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Theoretical and applied principles for the mechanism of sustainable development and management of economic systems formation, based on domestic and foreign specifics have been considered in the collective monograph. Specific character of mechanism of sustainable development of economic systems at the state level, sector, industry and enterprise formation has also been investigated. Mechanism of social and economic enterprises' development has been analyzed.

Collective monograph is intended for politicians, scientists, entrepreneurs, teachers, postgraduate students, students and anyone interested in the issues of formation the mechanism of effective regulation of enterprise economic activity.

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CONTENT

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ENERGY SECURITY IN UKRAINIAN GAS SECTOR: MEDIUM-TERM PRIORITIES OF INNOVATION ACTIVITY

Energy security is an attribute of national and economic security of Ukraine. The extremely high economic relevance of its strengthening is caused by the several reasons among which are: energy dependency of the monopolized import of natural gas from the Russian Federation; a high level of domestic gas consumption as per capita and per unit GDP, the economic recession of the Ukrainian gas production industry and the continuous decline of production levels. Thus, Ukraine has a high level of energy dependency from the natural gas imports - more than 50%: in 2015 import was 16.5 billion cubic meters (bcm) while the primary gas supply was 32.8 bcm. Despite that these indicators were the lowest on the modern stage of the Ukrainian history, in the future projection ensuring of energy security in this sector must also correlate with the minimization and diversification of external supplies. To reach this target benchmark crucial steps must be undertaken which allow to increase domestic supply and to reduce national demand. So, the strengthening of energy security in the gas sector is divided into three separate but closely linked areas: maximization of internal gas production; the replacement of natural gas by others fuel and energy resources; the savings of natural gas in various stages of its transformation – which correspond to the three strategic objectives (SOs) of energy security: energy independence (SO-1), energy efficiency (SO-2) and energy conservation (SO-2). Uncovered volumes of national gas interests have to cover due to its diversified imports, which is also responsible for the implementation of the first SO.

Each of these SOs is subdivided into operational objectives (OO), which subsequently disclosed through innovation priorities. Decomposition of the SOs at the operational level involves the following components:

– energy independency (SO-1) is responsible for the principles of energy self-sufficiency and liberalization, which implies the maximum possible use of national

gas potential in the domestic energy market, and prevention of gas suppliers cartel collusion. This SO will be possible due to implementation of two operational objectives: internal gas production maximization (OO-1.1) and external gas sources diversification (OO-1.2);

– energy efficiency (SO-2) includes realization such operational objectives as: substitution of natural gas by other conventional energy resources (OO-2.1) and development and deployment biogas projects (OO-2.2).

– energy conservation (SO-3) consists of two operational objectives: natural gas consumption reduction in the Ukrainian residential sector (OO-3.1) and the share of natural gas losses decreasing in the Ukrainian gas transportation system (OO-3.2) to the European levels.

Internal gas production maximization. (OO-1.1). Natural gas production amounted to 19.9 bcm in 2015 and had been less by 41% than the level of its consumption. The main reasons of gas production industry recession in Ukraine were [1, 2]:

significant depletion of existing gas wells: the most of them were operated over 50 years, the exhaustion degree accounted more than 77%, and more than 8000 wells were conserved;

critical reduction of exploration and production drilling. If in the 2001 – 2005 it was issued 75 new special permits for exploration of new gas areas, in 2006 - 2010 - only 10, and in 2011 – 2015 – 16, 3 of which were recalled. Compared to 2007, production drilling fell from 155 to 92 thousand meters in 2015 due to a shortage of investment funds and lack of prepared objects. In 2015 the special permits for gas production had 118 companies, and only 56 of them reported about its activity.

much of new opened gas deposits are small (89% reserves do not exceed 5 bcm) or/and are at significant depths (over 6 thousand meters).

Given these circumstances there is curvature of the Ukraine's energy balance, which has a high dependence from external gas supplies. However, according to P. Gozhik and E. Krizhakivsky "the problem with the gas, obviously, there would be if the state considered its extraction from the bowels as priority activity in the energy

sector of Ukraine, providing financial and the regulatory and legal bases" [3].

To overcome import dependence of natural gas is a main target of the Concept of Gas exploration industry in Ukraine to 2020 under which plans to increase national gas production up to 27 bcm by the end of strategic period, including PJSC "Ukrahazvydobuvannya" - up to 20 bcm (compared to 14.5 bcm in 2015) and private enterprises - up to 7 bcm (compared to 3.9 bcm in 2015). Simultaneously the natural gas consumption must be reduced to 30 bcm (compared to 33.8 bcm in 2015). However, Concept's objectives (opening and commissioning of new hydrocarbons plays through the substantial increasing geological exploration and development drilling wells; increasing the gas extraction coefficient through the effective use of modern technologies and equipment on the existing gas fields) are not specified on the level of innovation priorities that should serve the basis for strengthening Ukraine's energy security in the gas sector.

At the same time Ukraine is one of the oldest gas production countries (at the beginning of XX century Galicia was the one of the largest "hydrocarbon" regions in the world), that's why the majority of gas fields developed over 50 years, is largely depleted. In 1975 Ukraine reached the maximum of natural gas production at the level of 68.7 bcm. Currently, as noted in studies of The Energy Research Institute of RAS (ERI RAS), Ukraine is one of the few countries that crossed the peak of gas consumption before 2000 [4]. Despite this, the Ukrainian hydrocarbon production is cost-effective, since the gas fields have developed infrastructure, favorable climate and the landscape, while the majority of the world's giant gas fields of the traditional type are confined to the extreme regions [3].

Considering the above it is advisable to identify priority areas to achieve OO 1-1 "Maximization Of Internal Gas Production", among which are: innovative technologies of intensification of production on depleted gas fields; progressive technologies of deep drilling; innovative technologies of exploration and prospecting. Further a brief description of each of these areas are presented.

About 55 – 75% of hydrocarbons of old or so-called depleted Ukrainian deposits remain in the depths. So according to Y. Kuntsyak, annual production could

be increased to 5 - 6 bcm through the resuscitation of conserved gas wells [6]. In developed countries 30% of the gas is produced from closed wells at one time [7], instead of PJSC "Ukrgazvydobuvannya" annually loses is about 1.3 bcm of gas due to falling reservoir pressure [8].

Today there are a number of advanced technologies that allow to increase the gas extraction coefficient at exhausted deposits, among them we must consider the following.

Horizontal and multi-horizontal drilling is used to increase the useful length of the gas wells in inhomogeneous and low-permeability collectors. Testing of this technology on 10 Ukrainian gas wells allowed to get high, almost primary production rates, while the recovery period was 3 – 4 months, and the capital cost - only 30 – 35% of a new well invetstmets. [9] Using sidetracks cutting technology can revive about 4,000 of the 8,000 conserved gas wells [7].

Hydraulic fracturing is an increase of the injectivity of the gas wells by creating a highly conducted fractures in the target layer to ensure the inflow of produced gas. [10] Every year there are about 13 000 hydraulic fracturing operations in Russia, 20 000 in the US, and more than 500 in Serbia, while in Ukraine only 15 such operations were performed during the last 5 years [10]. The Concept of the gas industry development is planning to reach 80 hydraulic fracturing operations by 2020 (including only PJSC " Ukrgazvydobuvannya ") [11].

Booster compressor stations are used to provide the necessary volume of production on the gas and gas condensate fields in the conditions of constant falling of reservoir pressure [12]. There are 10 such stations in Ukraine [14] and it is planned the further application of this technology. So, PJSC "Ukrgazvydobuvannya" plans to build 19 new and reconstruct 6 existing booster compressor stations. The total investment for the implementation of these measures will amount to about 2 billion UAH [15].

In this article should be mention that there are another advanced technologies which can increase lifetime cycle of depletion gas well.

However, as Alexander Lukin considers, the depletion of traditional gas

resources was not the main reason of Ukraine's gas industry decline. It is happened due to the radically decreasing of deep drilling [16]. The main undiscovered hydrocarbon resources are located at depths of 5000 – 7000 m. For example, in the central part of the Dnieper-Donets basin 43 gas condensate and oil-gas fields have been opened at depths of over 5 km. In addition, there are productive layers in the open field at a depth of 5000 - 6000 meters, which allows to re-developing them with the use of new technologies [17]. But the use of modern innovative technologies of deep drilling requires large investments and is associated with the interaction with foreign investors and the international energy service companies.

According to the academician A. Lukin, the expected gas resources are about 5 trillion cubic meters in the Dnieper-Donets Basin, but they are located at a depth of 6 to 8 thousand meters. Such deposits can provide a powerful gas flows rate that reach 1-1.5 million cubic meters per day [18]. Now the development of the hydrocarbon potential of large and very large depths within the central part of the Dnieper-Donets Basin has already begun: in the Poltava region two super-deep wells have been drilled with a depth of more than 6.5 and 5.5 thousand meters, the initial gas flow rates of them reached up to more 1.2 million meters per day [9].

Today 172 prospective areas and 146 unopened drilling deposits are prepared for deep drilling, the expected gas resources of them are about 756.5 bcm [19]. Thus, in the case of large-scale development of the deep drilling technologies Ukraine's annual gas production can be increased by 10-15 bcm in a short time [2]. Different view A. Lukin, who believes that the development of deep hydrocarbon potential within the central part of the Dnieper-Donets basin can allow increasing natural gas production on 20-25 bcm in the coming years [18].

By the level of proven gas reserves Ukraine (604 bcm) ranks fourth place in Europe, behind the UK, Norway and the Netherlands. Initial resources explored only on 37% [21, p. 60]. So, the effective use of national resource base can not only provide long-term stable production volumes, but also increase them in the future. Experts agree that the exploration activity must be reach 500 thousand meters per year that would guarantee a steady increase proven reserves of hydrocarbons (the

criteria is 2 cm of proven reserves on a 1 cm of production) [12]. Priority areas for geological exploration must be Dnieper-Donetsk basin and shelf Black and Azov seas.

However, the Ukraine gas producing companies association called plans of rapid increase of gas production (27 bcm by 2020) unrealistic given the inadequacy of the existing organizational and economic mechanisms [21], in particular: excessive fiscal rates, which hinders investment in the development of new deposits; regulation imperfection of production-sharing agreements; a lot of bureaucracy procedures for obtaining all permits and approvals for natural gas exploration and production (in Ukraine investor spends 2-3 years to obtain all permits and approvals, whereas in developed countries this process lasts about 6 months); lack of local government interest to promote the gas industry development.

Despite the considerable difficulties most experts agree about the ability of Ukraine to provide self-sufficiency by the natural gas, but the period of implementation of these plans is 10 years. Thus, according to the Cambridge Energy Research Associates 10 billion dollars annual investments can achieve a positive result: production of traditional gas will increase to 28 bcm, and shale gas - up to 21 bcm in 2025, if the first steps would be done before 2017 [21]. DTEK managers also have optimistic gas production prospects who believe that "Ukraine can provide themselves with their own gas for 7-10 years using the correct national policy" and PJSC "Naftohazvydobuvannya" will increase its own gas production to 6 bcm by 2020 (compared to 750 mcm in 2014) [22].

Not only the self-sufficiency, but also diversify of external gas supplies (OO 1-2) become a significant value to form of a national model energy security, which together establish national energy independency in gas sector.

Ukraine depends from natural gas external supplies. In 2012 the import of natural gas was 32.9 bcm and it ranked the 11th place among the largest gas importers in the world, while the national level of energy dependency from gas import was 62%. In 2015 the imports was reduced to 16.5 bcm (through conservation of gas power stations, lower temperature conditions in the social sector, reduction of

industrial activities, etc.), and its place in this ranking fell by only 1 position, while energy dependency from external gas supplies was 49%.

At the same time Ukrainian gas transportation system is focused on Russian gas import and transit. There are 7 entry points on the Russia-Ukraine border, and also there are 2 entry points that allow to supply Russian gas from Belarus [36]. So, Russian Federation has monopoly impact on Ukrainian gas market. In 2012 the share of Russian gas in total Ukrainian import amounted to 99.8%, while in 2015 the corresponding value was only 37%, and in 2016 – 0. However, further operation of the national gas transportation system in reverse mode requires solving technical, organizational, economic and regulatory issues. Therefore, to guarantee the external gas supply diversity in Ukraine we must reconstruct and modernize national gas transportation infrastructure and choose innovation priorities of energy security on the medium term. Among them we must consider construction of a floating storage and regasification terminal (LNG-terminal) and building gas interconnectors on the EU-border.

Access to the sea routes open the possibilities to liquefied natural gas (LNG) supply in Ukraine. Back in 2012 Ukraine had an intention to build its own LNG-terminals to supply Caspian gas. However, political volatility, economic recession, the uncertainty with suppliers and investors didn't allow to implement these plans. Currently, the American company Frontera Resources and International Construction Consulting again plans to build a floating LNG-terminal in Ukraine. It is expected that LNG will be supplied by tankers across the Black Sea from the southern gas export-oriented countries to the Odessa region. In particular, the US company Frontera Resources plans to import LNG from its own deposits in Georgia - proved natural gas reserves in this country is about 300 bcm [23]. The design capacity of the floating LNG terminal is expected at the level of 5 bcm per year, the project period is 3 years (according to different estimates from 8 to 36 months). So it should be seen as innovative priority for the strengthening energy security in the medium period. To construction this plant it is necessary to attract $ 600-700 million private investments [24], while the average transport costs to supply it in liquid form added to the natural

gas spot price is about $ 150 per 1 thousand cubic meters [4].

Main barriers related to the implementation of this priority are linked to the political and economic spheres. Among them are:

- the passage of LNG-tankers through the Turkish straits Bosporus and Dardanelle. Experts mentioned that this barrier is purely politician: firstly, provided that Ukrainian LNG-terminal will operate at 100% load, the number of tankers that will pass through the straits will be up to 60 units per year (that's less than 0.05 % of total traffic through them), and secondly, under current agreements, tankers longer than 250 meters must be provided by a two special ships that slow the passage of others on 2 minutes. So, workload of Turkish straits will increase only on 2 hours per year.

- the accessability of the nearest LNG-suppliers. Currently, a limited number of the largest gas production countries has LNG-capacity. The closest LNG-exporters are Algeria, Equatorial Guinea, Nigeria. Azerbaijan and Georgia also plan to build their own LNG-terminals, but the project period of them is nearly by 4–6 years and their construction requires substantial investment [24].

Thus, the innovation priorities of the LNG-terminal construction is considered to be merely politician and aimed to enhance national security and economic sovereignty of Ukraine.

Another way to diversify external gas supply is import through the existing Ukrainian gas transportation system (GTS) from Europe in the reverse mode. By the experts opinion, reverse gas is seen as the most priority direction of diversification in the short term [25]. Currently throughput capacity of Ukraine's GTS is 142 bcm, while its workload was about 37% in 2015. After the first two branches of Nord Stream have been built 64% export of Russian gas can be exported to Europe bypassing Ukraine [26]. Despite the release of large capacity, there are some difficulties in the operation of Ukraine's GTS in reverse mode. These constraints include the following [26, 27]:

1) Russia is a major European gas exporter, and the reverse supplies expansion to Ukraine would mean re-export Russian gas;

2) compressor stations and automatic dispatch control designed for gas flow in a unilateral direction;

3) the emergence of "gas roundabouts", which means fixing at measuring stations on Ukraine's border physical movement of Russian gas and its re-import into the territory of Ukraine;

4) internal reconstruction Ukraine's GTS for gas movement in west-east direction;

5) some European GTS operators partially owned by Gazprom;

6) the vulnerability of Ukrainian consumers during a peak consumption period;

7) the parallel using of gas pipelines to transit Russian gas to the EU.

In such circumstances, reverse natural gas supplies from Europe did not solve the problem of monopoly dependency from one importer because Russia has a powerful effect on actors not only Ukrainian, but also European gas markets.

However, it is believed diversification of gas supplies to Ukraine is possible based on European efforts to overcome the impact of Russia's Gazprom on the EU gas market. Currently, European countries are interested in liberalization of relations in the gas sphere through the creation of a European regional gas center of transportation and distribution. Target model of European gas market is actively promoted, which suggests that the entire EU territory will be divided into several connected areas based on a spot gas trading scheme (so called "input-output" zones). Formation of a new zone will be based on the follow main principles: the first one is the presence of at least three gas entry points, and second one is the total capacity of the gas market must be at least 20 bcm [28].

Seeking to be part of the European gas market, Ukraine can join to one of them. Probably it will be Polish virtual trading platform which will bring together markets of Slovakia, the Czech Republic, and the Baltic States. Promotes Poland as the center of European gas trade zone several reasons, which are :

1) commissioning its own permanent LNG-terminal in the Swinoujscie (Baltic Sea);

2) opening "blue fuel" platform at the Warsaw Stock Exchange.

The concept of gas imports diversification, developed by LLC "Naftohazbudinformatyka", is based on the Ukrainian underground gas storage, Polish gas hub in Swinoujscie and the new proposed interconnectors Poland-Ukraine and Poland-Germany. As the experts consider, Polish path is critical for the natural gas supplies diversification to Ukraine, because the pipeline will deliver gas from German and Netherlands virtual trading platforms (NCG, Gaspool and TTF) and Polish LNG-terminal [25]. The implementation of this priority direction will include the construction of 99.3 km length and 8 bcm capacity alternative gas interconnector, bypassing the Russian gas transit. Commercial operation of this interconnector will be possible in 2020 [29].

Union of Ukrainian and Polish gas transportation systems will provide the opportunity to increase gas imports to Ukraine from Europe through the Polish territory and allow to store European gas in Ukrainian underground gas storages. The capacity between Poland and Ukraine will be 8 bcm per year (forward direction) and from Ukraine to Poland - 7 bcm per year (reverse direction). The estimated cost of construction in Ukraine is $245 million [30].

Energy efficiency (SO-2) includes the implementation of the two operational objectives for structural rationalization of the national energy balance and substitution of natural gas by other types of renewable gas resources. SO-2 will require product innovations by setting two operational objectives: substitution of natural gas by other conventional energy resources (OO-2.1) and development and deployment biogas projects (OO-2.2).

Ukrainian energy balance focused on consumption of imported sources, while the own energy resources remain untapped. Particularly Ukraine has huge coal potential. Current reserves-to-production ratio of coal and lignite in Ukraine is more than 890 years, compared to 35 years of the same indicator for natural gas. Given the above, the energy security model in gas sector of Ukraine must aimed to replacing natural gas with coal potential. This OO-2.1 includes two innovation priorities, which are: implementation of coal gasification projects of thin and super-thin coal seams, and the development of coal-water fuel production from hard coal and lignite for the

needs of CHP and municipal boilers.

As considered, the coal gasification projects development in Ukraine could increase annual domestic coal consumption by 10 million tons, which will be used to receive 4-6 bcm per year of synthesis gas [31, 32]. In 2015 Ukraine and Australia signed a Memorandum of Understanding, which is a beginning of a joint project of undergrounded coal gasification. The work will be conducted by the Australian company Linc Energy and Bond Bros Contracting and Ministry of Energy and Coal Industry of Ukraine [32]. Plants for the production of synthesis gas from coal in Ukraine expected to build near the chemical plants as this will ensure the gas sales, as it could not be used in GTS due to the difference in chemical composition with a natural methane gas [33].

Today the successful application experience of advanced coal gasification technologies is limited. So we know that success has made the South African company Sasol, which uses process Koppers-Totzek for gasification sub-bituminous coal and production from syngas the fertilizers and motor fuels [31]. However, the methanation processes of syngas are not fully developed, requiring scientific search for the implementation of this innovative priority in Ukraine to substitute natural gas.

In the medium term projects of coal-water mix production from coal and lignite are more attractive, which can be used for the needs of gas power plants, CHP and municipal boilers. In Ukraine, the replacement of natural gas by water-coal mix was announced in 2012. It was planned to take $ 3.65 billion loan from the State Development Bank of China to gasification and coal-water mix production and to reconstruct 4 Ukrainian CHPs – Severodonetsk, Nikolayev, Simferopol and Kryvorizka [33]. Now, despite the change of target orientation of Chinese loans, GC "Severodonetsk CHP" will continue to support idea of coal-water mix reconstruction. Current stage of its realization consists of land selection for line enrichment construction of the "Melnikova mine" coal (Lisichansk), the coal-water mix is planned to transport by the pipeline that specially should be built from the mine to CHP. Foreign experience of these projects – in Russia, China and the US – proves the ability of coal-water mix technology to produce cheap electricity and heat, as well as

the environmental impact reduction compared to the traditional coal combustion. In addition, Ukraine already has its own experience of building small-scaled projects of the coal-water mix production. For example, in 2012 this technology implemented in in Svérdlovsk (Luhansk region): capacity of the gas burner was 1.2 Gcal per hour with investment was about $3.5 million, annual coal-water mix consumption was 850 thousand tons and cost of heat production was decreased by 28%.

Extraordinary interest for strengthening energy security in the gas sector of Ukraine belongs to the biogas, including landfill gas production. The mass distribution of renewable energy sources is an actual trend of modern society which directs its towards to global climate goals. The use of biogas as a substitute for natural gas is a type of product innovations that allows to do that. The main areas of biogas consumption is its combustion in biogas power plants and CHP for the electricity and heat production, and also the production of purified biomethane for the traditional gas pipelines. In 2014 the National Action Plan for Renewable Energy was approved under which it had been planned to replace the 7.2 bcm of natural gas per year on the bioenergy. In Ukraine 4 million hectares of land not used for traditional agriculture, so it planned to develop the production of perennial energy crops [34].

In Ukraine, there are few examples of the successfully production of electricity from the biogas power plants, which are now operating on 2 pig and 2 cattle farms with a total installed power capacity of 2 MW and also more than 5 are under construction. Experts of Ukrainian Bioenergy Association assessed theoretical potential of biogas between 2.6 and 18 bcm of natural gas per year (in the case of 50% of arable land is used for maize silage cultivation), whereas the economic potential of biogas in calorific value of natural gas is estimated at 1 bcm per year and could be reached by 2020. The payback period of biogas projects is about 6-8 years and depends on the national green tariffs.

Ukraine also has significant landfill gas resources. There are about 1000 landfills of municipal solid waste and the environmental pollution problem of landfills methane is one of the most critical in the national economy. The annual landfill gas production can be about 400 million cubic meters per year on the 90

largest landfills. Currently there are already several examples of biogas projects at landfills in Yalta, Alushta, Lviv, Mariupol, Kremenchug, Lugansk, Kiev, but the problem of solid waste disposal is not completely solved.

According to the estimates of Renewable Energy Resources Association "Alternative" capital expenditures per 1 kW of installed biogas power plant capacity will be € 2500. Thus, the minimum investments size, in biogas power plant of 500 kW capacity, is about € 1.25 million, while the production cost of 1 thousand cubic meters biogas (after post-treatment) will be about € 100 [34] that in the conditions of constant spot gas prices growth in Europe is economically acceptable.

Therefore, the biogas technologies development and deployment will significantly contribute to energy efficiency in Ukraine. It must be considered as a form alternative gas fuel resource (stimulating the electricity production from biogas and biomethane production for injection into the pipeline and for the fueling vehicles), which provides the opportunity to cover peak loads in the national grid-system, promotes the creation of new jobs and the local economy.

Energy conservation is another area of ensuring energy security in Ukraine's gas sector. SO-3 involves the following operational goals: gas consumption reduction in the Ukrainian residential sector (OO-3.1) and decreasing of the gas losses share in the Ukrainian GTS (OO-3.2) down to the European levels.

Over the past 10 years, gas consumption in all sectors of the national economy halved and only a population had a stable its consumption [35]. In 2014, when gas prices started to rise, the residential gas consumption decreased by 11%, and in 2015 decreasing rate had been 25% by population (11.3 bcm), and 17% by CTV (5.9 bcm) compared to 2014 [36].

In 2016 the Concept of implementation of sustainable financing mechanisms for energy efficiency measures (the creation of an Energy Efficiency Fund) was approved, according to which annual gas economy for heating needs amounted to 11.4 bcm in the case of reaching the EU level of gas expenditure. This potential includes buildings thermal rehabilitation up to 7.3 bcm, the replacement of individual boilers up to 1.7 bcm, boiler modernization up to 1.1 bcm, heating network upgrades

up to 1.3 bcm [35]. Therefore, each of the above areas can be considered as an innovative priority. Experts agree with the conclusions that buildings thermomodernization is a highly capital-intensive activity which is costs from $ 60. $ 80 per square meter (estimated according to [37, 38]) and can take 15 - 20 years [37]. The annual effect of the implementation of this measure amount to 1.5 bcm of natural gas savings (according to the Concept [35]). Among the ways of thermomodernization are the following [39]:

• protecting constructions insulation (external walls, attic floors, ceilings over passages in-house, etc.),

• installation of individual heat points with weather control systems;

• upgrading internal heating and hot water supply networks;

• installation of thermostatic radiator on all heaters in the room;

• heat energy metering organizing in the apartments.

Reducing the share of natural gas losses in the Ukraine's GTS to the EU-level. In 2015 domestic gas consumption decreased by 8.8 bcm in compared to 2014 (from 42.6 to 33.8 bcm, 21%), but in-process losses for its production and transportation remained almost unchanged: 3.3 bcm in 2015 compared to 3 6 bcm in 2014 [36]. On January the 1st of 2015 gas pipeline length is 38,046 km, including main gas pipelines - 22,202 km, gas pipeline branching - 13,461 km and gas distribution pipelines - 2383 km [36]. The real state of the national GTS is outdated, about 3200 km of gas distribution pipelines and over 5,500 gas control points are disrepaired [40]. While in Eastern Europe generally in-process losses does not exceed 2.5% [40], in the Ukraine in fact they have already reached 9.8% in 2015 (according to JSC "Ukrtransgaz" [36]). Thus, the potential natural gas savings by reducing the share of in-process gas losses to the European level can be up to 2.5 bcm. According to the Concept implementation mechanisms of stable funding for energy efficiency through the modernization of gas networks is possible to decrease of 1.3 bcm of it [35]. Thus, technological innovation and priority can be defined as follows.

The implementation of new technologies and equipment to the Ukrainian gas transport systems is formed by three components [40]:

1) the state of the network - technical losses related to the gas leaks in the networking, technological features of equipment to lower pressure (working waste valves, etc.), prevention, new connections and emergency situations;

2) the needs of distribution companies - technical losses for heating industrial buildings in the cold period;

3) commercial losses - accounting errors, the inability to bring gas volume to standard conditions to household appliances accounting, inaccurate measurable equipment, its wear out. In addition, they include gas theft and losses from illegal connection to the gas system and so on.

Complete modernization of networks and facilities allows to deduce Ukrainian gas transportation system to the level of European standards. Hence the annual investment will amount to $ 7 billion, which would reduce gas losses to the accepted level in Europe, the percentage of emergency networks close to 0, and their degree of wearout will be displayed at acceptable rates [40].

Therefore, identification of strategic goals and innovation priorities leads to the conclusion that Ukraine has a real prospect to completely abandon of Russian gas consumption and become a full member of the European gas market. However, the implementation of our gas potential will require changes stiff organizational and economic mechanisms for the national gas market, which should contribute to the fruitful cooperation with both domestic and foreign investors.

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