

The strategic implications of the second Russia–China gas deal on the European gas market



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ABSTRACT

At the end of 2014, Russia and China signed a framework for their second natural gas agreement. According to this agreement, Russia will supply 30 billion cubic metres of gas to China over 30 years via the future Altai pipeline, which will connect Asian and European gas markets. This paper analyses the long-term impacts of this second agreement on the European gas market, based on a modified Hotelling model. We found that gas exports to China could result in re-optimisation of the Russian profit maximisation strategy in Europe via a stock effect, which occurs when the marginal production cost is affected by the remaining stock. The results show that the export supply to Europe could decrease by 11.8 bcm annually under a stock elasticity equalling unity. Furthermore, gas exports to China will reduce the long-term potential of Russia to supply gas to Europe. While scarcity of gas reserves may not be an issue for Russia in the medium term, it could become more important in the future. Our results show that Russia could take a stronger bargaining position after 2051. Overall, total gas consumption in Europe could decrease by 8.5 bcm annually.

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1. Introduction

1.1. Motivation

In May of 2014, Russia and China signed a \$400 billion gas contract. According to this contract, Russia will supply 38 billion cubic metres (bcm) of gas annually over 30 years, beginning in 2018, via the so-called “eastern route” (the Power of Siberia pipeline), from Kovykta to Vladivostok and then to the China’s north-eastern provinces [34, 7, 8]. Gas will be supplied from remote East Siberian gas reserves, which will unlikely be economically rational for the European gas market [32].

A few months later, Russia and China signed a framework for a second natural gas agreement. According to this second natural gas agreement, Russia will supply 30 bcm annually over 30 years via the so-called “western route” (the Altai pipeline) [35], from West Siberia via the province of Altai to the China’s western province of

Xinjiang [20]. The gas price has not yet been decided. The second natural gas deal is based on commercial and geopolitical rationales for Russia and China [19]. In contrast to the first gas agreement, building the Alai pipeline would enable Asian and European gas markets to connect.

Both sides are expected to benefit from both gas agreements. For Russia, exporting gas to China is an opportunity to diversify its gas supplies. This becomes especially important for Russia due to the unstable situation in Ukraine¹. Furthermore, both gas agreements could result in a substantial profit for Russia, depending on the gas price. For China, gas exports from Russia enable a reduction in local air pollution and greenhouse gas (GHG) emissions, by switching away from coal towards gas. Gas imports from Russia also allow China to diversify its gas imports.

Furthermore, third parties (e.g., European and Asian consumers and producers of gas) may be indirectly affected. Europe has been the main export gas market for Russia. Gas exported to China

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¹ The main amount of Russian gas towards European countries transits via Ukraine.

according to the second natural gas agreement could have supplied European economies. Russia has large gas reserves, which enable Russian gas producers supplying gas to the domestic and export markets in the medium term [45]. Therefore, one could expect that the second natural gas deal will unlikely affect the export supply to European economies. Nevertheless, in this paper we show that there are at least two reasons why Gazprom could re-optimize its profit maximisation strategy in the European gas market. These are (i) a stock effect and (ii) the impact on the future scarcity rent. We show that increasing the export supply of gas to China may lead to lower gas exports to Europe.

Although the media has given a lot of attention to this issue, there has not yet been a conceptual economic analysis that relies on theory of the exploitation of exhaustible resources. This paper aims to shed light on this politically important issue. The objective of this paper is to analyse the long-term implications of the second natural gas agreement between Russia and China on the European gas market. Although there are different modifications of the analytical Hotelling model, there are not so many numerical implementations. We develop an applied numerical Hotelling model, which includes some important features such as (i) two producers and two consumers, (ii) imperfect competition (i.e., Cournot oligopoly), (iii) a finite planning horizon, and (iv) stock effects. The numerical Hotelling model is formulated as a Mixed Complementarity Problem (MCP) and coded in the General Algebraic Modeling System (GAMS).

The rest of the paper is organised as follows: Section 2 presents the methodology and data; Section 3 presents and discusses the results from the analytical and numerical models; and Section 4 provides conclusions, focusing on policy implications.

1.2. The gas markets

1.2.1. Production of gas in Russia

Gazprom is the largest domestic producer of gas in Russia. Gazprom's share of total gas production in Russia in 2013 accounted for approximately 71%; the remainder was produced by independent gas and oil producing companies [31]. The government ownership share in Gazprom is slightly more than 50% [13]. Gazprom owns the Russian unified system of gas transmission [15]. Furthermore, according to *Federal Law No.117 from July 18, 2006*, [40], only Gazprom is allowed to export natural gas, which implies that, in addition to its pipeline monopoly, Gazprom also has a legal monopoly with respect to natural gas exports.

1.2.2. Domestic and European gas markets

The domestic market is the largest market and accounted for approximately 70% of the total gas supply in 2012 [22]. According to the *New Policies Scenario* of World Energy Outlook 2015, Russia's total consumption of gas is expected to decline from 2013 to 2040, with an annual average growth rate of -0.1% (see, Fig. 1). Domestic gas prices are regulated in Russia and are substantially lower than export netback prices. For example, the average domestic gas price in 2012 was approximately 30% of the average netback price for gas in Western Europe [14]. Gazprom is one of the world's largest exporters of natural gas. In 2013, Gazprom exported approximately 30% of world's total exports of piped gas [1]. Gazprom exports gas to European and Asian countries; the European gas market is the largest one for Russia [12]. In 2013, Gazprom's market share was approximately 30% of total gas imports into Western Europe [15]. Other large exporters of gas to Europe are Norway, Algeria, and Qatar [11]. The largest European importers of Russian gas are Ukraine, Germany, Italy, and Poland [12]; [10]. Many European countries rely heavily on Russian gas deliveries. Total gas imports in countries such as Bulgaria, Finland, Latvia, Lithuania, and Slovakia

come mainly from Russia [10]; [1]. Since 2008, Russian exports of gas to the EU have decreased due to the economic crisis, exports of LNG from the USA and more support for renewable energy in the EU [19]. According to the *New Policies Scenario* of World Energy Outlook 2015 [33], from 2013 until 2040, overall gas consumption in the EU is expected to remain constant (Fig. 2).

1.2.3. Chinese gas market

China itself is a large gas producer and it has large indigenous reserves of conventional and unconventional gas [18]. In 2007, China became a net gas importer [7, 8]. In 2012, the import share of gas was 28% of total gas consumption in China [7, 8]. The main import source for gas in China is Turkmenistan, which accounted for half of the total gas import in 2012, followed by Qatar (16%) and Australia (12%) [2]. The import share of gas from Russia accounts for approximately 1%.

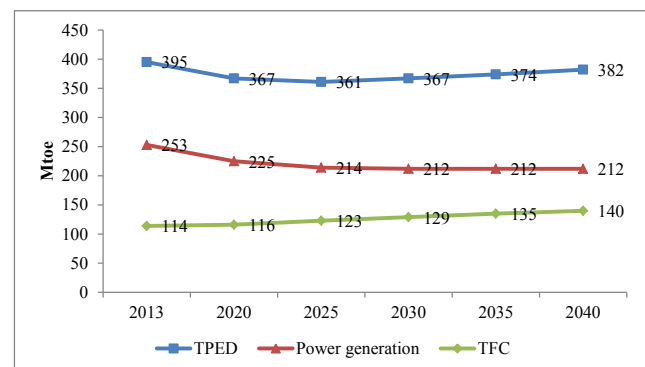
China imports LNG and piped gas. The main supplier of piped gas is Turkmenistan. In 2012, China imported 41.4 bcm of gas, where almost half of that (21.4 bcm) was piped gas, and the remainder was LNG [2]. The import of LNG in 2012 came mainly from Qatar (34%), followed by Australia (24%) and Indonesia (16%) [7, 8]. The share of Russian LNG was a rather moderate 3%.

The demand for gas in China is expected to increase (Fig. 3). According to the *New Policies Scenario* of World Energy Outlook 2015 [33], the average annual growth of total gas consumption is projected to be 4.4% from 2013 until 2040. The share of gas in total primary energy demand (TPED) and total final consumption (TFC) is expected to increase from 5% to 12%. Growing demand of gas results from economic growth and it also partially politically driven because China is attempting to reduce its coal usage. China announced a peak its GHG emissions around 2030 [5]. This goal should be achieved by replacing coal with gas, nuclear, and renewables.

Residential and non-residential gas prices in China are still de facto regulated. Moreover, there are large differences in gas prices among and within Chinese regions. Nevertheless, over the last few years, China undertook steps to create a more efficient gas price system [4]. Furthermore, the Chinese gas pricing system becomes more dynamic. A competitive market structure and the emergence of hub-based prices are prospects for a more efficient gas price system in China [37].

2. Methodology and data

We start our analysis with an analytical dynamic partial



a) TPED stands for total primary energy demand and TFC stands for total final consumption.

Fig. 1. Projections of gas consumption in Russia until 2040.^{a)} Source: OECD/IEA [33].

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