Charles University in Prague

Faculty of Social Sciences
Institute of Economic Studies

Bachelor thesis

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Level of competition on the gas market in the Czech and in the Slovak Republic

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Academic Year: **20011/2012**

Bibliographic Evidence Card

BLAHOVA, Alexandra. *Level of competition on the gas market in the Czech and in the Slovak Republic*. Prague, 2012. 52p. Bachelor Thesis (Bc.) Charles University, Faculty of Social Sciences, Institute of Economic Studies. Supervisor: Ing. Jiří Kracík.

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I hereby declare that I have compiled this bachelor thesis independently, using only the listed literature and resources.

I declare that the thesis have not been used for obtaining another title.

I agree to make this thesis accessible for study and research purposes.

Prague, 31.7.2012 Alexandra Blahová

Acknowledgements

I would like to express my full gratitude to Ing. Jiří Kracík whose support and valuable advice helped me to complete this thesis. I am also very grateful to all of those who provided me with very useful discussions, shared with me their views about Czech and Slovak gas markets and supported me while writing this thesis. Particularly to Mgr. Petr Mikeš from ČEZ, a.s., Ing. Richard Ružička from the Regulatory Office for Network Industries, and Mgr. Tomáš Václavík from Vemex,s.r.o.

Special merit belongs to all who stood by me during the time of writening, my beloved family and friends.

Abstract

The liberalization of the domestic gas market is a continual process which holds both potential benefits and challenges for the future. The trend has been to unbundle the former vertical companies and boost efficiency through the opening of the wholesale market to new suppliers. The objective of this thesis is to analyse the current situation on the Czech and Slovak gas markets and define the most important factors affecting the gas prices for the end-customers. For the purposes of this analysis we focus on the following three major areas. Firstly, the theoretical framework which aims to identify specific features of the natural gas market. Secondly, the commercial and technical perspective discovers the development of the natural gas markets in the Czech and in the Slovak Republic. Finally, the corporate perspective attempts to analyse business strategies of the incumbent company on the market and compare the two different pricing mechanisms: the traditional long-term contracts mechanism versus the spot markets.

This thesis provides evidence that natural gas plays an important role in the national energy policies and it is even expected to grow in the upcoming period. Equally, the character of the national markets has changed and as a reaction to this situation, all the market players need to adapt their business strategies.

Keywords:

Natural gas market, liberalization, competitiveness, Czech Republic, Slovak Republic

Abstrakt

Liberalizácia domácich trhov so zemným plynom je kontinuálny proces, ktorý prináša množstvo pozitívnych stránok, avšak aj výziev do budúcnosti. Súčasným trendom je oddelenie jednotlivých zložiek vertikálne integrovaných spoločností a otvorením domácich trhov zvýšenie efektivity. Cieľom tejto práce je analyzovať súčasnú situáciu na trhu s plynom v Českej a Slovenskej republike a určiť najdôležitejšie faktory ovplyvňujúce ceny plynu pre konečných zákazníkov. Súčasný vývoj na trhu je popísaný z troch strán. Teoretická základňa sa zameriava na špecifiká trhu so zemným plynom, komerčná perspektíva skúma rozvoj trhu so zemným plynom a popisuje hlavných hráčov v Českej, ako aj v Slovenskej republike. Z firemného pohľadu sa pokúsime analyzovať obchodné stratégie jednotlivých účastníkov na trhu s plynom a porovnať tradičný nákup zemného plynu cez dlhodobé kontrakty s novovznikajúcimi spotovými trhmi.

Výsledky tejto práce naznačujú, že zemný plyn hrá dôležitú úlohu v energetických politikách obidvoch štátov a predpokladá sa, že v najbližšej dobe jeho spotreba ešte porastie. Charakter trhu so zemným plynom sa taktiež postupne mení, čomu jednotliví hráči musia začať prispôsobovať svoje obchodné stratégie.

Kľúčové slová:

Trh so zemným plynom, liberalizácia, konkurenčné prostredie, Česká Republika, Slovenská Republika

Volume: 91 900 with spaces

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Acronyms

a.s.	joint stock company (akciová spoločnosť)
BAFA	Federal Office for Economics and Export (Germany)
BP	British Petroleum
CZK	Czech crown
DSO	distribution service operator
EC	European Commission
EEX	European energy Exchange
ERO	Energy Regulatory Office (Energetický regulační úřad)
EU	European Union
EUR	Euro
IEA	International Energy agency
kWh	Kilowatt hour
LNG	Liquefied natural gas
m^3	Cubic meter
MWh	Megawatt hour
NBP	National Balancing Point (United Kingdom)
NCG	NetConnect Germany
NG	natural gas
OECD	Organisation for Economic Co-operation and Development
OTC	over-the-counter
s.r.o.	limited liability company (spoločnosť s ručením obmedzením)
SPP	Slovenský plynárenský priemysel
TPA	third party access
TSO	transmission service operator
USD	United States Dollar
V4+	Visegrád Four (group of four Central European countries)

1. Introduction

"It is not the strongest of the species or the most intelligent that survives. It is the one that is the most adaptable to changes." Charles Darwin

Since the late 1990´s which is linked to the beginning of liberalization process of the gas market, the European market has undergone major changes. And since the European purpose was to create a competitive and efficient gas market across the whole Europe, Czech and Slovak Republic needed to adapt their national markets to these changes as well. Several legislation acts have been adopted and the so far vertically integrated companies were obliged to legally unbundle transmission and distribution activities from their supply business. The aim was to increase competition within the natural gas market and open it to new alternative suppliers. The initial stage of liberalization process of domestic gas markets was completed in both countries in 2007, when all customers obtained the right to choose their own gas suppliers. This implies that the liberalized European natural gas market is relatively young and it still needs some time to fully develop its potential. The level of integration of a single market is determined by the level of cooperation and the functioning of all national systems as a single system. Without clear rules and cooperation between all parties, the process does not progress.

Recent years have brought a real change of the business environment. The main reason was very well known financial crisis of 2008 which still confronts the European Union with various challenges. The industrial production was reduced which also lead to the decrease of natural gas demand (Fabini, 2012). At the same time the natural gas market processed important changes and the market players needed to adapt their business decisions. A continued rationale linkage of gas prices to those of oil products has been questioned as well. Traditionally, the natural gas has been purchased based on the long-term oil-indexed contracts. But since 2008, the emergence of spot markets in Continental Europe has challenged the traditional long-term contracts and the gap between these two pricing mechanisms widened. This period is therefore characterized by the existence of two price mechanisms, the so-called "hybrid price" model. In light of the above mentioned developments, it is not surprising that the gas purchasing and final prices have become a crucial topic.

The objective of this thesis is therefore to give an insight view on the concrete Central European gas markets, the Czech and the Slovak ones, describe the major changes of the market environment and analyse the reaction of the incumbents on the markets.

The first chapter provides an overview of the specific features of the natural gas market and presents the expected impacts of liberalization on the market. Despite the fact that this work is limited to Czech Republic and Slovakia, I do believe that in the future, we will talk more about a single gas market in the European context, not about the national gas market development. Later, the second chapter focuses on the national markets and presents the most important market players. Two pricing mechanism are described in the third chapter. Despite the fact that the oil-linked long term contracts play a major role in supplying the natural gas, natural gas trading location, the so called trading hubs, push towards and gain the importance. The last chapter focuses on the analysis of the behaviour of the major market players since 2010 and it tries to find out how the actual gas market looks alike and whether there is still some unused potential.

2. Theoretical framework

It is generally believed that competition in the market and especially in the energy market is necessary for efficiency and long term security of supply (Stern, 2010). The most important change was the gas market liberalisation which completely changed the market conditions. To discuss this further, the first chapter will look at various market structures, specific features of natural gas market and an expected effect of liberalisation.

2.1. Characterization of various market structures

We define generally three types of market situation: competition, monopoly and oligopoly as an intermediate market structure between these two.

Competitive market structure is a market situation with very useful properties and therefore we can very easily compare other types of market structures to the competitive market. Each firm produces identical products and they are not affected by any barriers to enter and to exit the market. No firm can significantly change the market price because it is set up by equilibrium between demand and supply of the commodity and therefore we assume that all the market players are price takers (Perloff, 2012). Every firm on the market earns a minimal profit and this situation is therefore the most favourable for the customers. Government is anticipated to stay away from the determination process.

In practise, we usually need to work with imperfect competition resulting from market failure. In this setting, the sellers on the market are able to affect the price of the good with their individual actions.

Monopoly, on the other hand represents an opposite extreme of the market structure to the perfect competition. One firm influences the market price and the level of output in order to maximise its overall profit (Varian, 2010). In contemporary economics, monopoly is treated as an inefficient situation misallocating the sources and provoking deadweight losses. The market barriers protect it against the entry of potential concurrence and this firm can easily increase its prices or restrict output below an ideal competitive output level in order to raise its gains (McKenzie, Lee, 2008). As a result, consumers are affected and economically disadvantaged.

Nonetheless, most of the markets currently lie between these two extremes. This situation is also known as **oligopoly**. Significant market shares are hold just by very small number of competitors and whether a price or quantity of natural gas supplied is talked about, for both cases all competitors influence each other (Friedman, 1983). We distinguish different types of oligopolies based on the exact behaviour of market players and their interaction.

Firstly, the quality-leader or **Stackelberg model** is represented by one leading firm setting up its output and another, following firm. The leader always takes into account the reaction of the follower. Another possibility is the price-leader model when one firm sets the price and the competitors decide about the quantity supplied based on this price. The same as in the previous case, the leader chooses the price regarding the expectations of the followers´ reaction. In **Cournot model**, each market player chooses its output as a profit-maximization decision concerning the expectations about the behaviour of other firms. In **Bertrand model**, each firm sets up its own price given the expectations about the other firms´ prices (Varian, 2010).

2.2. Specific position of the natural gas market

The European natural gas markets, mainly Czech and Slovak ones have been developed around **a natural monopoly structure**. This institutional framework enabled stable development of natural gas market over several decades. But this structure of the market also led to the situation which was much more convenient for sellers. They maximised their profits and any competition from the market structures was excluded.

The origin of monopolies varies strongly. In the past, it could be either state which created many monopolistic structures or they appeared naturally as a result of the characteristics of the market providing barriers to entry. Krugman (2005) sums up four principal types: control of scarce resource or inputs, economies of scale, technological superiority and government-created barriers. The second type, economies of scale, is the prime reason why natural gas market was occupied for such a long time just by one monopolistic company. Particularly the transmission and distribution parts of the market chain are considered to bear the characteristics of natural monopolies. They are represented by very high economies of scale, fixed investments in the pipeline construction, relatively low

variable cost on their operation, and the fact that the construction of second gas network would be unproductive (Stern, 2004). Moreover the natural gas market is affected by public interest. The security and stability of the gas-value chain has a strategic importance for a country and its environmental, social and national politics. This fact gives an argument for a regulation of the natural gas prices, licensing new entrants on the market and the observance of quality of provided services.

The whole process of regulation has undergone a complex historical development. In the Central European markets, there used to be just one **vertically integrated company** which operated in all parts of the gas chain value and covered full national gas demand. The vertical integration generally arose in the presence of market imperfections and is characterized by a strategic movement to enhance market power in upstream and downstream markets. Therefore it can be perceived also as a management decision (Eikeland, 2007).

Nowadays European Union is trying to break up vertically integrated companies trough introduction of a new organization model. Competition presented in all parts of the gas value chain, is expected to introduce innovation, decrease costs and increase efficiency of the whole market (Chevalier, 2007). Losing their market shares in traditional geographical territories, gas companies are expanding geographically or just regionally to the upstream or downstream levels where they are taking new positions. They are entering new potential markets or they apply cross-border mergers and acquisitions. This trend is expected to continue also in the future as the countries will go further in opening their gas markets.

A very important variable influencing vertical integration strategies that needs to be mentioned is **the bargaining power**. The process of unbundling[1] has weakened the positions of national gas incumbents and it has endangered their bargaining power in negotiations with foreign suppliers. In a case of cross-border merger and acquisition which have been already mentioned above, we can on the other hand count on stronger international positions (Zyuzev, 2008).

[1] The unbundling is an instrument implemented by the European directives based on which the energy transmission and distribution networks must be separated from production and supply side (Gilardoni, 2009). The first European gas Directive implemented accounting unbundling, the second gas Directive skipped to legal unbundling. The aim is to ensure an optimalisation of the usage of network system and greater motivation for the investments.

In general, the process of European gas market liberalization has been driven and regulated on two separated levels: **the national level** with national or regional wholesale monopolies operating on the downstream part of the gas market and **the European level** which is characterised by balancing between major producers and major national companies (Percebois, 1999).

2.3. Gneralized Stackelberg - Cournot - Nash models in downstream European gas market

Contemporary literature has presented many models analysing the European natural gas market and **the effect of liberalisation** on various parts of the market. Since the unbundling of particular activities in the gas value chain, game theorists have paid substantial attention to the market decisions of producers and market traders. I will present some of them which were focused mainly on the upstream[2] and downstream levels and on the interactions between various market players. The upstream part of the natural gas market is assumed to represent an oligopoly structure with very few competing producers, while downstream national part can be formed either by local within-country oligopolists or perfect competitors.

The market liberalisation implemented through adaptation of the European directives is just one necessary but not a sole sufficient step to obtain a fully competitive and efficient gas market. The facts that the upstream level is highly concentrated, the transport capacities are limited and the local demand is very inelastic make the introduction of competition to the market particularly difficult. This situation is very convenient for the producers who implement **a strategy "a la Cournot"**, and thus they influence the quantities of gas supplied or they limit their investment in capacities in order to increase downstream prices for greater profits (Mravec, 2011). On the downstream level, the situation is similar, the homogeneity of natural gas would enable more intensive competition among the market traders. Instead of pure price competition, the market traders operate on different demand territories and therefore this behaviour is generally characterized as a local Cournot model with strategic variables determined by gas volumes (Laleu, 2007).

[2] Upstream level of natural gas market represents the gas producers (production level) whereas the downstream market is charakterized by the market traders who supply the natural gas to the final consumers (distribution and selling part).

Although the idea of unbundling sounds intuitively persuasive, several studies have shown that it might lead to welfare decreasing effect for the customers. Previous theoretical studies have analysed the properties of market oligopoly, the effects of the vertical integration within particular market players and the effect of unbundling on these market traders. Greenhut and Ohta (1976, 1979) concluded that successive oligopoly derives higher consumer prices and lower output than vertical integration. Thus, they defended the existence of vertically integrated oligopolistic companies. Based on this oligopolistic model, Boots (2003) presented an empirical model GASTALE through which he analysed the European gas market. The core questions of the studies were the interactions of oligopoly in production and trade and their influence on market outcomes. Although the vertical integration is considered to put the customers at a disadvantage, the results showed the opposite and supported the prevention against monopolistic and oligopolistic structures in the downstream market. Because as Tirole (1988) stated: "What is worse than a monopoly? A chain of monopolies." The presence of monopolistic or oligopolistic structure both on upstream and downstream levels leads to double marginalisation and it is in the end disadvantageous mainly for final customers.

The impact of the liberalization of natural gas market was later analysed also by Golombek et al. (2000) who used a computable general equilibrium model and discovered positive effects of the liberalization on natural gas market, both on national and European levels. They proved an increase of economic welfare in the short and in the long-run and a decrease of average natural gas prices for the end-customers.

Another example of economic modelling of the effects of the gas market liberalization applied on the Czech market is offered by Mravec (2011). He used concretely extended standard Cournot models and recalculated them in two scenarios: before and after the market liberalization. The results significantly proved that the upstream market players might abuse their market power by capturing a significant part of the formerly regulated price margin (Mravec, 2011).

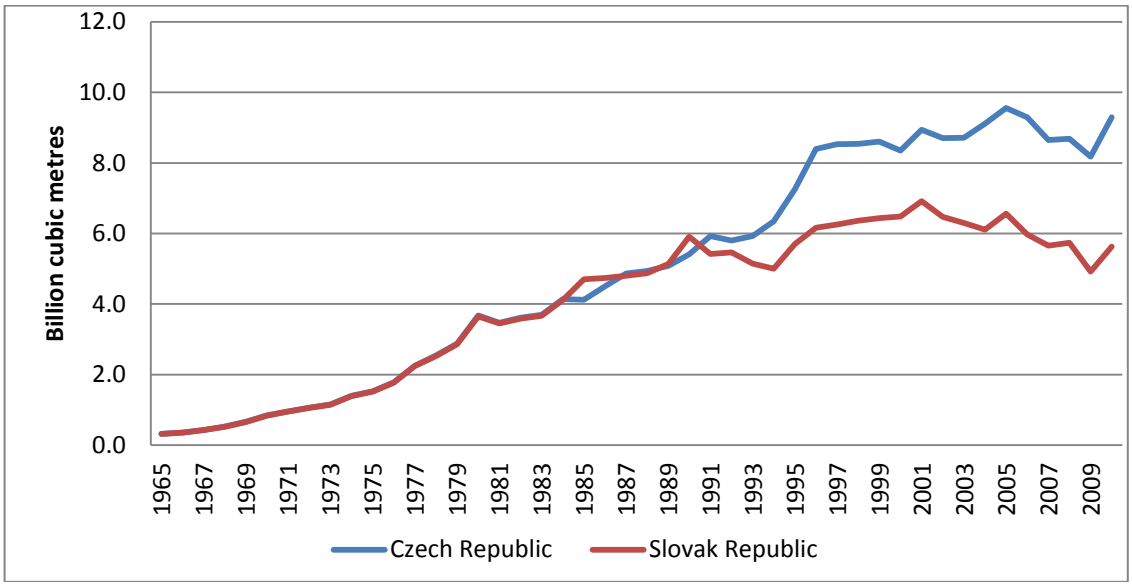
3. National gas markets – changes and challenges

Before liberalization, European national gas markets were characterised by high gas prices, tariff differentials, a very high degree of market concentration, completely interconnected all stages of gas chain between a supplier and a customer and almost no market-based balancing point (Honoré, 2010). Czech and Slovak markets were no exceptions but since 1990s both markets have undergone dramatic changes.

Natural gas is a very important source of energy for Czech Republic as well as for Slovakia and as we can see on the Figure 1, **natural gas consumption** has increased very significantly in the past 40 years. The environment-friendly character of the natural gas and the economic development of both countries are the reasons of such a large increase in consumption. We can remark that since 1996 the gas consumption stagnated and it reached its peak in 2005 (Czech Republic) and in 2001 (Slovak Republic). Since then it started to slightly decline. In 2009, the consumption of natural gas dropped very quickly mainly because of the global economic situation and rising oil prices that provoked also rising of natural gas prices (ERU, 2010). However, a very interesting remark for this graph is that lower levels of consumption of natural gas in 2009 cannot be seen as a rupture in previous increasing trend but just as an acceleration of longer downward oriented trend which already started four years earlier (E&C Consultants, 2010).

The first good sign of recovery was in 2010 when a small, approximate 10 percent growth in gas consumption was recorded. This increase can be explained by colder weather and lower temperatures comparing to the previous year, quick development of competitiveness in the gas market and in a case of Czech Republic, an adaptation of the environment tax on all types of fuel except natural gas (Czech National Report, 2011). Expectations for the next years are positive and slight annual increase is predicted given the expected recovery in the industrial sector.

Figure 1: Natural gas consumption in the Czech and in the Slovak Republic



Source: Author based on BP, 2011

The residential and commercial sectors in the Central Europe are the key drivers for the gas consumption and these two segments were strongly affected by the economic crisis. The switch to another source of energy would be very complicated for these customers and therefore we usually call them "captive" sectors.

Residential sector is characterised by houses where people use the natural gas as a source of energy for heating and cooking. Based on the quantity consumed, they are divided into different groups. But generally, we remark that since the 1970s, the total energy used per household has increased. Anouk Honoré (2010) defines these changes mainly by an increase of living area per household, a significant penetration of central heating and a continued growth in the stock of electrical appliances. These consumers have very price-inelastic demand. They have fixed investment into the machines and they are confronted to the energy bill just periodically. They can, however, react in the long-term to price changes or environmental regulations through modification of home systems.

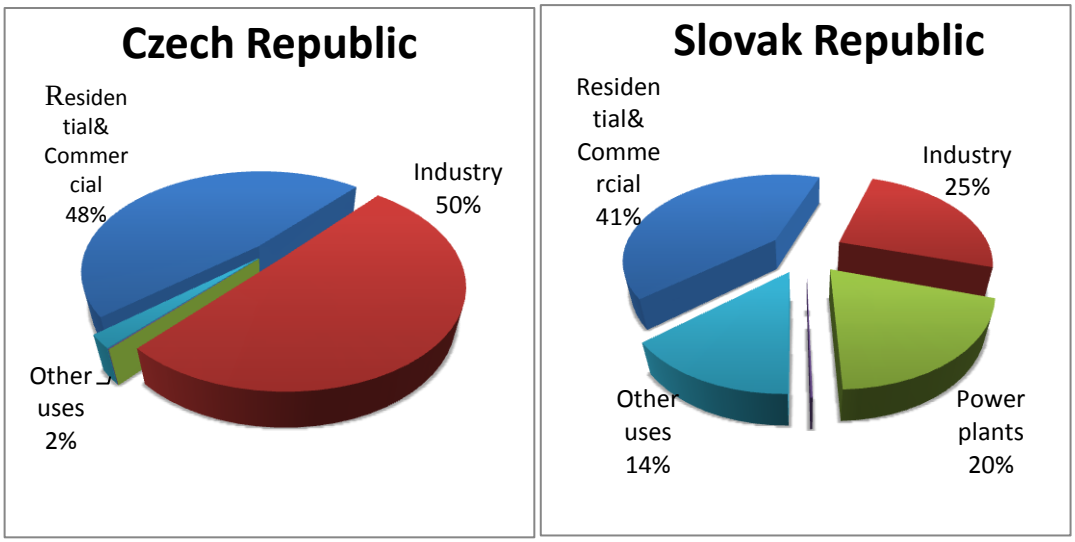
The second group of final customers is **industrial sector**. Uses of natural gas in industry are very wide and innumerable, not even mentioning the new applications which are being developed every day. But comparing to residential and commercial sectors, the industrial users are highly affected by increases in gas prices. If they have no option for double-switching and changing for another source of energy, their gas demand is in the short term rather price inelastic (Honoré, 2010). The industries which can replace

their gas consumption by another source of energy even in the short-term can easily react to price changes. But this is only a theoretical point of view because on the European gas market, the prices of gas are linked to the prices of other fuels.

For instance, we can conclude that the residential and commercial sectors have very small price elasticity but they strongly depend on the weather condition. And as the Czech and Slovak gas markets are characterized by wide seasonal disparities between summer and winter period, increased gas demand draw by heating needs during the winter is not surprising.

On the following graphs, Figure 2, we can see the inland sales of natural gas in the Czech and Slovak Republic divided between **national sectors of economies**. Comparing these two countries and their main natural gas sales, we can see wide differences. Almost a half of the total consumption in both economies is allocated in the residential and commercial sector. The other half is covered by industrial sector in Czech Republic and by industrial and power plants sector in Slovakia. Just a negligible volume of natural gas is consumed by transport.

Figure 2: Percentage of total consumption in the Czech and in the Slovak Republic



Source: Eurogas, 2011

Unfortunately, neither Czech Republic nor Slovakia can cover their domestic demand by their own production, they are almost 100 percent dependent on foreign sources and their choice on the source of supply is limited to Russian natural gas or Norwegian.

3.1. Natural gas market of Czech Republic

Czech Republic has adopted the EU's objectives in the energy policy with a focus on market competition and industry deregulation. The competition has been rapidly developing and intensifying and additional new gas traders entered the liberalised market on both upstream and downstream levels of natural gas market (Czech National Report, 2011). These positive improvements were accomplished by continued implementation of primary and secondary European energy directives, mainly adopting the so-called third energy package. In order to analyze the impact of market opening on customers and the behaviour of various market players, the full understanding of the specific market features is necessary.

3.1.1. Legal framework

The start of liberalization process in Czech Republic is dated back to the year 2004. Since then the market has passed a major development in many ways. The biggest change has been adapted to the structure of a market in relation to unbundling requirements. In 2005, Czech legislation required accounting **unbundling** of transmission and distribution companies which represented the first actual step of market liberalization with a view of preventing the abuse of dominant position in the market. One year later, legal unbundling of transmission system operators was adopted and it provoked the establishment of RWE Transgas Net, a.s. (later renamed for NET4GAS) as a transmission independent company of RWE with separate identity on the market. The next step was legal unbundling[3] of distribution and storage system operators with the establishment of 6 regional gas distributional companies and RWE Gas Storage (initially they all constituted a part of RWE, a vertically integrated company). An important change was recorded in January 2006 when all customers, except for households, became eligible. A free choice of supplier has been extended on year later, in January 2007, also to households. Finally, this year Czech Republic implemented the so-called Third Energy Package, officially Directive 2009/73/EC in order to harmonise European and Czech legislation. One of the main objectives was already mentioned, effective separation of gas transmission operators from gas production and supply activities and reinforcement of consumer protection. In order to fulfil these goals and enhance the efficiency of regulation, the intra-group regulation and supervision was transmitted

[3] Legal unbundling comparing to the ownership unbundling means that several parts of gas value chain have to represent legally independent entities with autonomous management. They can still be owned by one active group but interferences in the entities'' operations are forbidden.

to **Energy Regulatory Office (ERO)**. The competences of this national regulatory authority were extended and they were given freedom in decision-making (Czech National Report, 2011). ERO became an independent subject from the business sector with executive power. It is responsible for setting out the regulatory methods through transmission and distribution customers pricing. Nevertheless, carrying out the inspections and imposing the penalties is within the competences of the **State Energy Inspectorate**.

3.1.2. Structure of the Czech natural gas market

As I have already mentioned, Czech Republic is fully dependent on foreign sources of natural gas.[4] The domestic needs are almost exclusively covered by imports from Russia and the balances are supplied from Norway.[5] The contracts are based mainly on the long-term take-or-pay agreements. The reason is given by the intention of Czech Republic to provide security of supply and reasonably diversify the sources of natural gas.

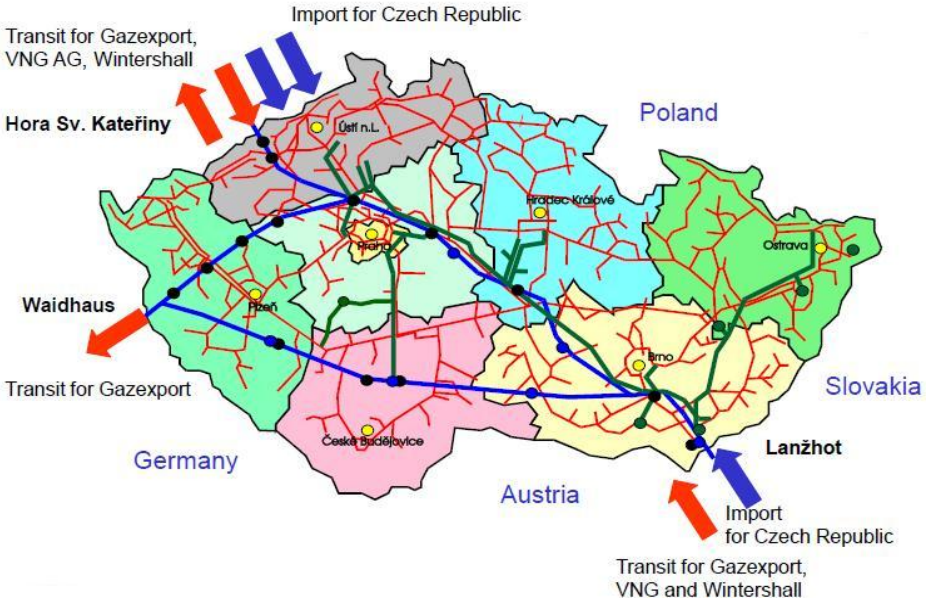
The **gas supply chain** of Czech Republic consists of a network transmission system, six regional distributional systems and natural gas storage facilities balancing the seasonal differences (Mravec, 2011).

The opening of the Czech gas market resulted in a large number of new suppliers entering the market and the utilisation of the **transmission system**, operated by NET4GAS, s.r.o.[6] significantly increased. The transmission system operator also covers the transit across Czech Republic but this activity is strictly regulated by the Czech national Energy Regulatory Office (ERO). It is responsible for setting out of the TSO´s entry tariffs at a single level for all borderline points (there are three interconnection points at the state border: Lanhžot, Hora sv. Kateřiny and Waidhaus) and also for determining of maximum allowed transmission charges for end-customers. The costs for transmission are calculated on the entry/exit principle, affected by costs, depreciation and amortisation, profit and the correction factor.

[4] Domestic production meets roughly 1,3 percent of national demand (IEA, 2010).
[5] The first contract with Norwegian companies was concluded in 1997 and nowadays it covers almost one quarter of total imports.
[6] Until 3 March 2010 known under the name RWE Transgas Net, s.r.o.

Moreover, Czech Republic plays an important role in an international transitory system of Russian gas to Germany and France. According to the Czech National Report, the total volume of imported gas has an increasing tendency and this trend is partly drawn also by foreign customers (Czech National Report, 2011). The convenient geographical location creates favourable conditions for development of integrated European gas market and intensifies the co-operation between neighbours. Mainly the gas crisis in January 2009, demonstrated the need of increasing security of supply of natural gas. Nowadays, the major investment project is the new GAZELLE gas pipeline whose goal is to connect the Czech Republic to Russian suppliers via the so-called northern route, Nord Stream (Czech National Report, 2011). This connection is expected to increase the capacities of the current Czech transmission system and provide new gas flows. The project offers higher level of security and reliability of gas supply for the whole central European region in a short-term but also a long-term perspective.

Figure 3: Czech national network system



Source: RWE Transgas a.s.

The natural gas is transported to the final customers by one of six licensed **distribution systems**, four of them are a part of RWE group. The distribution charges are regulated as well on an annual basis by ERO but the cap method is imposed. The charge is

therefore composed of two parts, the stable and the variable one, based on the distribution capacity and gas quality.[7]

As natural gas is a very seasonal commodity, Czech Republic needs a mean how to balance the gaps between the winter and the summer national demand. This is provided by the underground **storage facilities**. There are three system operators: RWE Gas Storage, MND (Moravské naftové doly) and SPP Bohemia. Moreover there are projects to extend capacity at the storage sites in order to provide a secure natural gas supply (IEA, 2010).

In order to ensure transparency and equal conditions, the Public notice no. 545/2006 requires the general **standards of quality** of supply and services. Each holder of the licence (nowadays there are 144 of licensed traders presented) is obliged to publish an annual summary about fulfilling the relevant parameters. In January 2010, state-owned market operator - OTE, a.s. was established. In order to simplify the communication, clear the imbalances between the market players and play a role of neutral counterparty in all relevant transactions (Czech National Report, 2010). This combination of several measures, including long-term supply contracts, high capacity of underground storage facilities and requiring safety standards of the supply infrastructure applied on Czech natural gas market contribute together to a high degree of supply security (IEA, 2010).

3.1.3. Overview of market traders

The full effect of liberalization has been recognized in all distribution customer segments. A dominant supplier in the Czech gas market, RWE declared that: ” The liberalization of the Czech gas market has seen an increased role of market forces accompanied by steadily increasing competition among suppliers” (RWE Transgas a.s., 2011).

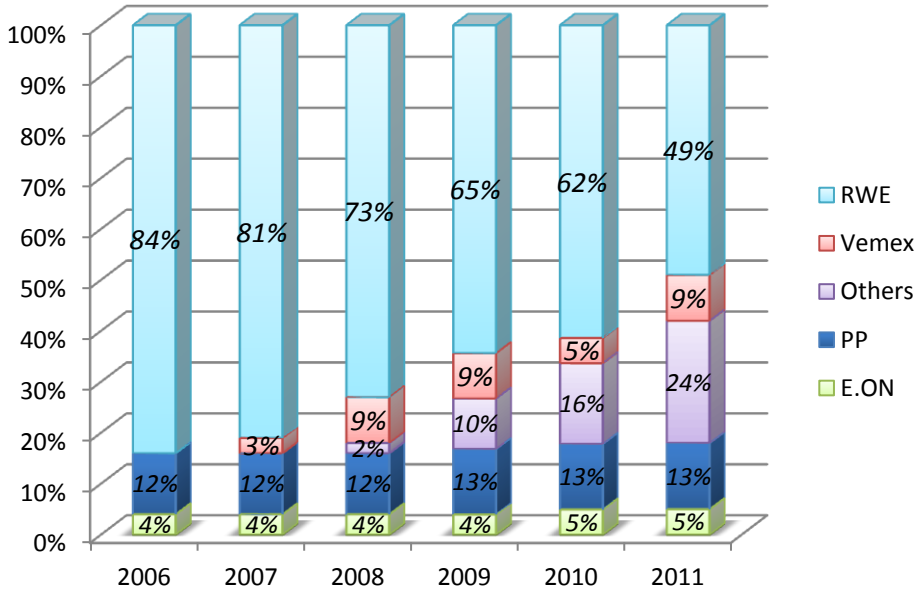
RWE is the most important market player in the Czech Republic. Its core business covers natural gas imports through its subsidiary NET4GAS, s.r.o., providing storage facilities through RWE Gas Storage, s.r.o and supplying natural gas to final customers. New traders came with competitive services and products and very successfully competed with the incumbent. They helped very successfully to decrease the concentration in the Czech

[7] Based on the offical webside www.eru.cz

gas market (Czech National Report, 2011). Over the past five years, RWE has lost its dominant market power from 84% to 49% and a number of alternative suppliers have been overtaking its market shares. The way of switching the supplier was simplified and therefore a large number of gas supplier switches was presented within all customer categories, categories of large and medium-sized customers but also small business and households.

The second major gas trader operating on the Czech market is VEMEX s.r.o. In 2010, the company held market share of more than five percent and in one year they almost doubled the number of their customers to 9 percent. Last company which crossed the five percent market share was SPP CZ, a.s.

Figure 4: Development of market shares 2006-2011



Source: RWE Transgas,a.s, 2011

3.1.4. Customer switching

The full liberalisation of the gas market also provided an opportunity to final customers to choose their gas supplier. In 2010, an amendment to the Gas Market Rules covered the problem of the gas supplier switching. The goal was to make the whole procedure faster and smoother for the end-costumers. The whole simplification of the process now takes 10 business days and a very important role is covered by the market operator. It became a very useful intermediary which shares relevant information within the counterparts.

The following Table 1 shows the numbers of customers divided into categories who have changed their gas supplier since 2005.

Table 1: Switching rate in %

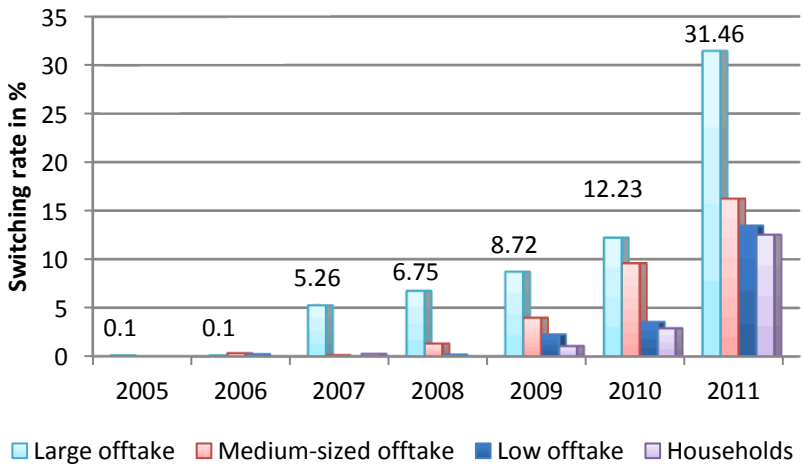
Type of demand	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*
Large offtake	0,1	0,1	5,26	6,75	8,72	12,23	31,46
Medium-sized offtake	-	0,32	0,12	1,32	3,98	9,6	16,24
Low offtake	-	0,23	0,03	0,18	2,26	3,55	13,46
Households	-	-	0,25	0,0	1,07	2,9	12,53

Source: The Czech Republic´s National Report on the Electricity and Gas Industries, 2005-2011

Note: A group "large offtake" consists of business customers with annual gas consumption more than 4200 MWh, "medium-sized offtake" are end-customers with tha gas consumption 630-42000 MWh per year and "low offtake" includes the end-customers with the annual gas consumption bellow 630 MWh .

Most of the supplier switching is caused by the fact that new traders entering the gas market were able to offer lower prices than the incumbent supplier. And therefore the customers migrate from the incumbent supplier to alternative suppliers. The most active category was the large offtake category whose switching rate for the year 2011 was 31,46 percent. For the industrial customers a changing of gas supplier can be very helpful mostly for lowering the production costs. In terms of absolute numbers of gas supplier switches, in 2011 the largest number took place in the household category. Moreover, all of the categories have an increasing tendency which is also expected to continue within the next following years.

Figure 5: Customers´ gas supplier switches 2005-2011



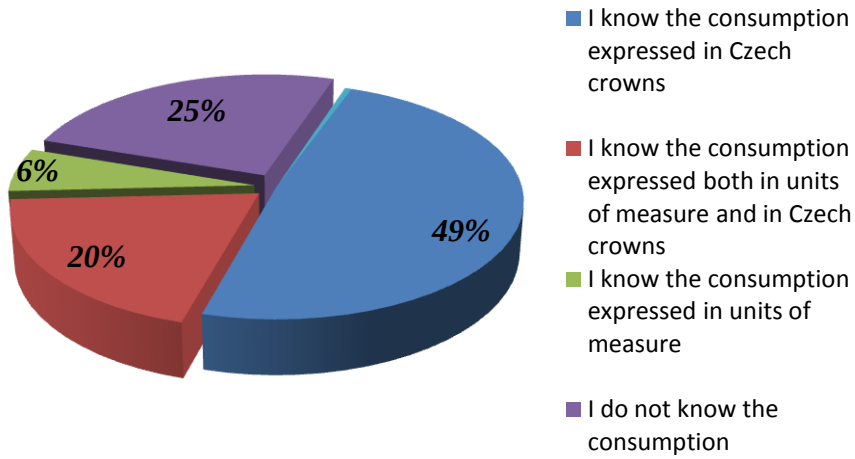
Source: The Czech Republic´s National Report on the Electricity and Gas Industries, 2005-2011

3.1.5. Public opinion on the natural gas market

Natural gas plays a very important role in the Czech energy market. In December 2010 and 2011, Czech marketing company Factom Invenio agency conducted a research concerning a public opinion related to the Czech natural gas market. They surveyed a representative sample of 977 gas consumers.

The results were interesting. Almost one quarter of the respondents using natural gas did not know their monthly consumption and one half was able to express it just in Czech crowns. Young people under 30 form a group which is the least interested in their household natural gas consumption.

Figure 6: Familiarity with monthly consumption of natural gas



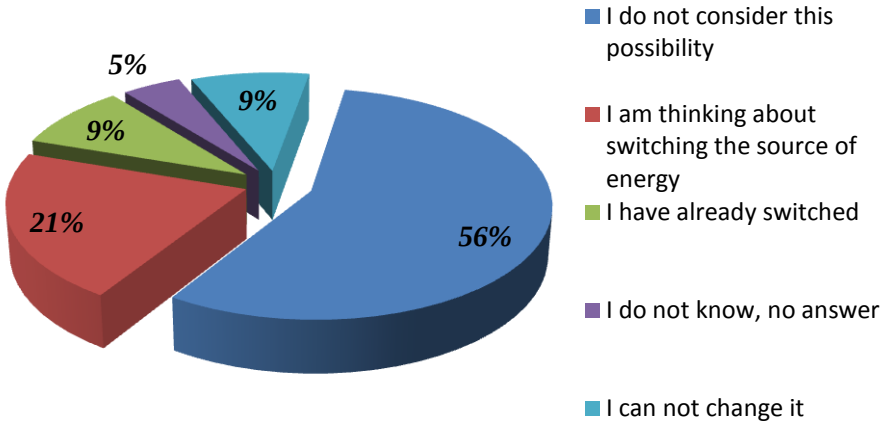
Source: Factum Invenio, 2011

Another interesting result comes from the fact that despite a vast majority of people consider the gas prices excessive, overall satisfaction with the supplier of natural gas is very high. Even more than three quarters of respondents are satisfied and almost one half does not consider the switching of the gas supplier. Only a relatively small proportion of consumers would opt for the switching of their gas supplier because of their dissatisfaction with the gas prices. Even fewer of them (about 9 percent) actually made a step to the real switching. There is also a significant group of consumers who would like to change their gas supplier but they have problems with orientation on the market and they would need a professional help.

When considering a change of potential suppliers, price clearly plays a dominant role in decision making, followed by fixation of conditions of the contract. A positive fact is that the awareness of the population in the area of the competitive offers by various gas suppliers increases but people who actually consider the switching are in the minority.

This research just proved that the Czech natural gas market is changing but relatively slowly influences a public awareness.

Figure 7: Switching to another source of energy as a reaction to the increase of natural gas prices



Source: Factum Invenio. 2011

3.2. Natural gas market of the Slovak Republic

The natural gas is crucial source of energy for Slovak economy.[8] But as Slovakia belongs to the countries with a small internal market, the effective cover of its needs with its own production is unrealistic.[9] Therefore Slovakia wholly depends on the imported gas from Russia which is assured by long-term take-or-pay contracts with Russian public company Gazprom Moscow.

In the 80s and 90s, the price for natural gas mainly for households was very low, even under the cost level and the losses were compensated by the prices for industrial sector. This situation was very convenient for Slovak households and all villages fought for the access to the transmission and distribution network. Natural gas was therefore able to reach customers located even in the most distant regions where investment in the network was not considered to be profitable (Cavaliere, 2007). Nowadays Slovakia counts with very **high density of gas pipelines** and approximately 77 percent of Slovak villages have an access to the network which covers about 94 percent of the whole Slovak population (Studenec, 2011).

3.2.1. Legal framework

The liberalization of Slovak gas market went through various stages as well as the liberalization in the Czech Republic. The European gas Directives have been implemented into Slovak legislation through several amendments. In 2001 the regulatory Act 276/2001 defining common rules for natural gas was adopted and among other definitions, the Regulatory Office for Network Industries (hereafter only as "the Office") was also established. The Office is currently responsible for the regulation of connection and access to the transmission and distribution networks. It determines the charges for the transmission and distribution of gas, gas storage, gas supply for households and a last resort gas supply. So far, only the production and accumulation part of the natural gas chain have not been the subjects of the Office´s regulation (the Office, 2012). In 2005, all non-household customers became eligible and just two years later, the natural gas market became completely liberalized for all customers, including the residential ones.

[8] Natural gas accounts for about 30 percent of the country´s primary energy supply.

[9] The actual production in Slovak Republic is very small and only territorial (annually the production covers approximately 2% of national consumption). And for the next years, it is expected to decline rapidly, dropping to approximately 30 percent of current production by 2014 (IEA, 2011)

This has allowed all customers to select their own supplier. The most important implementation of European legislation was in 2006 trough Energy policy 2006. The main goals were ensuring sufficient volume of energy sources, sustainable development and security of supply (Studenec, 2011). The full implementation of the first two European Gas Directives into the Slovak legislation passed in 2007 in order to accelerate the full harmonization of the Slovak legislation with the European one (the Office, 2011). The actual functioning of Slovak gas market is therefore regulated by the regulation of the Government 409/2007 and by its later amendment 212/2010 which lay down the rules of the behaviour of market players. The legal unbundling was completed by 2007 and the dominant importer of natural gas Slovenský plynárenský priemysel was divided into three: SPP, a.s., SPP-distribúcia, a.s. (DSO) and SPP-preprava, a.s. (TSO). Thus the actual division between gas distribution representing the physical flow and gas sales as sales flow became more obvious. In September 2012, the implementation of the Third energy package into the Slovak legislation is anticipated and it is expected to bring some structural changes.

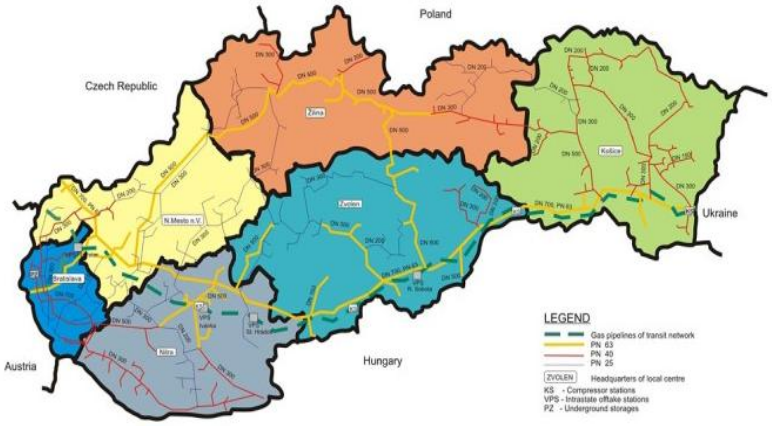
3.2.2. Structure of the Slovak natural gas market

Transmission of the natural gas in the Slovak republic is operated by transmission system operator Eustream, a.s. The company started its activity in 2006 after the legal unbundling from SPP as 100 percent subsidiary of SPP. Based on the entry/exit system Eurostream provides the access to the transmission network system. Nevertheless the access and a gas transmission are subjects to price regulation defined by the Act No. 276/2001 Coll. Based on the benchmarking method. The Slovak transmission system is from the larger part used by foreign users[10] and just about 10 percent of the transmission capacity stays within Slovak Republic (the Office, 2010). But in about three years, it is expected that the transit of Russian gas through Slovakia drops 90 percent from the current level. The North Stream pipeline will deliver all Russian gas supplies which are currently shipped through Ukraine and Slovakia (Natural gas Europe, 2012). Slovakia therefore will be obliged to face new challenges arising from an increase of pipe-to-pipe competition and the huge loses of financial revenues from the transit operations.

[10] In 2011, about 75 percent of natural gas flow from Russia to Western Europe was passing through Slovak Republic.

Slovak Republic imports approximately 97 percent of the whole volume of natural gas through the long-term contracts with Russian company Gazprom whereas the transitory country is Ukraine. The turning point in the view on foreign supply of natural gas was remarked during "**the gas crisis**" in January 2009. After analysing the crisis situation, transmission company Eurostream adopted additional technical possibilities of reverse flows of natural gas from the Czech and Austrian networks in a case of repeated cut-offs of gas supplies. At the same time Eurostream cooperates with Hungarian company FGSZ Zrt (later replaced by MVM OVIT) on new pipeline interconnection between Slovak Republic and Hungary (the Office, 2010). The project would be a part of the V4+ countries north-south corridor which aims to connect European gas pipelines as Nabucco, South Stream or LNG terminal in Croatia and in Poland. Slovakia could through these networks diversify its sources of natural gas. Moreover, in order to increase the security of supply, Slovak government established new amendment to an Energy Act (in February 2009) which requires a supply of natural gas to all end-customers even in a case of total cut-offs.

Figure 8: Slovak national network system



Source: SPP Distribúcia, 2012

As far as the **distribution** of natural gas is concerned, there is only one distribution system operator in the Slovak Republic – SPP Distribúcia, a.s. It is a 100% subsidiary of SPP and its network covers the whole territory. This company also provides the monitoring of the distribution network and it controls the balances in the system. Traders are obliged to announce the expecting volume of gas import on a daily basis. Beside SPP Distribúcia, several less significant and just local distribution companies operate. The tariffs for gas distribution are as well regulated and determined on the so-called postage stamp principle and therefore the annual volume of distributed gas and the customer´s category are the only determinants (the Office, 2010).

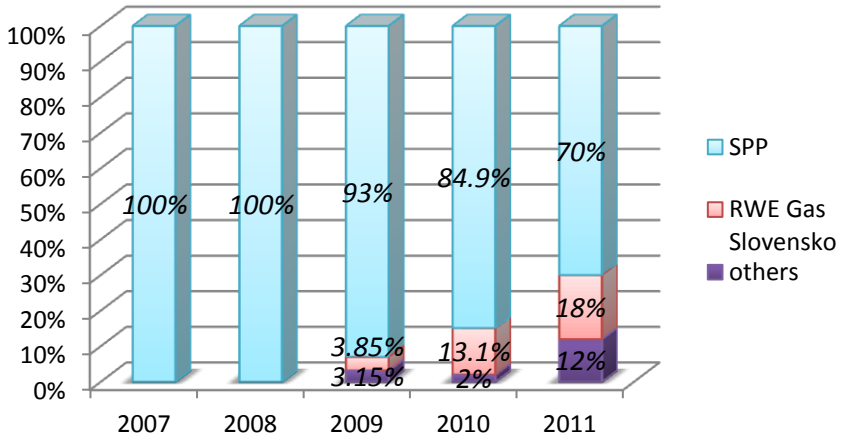
The number of **storage** providers in Slovak Republic has not changed since the liberalisation of the gas market in 2007. The storage facilities are operated by two main companies NAFTA, a.s. and POZAGAS, a.s. (the Office, 2010). Their services are used mainly by Slovak incumbent SPP and then various foreign companies from Austria, Germany, Czech Republic and France. Their main role is to balance the differences between the supply of natural gas and its real consumption mainly within the summer and winter periods. They also provide the secure supply of natural gas in a case of unpredictable occasions. The regulation is provided by setting the maximum price based on the benchmarking system with the other countries. As there are just two storage companies presented, both with the partial ownership linkage to the SPP and transmission and distribution systems as a whole subsidiaries of SPP, we cannot talk about the competitive national market. On the other hand, the increasing cooperation within the Central European countries and the close presence of important storage facilities in Austria, Czech Republic and Hungary generate the concurrence on the multinational level.

3.2.3. Overview of market players

In the past, the Slovak gas market was vertically integrated with one dominant player involved in all parts of the gas chain. SPP wholly controlled transmission, distribution, retail and industrial sale. European liberalization policy aimed to introduce competition to the gas market and break vertical integration (Cavaliere, 2007).

Considering the actual number of licensed traders presented on the gas market, we can assume that the Slovak gas market has a stable structure. The traditional incumbent is Slovenský plynárenský priemysel, a.s. (SPP, a.s.). New traders, usually local branches of international companies, entered the market in 2009 and even though the market is open for all categories of consumers, including households, new competitors pierced mostly into the industrial sector. Nevertheless, SPP, a.s. as an incumbent trader remained in its dominant position and covered 82 percent of the wholesale market. The other 18 percent were covered by new companies as RWE Gas Slovensko, s.r.o., SHELL Slovakia, s.r.o., VNG Slovakia, spol. s.r.o., Lumius Slovakia, s.r.o. (the Office, 2010). Regulated prices for household customers and more complicated process regarding the administration of the price proposals limit the effective development of competition in the household segment of the market.

Figure 9: Development of the market shares 2007-2011



Source: the Office, Annual Report 2007-2011

As it was already mentioned, the most part of the gas supplies is ensured by the long-term gas supply contracts signed in 2008 for the next 20 years, between SPP and Gazprom Export. In order to increase the security of supply and diversify portfolio, SPP conducted gas supply contracts also with E.ON Ruhrgas and GDF SUEZ which ensure the supplies through the reversal flow in a case of disruption of supplies from the east. Other alternative suppliers usually cover the natural gas supplies by the diversified portfolio of their mother companies or through NAFTA, Slovak producer and storage operator (IEA, 2011).

3.2.4. Customers switching

At present, there are several active suppliers on the gas market, the switching of supplier is legally accessible to all consumers and it is free of charge. The actual length of the switching procedure is determined in the Ordinance of the Slovak government No. 409/2007 Coll. Despite the fact that Slovak gas market is officially fully open since 2007, in reality it began developing just in late 2009 when several subsidiaries of major European gas companies entered the market and they started to provide the end-customers with alternative offers. The supply to household customers is covered mostly by the incumbent supplier, SPP. Regulated end-user prices for household customers represent the barriers to more competition and they may also prevent the market from the necessary private investments. The role of regulatory office is therefore to ensure a stable, predictable and transparent environment in order to provide a well—functioning gas market and attract

the needed investment (IEA, 2010). The year 2011 was important from a point of view of the increased number of switches of gas supplier in all categories.

Table 2: Switching rate in %

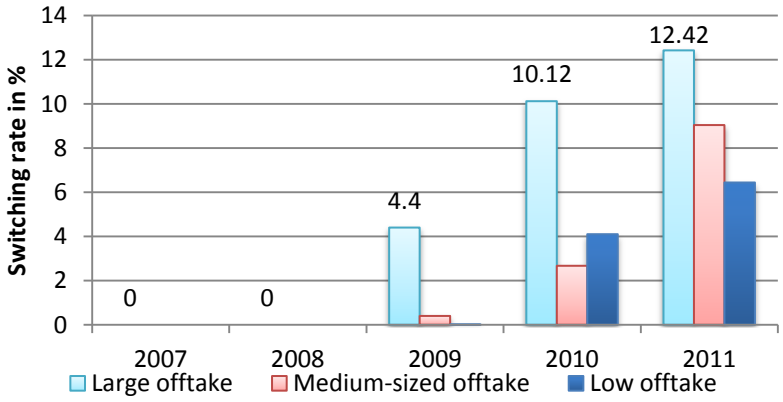
Type of demand	*2007*	*2008*	*2009*	*2010*	*2011*
Large offtake	0	0	4,4	10,12	12,41
Medium-sized offtake	0	0	0,41	2,67	9,04
Low offtake	0	0	0,01	4,1	6,44
Household	0	0	0	0	21 376 (No. Of switches)

Source: the Office, Annual Report 2007-2011

Note: A group "large offtake" consists of business customers with annual gas consumption more than 4200 MWh, "medium-sized offtake" are end-customers with the gas consumption 630-42000 MWh per year and "low offtake" includes the customers with the annual gas consumption bellow 630 MWh .

The switching rate has an increasing tendency since 2009 and within 2 years it almost tripled in the category of large offtake. The most active category in the sector has been the large-offtake category. The changed market conditions lead to the possibility for the big industries to negotiate the natural gas supplies also with alternative suppliers. The residential customers are still protected by the national regulation and therefore in 2011 the incumbent still covered 90 percent of the market. However, this category experienced a sharp rise of the number of switches within the last two years as well. And this increase is attributed to the entering new alternative suppliers to the market and mainly the proactive policy of RWE Gas Slovensko, s.r.o. (the Office, 2010). The aim of the Office is to make the process of switching the gas supplier easier in order to increase the competition on the gas market.

Figure 10: Customers´ gas supplier switches



Source: the Office, Annual Report 2007-2011

4. Pricing formula

In recent years, the price of natural gas has become a very interesting topic. As natural gas is one of the most important sources of energy and many countries depend on this source, the customers need to be ensured by regular supplies and reasonable prices. Nevertheless, there are many factors which influence the natural gas price on the global as well as regional level.

This part therefore deals with the pricing structure in the European gas market and especially in our relevant regions. They are still dominated by long-term gas contracts even though there are some tendencies to pass on gas-to-gas pricing mechanisms. Later we take a closer look at the determinants of the prices for end-customers in the concrete cases of the Czech and the Slovak Republic.

4.1. Long-term contracts

Traditionally, the gas as a commodity is sold via **long-term contracts** with the period from 20 to 25 years. These contracts maximise the rent income of the producers and keep the natural gas marketable at the same time. The buyer is forced to buy at least a minimum quantity of gas at the price that is competitive with other sources of energy[11] even if he does not want it to be delivered.

The traditional formula used for determining the price of the natural gas as a commodity at calculation date is following (Asche, 2002):

$$P = P_0 + \sum_{\mathrm{j}} \alpha_{\mathrm{j}} \left(AE_j - AE_{j0}\right) EK_{AE_j}\, \gamma_j$$

Where P is the purchasing gas price, P_o is the basis price, α_j is a weight parameter for substitute j (supposing that $\sum_j \alpha_j = 1$), AE_j and AE_{j0} represent the actual and the historic price of a given substitute j. Finally EK_{AK_j}determines an energy conversion factor and $\gamma_j$is characterized as the impact factor for price changes in substitute j.

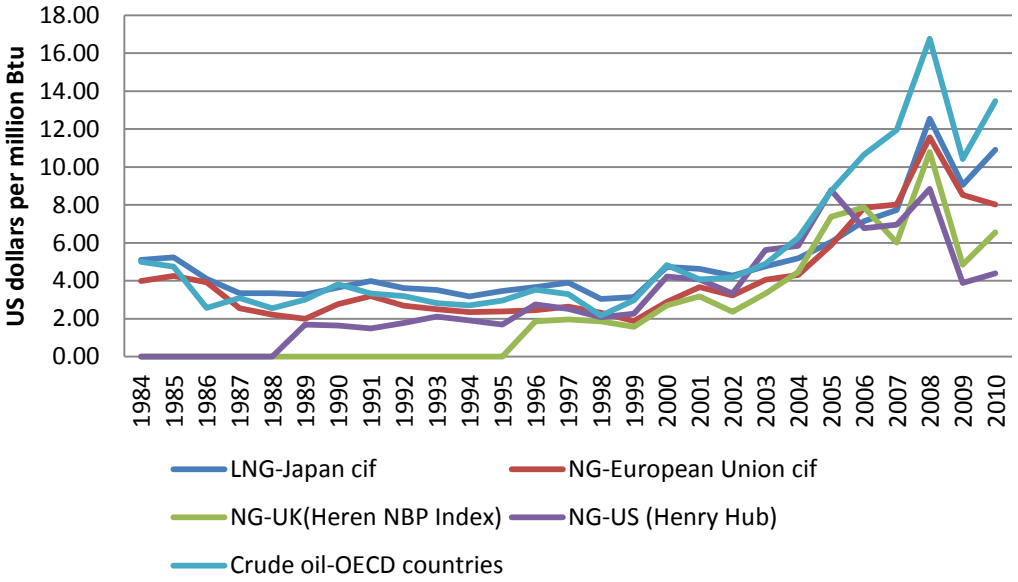
[11] This obligation is covered by the minimum take-or-pay clause of a contract.

The price is traditionally related to the price of oil products using special formulas of indexation (Chevalier, 2007). In the Czech and Slovak Republic, the key indexation parameters are gas oil, fuel oil and coal. The trading of natural gas is stabilized by the fact that the sales of natural gas are mostly long-term contracted. But still the prices of natural gas are strictly controlled because there is a strong correlation between the price of natural gas and the economic development of European countries. This problem is very important mainly for definition of energy policies adopted on the national or European level.

The main reason for the linkage between the prices of natural gas and oil products comes from the fact that these products represent alternatives in the long run. If the price of one of them was much lower, it could mean an incentive for the consumers to switch to other source of energy. And therefore in Continental Europe, the suppliers use long-term contracts with natural gas price indexation as a protection against any kind of disproportions with market values and also to manage additional supply needs during winter when predictable peak demand is expected. Both buyer and supplier study the market development and in case that any market conditions change, the price is renegotiated. Normally, it is done every three years, more frequent changes are very limited.

The theory of integrated markets concludes that if a homogenous product is supplied by different market participants, then the prices of this product should react at the same direction and converge in the long run. In case that the differences are presented, they should respond just to transportation costs or quality differences (Asche, 2002). This theory is proven on the following graph which covers the development of natural gas trading prices across regions and the correlation between the gas and the oil prices.

Figure 11: Price development of natural gas



Source: BP, 2011

All regional markets are connected and they affect each other. The price of the natural gas has slowly risen since 2000 and just the global economic crisis caused a strong decline. The development of natural gas prices obviously follow the development of oil prices on the international market which as well suffered from the effects of the global economic crisis. Whereas in July 2008, the Brent crude oil price peaked, by the end of the year it experienced a large decrease of 70% (European Commission, 2010). Between the years 2008 and 2009, the global prices of natural gas were affected as well and given the interconnection between oil and gas prices in many long-term gas contracts, gas prices dropped by around one fourth. Since then, the prices have raisin but they have not already reached the before crisis level. This situation is due to the consumption which started to recover just thereafter (European Commission, 2010). It is also remarkable how much a gas price is linked to the oil price. It actually follows its development in a global scope and all major world spot markets seem to converge in the long term. The most probable scenario for the next 10 years expected by many economists is a continual increase of natural gas prices.

4.2. Energy exchange markets

During the last 10 years, we have observed several changes in purchasing of natural gas in Europe. Although long term contracts still dominate, **international energy exchange markets** specializing in electricity, heat and fuel products have emerged and recorded a significant growth. This fact can be explained by a tendency of European Union to render the European natural gas market more competitive and to ensure a price which reflects the balances between the supply and the demand of the market participants. Nevertheless, the characteristic features of energy products, mainly the difficulties in storing and transporting, distinguish these types of markets from other commodity markets. And as a result, instead of a close linkage of a spot and future prices which is on the energy market very rare, the cyclical seasonal variations in prices are presented.

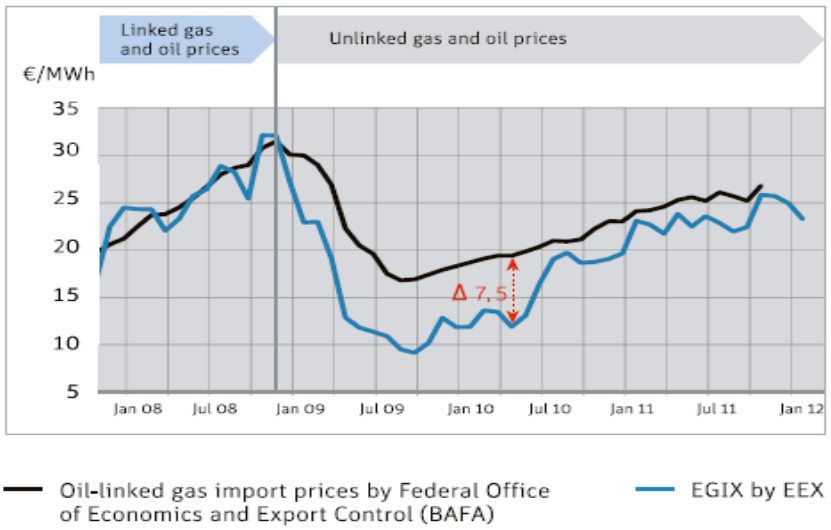
On exchange markets the prices of natural gas are determined either on **the spot market** where the commodity is delivered the same day as the transaction was conducted or on **the forward market** where a delivery is scheduled at some agreed date in the future. On the spot markets the prices are determined based on the gas-to-gas competition, balancing the natural gas supply and demand and therefore the spot prices can be extremely volatile. The suppliers are purchasing small quantities in order to balance the immediate differences whereas the forward markets allow the market players to agree on transactions ahead of time. The natural gas prices on the forward markets are primary influenced by seasonal expectations and comparing to the spot prices, they are much less volatile and they just tend to mirror consumer demand (Edwards, 2010).

The leading energy exchange market in Europe is the **European Energy Exchange** (EEX). It provides the market traders with an alternative for substituting energy sources in gas supply contracts on the current market price for natural gas. Monthly reference prices for the gas market are expressed by the European Gas Index (EGIX).[12] As we can see on the Figure 12, the gap between the oil-linked import prices expressed by Federal Office for Economics and Export (BAFA) and the monthly reference prices traded on the energy exchange is quite straightforward mainly in the period 2009-2010. At the late 2010, rapid rise

[12] The EGIX is calculated based on all concluded exchange transactions which are traded on the Derivatives market in the respective month for the NCG and GASPOOL market areas. Since this index is considered to be transparent and in line with the natural gas market development, it can be used as an alternative to indices linked to the oil price.

in spot prices was observed and it has considerably contributed to the narrowing of the gap. However, the difference between these two pricing mechanisms provokes important renegotiations of long term gas contracts between the gas producers and European importers of piped natural gas.

Figure 12: Development of the oil-linked gas prices and monthly reference price on EEX



Source: European Energy Exchange, 2012

Nowadays the Czech and Slovak suppliers use both ways to purchase the natural gas. The traditional incumbents prefer the long-term contracts linked to the oil products which ensure the security of supply whereas the alternative suppliers usually trade on the exchange markets where a price level is currently lower than oil-linked prices. Nevertheless there is no theoretical reason why market prices could not exceed oil-linked prices. Therefore, an expectation of indeterminate lower market prices is quite short-sighted and an existence of this hybrid pricing is just temporary. It is generally believed that the co-existence of oil-linked and market-based gas pricing is unsustainable and it is the gas-to-gas competition that represents the best available indicator of the demand and supply conditions on the gas market (Stern, Rogers, 2011). On the other hand, one of the major problems associated with the hub-based pricing is the oligopolistic nature of the Central European gas markets. These markets are characterized by relatively small number of gas suppliers and even fewer gas producers located outside of European Union. Therefore it could happen that the gas pricing based on the gas-to-gas competition would have to face potential manipulations on the both sides.

4.3. Factors influencing the natural gas prices on regional level

On the regional level, the natural gas prices for end-customers are derived by various factors. Based on the work of Andrea Gilardoni, we can list some of them. Firstly, it is the actual **market structure**. It influences the nature of the pricing mechanism alongside the whole gas chain (IEA, 1998). In low concentrated markets, as oligopolistic ones, there are no incentives for the sellers to decrease prices for customers. In high concentrated markets, it is the competition among participants that provokes pressures and leaves the customers free to choose their own supplier. The introduction of competition also leads to maximising efficiency, productivity and decreasing the costs in order to get comparative advantage (Honoré, 2011).

This provokes a question about the former gas market characterized by highly inelastic demand combined with high concentration ratio. The price impact of this combination can be determined by Cournot and Nash formula (1951):

$$\frac{(Price - Marginal\ cost)}{Price} = \frac{HHI}{\varepsilon}$$

The formula expresses the fact that the price differential to marginal cost depends on the market concentration given by Hirschmann-Herfindahl index (HHI) and is inversely related to price elasticity of demand given by ε (Dickel et al., 2006). And finally the end-customers are those who pay extra beyond costs coming from the fact that their demand is highly inelastic and the market is characterized by a high concentration ratio.

Secondly it is **a natural gas chain** which is composed of different parts between the producer and the final consumer. Additional costs arise in a case of long distance transportation, storage and local distribution.

Natural gas prices can also vary depending on **the type of consumer**. **The price seasonality** is a very important determinant, too. As I have already mentioned, consumption varies sharply trough the year and gas storage actually helps to mitigate these differences. The last but not least is **the involvement of the government**. Energy has always

been a very hot topic and provoked economic, political and social questions. Each country has adopted certain legislation in order to regulate and tax the natural gas market and trough this influence the situation.

4.3.1. Natural gas pricing in Czech Republic

In the Czech Republic, the price of natural gas for end-consumers is regulated by Act No. 458/2000 Coll. It´s composed of five parts: the price of commodity (P_{NG}), the price of transportation (P_{TSO}), the price of distribution (P_{DSO}), the price for storage (P_{SSO}) and the price of gas supplier (P_S):

$$P = P_{NG} + P_{TSO} + P_{DSO} + P_{SSO} + P_S$$

The most important part is **the price of commodity** which covers almost 70% of the final price for consumers. The remaining 30% consists mainly from other four parts. The actual percentage can be seen on the Figure 13. Whereas the price of storage and the price of gas supplier are defined on the competition basis, the price for transportation and distribution are regulated by national authority, ERO. The tariff therefore comprises two parties: fixed and variable one. Fixed costs are those which remain constant in total amount regardless the monthly changes in volume whereas variable costs are those which vary in total amount of consumed natural gas and increase or decrease in a volume of consumption.

The main factor affecting the final price is the purchase price of natural gas for which the supplier buys this commodity from Russian or Norwegian producers. This commodity prices are mostly determined and affected by the development on the global energy markets, based on the changes of market oil, heavy and light fuel oil and coal prices and also the developments of Czech exchange rate and inflation.

Prices of gas supply to industrial customers are normally determined individually through a price formula and they are calculated on a monthly basis. To small business customers and households, prices normally change quarterly. Contracts between the gas supplier and the end-consumers are typically signed for an indefinite period of time and they usually agree on bundled gas supply. In other words, the trader is responsible for all services

related to gas supply for the consumer, from the commodity itself, trough transmission, storage and final distribution (Czech National Report, 2011).

4.3.2. Natural gas pricing in Slovak Republic

The division of final end-customer price in Slovak Republic is the same as in the Czech Republic, it is determined by five major parts.

The fundamental change in pricing method of regulation was applied in 2009 when the Office started to use **the price cap**[13] instead of the revenue cap regulation method which was used till then. The price cap method helps to stimulate the level of competition and consumer protection on the gas market. And one of its most important advantages is the stability of prices even in the short-term period (the Office, 2010). Currently, the Office has passed into the second regulatory period 2012-2016 which is determined by the national law, especially the manor of price regulation has to be in line with the energy policy of the Slovak Republic.

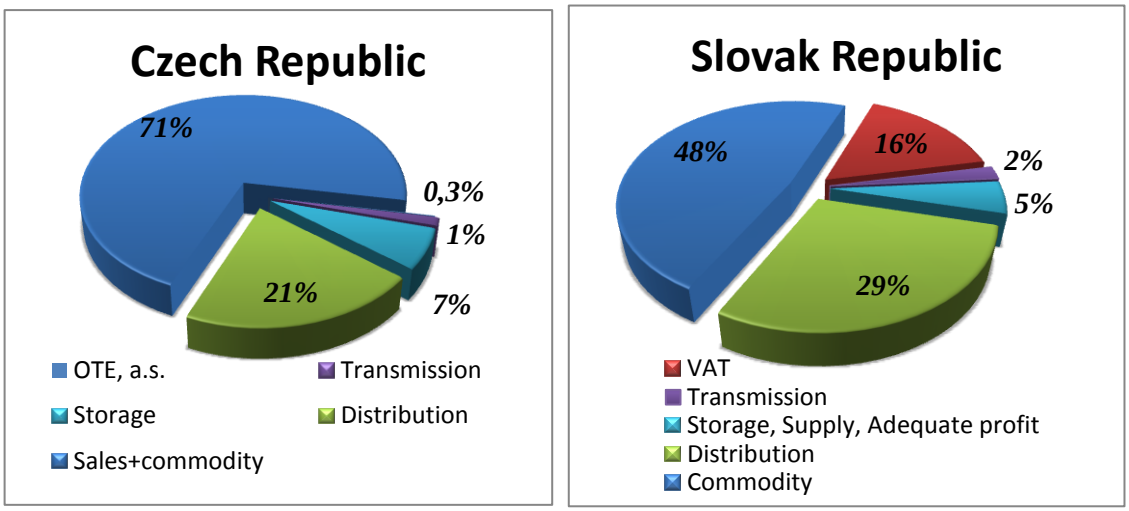
Maximum prices determined annually by the Office for the household sector are two-component, consisting of the maximum monthly fixed rate and the maximum rate for the extracted gas. For the non-residential sector, the prices are determined on the market and no regulation is imposed. As already mentioned the development of gas prices is strongly influenced by the prices of oil products on the exchange markets and the development of exchange rate of Euro against U.S. dollar. On the following graph we can see that the most significant part of the final price for end-customers is the purchase price of natural gas purchased from a foreign supplier.

The traditional problem is that the price cap is calculated based on the oil-linked pricing formula which is affected by the light and fuel oil prices and the exchange rate EUR/USD. And just then, the part of negotiations between the national incumbent and the Office starts. It is not surprising that everybody provides different values and a final agreement is hardly achievable. The other major argument in favour of deregulation

[13] This regulation method is given a ceiling on the price which gas companies can charge for supplying of natural gas to final customers depending on several variables such as underlying costs or inflation.

is the rigidity of the regulator. In a case of unpredictable occasion, the commodity markets react immediately whereas a regulatory office is not flexible enough to react directly.

Figure 13: Comparison of a structure of an average price for gas supply to household



Source: the Office, Annual Report 2010

5. The behavior of the major traders on the gas market – analysis of available data

This chapter goes to a deeper analysis of the connection between the aims of the major market players and the recent market situation. At the end, we try to form some ideas and theories about the expected trends towards future development. Generally, the adopted strategy of the incumbents strongly influences the situation on the whole market. In recent years, the level of competition has been increasing as new market players have extended the scope and the scale of their traditional business. Mostly governments step in and enact their behaviour through legislation. But there are still several decisions which need to be taken on the corporate level because as Anna Nikulina (2010) declared: *"Business corporations are probably the key parties in shaping country's energy balance one or another way due to the reason that these are the parties that take investment decisions and associated risks."*

A goal of this chapter is therefore to define and analyse their strategies. In this behaviour-based analysis of the development of natural gas market, the assumed portfolio of a dominant player RWE is taken as a starting point. We then make a range of assumptions regarding the pricing formulas which are used in order to purchase the natural gas and analyse the position of the incumbent as well as the alternative gas suppliers on the market.

Both, **Czech and Slovak gas markets are dominated by one**, the most important large company which plays a fundamental role. These companies (speaking about RWE in Czech Republic and SPP in Slovakia) used to be former national companies and nowadays they supply natural gas to end-customers. The main reasons for their dominancy are the size and relations created within long time of market dominance. As they possess technological capacities and financial resources, they can easily apply their bargaining power and also power to influence the governments. The decisions taken by this relatively low number of leading companies will strongly influence the future trends of the markets (Gilardoni, 2008).

Suffice it to say that, as Czech and Slovak liberalisation programs began to evolve in the 2000s, the national incumbents began to confront several emerging realities. Opening of the national markets and entering of the alternative suppliers meant losing market shares and losing profit they were used to. Hence in order to keep their position they could either decrease the prices or the volumes or find other areas of business and probably other countries in which to operate as the gas market liberalization has been supported in all European countries. Moreover, they also need to find a fair balance between the price and the quality of provided services.

As a result of this process, the companies generally share little of the corporate culture of the pre-liberalised vertically integrated companies. They do not have anymore the "national relationship feeling" created by traditional cultural support of the long term contracts, on the contrary, they tend to rely more on the competitive gas markets through their ownership of multi-national companies. This became particularly evident in the post-2009 period when the management board recognised the huge financial changes. As mentioned earlier, the co-existence of traditional oil-indexed and spot prices lead to the creation of a "hybrid gas price" mechanism. Not forgetting to mention several legislative developments, such as the effective third party access, ownership unbundling and regulatory oversight which completely transformed the conditions on the Central European gas markets.

5.1. Time framework

Competition among market traders started mainly in 2009, new companies entered the national level and even regional and local gas companies started to provide natural gas outside their traditional sales areas. The traditional incumbent RWE, a.s. has been losing the customers and in order to retain the revenues, the company needed to change its business strategy. In our analysis, we focused on the development of the residential market since 2010 when the number of supplier switches significantly increased.

A different situation in Slovak Republic is given by the fact that the gas market is not fully open as the prices for households are still regulated. The prices of natural gas are determined by the national regulator, the Regulatory Office for Network Industries which keeps a very close eye mainly on the residential market segment. The main reason for

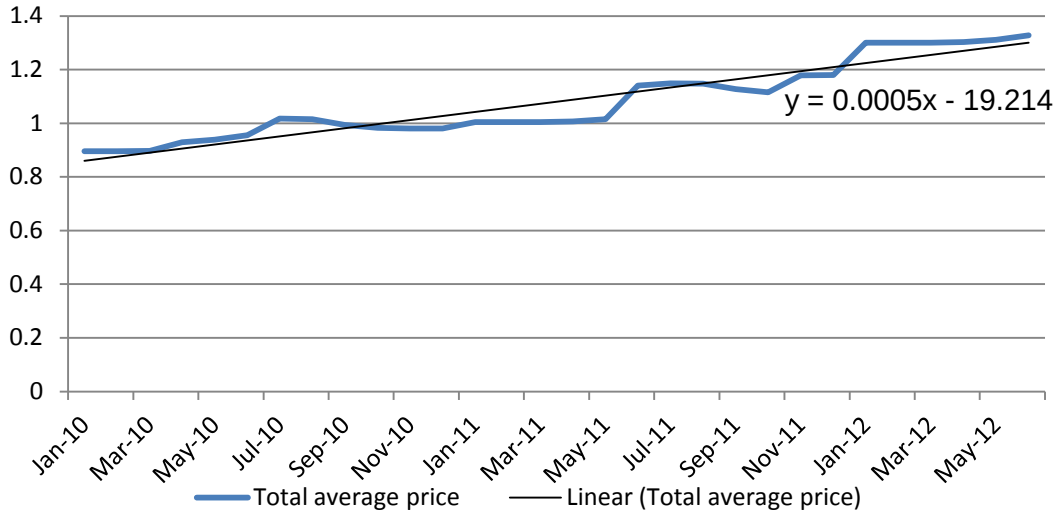
the regulation of the domestic natural gas prices is the fear of the authorities that volatile energy costs could be very problematic for a significant part of Slovak population. The Slovak gas supplier are obliged to cooperate with national authority, the Office, which is responsible for setting up the prices for residential users. The market specifications for the upcoming period are given the Regulatory policy 2012-2016. The prices have already risen in recent years, but the gas incumbent, SPP argues that the regulated prices for households are undervalued and they are not able to cover completely their costs. Apparently the argument is based on the prices of long term contracts in which the natural gas is purchased. The alternative suppliers confirmed that their costs are lower because of the purchases realized on the market and OTC platforms. SPP requires an increase by 17 percent which is not in compliance with the calculation of the Office. The conflict eventually led to the courts.

5.2. Data and definitions

It should be stressed that the price of natural gas has an important economic impacts on both, small and large end-consumers. For our analysis, we take into acount the household sector and small end-customers with an annual consumption below 630 MWh. Large industrial companies have a very strong position and they usually negotiate specific conditions of the gas contract with the supplier. Moreover, we will use for a discussion prices of RWE Energie,a.s. which represents one regional RWE supplier.

Given different groups with specific price conditions in a residential sector, a volume-weighted average method was used in order to obtain an average total price for a period between January 2010 and June 2012. We can see that it has a slightly increasing tendency within the analysed period.

Figure 14: Total average price for residential sector in CZK/kWh

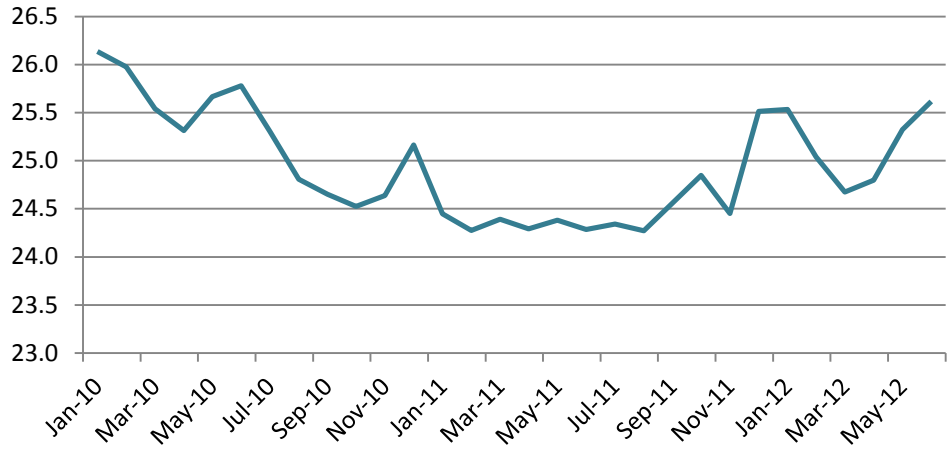


Source: Author, RWE Energie, a.s.

Since 2009, new alternative suppliers entered the gas market and therefore different models to set gas market prices have been developed. Initially only the replacement value from alternative fuels, such as gas-to-oil pricing was used but currently, when competition appears, more flexibility is expected. And market prices are also determined by the supply-demand balances on the spot and forward energy markets.

Continuous changes in the prices together with the development of the exchange rate between the Czech crown and the Euro, determine the final price of natural gas. And as we can see on the following graph, Figure 15, Czech crown was straightening since 2010 and just in September 2011 it started to weaken but even by the end of the year it did not reach the previous position. The reasons for the volatility of the exchange rate are both the situation in the European region and domestic economic developments and future expectations. At the same time, weakening Czech crown is projecting a negative influence, especially in terms of higher final energy prices.

Figure 15: Exchange rate CZK/EUR

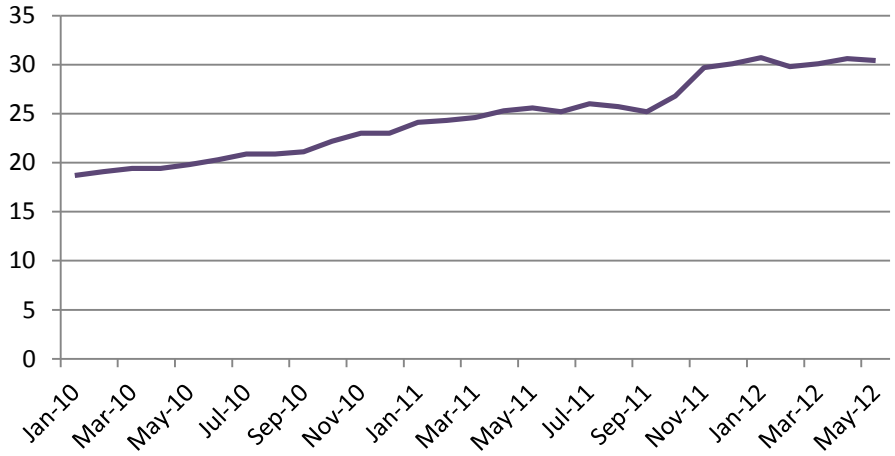


Source: Author based on the Czech National Bank

Long-term gas contracts conducted by natural gas suppliers with the major producers are linked to the price development of a basket of oil products. Once the gas supply contract is concluded, the price formula automatically determines the price on a monthly basis. The actual price is determined by the preceding 6-9 months and thus the buyer will be paying a price during the first quarter of a year related to an average of oil-product prices in the preceding two or three quarters of the previous year (Stern, 2011).

Since the actual values of long-term pricing formula are considered to be very sensitive information, we used publicly accessible BAFA German Border Price as a proxy for an oil-indexed price. This price is set monthly by Federal Office of Economics and Export Control and it shows the price of German natural gas imports from Russia, Norway and Netherlands usually following with a lag of the oil price. It therefore covers the same producing countries as the portfolio of Czech Republic and we can expect a very similar development in both markets. Within the analysed period, the border prices have risen by more than one third.

Figure 16: Oil-indexed natural gas price in EUR/MWh



$Note: BAFA\ Predictor = 1.2184 + 0.3470 * (9\ month\ rolling\ average\ gasoil\ price) + 0.3672 * (9\ month\ rolling\ average\ fuel\ oil\ price) in\ €/MWh$

Source: Author based on BAFA, Federal Office of Economics and Export Control

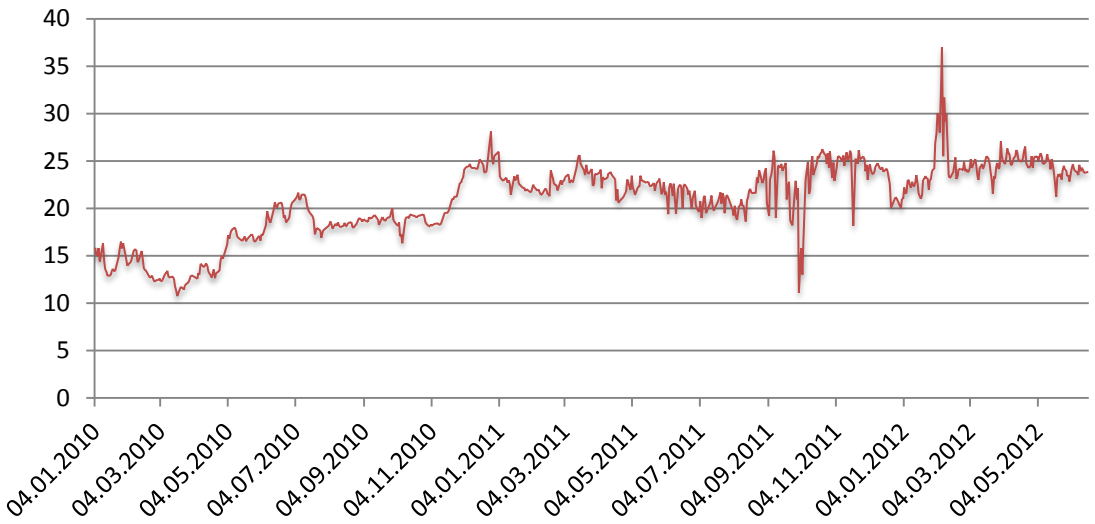
For **the spot and forward prices** we used the settlement prices NetConnect Germany (NCG) traded on Energy Exchange Market (EEX) which demonstrate high liquidity and cover a big potential volume area. EEX offers also other possibilities for exchange trading in natural gas such as the GASPOOM, Title Transfer Facility (TTF) and in a very early future it will expand on the British National Balancing Point (NBP) and therefore it will open the most important European gas markets to the trading participants.

All the price data are traditionally listed in Euro per Megawatt hour (EUR/MWh) and in order to use them for our analysis they needed to be converted to Czech crowns per Megawatt hour (CZK/MWh) based on the Czech National Bank exchange rate.

The trajectory of the development of the NCG spot prices is illustrated in Figure 17, indicating thesupply-demand natural gas balances and seasonal differences. Since the beginning of the year 2010, an increase in gas demand was supported by positive GDP growth rates within the European Union (EC, 2010). The increase in prices in the second quarter of 2010 is quite unusual, as normally this period is characterized by higher temperatures and decrease in gas consumption. The storage operators usually use this period of the year for refilling their storage facilities before the pipeline maintenance period begins. But this year several maintenance problems in Norway have occurred which

caused a tightening of the gas supply and derived the natural gas prices up. The consecutive drop in the prices was caused by the restarting production of the Qatari LNG plants which just supports the global interconnection of the markets. During the rest of the year the prices were quite stable and just the end of the year came with a slight increase and the price reached the before crisis price level at the beginning of 2009. On average, natural gas prices increased by 40,37 % in December 2010 comparing to the average price in January 2010 and the reason is especially the weather and an European economic recovery (Fabini, 2012). Within the following year, the price development was quite stable. Taking into consideration the events as political disturbances in the Middle East and North Africa opening the questions about the future gas supplies and Japanese tsunami affecting the global natural gas demand, we can conclude that they did not cause major movements in gas prices and the spot markets kept their stable position. Generally the price development between January 2011 and June 2012 was quite reliable and the main drivers behind the natural gas price changes were the economic situation in the Europe, the weather conditions and the oversupply of natural gas. The only radical change was remarked after an accident in Fukusima in the beginning of 2011.

Figure 17: Daily spot price of natural gas in EUR/MWh



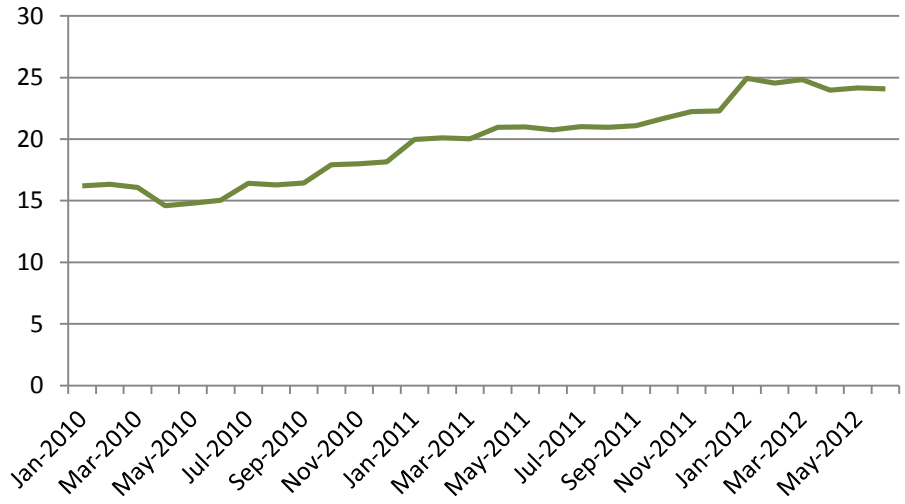
Source: Author based on the NCG prices on EEX

To make the daily spot data comparable, we average the daily spot observations within each day to obtain an average spot price for a given day. We performed this level of aggregation also to the future observations where we use a volume-weighted average method across all trading futures and we assumed a future portfolio given following formula:

$$0{,}5\ Y + 0{,}3\ Q + 0{,}2\ M.$$

Where Y indicates year gas future, Q stands for quarter gas future and M is month gas future. In the long run the natural gas supply depends on prices and national demand rather than the other way around. As a result, the gas suppliers predict the future prices mostly as a function of expected demand and expected development of the purchasing price on the gas markets. Nevertheless, the forward prices can be very easily influenced by unpredictable global situations or macroeconomic drivers. As we can see on the following graph, Figure 18, the natural gas prices for futures traded on the EEX are increasing in the time. Since the beginning of 2010, they have risen by one third.

Figure 18: Monthly forward price of the natural gas in EUR/MWh

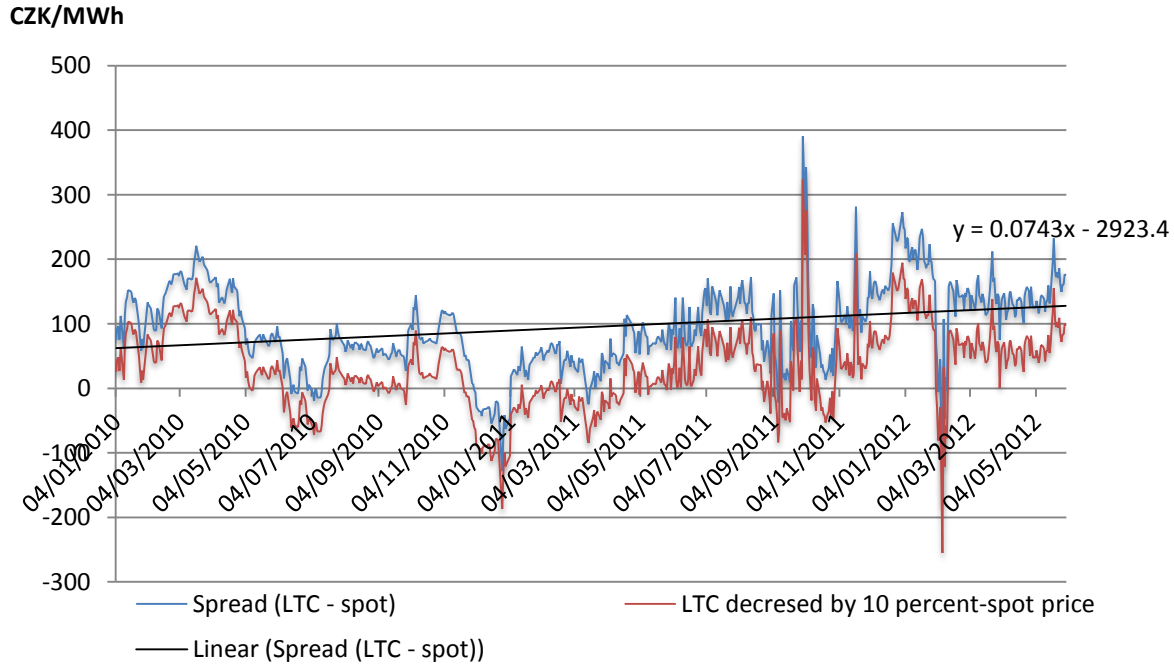


Source: Author based on the NCG prices on EEX

5.3. Defending the status quo versus liberalization

It has always been in the best interests of the incumbent suppliers to defend their status quo of natural monopolies with long-term oil-indexed contracts and vertically integrated companies over the whole gas value chain. They often argue, quite honestly, that this pricing mechanism provides the long-term security of supply and therefore also many of their end-customers remained in favour of it (Melling, 2010). Moreover, they can also draw from their privileged position and use the long-established market experience and a multiplicity of arbitrage opportunities which have arisen from their diversify portfolio. During the recent period, the incumbents became very powerful and profitable while new entrants struggle to achieve critical customer base. Some of the main advantages of the incumbents have been weaken by the changes in national legislation, later followed by legal unbundling. But the principal enemy of long-term oil-indexed contracts has appeared mainly with the emergence of spot markets in Europe and large oversupply of natural gas. This situation led to a huge difference between oil-indexed and spot prices which was remarked by new breed of suppliers and they managed to seize their moment, undercut the traditional incumbents in their domestic markets and grow their market shares.

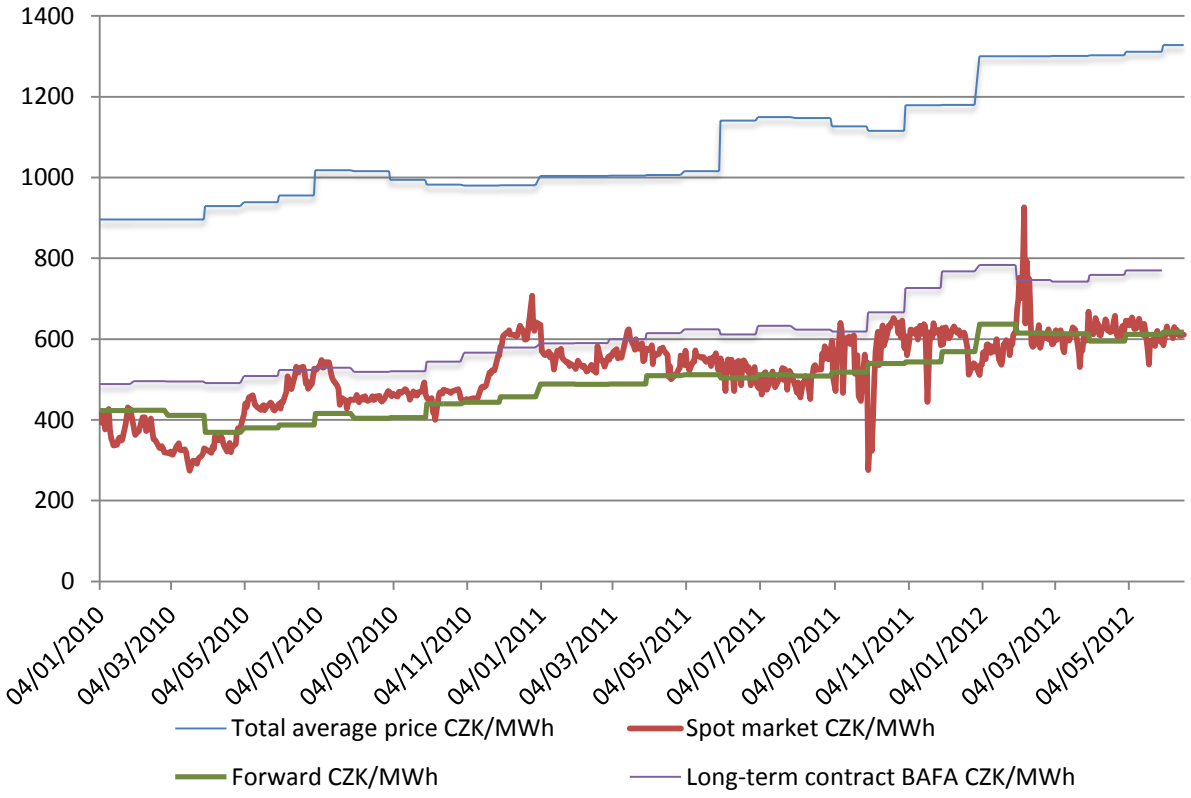
Figure 19: Spread between oil-indexed and spot price in CZK/MWh



Source: Author based on BAFA and EEX

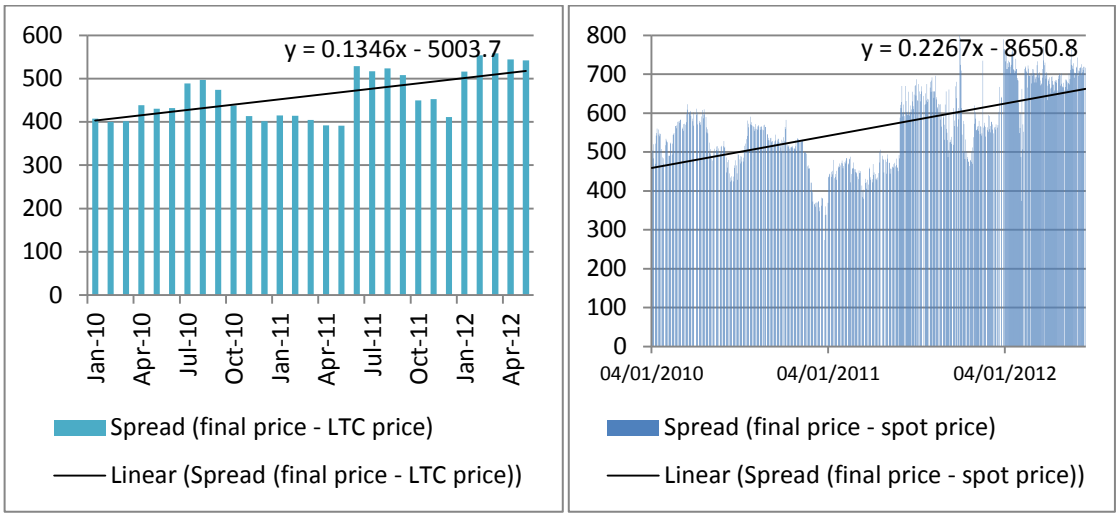
The final graph, Figure 20, describes the current situation on the gas market. The most remarkable is the divergence of the spot prices determined on the EEX from oil-linked prices, in Figure 19. Regional incumbent position has been eroded and currently it needs to deal with an intensifying competitive environment. New gas suppliers without previous commitments have been able to enter the market and press the market prices down as they purchase the natural gas on the spot markets. Thus they gain a competitive advantage over traditional gas supplier who purchases the natural gas still traditionally, based on the oil-linked long-term contracts and therefore it yields higher prices. Since 2010, the total average price for residential sector is sharply increasing along with an increase of the oil-indexed price and the spot and forward prices. But more interesting are the following graphs, Figure 21, which indicate the spread between the total average price for end-customers and the natural gas price for which it is purchased either through oil-indexed long-term contracts or on the spot and forward markets. This spread has an increasing tendency which proves a hypothesis that the prices for end-customers rise faster than the purchasing price of natural gas. This also opens a question whether this is not an offensive strategy of the incumbent how to compensate a current looses in the market shares, by chance.

Figure 20: Development in the natural gas market in CZK/MWh



Source: Author, based on RWE Energie, a.s., BAFA, EEX

Figure 21: Spread between total average cost and oil-indexed price and spot price in CZK/MWh



Source: Author based on RWE Energie,a.s., BAFA and EEX

To summarize this part, as new alternative suppliers enter the market, the traditional incumbent is suffering from losing its sales of oil-indexed supplies to former customers. The alternative suppliers are taking over these windfall profits by providing natural gas purchased on the spot markets directly to the incumbent´s former customers. As a result in order to yield the best outcome in the prevailing situation, the incumbent reacts with an increase of the prices and enlarging its influece through expansion on new, recently liberalised gas markets. At the same time, it is important to note that almost all significant gas suppliers have usually a diversified portfolio of acivities, including electricity generation and sales or petrochemichal industry. Markets are fundamentally developing and the various market players are trying to adapt to these changes given aggressive competition on the market.

5.4. New pressures on the gas value chain

For more than 30 years, oil-linked long-term contracts served as the basis for purchasing the natural gas, primary because oil was viewed as the closest substitute in the long run and also as relatively liquid and stable market. Since 2010, however, this type of contracts has broken down and the gas spot markets as well as the forward markets have become more liquid. Generally they offer consumers a good alternative to traditional long-term contracts, mainly because they reflect the actual market situation and prices

are based on short-term fundamentals rather than on global oil market. Risk is redistributed through the value chain.

This breakdown is not expected to be just a temporary phenomenon. Regulatory changes in the Czech and Slovak Republic have created friendly conditions for such a change. Moreover a lot of industry experts expect the natural gas markets to remain oversupplied for the next three or five years as a reaction to the boom in shale gas production and liquefied natural gas (Dincerler et al., 2012). These seismic changes have transformed global energy markets and they pushed the spot prices down. As customers insist on using currently lower natural gas prices, the suppliers are forced to sell the natural gas for the prices closer to those traded on spot or forward markets. Therefore they need to negotiate a reduction of minimum amount of gas purchased on oil-indexed prices they are otherwise obliged to take. In particular, the market players should focus their intention on finding a fair balance between the share of long-term contracts which have been already concluded and the trading on the gas market. The actual situation influences not only the position of the traditional incumbent who is losing its market shares because of higher prices but also a position of Russian state-owned gas producer Gazprom. Multinational energy companies are seeking for lower prices for the gas imports and as Europe is the most important importer with very high annual consumption, it would not be in the best interest of Gazprom to lose these clients. After strong pressure from several European gas companies, Gazprom agreed on revaluating the purchasing price and decreased it by approximately 10 percent. The change was promoted by the fact that the linkage to oil provoked a 25 percent average gap between the spot prices and long-term contracts over the past two years (Stern, 2012). The effect can be seen on Figure 19 and we can conclude that this step truly decreased a gap between the oil-linked prices and spot prices. But the actual problem of changing the pricing formula and increasing the spot price component in the long-term contracts was not solved.

The most important will be therefore the development in the following 2-3 years when the establishment of a new pricing method and contractual gas framework will be hopefully set up. The whole European gas market is moving towards the hub-based pricing which means several changes for long-term contracts as well. But one thing is clear, the whole process will be very painful because the situation on which people and mainly the market players have been used to for such a long time, is changing.

6. Conclusion

Liberalization is a very complex process which has already proved that changes the market structure significantly but along with this, major challenges come as well. Generally, over the past decades, the main objective is to build up a market which is sustainable and secure, which brings more choice, more freedom and more efficiency to final customers. On the competitive open markets, it is a custom reality that companies have economic incentives to do their best. But the natural gas market has its own specific features and therefore the process of changing is neither simple nor fast. Comparing to many previous years, when the central European markets were formed by one vertically integrated company, the Czech and the Slovak Republic have achieved a notable progress in market liberalization. Liberalization process has changed the legal and economic framework of their national gas industries. The mutual cooperation between these two countries has been strengthened, too. Both countries have opened their natural gas markets and competition on these markets has increased significantly. Indeed, the main obstacle to gas market opening – reducing the national regulation- cannot be removed completely, a certain amount of market oversight is still necessary in order that the markets can work properly.

It is generally expected that the biggest beneficiaries of these changes should be the end-customers even though the final prices tend to be more volatile and less regulated. The process of liberalization should easily lead to price reductions. The reason is simple, the liberalization process is intended to introduce competitive forces and put final prices in line with the overall costs. But since the principal method to buy natural gas used to be just long-term contracts linked to the development of oil prices, the resulting final price had an increasing tendency comparing to the spot market. This has become even more supported with entering of new gas suppliers on the market. Low prices on the spot market enabled new suppliers to build their market position relatively quickly. We can conclude that the traditional Czech incumbent faces several changes on the market to which it needs to adapt its business strategy. An interesting conclusion is that according to our analysis, the domestic prices increased significantly, especially those of the market incumbent. It can be explained by its short-term disadvantageous position due to long-term take-or-pay contracts comparing to prices derived from gas-to-gas competition. As our analysis showed, the alternative suppliers can provide natural gas at lower prices since they purchase it on spot and forward markets. This price difference opens many questions concerning a rationality of oil-indexation

of the gas purchased prices. The intention is therefore to change the pricing mechanism in order to decrease a gap between the oil-indexed prices and spot prices and avoid a situation that the price changes would have to depend only on the negotiations between the multinational gas companies and gas producer Gazprom.

Another reaction of the Czech national incumbent was entering new gas markets such as the Slovak one. Providing natural gas to end-customers at prices which are 12 percent lower than the traditional incumbent ´s (SPP) offers is according to RWE, the best offer on the Slovak gas market. With this strategy, the company was quite successful and it admits that its market shares have increased to 21 percent comparing to 18 percent last year whereas they decreased from 62 percent in 2010 to 49 percent in 2011 on the Czech gas market.

Second major challenge for the energy sector is also security of supply which does not combine easily with the market liberalization. And especially not with tendencies of market players to maximize their profits by minimizing their costs. Nevertheless, it is obvious that competition on the downstream level of the gas markets is the most powerful tool to interconnect gas markets in European level. But there is still a long way to go with many remaining challenges to solve. Enhancing European cooperation of regional authorities as well as promotion of the development of liquid natural gas hubs for trading gas as an opposition to the long-term contracts are important conditions for creation of a single liberalized European gas market.

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Factum Invio: www.factum.cz

Federal Office of Economics and Export Control: www.bafa.de/bafa/en/index.html

Net4gas, a.s.: www.net4gas.cz

Regulatory Office for Netwrk Industries: www.urso.sk

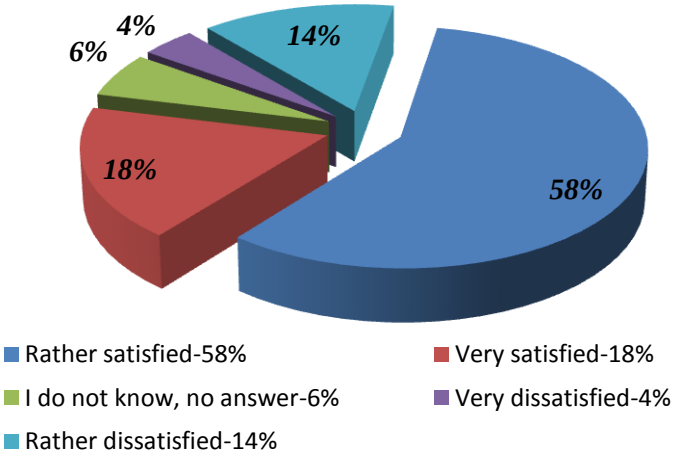
RWE, a.s.: www.rwe.cz

SPP, a.s.: www.spp.sk

7. Appendix A

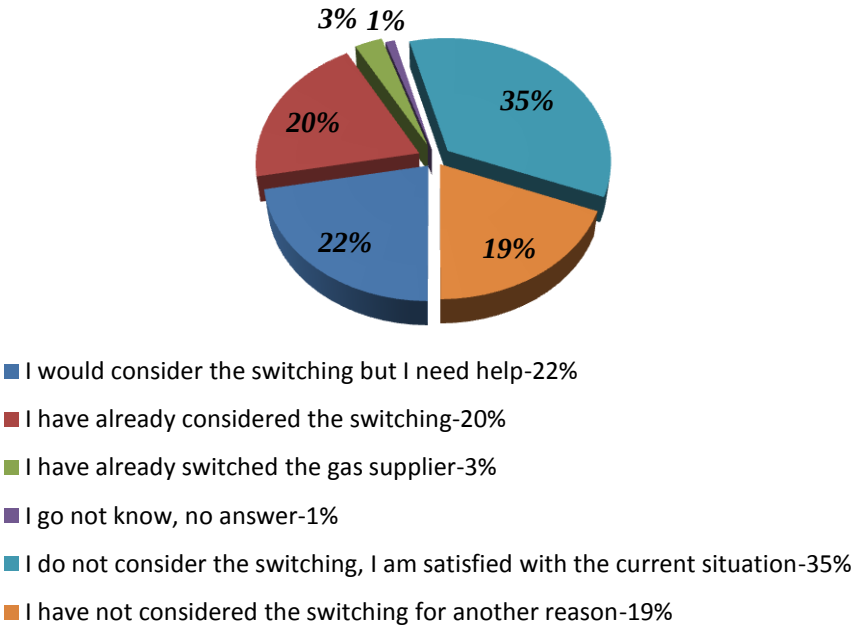
The results of a research conducted by Czech marketing company Factom Invenio agency in December 2010 and 2011.

Figure 22: Satisfaction with the gas supplier



Source: Factum Invenio. 2010

Figure 23: Potentional change of gas supplier

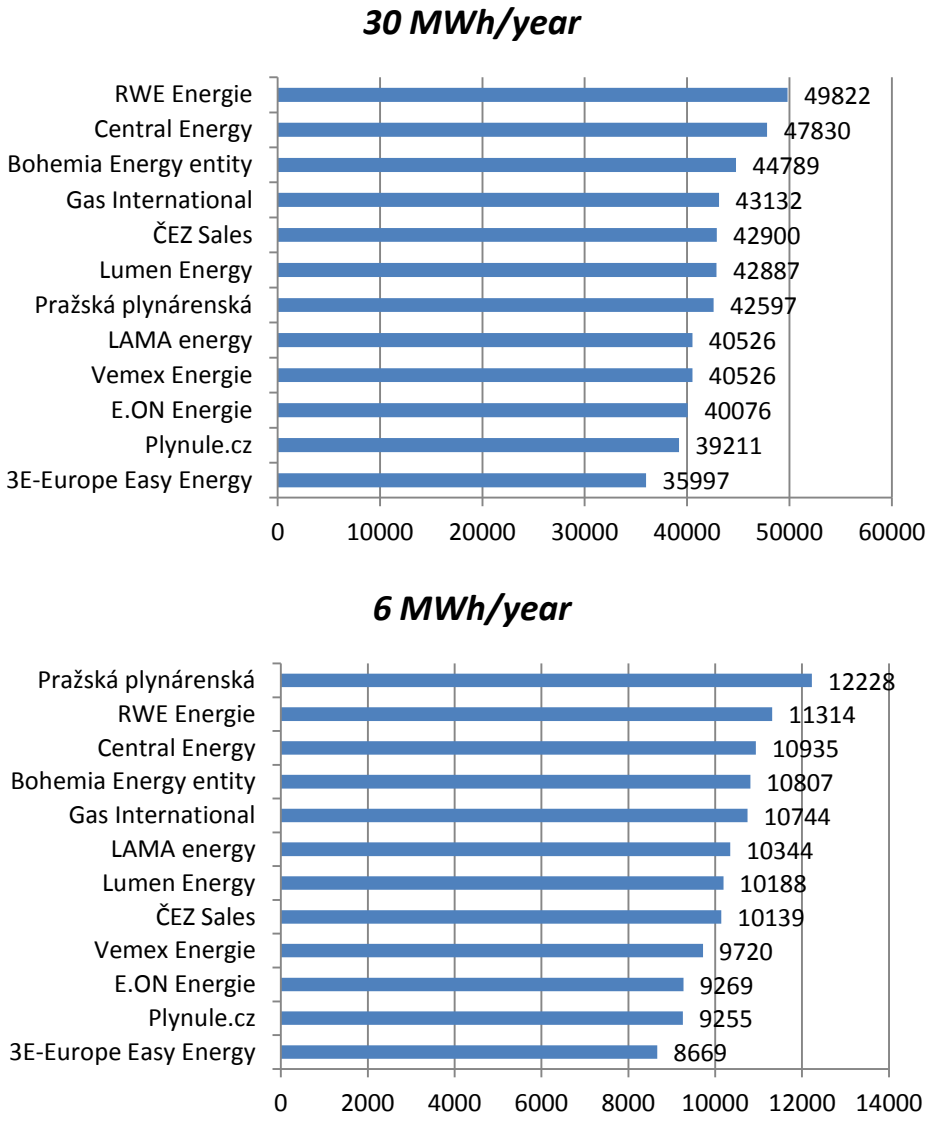


Source: Factum Invenio. 2011

Appendix B

Since 2007, we can consider the Czech gas market to be fully open gas market with increasing number of competitors entering the market and increasing volume of customer switching. It provokes a downward pressure on gas prices. Each competitor is trying to attract as much customers as possible through different promotions or benefits. Comparing two different cases, one household with average annual consumption 30 MWh and another with 6 MWh per year, we can see that there are wide differences in final prices and customers could save up to 29 percent of their costs. For the comparison, the prices of the second quadrimestre 2012 were used and the final annual price includes all fixed costs. As we can see on the Figure 25, total annual costs vary in different regions and different gas suppliers.

Figure 24: Comparison of supplier prices for household with average annual consumption 30 MWh and 6 MWh



Source: www.cenyenergie.cz

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Akademický rok 2011/2012

TEZE BAKALÁŘSKÉ PRÁCE

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Garant studijního programu Vám dle zákona č. 111/1998 Sb. o vysokých školách a Studijního a zkušebního řádu UK v Praze určuje následující bakalářskou práci

Předpokládaný název BP:

Konkurenčné prostredie na trhu s plynom v Českej a Slovenskej republike
Level of competition on the gas market in the Czech and in the Slovak Republic

Abstrakt:

Vo svojej práci by som sa chcela sústrediť na analýzu konkurenčného prostredia na trhu so zemným plynom v konkrétnych krajinách strednej Európe. Špecifickým prípadom Českej a Slovenskej republiky je to, že ide o malé krajiny vyznačujúce sa vysokou závislosťou na dovoze zemného plynu. Mojím cieľom je spracovať informácie o súčastnom tržnom chovaní jednotlivých spoločností a určiť rozhodujúce determinanty ovplyvňujúce konečnú cenu pre spotrebiteľov. Všeobecne očakávaným výsledkom je, že súčastná tendencia liberalizácie európskeho trhu s plynom priláka viac konkurentov a tým dôjde k zníženiu cien.
Na začiatku nastienim všeobecný prehľad o súčastnej situácii na trhu. V druhej časti by som sa sústredila na štruktúru zákazníkov a cenotvorbu, hlavne sa budem snažiť určiť premenné vplývajúce na tvorbu cien zemného plynu a fungovanie regulácie. V poslednej časti sa budem zaoberať jednotlivými významnými obchodníkmi na trhu a na základe dostupných dát analyzovať ich chovanie.

In my work I would like to focus on the analysis of competition on gas market in specific countries in Central Europe. The specific case of the Czech and the Slovak Republic is that they are small countries with high dependence on imported natural gas. My goal is to process information about current market behavior of individual companies and to identify critical determinants influencing the final price for consumers. Generally, the expected result is that the current trend of liberalization of European gas market attracts more competitors and thus reduces the price.
At the beginning I will present a general overview of present-market situation. In the second part, I would focus on the customers´ structure and pricing structure, especially to determine the variables affecting the pricing and operation control. In the last section I will try to capture various major retailers and on the basis of available data analyze their behavior.

Osnova

1. Vývoj legislatívy a regulácie počas procesu liberalizácie
2. Špecifiká nezávislého predajcu na trhu s plynom
3. Charakteristika trhu v Českej republike a konvergencia slovenského trhu
4. Chovanie významných obchodníkov, analýza dostupných dát
7. Záver

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