

LIBERALIZATION AS A CONDITION REDUCING CONCENTRATION OF NATURAL GAS SECTOR IN THE SLOVAK REPUBLIC

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Abstract

Currently, changes in European energy policy priorities and policies have brought many challenges. It is necessary to solve especially the changes in the global climate, ever-decreasing oil and gas reserves and the rapid rise of energy prices, reduced energy safety. The aim of this contribution is to point out the positive effects of the liberalization of the energy market in Slovakia. Therefore, we will analyze the timing of the creation of a single gas energy market in the household sector. We have used the Herfindahl-Hirschmann index, switching to reflect the relationship between the concentration rate and the number of companies, which are operating on market. To achieve this goal, we have used a variety of methods, from collecting information, especially from scientific works from both, foreign and home authors. From the scientific methods we used mainly coupled methods of induction and deduction, analysis and synthesis and to better illustrate of the results obtained, we used graphical and mathematical methods, which are mainly used for the clear presentation of our results in tables and charts.

Key words

gas market, liberalization, single energy market, competition, Herfindahl-Hirschmann index, switching, household sector.

JEL Classification: D4, O12, O16

Introduction

The beginnings of the creation of a single energy market in the European Union date back to May 9, 1950 when French Minister for Foreign Affairs Robert Schuman presented a plan for closer cooperation between six Western European countries. Currently, changes in European energy policy priorities and policies have brought many challenges. It is necessary to solve especially the changes in the global climate, ever-decreasing oil and gas reserves and the rapid rise of energy prices, reduced energy safety. (Yergin, D-Hillenbrand, 1982) The consequences are interruptions of energy supplies, increasing level of dependence on imports from third countries. In Slovakia from 1 January the new regulatory policy began to apply and for unifying all

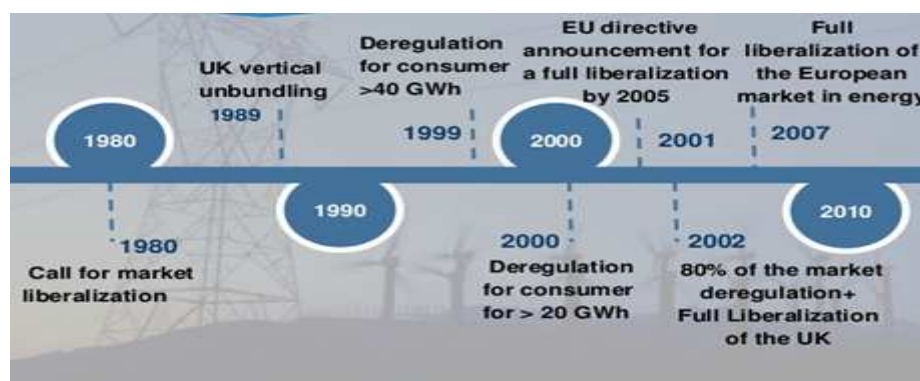
conditions for comparison, the year 2017 will not be included in the calculations.

1. Energy packets as a condition for implementation of liberalisation natural gas sector

First „package“ of energy liberalization was oriented on the ownership of new generation, but was introduced only accounting and functional unbundling. Each state should create the independent authority to solve discrepancies of the market (independent regulator). In this period the liberalization was introduced only for big customers.

This first package was adopted in EU in 1996 in electricity sector, and two years later – 1998, was adopted first package in natural gas sector. (Baldwin, Richard, 2008)

Figure 1. Liberalization of energy sector



Source: own processing by <https://www.siea.sk/materials/files.com>

The second wave of liberalization of energy market was adopted by Directive 2003/55/EC of the European Parliament and of the Council of 26 June 2003 concerning common rules for the internal energy market of natural gas. The experience gained in implementing this Directive shows the benefits, that the internal energy market can bring in terms of higher efficiency, lower prices, higher level of services and increased competitiveness. (Lesser, Jonathan A. - Giacchino, 2009). However, the significant shortcomings remain and the

possibilities for improving the functioning of the market remains, in particular measures are needed to ensure the same conditions in manufacturing and to reduce the abuse of the dominant position and the ruthless behavior of monopolies. (Morthorst, Wehnert, 2015). The aims of 2-nd package mainly were: of increasing efficiency, price reductions, higher standards of service and increasing competitiveness. Execution of legal unbundling should be implemented not later than 7. júla.2007. (Laughton, 2003)

Figure 3. Gaps in the second package



Source: own processing by <http://eur-lex.europa.eu>

The third energy package has strengthened the current position of consumers on the market. (Lesser, Jonathan A. - Giacchino, L. R.:2009). The Directive determines that when the consumer asks for a change of energy supplier, this change should be made by the concerned network operator within three days of the submission of the application. Consumers also have the right to receive complete information about their consumption. The directives strengthen the powers of the national regulatory authority in the areas of competition and consumer protection, through the establishment of an Independent Transmission

Operator (hereinafter ITO) model. (Kraus, M.: (2012) *Liberalised Energy Markets — Do We Need Re-Regulation?*). At the same time, The Agency for the Cooperation of Energy Regulators (hereinafter ACER) was established. The latest round of EU energy market legislation, known as the third energy package, has been adopted to improve the functioning of the internal energy market and resolve structural problems. It covers five main areas. (Directive 2009/73). Short recapitulation of process liberalisation in energy sector in EU shows next picture.

Picture 4. Third liberalization package in EU



Source: own processing by Hunt, 2012

2. Impact of liberalisation on reducing concentration

In the following part of the paper we will point out the direct impact of the liberalization of the energy sector in the Slovak economy through the Herfindahl-Hirschman index (hereinafter HHI). HHI is known as the Herfindahl-Hirschman Index, and is named after economists Orris C. Herfindahl and Albert O. Hirschman. (Hirschman, 1964) HHI is used in developed countries to measure the level of concentration of the national economy. Vertically integrated monopoly companies operating in the energy sector have been abusing their dominant position on the market. (Train, 2001). Implementation of the liberalization package adopted by the European Community was gradually reduced the degree of concentration in the SR. The Herfindahl-Hirschman Index (hereinafter HHI) is a common measure of market concentration of the sector that is used to determine market competitiveness. We can say that mergers and acquisitions usually caused increasing HHI, but the restructuring of sector, like liberalisation usually caused decrease HHI. It is calculated by squaring the market share of each firm operating in a market and then summing the resulting numbers. The Herfindahl Index (H) ranges from 1/N to one, where N is the number of firms in the market. The HHI is expressed as:

$$HHI = s_1^2 + s_2^2 + s_3^2 + \dots + s_n^2 = H = \sum s_i^2 \quad (1)$$

where s is the market share of each firm expressed as a whole number, not as decimal and n is number of companies in sector. (Warren-Boulton, 1990).

For example, if there was only one company on the market with a 100% share, the HHI index would have a value of 10,000 (100^2). For example, if there was

only one company on the market with a 100% share, the HHI index would have a value of 10,000 (100^2). Conversely, if there were 1,000 companies on the market, with market shares close to zero ($1/1000$), then the market would be close to perfect competition and should be close to zero $0,000001000$ ($(1/1000)^2$). The U.S. Department of Justice considers a market with result of HHI of less than 1,500 to be a competitive market, an HHI of 1,500 to 2,500 to be a moderately concentrated market. (Hunt, 2012).

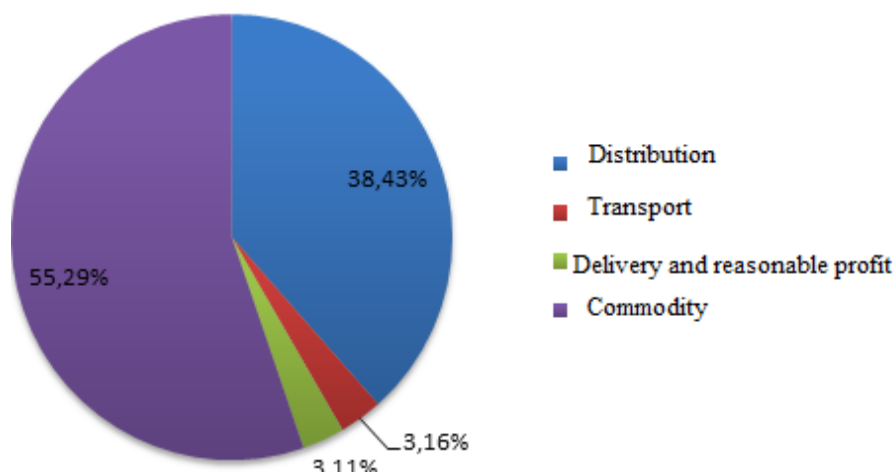
3. Analyzis of natural gas sector in Slovakia

Slovakia has to import about 98% of its natural gas consumption, mainly from Russia, which comes either through a traditional transit route through Ukraine, or is bought in Germany or the Czech Republic where it flows through the Nord Stream gas pipeline. In the slovak gas market operate 17 stable suppliers, but according to last report of the Regulatory Office for Network Industries (hereinafter RONI) is five. They are delivering the most important the volume of gas supplied, the Slovak gas industry, a. s. (hereinafter SPP), Innogy Slovakia, s. r. o., ZSE Energy, a. s., and Slovakia Energia, a. s., ELGAS, s.r.o. The market price of natural gas is influenced by several factors, as are the development of oil prices and ratio the Eur / USD exchange rate, because oil and oil products are traded on the international market in US dollars (USD). The market price has only about 30% influence on price setting for regulated entities in Slovakia, the remaining 70% is from the long-term SPP contracts with the russian Gazprom. (website Enviroportal, 2014). The most important factor in choosing a gas supplier is the price. The final gas price consists of the commodity price, the price for the transportation, distribution and storage of natural gas. The price includes „reasonable“ profit for the gas supplier. The gas price consists of a fixed and variable component. (website Finance, 2015). Fixed rate

represents monthly payment per delivery point (€ / month), while the variable rate represents the price for gas consumed (€ / kWh). Natural gas price is in the household and in small business category regulated by the Regulatory Office for Network Industries (hereinafter RONI). Maximum gas prices have fallen slightly since 2013. The final price is determined by the sum of the purchase price of gas, from long-term contracts with Russia's Gasprom, representing 70%

and the gas price published by the EEX (European Energy Exchange), which forms in the formula with 30%. Share of commodity on final prices is about 55% for households. More than a third of the price is for distribution, and about 3% is for transport and reasonable "profit" for supplier. Structure of the price for the year 2016 is shown in the following chart. (websiteRONI 2016)

Chart 1. Structure of the average price for gas supply to households in 2016



Source: Annual Report of RONI for 2016

From 1 January 2017, RONI a new decree applies for gas supply to the household sector. The new Decree unified the method of setting prices for the supply of gas to households, with up to 2017 four tariffs, namely D1 to D4, with D4 was not regulated. From 2017, households are divided up to 8 tariffs from D1 to D8, according thier consuption, but only D1 till D6 are regulated. Analyze of natural gas sector we focused only for the years 2009 to 2016, because from 1 January the new regulatory policy began to apply and due unifying all conditions for comparison, so the year 2017 will not be included in the calculations.

4. Practical application HHI in SR

2009 was a turning point for the gas market due to the began of market liberalization and therefore, the market started to open. A significant impact had the Russian-Ukrainian crisis, which, due to the almost 100% Slovak dependence on Russian gas, caused gas supplies to Slovakia to stop. For enesure deliveries for households the reverse flow through transport network was started to operate. During this period, natural gas from slovakian storage was also supplied outside Slovakia, thereby reducing the security of gas supplies to our country. This year the dominant supplier was SPP and its market share was about 90% of the total number of suppliers. Finding a shares of alternative suppliers with a share of less than 5% was not possible and so the sum of all other suppliers is one group of "Other" of 10%.

Table 1. Market shares of gas companies in 2009

Suppliers	Market share(%)
SPP	90
Other (2subjects)	10

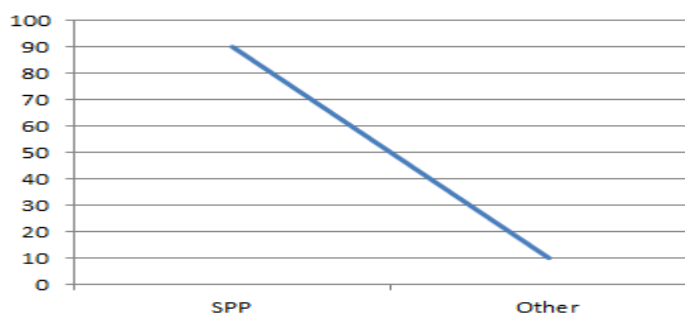
Source: Own processing according annual report of RONI

$$\text{HHI (2009)} = 0,90^2 + 0,10^2 = 0,82$$

(2)

According to HHI criteria, if the market share of the SPP is 90%, it is clear, that this market was almost monopoly in 2009 and therefore the HHI index determined as a highly concentrated sector.

Chart 2. HHI 2009



Source: own processing according to the table above

In year 2010 competition had entered to the households sector, too. First alternative supplier was RWE Gas Slovakia (hereinafter RWE), with share of 13,10%. New suppliers have chosen only the

industrial companies. In the category of household was not competition in this period, and the traditional supplier of the gas SPP dominated almost all of the market.

Table 3. Market shares of gas companies in 2010

Suppliers	Market share(%)
SPP	84
RWE	13,10
Other	2

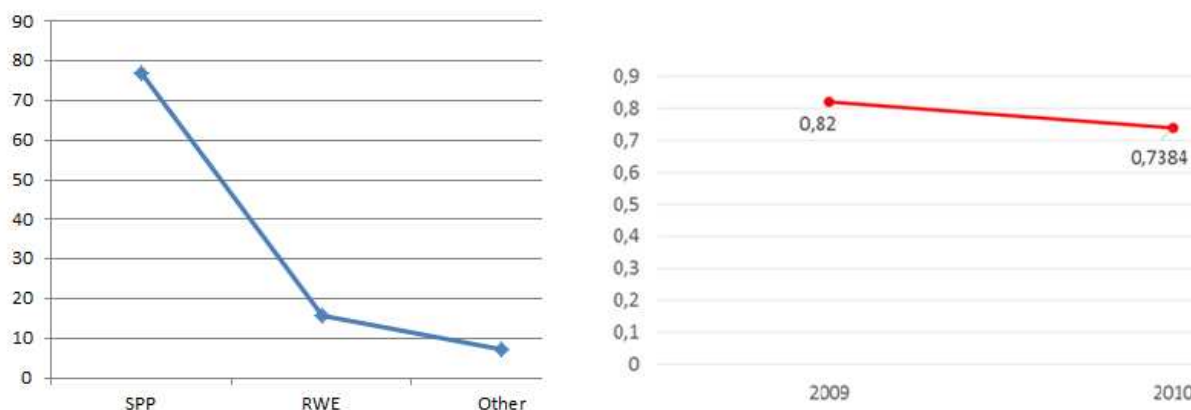
Source: Own processing according annual report of RONI

$$\text{HHI(2010)} = 0,849^2 + 0,131^2 + 0,02^2 = 0,738$$

(3)

The HHI index for this year is 0.738, which is lower than in 2009, but the market is still very concentrated, as shows next chart.

Chart 3. HHI 2010 and Development of HHI 2009- 2010



Source: own processing according to the table above

The change occurred in 2011, in which the liberalization of the Slovak gas market was considerably strengthened and competition in gas supply also increased to all groups of customers and thus to households, too. Households had since 1.7. 2007 opportunity to choose its supplier and it was used more than 21,000 households. This year

households started to supply mainly SPP, ČEZ Slovakia, RWE Gas Slovakia and Magna E.A. Altogether 18 alternative gas suppliers and the share of SPP has decreased to 77.1%, RWE Gas Slovensko improved to 15.6% and share of the other competitors were 7.3%.

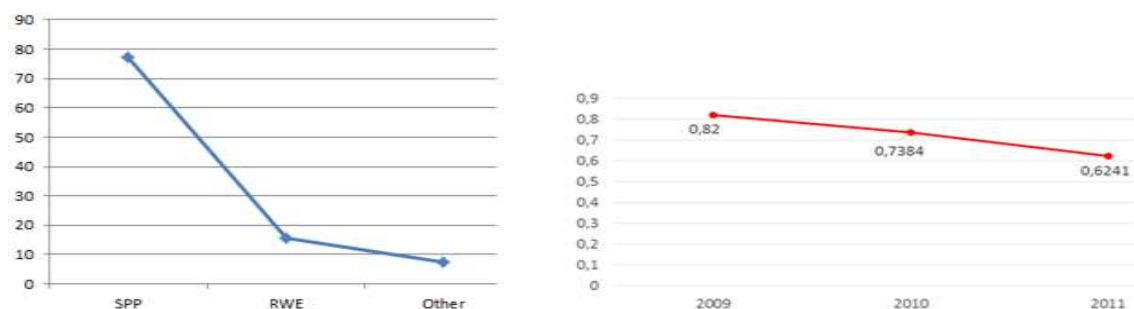
Table 4: Market shares of gas companies in 2011

Suppliers	Market share(%)
SPP	77,1
RWE	15,6
Other	7,3

Source: Own processing according annual report of RONI

$$HHI (2011) = 0,771^2 + 0,156^2 + 0,073^2 = 0,6241 \quad (4)$$

Chart 4. HHI 2011 and development of HHI



Source: own processing according to the table above

In 2012 there a significantly competition was increased, there were 25 gas suppliers and more than 140 companies owned a license to sell gas. The share of SPP's fell to 70%, and the share of RWE was accounted for 18.7%, company Elgas had 2,7% and the other companies (Energetické centrum, Vaša energia, Slovakia Energy, Energie2, ZSE Energia, Stredoslovenská energetika, Lama Energy) covered 11.3% of the market. The result was an increase in changes in the choice of gas suppliers, which was used by over 131,000 households. It was the biggest number of changes in whole period of liberalization.

In this year, the dominant gas supplier in an effort to expand its portfolio of services, has also begun to offer electricity sales. This year, the liberalisation was continued and of the 3rd Liberalization Package was implement to slovak legal framewor. The Government of the Slovak Republic approved the method of segregation of the transmission network from the supplier of the SPP according to the ITO model in accordance with § 50 of Act no. 251/2012 Coll. About Energy, allowing eustream, a.s. be part of the vertically integrated company of the SPP.

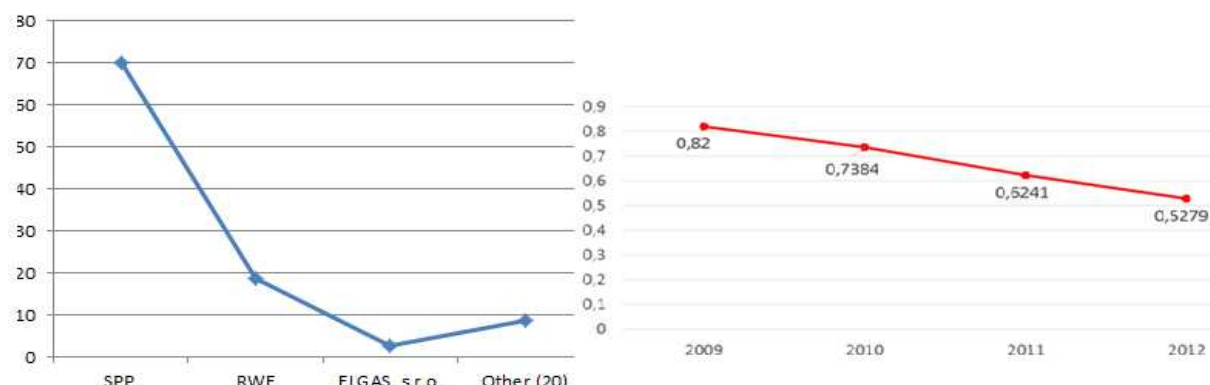
Table 5. Market shares of gas companies in 2012

Suppliers	Market share (%)
SPP.	70
RWE	18,7
ELGAS, s.r.o.	2,7
Other (20)	8,6

Source: Own processing according annual report of RONI

$$HHI(2012) = 0,70^2 + 0,187^2 + 0,027^2 + 0,086^2 = 0,5279 \quad (5)$$

Chart 5. HHI 2012 and development HHI



Source: own processing according to the table above

In 2013 the largest share of the total amount of the delivered gas of 63.2% had SPP, RWE Gas Slovakia reached 18.7%, ELGAS improved to 4% and the other 23 companies secured the remaining 14.1% of gas

consumption. This year there was a saturation of the market by competing gas suppliers, which resulted in a decrease in the number of changes to switching supplier for 88,000 households.

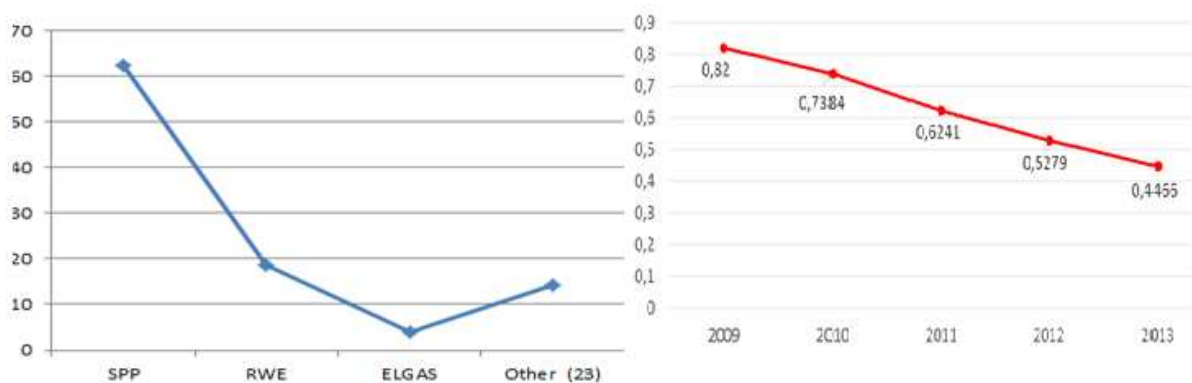
Table 6. Market shares of gas companies in 2013

Suppliers	Market share(%)
SPP	62,3
RWE	18,7
ELGAS	4
Other (23)	14,1

Source: Own processing according annual report of RONI

$$HHI(2013) = 0,632^2 + 0,187^2 + 0,04^2 + 0,141^2 = 0,456 \quad (6)$$

Chart 6. HHI 2013 and development HHI



Source: own processing according to the table above

In 2014, there was a significant fall of natural gas consumption due to the increased interest of consumers in alternative fuels and thermal insulation of buildings, state support for renewable sources, which was in line with the European Union's policy (hereinafter EU). (Mc Corvick, J.:2014) Gas demand was also influenced by the change of weather during the warm winter and on the energy exchanges dropped gas prices, due to warm winters and mainly excess gas offer over demand on spot gas market. The gas market may be considered stable this year, with no

significant changes in the gas suppliers' structure. Stability of gas supplies was been disturbed by tense relations between the Russian Federation and Ukraine. On the basis of a joint memorandum between eustream and Ukrainian operator Ukrtransgaz a new Slovak-Ukrainian connection was built as well as a new entry-exit point in Budince. The gas pipeline has been operational since September 2014, which strengthening energy security of Ukraine and diversification of Ukraine's energy gas resources.

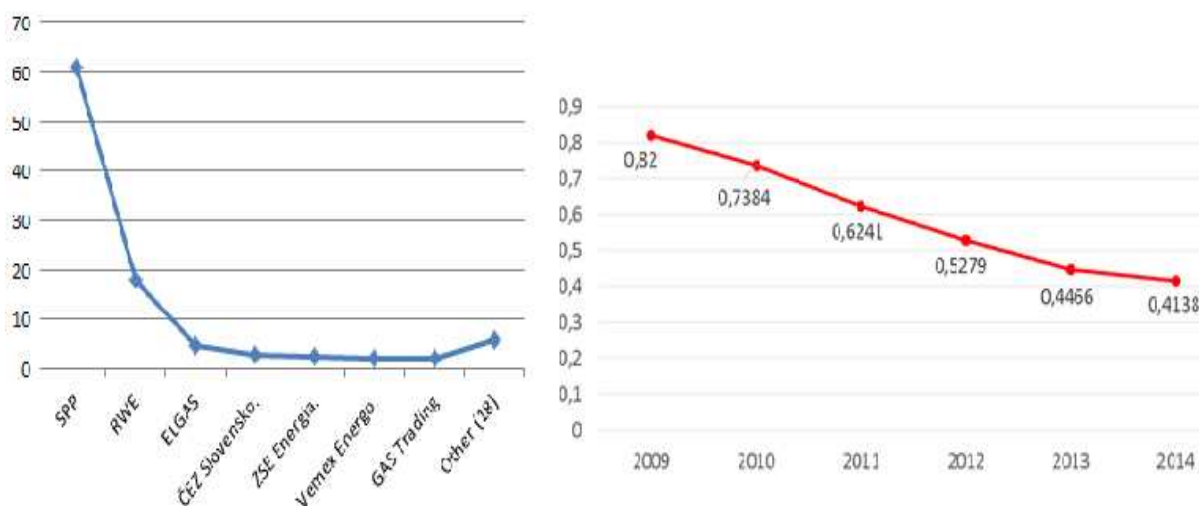
Table 7. Market shares of gas companies in 2014

Suppliers	Market share(%)
SPP	61
RWE	18
ELGAS	5
ČEZ Slovensko.	2,88
ZSE Energia.	2,49
Vemex Energo.	2,42
GAS Trading	2,18
Other (18)	6,03

Source: Own processing according annual report of RONI

$$HHI(2014) = 0,61^2 + 0,18^2 + 0,05^2 + 0,0288^2 + 0,0249^2 + 0,0242^2 + 0,0218^2 + 0,0603^2 = 0,413 \quad (7)$$

Chart 7. HHI 2014 and development HHI



Source: own processing according to the table above

In 2015 gas supplies from Russia decreased and were provided by reverse flows from Western Europe, especially through the newly built entry-exit point Budince. From 1 July 2015 was put into operation Slovakia-Hungarian gas interconnector, whose construction began in 2013. (Tlačová Agentúra SR –

Energia. 2017). The volume of supply meets to the needs of Slovak customers in all groups of delivery points (large customers, small businesses and households). This year, begun to build the interconnection of Slovak-Polish, which will play an important role in connecting Eastern Europe - from

the LNG terminal in the Polish city of Świnoujście to the planned LNG terminal on the Croatian island of Krk. (Galczynski, Marcin, 2015). Another important day this year was May 21, 2015. Slovakia, Romania, Bulgaria and Hungary jointly signed a Memorandum supporting the Easting gas pipeline project of

eustream. The project involves the construction of a gas pipeline between Slovakia and Bulgaria to connect the Slovakian transport network from the Veľké Kapušany to the trans-Balkan gas pipelines that pass through Ukraine, Romania, Bulgaria and Turkey. (Liptáková, Jana 2017)

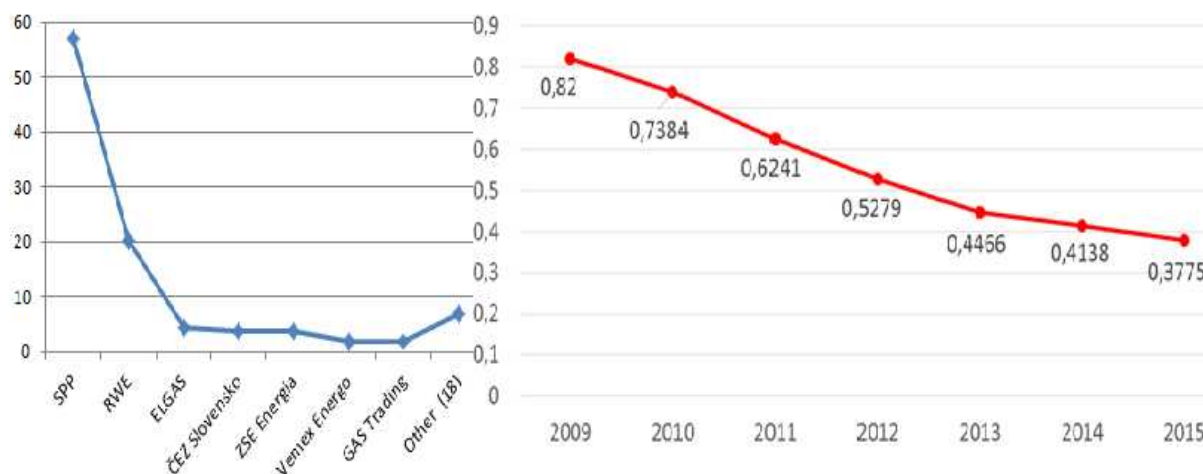
Table 8. Market shares of gas companies in 2015

Suppliers	Market share(%)
SPP	57,13
RWE	20,22
ELGAS	4,42
ČEZ Slovensko	3,66
ZSE Energia	3,76
Vemex Energo	1,93
GAS Trading	1,98
Other (18)	6,89

Source: Own processing according annual report of RONI

$$HHI(2015) = 0,5713^2 + 0,2022^2 + 0,0442^2 + 0,0366^2 + 0,0376^2 + 0,0193^2 + 0,0198^2 + 0,0689^2 = 0,3775 \quad (8)$$

Chart 8. HHI 2015 and development HHI



Source: own processing according to the table above

Gas consumption in 2016 was 51 TWh, which is 1% higher than in 2015. We can note that after its sharp decline in 2014, consumption has stabilized but is still 7% lower than in 2013. This negative development was mainly due to switching to renewable sources, thermal insulation of buildings, houses and increasing consumer awareness of energy efficiency. A negative factor was also the rising temperature during the winter heating season. At the same time, 4 suppliers of gas, whose volume of deliveries did not reach not even 1% of the total

supplied volume of the gas, stopped their activity, because could not compete with already established companies. Of the 25 registered suppliers in the household sector, until to 15 companies perform integrated supplies, gas and electricity supplies. The price for gas supply to households was the whole regulatory period calculated according to the methodology Price Cap for all tariff categories D1 to D4, but D4, with the consumption of gas over 6 500 m³, has not been regulated.

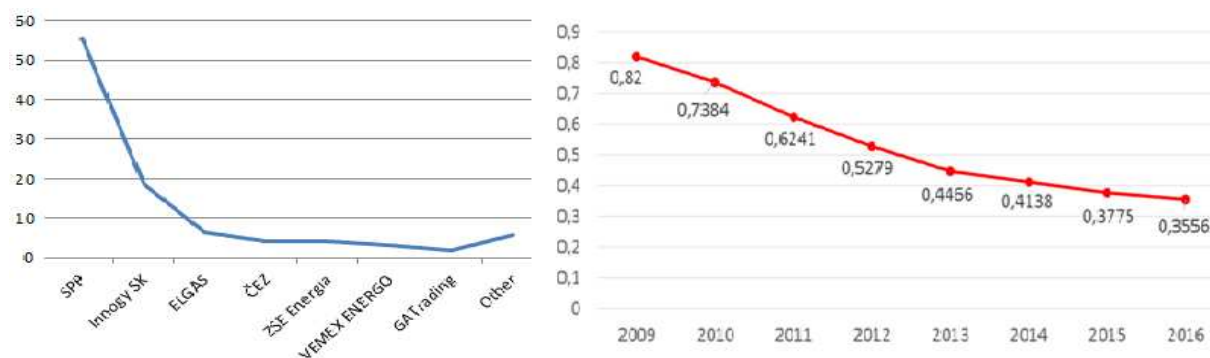
Table 9. Market shares of gas companies in 2016

Suppliers	Market share(%)
SPP	55,50
Innogy SK	18,75
ELGAS	6,47
ČEZ	4,12
ZSE Energia	4,09
VEMEX ENERGO	3,07
GATrading	1,92
Other	5,94

Source: Own processing according annual report of RONI

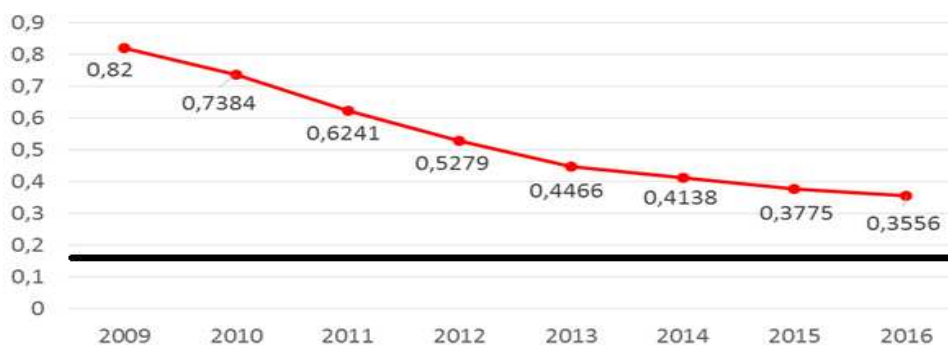
$$HHI(2016)=0,5550^2+0,1875^2+0,0647^2+0,0412^2+0,0409^2+0,0307^2+0,0192^2+0,0594^2 = 0,3556 \quad (9)$$

Chart 9. HHI 2016 and development HHI



Source: own processing according to the table above

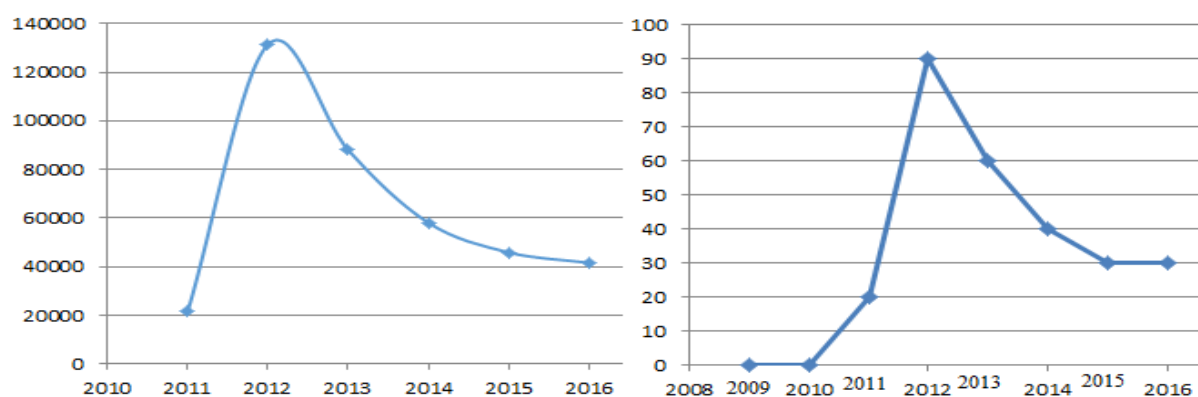
Chart 10. Development of HHI with a recommended value of 0.18



Source: own processing according: Hirschman,1964

If we want to evaluate the degree of market liberalization, we can use a switching indicator which percentage indicates the rate of change in of suppliers to the total number of of suppliers in the year, while with the change we understand the change the transition to another gas supplier. The breakthrough year was 2011, in which households had the

opportunity to change their traditional gas supplier and switch to the competitive one. The most significant year was 2013, when this indicator reached the highest value of 90% in the household sector, in absolute value 131 385. By 2014 there is a growing trend in switching, then development of this indicator decline slightly.

Chart 11: Development of absolute and percentage switching

Source: Own processing according annual reports of RONI

Conclusion

Increased competition on the gas market, for which we are grateful for the liberalization of this sector, is reflected not only in price but also in differentiated products and expanded marketing. Until recently, on the market was just one homogeneous product, but gradually since 2009, began to apply innovation and product differentiation. Product differentiation first appeared in large customers, but gradually also in the household sector. According to the EC survey, consumers in the Slovak energy market are very satisfied with the range of offers and the number of suppliers on the market, as well as with the ease of switching supplier. Such attitude can express great customer satisfaction or even lack of interest and very low awareness. According to the survey, Slovakia is also the country where there is the highest number of people who do not know how the price of commodities on the market has changed in recent years. To Slovak households was missing a financial motivation to change their suppliers, because they will save less than 6% from their payments for energy. But in 2012, more than 90% of households requested a change in gas supplier, which in absolute terms represented more than 131,000 changes, then this indicator gradually declined. Switching of annual changes to levels ranging from 8.5% to 14% will result in greater competition between individual suppliers for the benefit of end consumers. The main

reasons was saturation of the market, low household awareness and high market share of the three largest companies in the market. These companies by mutual price agreements may be a danger to a real market environment and healthy competition. Liberalization also had some negatives. By applying the unbundling of the 3rd liberalization package, astronomical expenses have arisen due transformed and sold of energy network. The distribution of the networks could be implemented operatively, because the internal communication and management system has already been developed and tested. The benefit of this measure is highly controversial, as there was a worsening of the co-operation between those private companies that started to operate on distributed networks primarily for profit, not as former state-owned enterprises that also fulfilled a certain "social" function. The impact of liberalization on domestic markets in individual countries often points to the unequal status of the individual states in the Community. Strong states prevent liberalization in their own country but take over the power companies especially in Central and Eastern European countries. In order to complete liberalization, a higher investment rate to network renewal is needed, a higher use of renewable energy sources across the Community, so that they are not subsequently deformed prices in these markets.

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