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The World oil market influence on gas market in Latvia: technical and commercial aspects

Promotional Work

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Summary

The aim of the promotional work is to assess world oil market influence on gas market in Latvia. In particular, to analyze energy market and, especially, gas market trends and changes during last decade starting with situation in gas supply in Latvia soon after Latvia had regained independence. Focus will be made both, on gas supply chain technical and economic conditions. Particular attention in the thesis is paid to analysis of gas market in Latvia and its changes, privatization issues, development of tariffs and gas pricing, technical modernization of gas supply system. Emphasize is made on practical implementation of reorganization and modernization measures related to gas supply system and gas market development. In work it is analyzed and explained how and why joint stock company "Latvijas Gaze" from almost bankrupted company have become a flourishing company, and natural gas- the most preferred fuel in Latvia.

Promocijas darba mērķis ir novērtēt pasaules naftas tirgus ietekmi uz gāzes tirgu Latvijā, sevišķu uzmanību pievēršot gāzes tirgus attīstības tendencēm un izmaiņām pēdējo desmit gadu laikā, sākot ar situāciju gāzes apgādē drīz pēc neatkarības atgūšanas. Darbā tiek analizēti gāzes apgādes sistēmas attīstības tehniskie un ekonomiskie aspekti, īpašu vērību pievēršot gāzes tirgus Latvijā analīzei un izmaiņām tajā, privatizācijas jautājumiem, gāzes tarifu un cenu attīstībai, gāzes apgādes sistēmas tehniskajai modernizācijai.
Galvenā vērība darbā tiek pievērsta reorganizācijas un modernizācijas pasākumu izvēlei un praktiskās ieviešanas analīzei. Darbā ir analizēts un pamatots kā un kādēļ no praktiski bankrotējušas kompānijas akciju sabiedrība "Latvijas Gāze" ir kļuvusi par plaukstošu uzņēmumu un dabasgāze - par visnozīmīgāko kurināmo Latvijā.

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Introduction

In the mission statement of European Commission Directorate General of Energy and Transport it is stated [1]: "Energy and transport are at the heart of European policy and have a considerable impact on everyday life of citizens." At present actions in EU in the field of energy is based on the Commission document: The green Paper " Towards a European strategy for the security of energy supply" [2] and this fact shows that reliable energy supply for all citizens of EU is the key issue at the particular moment. Pursuant to the Directive of security of natural gas supply [3] the appropriate measures in cooperation with another EU member state to achieve the security of supply standards using gas storage facilities located within that other EU member state is highly recommended.

Natural gas, which is regarded as the preferred fuel for electricity production in European Union, is becoming increasingly important source of energy. Europe is in relatively strong position as regards gas supplies, as it has significant reserves of its own and 70%-80% of world reserves are within the European market's economic reach [4].

The problems of natural gas supply system in Latvia had attracted attention of several scientists, in particular, A. Davis, E. Dzelzitis, J. Ekmanis, I. Kudreņickis, M. Gedrovics, A. Kreslins, A. Magidenko, I. Platais, P. Sipkovs, D. Turjajs, V. Zebergs, N. Zeltiņš and others. However, no research has been performed concerning problems of possible gas market opening and liberalization and very limited concerning privatization of gas branch.

The aim of the promotional work is to assess world oil market influence on gas market in Latvia. In particular, to analyze energy market and, especially, gas market trends and changes during last decade starting with situation in gas supply in Latvia soon after Latvia had regained independence. Focus will be made both, on gas supply chain technical and economic conditions.

Particular attention in the thesis is paid to:

- analysis of gas market in Latvia and its changes;
- privatization issues;
- development of tariffs and gas pricing;
- technical modernization of gas supply system.

Since the author of these thesis was privileged to be part of the team that reorganize and modernize Latvian gas supply system the emphasize will be made on practical implementation of reorganization and modernization measures related to gas supply system and gas market development. In work it is analyzed and explained how and why joint stock company "Latvijas Gaze" from almost bankrupted company have become a flourishing company, and natural gas- the most preferred fuel.

In addition, issues of gas market opening and liberalization in Latvia is analyzed, as well as options of incorporation of Latvian gas supply system into European gas supply network and options of increasing of regional gas supply safety by utilization of existing and potential underground gas storages in Latvia.

All kind of analysis is based on practical examples, actions that are implemented and conditions after implementation assessed.

The results of the promotional work are used for preparation of normative documents of national level and the gas branch and incorporated into programs for engineers and masters studies of department of Heat, Gas and Water Technologies of Riga Technical University.

1. World energy market and gas supply system in Latvia in 90s

1.1. Gas market as part of world energy market

Natural gas accounts for 21% of global energy supply [5] with slightly higher proportions in the relatively mature markets of North America and Europe. Rapid growth since 2000 is expected to moderate in the second half of the decade, but in the next five years, global gas demand is projected to increase to 3.2 trillion cubic meters, or 2.4% per year. Even if high gas prices persist, a decrease in growth is only likely to be felt after 2010.

As the world market for natural gas is fragmented in different regional markets, it is not possible to talk about a world price for natural gas. Although there is a market liberalization trend all over the world, in many countries natural gas markets are still highly regulated. As a result of different degrees of market regulation, natural gas prices differ among countries. In North America, for example, where the market is highly liberalized, prices are very competitive and respond to demand and supply forces. After liberalization, natural gas prices have declined significantly. On the contrary, in the Russian Federation, where there is a clear monopoly, domestic prices are kept artificially low while gas is sold in foreign markets at higher prices in order to recover loses. In Europe, sales price for natural gas is most often based on competition with alternative fuels [6].

Natural gas prices may be measured at different stages of the supply chain. At the beginning, there is the wellhead price. Prices are also measured for different end-user groups as residential, commercial, industrial consumer or electric utilities. Prices at the wellhead show high volatility depending on weather and different market factors. Increasing efficiencies in transport, storage and delivery allow for consumers to reduce the impact of price volatility.

In general, the main components of natural gas price are:

- wellhead price (the cost of natural gas itself or commodity cost)
- long-distance transportation cost
- local distribution cost.

According to EIA, wellhead price represented 34% of residential natural gas price, while transport accounted for 19% and distribution to customers 47%. The largest share of the final price is made up by distribution costs. As most large industrial and commercial gas users tend to buy gas from producers or market makers, they reduce their price considerably [7].

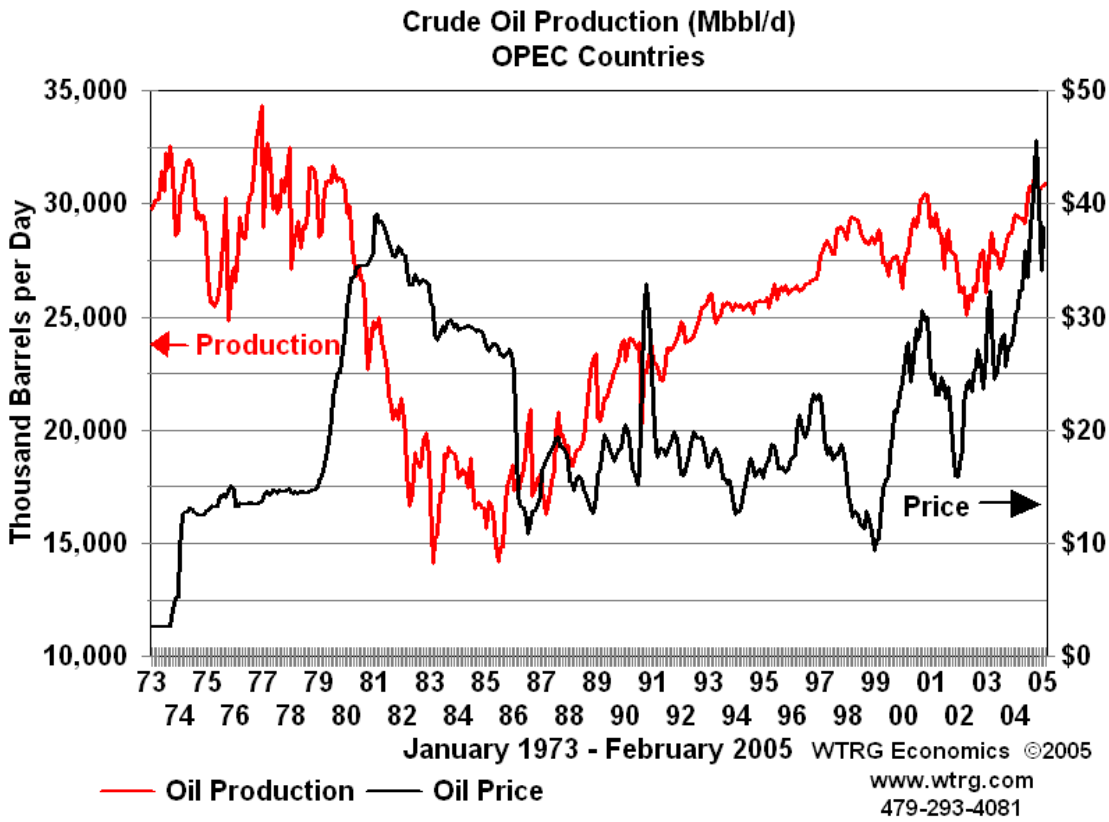
The major demand factors are weather and economic activity. Due to the importance of the weather factor, natural gas demand is highly seasonal. Other forces affecting demand are population changes and natural gas user trends. Changes in legislation concerning air pollution control may lead to increasing demand for this clean fuel. Supply factors are transport availability and accessibility as well as the physical amount of natural gas being produced and the level of stocks.

Natural gas competes with other sources of energy as oil, electricity or coal. Natural gas price is particularly pegged to that of oil, since oil is natural gas closest substitute and supply of oil and natural gas are closely linked.

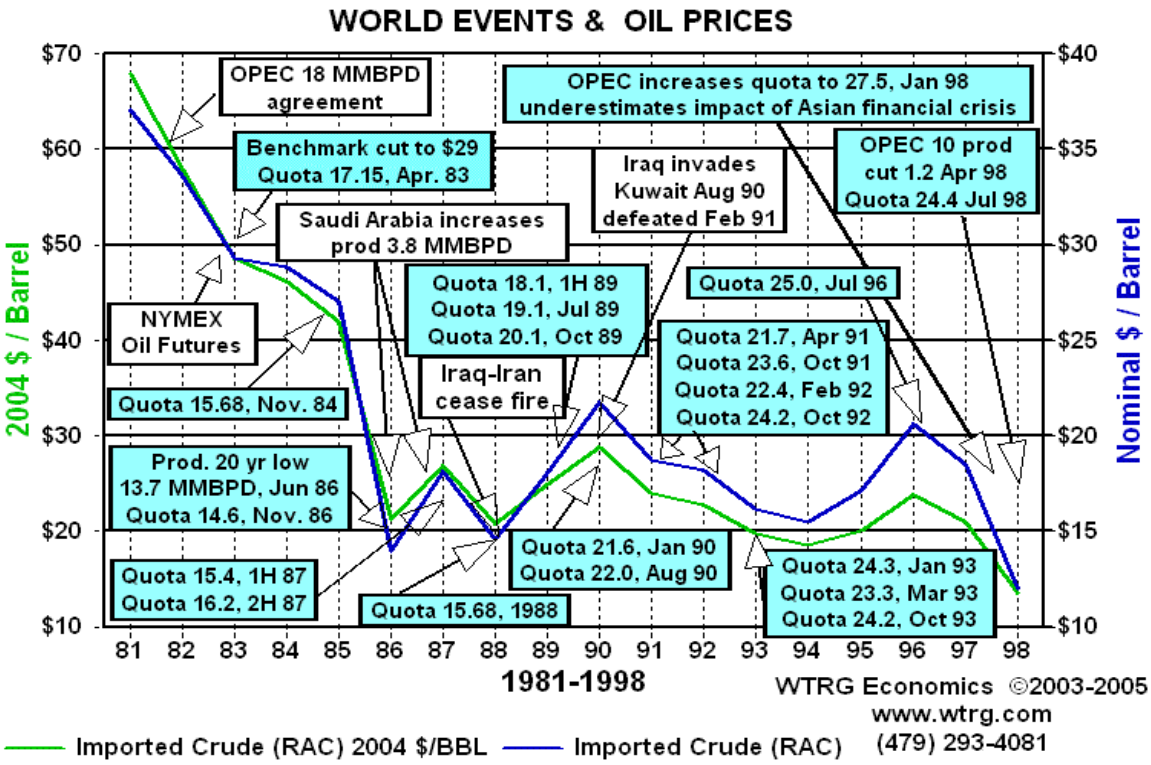
Like most commodities, natural gas prices are cyclical. Their increase as a result of higher demand encourages exploration and drilling (as it happened in 2000).

Although it takes some time for the production industry to respond to a price signal, once production increases prices tend to fall. However, market fundamentals indicate that in the future natural gas prices may not fall to the low levels of the past years [8].

Picture 1.1.



Crude oil prices behave much as any other commodity with wide price swings in times of shortage or oversupply. The crude oil price cycle may extend over several years responding to changes in demand as well as OPEC and non-OPEC supply.



Picture 1.2.

The need for energy in the world is increasing dramatically. Primary energy consumption rose from 3862.0 million tons of oil equivalent (Mtoe) in 1965 to 8883.8 in 1999 and 9124.8 in 2001 according to the BP Amoco statistical review for commercially traded fuels (wood, peat and animal waste excluded) [9].

According to International Energy Outlook 2002 produced by the Energy Information Administration of US Department of Energy as an annual projection of international energy demand, by 2020 there will be 60% growth in the global energy consumption as compared with 1999 [10]. Oil is expected to remain the world's dominant source of energy, accounting for about 40% of all energy consumption. Coal is projected to account for a shrinking portion of energy use worldwide. In 1999 coal provided 22% of the world primary energy consumption, down from 27% in 1985, and this percentage is expected to fall to 20 % by 2020. Natural gas remains the fastest growing component of the world energy market. Gas use is projected to nearly double over the next two decades, and its share in the total energy consumption is expected to increase from 23% in 1999 to 28 % in 2020. Much of the projected growth in the natural gas consumption is due to demands of new efficient natural gas fuelled power plants. Nuclear power capacity is expected to stabilize, with a boost coming from developing countries. Nuclear capacity in the industrialized world will continue to decline, but at a slower rate than predicted earlier. In the renewable energy use 53% increase by 2020 with regard to the level of 1999, but its share in the total world energy market is expected to fall from 9% to 8% by 2020.

The world energy market is undergoing permanent changes depending on new technology development, price fluctuations and other reasons, one of the most important being clean environment concerns of highly industrialized nations.

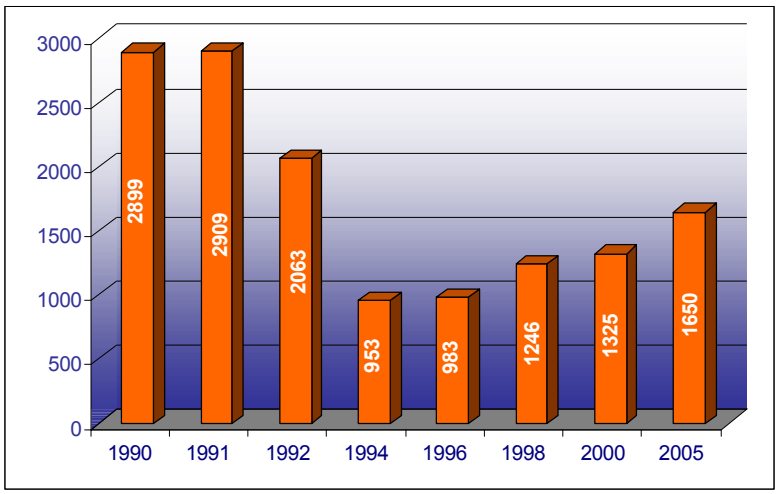
The global trend to replace traditional fossil fuels such as coal and oil with clean gas has been caused largely by heightened environmental concerns, and international commitments to

comply with noxious emission limits. The physical and combustion characteristics of natural gas are able to respond to these concerns, thus providing highly industrialized nations in particular with a means to meet the requirements of international environmental agreements. The use of natural gas also includes the important advantage of high efficiency in gas-to-electricity conversion, a factor, which is central to developing nations. Both the above reasons have created a new demand sector for natural gas, which is reflected in the substantial growth in the internationally traded gas over the last decade.

1.2. Natural gas system in Latvia: history and status in mid of 90s

The first natural gas supplies to Latvia were started in the year 1962 when the gas pipeline was built from Dashava in Ukraine. Gas supply system in Latvia was projected and created as a component of a unified Soviet Union gas supply system, in which an important role was played by Incukalns Underground Gas Storage (hereinafter – Incukalns UGS), which started its operation in 1968 and was projected as a gas supply seasonal regulator of regional significance [11].

After Latvia regained independence economics experienced rapid changes. In connection with the insufficient work efficiency and quality upon extraordinary rapid growth of power resource prices, all major industrial companies actually ceased to exist in Latvia, and it materially influenced the natural gas consumption in Latvia. In order to retain the gas infrastructure, a decision was made to combine several gas supply companies being under different guidance and establish a state company "Latvijas Gāze", which at the end of 1993 was transformed to a state stock company, which performed purchase, transmission, storage, distribution and sales of natural gas in the whole territory of Latvia.



Picture 1.3. Consumption of natural gas in Latvia (million m^3)

As essential feature of the Soviet gas supply system and therefore, also Latvian, have to be mentioned the emphasized importance of the scale of development, neglecting efficiency of operation, metering and quality of construction because administratively determined gas price was very low. Some gas pipeline sections and equipment constructed in the early 60s had to be replaced. A major problem was reconstruction of compressor equipment at Incukalns UGS. Also the systems of distribution pipelines constructed according to the USSR construction norms did not correspond to the requirements of international standards. Gas consumption metering equipment did not ensure exact control of the volume of purchased and sold gas. There were no gas meters in apartments [12].

In 1991, Latvia consumed 2909.4 million m^3 of natural gas, but due to increase of gas purchase prices in the next two years from 17 Russian Roubles to 83 USD per 1000 m^3, which, given the exchange rate of those times, is almost 300 times more, fall of industry and availability of cheap mazut in the market, the gas consumption rapidly decreased and in 1994 reached the minimum – 953 million m^3, which was only 16.9%[13] of the total balance of primary power resources consumption. The increase of natural gas price was a reason for its replacement with other fuels. The sales of natural gas in Latvia highly depend on its competitiveness with heavy fuel oil. The condition was even more complicated by the fact that in connection with the price jump consumers were unable to make settlements for gas and in 1993 on average only 30% paid for the received gas. The fact that natural gas prices for different groups of customers were not cost based and were not taking into consideration price of competitive fuels even worsen situation.

Table 1.1. Natural gas prices for different groups of customers (LVL/ 1000m3)[14]

Customer	01.10.93	01.08.94	01.01.95	01.05.95
RESIDENTIAL				
With gas meter	64.0	64.0	64.0	85.0
Without gas meter (LVL/months/person)				
With stove &centralized warm water	0.52	0.52	0.52	0.68
With stove only	0.70	0.70	0.70	0.94
With stove& flowing water heating system	1.06	1.06	1.06	1.40
INDUSTRIAL & COMMERCIAL				
Without prepayment	64.0	60.0	60.0	60.0
With prepayment				
Cons>100 mio Nm3	64.0	60.0	52.0	52.0
Cons 50-100 mio Nm3	64.0	60.0	56.0	56.0
Cons <50 mio Nm3	64.0	60.0	58.0	58.0

Meanwhile, in such circumstances the consumers requested precise recording of consumed gas and, in order to meet this requirement, it was necessary to buy and install gas meters actually for all consumers [15]. The state joint stock company “Latvijas Gāze” had only one option – to take loans:

- for settlement of payment to gas supplier;
- for crediting of consumers that could not pay for consumed gas;
- for purchase of gas meters;
- for urgent repair and modernization works, among the most important urgent reconstruction of compressor facility of Incukalns UGS.

In 1994, the net sales of the state joint stock company “Latvijas Gāze” was only 70.1 million LVL, whereas payables reached 48.6 million LVL, and the company’s long-term

loans from credit institutions - 20.5 million LVL (World Bank loan, Japan EXIM and ERAB), and short-term G-24 loan of 7.7 million LVL [16]. During the next couple of years it was forecasted that the company would become insolvent and subsequently go bankrupt.

In 1995 the joint stock company "Latvijas Gāze" under privatization was a horizontally integrated company with complex structure and many branch offices**.** The number of Company's employees reached 3387 employees.

Latvia receives natural gas, which is supplied in summer months, through pipelines only from Russia. At this time the gas, which is not necessary for final consumers, is pumped in Incukalns UGS. Whereas, in winter months Latvian consumers receive natural gas solely from the storage and Latvia is the only country in the EU, which does not receive gas from the supplier in winter months. In winter months, from Incukalns UGS through the same pipelines, by which the gas was supplied, it is delivered also to Western regions of Russia and also to Estonia through a pipeline, which connects Latvia and Estonia.

The Baltic gas supply system is not connected with the European Union's gas supply system, and Russia is the one that supplies gas to all the Baltic States. The Latvian gas supply system is connected solely with the Estonian and Lithuanian gas supply systems.

Picture 1.4. Gas network of the Baltic States

The gas networks of the Baltic States are connected solely with each other and with the Russian gas supply system, and they are not directly linked to the total gas system of other EU member countries.
The Latvian natural gas supply specifics is connected with the use of Incukalns UGS in autumn – winter period and there have been no other gas supply sources during this period so far, which actually makes it impossible to make gas market liberalization in Latvia.

Therefore, Baltic States can be classified as an isolated market.

The stability of natural gas supply in Latvia is guaranteed by Incukalns Underground Gas Storage. The total volume of the storage is 4.4 BCM, and active volume 2.3 BCM. There are unique geological conditions for creation of the system of natural underground gas storages in Latvia in the future with an active total volume of up to 50 BCM.

The existence of beneficial geological conditions in Latvia was proved once again by feasibility study performed by Baltic Energy Corporation and CMS Gas Transmission and Storage Company (USA) in 1997 [17]. These conditions can enhance not only the development of the gas supply system around the Baltic Sea, but also promote the improvement of gas supply reliability for the whole Europe.

Latvia could become a major seasonal regulator of natural gas for Western region of Russia and for Baltic Sea countries: Lithuania, Estonia, Finland, and Sweden. By integration of Latvian underground gas storage system in joint Russian - European gas transmission system unevenness of winter consumption for European countries partly can be covered [18].

To utilize the potential of Latvian underground storages construction of new transmission pipelines is required [19]. The possibilities of the integration of Baltic gas systems in Nordic and Western European gas pipeline systems more in detail were considered within Baltic Gas Study [20] financed by PHARE. This study was performed by Danish Oil and Gas Company DONG and PLE from Germany. Within the scope of the study the connection of Estonian and Finnish, connection of Lithuanian and Polish gas pipeline systems and Nordic Gas Grid was analyzed, but more comprehensive feasibility study of Nordic Gas Grid [21] was started in July 1997 and results presented on October 1998 by Tebodin B.V., Arthur D. Little Ltd.

Connection Estonia - Finland

The connection to Finnish network would be possible by construction 85 km long sub-marine gas pipeline between Tallinn and Helsinki, gas pipeline via Estonian territory - 50 km long and 15 km in Finland. Estonian - Finnish pipeline would allow to connect Baltic transmission network to network of Scandinavian countries and ensure the connection to the Barents sea gas pipeline and Russian gas supply system via Finnish network in the perspective. The estimated cost of this project is 112 million USD.

Connection Poland - Lithuania

Another way of diversification of gas supply for Baltic countries would be a construction of gas pipeline connecting Polish and Lithuanian gas transmission networks. Gas delivery would still be from Russia, but Baltic States could receive it from one of the major transmission pipeline connecting Russia with Europe. The approximate length of a new pipeline is 250 km, including 120 km in Poland and 130 km in Lithuania. Estimated cost of this project is 160 million USD.

Nordic Gas Grid

Nordic gas Grid provides for connection of Russian and Norwegian gas networks through Sweden and Finland anticipating connection of Danish, German and Baltic gas systems.
Total investment is estimated at 3.5 billion USD (3.8 billion USD in the opposite case).
Regarding Baltic States the conclusion is drawn that still Russian gas will dominate in this region mainly due to more favorable price, nevertheless, the possibility to conclude gas delivery agreements with Norway will exist. In particular, it is necessary to emphasize the essential role of Latvian underground gas storage potential provided for by the study to ensure load balancing.

1.3. Problems related to natural gas market and gas supply system in mid of 90s

1. **Impossibility of efficient management due to complicated structure of the company**

In mid of 90s the State owned joint stock company “Latvijas Gaze” had a very complicated structure consisting of:

- main enterprise;
- the following subsidiaries without subunits: Incukalns UGS, Gas Transportation, LPG Export Terminal;
- and the following subsidiaries with regional subunits: Rigas Gaze, Valmieras Gaze, Liepajas Gaze, Daugavpils Gaze (in total 38 subunits)
- and recreation facility “Rigas licis”.

All subsidiaries were rather independent, and due to very complex structure, the company was very difficult to manage in efficient manner. There were many unnecessary middle manager positions and the total number of employees in 1995 was 3387.

2. **The whole natural gas business owned by the State**

In mid of 90s Joint Stock Company "Latvijas Gaze" is owned by the State, and that creates unnecessary pressure on the company management, especially, in respect of prevention of disconnection of the customers that are not paying and, as individual economic interests of certain politicians contradicts common interests of the Country, there are certain attempts to influence activities of the company that are not in line of business interests.

3. **Gas prices set without taking into consideration energy market trends and there are cross subsidies between groups of customers**

In mid of 90s gas prices for end-consumers for different groups of customers were not cost based because contained cross-subsidies, and that created market distortions. Natural gas prices are not adjusted to inflation [22]. Moreover, in gas pricing there were no reference to the competing energy sources, therefore natural gas lost to its main competitor – heavy fuel oil (HFO) and was replaced by cheap low quality mazut.

4. **Many customers were not paying for natural gas, natural gas consumption dropped and number of customers was decreasing**

Due to economic crisis in the country majority of customers could not make tamely payments, and in years 1993 and 1994 only about 25-30% of consumed gas was paid for [23]. Many of customers become insolvent and afterwards bankrupted. Due to availability of cheap mazut many customers changed fuel and therefore number of customers and, subsequent, natural gas consumption decreased sharply. At the same time the company should take credits to pay for natural gas supply.

5. **Technical conditions of the gas supply system poor**

Technical conditions of the gas supply system, including Incukalns UGS, were very poor. Equipment was produced in former USSR and urgently needed repairs because most of it was running from initial installation. The most acute need for reconstruction and repairs were in Incukalns UGS, as well as installation of gas meters for every customer and construction of gas metering station on the border between Russia and Latvia.

6. **Gas market isolated and there is lack of connections with joint European gas grid**

Since gas supply systems of the three Baltic Countries were designed and constructed as part of the North-West USSR gas supply system, these systems does not have connections with any other gas supply networks. In case of Latvia, security of supply is improved greatly due to existence of Incukalns UGS in the territory of the country [24], however, the potential of Incukalns UGS and options of other potential UGS in Latvia cannot be used without development of connections.

2. Privatization and restructuring

In such difficult economic situation for the joint stock company " Latvijas Gaze", the Cabinet of Ministers of the Republic of Latvia on August 2, 1995 [25] made a decision to include the joint stock company "Latvijas Gāze" into the list of companies that should be privatized, but on November 24, 1995 the Cabinet of Ministers approved the Basic Terms and Conditions of Privatization [26], which planned company's privatization by means of foreign capital acquire method by choosing two strategic investors, from which one should be the gas supplier. Additionally, one of the most essential criteria for selection of strategic investor according to the basic terms and conditions was proposals of the potential investor for ensuring sustainable Company's development. Thereby potential investors in their negotiations with the Latvian State, which was represented by the Latvian Privatization Agency, discussed concrete proposals and requirements in order to improve the situation in gas supply and actually avoid the Company's bankruptcy. Based on the submitted proposals, the Board of the Privatization Agency already on August 1, 1996 approved the Tender commission's proposal on selection of two strategic investors: a group from Germany, which was set up of Ruhrgas AG and Preussen Elektra AG and the stock company "Gazprom", and on April 2, 1997 the Latvian State, the German Group and AS "Gazprom" signed the share purchase agreements and shareholders' agreement. It should be noted here that the Directive 98/30/EC on common rules for internal natural gas market was adopted only on June 22, 1998 [27].

2.1. Privatization process of the natural gas company in Latvia

2.1.1. Selection of strategic investors

In order to discuss the necessity and methods of privatization as well as criteria for selection of strategic investors we have to stress one again situation in business environment at the time when decision on privatization of the gas industry was passed in Latvia. In 1994 Annual Report we can find interesting facts about this time. In particular, natural gas sales comparing to year 1993 went down by 28.6%, and that was caused by customers' inability to pay, high gas prices due to high purchase price and non-competitiveness with other fuels, and decrease of gas consumption due to collapse of industry and low economic performance. The total debt of customers as of 01.01.1995 reached 48.58 million Latvian Lats (LVL) comparing to company's annual turnover from basic activities 70.1 million LVL. In order to pay for the gas supplier the company had to take credits and in the end of 1994 the total amount reached almost 28 million LVL. According to some prognoses Latvian gas company would become insolvent in two years.

On August 2, 1995 by the order of the Cabinet of Ministers the Company was transferred for privatization, and it was decided the company must be privatized with the method of private capital attraction.

Initial letter in order to find interested parties was sent out by the Latvian Privatization Agency (LPA) on September 11, 1995 about intention of Latvian government to start privatization of Latvijas Gaze and to sell up to 24% of the shares of the company to the strategic investor. Initially German companies Ruhrgas and Preussen-Elektra, Gaz de France and North Hydro expressed interest to participate in the process of privatization, but North Hydro soon resigned. On November 24, 1995 the Basic Regulations of Privatization of SJSC Latvijas Gaze was approved by the decision of LPA provided for to perform privatization with the private capital attraction method, and relevant Tender commission had been formed under chairmanship of State Energy Minister.

Regarding selection of potential strategic investors the following main selection criteria have been defined:

– two strategic investors shall be determined;

– both shall be foreign gas companies;

– one of them shall be gas supplier to Latvia.

Privatization regulations also provided for that the decision about selection of strategic investors must be based on

–proposal of the tenderer on development of the company;

–experience of the tenderer;

–offered price, which should not be less than LVL 2.50

On August 1, 1996 the Board of LPA approved the proposal of the Tender commission about selection of two winners of the tender: Gazprom and consortium consisting of Ruhrgas and PreussenElektra from Germany. It is worth to mention that consortium of these two German companies had been made specially to participate at the Tender.

In general, for company's employees it was very difficult time because the investors put lot of efforts to learn everything about the company, and we had to get used to, especially, Western style of work.

Only on April the 2nd, 1997 LPA, the company and the investors signed Sale and Purchase Agreement [28] and Shareholders Agreement [29].

2.1.2. Privatization stages

Pursuant to the Regulations following stages of privatization were provided for:

First [30] - increase of a share capital of the company by issuing 9,000,000 "new" shares, which are ordinary shares with voting rights by transforming accumulated capital into the share capital with the nominal value of LVL 1 (Companies share capital has reached 36,000,000 after this stage).

Sale of all these shares to the strategic investors: 4,500,000 to Gazprom and 4,500,000 to German consortium.

Second - sale of 2,700,000 state owned "old" ordinary shares with voting rights to the two strategic investors in halve;

Third–sale of the shares to the employees and public using privatization vouchers. The state-owned share, to be sold to the employees and public, have been increased from 270,000 to 3,600,000 for employees and from 450,000 to 5,400,000 for public by modifying Basic Regulations. The price of one ordinary share with voting rights for employees was LVL 2.5 and minimal price LVL 2.5 for public to be paid by privatization vouchers. Public offer shares are sold in the auction: 5,399,862 shares were sold to 8,940 persons at price LVL 30.84

–720,000 of the shares have been purchased by Latvian Saving Bank based on the special agreement with Latvian Privatization Agency in order to improve its liquidity

Forth–In order to fulfill the conditions of the Sale and Purchase Agreement with strategic investors on July 1, 1998 General Meeting of the company passed the decision about increase of the share capital of the company from LVL 36,000,000 to LVL 39,900,000 by issuing 2,871,480 ordinary shares with voting rights in a closed issue and 1,028,520 ordinary shares with voting rights in a public emission with nominal value LVL 1. Closed issue shares were offered to strategic investors half-and-half.

Fifth- Sale of 10.7 million shares at auction, where the sales price was LVL 2.63 against the face value of LVL 1, but the highest price offered was 3.32 LVL for one share [31].

After auction the general director of LPA Mr. Janis Naglis said: "So glad I have not been for a very long time, and by this auction the State succeeded to gain more funds than

several ministries in a longer period obtaining World Bank structural credit in the amount of USD 40 million."

Sixth- In year 2000 two auctions were organized by Riga Stock Exchange: on March 27 almost 26% of the company's shares were sold, but on December 18 about 2%. On these auctions the share price reached its maximum and exceeded 10 LVL per share.

Seventh- The last auction took place on December 20, 2001 when last 3% of the State owned shares were sold for privatisation vouchers. At present state keep only 117 shares [32]. After transfer of the shares by E.ON Energie (former PreussenElektra) to Ruhrgas and sales of Itera Latvija to Gazprom the shareholder structure of the company is the following:

E.ON Ruhrgas International AG 47.2%
OAO "Gazprom" 34%
SIA "Itera Latvija"16%
Others 2.8%

In accordance with the Company's share purchase agreement with strategic investors, the Latvian State granted the Company exclusive rights for storage, transmission, distribution and sale of natural gas, which is reflected in the respective licenses, which are in force until February 10, 2017. Whereas, the strategic investors were placed a duty to take over all debt liabilities of the Company, were banned to reduce the number of employees for 2 years, as well as a range of other requirements were set forth. The issue about exclusive rights and possibilities of access by third party was carefully discussed during the process of privatization talks. At the strategic investors' request, in order to avoid the situation that the Company is always competing with the sole supplier, who is simultaneously the shareholder of the very as Company, and in order to protect the consumers' interests because " Latvijas Gaze" has a regular commitment to supply gas users, it was decided to grant exclusive rights for twenty years for gas transmission, storage and distribution, as alternative gas supply options during this period seemed fairly unreal. Given the circumstances in the power resources market, as well as the financial status of a/s "Latvijas Gaze" at the moment when the agreements with strategic investors were signed, as well as the price for which the shares were purchased (LVL 2.50 per share at the nominal value 1 LVL), a/s "Latvijas Gaze" shareholders treat their requirements to comply with the contractual terms and retain exclusive licenses until the year 2017 as absolutely grounded and do not wish to withdraw from them.

The Company's privatization actually ended in 2002 when the State in an auction sold the shares owned by it and left in its ownership only 117 shares from 39.9 million.

2.2. Results of privatization and restructuring of the company

In 1995 the joint stock company "Latvijas Gaze" under privatization was a horizontally integrated company with complex structure and many branch offices. The number of Company's employees reached 3387 employees. In order to ensure operational effectiveness and improve the financial condition, gradually business process optimization and the company's restructuring was carried out. Step by step, structural units, which were engaged in business types uncharacteristic for a natural gas company: medical and leisure complex, liquefied gas branch, etc., were separated and sold. When taking the measures for structural optimization, which were basically finished in 2002, but completely - in 2004, an integral company was established, which by minimum resources and number of employees

could perform the necessary functions. In 2004, the number of employees in a/s "Latvijas Gāze" was 1267 people, which is 37% of the number of employees before starting of privatization [33].

It should also be noted that together with restructuring, an up-to-date information system was implemented in a/s "Latvijas Gaze", which was based on *Oracle* system. The mentioned information system ensures separate accounting of gas transmission, distribution, storage and sales, and thereby complies with the requirements of the Directive 98/30/EC of July 21, 1998 on common rules for internal natural gas market, which were effective at the moment of starting the implementation when the issue about legal separation of individual service providers was not put forward.

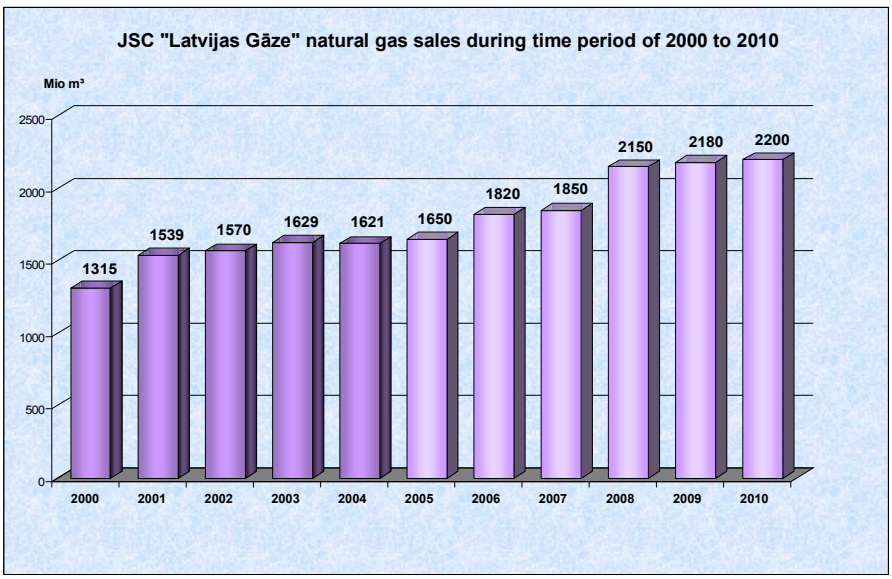
3. Development of energy market in Latvia

3.1. Changes of energy and gas market in 1991 to 2002

During the period after a/s "Latvijas Gaze" privatization, the Company's restructuring and modernization was carried out by support of strategic investors.

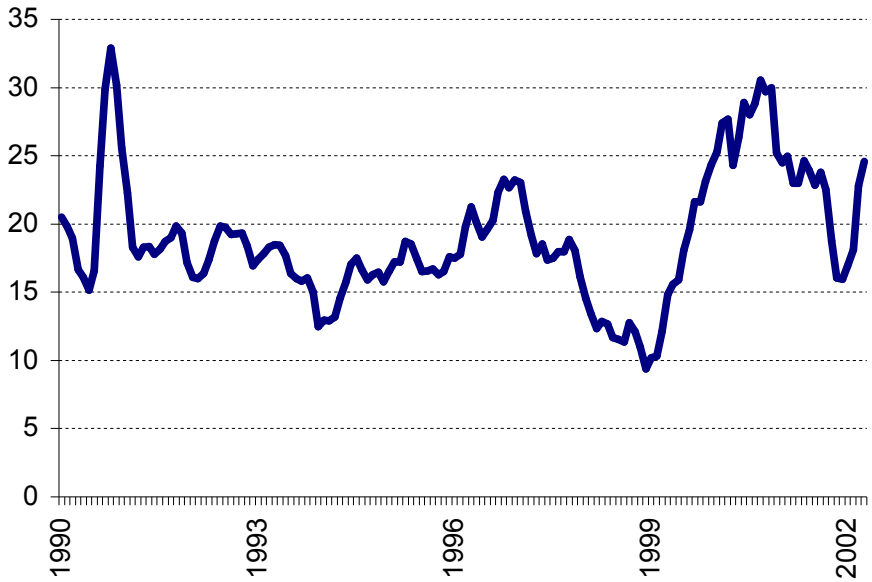
The natural gas sales gradually increased, and in 2004 reached 1621 million m^3, which, however, is only 55% of the sales in 1991, but it is expected that until the year 2010 the natural gas sales will reach 2200 million m^3 per year:

Picture 3.1. The natural gas sales in Latvia



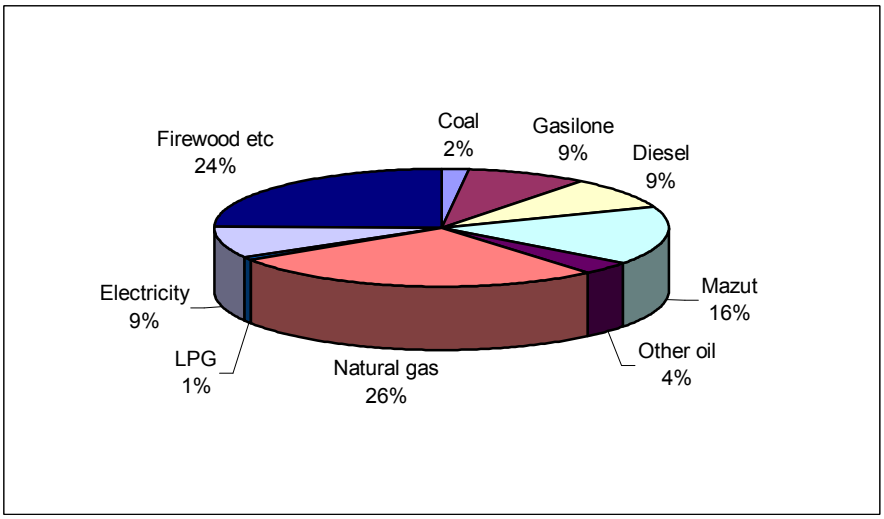
The Latvian energy market is also permanently developing [34]. However due to very low purchase power of consumers, it is mainly energy price driven. The total primary energy consumption in Latvia halved during 1990-1995 form some 9 Mtoe in 1990 to just 4,5 Mtoe in 1995. It has recently stabilised at around 4 Mtoe per year [35]. After Latvia regained its independence, the purchase price of natural gas and its price for end-consumers rocketed to European levels just in couple of years, while the price for other competing fuels climbed gradually; therefore major end-consumers, in particular heat and electricity producers, chose heavy fuel oil (mazut) instead of natural gas [36]. A great majority of them have such opportunity, and among the most important are cogeneration plants [37], so the share of natural gas in the energy consumption has dropped dramatically. In addition, oil prices in the world market started to drop sharply from 1997, reaching its minimum in 1999 (since 1976) of 9.39 USD/ barrel [38].

Picture 3.2
World oil price chronology (USD/barrel)

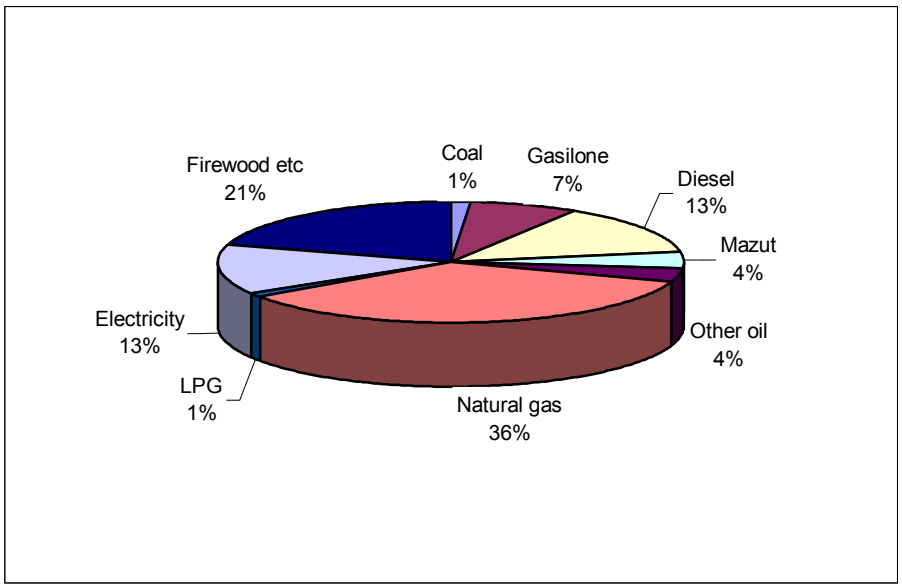


In general, the prices for mazut in Latvia followed the world oil pattern, and natural gas was out-competed by heavy fuel oil in the country (reflected in the energy consumption balance), and the natural gas share in 1998 decreased to 26%, with the heavy fuel oil accounting for 16%. After the mazut price increased, the natural gas share was increasing gradually, reaching 36% with heavy fuel oil shrinking to 4% in 2001 [39].

Picture 3.3
Primary energy consumption in Latvia in 1998

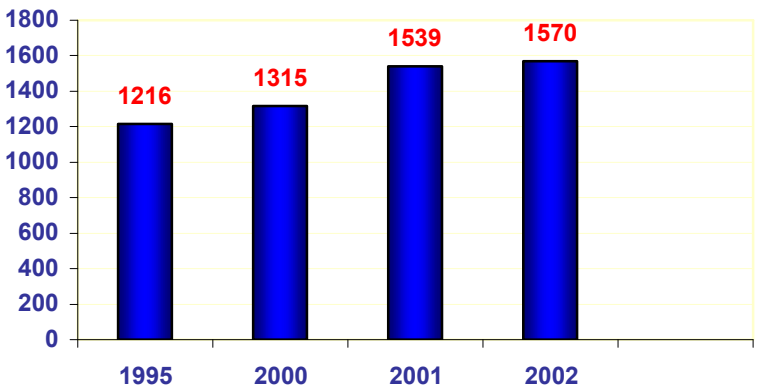


Picture 3.4.
Primary energy consumption in Latvia in 2001[40].



With the mazut price increase that started at the end of 1999 and the natural gas price for end-consumers remaining at the same level, natural gas became a more competitive energy source, and Latvian consumers tended to use it instead of heavy fuel oil, which was reflected in the growth of annual natural gas consumption [41]. It should be noted that "Latvijas Gaze" succeeded in attracting new customers of natural gas, which increased the total natural gas consumption.

Picture 3.5 [42]
Annual natural gas consumption in Latvia (million m^3)



The Energy Law [43] defines *fuel* and *energy* as follows:

- fuel: oil and oil products, natural gas, liquefied gas, oil shale gas and oil, coal, peat, wood and other biomass, and nuclear fuel that is burnt in order to generate energy;
- energy: (in the interpretation of this Law): a product with a certain value - generated electricity or heat energy as well as gas.

In our opinion, this definition already includes the substitutability of fuels between natural gas and oil products, since from the functionality point of view the aim of burning all these fuels is one and the same – to generate energy, including heat.

In Latvia, there is a cost-driven viable energy market; in particular, natural gas is competing with heavy fuel oil, and depending on the price large customers tend to opt between natural gas and heavy fuel oil, whatever is cheaper [44].

3.2. Substitutability between natural gas and the most common oil products (heavy fuel oil, diesel fuel)

3.2.1. Substitutability of Natural Gas and Liquid Fuels from the Point of View of Origin

One of the most recognised theories on the origin of organic fossil fuels – peat, brown coal, coal, oil, and natural gas – suggests that all the abovementioned fuels resulted from organic elements of plants and micro-organisms in different periods of Earth's history. Various factors (depth, temperature, pressure, presence of oxygen and micro-organisms, etc.) caused the separation of two trends of further decomposition and transformation of organic elements. The first trend is the formation of solid fuels through the stages of peat, brown coal, and coal. The second trend – the plants and micro- organisms transformed into hydrocarbons, which then served as the basis for oil and gas formation. The result is separate or associated gas and oil fields.

Natural gas and oil have one origin – organic elements of plants and micro- organisms. The processes of formation of natural gas and oil have a common character, which results in adjacent territories of oil and gas fields.

3.2.2. Substitutability of Natural Gas and Liquid Fuels from the Point of View of Combustion Conditions

Liquid and gaseous fuel is burnt in box furnaces, where the fuel burns in flying conditions. Combustion of gaseous fuels is homogeneous, as gas and combustion air are substances of one and the same aggregative state. Liquid fuel is fed into the furnace through a nozzle that transforms liquid fuel into very small drops. These drops evaporate within a fraction of a second; fuel vapour mixes with the air and flames out. Therefore combustion of liquid fuel is also considered homogeneous, in particular today when new furnaces are introduced, ensuring high-quality atomising of liquid fuel. It is also possible to burn pulverised solid fuel in box furnaces - peat, brown coal, coal – although this makes combustion heterogeneous. We have a Latvian example of using three fuel types in the same furnace.

The annual reports [45] of the state-owned electricity supplier „Latvenergo" show the following fuel mix for its Combined Heat and Power (CHP) plants *TEC-1* and *TEC-2* located in the capital city Riga:

Table 3.1
Fuel Mix in the CHP TEC-1

Year	Fuel Mix, %		
	Heavy oil	Gas	Peat
1990	0,3	96,0	3,7
1991	0,8	92,1	7,0
1992	0,7	85,1	14,2
1993	6,8	67,5	25,6
1994	9,4	66,2	24,4
1995	8,1	57,2	34,7
1996	3,5	66,5	30,0
1997	1,2	56,0	42,8
1998	0,2	66,5	33,3
1999	0,0	80,0	20,0

Table 3.2
Fuel Mix in the CHP TEC-2, in %

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Heavy oil	8,1	2,5	0,8	2,9	6,5	9,8	4,7	0,30	9,0	4,6
Natural gas	1,9	7,5	9,2	7,1	3,5	0,2	5,3	0,7	1,0	5,4

According to the same annual reports [46] these Latvenergo owned and operated CHP plants generated 31% of the total electricity produced by Latvenergo in 2001 as well as 67 % of the district heat generated for the Riga district heat supply network. According to information provided by Latvijas Gāze, natural gas consumption in 2001 at these CHP plants amounted to approximately 500 million m^3, therefore these consumption sites alone account for 48 % of the overall consumption of natural gas consumed in the Latvian district heat sector.

Using existing technology, natural gas and oil products such as heavy fuel oil are substitutable in the same furnace, as are pulverised solid fuels, irrespective of the fact that the combustion of gas and oil products is homogeneous whereas the combustion of solid fuels is heterogeneous.

3.2.3. Substitutability of Natural Gas and Liquid Fuels from the Point of View of Physical Properties

Standard handbook references, calculations and analysis substantiate that that the amount of combustion air and the volume of flue gases are practically the same both for different oil products and natural gas:

Table 3.3
Volumes of combustion air and flue gases for natural gas and oil products

	Theoretically required amount of combustion air V^o, m^3/kg (m^3/m^3)	Theoretical volume of flue gases V^o_{dg}, m^3/kg (m^3/m^3)	Net Calorific Value Q_z^d, MJ/kg (MJ/m^3)
Heavy fuel oil with a sulphur content up to 2 %	10,45	11,28	40,22
Heavy fuel oil with a sulphur content up to 3,5 %	10,20	10,99	39,81
Diesel (Gas Oil)	11,20	12,12	42,32
Natural gas	9,72	10,80	33,10

Table 3.4

	Specific boiler efficiency	Fuel required for the generation of 1 MWh, kg/MWh, m^3/MWh	Combustion air for the amount of fuel required for the generation of 1 MWh, m^3/MWh	Volume of flue gases created by combustion of the amount of fuel required for generation of 1 MWh, m^3/MWh
Heavy fuel oil with a sulphur content up to 2 %	0,88	101,7	1115,9	1201,2
Heavy fuel oil with a sulphur content up to 3,5%	0,88	102,8	1100,7	1182,7
Gas Oil	0,87	97,8	1149,9	1240,7
Natural gas	0,92	118,2	1206,5	1335,1

In the case of liquid fuels and natural gas the required volumes of combustion air and the output of flue gases are in practice very closely related, therefore

- one and the same boiler installation can be used, as aerodynamic conditions for the boiler are practically the same and
- the same ventilators and flue gas fans can be used.

3.2.4. Substitutability of Natural Gas and Liquid Fuels from the Point of View of Boiler Type and Burners

The abovementioned similarities of gaseous and liquid fuels – the same type of furnace (box furnace), similar amounts of combustion air and volumes of flue gases – lead to the manufacture of multi-fuel burners (boilers), i.e. facilities which allow the production of thermal heat or electricity from two or more fuel types. Usually, one energy type is the primary fuel that is permanently used, and another is the alternative fuel that is used for starting up the facility or as a reserve or an emergency fuel. Being a reserve fuel, it can also be used permanently as a primary energy source.

Most boiler plants of Latvian district heat supply companies employ heat boilers manufactured in the former USSR. Such boilers are still made in Russia; they can use both natural gas and heavy fuel oil. Therefore these installations are called dual fuel installations. The most popular ones are:

a) water heating boilers for medium and large capacities, intended for district heat supply

- steel water boilers KVGM (the name itself already includes the fuel types that can be used in this boiler: gas/ heavy fuel oil water boiler),
- steel water boilers PTVM, intended for using both heavy fuel oil and natural gas,

b) water heating boilers for small capacities

- TKU-0,8, a portable boiler for a container. Both natural gas and light fuel oil products can be used to simplify its operation.

c) steam boilers

- E (DE) type boilers, with steam output from 1 to 25 t steam/h. Catalogues, e.g., http://www.kotel.ru/s.php/62.htm [47], give the official name of these boilers - Steam gas/ heavy fuel oil burners of E (DE) type with an output of 1 to 25 t steam/h. DKVr type boilers, in the catalogues they are called steam boilers DKVr with gas/ heavy fuel oil furnaces.

To run multi-fuel boilers, proper burners are needed. Already the former USSR offered several burner types, which allow the use of gas and heavy fuel oil or diesel (gas oil). For example, the Estonian factory "Ilmarine" produced gas/ heavy fuel oil burners GMGm for DKVr type boilers. Other common burners are FGM or OEN-GMV designed by Orgenergoneft.

As for burners manufactured in other countries, the Finnish Oilon Oy multi-fuel burners have gained significant popularity in Latvia. Oilon industrial burners are multi-fuel burners in which liquid fuels and gases can be combusted either separately or simultaneously. Therefore both energies fed into this industrial boiler type are fully substitutable.

Latvijas Gāze's information as regards boiler type installations for 104 industrial and commercial customers representing 85 % of Latvijas Gaze's industrial and commercial end-consumer market in 2001 prove that the above mentioned boiler types are widely used in Latvian district heating and industrial boiler house applications. In analysing the customer information, we can conclude that 50 out of the 104 customers have no reserve fuel, however, these gas-only customers represent only 5.2% of the non-domestic natural gas market for Latvijas Gaze in 2001 and technically they can switch to an alternative fuel if necessary investments as described above are made. For the same year the other 54 dual-fuel equipped customers accounted for 80% of the total non-domestic natural gas end-consumer market for Latvijas Gaze. Below, we will discuss these analytic data in more detail for the Latvian industrial end-use market.

From a technical point of view, industrial and commercial consumers can replace natural gas with liquid fuels such as oil products based on their energy consuming equipment (industrial furnaces and boilers). Substitutability exists in many practical cases in Latvia where dual-fuel or multi-fuel boiler installations and burners are in operation. These installations enable the separate or simultaneous combustion of both natural gas and liquid fuels (oil products).

3.2.5. Substitutability of Natural Gas and Liquid Fuels from the Point of View of Uninterrupted District Heat Supply

According to information by the Latvian Statistics Office for the year of 2001, the district heat and electricity sector in Latvia accounts for 70.5 % of the Latvian non-domestic natural gas end-consumer market. Up until 1991, USSR norms stipulated that reserve or emergency fuel stocks must be established in Latvia. If natural gas is the primary energy, heavy fuel oil is usually used as a reserve or emergency fuel. Gas-fired thermal power plants which receive natural gas from one source throughout the year must have emergency heavy fuel oil facilities. In the case of seasonal gas supply, heavy fuel oil facilities serve as a reserve. Power plants, which use heavy fuel oil as the primary energy must be provided with gas as a reserve or the emergency fuel (excluding state fuel oil reserves). The main requirements based on these norms are summarised in the following table.

Table 3.5

For fuel consumption exceeding 150 tonne/h

Heavy fuel oil facilities	Storage tank capacity
Reserve stocks for gas-fired power generation	10-day consumption
Emergency stocks for gas-fired power generation	5-day consumption
For peak water boilers	10-day consumption

For fuel consumption less than 150 tonne/h

Purpose and type of fuel supply	Capacity of liquid fuel storages
1. Primary and reserve, to be delivered by railway	10-day consumption
2. Primary and reserve, to be delivered by road	5-day consumption
3. Emergency for gas boiler plants, to be delivered by railway or road vehicles	3-day consumption
4. Basic, reserve, and emergency, to be delivered through pipelines	2-day consumption
5. Start-up for boiler plants with output 100 Gcal/h and less	Two reservoirs, 100 t each
6. Start-up for boiler plants with output greater than 100 Gcal/h	Two reservoirs, 200 t each

With the exception of the specifications for boiler and furnace equipment used, most of the natural gas customers, according to information collected by Latvijas Gaze in the second half of 2002, shows that approximately 79 % of Latvijas Gaze's non-domestic end-consumer market in 2001 could readily switch between natural gas and various alternative fuels, primarily oil products while small and medium industrial and commercial consumers at an annual consumption between 0.5 to 1 million m^3 added another 1% to this fuel-switching gas customer base in 2001.

All power generating plants and district heat boiler plants in Latvia, which were built during the USSR period and which used natural gas as their primary energy, had to dispose of heavy fuel oil facilities. This allowed for the use of heavy fuel oil in case of emergency or

interruption in the supply of the primary energy. These facilities still exist and are still in use today.

Latvijas Gaze's customer survey of 2002 substantiates that practically all district heat companies that reported to Latvijas Gaze in 2002 about their reserve fuel possibilities, have dual fuel natural gas fired equipment. Given the boiler installations in use, all the consumers surveyed have the technical possibility to switch from natural gas to oil products and vice-versa. The analysis of the survey conducted by Latvijas Gaze even allows us to conclude, based on the data of 2001, that approximately 80 % of Latvijas Gaze's total non-domestic end-consumer market (this exceeds the market share of the district heat and electricity sector) can readily switch from natural gas to alternative energies**.**

The time needed to replace the fuel with its substitute in dual fuel installations is relatively short, i.e. between 1 to 3 hours, for example, it is so for large-scale Combined Heat and Power Plants operated by Latvenergo, the state-owned electricity utility.

3.2.6. Substitutability of Natural Gas and Liquid Fuels in Technological Processes of Latvian Industries

An important factor is the substitutability of natural gas and liquid fuels in technological industrial processes, for example, in the food industry. Restructuring in many food processing companies resulted in the introduction of new modern energy using facilities fired with natural gas or run on electricity.

The remaining industrial and commercial consumers include small enterprises, municipal and state buildings and other small-scale users.

All other (gas-only) consumers are technically able to use, for example, diesel fuel instead of natural gas, however, it will take a certain transition period and financial resources to switch to another energy source. Technically, to switch from natural gas to liquid fuels in these typical small-scale applications, the gas burner must be replaced by a multi-fuel burner, supplemented by a liquid fuel storage tank, and a pipeline system must be installed. We estimate that the size of investments is usually between 20% to 30% of the price of fuel consumed per year. As opposed to the administrative fuel reserve requirements of the USSR period described above, the consumer today has an investment choice between gas-only and dual-fuel energy using equipment. His decision will depend on his perception of a long-term energy price trend, which would justify this investment.

Gas use in industrial technological processes is equally replaceable as in the district heat and electricity generating sectors. Historically, USSR norms mentioned above applied equally to this final energy using sector. According to information available to us some small and medium industrial and commercial undertakings can only switch to alternative energies after installing additional equipment needed to fire, transport and store the required alternative fuel.

3.2.7. Legal Provisions about the Substitutability of Fuels under Latvian Legislation

Article 66 of Cabinet Regulations No. 23 of January 1998 [48] (Regulation on Gas Supply and Usage) stipulates that if the natural gas user's energy facilities or equipment preclude interruption of gas supply for technological reasons or due to other conditions, and provided the natural gas supply contract with the natural gas supplier does not guarantee

continuous natural gas supply, the user shall at its own expense provide for the construction of either an independent gas supply pipe or the utilisation of a reserve fuel.

That fuels are substitutable is also mentioned in Cabinet Regulations No. 106 of 12 March 2002 (Supply Procedure of Energy Consumers and Fuel Sales Procedure during an Energy Crisis) [49], issued under Article 64 and Article 73 of the Energy Law [50]. Article 22.1 of these regulations requires the substitutability of one fuel with another if the State Energy Crises Centre requires it.

3.2.8. Energy Prices and Energy Balance in Latvia

Changes in energy prices for consumers can be described by the following data from Latvijas Gāze, the Central Statistics Bureau of Latvia and the National Report under the UN General Convention on Climate Change as well as surveys of companies:

Table 3.6

Energy Prices* For Consumers

	Unit Price	1998	1999	2000	2001	Quarters I and II of 2002
Natural gas (maximum tariff)	Ls/1000 m^3	60,70	60,70	60,70	66,77	66,77
Diesel (Gas oil)	Ls/t	184	220	257	253	239
Fuel for household ovens	Ls/t	112	106	140	128	145
Heavy fuel oil	Ls/t	43	53	63	79	78
Coal	Ls/t	35	35	36		
Wood	Ls/t	6,7	6,7	7		

*prices include excise taxes for oil products and exclude VAT

Natural gas tariffs differ depending on the consumer's annual consumption and the prevailing North Western European heavy fuel oil price. The table below refers to the year 2002:

Table 3.7.
Gas Tariffs And Consumer's Annual Gas Consumption

	Annual gas consumption, thousand m^3							
	Below 12,6	From 12,6 to 25	From 25 to 126	From 126 to 1260	From 1260 to 12600	From 12600 to 20000	From 20000 to 126000	Above 126000
Maximum tariff, Ls/1000 m^3	66,77							
Obligatory discounts, Ls/1000 m^3	0,00	0,00	2,40	2,40	4,77	5,77	9,37	13,17
Tariff including discount, Ls/1000 m^3	66,77	66,77	64,37	64,37	61,54	60,54	56,94	53,00*

* the tariff applies to the CHP plants *TEC-1* and *TEC-2* as well as the Riga district heat supply operated by Rīgas Siltums

The following table is based on the data provided by the Ministry of Economy and describes the fuel balance for Latvia:

Table 3.8
Fuel Balance for Heat Supply and Thermal Technologies

Consumption of energy resources in Latvia (excluding electricity and transport), in %						
	1996	1997	1998	1999	2000	2001
1. Natural gas and liquefied gas	20,38	26,30	27,42	29,03	33,24	38,05
2. Light oil products and other oil products	23,41	22,89	23,34	25,92	29,11	28,70
3. Heavy fuel oil, shale oil	25,86	19,94	19,93	17,48	8,65	5,88
4. Wood, peat, coke, and other fuel types	26,89	27,73	26,61	25,24	27,00	25,36
5. Coal	3,46	3,14	2,70	2,33	2,00	2,02

Using the same table with natural gas and oil product consumption combined (points 1.-3.) yields the following picture:

Table 3.9
Fuel Balance for Heat Supply and Thermal Technologies

Consumption of energy resources in Latvia (excluding electricity and transport), in %						
	1996	1997	1998	1999	2000	2001
Natural gas, liquefied gas, heavy oil, shale oil, light oil products and other oil products	69,66	69,13	70,69	72,43	71,00	72,62
Wood, peat, coke, and other fuel types	26,89	27,73	26,61	25,24	27,00	25,36
Coal	3,46	3,14	2,70	2,33	2,00	2,02

The percentage share of natural gas and oil products combined in energy consumption remains practically constant over the period 1996 to 2001. This means that natural gas and oil products are substitutable and natural gas consumption has increased crowding out oil products, primarily heavy fuel oil. The main reason for this rapid development are changes in fuel prices benefiting natural gas.

3.2.9. Costs of Efficient Energy Production and Substitutability based on Price Aspects

Specific costs of energy production, measured in Ls per MWh, can be described using data from Table 3 as follows:

Table 3.10

Specific Costs of Energy Production

	Boiler efficiency	Energy and electricity needed for production of 1 efficient MWh	Price of fuel and electricity excluding VAT	Efficient energy costs Ls/MWh excluding VAT
Natural gas at net calorific value (7900 kcal/m^3)	0,92	118,2 m^3	from 53,00 Ls/1000 m^3	from 6,27
		118,2 m^3	up to 66,77 Ls/1000 m^3	up to 7,89
Heavy Fuel Oil	0,88	0,1028 t	78,00 Ls/t	7,93
Coal	0,70	0,2046 t	36,00 Ls/t	7,36
Wood	0,70	0,6 t	7,00 Ls/t	4,20
Diesel (Gas Oil)	0,87	0,0978 t	239,00 Ls/t	23,37
Electricity	0,98	1,02 MWh	33,051 Ls/MWh	33,71

Costs of efficient energy production, measured in Ls per MWh, as has already been stated in Sect. 3 of the opinion provided by the Competition Council to Latvijas Gaze, take into account the energy prices, the boiler efficiency and the consumed fuel type. However, the actual costs of 1 MWh of energy for final use will be substantially higher in the case of oil products, wood and coal, because of transport and storage costs as well as warming-up for heavy fuel oil reserves. Natural gas supply up to the end-consumer's premises is covered by the natural gas tariffs referred to in Table 4, therefore the end-consumer can save such additional energy costs when using natural gas. The consumer will choose the least cost solution. Currently, as also recognised in Sect. 8 of the opinion provided by the Competition Council to Latvijas Gaze, consumers perceive that natural gas is the least expensive energy source.

Thus, it is clear that if the price of particular energy or other additional costs (such as natural resources taxes) change, the heat producer will choose the energy which will generate the least costs for 1 MWh of the final energy produced. In its 1999 Annual Report Latvenergo illustrates how the abovementioned factors influence their preference for one or the other energy source, as "the fuel mix varies in different years according to the supply situation and the price policy in the energy market, as well as due to limitations in heavy fuel oil supplies".

This means that the natural gas price will always have a competition limit as long as consumers have a technical option to switch from natural gas to another energy source, as explained above. In our opinion, the end-user who has made a long-term investment in a gas supply system has no economic motivation to substitute natural gas due to additional costs, is incorrect. In Latvia, this proposition certainly does not apply to the district heat supply companies and to most industrial consumers as well, but it may apply to small heat generating equipment (for example, used in apartments which accounted for less than 7 % of Latvijas Gaze's total annual gas consumption in 2001), as they do not have the technical possibility to make necessary fuel switching investments.

The Latvian energy market is characterised by a large representation of dual fuel fired gas equipment, which generates a strong correlation between the price of natural gas and competing energies, primarily oil products. A similar conclusion can be found in the National Energy Efficiency Strategy approved by the Latvian Cabinet of Ministers on 21 November 1999, according to which "competition is also possible among different energy types - gas, liquid oil products, wood, peat, and coal for heat supply and technological processes; gasoline, diesel, and liquefied gas – in transport etc."

Therefore the result of competition among different available fuels depends on the prices in the energy market, as choice in shopping for energies because of fuel switching is a reality in the Latvian industrial and commercial end-user market.

3.2.10. General trends of energy market in 1991 to 2002

World energy market is undergoing permanent changes with one energy source substituting others. The global trend is- natural gas replacing other fossil fuels, in particular oil and coal.

There is cost driven viable energy market in Latvia, in particular natural gas is competing with heavy fuel oil, and depending on price large customers tend to opt between natural gas and heavy fuel oil, whatever is cheaper. Using existing technology, natural gas and oil products such as heavy fuel oil are substitutable in the same furnace, as are pulverised solid fuels, irrespective of the fact that the combustion of gas and oil products is homogeneous whereas the combustion of solid fuels is heterogeneous.

From a technical point of view industrial and commercial consumers can replace natural gas with liquid fuels such as oil products based on their energy consuming equipment (industrial furnaces and boilers). All power generating plants and district heat boiler plants in Latvia, which were built during the USSR period and which used natural gas as their primary energy, had to dispose of heavy fuel oil facilities, which allowed for the use of heavy fuel oil in the case of an emergency or an interruption in the supply of the primary energy. These facilities still exist and are still in use today.

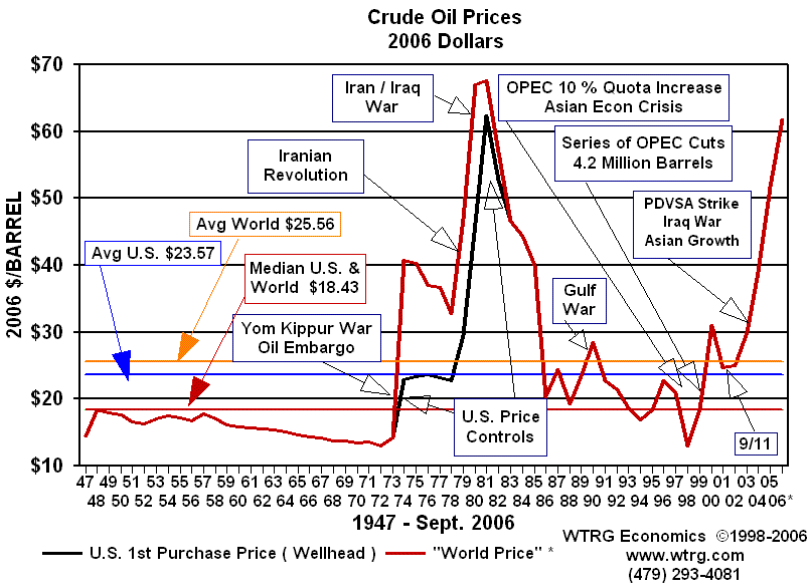
The percentage share of natural gas and oil products combined in energy consumption remains practically constant over the period 1996 to 2001. This means that natural gas and oil products are substitutable and natural gas consumption has increased crowding out oil products, primarily heavy fuel oil. The main reason for this rapid development are changes in fuel prices benefiting natural gas.

The Latvian energy market is characterised by a large representation of dual fuel fired gas equipment, which generates a strong correlation between the price of natural gas and competing energies, primarily oil products. Therefore the result of competition among different available fuels depends on the prices in the energy market, as choice in shopping for energies because of fuel switching is a reality in the Latvian industrial and commercial end-user market.

3.3. Oil market development in time period of 2002 to 2006

In 2001 a weakening US economy and increases in non-OPEC production put onward pressure on prices. In response OPEC once again entered into a series of reductions in ember quotas cutting 3.5 million barrels by September 1, 2001. In the absence of the September 11, 2001 terrorist attack this would have been sufficient to moderate or even reverse the trend. In the wake of the attack the crude oil price plummeted. Spot prices for the U.S. benchmark West Texas Intermediate were down 35 percent by the middle of November [51].

Picture 3.6. Crude oil prices 1947-2006 [52]



Under normal circumstances a drop in price of this magnitude would have resulted an another round of quota reductions but given the political climate OPEC delayed additional cuts until January 2002 when it reduced its quota by 1.5 million barrels per day and was joined by several non-OPEC producers including Russia who promised combined production cuts of an additional 462,500 barrels. This had the desired effect with oil prices moving into the $25 range by March, 2002. By mid-year the non-OPEC members were restoring their production cuts but prices continue to rise and U.S. inventories reached a 20-year low later in the year. By year- end oversupply was not a problem. Problems in Venezuela led to a strike at PDVSA causing Venezuelan production to plummet. In the wake of the strike Venezuela was never able to restore capacity to its previous level and is still about 900,000 barrels per day below its peak capacity of 3.5 million barrels per day. OPEC increased quotas by 2.8 million barrels per day in January and February, 2003.

On March 19, 2003, just as some Venezuelan production was beginning to return, military action commenced in Iraq. Meanwhile, inventories remained low in the U.S. and other OECD countries. With an improving economy U.S. demand was increasing and Asian demand for crude oil was growing at a rapid pace. The loss of production capacity in Iraq and Venezuela combined with increased production to meet growing international demand led to the erosion of excess oil production capacity. In mid 2002, there was over 6 million barrels per day of excess production capacity, but by mid 2003 the excess was below 2 million. During much of 2004 and 2005 the spare capacity to produce oil has been under one million barrels per day. A million barrels per day is not enough spare capacity to cover an interruption of supply from almost any OPEC producer. In a world that consumes over 80 million barrels per day of petroleum products that adds a significant risk premium to crude oil price and is largely responsible for prices in excess of $40 per barrel.

2005 has been the first year since the 1980s when the annual average price for crude oil has remained, constantly, well above USD 50 per barrel, reaching record prices and closing the year at more than USD 65 per barrel. Gas prices, too, have spiralled and the extremely cold winter, especially in central and Eastern Europe, has seen unprecedented demand for gas, with some interruptions to supply [53]. Different energy agencies predict that, while prices are likely to ease over the next two years [54], they will nonetheless remain significantly above USD 40 per barrel. Prices for crude oil, petroleum products and natural gas are projected to remain high through 2006 before starting to weaken in 2007.

3.4 Why natural gas price in Latvia shall depend on heavy fuel oil price?

Gas chain from gas production to the final consumer is developed for a very long time period. In addition, the matters of cost recovery due to capital intensity of gas chain projects are very sophisticated. Taking into the consideration the fact that there are no unified world gas prices these require clear definition by means of contract. Moreover, the recovery of gas transportation costs consisting of the capital cost of installation of facilities, and operating costs have to be agreed upon, also. Finally, all the costs must be covered by the end consumers, which are willing to pay only price competitive to other fuels. Therefore, the requirement to balance the particularly complex financial issues over a very long time period predetermines necessity of well-defined contractual arrangements and careful determination of gas price.

The general principle for natural gas pricing is the following: the price of gas purchased from the seller at the consumer's burner should not exceed the price of competitive fuels (oil,

coal, electricity etc.), and the costs of transmission and distribution should be taken into account [55] or otherwise, the consumers will chose other types of fuel. Only few customers that have particular needs will agree to pay more. In addition, maximum acceptable gas price can be influenced by environment taxes due to taxes imposed on e.g. oil or coal. There are three steps to determine initial gas price:

1) The cost of energy in the principal markets for gas must be determined through published information;
2) The value of the energy unit from gas compared with that of other fuels must be evaluated, including savings for maintenance, unnecessary storage facilities etc.
3) The discount to achieve new markets and the gains from gas sold in existing markets must be assessed.

The obtained values will differ from one market sector to another, but an assessment must be made to come to one price. Then the costs of transmission, distribution and some profit have to be added. In such way the price, which the buyer is able to pay to the seller is calculated.

In order to satisfy the general principle, a gas pricing formula must meet two criteria:

- it must be such that, at the time the contract is agreed, natural gas supplied under that contract would be competitive at the burner tip;
- it must reflect changes in the competitive energy supply for the market in such a way that the computed natural gas price continues to be competitive at the burner tip.

A number of different formulas are in use around the world, but the most common is the "Multiplicative Formula" of the following type:

$$Pt = Po\left(a\frac{(GO)t}{(GO)o} + b\frac{(FO)t}{(FO)o} + c\frac{(PPI)t}{(PPI)o} + ... \right) \quad (3.1)$$

where:

Pt - price of natural gas at time t
(GO)t- price of gas oil at time t
(FO)t- price of fuel oil at time t
(PPI)t- Producer Price Index at time t- a measure of inflation
t- an agreed time period prior to time t – the time lag effect
Po, (GO)o, (FO)o and (PPI)o are the values of the respective variables at time zero

$$a+b+c+\ldots=1 \quad (3.2)$$

The number of terms within the brackets of the formula (3.1) can be as many as the parties that sell and purchase gas wish, and could include prices of e.g. electricity, heavy fuel oil, wood etc.

The same formula can be expressed in additive manner:

$$Pt=Po+A\{(GO)t-(GO)o\}+B\{(FO)t-(FO)o\}+C\{(PPI)t-(PPI)o\}+.... \quad (3.3)$$

In this form, the parameters have the same definitions as in multiplicative formula, except that constants a,b,c,..are replaced by A,B,C,..where A+B+C…is not equal to 1.

The underlying principle for determining the parameters to be used in the pricing formula and their weightings is that the price of gas in the market place should remain competitive with the alternative energy resources available to the customer. This is not a simple statement that the cost of a unit of heat for gas and its competitors should be the same, there are other factors that must be taken into account in looking for the overall costs of using energy-maintenance, storage, ease of control, clean burning, low pollution levels etc.

Referring to the energy market in Latvia, as it was proved earlier there is cost driven viable energy market in Latvia, in particular natural gas is competing with heavy fuel oil, and depending on price large customers tend to opt between natural gas and heavy fuel oil, whatever is cheaper. Using existing technology, natural gas and oil products such as heavy fuel oil are substitutable in the same furnace, as are pulverized solid fuels, irrespective of the fact that the combustion of gas and oil products is homogeneous whereas the combustion of solid fuels is heterogeneous. From a technical point of view industrial and commercial consumers can replace natural gas with liquid fuels such as oil products based on their energy consuming equipment (industrial furnaces and boilers).

As it was explained before and referring to the formula (3.1) and formula (3.3), natural gas price in Latvia shall be determined as follows:

$$Pt = Po\left(\frac{(FO)t}{(FO)o} + c\frac{(PPI)t}{(PPI)o} + ...\right) \qquad (3.4)$$

or

$$Pt=Po+ B\{(FO)t-(FO)o\}+C\{(PPI)t-(PPI)o\}+.... \quad (3.5)$$

Taking into consideration above facts, since January 1, 2000 gas purchase price from the natural gas supplier in Latvia is based on heavy fuel oil price in international markets. New method of setting gas sales tariffs to the customers in Latvia, as it will be explained later, through gas purchase price, which is one of components of gas sales price to end-consumers, takes heavy fuel oil price in international markets in consideration for setting gas price.

Since there is not available accurate and independent statistics regarding heavy fuel oil price in Latvia and the general rule is that parameters that are used for price setting shall be:

- truly market determined, independent of government or state influence, and , desirably, of some relevance to the market in which the gas will be sold;
- available in independently published statistics, with assurance that it will be available in years to come,

it was decided to use the price of heavy fuel oil, calculated as average mathematical figure for six calendar months before the month of supply of gas, as provided for by Reuters in «Platt's Oilgram Price Report» in the section «European low/high averages. BARGES FOB ARA». That means that price of heavy fuel oil in ports of Amsterdam, Rotterdam and Antwerp [56] is considered since this information give true picture of heavy fuel oil price in Europe.

3.5. Analysis of development of «EUROPEAN LOW/HIGH AVERAGES BARGES FOB ARA» published by Reuters in «Platt's Oilgram Price Report»

The author has collected and analysed monthly and semi-annual values of the Averages Barges FOB ARA [57] starting from 2002. Since, for time period till 2005 for price settlement purposes heavy fuel oil (HFO) with sulphur content of 3.5% was used and from 2005 HFO with sulphur content of 1% is applied, information is provided accordingly. The reason for " switching" from HFO with sulphur content of 3.5% to one with 1% are changes

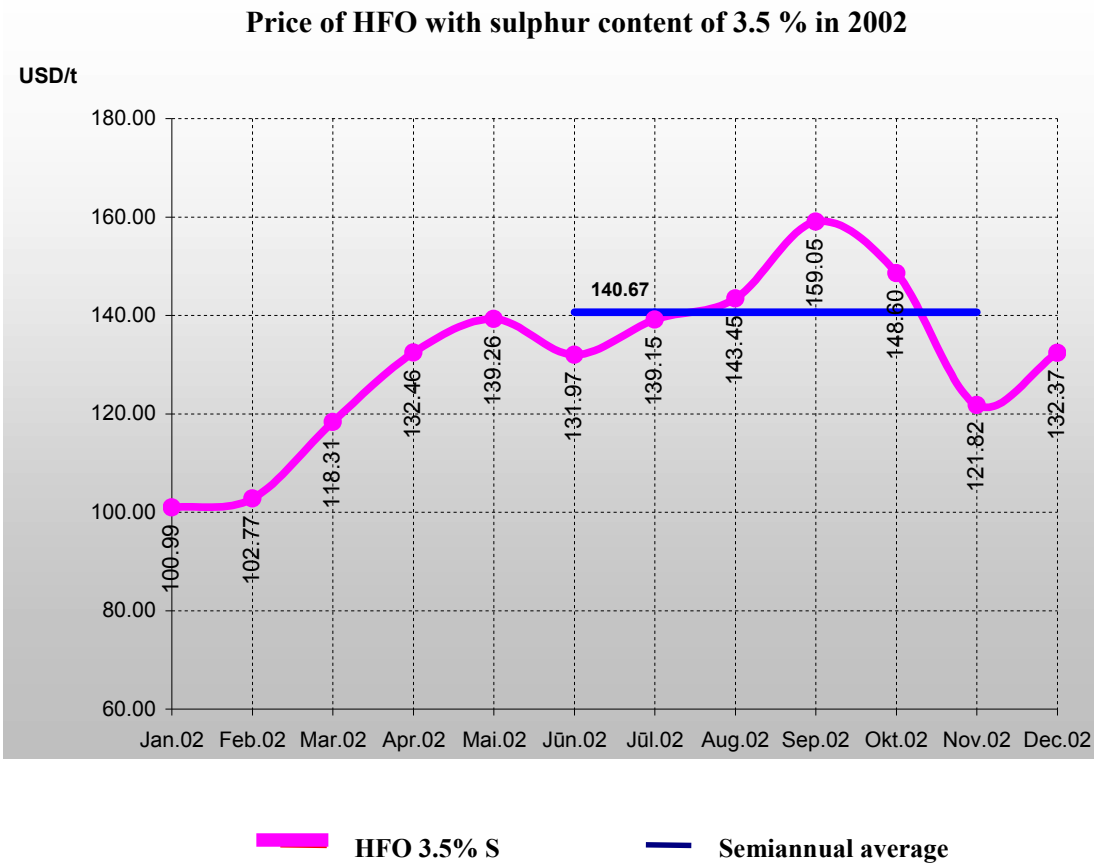
in Latvian fuel market due to joining EU, where usage of HFO with sulphur content of 3.5% is restricted.

However, for purpose of comparison and in order to show extremely rapid increase of HFO price in time period from December 2003 to January 2006 price of HFO with sulphur content of 3.5% is shown separately.

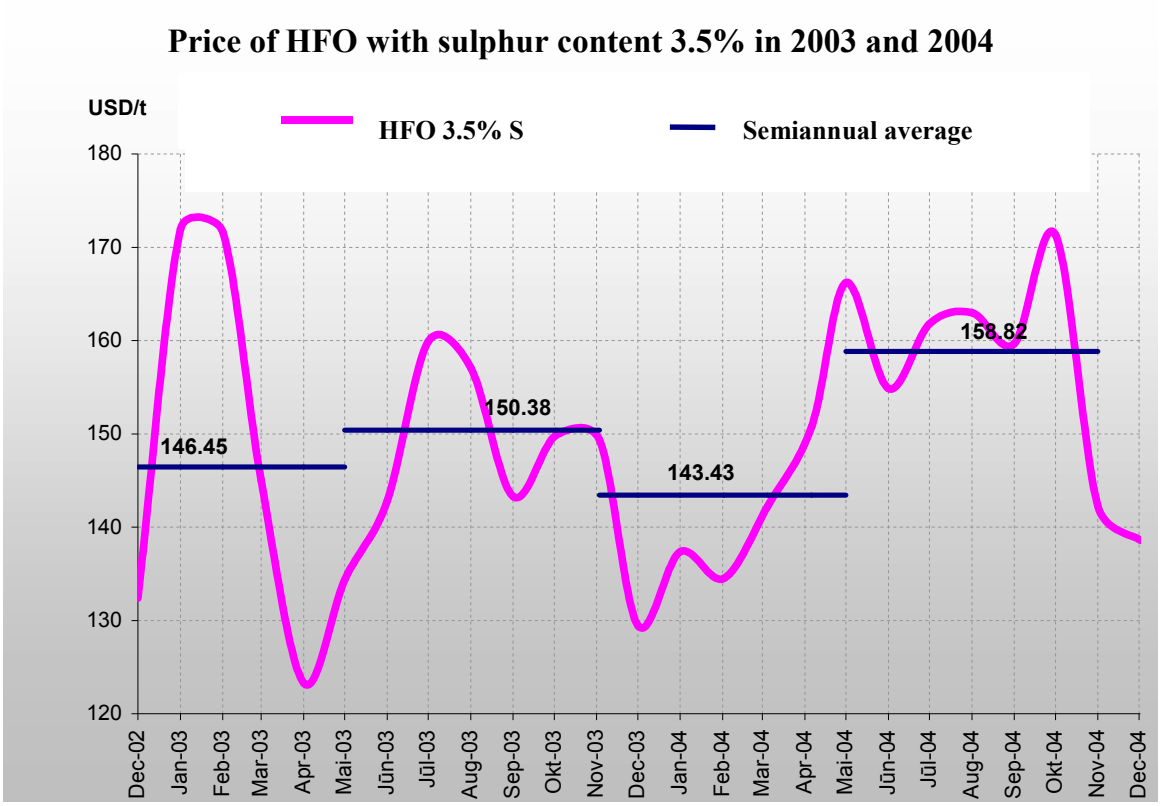
As you can see from the following pictures (3.7-3.10) slight increase of HFO price started in second half of 2002 and gently continued in 2003 and 2004. The average semi-annual values increased from 140.67 in second half of 2002 to 158.82 USD/t in second half of 2004. The real rally of HFO prices started in 2005 when they jumped from 158.82 USD/t in second semi-annum of 2004 to 253.97 USD/t in second half of 2005 and in beginning of 2006 reached 264 USD/t (two months average). In the time period from January 2002 to January 2006 price increase was 2.6 times.

Concerning increase of price of HFO with sulphur content of 1% the situation is very similar: it rose from 202.62 USD/t in first half of 2005 to 296.86 USD/t in first months of 2006.

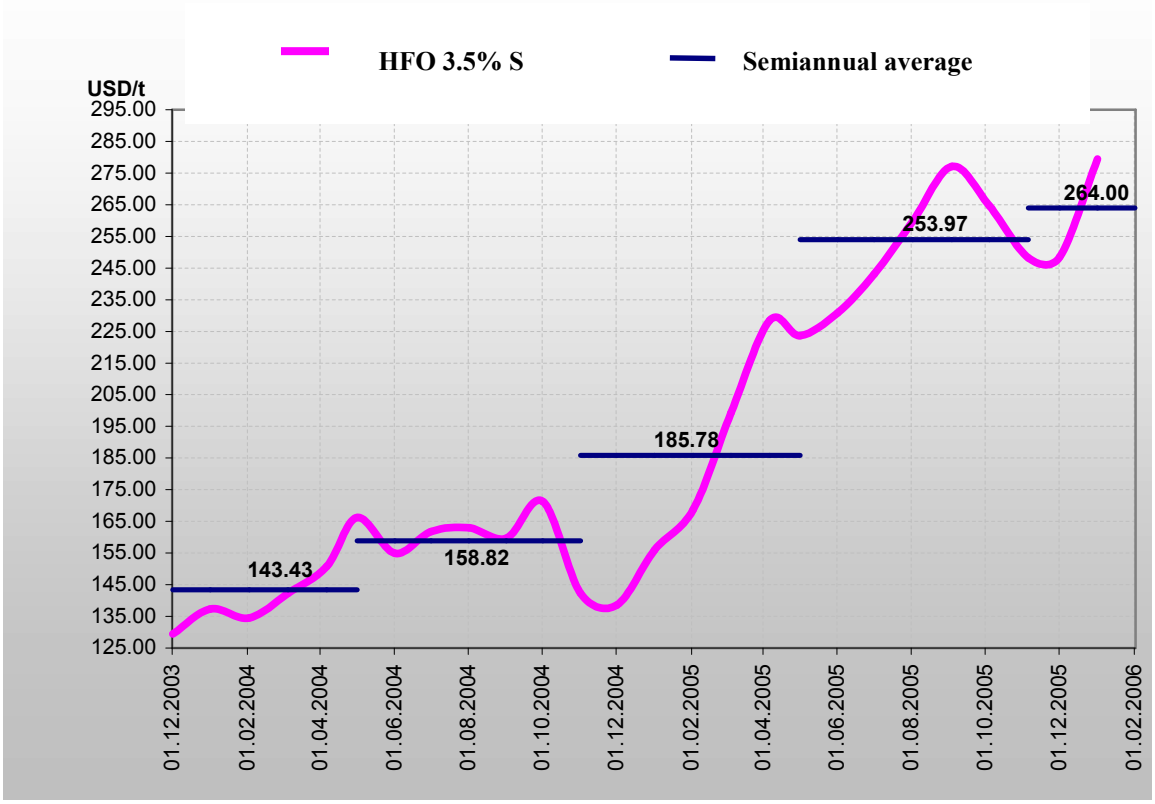
Picture 3.7.



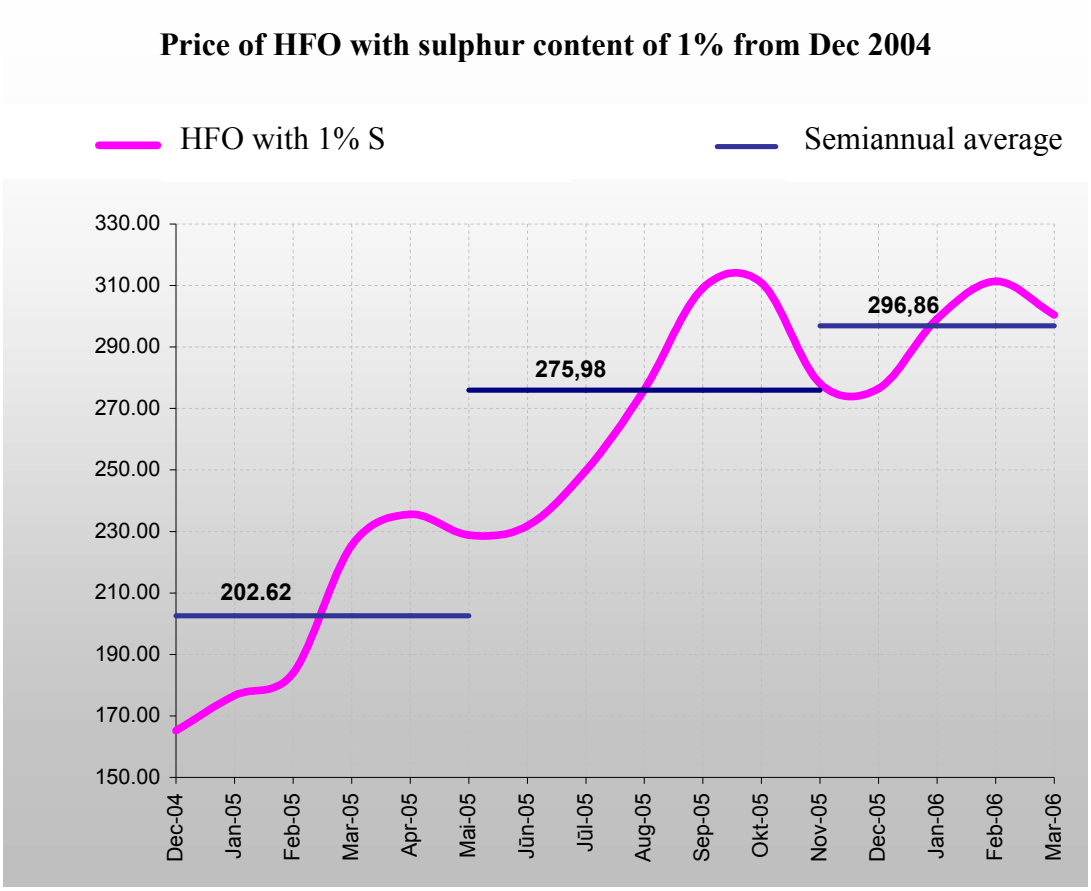
Picture 3.8



Price of HFO with sulphur content 3.5%from Dec 2003



Picture 3.9



Picture 3.10

3.6. Influence of HFO price increase on end-consumer prices in Latvia

3.6.1. Setting of end-consumer gas tariffs in Latvia

In accordance with the law "On Regulators of Public Utilities" [58] and the corresponding normative acts gas transmission, distribution, storage and end-user prices and tariffs for natural gas is set by Public Utility Commission (PUC) in accordance with the methods of calculation approved by PUC.

Referring to the " Natural Gas Sales Tariff Calculation Methodology", tariff ceiling method is used to set the service tariffs [59]. The regulated enterprise shall clearly and unambiguously reflect the costs of each regulated service including only the assets and activities related to the regulated services. The regulated enterprise shall apply the cost allocation model, following approval of its basic principles, specification and introduction by the regulator. The cost allocation model shall be comprehensive. The duration of the tariff review cycle is three years. Regulatory asset base and the rate of return on capital are used for the determination of capital costs. In accordance with the law " On Regulators of Public Services", tariffs shall correspond to economically justified costs. When setting the base tariff the regulator is performing cost and profit analysis and assessment.

Two interrelated activities included in this methodology constitute the basis of tariff setting:

- setting economically justified base tariffs for the base year of the tariff review cycle,
- setting tariff ceiling for years of the tariff review cycle.

Costs to be included in tariff calculation consist of capital costs and operational costs. Capital costs consist of return on capital and depreciation. Only the costs that are justified are included in tariff calculation. Capital costs are comprised of the return on capital and depreciation (amortization). Based on the return on capital, the profitability of operation of sales service provider is analyzed within the tariff review cycle. The regulated enterprise shall provide such accounting of capital costs and their allocation by services that render clear and unambiguous understanding about changes in costs.

The value of the regulatory asset base of sales shall be determined at the beginning of the base year of the first tariff review cycle allocating to it only the usable assets or part of them and using for calculation the remaining balance value at the end of the year of the financial report of the previous year.

Fixed assets acquired by payments (connection fees) from users shall not be included in the RAB value and the depreciation of these fixed assets shall not be covered by the tariff. Since the fixed assets acquired by connection fees are not included in the RAB value, the enterprise cannot base tariff calculations on planned capital return from the respective assets.

At the beginning of the base year of the next tariff review cycle RAB is determined by adding the investment supplementing RAB and accepted by the regulator and implemented within the review cycle period to the RAB value at the beginning of the base year of the previous tariff review cycle and subtracting depreciation.

$$RAB_t = RAB_{t-1} + INV - I_{dep} \quad (3.6)$$

INV – investment supplementing RAB, [Ls];

$\boldsymbol{I_{dep}}$ – depreciation of fixed assets and write-off of the value of intangible assets, [Ls].

The return on capital is calculated by the formula [Ls]:

$$P = RAB * wacc \quad (3.7)$$

RAB – RAB value at the beginning of the base year of the tariff review cycle, [Ls];

$wacc$ – the weighted average rate of return on capital (%).

The return on capital provides the income of owners and creditors from the investments made:

$$P = P_{net\ progn} + I_{interests} \quad (3.8)$$

Gross profit is comprised of the return on capital and taxes to be paid from gross profit:

$$P_{bruto} = P + I_{property\ tax} + I_{income\ tax} = P_{net\ progn} + I_{interests} + I_{property\ tad} + I_{income\ tax} \quad (3.9)$$

The weighted average rate of return on capital is calculated as follows:

$$wacc = r_e * E/(E+D) + r_d * D/(E+D) \quad (3.10)$$

r_e – rate of return on equity;

$E/(E+D)$ – share of equity in the total (own and borrowed) capital;

r_d – rate of return on borrowed capital;

$D/(E+D)$ – share of borrowed capital in the total (own and borrowed) capital.

The rate of return on equity is determined as follows:

$$r_e = r_f + r_c \quad (3.11)$$

r_f – the average interest rate of long-term (risk-free) government bond in OECD countries;

r_c – the risk premium that includes the assessment of country risk and sector risk.

The rate of return on borrowed capital is determined based on one of the following principles:

1. The rate of return on borrowed capital is determined as the average long-term lending rate for domestic enterprises reducing it by the possible volume discount for the regulated enterprise;
2. The rate of return on borrowed capital is determined as the sum of the rate on long-term treasury notes and sector risk premium.

The forecasted return on capital shall be evaluated for the entire tariff review cycle to determine the validity of tariffs and profitability of operation of a service provider.

Sales service provider's operational costs ($\mathbf{I_{op}}$) include the following positions:

$$I_{op.} = I_{pers} + I_{rep} + I_{other} \quad (3.12)$$

I_{pers} – personnel and social costs, [Ls];

I_{rep} – costs of regular operational property maintenance repairs performed by subcontractors, [Ls];

I_{other} – costs of other economic activities, [Ls].

Sales service base tariff (T_s) is calculated by dividing total sales service costs by the number of natural gas users and is determined in Lats per year.

$$T_s = I_s / n_{ab} = A_B \quad (3.13)$$

The subscription fee base is set equal to the sales service base tariff for all natural gas users.

Tariff ceiling principle says that within the tariff review cycle the actual tariff value (FTV_t) at no point of tariff review cycle shall exceed the tariff ceiling value (TGV_t):

$$FTV_t \leq TGV_t \quad (3.14)$$

In the base year tariff ceiling value in terms of money is equal to the base tariff value. The base tariff value is determined on the basis of the forecasted service provider costs in the base year. The tariff ceiling value expressed in percent in relation to the base tariff shall be 100% for the first year of the tariff review cycle. In the following years of the tariff review cycle the changes of tariff ceiling value for a specific year shall be calculated according to the following formula:

$$TGV_t\,[\%] = TGV_{t-1}[100\%] + \Delta TGV_t[\%] \quad (3.15)$$

$$\Delta TGV_t = PCI_{t-1} - X + Z \quad (3.16)$$

ΔTGV_t – changes of tariff ceiling value for the current year of tariff review cycle, [% compared to the previous year of the review cycle];

PCI_{t-1} – consumer price changes in the previous calendar year, [%]. Consumer price changes are determined for the second and third year of the tariff review cycle using the data published by the Central Statistical Bureau of the Republic of Latvia;

X – efficiency changes' factor, [%].
Efficiency changes' factor is determined in relation to the forecasted changes of total productivity factor and other factors the significance of which is evaluated by the regulator, [%];

Z – unanticipated changes' factor, [%].

Unanticipated changes' factor is determined after a motivated request by the service provider.

Tariff ceiling value in terms of money for the next year of the tariff review cycle is calculated as follows:

$$TGV_t\,[Ls] = TGV_{t-1}\,[Ls] * TGV_t[\%] \quad (3.17)$$

Natural gas purchase price is calculated as follows:

$$C_{\,average\ annual\ purchase} = I_{purchase.t} \,/\, Q_{purchase} \quad (3.18)$$

$C_{\,average\ annual\ purchase}$ – the average forecasted natural gas purchase price (system price), [Ls/ths.m^3];

$\boldsymbol{I_{purchase.t}}$ – total costs of natural gas purchase in year n, [Ls].

$$I_{purchase.t} = (\, C_{agreement.t} \times q_{acyual.t} / q_{norm.}) \times L_t + I_{purch..t} \quad (3.19)$$

$C_{agreement.t}$ –natural gas purchase price forecast in year n determined in the contract [USD/1000m^3];

$q_{acyual.t}$ – the forecasted actual lowest calorific value of natural gas in year n, [kcal/n.m^3];

$q_{norm.}$ – normative lowest calorific value of natural gas determined in the purchase contract, [kcal/n.m^3];

L_t – the forecasted exchange rate of 1 USD by the Bank of Latvia in year n;

$I_{purch..t}$ – additional costs of prepayment for natural gas purchase (lending), [Ls].

The regulator approves natural gas sales end-user tariffs. Storage, transmission and distribution service tariffs and natural gas price are included in sales end-user tariffs taking into account natural gas pressure in the distribution system at the connection point of user's facilities or on the border of belonging of distribution gas pipe (high or medium/low pressure) and natural gas consumption volume.

Sales services are included in the subscription fee.

Natural gas sales end-user tariffs by pressure levels are determined as follows:

$$T_{(1\text{ -}8)\ end\ sales\ H.p.} = C_{average\ gas\ purchase.} + T_{TSO} + T_{GSO} + T_{dif\ (1\text{-}8).DSO} \quad (3.20)$$

$$T_{(1\text{-}8).end\ sales\ MLp} = C_{average\ gas\ purchase.} + T_{TSO} + T_{GSO} + T_{dif(1\text{-}8)\ DSO} \quad (3.21)$$

$T_{(1\ -8)\ end\ sales\ H.p.}$ – differentiated sales end-user tariffs for users connected to the high pressure distribution system;

$C_{average\ gas\ purchase}$ – the average forecasted natural gas purchase price, [Ls/ths.m^3];

T_{TSO} – natural gas transmission service tariff calculated in accordance with "Natural gas transmission service tariff calculation methodology" approved by the regulator[60];

T_{GSO} – natural gas storage service tariff calculated in accordance with "Natural gas storage service tariff calculation methodology" [61] approved by the regulator;

$T_{dif.DSO}$ – differentiated distribution service tariffs for distribution system users depending on connection pressure and natural gas consumption volume. Distribution service tariff is calculated in accordance with "Natural gas distribution service tariff calculation methodology" [62] approved by the regulator;

$T_{(1\text{-}8).end\ sales\ MLp.}$ – differentiated sales end-user tariffs for users connected to the medium or low pressure distribution system.

Natural gas distribution service tariffs are calculated for each of the following pressure levels:

- high pressure distribution system (0.4 to 1.6 Mpa);
- medium (up to 0.4 MPa) and low pressure (up to 0.005 MPa) distribution system, including in-yard pipes and access pipes.

surroundings

In March of 2006 the PUC approved new tariffs that become valid from July 1, 2006.

In order to demonstrate the complicity of tariffs the author has shown all currently valid tariffs as follows (all tariffs without VAT):

Natural gas transmission service tariff [63]

7,94 Ls/1000 n.m^3

Natural gas storage service tariff

4,27 Ls/1000 n.m^3

Table 3.11

Natural gas distribution service tariff

Annual consumption volume	Tariff Ls/1000 $n.m^3$
Up to 0,5 thousand $n.m^3$	50,30
From 0,5 thousand.$n.m^3$ to 25 thousand.$n.m^3$	49,23
From 25 thousand.$n.m^3$ to 126 thousand.$n.m^3$	31,68
From 126 thousand.$n.m^3$ to 1 260 thousand.$n.m^3$	26,93
From 1 260 thousand.$n.m^3$ to 12 600 thousand.$n.m^3$	22,18
From 12 600 thousand.$n.m^3$ to 20 000 thousand.$n.m^3$	19,01
From 20 000 thousand.$n.m^3$ to 100 000 thousand.$n.m^3$	10,30
Above 100 000 thousand $n.m^3$	3,49

Natural gas sales service tariffs (subscription fee)

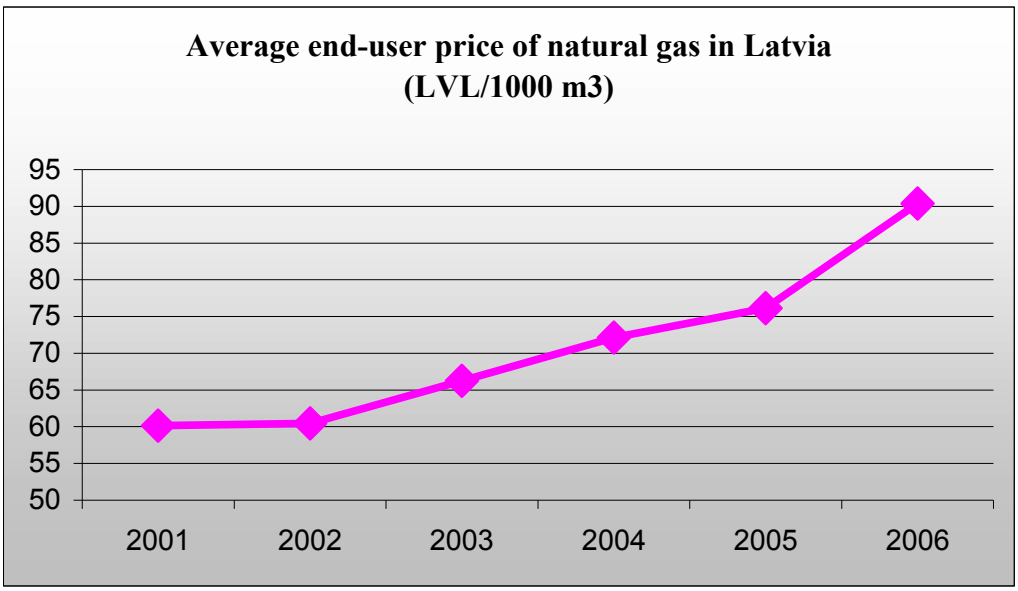
Users that own commercial gas meters 0,62 Ls a month

Users that use commercial meters owned by service provider 0,65 Ls a month

Table 3.12. Natural gas sales end-users tariffs depending on gas consumption volume and quotation of HFO with sulphur content 1% BARGES FOB ARA at caloricity of 7900 kcal/n.m^3 (in Ls/thousands.n.m^3)

	User group depending on annual consumption, thousand.n.m^3							
HFO quotation, USD/t	Up to 0,5	From 0,5 to 25	From 25 to 126	From 126 to 1 260	From1 260 to 12 600	From 12 600 to 20 000	From 20 000 to 100 000	Above 100 000
Up to 100	110,91	109,84	92,29	87,54	82,79	78,62	70,91	64,09
Up to 110	112,62	111,55	94,01	89,25	84,50	81,33	72,62	65,81
Up to 120	114,33	113,26	95,72	90,97	86,22	83,05	74,33	67,52
Up to 130	116,05	114,98	97,44	92,68	87,93	84,76	76,05	69,24
Up to 140	117,76	116,69	99,15	94,40	89,64	86,48	77,76	70,95
Up to 150	119,48	118,41	100,86	96,11	91,36	88,19	79,48	72,66
Up to 160	121,19	120,12	102,58	97,82	93,07	89,90	81,19	74,38
Up to 170	122,90	121,83	104,29	99,54	94,79	91,62	82,90	76,09
Up to 180	124,62	123,55	106,01	101,25	96,50	93,33	84,62	77,81
Up to 190	126,33	125,26	107,72	102,97	98,21	95,05	86,33	79,52
Up to 200	128,05	126,98	109,43	104,68	99,93	96,76	88,05	81,23
Up to 210	129,76	128,69	111,15	106,39	101,64	98,47	89,76	82,95
Up to 220	131,47	130,40	112,86	108,11	103,36	100,19	91,47	84,66
Up to 230	133,19	132,12	114,58	109,82	105,07	101,90	93,19	86,38
Up to 240	134,90	133,83	116,29	111,54	106,78	103,62	94,90	88,09
Up to 250	136,62	135,55	118,00	113,25	108,50	105,33	96,62	89,80
Up to 260	138,33	137,26	119,72	114,97	110,21	107,04	98,33	91,52
Up to 270	140,04	138,97	121,43	116,68	111,93	108,76	100,04	93,23
Up to 280	141,76	140,69	123,15	118,39	113,64	110,47	101,76	94,95
Up to 290	143,47	142,40	124,86	120,11	115,35	112,19	103,47	96,66
Up to 300	145,19	144,12	126,57	121,82	117,07	113,90	105,19	98,37
Up to 310	146,90	145,83	128,29	123,54	118,78	115,61	106,90	100,09
Up to 320	148,62	147,55	130,00	125,25	120,50	117,33	108,61	101,80
Up to 330	150,33	149,26	131,72	126,96	122,21	119,04	110,33	103,52
Up to 340	152,04	150,97	133,43	128,68	123,92	120,76	112,04	105,23
Up to 350	153,76	152,69	135,14	130,39	125,64	122,47	113,76	106,94

As shown in the next chart, natural gas price for end-users in Latvia since 2001 increased by 50.2% and during 2005 by 18.7%. It is expected that in 2006 it will exceed 90 LVL/1000 m3.



Picture 3.11.

3.6.2. Comparison of natural gas end-consumer prices in Latvia and EU

However, natural gas price for end-users in Latvia remains one of the lowest in EU for different groups of customers.

Prices of EU gas end-consumers are collected following the principles and methodology implemented in Directive 90/377/EEC for Price Transparency of the prices charged to industrial end-users [64], extended to domestic end-users. Due to the fact that in EU countries different tariff systems are applied and in order to compare gas prices between different countries, and to observe price differences for different consumption volumes, typical standard consumers are defined, both for household and for industrial consumers. Prices are reported for several standard domestic and industrial consumers. Such standard consumers are defined according to their annual consumption and profile.

Table 3.13. Standard consumers for households:

Standard consumer	Annual consumption
D1	8.37 GJ
D2	16.74 GJ
D3	83.70 GJ
D3-b	125.60 GJ
D4	1047.00 GJ

Table 3.14. Standard consumers for industry:

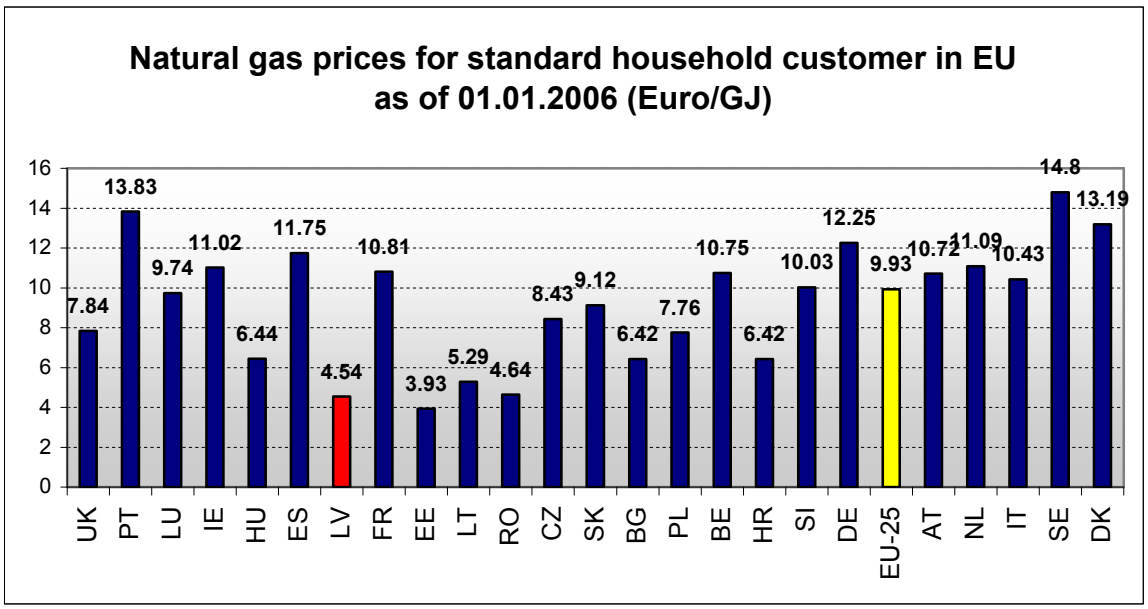
Standard consumer	Annual consumption
I1	418.6 GJ
I2	4186 GJ
I3-1	41860 GJ
I3-2	41860 GJ
I4-1	418600 GJ
I4-2	418600 GJ
I5	4186000 GJ

For comparison purposes as the standard household consumer is chosen with annual gas consumption of 83.7 GJ and for industrial consumer I3-1 with annual consumption of 41.86 TJ.

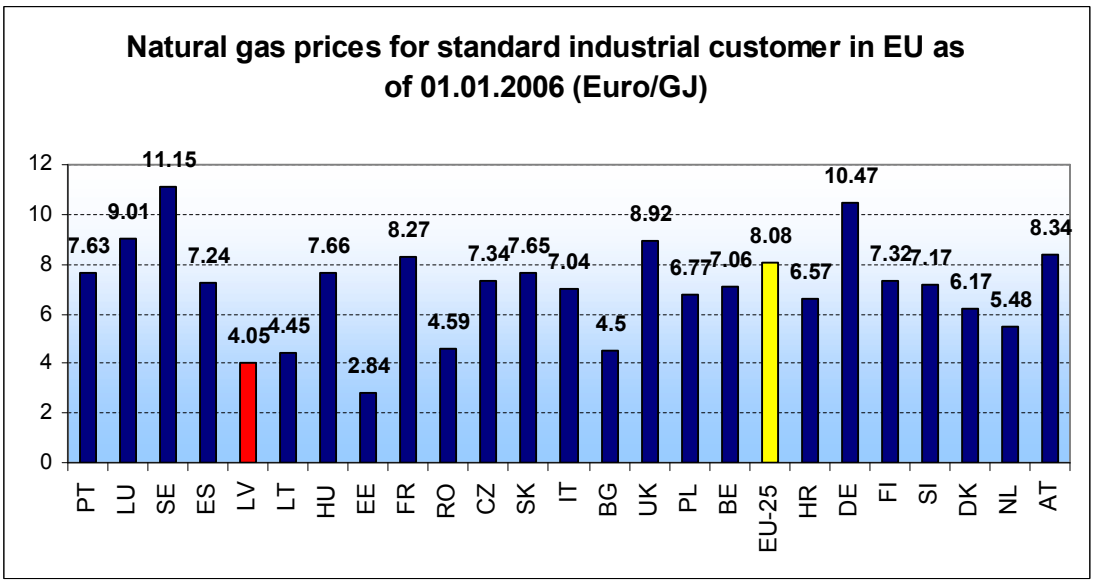
The comparison of natural gas prices for standard household and industrial consumers (without taxes) in EU countries as of 1 January 2006 is shown in the next 2 pictures [65].

The following abbreviations of the countries are used:

BE-Belgium
CZ-Czech Republic
DK- Denmark
DE- Germany
EE-Estonia
EL- Greece
ES-Spain
FR- France
IE-Ireland
IT- Italy
LV-Latvia
LT- Lithuania
LU-Luxemburg
HU- Hungary
NL- Netherlands
AT-Austria
PL- Poland
PT- Portugal
SI- Slovenia
SK- Slovakia
FI- Finland
SE-Sweden
UK- United Kingdom
BG- Bulgaria
RO-Romania
NO- Norway



Picture 3.12



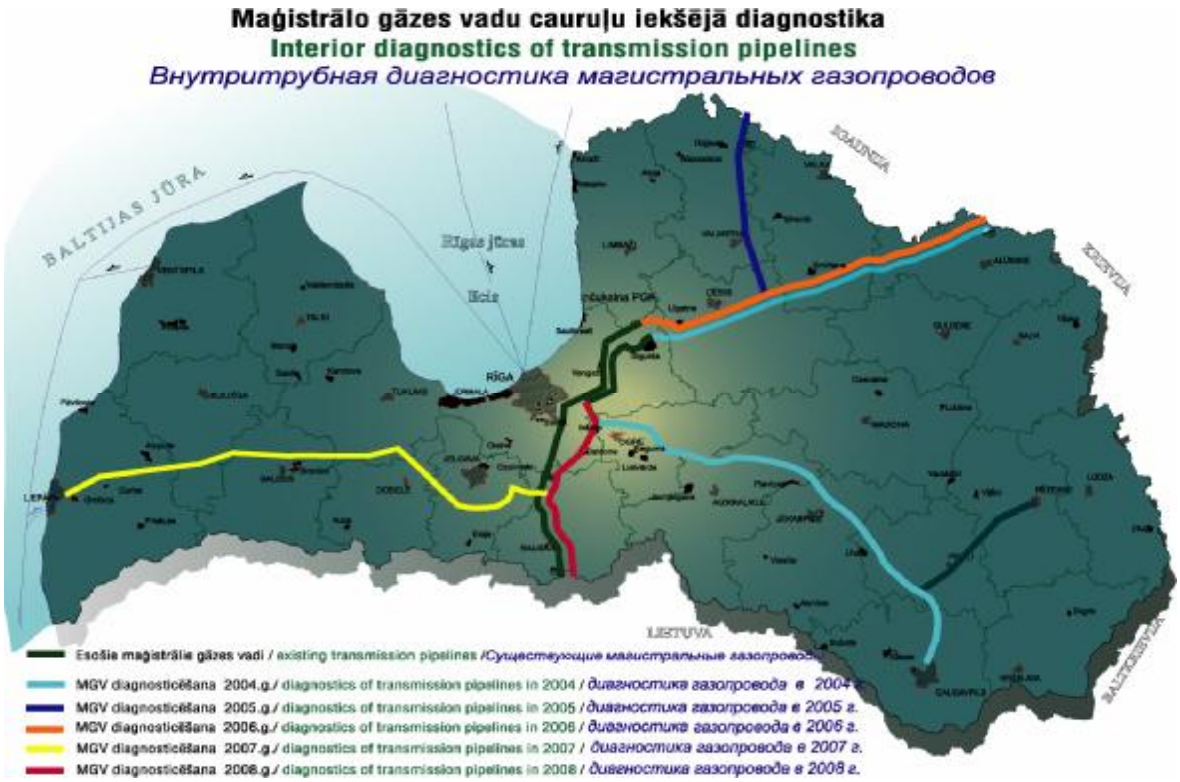
Picture 3.13

As one can see from charts above natural gas prices for average standard customers remain very low comparing to average EU natural gas prices and comprise little more than 50% of average price for both, households and industrial customers. There are several reasons for this situation, which will be analysed later.

4. Technical description of gas supply system in Latvia and its development

4.1. Gas transmission network

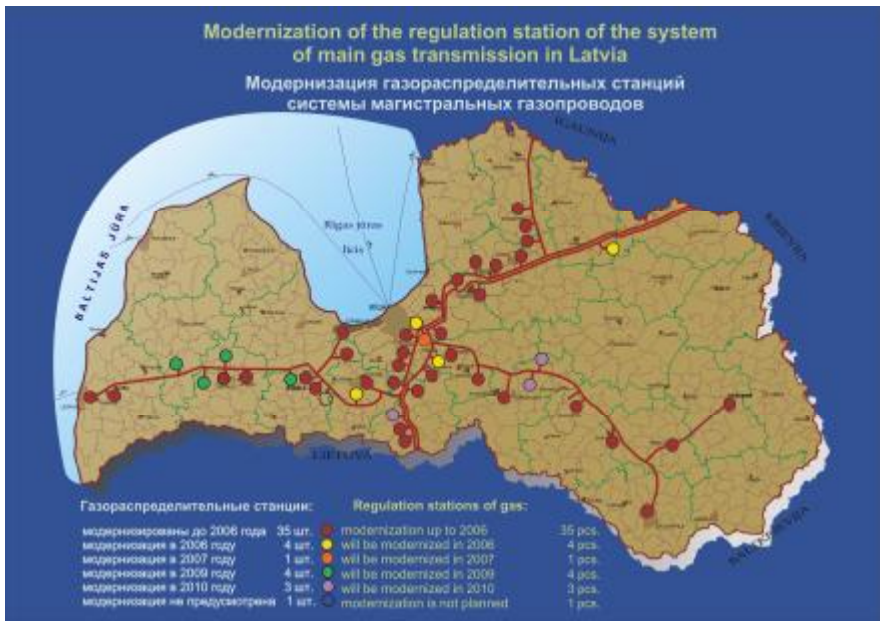
JSC “Latvijas Gaze” operates a 1244.175 km high-pressure pipeline network [66]. This system is supplied with gas from the Russian system. Gas is taken over at the Russian/Latvian border approximately 40 km downstream of the Izborsk compressor station at Korneti Gas Metering Station. East of Riga, the Incukalns underground storage facility is linked to both Izborsk - Riga pipelines. During winter, gas is withdrawn from the underground storage facility, used for Latvian and Estonian consumers and sent back to Russia. In order to supply gas for needs of Lithuanian consumers a new gas metering station has to be built.
More than 40% of gas transmission network is 40 years old or older therefore diagnostics of these pipelines is required. The company has developed the programme for inline diagnostics of the gas transmission pipelines and successfully is implementing this program [67].



Picture 4.1

The stability of gas pressure for customers is ensured by gas 47 regulation stations (GRS). Extensive modernization program[68] of gas regulation stations (GRS) was started in year 1999, in the end of 2003 52.4% of the total number of GRS has been modernized and 20 more GRS must be refurbished. The modernization programme will be completed in 2010.

Picture 4.2. Modernization of gas regulation stations



All modernized GRS fully comply with requirements of European Norms.

Corrosion protection for gas transmission system is guaranteed by 103 stations of cathode protection covering 97-99% of the transmission network.

Picture 4.3. Gas main cathodic protection stations in Latvia

4.2. Metering station

JSC "Latvijas Gaze" has a modern metering station on Russian/Latvian border commissioned on August 1997. It is located near to the primary road connecting Riga in Latvia and Pskov in Russia, in the North- Eastern area of Latvia. Here, the two 700 mm gas pipelines are supplying Latvia with Russian gas, enters the Republic of Latvia. Korneti metering station is metering automatically the flow of gas and analysing the quality of natural gas. Maximal total flow is 15.0 a day, and minimal total flow 2.0 x 10^6 N $_{20}$ m^3. Capacity of the metering station is 2-15 million m^3 per day. Operation mode is either remote operation from Riga or local operation from site control room with monitoring in Riga. The bi-directional metering station is equipped with orifice turbine meters measuring actual, average over time and accumulated volumetric flow values. In addition gas composition, specific gravity, calorific value, dew point by means of gas chromatography system and other analyzers are recorded. The accuracy of the metering station is better than 1% of actual flow. Designed pressure of the station is 54 and operating pressure range from 20 to 54 bar gauge.
Gas metering sation Korneti is one of the most modern in Central and Eastern Europe.

Picture 4.4.
Gas metering station Korneti

4.3. Distribution system

Natural gas is supplied to the consumers from distribution network where it enters from the transmission network via pressure regulation stations. Total length of the distribution network is 3586.1 km, including 621.3 km of polyethylene (PE) pipelines. Distribution lines are divided in three pressure groups:

- High pressure (4 to 12 bar) 688.9 km
- Medium pressure (0.05 to 4 bar) 1120.1 km
- Low pressure (up to 0.05 bar) 1777.0 km.

Diameter of distribution lines varies from 25 mm to 700 mm for steel pipes and from 33 mm to 225 mm for PE pipes.
The company ensures stabile supply pressure for gas equipment by means of pressure regulation equipment: gas regulation installations (233 units), cabinet-type gas regulation installations (623 units) and house regulators (3344 units). Extensive modernization program of these units have been started in 1999 and will be completed in 2004.Corrosion protection for gas pipelines is ensured by 359 protection installations consisting of cathode stations (289 units), reinforced drainage installations (45 units) and polarized drainage installations (25 units). By means of these units coverage of 95%-97% of the total network of underground steel gas pipes is ensured. In general, great attention was paid by the Company to further

natural gas distribution system expansion and new users' connection to the existing gas supply system. Since 2002 JSC " Latvijas Gaze" was building and till 2007 is planning to build some 200 km of new pipelines in average.

Picture 4.5

4.4. Storage Facilities

The Incukalns Underground Gas Storage facility is located approximately 50 km North-East of Riga and connected to both parallel lines from lzborsk to Riga.

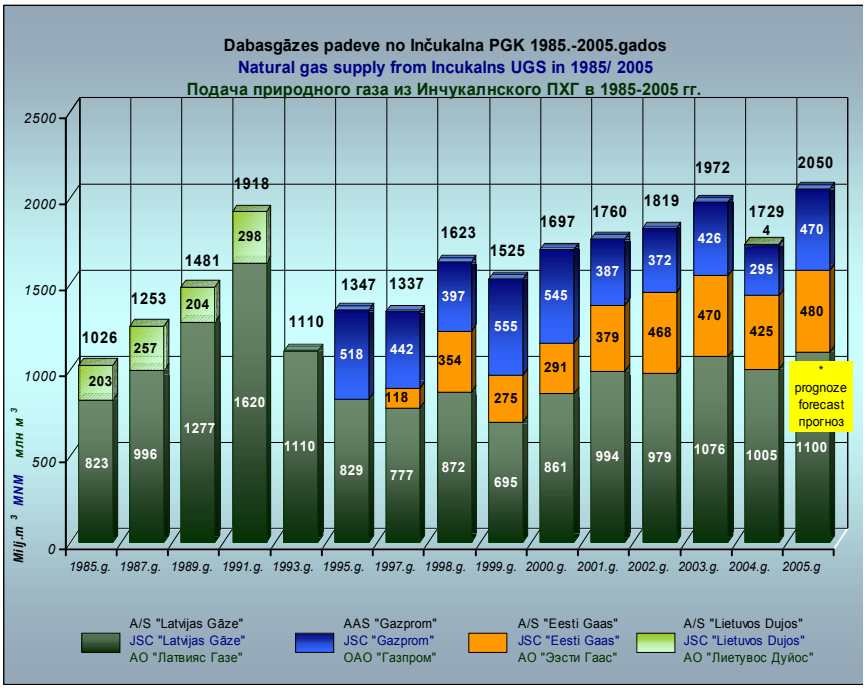
The aquifer has been under development since 1961 [69]. Gas was first injected into the structure in 1968. The gas volume has now reached a total of 4.4 x 10^9 Sm^3 (reference temperature 20 °C). The working gas volume is estimated to be 2.255 x 10^9 Sm^3. Gas storage is developed in Cambrian sandstone reservoir with average porosity values over 20%, average gas permability of 460 milidarcies at the average depth 700 meters covered by a thick and integral seal composed of clays and dense limestone. There are 93 working well in Incukalns UGS cumulatively capable of withdrawing 30 Mm^3 a day.

The maximal designed pressure of the reservoir is 105 bar, minimum operating pressure 40 bar, maximum deliverability quantity at maximum pressure 30 Mm3/day, maximum deliverability quantity at minimum pressure 10 Mm3/day.

The designed maximum injection rate is 15 x 10^6 Sm^3/day. The actual injection rate varies from 2 Mm3 to 15 Mm3 a day. The designed maximum withdrawal rate is 30 x 10^6 Sm^3/day, but actually it varies from 2 Mm3 to 24 Mm3 a day. Two 720 mm pipelines carry gas from gas transmission grid, which is located about 1 km from the storage. Transmission line pressure varies from 25 bar to 42 bar, but typically runs from 31 bar to 36 bar. The gas flows from the station side gate valves, through scrubbers at the compressor station and is compressed after which it flows to three storage field distribution points, where the gas is measured and flows to the 93 storage wells.

On withdrawal the gas flows from the wells to the field distribution stations where the pressure is regulated and the gas is measured. It then flows back to the Cooper Bessemer compressor station site only, where the gas is filtered, scrubbed and passed through a dehydrator and delivered to the pipeline. All of the station piping and wells are under cathodic protection utilising 8 rectifiers strategically located. In total in Incukalns UGS there are five

reciprocating compressors at station, which are designed for gas compression during injection. The total capacity of the drivers is 22100 kW. Five Cooper Bessemer Z-330-7500 hp units were installed in 1995. Two of these units are in first stage service, three units in second and third stage service. Gas is cooled after each of three stages of compression. Major modernization works at present are carried out in Incukalns UGS. The largest investments in IUGS are provided for installation of new compressor, modernisation of bore-wells and gas collection stations.



Picture 4.6

Currently Incukalns UGS is used not only for needs of Latvian consumers, but also for customers in Northwest Russia, Estonia and Lithuania.

5. Issues of gas market opening and liberalization in Latvia

As it was explained before JSC "Latvijas Gaze" and Latvian Government requested European Commission to grant derogation from gas market liberalization. As this subject is of a vital importance, in the following capture reasons for asking the derogation are analysed. The main reasons due to which the Republic of Latvia requested a possibility to abstain from introduction of individual norms of the Directive are:

1) the rules of competition in the region;
2) agreements between the Republic of Latvia and the Joint Stock Company Latvijas Gaze;
3) other reasons.

Below each of the enlisted reasons has been analysed in detail.

5.1.Competition rules in the region

The network of gas supply in Latvia is not linked to gas supply systems of other countries, and the systems of gas supply of the three Baltic States are only linked with each other, as well as linked to the gas network in Russia and receive natural gas only from Russia. Due to this, the Baltic States can be classified as isolated market. This fact is also confirmed by the Communication of the European Commission to the European Council and European Parliament published on November 14, 2005. In the technical annex to the Communication, the European Commission emphasizes that the Baltic States and Finland are not linked to the gas system in Europe and this situation may change only upon impact of economic circumstances.

As mentioned already previously and as justly confirmed also in the Report of the European Commission dated November 15, 2005, both Latvia and the Baltic region and Finland as a result of objectively arising conditions have only one internal gas supplier – the Russian company OAO Gazprom, which is the sole owner of gas transportation system. Besides, the Latvian border simultaneously is the Eastern border of the European Union and there are no other possibilities of supplying natural gas to Latvia from EU countries.

Subsequently upon such historical circumstances competition in Latvia in the gas sector is not possible.

5.2.Agreements between the Republic of Latvia and the stock company Latvijas Gaze

On August 2, 1995, on the basis of the Republic of Latvia Cabinet of Ministers' order No. 444, the state stock company Latvijas Gaze was included in the list of companies subject to privatisation. On November 24, 1995, the "Basic Rules of privatisation of the state stock company Latvijas Gaze" were approved, which planned to privatise the Company by means of attracting foreign capital, by selecting two strategic investors, one of which should be the supplier of gas. Besides, one of the most essential criteria for selection of strategic investor in the basic rules was the proposal of potential investor to make investments for relatively long-term development of the Company. In this connection, potential investors during the negotiations with the Latvian government discussed concrete proposals and requirements for

improvement of situation in the area of gas supply and avoiding of the Company's bankruptcy.

According to the submitted proposals, the Board of the Latvian Privatisation Agency on August 1, 1996 approved proposals of the Tender Commission about selection of two strategic investors: a group from Germany, set up by Ruhrgas AG and Preussen Elektra AG and the stock company Gazprom.

On April 2, 1997 the Republic of Latvia, represented by the state stock non-profit organization Latvian Privatization Agency, on one part and the Joint Stock Company under privatisation Latvijas Gaze on the other part, and Ruhrgas AG and PreussenElektra AG (now – E.ON Energie AG) on the third part entered into the Share Purchase Agreement, and the Republic of Latvia, represented by the state stock non-profit organization Latvian Privatisation Agency, on one part and the stock company under privatisation Latvijas Gaze on the other part, and the open stock company Gazprom on the third part entered into the Share Purchase Agreement (hereinafter both agreements together referred to as the Share Purchase Agreements), as well as the Republic of Latvia, represented by the state stock non-profit organization Latvian Privatisation Agency, on one part and the stock company under privatization Latvijas Gaze on the other part, and Ruhrgas AG and PreussenElektra AG (now – E.ON Energie AG) on the third part entered into the Shareholders' Agreement (hereinafter – the Shareholders' Agreement).

In the Share Purchase Agreement, the government of the Republic of Latvia, admitting that the Company is operating on commercial grounds, undertook the following commitments and guarantees:

In accordance with the basic rules of privatisation of s/c Latvijas Gaze in the Share Purchase Agreements and the Shareholders' Agreement, the government guaranteed to preserve JSC Latvijas Gaze as an integral company whose main types of operations would be transportation, storage, distribution and sale of natural gas, and the Company will be granted exclusive licenses for transportation, storage, distribution and sale of natural gas until the year 2017.

Besides, the government guaranteed that JSC Latvijas Gaze would be granted unlimited and exclusive right to use Incukalns UGS for the period of twenty years.
Participation of foreign investors in the privatisation was agreed in the above mentioned guarantees by the Latvian government.

It should be noted that the first Directive on common principles on creating of internal natural gas market (98/30/EC) was adopted only on June 22, 1998 (withdrawn by the Directive 2003/55/EC) [70] and the date for accession of Latvian to the European Union was not agreed yet.

Failure by the Latvian government to meet its contractual commitments may leave a range of adverse consequences, including a request to return compensation for investments made and indemnification for losses to the shareholders. Meanwhile, the stability of natural gas supplies may be threatened, which would leave a definitely negative impact on the Latvian economic condition.

5.3.Other reasons

1) Commitment of the Latvian government to meet the provisions of international treaties

The Saeima (Parliament) of the Republic of Latvia on December 13, 1995, by means of the law "On Regulations of the European Charter concerning Energy Issues" [71] approved a regulation of the European Charter concerning energy issues (signed on December 17, 1994 in Lisbon) whose Article 16 provides that if the Parties later sign any other agreements whose regulations would change the provisions of previously signed agreements, then the regulations of the Charter, which are more favourable to the investors, would be applied.

The Latvian government is liable for violation of provisions stipulated in the Share Purchase Agreements and the Shareholders' Agreement.

2) Isolated market with a single internal gas supplier

The network of gas supply in Latvia is not linked to the systems of gas supply of other countries, and the systems of gas supply of the three Baltic States are only mutually linked to each other, as well as to the gas network of Russia and receive natural gas solely from Russia. Thus the Baltic States may be classified as an isolated market.

This fact is confirmed also by the European Commission Report to the European Council and the European Parliament published on November 15, 2005. In the Technical Annex of the Report the European Commission emphasizes that the Baltic States and Finland are not connected with the European gas network, and this situation may change solely in the influence of economic circumstances [72]. As we know, Finland has been granted deviations for liberalization of the gas market, and in this country only the secondary gas market has been liberalized. It should be noted that this secondary market actually is not operating because in this SPOT market in 2005 (January-October) only about 0.76% of the total gas consumption in Finland was sold [73]**.**

3) Emerging market

JSC Latvijas Gaze has one major internal supplier – OAO Gazprom. Until the year 2002, given the political situation and changing economic conditions, the Company could not sign an agreement with the main supplier for a period longer than one year. Besides, the agreed contractual price and some other individual provisions of the agreement were not based on generally accepted principles of gas market because the price of competing power sources was not taken into account, but there was only one price fixed, which was mainly based on the political state of affairs and other conditions, which are not connected with market processes. In additions, such agreements signed for one-year period lacked many provisions, which were necessary for successful performance of agreement in market conditions. Only at the end of 1999, the first agreement on supply of gas for a medium period was signed. The mentioned agreement came into force on January 1, 2000 and was in force until 2005. This agreement included the basic rules, which are characteristic to a commercial agreement on supply of gas, but in 2003, for the purposes of elimination shortcomings of the mentioned agreement, an Appendix to the Agreement was signed whose period was 10 years and which came into force on January 1, 2004. This Appendix included all provisions, which are characteristic to a long-term agreement on supply of gas. In accordance with the Directive, a new market – it is a member country whose first commercial supply in accordance with the first long-term agreement on supply was made no more than 10 years ago. The Directive of the European

Council 2004/67/EC "On measures to be taken for ensuring safety of natural gas supplies" [74] provides that a long-term agreement on supply of gas is an agreement whose period is more than 10 years. In accordance with the definitions of the Directive 2004/67/EC of the European Council, the gas market in Latvia fully complies with the definition of "new market" not only literary, but also in substance because only the Appendix to the Agreement with the main supplier includes all the necessary commercial provisions based on the market provisions of power resources in Europe.

4) Investments

Firstly, it should be noted that the gas system in Latvia was created in Latvia starting from the 60-ties of the previous century, about 40% of main gas pipelines and about 25% of distribution networks are older than 30 years and require large capital investments.

Already starting from the year 1997, i.e., the year when strategic investors started their involvement in JSC Latvijas Gaze, in accordance with the provisions of the Shareholders' Agreement, the Company renewed making of investments into modernization of the gas supply system, raising of safety of facilities and construction of new lines.

If the Company is not retained as an integral enterprise, then separated units would not be able to make the necessary investments.

In view of the above mentioned, we ask to ensure that the Republic of Latvia until the year 2017 has a possibility to withdraw from implementation of some individual norms of Directive 2003/55/EC.

5.4.Impact of postponement of Directive implementation on the market development

5.4.1. Benefits

In connection with the fact that real market liberalization due to historical reasons, as explained before, is not possible in Latvia, all those factors, which positively impact the gas market of other countries when liberalizing it, will not work here. Thereby the most essential benefit from postponement of opening of the market will be the fact increase of costs will be lower, compared to the cost increase in case of market liberalization. Thus JSC "Latvijas Gāze" for its consumers will be able to offer natural gas for lower prices than in case of market liberalization.

Meanwhile, market liberalization would adversely impact also the moral climate in the very JSC "Latvijas Gāze". If at the moment being the Company, which recently carried out the necessary restructuring measures by using considerable material resources for this purpose, as well as irrespective of the considerable decrease of the number of employees, nevertheless reached the understanding of workers about the occurring matters, then in case of repeated restructuring by making division of the company, such an act would be hardly understandable. Consequences of such unreasonable action might be loss of employee motivation, which may adversely impact work safety and results achieved.

Finally, a very essential benefit is a possibility for the Company is to continue the started investment program whose enforcement will ensure with gas not only the consumers in those Latvian regions where the gas is not yet available, but will also promote the gas supply safety

of the region, which includes not only Latvia, but also Estonia, Lithuania, North-West of Russia and later also Finland. In case of partial enforcement of the investment program, ensuring of safe gas supply to all these consumers might be even more problematic, but this program can efficiently be realized solely by a unified company JSC "Latvijas Gāze".

5.4.2. Losses

Given that real gas market liberalization is not possible in Latvia, no losses might arise from postponement of implementation of the directive.

5.4.3. Impact on the natural gas price

Opening of the gas market in the Latvian circumstances will considerably increase the final gas tariffs for users, especially for those with small gas consumption scope. It is connected with the circumstance that in case of introduction of authorized users, the part of full costs of distributions network will be referred to the "small" users' tariffs by considerably increasing them. However, such an act would be discriminating towards "the small" users, it does not comply with the requirements of the EU directive, as in the current gas supply system in Latvia the "large" users also use the gas distributions networks.

In case of opening of the gas market in connection with the expected growth of gas purchase prices for the merchant's technological needs, all levels of service tariffs will materially grow too.

If the users buy the natural gas from other suppliers (without involvement of Russian companies), for example, Central Asian countries, higher gas price level is expected on the border of Latvian State and also higher "final" tariff level is expected for practically all users, which is connected with growth of transit rates upon increase of the distance of supplies.

If individual users themselves buy gas from a/s "Gazprom" (from Russia), but without discounts on amount, compared to the variant that the whole gas is bought by JSC "Latvijas Gāze", the expected purchase price level can be compared with the variant that gas is bought from the Central Asian countries and users' tariff level are also respectively higher.

The lowest tariff level is ensured by retaining the existing system when all gas is bought by JSC "Latvijas Gāze" and retaining the existing tariff calculation methodology.

5.4.4. Impact on costs

According to the information from EC Report Technical Annex [75], division of a Company with more than 100,000 consumers creates additional one-time costs of EURO 3-10 million, and additional production costs of 10-15%, which would clearly cause rapid growth of gas price for consumers. There is no basis to consider that in case of Latvia these costs will be lower. Taking into account:

1) the current tendencies in the fuel market when the gas prices preserve to be high;

2) equalization of supply prices between the Western European and Central and Eastern European member countries, which in the next year will cause a growth of gas supply prices in Latvia by about 30% -50% depending on the mazut price, with a tendency to grow still more in the future;

3) the high inflation level in Latvia, which in 2005 will increase 7% and is the highest among EU member countries;

4) the Latvian low GDP per capita, given the real purchasing power, which in 2005 is only 45.4% of the average rate among the EU member countries [76],

any additional costs, which will be invested in the Company's reorganization are not justified and ungrounded, as in the given circumstances it is not currently possible in Latvia to create a really functioning free gas market, which is evidenced in the practice by the situation in the Finnish gas market**.**

Together with the growth of production costs, there is a basis to consider that also the gas purchase costs will grow. Firstly, it is connected with Take-or-Pay provision in the gas supply agreement with OAO "Gazprom", which is in force until the year 2015 and provides 100% Take-or-Pay provision. Therefore JSC "Latvijas Gāze" will have to pay also for any gas amount, which it was unable to sell.

Secondly, there is a possibility that OAO "Gazprom" as the only external gas supplier if the market is liberalized and thus the guarantees are not observed, which the Republic of Latvia gave to OAO "Gazprom" by signing respective share purchase and sale and Shareholders' Agreements, Latvia would apply exactly the same provisions as when fixing the gas sales price to Western European countries, which would cause rapid growth of gas prices in Latvia.

Given the above mentioned, the norms of the Directive, the European Energy Charter agreement and the promises given by the Republic of Latvia to the joint stock company "Latvijas Gāze" and its foreign investors have asked to grant the Republic of Latvia a derogations from implementation of individual norms of the Directive until the year 2017.

However, Saeima (Latvian parliament) had passed a special Law [77] on postponement of becoming effective several articles of the Energy Law till January 1, 2010, which actually mean that gas market opening in Latvia is postponed to year 2010. EC have not objected to the decision of the Saeima.

6. Prospects of development of Incukalns UGS and integration of underground gas storage potential into European Gas Network

It is expected that natural gas consumption in Latvia will increase [78]. The same trend of gas consumption is forecasted in the neighbouring countries also. According to the estimates performed by specialists of the OAO "Giprospecgaz" in their feasibility study regarding regional development of gas supply system in Baltic Countries, North-West Russia and Finland, needs for natural gas will reach in year 2015 in Latvia 2.8 $.10^9 m^3$, Lithuania 5.25, Estonia 1.37 $.10^9 m^3$, Finland 6.07 $.10^9 m^3$ and Russia 39.98 $.10^9 m^3$ (BCM). Total gas demand of this region in year 2015 will reach 39.98 $.10^9 m^3$, and in year 2020 even 41.76 $.10^9 m^3$. (see Table 6.1.) At the same time, due to the fact that natural gas in the region is and according to prognosis will be extensively used for heating purposes, huge difference between gas consumption in summer and winter will remain [79], and, for example in 2015 monthly consumption of gas in July, according to the forecasts, will be only 36% of the one in January. Needs for natural gas in the countries described above are shown in the Table 6.1. [80]

BCM

Consumers	Years			
	2003	2010	2015	2020
Latvia	1.65	2.20	2.80	3.00
Lithuania	2.96	4.96	5.25	5.46
Estonia	0.85	1.10	1.37	1.50
Finland	5.11	5.62	6.07	6.10
NW Russia	19.45	22.92	24.49	25.70
TOTAL	**30.02**	**36.80**	**39.98**	**41.76**

Table 6.1. Annual gas consumption volumes

At present, gas to Latvia is supplied in summer by two pipelines of 720 mm diameter and is taken over at the Russian/Latvian border approximately 40 km downstream of the Izborsk compressor station at the Korneti Gas Metering Station. East of Riga, the Incukalns Underground Gas Storage (UGS) facility is linked to the both Izborsk - Riga pipelines. During winter, gas is withdrawn from the underground storage facility, used for Latvian and Estonian consumers and sent also back to Russia [81].

Estonia is receiving gas by two pipelines Isborsk- Tartu-Rakvere (530 mm) through the whole year, and Viresi-Tallinn (720 mm) via Latvia in winter. The same like in Latvia, there the highest monthly consumption (in winter) and the lowest monthly consumption (in summer) differs greatly and reaches even five times.

What concerns Lithuania, gas is supplied only by pipeline Minsk-Vilnius (1220 mm). After commissioning of gas-metering station on Latvian –Lithuanian border it is expected that

"Lietuvos Dujos" will receive gas supplies from Incukalns UGS on regular basis (not only in high emergency cases, like it is now). In Lithuania, summer and winter monthly gas consumption difference is about two times.

For NW of Russia gas is supplied by pipeline systems Grazovec-Leningrad, Serpuhov-Leningrad and Belousovo-Leningrad from Nadim-Pur-Tazovsk region of Tymen Oblast.

Picture 6.1. Map of gas transmissions pipelines

Gas to Finland is supplied by pipeline Leningrad-Viborg- Russian border. Both, in Finland and in NW Russia, similar to three Baltic Countries, gas consumption in winter months comparing to summer months differ at least two times.

In order to meet changing demands of customers in this particular region, currently there are three underground gas storages in operation: Incukalns UGS in Latvia and Nevskoye and Gatchinskoe in Russia.

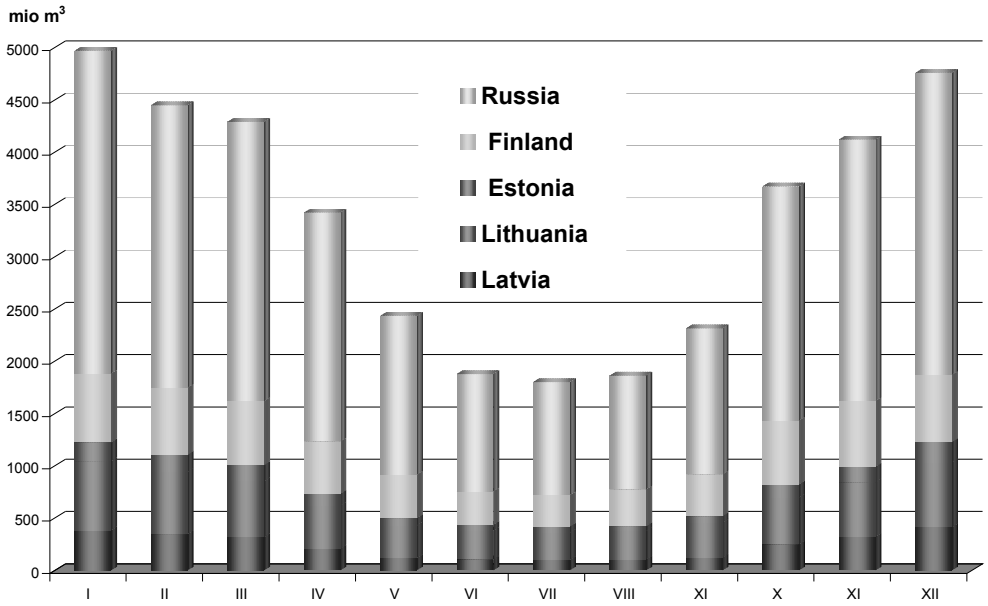
6.1. Aims of developing Latvian underground gas storages

In my opinion, potential of Latvian underground gas storages can be well used to meet increasing and changing demands for natural gas in the region and, therefore, Joint Stock Company " Latvijas Gaze", which owns and operates Incukalns Underground Gas Storage in Latvia, currently with the active gas volume of 2.3 $.10^9 m^3$ (total volume 4.4 $.10^9 m^3$) initiated

feasibility study regarding development of regional gas transmission network and possibilities of utilization of natural underground gas storage potential in Latvia, which was performed by OAO " Giprospecgaz".

Following the request of JSC "Latvijas Gaze" specialists of OAO "Giprospecgaz" have performed analysis of natural gas demand in Baltic Countries: Latvia, Lithuania, Estonia and Finland and NW Russia based on the information obtained from the gas companies of particular countries.

The compiled results show that the unevenness of the monthly consumption and, in particular, difference in natural gas consumption in summer and winter months will remain high, as presented on the following Figure 6.2.



Picture 6.2. Unevenness of natural gas consumption in year 2015

In order to meet changing demands of consumers, the capacity of the underground gas storages in the region have to be increased. Following the suggestions of OAO "Giprospecgaz" specialists, it is advised to increase Incukalns UGS capacity due to

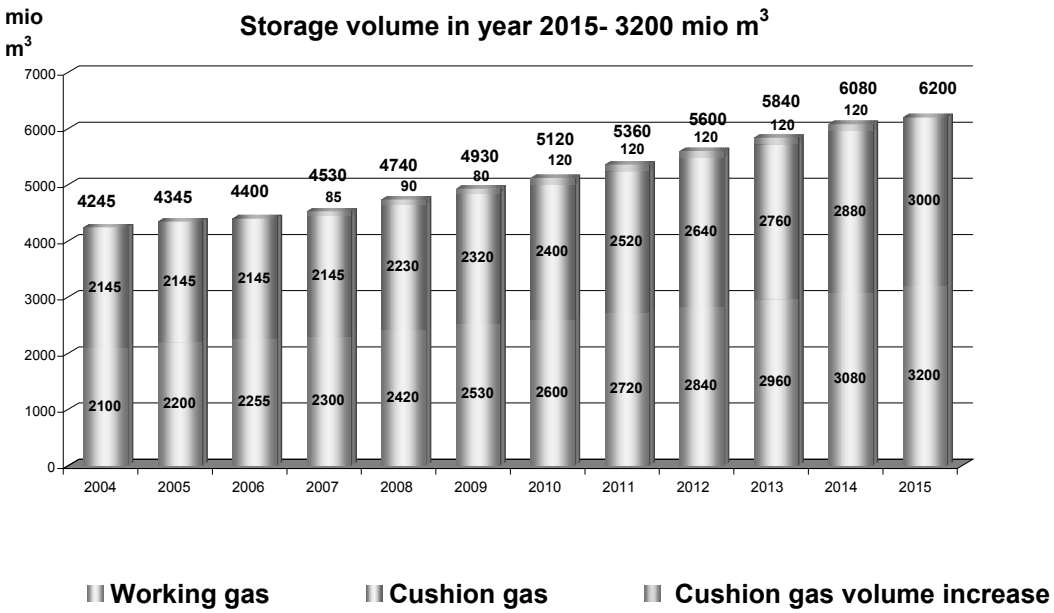
- existing structure in place with potential for further increase;
- increase of gas consumption in the region;
- seasonal unevenness of gas consumption;
- limited options for development of other storages in the region.

Taking into consideration geological features and gas dynamics of the reservoir, it is estimated that without construction of additional wells active storage volume of Incukalns UGS can be increased to 2.3-2.6 $.10^9 m^3$ and then further to 3.2 $.10^9 m^3$. At the same time, it is expected that the active volume of Nevskoye UGS will be increased to 1.9 $.10^9 m^3$ on 2010 and 2 $.10^9 m^3$ in 2015, and Gatchinskoye UGS remain at current volume of 0.2 $.10^9 m^3$ of active gas.

Referring to the feasibility study performed by OAO "Giprospecgaz" specialists [82], gas from Incukalns UGS can be delivered to Finnish customers, first, by pipeline Viresi-Tallinn and, following, by pipeline Tallinn-Helsinki with the length of 111 km, including 63 km submarine pipeline, which has to be constructed. In order to meet estimated demand in Finland, the diameter of pipeline shall be 700 mm with submarine part 500 mm, and two compressor stations, one in Latvia and one in Estonia, and one reception terminal in Finland also shall be built. The total estimated annual volume to be delivered to Finland in 2015 may reach 750 Mio m^3.

In order to deliver estimated annual gas volumes for meeting customer needs in Lithuania, which is set on the level of 200 Mio m^3 for years 2015-2020, the looping to gas pipeline Iecava-Liepaja shall be built with diameter 500 mm and length of 75 km.

It is estimated that Estonian customers in time period of 2015-2020 may need 600 Mio m^3, which will be delivered by pipeline Viresi-Tallinn through the gas metering station "Karksi".

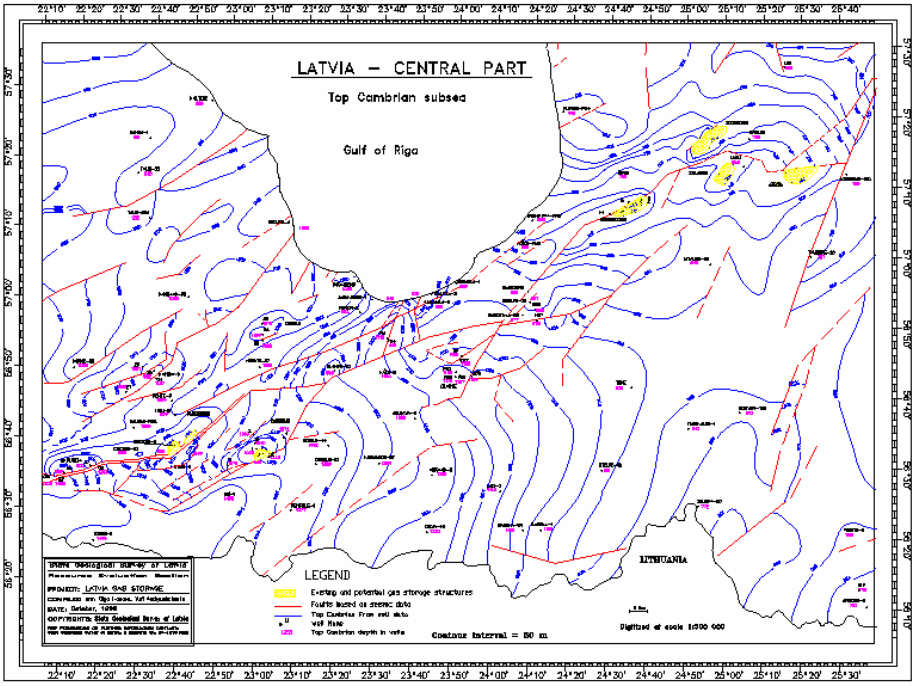


Picture 6.3. Gas volume increase in Incukalns UGS

6.2. Prospects for the Latvian UGS development

Governments of Baltic Countries are expressed their interested in gas transit through them from Russia to Europe. In such case, a special role could be played by the Latvian underground gas storage (UGS) facilities (the existing Incukalns UGS as well as potential UGSs that could be successfully built utilizing favourable geological conditions in Latvia) [83]. These UGSs might be used most profitably if they were filled with cheaper gas during summer time, but gas used in winter.

Construction of new UGSs requires large investments, however these investments might become a profitable money allocation. Besides, it should be remembered that UGSs of a large capacity (up to $50.10^9 m^3$) situated in the centre of Europe would improve security of gas supply, especially if one takes into account the huge distances from the gas fields of Russia (3000 - 4000 km). Gas as highly efficient fuel can be utilized in a wider scale for traditional purposes (household, industry, etc.) in all Baltic Countries, especially taking account of their only partial coverage with gas pipelines.



Picture 6.4. Possible sites of UGS in Latvia

The Joint Stock Company " Latvijas Gaze" in Latvia has its own UGS (Incukalns UGS) with active capacity $2.2.10^9$ m^3 [84] and it is one of the biggest UGS in the Europe (sea Table 6.2). Bearing in mind distance from gas extraction places in CIS and Norway, this UGS can play a significant role in gas supply security in North Europe. It also can give profit if during summer time, when gas pipeline from CIS are not overloaded and gas marginal cost is approximately 30% or even more cheaper than during winter time, is stored and than in winter extracted and sold.

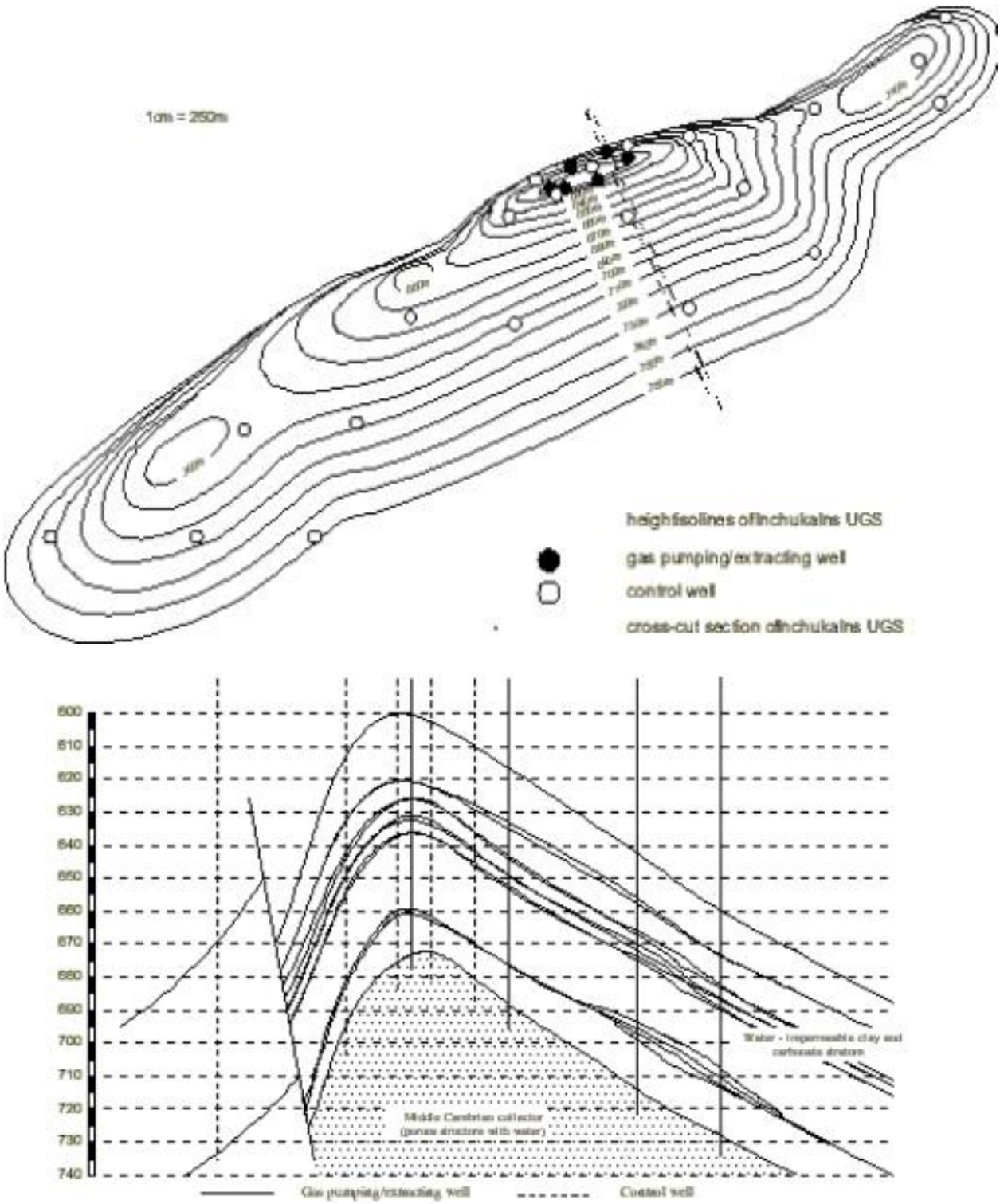
Latvia has unique geological conditions for building of UGS. There already exists UGS capacity of 2.3. $10^9 m^3$, and investigations show that it is possible to develop other similar storage sites with a total active capacity above 50. $10^9 m^3$. The existence of beneficial geological conditions in Latvia was proved once again by feasibility study performed by Baltic Energy Corporation and CMS Gas Transmission and Storage Company (USA) in 1997 (picture 6.4).

These conditions can enhance not only the development of the gas supply system around the Baltic Sea, but also promote the improvement of gas supply reliability for the whole Europe. The Incukalns UGS is located in the central part of Latvia, but in perspective UGS can be spread all over the territory of Latvia, but especially in western part of Latvia.

	Existing	Perspective
Latvia	2.3	50 (8 UGS)
Poland	0.56	5.23
Slovakia	1.60	1.62
Hungary	1.92	2.52
Czech Republic	2.01	1.20
Romania	0.57	1.45
Slovenia	0.07	0.07
Bulgaria	0.60	0.60

Table 6.2. The UGS capacities in Eastern Europe (10^9 m^3) [85]

One of the largest and well-investigated perspective UGS is situated at Dobele. The peculiarities of the geological structure in Latvia create unique favourable conditions for setting up an underground storage. The lower of the sedimentary rocks contains Middle Cambrian limestone strata with a good collector capacity practically all over the territory of the country. A thick water-impermeable clay and carbonate stratum covers this layer (see picture 6.5).



Picture 6.5 Illustration of geological conditions of Latvian UGS (existing Incukalns UGS)

The existing Inchukalns UGS in Latvia is the only one in the Baltic States. The depth of this Middle Cambrian collector (reservoir) is 620 to 760 m. The present capacity of this collector is $4.4.10^9 m^3$ (the active capacity - $2.3.10^9 m^3$), average porosity over 20%, average gas permeability 460 milidarcies. What concerns potential Dobele UGS, 20 wells have been drilled already at this site, and the working capacity of this storage is estimated at $10.10^9 m^3$

The existing Incukalns UGS with a capacity of 2.3. $10^9 m^3$ at present is used in the following manner. In the summer period gas received from Russia is injected into the storage, but in winter withdrawn from the storage and used for consumers in Latvia (about 85% of annual consumption in winter), returned back to Russia and delivered to Estonia. There are no gas supplies by pipelines for Latvian consumers from Russia in winter. In such a way, more scarce pipeline capacities in Russia in winter can be used for gas transportation to the Central and Western Europe. If the additional gas transportation were calculated at marginal costs, the transportation cost of gas in long-distance pipelines (approximately 3000 km) would be 30-40% of its total cost.

The UGS certainly performs all the necessary functions for increase of the reliability of gas supply. In order to meet accepted reliability standards, volume of approximately 15 days of maximum gas consumption should be kept in long distance pipelines, the volume that the existing UGS can fully ensure not only for Latvia, but also for the entire Baltic region. In addition, we would like to stress that in harsh conditions of present winter Latvia due to its underground gas storage was among these very few countries in Europe that had no necessity to limit any gas consumption.

Changes in the weather conditions effect both the variations of gas consumption in each season of the year and long-term variations (in the series of warm and cold winters). Seasonal variations are rather stable, therefore a reserve of about 40% of the annual gas consumption is necessary in the climate zone of Latvia to compensate the variations of gas consumption for heating. Considering the comparably high specific weight of heating in Latvia where practically no heavy industry is developed the total amount of the reserves for the compensation of seasonal variations may be 24-28% of the annual gas consumption (see Table 6.3.). It means that the perspective UGS with the capacity of 50.10^9 m^3 could ensure these variations in the North European region with the consumption of about $150\text{-}200.10^9$ m^3 a year.

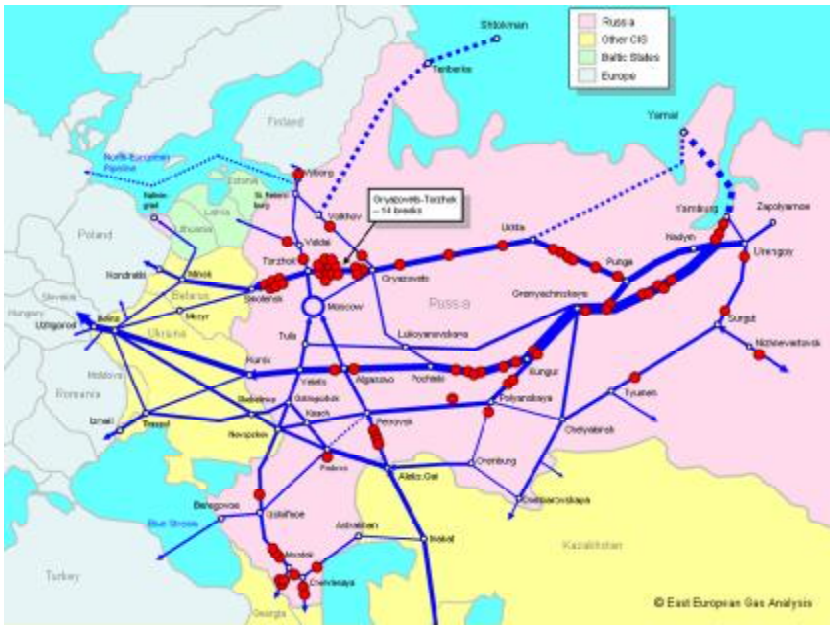
An all round estimation of the use of UGS in the gas supply system is connected with the solution of several economic problems. So, it is rather complicated to calculate the compensation of variations in the daily, seasonal and annual gas consumption by means of UGS in terms of profit.

The group of the consumer mode	Specific weight (%)	Long-term deviations (%)	The amount of reserves against the yearly fluctuation of consumption (%)
Consumers using gas for heating	85	20	17,0
Consumers using gas for technological purposes	15	5	7,5
Total	100	-	24,5

Table 6.3. The amount of the reserves needed for the compensation of long-term gas consumption fluctuations in Latvia.

As described above the UGS potential in Latvia (capacity more than 50. $10^9 m^3$) can provide reserve capacity for the large region with annual consumption of 150-200. $10^9 m^3$. It

could have a great importance for the Baltic See Pipeline project connecting Russia with Germany for purpose of improvement of reliability of gas supply that at present due to the latest developments in gas industry is considered the highest priority of EU energy policy. This pipeline is shown in Pic.6.6 with doted line crossing the Baltic Sea. In latest project options, branch lines to Kaliningrad, Sweden and Poland etc. are considered. In case branch pipeline to Latvia would be constructed and Latvian UGS potential used, gas supply security for Europe would be improved considerably because possible disruptions on gas pipelines on the long route of more than 3000 km from gas deposits to the Finnish Bay where the Baltic Sea pipeline starts would not influence gas supplies (see Picture 6.6).



Picture 6.6. Prospects of the developing gas supply system and number of defects in the main pipelines 2000-2003 years

6.3. Method of gas supply systems optimisation

Based on information obtained from each country of the region regarding gas demand for the time period ending in year 2020, OAO " Giprospecgas" by means of computer modeling of gas flows and assessing few different scenarios, have come up with the proposals on development of gas transmission systems of the region, including countries, Lithuania, Latvia, Estonia, NW Russia and Finland and also developed two step-by-step feasible options for expansion of existing Incukalns Underground Gas Storage.

However, the possibilities of utilization of Latvian UGS potential with the total active capacity over 50. $10^9 m^3$ are not explored sufficiently, but it can be important for the whole Europe as explained above. It is particularly complicated to estimate feasibility of increase of gas supply reliability. As we can see in Picture 25 number of disruptions on main gas pipelines are considerable and the problem of improvement of gas supply reliability for Europe is becoming more and more important.

The calculation of the profit gained from raising the reliability of gas supply by means of UGS is not so simple either, considering the possibility to supply the consumers with gas from several points, including, case of a system of gas pipes with closed circuits or several

sources of gas etc [86]. As mentioned above, UGS may yield great economical effect by reducing the carrying capacity of the main gas pipes (during the maximum consumption). In a general way one can write that the profit from the gas supply system using the UGS will be higher:

$$P_{GSS} < P_{GSS+UGS}; \qquad (6.1)$$

or

$$P_{GSS} < P_{GSS} + \Delta P_1 + \Delta P_2 + \ldots + \Delta P_n, \qquad (6.2)$$

where:
P_{GSS} - the profit from the gas supply system without UGS;
$P_{GSS+UGS}$ - the profit from the gas supply system with UGS;
$\Delta P_1 + \Delta P_2 + \ldots + \Delta P_n$ - extra profits from the use of UGS due to various effects from the use of UGS

Thus, to compensate the daily variations in the gas consumption, UGS may replace over-ground high-pressure boilers. For compensation of seasonal variations, UGS may replace over-ground oil tanks, and so on. In addition, if the construction and utilization costs of the UGS will be lower, consequently, the gas supply system may give extra profit. In the same way it refers to the other aspects of the use of UGS in the gas supply system yielding additional profit. Greater problems here are related to improvement of the calculation theories and procedures in order to estimate to a full extent the profit from the UGS. This may define the perspectives for development of the Latvian UGS when creating the North European system of gas supply [87].

6.4. Results

Based on the results of the above feasibility study Joint Stock Company " Latvijas Gaze" have prepared investment plan for the first sage of Incukalns Underground Gas Storage expansion, however, the main condition to start the whole project is positive decision on construction of submarine gas pipeline, connecting Estonian and Finnish gas grids. At present, extensive discussions between " Gazprom", "Gasum", " Latvijas Gaze" and " Eesti Gaas" is taking place. What concerns Incukalns Underground Storage; it is advised to increase its capacity due to

- existing structure in place with potential for further increase;
- increase of gas consumption in the region;
- seasonal unevenness of gas consumption;
- limited options for development of other storages in the region.

Taking into consideration geological features and gas dynamics of the reservoir, it is estimated that without construction of additional wells active storage volume of Incukalns Underground Gas Storage can be increased to 2.3-2.6 $.10^9 m^3$, and then further to 3.2 $.10^9 m^3$.

Further study is required regarding utilization of perspective 50. $10^9 m^3$ UGS capacity in Latvia that can help to solve the increasingly important problem of reliability of gas supply to Europe...

6.5. Prospects of incorporation of UGS in Latvia into joint EU network

To provide customers with reliable and secure gas supply, market situation have been analysed for the region of countries, including Latvia, Lithuania, Estonia, Finland and NW Russia [88] for the time period that ends in year 2020, and the following main conclusions have been drawn:

- need for natural gas will increase;
- seasonal unevenness of gas consumption will remain;
- in order to ensure reliable gas supply for Finnish customers and meet their increasing demands, underground gas storage is advised to be used;
- due to lack of possibility to develop seasonal underground gas storage in Finland and limited options for development of other storages in the region it is advised to use Incukalns Underground Gas Storage in Latvia, which already is used for customers in Latvia, Estonia, NW Russia and, most probably, in the nearest future will be used for Lithuanian customers on commercial terms too;
- for gas supply from Incukalns Underground Gas Storage new submarine gas pipeline shall be built;
- in order to meet increasing demand for gas storage volume, Incukalns Underground Gas Storage has to be expended.

Initial calculations show that there are certain perspectives to incorporate new perspective UGS capacities in Latvia (total capacity over 50. $10^9 m^3$) into European gas supply system especially due to insufficient gas supply security to Europe.

7. Evaluation of economic position of the JSC " Latvijas Gaze" in the future

7.1. Investment program

In accordance with the Investment program approved by the Council [89], the company is planning to invest 73.8 Mio LVL in improvement of gas supply security in the time period from 2006 to 2010.

Table 7.1. Investments in improvement of security of supply, thousand LVL

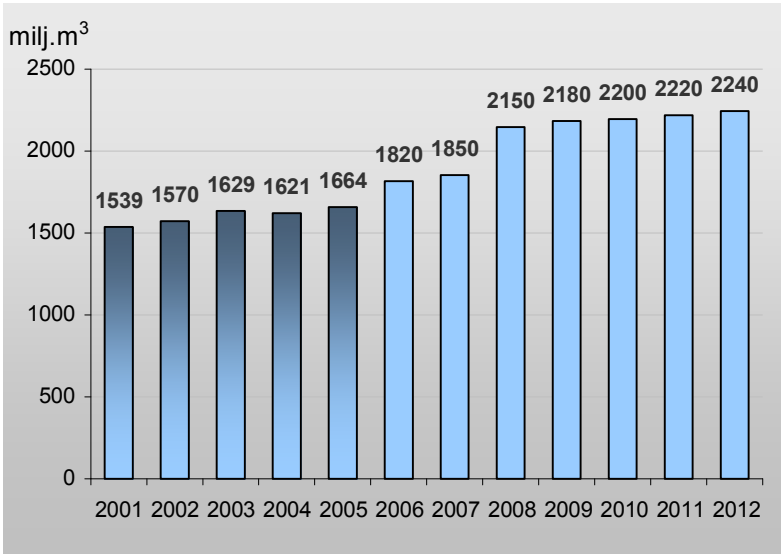
Facility	2006	2007	2008	2009	2010	TOTAL
Inčukalns Underground Gas Storage	11 510	12 710	6 480	10 180	5 460	**46 340**
Gas Transmission System	5 743	3 771	3 620	2 854	2 003	**17 991**
Gas Distribution System	2 941	1 195	1 435	1 400	1 365	**9 436**
TOTAL	**20 194**	**18 776**	**11 535**	**14 434**	**8 828**	**73 767**

7.2. Revenues and expenditure

JSC „Latvijas Gaze" budget's revenue part is formed by gas sales to three main categories of consumers: industrial plants, residential consumers, motor-transport, as well as funds received for natural gas transportation and storage.

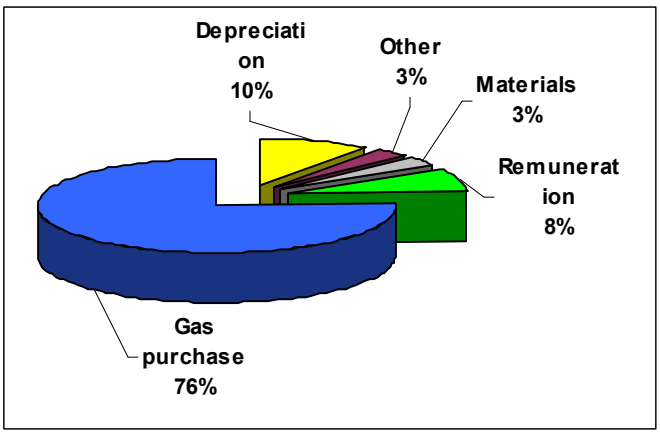
Increase of gas consumption volumes are ensured by expansion of gas supply system network in Latvia and connection of new customers to the existing gas grid. Actual data and forecasted increase of gas consumption volumes are reflected in the following picture.

Picture 7.1. Natural gas sales 2001-2010

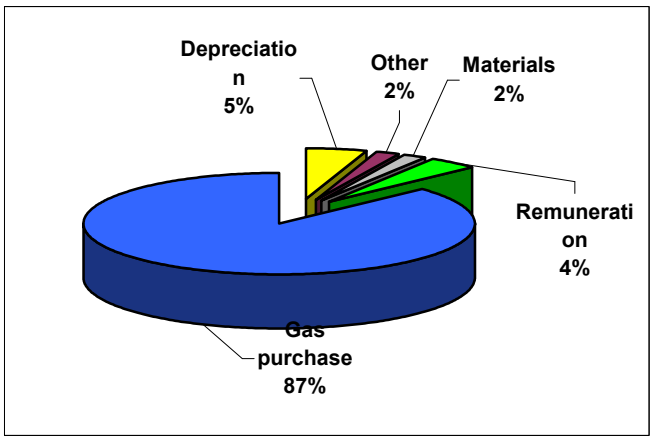


Growth level of the Company is regulated by the tariff system. Economically justified tariffs have to ensure inflow of the necessary resources in order to: cover the current expenses, accumulate resources for renewal of capital funds and investments for development.
When predicting production expenses, the structure and amount of expenses of 2005 have been used, as well as the predicted natural gas sales amounts, dynamics of gas purchase prices, producer and consumer price indices.

In the structure of production expenses, the main component is the expenses for natural gas purchase. According to the judgment of experts, in the upcoming years the tendency of natural gas price increase from 20% at the beginning of period to 5% at its end will remain. The expense section for gas purchase will increase from 76% in 2005 to 87% in 2012.



Picture 7.2. Production costs and their structure in 2005



Picture 7.3. Production costs and their structure in 2012

Depreciation deductions, considering the investment programme, increase in absolute terms, but decrease in relative terms from 10% to 5%.
Salary fund increases in proportion to consumer price index (in 2006 – 7%, 2007 – 5.5%, 2008-2012 – 4% per year on average).
Increment rates of material costs are predicted, considering growth of gas sales amount and inflation component.

Table 7.2. Prediction of production expenses, 2006-2012, thousand LVL

	2006	2007	2008	2009	2010	2011	2012
Natural gas purchase	111243	135692	181350	202269	214331	227073	240572
Operating expenses	17121	18125	19498	20345	21206	22102	23037
Remuneration for work	9461	9981	10381	10796	11228	11677	12144
Materials	3582	3842	4643	4896	5139	5393	5659
Other expenses	4078	4302	4474	4653	4839	5033	5234
Depreciation	13289	15314	16282	16562	16629	15470	13644
Production expenses in total	141653	169130	217130	239176	252165	264644	277253

Administrative expenses are predicted depending on growth of prices.
Prediction of revenues and expenses for the JSC "Latvijas Gāze" is given in Table 7.2.

Table 7.3. Prediction of revenues and expenses of the JSC "Latvijas Gāze", 2006-2011., thousand LVL

PROFIT OR LOSS STATEMENT	2006	2007	2008	2009	2010	2011	2012
Net turnover (NT)	170733	204879	256099	281709	302837	317979	333878
Growth	*28%*	*20%*	*25%*	*10%*	*8%*	*5%*	*5%*
Production expenses	141653	169130	217130	239176	252165	264644	277253
including depreciation	*13289*	*15314*	*16282*	*16 562*	*16 629*	*15 470*	*13 644*
Gross profit (GP)	**29080**	**35749**	**38969**	**42534**	**50672**	**53335**	**56626**
GP/NT	17%	17%	15%	15%	17%	17%	17%
Administrative expenses (AE)	6134	6472	6731	7000	7280	7571	7874
AE/NT	4%	3%	3%	2.5%	2.4%	2.4%	2.4%
Balance of other revenues/expenses			121				
Profit before taxes	**22946**	**29277**	**32360**	**35534**	**43392**	**45764**	**48752**
Taxable income	*8370*	*12678*	*14792*	*17686*	*25478*	*29008*	*33822*
Enterprise income tax	1256	1902	2219	2653	3822	4351	5073
Other taxes	1286	1286	1286	1286	1286	1286	1286
Net profit (NP)	**20404**	**26090**	**28855**	**31595**	**38285**	**40127**	**42392**
Profitability (NP/NT)	12.0%	12.7%	11.3%	11.2%	12.6%	12.6%	12.7%

7.3. Forecasted results of operation

The predicted profit (net) in 2006 is estimated LVL 20 million or 12% of trade turnover. According to calculations, profitability of the Company during the predicted period will remain in the level of 11-13% and will make LVL 42.3 million in 2012.
The Company's own capital (profit + depreciation deductions) is sufficient for business development and implementation of investment program concerning gas supply safety improvement.

However, in case larger-scale project will be implemented (e.g., expansion of Incukalns UGS) JSC " Latvijas Gaze" will have to attract financing from outside.

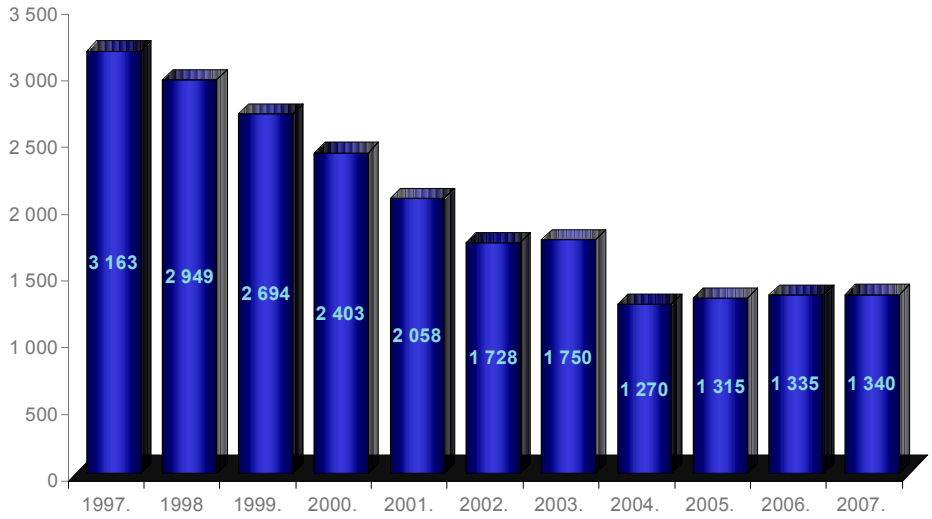
8. Results of solution of the problems experienced by JSC "Latvijas Gaze" in the middle of 90s and evaluation of implemented measures

1. Restructuring of the JSC "Latvijas Gaze" and optimization of business processes

In 1995 the stock company "Latvijas Gaze" under privatization was a horizontally integrated company with complex structure and many branch offices. The number of Company's employees reached 3387 employees. In order to ensure operational effectiveness and improve the financial condition, gradually business process optimization and the company's restructuring was carried out. Step by step structural units, which were engaged in business types uncharacteristic for a natural gas company: medical and leisure complex, liquefied gas branch, etc., were separated and sold. When taking the measures for structural optimization, which were basically finished in 2002, but completely - in 2004, an integral company was established, which by minimum resources and number of employees could perform the necessary functions. In 2004, the number of employees in a/s "Latvijas Gaze" was 1270 people, which is 37% of the number of employees before starting of privatization.

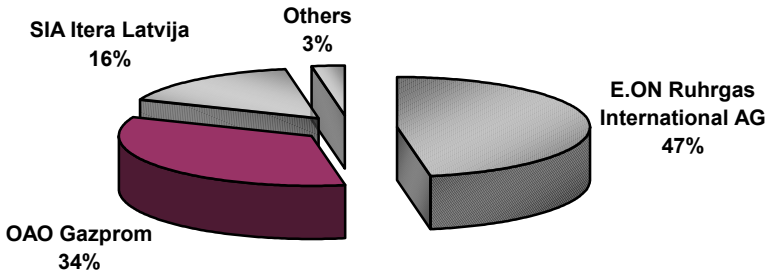
In 2004 restructuring process was completed and there are no further reduction of employees expected (picture 8.1).

Picture 8.1. Changes of number of employees



2. Privatization process successfully completed

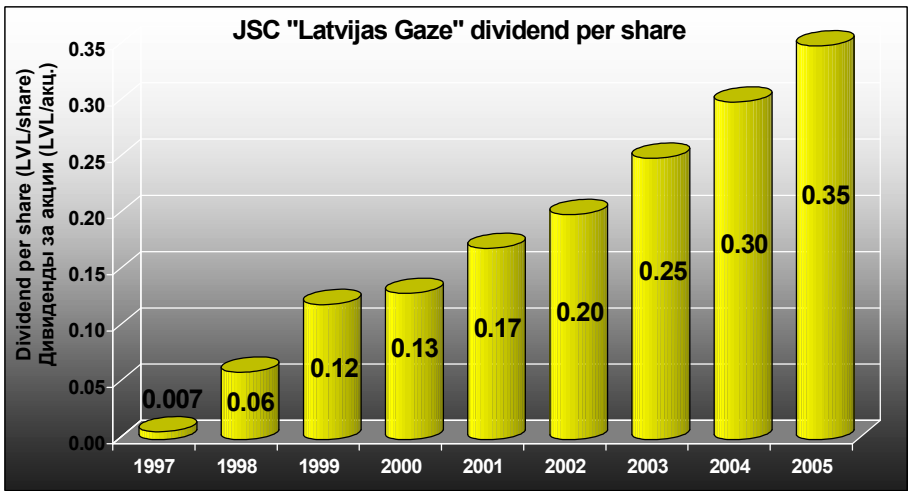
The complex privatisation process was completed on December 20, 2001 when last 3% of the State owned shares were sold for privatisation vouchers. At present state keep only 117 shares. It is necessary to admit, that the choice of strategic investors was very successful. After transfer of the shares by E.ON Energie (former PreussenElektra) to Ruhrgas and sales of Itera Latvija to Gazprom the shareholder structure of the company is the following (picture 8.2):



Picture 8.2. Ownership structure of JSC "Latvijas Gaze"

In general, JSC "Latvijas Gaze" privatization was one of the first completed privatization cases in Eastern and Central Europe in gas branch and was estimated as one of the very successful ones by case study group concerning privatization issues for World Gas Conference in 2000 [90].

The shares of the JSC " Latvijas Gaze" are quoted in the Official List of Riga Stock Exchange and Baltic Stock Exchange [91]. At the end of 2005 the capitalization value of he company reached LVL 383.44 million, but price of one share since summer of 2006 is exceeding LVL 10. From almost insolvent company in mid of 90s, JSC "Latvijas Gaze" have become a profit generating company to its shareholders and during last years have been able to increase amount that is paid in dividends (picture 8.3)



Picture 8.3. Amount of dividends paid by JSC " Latvijas Gaze" to its shareholders

3. **Gas prices for end- consumers are set using complex method in order to consider real costs of every group of customers**

As it was explained earlier, the new method of tariff setting approved by Council of PUC on 30 November 2005 consists of four different tariffs: for gas transmission, storage, distribution and sales. All justified costs are included, and reasonable profit to the company guaranteed. Gas purchase costs, which are set depending on HFO with sulphur content 1% price in Amsterdam region, form the basis for calculation. There are eight groups of customers established. Such complicated system gives the possibility to set tariffs for end-consumers, which are based on real costs of gas supply depending on place in gas supply chain and there is no place for any market distortions.

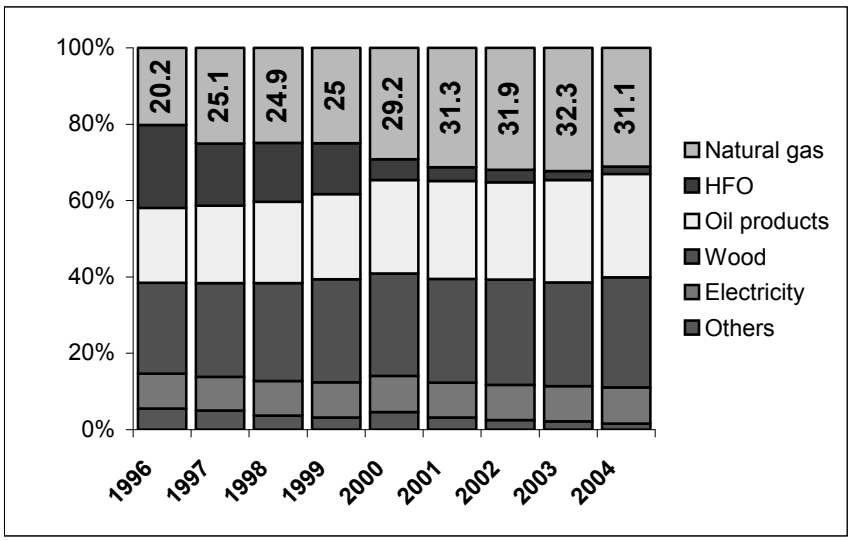
At the same time, it is necessary admit that natural gas tariffs for end consumers in Latvia remain among the lowest in EU [92]. There are few reasons for that, however, the three most important are:

- closeness to the supplier in comparison with other countries,
- having gas suppliers among major shareholders and
- having Incukalns UGS, which is required by gas supplier in winter for reliable gas supplies to other countries.

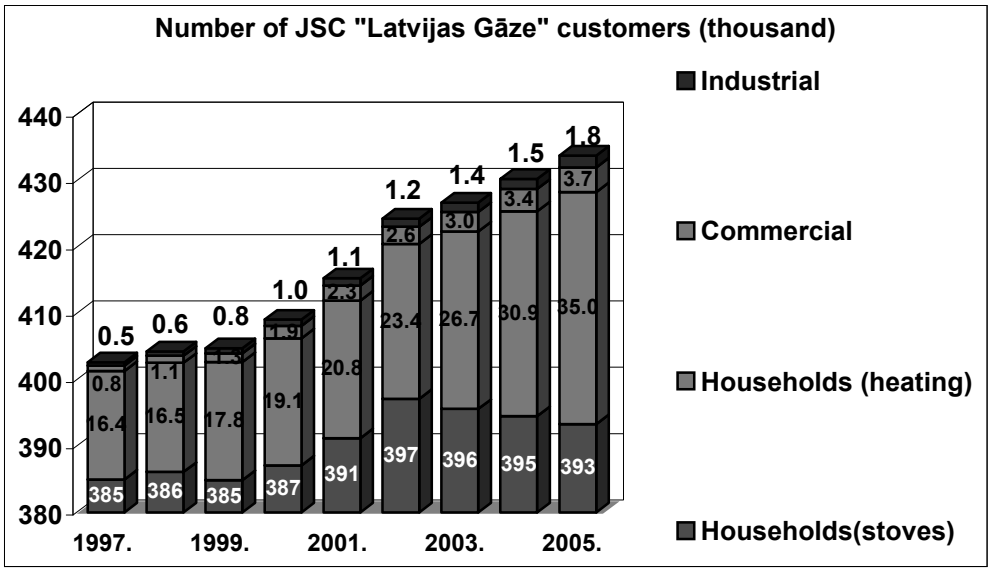
Positive influence on keeping low end-user prices in current conditions has also resolution of Saeima about postponement of gas market opening in Latvia. Because, as it was in detail explained earlier, lack of connections with joint EU gas network prevents Latvia from receiving natural gas from any other supplier except suppliers in Russian Federation and access to gas network in Russia is limited, hence there is no possibility to develop gas market in Latvia. Therefore, any formal measures of gas market liberalization will only increase costs, thus increasing gas prices to end-consumers.

4. **Natural gas consumption and number of customers are increasing, there are no significant debts of customers**

As it was described earlier, natural gas consumption in Latvia is increasing year by year and in 2005 reached 1.664 BCM. Natural gas in Latvia s preferred kind of fuel for few years and keeps its place in balance of primary energy consumption (PEC) since year 2001 above 30% [93]



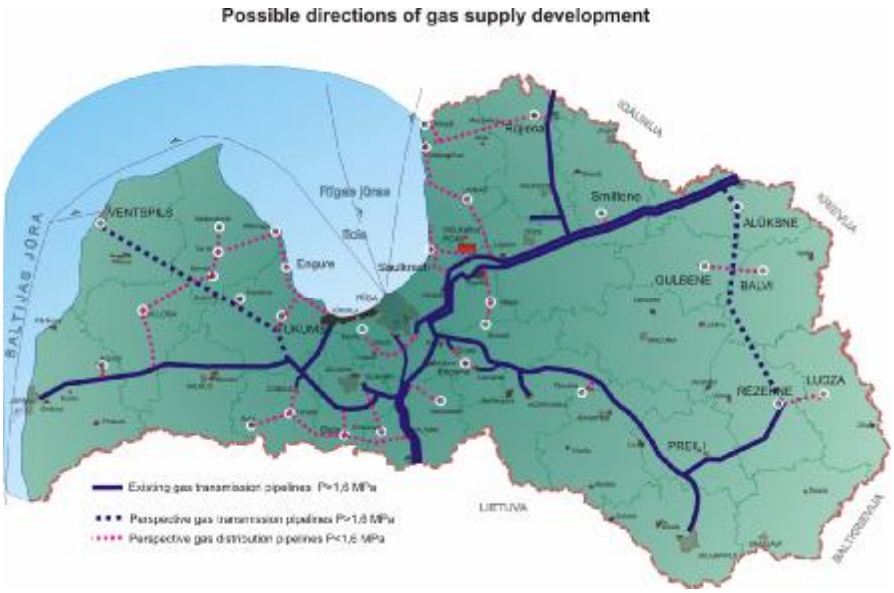
Picture 8.4. Natural gas share in PEC in Latvia



Picture 8.5. Increase of number of natural gas customers

There are few reasons for stable increase of natural gas consumption. Among others, important is permanent increase of the number of customers (picture 8.5) due to attractiveness of natural gas because its reasonable price comparing to other competitive fuels, its cleanness and easiness to use. Number of customers and consumption is increasing also because the company pays great attention to further expansion of natural gas networks. In 2005, 250 km of gas distribution networks and 46 km of gas transmission pipelines were constructed.

Regarding construction of new pipelines and attraction of new customers, JSC "Latvijas Gaze" have elaborated further development plans and have prepared schemes for expansion of existing gas network in Latvia (picture 8.6).



Picture 8.6. Possible directions of gas supply network development

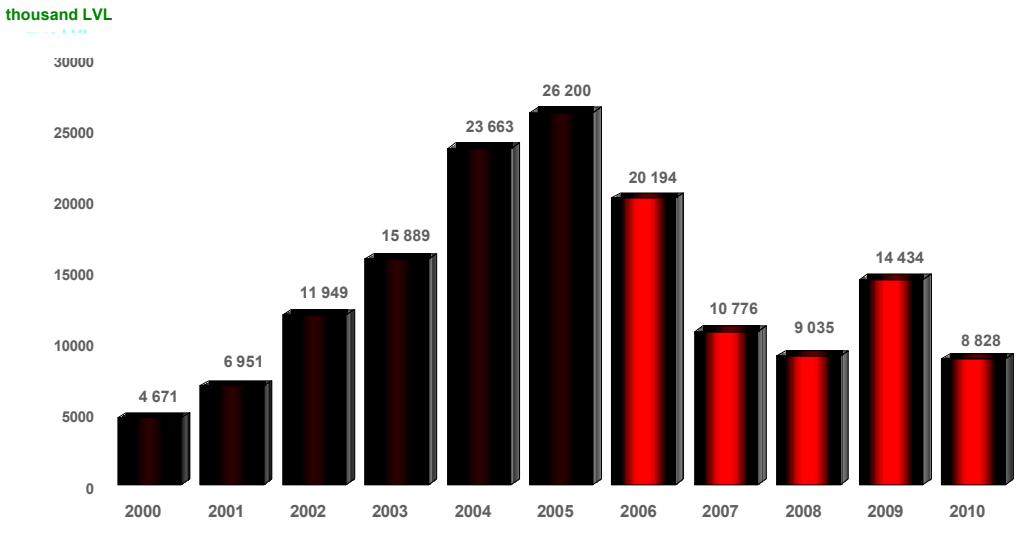
At the moment the company is initiated work with municipalities on finding a cooperation schemes with the aim to find a solution for using EU funds for construction of new gas pipelines because National Strategic Reference Framework for year 2007-2013 does not provide such possibility to the company directly [94].

5. Technical conditions of the gas supply system

As it was described earlier JSC "Latvijas Gaze" permanently is investing in modernization of existing facilities and construction of a new ones.

Since end of 90s after agreements with strategic investors about privatization of the company were signed, the shareholders paid great attention to modernization issues. In particular, during this period of time there had been started such modernization programs as reconstruction of gas regulation stations of gas transmission network, modernization of gas regulation stations and regulation units of gas distribution networks, modernization of dispatching system and construction of modern dispatching center and implementation of modern SCADA system, inline diagnostics of gas transmission pipelines and elimination of defects, construction of new new compressor facility and installation of new gas turbine type compressor in Incukalns UGS [95] etc. Many of these programs are completed, and in March of this year the Council of the company approved new program for further improvement of safety of supply till year 2010.

Starting from year 2000 to 2005 the company has spent almost LVL 90 million in implementation of the mentioned programs. During the next years till 2010 it is planned for to spent more than 56% for needs of Incukalns UGS.



Picture 8.9. JSC " Latvijas Gaze" investments 2000-2010

6. Gas market is still isolated and there are no connections with joint EU grid

One of the biggest problems of gas supply in Latvia is lack of connections with joint EU gas grid. That is the reason, why there are no possibilities of alternative gas supply, at least in

conventional manner, by pipeline. That is also the main reason why true competition in gas market in Latvia is not possible. That is also the reason why Latvian Government by adopting Basic Guidelines for Energy Sector Development for 2006-2016 [96] have expressed concern about Latvia's dependence on one supplier and have suggested consider alternative fuels. At the same time lack of connections between gas supply networks of the Baltic Countries and other Europe prevents of utilization of potential of underground gas potential in Latvia. JSC " Latvijas Gaze" with the support of Ministry of Economics and Ministry of Foreign Affairs have proposed to include several projects into list of EU TEN projects as provided for by guidelines for trans-European energy networks [97] (expansion and development of underground gas storages, Nordic Gas Grid project, gas pipeline connecting gas depositories in Russia for gas supply to Germany via Latvia, so called Amber project, etc.).

However, now hope on EC support in construction of connecting gas pipelines gives the last decision of the European Parliament and the Council on Trans-European energy networks [98], where among first priority projects in the 1st annex is stated:
" NG.1. United Kingdom — northern continental Europe, including the Netherlands, Belgium, Denmark, Sweden and Germany — Poland — Lithuania — Latvia — Estonia — Finland — Russia:

Gas pipelines to connect some of the main sources of gas supply in Europe, improve network interoperability, and increase security of supply, including natural gas pipelines via the offshore route from Russia to the EU and the onshore route from Russia to Poland and Germany, new pipeline building and network capacity increases in and between Germany, Denmark, and Sweden, and in and between Poland, the Czech Republic, Slovakia, Germany, and Austria."

In paralel to activities on European lewel, JSC " Latvjas Gaze" together with OAO " Gazprom" and Gaum OY is working on implementation of connection Finland-Estonia with the aim to use Incukalns UGS for needs of Finland.

7. Passing of knowledge about gas market isses and gas supply system to students of the RigaTechnical Universirty

The author of this dissertation for four years already is passing her knowledge to the students that are studing issues if of heat, gas and water tehnolody and is participating in evaluation of of students' workts prepared for obtaining Masters degree.

Summary

1. The author of the dissertation in her work is analysing development of gas market as a component of energy market and changes in gas supply system in Latvia during the last decade. In the work it is assed world oil market influence on gas market in Latvia. In particular, it is analyzed energy market and, especially, gas market trends and changes during last decade starting with situation in gas supply in Latvia soon after Latvia had regained independence. Focus is made both, on gas supply chain technical and economic conditions.
2. Mainly due to collapse of industry and jump of natural gas purchase price almost three hundred times in two years causing sharp increase of gas sales price in Latvia, natural gas consumption considerably decreased and receivables for gas constituted only about 30% in 1993 and 1994. State-owned joint stock company "Latvijas Gaze" was in front of bankrupt, and it was decided to privatise the company.
3. The share purchase agreements with strategic investors of the JSC "Latvijas Gaze", OAO "Gazprom" and Ruhrgas AG/ PreussenElektra AG, were signed in April of 1997. The complex privatisation process, which consisted of seven stages and is referred to most successful in gas industry in Eastern and Central Europe, has been finished in 2002 and restructuring of the company and optimisation of business processes has been completed in 2004.
4. There is cost driven viable energy market in Latvia, in particular, natural gas is competing with HFO, and depending on price customers tend to opt between natural gas and HFO, whatever is cheaper. The Latvian energy market is characterized by a large representation of dual fired gas equipment, which generates a strong correlation between the price of natural gas and competing energies, primary oil products. Therefore, in accordance with the method setting of gas tariffs approved by Public Utility Commission (PUC), gas end-user prices have direct correlation to HFO price.
5. Calculation of gas purchase price from the gas supplier in Latvia is based on semi-annual average price of HFO with sulphur content 1% (till 2005 was based on price of HFO with sulphur content 3.5%) in Amsterdam region, which is published by Reuters in Oilgram Price Report (European Low/High Averages Barges FOB ARA). In the time period from January 2002 to January 2006 European Low/High Averages Barges FOB ARA increased 2.6 times.
6. Gas transmission, distribution, storage and end-user tariffs in Latvia are set by PUC for the tariff cycle of three years. Tariff ceiling method is used for setting of the tariffs. The regulator is performing cost and profit analysis and assessment. Tariff ceiling principle provides for that within the tariff review cycle the actual tariff value (FTV_t) at no point of tariff review cycle shall exceed the tariff ceiling value (TGV_t):

   $$FTV_t \leq TGV_t$$

   and end-user sales tariffs are calculated as follows:

   $$T_{(1\text{-}8)\ end\ sales\ H.p.} = C_{average\ gas\ purchase.} + T_{TSO} + T_{GSO} + T_{dif\ (1\text{-}8).DSO}$$

   $$T_{(1\text{-}8).end\ sales\ MLp} = C_{average\ gas\ purchase.} + T_{TSO} + T_{GSO} + T_{dif(1\text{-}8)\ DSO}$$

   $T_{(1\text{-}8)\ end\ sales\ H.p.}$ – differentiated sales end-user tariffs for users connected to the high pressure distribution system;

   $C_{average\ gas\ purchase}$ – the average forecasted natural gas purchase price,

   T_{TSO} – natural gas transmission service tariff;

T_{GSO} – natural gas storage service tariff;
$T_{dif.DSO}$ – differentiated distribution service tariffs for distribution system users depending on connection pressure and natural gas consumption volume.
$T_{(1\text{-}8).end\ sales\ MLp.}$ – differentiated sales end-user tariffs for users connected to the medium or low pressure distribution system.

7. The complex tariffs' setting system gives the possibility to set tariffs for end-consumers, which are based on real costs of gas supply depending on place in gas supply chain and there is no place for any market distortions. At the same time, it is necessary admit that natural gas tariffs for end consumers in Latvia remain among the lowest in EU. Average natural gas end-user prices in the time period form January 2002 to January 2006 increased by about 50% only (at the same time European Low/High Averages Barges FOB ARA increased 2.6 times). There are few reasons for that, however, the three most important are: closeness to the supplier in comparison with other countries, having gas suppliers among major shareholders and having Incukalns UGS, which is required by the gas supplier in winter for reliable gas supplies to other countries.
8. JSC "Latvijas Gaze" permanently is investing in modernization activities. Since end of 90s, the following modernization programs were implemented: reconstruction and modernization of gas regulation stations and installations, modernization of dispatching system and construction of modern dispatching center, implementation of modern SCADA system, inline diagnostics of gas transmission pipelines and elimination of defects, construction of new new compressor facility and installation of new gas turbine type compressor in Incukalns UGS etc. Starting from year 2000 to 2005 the company has spent almost LVL 90 million in implementation of the mentioned programs. Many of these programs are completed, and in March of this year the Council of the company approved new program for further improvement of safety of supply till year 2010 providing for investment of LVL 73.8 million in improvement of gas supply security.
9. Natural gas network of Baltic Countries has no connection to joint EU gas grid, and Latvia has only one main gas supplier in Russian Federation where access to gas network is limited. In such conditions here it is not possible to have functioning gas market in Latvia. In addition, Latvia meet criteria of emerging gas market. Therefore, Joint Sock Company "Latvijas Gāze" and its foreign investors have asked to grant the Republic of Latvia a derogations from implementation of individual norms of the Directive until the year 2017.However, Saeima had passed a special Law on postponement of becoming effective several articles of the Energy Law till January 1, 2010, which actually mean that gas market opening in Latvia is postponed to year 2010. EC have not objected to the decision of the Saeima.
10. Incukalns UGS with the active volume of 2.3 BCM currently is used in winter for gas consumers in Latvia, Estonia, NW Russia and Lithuania. According to research activities performed by OAO "Giprospecgaz" Incukalns UGS can be expanded till active gas volume of 2.6 BCM and further till 3.2 BCM, and it can be used for customer needs Finland, provided for gas connection Estonia-Finland is built. Gasum OY from Finland is looking for options to use Incukalns UGS for customers in Finland. There are excellent geological conditions for development of new underground gas storage facilities in Latvia with the total active gas capacity of 50 BCM, which is almost equal volume of all gas storages in use in 'old" EU. If for planning of gas supply system for Europe system optimisation methods would be used avoiding political aspects, Latvia could become a major gas storage site in Europe.

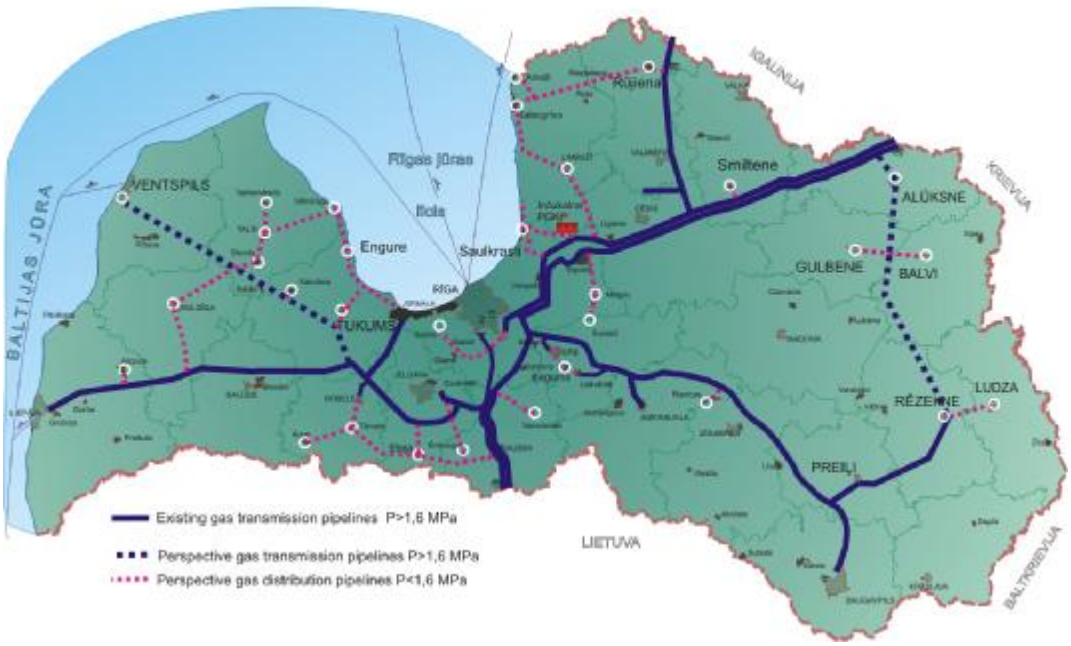
11. From almost insolvent company in 1994,business Joint Stock Company “Latvijas Gaze” has become a profit generating company to its shareholders. The shares of the JSC “ Latvijas Gaze” are quoted in the Official List of Riga Stock Exchange and Baltic Stock Exchange. At the end of 2005 the capitalization value of he company reached LVL 383.44 million, but price of one share since summer of 2006 is exceeding LVL 10. The prognosis of business activities of the company shows that the Company’s own capital is sufficient for business development and implementation of investment program concerning gas supply safety improvement. However, in case larger-scale project will be implemented (e.g., expansion of Incukalns UGS) JSC “ Latvijas Gaze” will have to attract financing from outside.
12. Most of the problems that impeded the company’s activities in mid of 90s and created market distortions are solved. In particular:
    - performed restructuring of the JSC “Latvijas Gaze” and optimization of business processes;
    - privatization process successfully completed;
    - gas prices for end- consumers are set using complex method in order to consider real costs of every group of customers;
    - natural gas consumption and number of customers are increasing, there are no significant debts of customers;
    - technical conditions of the gas supply system meets criteria of EU norms;
    - gas market is still isolated and there are no connections with joint EU grid, However, now hope on EC support in construction of connecting gas pipelines gives the last decision of the European Parliament and the Council on Trans-European energy networks.

Conclusions

1. It has been performed the analysis of gas market as a component of the energy market taking into consideration patterns of development of world oil market and estimated related changes in the gas supply system in Latvia during the last decade, starting with grave situation in mid of 90s and privatisation process in 1997 till its accomplishment in 2002 and business processes optimisation in 2004.
2. As the result of analysis of technical and commercial aspects of Latvian gas supply system it has been proved that there is a cost driven viable energy market in Latvia characterized by a large representation of a dual fired gas equipment, which generates a strong correlation between the price of natural gas and competing energies, primary heavy fuel oil.
3. It has been developed a method of gas purchase price justification based on heavy fuel oil with sulphur content of 1% semi-annual average price (till 2005 heavy fuel oil with sulphur content 3.5%).
4. It is offered mathematical model of setting of tariffs for gas transmission, distribution, storage and sales for the tariff cycle of three years according to ceiling method based on objective analysis of costs and profit depending on place of the customer in gas supply chain thus preventing market distortions.
5. It has been analyzed technical and economic feasibility of investments in modernization of Latvian gas supply system: reconstruction and modernization of gas regulation stations and installations, modernization of dispatching system and construction of modern dispatching center, implementation of modern SCADA system, inline diagnostics of gas transmission pipelines and elimination of defects, construction of new new compressor facility and installation of new gas turbine type compressor in Incukalns UGS.
6. There have been assessed possibilities of expansion of Latvian underground gas storage facilities from current active volume of 2.3 billion cubic meters to 2.6 billion cubic meters and further to 3.2 billion cubic meters, what will pave a way for their utilization for needs of Finland. Principles of method of optimization of planning of European gas supply system are outlined, which corresponds to the last decision of the European Parliament and the Council on Trans-European energy networks, and which could convert Latvia into considerable gas storage site for the whole Europe.
7. The results of the work are implemented in the restructuring of JSC " Latvijas Gaze" in process of privatization, in developing the technical conditions of the Latvian gas supply system that corresponds to the requirements of the European Norms and Standards, through Public Utility Commission and amendments to the Latvian legislation by implementing the European Directives, developing of the gas branch into profit generating industry, at the same time achieving one of the lowest end-user prices in European Union, which in time period from 2002 to 2006 have increased by about 50% comparing to 2.6 times of heavy fuel oil price in average in Europe.
8. The methods offered in the promotional work are incorporated into program for the engineers and masters studies of the Department of Heat, Gas and Water Technologies of the Riga Technical University "Regional planning of gas supply".

Appendix 1

Possible directions of gas supply development



Appendix 2

DESCRIPTION OF THE GAS TRANSMISSION SYSTEM

Gas transmission system consists of 1296.7 km of gas transmission pipelines (GTP)

No.	Title	Year of putting into operation	Length l, km	Diameter Dn, mm
1.	Rīga - Viļņa	1962.	69.964	500
2.	Iecava - Liepāja	1966.	209.64	500/350
3.	Rīga - IPGK I	1967.	45.037	700
4.	Pleskava - Rīga	1972.	159.001	700
5.	Rīga - IPGK II	1978.	41.737	700
6.	Rīga - Paņeveža	1983.	84.03	700
7.	Izborska - IPGK	1987.	161.713	700
8.	Rīga - Daugavpils	1988.	203	500
9.	Vireši - Tallina	1994.	88	700
10.	Upmala - Preiļi	2001.	13.10	400
11.	Preiļi - Rēzekne	2005.	46.70	300
12.	Branch lines		161.89	100, 150, 200, 350, 500

I. Natural gas commercial metering on Latvian-Russian border is performed by - **GMS "Korneti".**

Natural gas commercial metering on Latvian-Estonian border is performed by - **GMS "Karksi" (Estonia).**

II. Stability of pressure of gas that is transferred into distribution networks in compliance with the technical demands , is provided by - **48 gas regulation stations (GRS).**

III. Corrosion protection for 1296,7 km of GTP is provided by - **102 stations of cathode protection**

IV. Uninterrupted control of optimal gas transmisssion regime is performed by - **SCADA system**

Appendix 3

DESCRIPTION OF GAS DISTRIBUTION PIPELINE SYSTEM

I. Total length of underground gas distribution pipelines of JSC "Latvijas Gaze" amounts to - 4 062 km
including, PE gas pipelines - 1 043 km

- · High pressure gas pipelines (from 4 to 12 bar) - 707 km
- · Medium pressure gas pipelines (from 0,05 to 4 bar) - 1 403 km
- · Medium pressure gas pipelines (100 mbar) - 62 km
- · Low pressure gas pipelines (till 0,05 bar) - 1 890 km

II. The pressure stability of the gas supplied for gas equipment according to the technical demands is ensured by means of pressure regulation equipment:

- · Gas regulation installations (GRI) - 226 pcs
- · Cabinet- type gas regulation installations (CGRI) - 761 pcs
- · House regulators (HR) - 6 462 pcs
- · Stabilizers (HS) - 435 pcs

III. Corrosion protection of 3019,6 km of gas pipelines is ensured by means of 357 protection installations:

- · Cathode stations - 285 pcs
- · Reinforced drainage installations - 46 pcs
- · Polarised drainage installations - 26 pcs

Appendix 4

Basic characteristics of Incukalns Underground Gas Storage

Date of putting into operation	- **1968**
Type of storage	- aquifer
Depth of gas reservoir	- 620 - 760 м
Total area of gas reservoir spread	- 14,7 км^2
In 2003 Inckukalns UGS reached the following characteristics:	
Total gas volume	- **4400 million m³**
Active gas volume	- **2255 million m³**
Cushion gas volume	- **2145 million m³**
Maximum daily injection	- 13 million m³
Maximum daily withdrawal	- 24 million m³
Technological equipment of compressor facility	
Gas pumping units Cooper Bessemer - 12Z330	- 5
Total capacity of gas pumping units	- 22100 kW (5x4420 kW)
Total number of wells	- 180
Number of operation wells	- 93
Number of wells for attendance and control	- 87
Collection stations	- 3
Total length of technological lines	- 42,5 km

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