Jarkko Heinonen “*Estonia: LNG terminal project at Pakri Peninsula*”. – LogisticsTurku, Esmerk, April 15, 2009; <http://www.logisticsfinland.fi/logistics/bulletin.nsf>

<sup>10</sup> *Estonia: Govt supports LNG terminal project*. – Esmerk uutispalvelu, April 28, 2009; <http://www.logisticsfinland.fi/logistics/bulletin.nsf>

<sup>11</sup> *INA May Join Adria LNG Venture*. – Oil and Gas, March 12, 2008; <http://www.oilandgasinsight.com/file/62568/ina-may-join-adria-lng-venture.html>





Partners in the *Adria LNG* project: *E.ON AG* and *RWE AG* (Germany) – 31.15% and 16.69%, respectively, *OMV Gas International* (Austria) – 25.58%, *Total SA* (France) – 25.58%, *Geoplin* (Slovenia) – 1%.

Location of the terminal in the city of Omisalj on the north of the Krk Island in the Adriatic Sea<sup>12</sup> was finally decided in September, 2008.

*Main indices of the project:*

- investments – €800 million (nearly \$1.04 billion);
- capacity – 10 (initial) – 15 (expansion) BCM/yr<sup>13</sup>;
- approximate period of construction – 3 years;
- commencement of construction – end of 2009;
- commissioning – 2014;
- number of jobs created by construction – 1-1.5 thousand;
- personnel – 50-100 persons;
- handling tankers up to 265 thousand cu.m (*Qmax ships*);
- annual average turnover – 100 tankers a year.

**Poland (Swinoujscie LNG Terminal)**

In late January, 2009, the EU leadership allocated a grant to construction of the terminal in Poland in the amount of €80 million (\$105 million) for implementation of infrastructural projects of energy supply to the member states totalling €4.5 billion

*Indices of the terminal:*

- location – city of Swinoujscie on the Baltic coast in the north of Poland, close to the German border;
- tentative term of commissioning – 2013-2014;
- LNG suppliers – Qatar, Algeria, Egypt, Libya, Nigeria, Norway;
- approximate cost of terminal construction – €450 million (to be specified after the feasibility study);
- cost of the terminal connection to the Polish GTS – €30-100 million;
- cost of tankers – to \$200 million/vessel;
- required number of tankers – approx. 3;
- builders and operators – *Polskie LNG* company (established in 2007, 100% owned by *Polskie Górnictwo Naftowe I Gazownictwo S.A.*);
- terminal capacity – 2.5 (initial) – 7.5 (expansion) BCM/yr;
- tanks for LNG storage – 2 × 100 thousand cu.m;

In mid-April, 2009, *Qatargas* and *PGNiG* signed a general agreement of LNG supply from Qatar to Poland, starting from 2014, in the amount of 1 million tons a year. Deliveries will be performed by *Q-Flex* class tankers (capacity – 210-216 thousand cu.m).<sup>14</sup>

**Bulgaria**

In April, 2009, Bulgaria agreed construction of an LNG terminal with Qatar.<sup>15</sup> Egypt has been negotiated as another supplier.<sup>16</sup>

According to preliminary data, the terminal will be located in Greece, on the Aegean Sea coast.<sup>17</sup>

**Possible location of LNG terminal for Bulgaria**



**Volumes of production, consumption and import of gas by European countries planning construction of LNG terminals, as of 2007, BCM/yr**

	Production	Consumption	Import			Dependence on gas supply from Russia, %	Capacity of LNG terminal
			Total	Including from Russia	Russia's share in total imports, %		
Lithuania	-	3.70	3.70	3.70	100.0	100.0	2
Latvia	-	1.60	1.60	1.60	100.0	100.0	NA
Estonia	-	0.85	0.85	0.85	100.0	100.0	NA
Romania	11.00	16.00	5.20	4.90	94.2	31.0	To be specified by feasibility study
Croatia	3.00	3.20	0.80	0.80	100.0	25.0	10-15
Poland	6.00	16.40	10.00	6.85	68.5	42.0	2.5-7.5
Bulgaria	0.30	3.60	3.50	3.50	100.0	≈100.0	NA
Ukraine	20.00	68.00	51.00	51.00	100.0	75.0	≈5-10

Ukraine should see its LNG resource base in the first place in North African countries (Egypt, Algeria, Libya), since, *first of all*, that region is the closest among LNG producers. *Second*, analysis of the capacities of LNG producing enterprises in those countries proves the existence of spare LNG volumes and interest of those countries and owners of said enterprises in new markets (Table “*LNG production capacities in North African countries*”).

**LNG production capacities in North African countries, BCM/yr**

	Nominal	Actual		Idle		Plans of growth	
		2007	2008	2007	2008	till 2010	2010-2015
		Algeria	27.20	24.70	22.20	2.50	5.00
Egypt	16.60	13.60	13.60	3.00	3.00	+6.80	+10.40
Libya	3.20	0.76	0.53	2.44	2.67	-	+0.90
<b>Total</b>	<b>47.00</b>	<b>39.06</b>	<b>36.30</b>	<b>7.94</b>	<b>10.67</b>	<b>+12.30</b>	<b>+16.80</b>

There are three possible options of a planned LNG terminal location: Pivdennyi, Ochakiv, and Feodosiya sea ports. Each of those ports has its advantages and disadvantages.

Analysis of the properties of LNG terminals in Egyptian, Algerian and Libyan ports and Ukraine’s Black Sea ports shows that to supply LNG to Ukraine from North Africa, it is technically and economically sound to use tankers of 120-140 thousand cu.m. Such tankers could get LNG from the ports of Damietta and Idku in Egypt, Arzew El-Djedid and Béjaïa in Algeria and all new ports now built or designed in those countries.

Given the high cost of tankers, at the initial stage of implementation of an LNG supply project, it would be suffice to lease them.

In the Ukrainian conditions, a shore LNG terminal with the capacity of 10 BCM/yr looks preferable, to be built in two phases: I – construction of a terminal with the capacity of 5 BCM/yr; II – its enlargement to 10 BCM/yr.

Tentative estimates of the required capital investments are presented in Table “*Tentative estimate of capital investments...*”, (p.62).

<sup>12</sup> Igor Ilic “Croatia LNG project maybe boosted by Russia gas cut”. – CROWN Croatian World Network, January 20, 2009; <http://www.croatia.org/forum/viewtopic.php?f=24&t=1081>

<sup>13</sup> Ibid.

<sup>14</sup> Sources: *Qatargas signs new agreement with PGNiG*. – Qatargas, April 15, 2009; <http://www.qatargas.com/news.aspx?id=147154>; *Poland inks LNG deal with gas giant Qatar*. – Zawya, April 15, 2009; <http://www.zawya.com/story.cfm>

<sup>15</sup> *Bulgaria, Qatar consider building liquefied gas terminal*. – Bayt.com, April 14, 2009; <http://news.bayt.com/2009/04/14/bulgaria-qatar-consider-building-liquefied-gas-terminal>

<sup>16</sup> *Bulgaria inks deal to buy Egypt gas*. – ArabFinance, April 26, 2009; <https://www.arabfinance.com/News/newsdetails.aspx?id=137367>

<sup>17</sup> *Qatar, Bulgaria discuss LNG terminal, sign cooperation agreements*. – Business Intelligence - Middle East, April 15, 2009.



Tentative estimate of capital investments required for construction of an LNG terminal in different Ukrainian ports, million \$

Item of expenses	Ukrainian ports, specifically:					
	Ochakiv		Pivdennyi		Feodosiya	
	Cost	Note	Cost	Note	Cost	Note
1. Construction of an LNG admission terminal	750		750		750	
2. Arrangement of port infrastructure (berths, fairway, navigation, tugs, control system, deepening, etc.)	1,060	Large volume of deepening operations	195/360	Dependent on the option chosen	70	
3. Connection to Ukraine's GTS (construction of a gas metering station, compressor stations, lines, refitting of existing systems)*	40		100	Additionally requires re-equipment of Berezivka compressor station	350-460	Additionally requires construction of 1-2 compressor stations
<b>Total</b>	<b>1,850</b>		<b>1,045/1,210</b>	<b>Intense traffic, long time of demurrage</b>	<b>1,170-1,280</b>	<b>Best fit port</b>

\* Data of Ukrtransgaz State Company – <http://www.ukrtransgaz.naftogaz.com>

**The overall term of design, equipment delivery and terminal construction makes:**

- for phase one – 3.5 years;
- for phase two (complete development) – 4.5 years.

The overall term of construction of an on-shore process terminal makes: phase one – 2.5 years; complete development – 3.5 years.

For further implementation of the project, evaluation of capital investments, operating costs and, consequently, the price of natural gas after re-gasification, the feasibility study and business plan of the LNG supply to Ukraine investment project must be developed.

**The benefits of implementation of an LNG project in Ukraine may include:**

- moderate aggregate capital investments – up to \$2 billion (compared to other large-scale projects, e.g., the *White Stream* gas pipeline – \$15 billion, the Ukrainian portion of Euro 2012 – \$3-5 billion);
- no need of coordination with other transit countries, as in case of implementation of pipeline projects;
- admission of gas from alternative sources;
- flexible scheme of gas supply to consumers;
- enhancement of energy security of the country;
- employment of construction, metallurgical and other Ukrainian enterprises and organisations;
- creation of additional working places.

**Required from Ukraine:**

- a coordinated development strategy independent of the political situation; furthermore, for terminal construction, a sound company should be chosen, that has a strong position in Europe and the experience of implementation of LNG projects, capable of its management;
- consistency and predictability (of the legislation and development priorities);
- an active stand of the state, including with respect to steadfast implementation of the LNG project.

Cooperation of domestic shipbuilders with foreign partners in methane carrier building looks promising as well.

At the beginning of the world financial crisis, they often referred to the classic example of state regulation of the economy under the New Deal of the US President F.Roosevelt that made the national economy to operate effectively during the so-called Great Depression at the expense of implementation of a number of infrastructural projects. Many countries of the world tried to adopt that experience, including Ukraine. Since it has never come handy, a logical question arises: what should the scale and importance of the projects be to deserve attention of the country leadership?

Ukraine is a developing economy. It positions itself on the world market as a hi-tech country with a huge scientific and industrial potential, but despite all that, innovative ideas are implemented here with reluctance - last of all, after almost all countries employed them. It seems that the fate of the national LNG project may be the same.

An LNG terminal is certain to be built in Ukraine, maybe after 2020; there is a hope that Ukraine will be at the cutting edge, not remain a raw material appendage to the Russian federation or EU. Under a pessimistic scenario, this may occur in indefinite future.

**White Stream gas pipeline – a myth, or a reality?**

The *White Stream* gas pipeline project, under its initial name – *GUEU* (Georgia-Ukraine-EU), was inaugurated in November, 2006, at the 2<sup>nd</sup> European Energy Summit in Vienna (Austria); under the present name – in October, 2007, at the European Energy Summit in Vilnius (Lithuania).

As the route appeared, it was called “gas of the future, free from political pressure”.<sup>18</sup> The gas pipeline was designed to diversify routes of Central Asian natural gas supply to the EU countries; it presumably relied on the Azeri, Turkmen and Kazakh gas; the gas pipeline capacity was to reach: at the 1<sup>st</sup> phase – 8 BCM/yr, with future increase to 16-32 BCM/yr at the 2<sup>nd</sup> and 3<sup>rd</sup> phases, respectively.

The pipeline project was designed by engineering companies *Pipeline Systems Engineering* (London, Great Britain) and *Radon-Ishizumi* (New York, USA). At the first phase, it was to carry Caspian gas to Romania, with subsequent connection to the Trans-Caspian gas pipeline system.

<sup>18</sup> See: Mchedlidze D. Will there be a new gas pipeline? – *Obshchaya Gazeta*, No. 5, May 2006.



In 2007, *GUEU-White Stream Pipeline Co Ltd* (London), set up by the above-mentioned design companies, released two options of the gas pipeline route (Map “Possible routes of White Stream gas pipeline”).

According to the company plans, the gas pipeline is to begin as a branch from the Baku-Tbilisi-Erzurum main pipeline. In fact, it is the project’s bottleneck, since growth of supply puts on the agenda the issue of gas pipelines construction for gas delivery to Georgia, which will seriously increase the declared total value of the project (\$5 billion in 2007 prices).

It considered the following probable further routes of the pipeline:

No. 1: Georgia-Black Sea-Ukraine-Romania (length – 1,355 km, in that, across Georgia – 115 km, Ukraine (the Crimea) – 215 km);

No. 2: Georgia-Black Sea-Romania (length 1,235 km).

In January, 2008, at the EU summit in Brussels (Belgium) the idea of the gas pipeline and Ukraine’s interest in it were reported by Ukraine’s Prime Minister Yu.Tymoshenko.

Another presentation of the project by *GUEU-White Stream Pipeline Co Ltd* took place at an international energy forum on May 22, 2008, in Kyiv. This time, it presented the Ukrainian option of transportation of Caspian gas to European countries via Georgia and the Black Sea using the *White Stream* ideology (Map “Possible routes of Caspian gas supply via Georgia and Black Sea”).

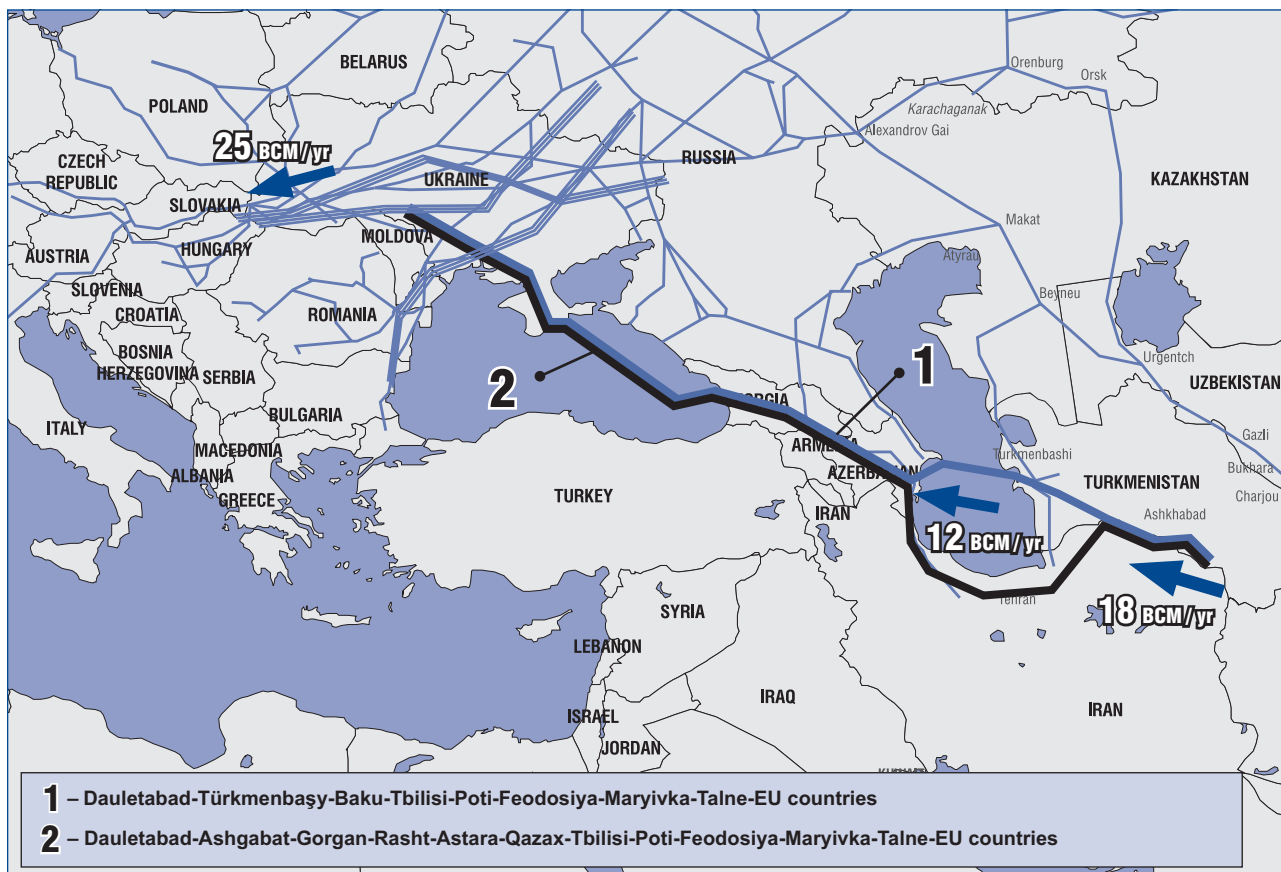
Possible routes of Caspian gas supply via Georgia and Black Sea



The Ukrainian version of the project, by contrast to that proposed by *GUEU-White Stream Pipeline Co Ltd*, cites the required costs in current prices, specifically, calculated the value of construction of pipelines:

- from gas fields in Turkmenistan to the Black Sea coast (with options: via the Caspian Sea, or bypassing it, via Iran);
- from Feodosiya to Talne, where the *White Stream* is to be connected to the Ukrainian GTS for transportation of gas from the Crimea to other European countries.

Possible routes of White Stream gas pipeline







Main indices of the Ukrainian version of the gas pipeline project (in 2008 prices):

- *route*: Turkmenistan-Caspian Sea-Azerbaijan-Georgia-Black Sea-Ukraine (Feodosiya-Talne);
- *capacity* – 30 BCM/yr;
- *length* – 3,220 km;
- *cost* – \$15 billion (in that, approximately \$5 billion – the Black Sea crossing).

The *White Stream* project was especially topical in view of growth of the world oil prices in summer 2008 (followed by its decline because of the world financial crisis) and the gas conflict between Russia and Ukraine in January, 2009.

At the beginning of April, 2009, the Minister of Energy of Georgia O.Khetaguri and the General Director of *GUEU-White Stream Pipeline Co. Ltd* R.Pirami signed a memorandum of cooperation at implementation of the *White Stream* gas pipeline construction project.<sup>19</sup>

The document reflects the parties' desire to cooperate at creation of the southern gas corridor, of interest for Georgia and the EU countries. According to the Georgian side, the project is intended to ensure Europe's energy security through diversification of energy supply routes and sources. Implementation of the project will give Georgia enhancement of its energy security, growth of the transit potential and budget revenues from gas transit.

Further documents are to be signed with the Government of Romania.

The project is viewed as an alternative to the *Nabucco* project, where Georgia also acts as a transit country.

*GUEU-White Stream Pipeline Co. Ltd* does not rule out that construction of the pipeline will commence in 2012, the first phase of the project is planned to be completed in 2015. Pre-project activities are to be funded by the EU that has allocated three grants to that purpose.

The *White Stream* was supported mainly by the US, EU and Ukraine. Azerbaijan is also interested in the project implementation – as a probable supplier of gas at EU prices and a US ally.

Russia, quite logically, opposes the project.

Romania is involved in the *Nabucco* project but is loyal to construction of the *White Stream* gas pipeline – especially if goes across its territory. But since the adjusted route bypasses the Romanian territory (it is to go across Serbia), one may expect that Romania's stand on *Nabucco* or *White Stream* projects will be more definite with time.

Timely implementation of the *White Stream* may also be affected by the designed crossing with the *Blue Stream* gas pipeline. The problem can be resolved, but this circumstance gives aces to the Russian Government, with which this needs to be negotiated.



Implementation and environmental expert examination of the project may also be delayed by the fact that part of the *White Stream* route is to go across the Russian exclusive economic zone. However, this may be counterbalanced by the passage of the large segment of the competing planned route of the *South Stream* across the exclusive economic zone of Ukraine.

It should also be noted that Georgia and Azerbaijan are similarly interested in implementation of the *Nabucco* project – much (twice) cheaper than the *White Stream*, almost negotiated by all participants.

To be sure, the future of the *Nabucco* and *White Stream* projects may be darkened by the Memorandum of supply of natural gas signed by Russia and Azerbaijan. Although it does not specify the exact volumes of delivery, it can seriously influence both projects, where Azeri export gas is viewed as the resource base at the initial stage of implementation – since *Gazprom* OJSC management repeatedly announced its readiness to buy all gas exported by Azerbaijan.

Furthermore, the attractiveness of the *White Stream* project for potential investors and participants is reduced by technical difficulties of its implementation.

**So, under the optimistic scenario, the *White Stream* project is to provide a politically safe short route for Caspian gas transportation to Ukraine and the EU. It is evident however that under equal conditions, preference will be given to *Nabucco*, while the *White Stream* will remain a “technical” project.**

**The project viability will grow in case of unanimous support (including financial) of its implementation by all lobbyist countries, i.e. international recognition of its political rationale, as was the case with construction of the Baku-Tbilisi-Ceyhan oil pipeline.** ■

<sup>19</sup> Russian gas will go to South Ossetia, bypassing Georgia. – *Korrespondent.net* internet publication, April 6, 2009, <http://korrespondent.net/business/796603>