The Cost of Russian Gas

A BENCHMARK STUDY ON RUSSIAN INDUSTRIAL GAS PRICES

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EuroChem

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I. Executive Summary

1. We have been asked by EuroChem to address three questions regarding Russian industrial gas pricing in 2019:

   a. Whether the prices of Russian independent gas producers ("IGS") can be regarded market prices, not influenced by Gazprom's provision of the majority, or substantial portion of the Russian natural gas market;

   b. Whether there are world market prices for natural gas that would be available for the Russian fertilizer companies like EuroChem;

   c. Whether Gazprom's prices are set in accordance with market principles.

2. We understand that, at least initially, these questions arise in the context of a petition for the imposition of duties on Russian phosphate fertilizers to the Department of Commerce of the United States due to an alleged less than adequate remuneration of natural gas production, transportation and supply costs.[1]

I.A. Are IGS prices market prices?

3. In order to address the first question above, we provide an overview of the Russian gas market delineating the split between domestic and export markets as well as the regulation of the domestic market. While the state-owned company Gazprom still holds a pipeline export monopoly, it has been facing increased competition in the domestic market from independent gas suppliers (IGS), of which the two largest are Novatek and Rosneft. By 2019, the Gazprom Group's share of the domestic Russian market had fallen just below 50%. The market share of the IGS outside of the residential segment, which is almost entirely supplied by Gazprom Group, is even higher – potentially over 60%.

4. Further competitive pressure on Gazprom has been provided by the creation of a gas trading hub, the St Petersburg gas hub (SPIMEX). However, the volumes traded directly at the hub only account for around 3% of the total gas consumed in Russia.

5. Gazprom's sales prices are regulated by the government but those of the IGS are not. In fact, Gazprom's average sales prices have consistently been higher than those of Novatek and Rosneft. This is also the case for the gas bought by EuroChem: the price it paid to Gazprom has been around [ ] higher than the price that it paid IGS. For this reason, Gazprom has been losing market share in the industrial segment and asked the regulator to be allowed to apply a discount to be able to compete with Novatek and Rosneft.

[1] Cf. *Petitions for the Imposition of Countervailing Duties Pursuant to Section 701 of the Tariff Act of 1930, As Amended on Behalf of the Mosaic Company*, 26 June 2020.

6. As we discuss below, the gas prices paid by EuroChem are sufficient to cover the costs of Novatek, who we take to be representative of the IGS more generally, and enable it to earn a reasonable return. Accordingly, it is clear that the IGS are exerting some competitive pressure on Gazprom with respect to gas prices for phosphate plants in Russia and that the prices they receive from such plants are at market levels in the sense that they enable IGS to cover their costs and make a reasonable return.

I.B. Are world gas prices a relevant benchmark?

7. Unlike other commodity markets, such as coal or oil, natural gas markets are regional with persistent structural differences in prices. This is largely because of the relatively high transportation costs for gas compared to other commodities. For long-distance transportation by seas, gas has first to be liquefied, in order to make it sufficiently dense to be carried on a ship, and then regasified on arrival at its destination port. Equally, transporting gas long distances by pipeline is costly.

8. Consequently, we do not consider that world gas prices provide a relevant benchmark. However, hub prices in north-western European gas markets, many of which are widely acknowledged to be competitive, are sufficiently close to Russia to make price comparisons a potentially relevant benchmark, once transportation differentials are taken into account. Nonetheless, such comparisons need to be treated with caution because Gazprom's production costs are lower than those of other producers supplying the European market, so marginal European prices will reflect those higher production costs. In addition, large industrial customers, such as fertilizer plants, adopt a variety of different purchasing strategies so is difficult to be certain precisely how a comparison should be made. Finally, it should be borne in mind that in 2019 there was no possibility of physical flows from Europe to Russia along three main pipelines connecting Europe and Russia.

I.C. Are Gazprom's prices based on market principles

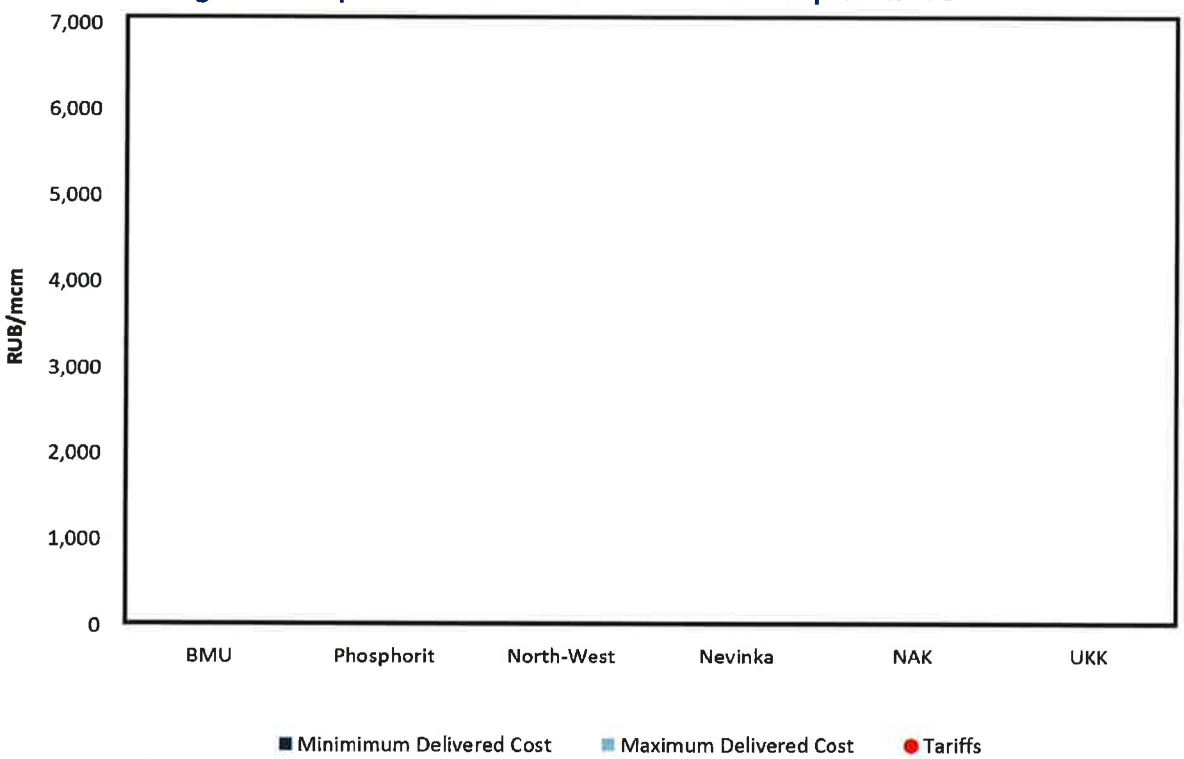
9. We have adopted two approaches to determining whether Gazprom's prices are based on market principles. First, whether Gazprom is able to cover its costs of supply, a basic requirement if its prices are based on market principles. Second, whether the prices paid by EuroChem are comparable to those that a European fertilizer producer might have paid during 2019.

10. Basic economic principles dictate that a firm must at least recover its short-term marginal operating costs in order to remain solvent. However, for the longer term, an adequate remuneration must also include depreciation, and a fair return on the current capital employed in assets used for gas production. We use the term "all-in delivered costs" for the sum of operating costs, depreciation and a fair return for Gazprom's production and transportation businesses. We have calculated 2019 all-in delivered costs for Gazprom and also for Novatek, which we take to representative of IGS more broadly.

11. To the extent that the operating costs we have calculated include allowances for the costs of the flexibility in deliveries required for residential customers but not for industrial customers, we may have over-estimated the costs that industrial users should pay to cover the cost of natural gas production. This is more likely to be an issue for our analysis of Gazprom's costs than those of the IGS because typically IGS predominantly sell gas to industrial customers, with Gazprom serving most domestic customers.

12. We have calculated a range of all-in delivered costs for Gazprom, since we obtain somewhat different results depending on the sources on which we rely.[2] However, the prices paid by all bar one of the principal phosphate and fertiliser plants owned by EuroChem are exceed the maximum all-in delivered costs that we calculate, as can be seen from Figure 1. The one plant, North West, for which this is not the case pays a price that is only [ ]% below Gazprom's maximum all-in delivered costs, which we consider to be insignificant given the approximations we have to make in estimating transportation distances.

Figure 1: Comparison of all-in delivered costs and Gazprom tariffs



Source: The Brattle Group.

13. Our second calculation effectively compares the prices paid by EuroChem to the prices that fertilizer plants in the competitive markets of north-west Europe might pay. Specifically, we have focused on the German market, since it is the largest gas market in Europe, and netted back German hub prices for 2019 to the locations of EuroChem's fertilizer plants. We have considered two different purchasing strategies: buying gas on the basis of month-ahead and day-ahead prices. During the course of 2019, the prices for

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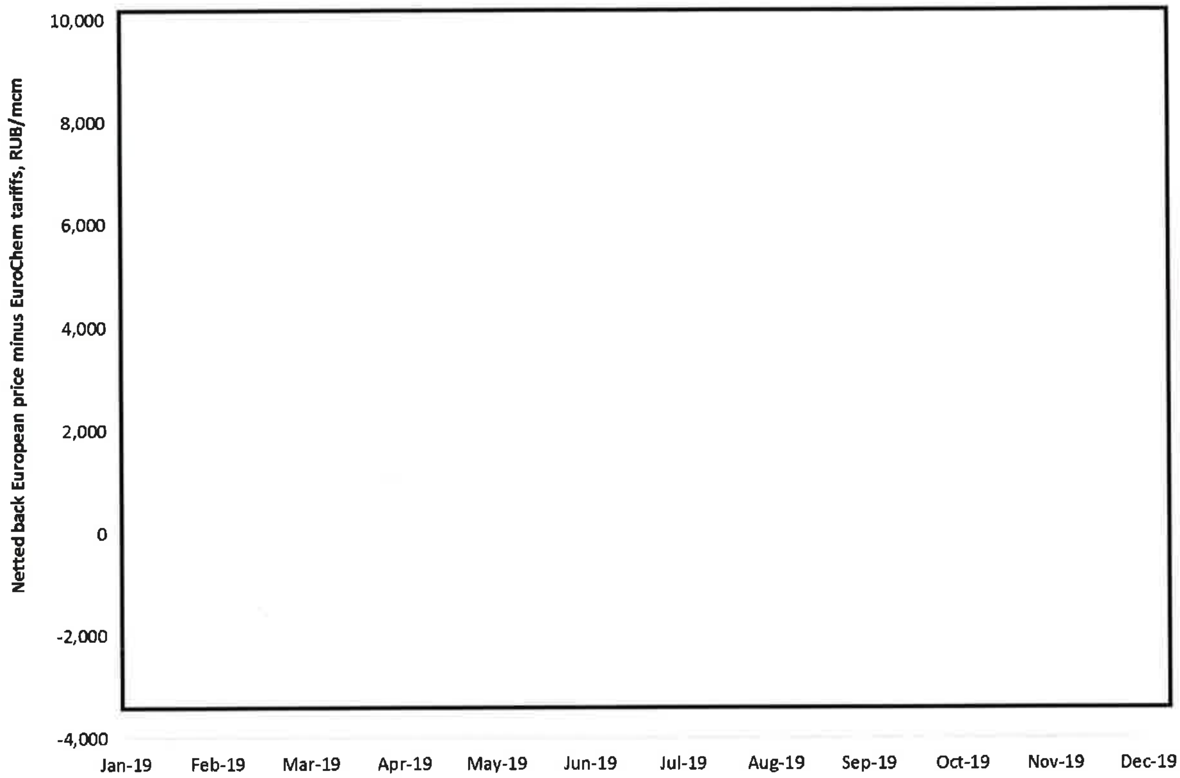
[2] Delivered costs are the summation of all-in production and transportation costs.

these products varied from 7,258 RUB/mcm to 18,845 RUB/mcm. As shown in Figure 2, we find that whilst European prices were higher than Russian prices for the first half of the year, they were then generally lower than Russian prices for the months July 2019 to October 2019 before being higher again for the last two months of the year. However, assuming that the prices EuroChem has paid in 2020 are similar to those that it paid in 2019, European prices have been lower than the prices paid by its fertilizer plants since February 2020.

Figure 2: Range of netback results



14. Accordingly, we conclude that there is no systematic evidence of the prices paid by EuroChem being lower than European prices and so, in this sense as well, the Russian prices appear consistent with market principles.

I.D. Structure of the report

15. The remainder of the report is structured as follows. Section II provides a brief overview of the Russian gas market to answer the question whether IGS prices are market prices. Section III explains why there is no such thing as a world gas price. Sections IV and V consider the question of whether Gazprom's prices are based on market principles from two different perspectives. First, whether the tariffs are in line with the costs that a gas supplier would expect to recover in a competitive market. Second, whether these prices are below those that large European gas customers had to pay, when a comparison is made on a like-for-like basis.

II. The Russian gas market and IGS prices

16. This section provides background on the Russian gas market in order to answer the question whether IGS prices are market prices.

II.A. Production

17. Russian gas production was relatively constant from 2010 to 2016 at around 590 bcm[3] per year. However, as shown in Figure 3, production increased by 8% in 2017 followed by another 5% increase in 2018. In 2019, production totalled 679 bcm.[4]

18. This increase in production is associated with the exploitation of new gas fields on the Yamal peninsula in north-western Siberia.[5] Thus, the ramp-up of production at the Bovanenkovo field led to new supplies of 96 bcm in 2019.[6] Russian gas production is expected to continue growing in the coming years in order to meet the demand for exports to China.[7] Not all the increased production will come from Gazprom, the output from the IGS is also expected to grow. For example, in September 2019, another large scale LNG project, Artic LNG 2, owned by a consortium of European energy companies and Russian independent gas producers, reached its final investment decision.[8]

3 Billion cubic metres.

4 BP Statistical Review of World Energy 2020, p. 34. Note that these figures are in European standard cubic metres, and assume an energy content of 40 mega joules (MJ) at 15°C. In contrast, Russian standard cubic metres, as reported by Gazprom and used later on in the report, have an energy content of ~37 MJ at 20°C.

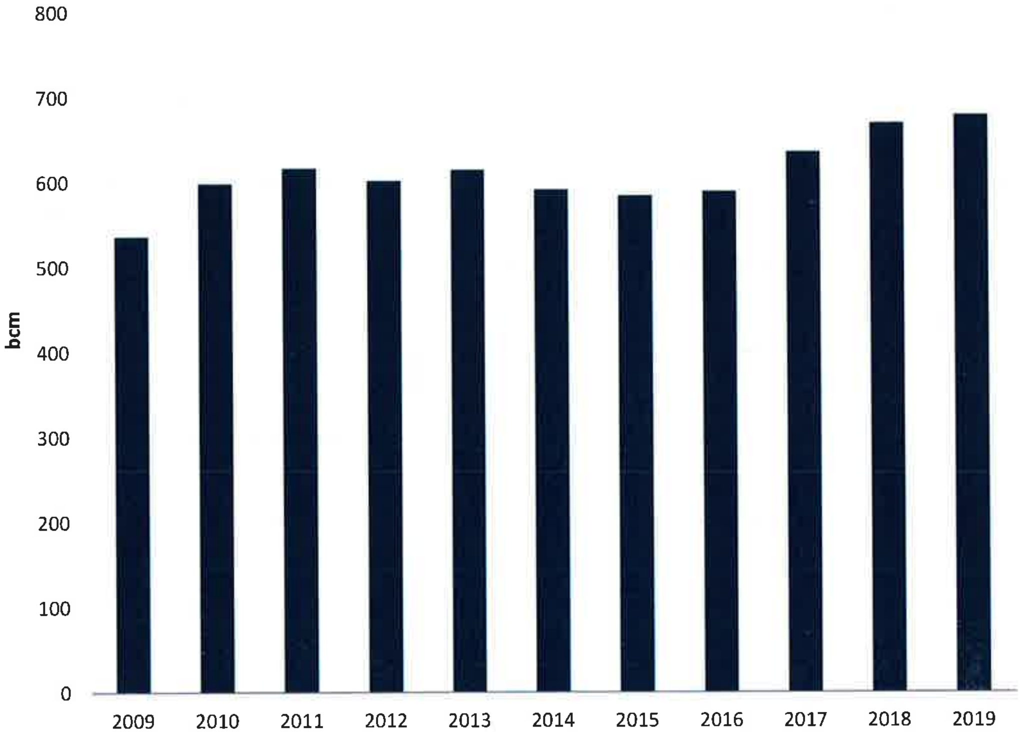
5 Russian gas fields have traditionally been clustered around the city of Novy Urengoy, near the Ural mountain range.

6 Gazprom Website, "Yamal" (Accessed 16/10/2020); Gazprom Website, "Bovanenkovskoye Field" (Accessed: 16/10/2020).

7 Russia and China have agreed a long-term supply contract over 38 bcm per year, expected to be reached by 2024. See Gazprom Website, "Gazprom Commences Pipeline Supplies of Russian Gas to China", 2 December 2019 (Accessed 16/10/2020) and Independent Commodity Intelligence Services Website, "China's Gas Demand Growth Slows as Russian Pipe Supply Starts", 4 December 2019 (Accessed 16/10/2020).

8 PAO Novatek Website, "Final Investment Decision Made on Artic LNG 2 project", 5 September 2019 (Accessed 16/10/2020).

Figure 3: Annual gas production in Russia[9]



Source: BP Statistical Review of World Energy 2020, p. 34.

19. Gazprom has always dominated the production of gas in Russia. However, as we discuss below, independent gas producers have been increasing their market share over recent years. While Gazprom still produced around 78% of all natural gas in 2009, this share had dropped to around 67% in 2019, with Rosneft and Novatek each producing around 10% of the total Russian production.[10]

20. Russia produces most of its gas in the Urals or north-west Siberia, but the main markets for the consumption of gas are much further to the west in European Russia, the former Soviet Union ("FSU") countries and Europe. Typical transportation distances are large, approximately 2,300-2,785 km for domestic supplies and 3,200-3,700 km for exports.[11] As a result, gas supply costs are closely linked to transportation distances, as can be seen from Figure 4 below.

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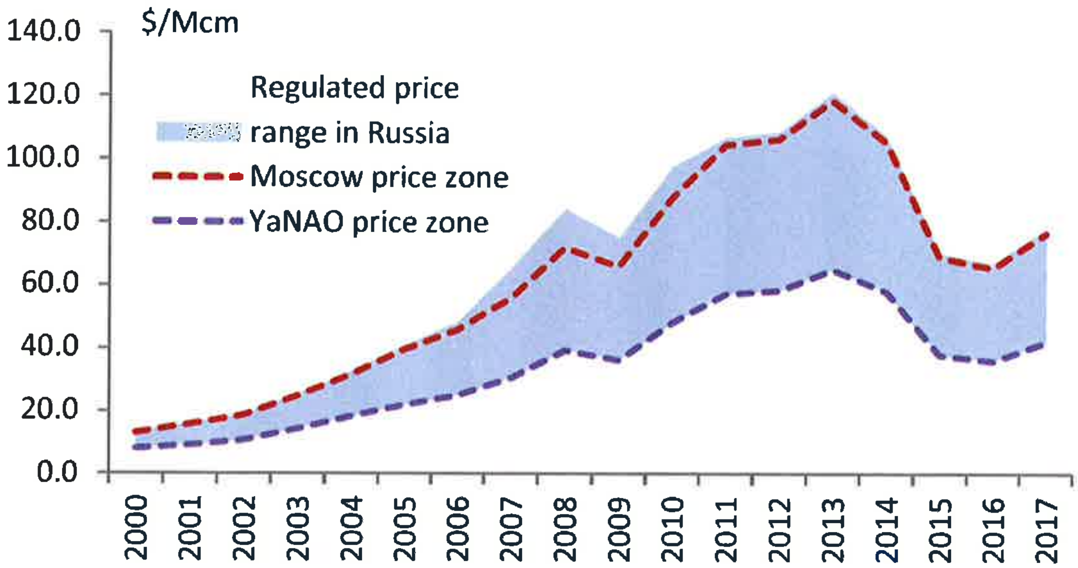
9 Gazprom does not publish data on the total Russian gas production. If it did the annual volumes would be around 9% higher due to differing measurement conventions (see footnote 4).

10 Gazprom in Figures 2009-2013, Gazprom in Figures 2014-2018, Gazprom in Figures 2015-2019, PAO Novatek Annual Report 2019, p. 22; Rosneft Annual Report 2019, p. 36.

11 Minimum domestic transportation distance taken from Yermakov, V., "It Don't Mean a Thing, If it Ain't Got that Swing: Why Gas Flexibility is High on the Agenda for Russia and Europe'", the Oxford Institute for Energy Studies, February 2019, p. 20. Maximum domestic distance and export distances are taken from Yermakov, V., "Russian Gas: the Year of Living Dangerously", the Oxford Institute for Energy Studies, September 2020, p. 15.

Figure 4: Range of regulated industrial gas prices due to transport costs[12]



Source: FTS, FAS, Center for Energy Policy Research, HSE

II.B. The domestic market

21. Domestic consumption accounted for approximately 65% of the gas produced in Russia in 2019.[13] Domestic consumption has been broadly stagnant since 2007, except for declines in 2009, due to the financial crisis, and 2015, due to an abnormally warm winter. Gas accounts for around half of all energy demand in Russia.

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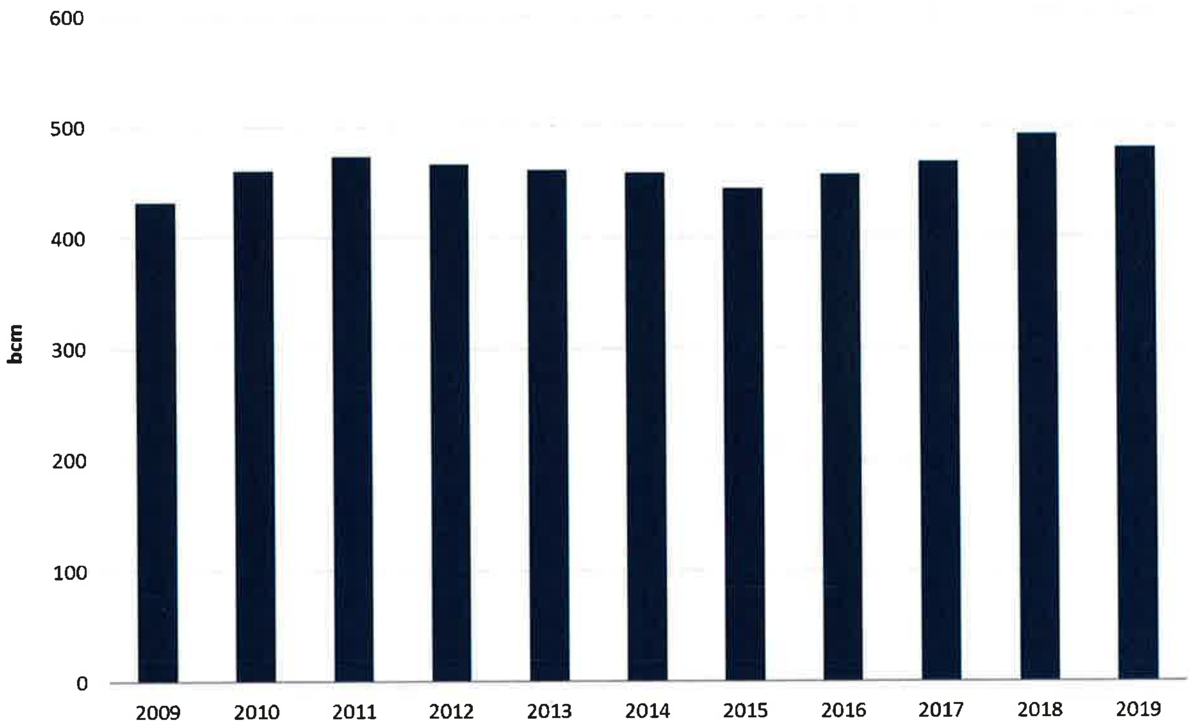
12 Yermakov, V. and Kirova D, "Gas and Taxes: The Impact of Russia's Tinkering with Upstream Gas Taxes on State Revenues and Decline Rates of Legacy Gas Fields", the Oxford Institute for Energy Studies, October 2017, Figure 2, p. 4.

13 Domestic consumption was 444 bcm and Russian production was 679 bcm in 2019; see BP Statistical Review of World Energy 2020, pp. 34-36.

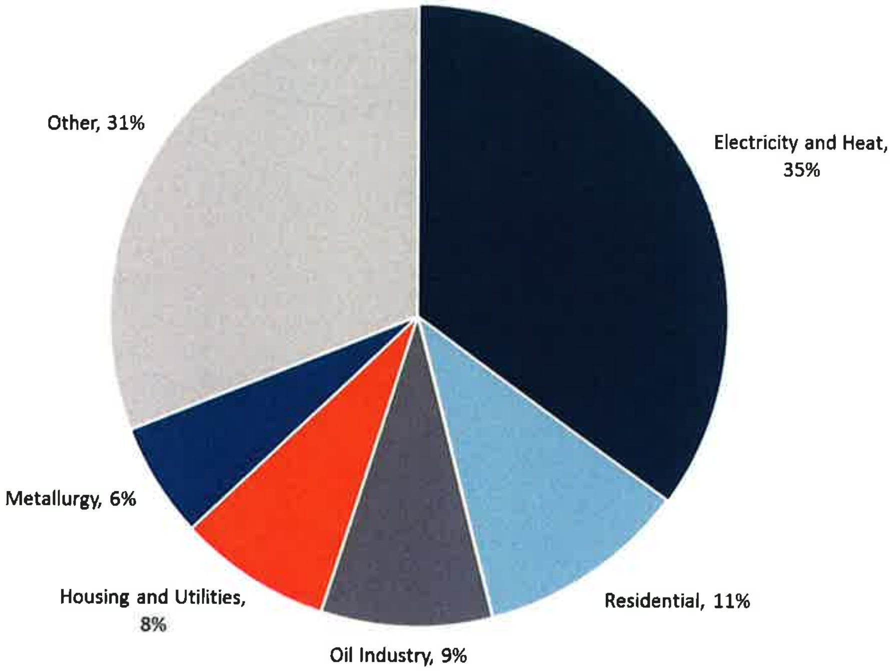
Figure 5: Annual gas consumption in Russia



Source: Gazprom in figures, various editions.

22. Figure 6 shows a breakdown of domestic gas consumption by sector in 2019. We understand that the "other" sector is not split into more detailed shares because the proportion of gas consumption in individual industries is too small. In this respect, we note the combined gas consumption of the EuroChem plants in 2019 was around [ ] bcm, or approximately [ ]% of the total gas consumed in 2019.

Figure 6: Breakdown of consumption by sector in 2019



Source: Gazprom Annual Report 2019, p. 60.

23. While Gazprom remains the dominant supplier in the domestic market, the market has slowly developed into an oligopoly featuring emerging players such as Novatek and Rosneft.[14] As shown in Figure 7, the market share of the IGS has grown from under 40% in 2009 to over 50% by 2019. Whilst Gazprom still provides gas to household and industrial consumers at government regulated tariffs, the IGS focus on industrial sales at unregulated prices.[15] For example, in 2019, Novatek sold only 2% of its natural gas to household consumers.[16] This means that the market share of the IGS in the industrial sector is considerably higher than their share of the overall market – perhaps over 60%.[17]

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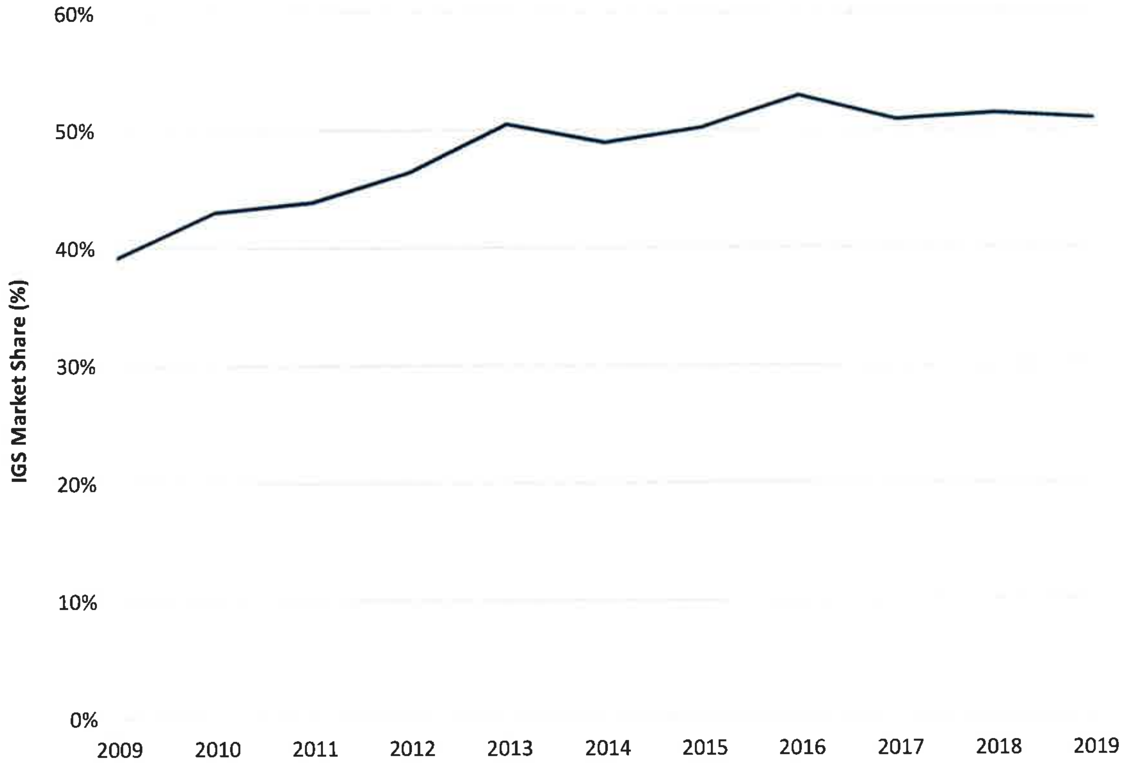
14 James Henderson, "Interview on *The Globalisation of Russian Gas: Political and Commercial Catalysts*", Oxford Energy Podcast, the Oxford Institute for Energy Studies, June 2020.

15 While the IGS sell in the unregulated segment of the Russian domestic market, they pay a regulated transport tariff to use the Gazprom-owned gas transportation system.

16 PAO Novatek Annual Report 2019, p. 27. Rosneft does not disclose the relative share of industrial and household customers but notes in its annual report that the average sales price was heavily affected by a change in regulated industry prices; see Rosneft Annual Report 2019, p. 107.

17 If the IGS provided no gas to the sectors Gazprom calls residential and households & utilities, then their share of the remaining market would be 63%. Whilst we know that some IGS do serve small numbers of residential customers so that this figure would be an over-estimate, it is also possible that the IGS do not target some of the other sectors, such as the heat part of the electricity and heat sector or small consumers within the other sector. Hence, it is not possible to determine a precise figure for the industrial segment alone.

Figure 7: Growth in market share of the IGS

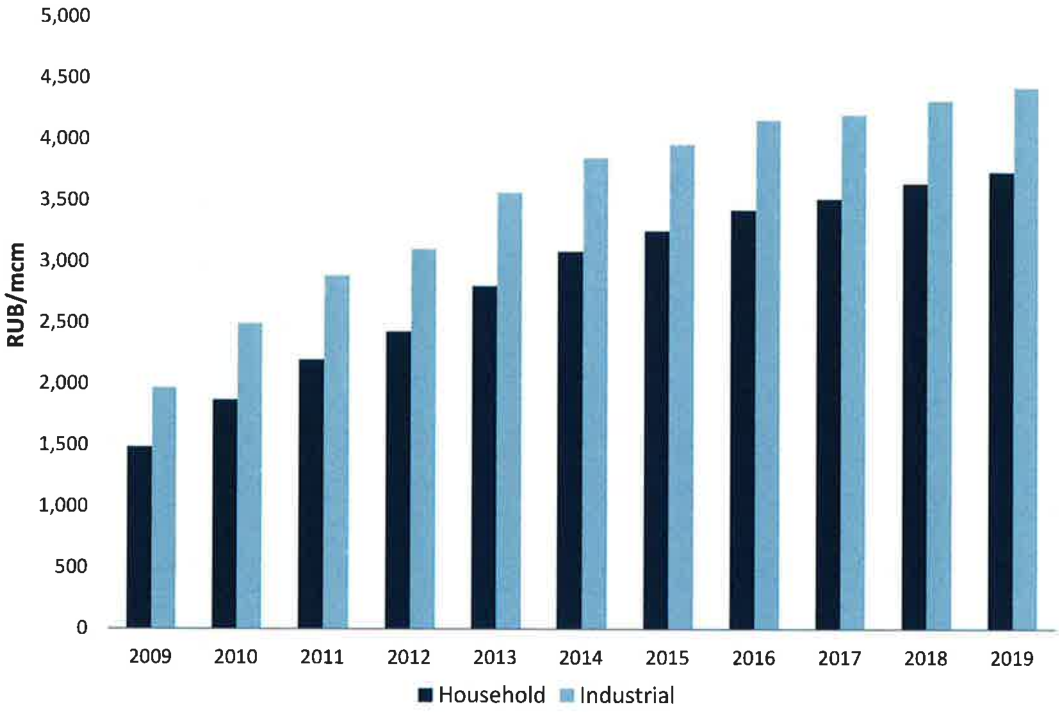


Source: Gazprom in Figures 2009-13, p. 67, Gazprom in Figures 2014-18, p. 79, Gazprom in Figures 2015-19, p 81.

24. There are regulated prices for residential and non-residential consumers. Traditionally, the regulated prices for households have been set at very low levels. Indeed, until 2009, the residential tariffs did not cover Gazprom's production costs.[18] However, average wholesale gas tariffs for both industrial and residential users have increased significantly over recent years. Figure 8 demonstrates that between 2009 and 2019, industrial prices rose by an average of 9% per year and household prices by an average of 10% per year.

[18] Henderson, P. and Yafimava, K., "The Pricing of Internationally Traded Gas, CIS Gas Pricing: Towards European Netback?", the Oxford Institute of Energy Studies, 2012, p. 179.

Figure 8: Average wholesale regulated tariffs in Russia



Source: Gazprom in Figures 2008-2012, p. 66, for 2008-2012; Gazprom in Figures 2013-2017, p. 80, for 2013 to 2017; Gazprom in Figures 2015-2019, p. 85, for 2015 to 2019.

25. The original plan was for domestic gas prices to reach parity with Gazprom's export prices by 2011. However, the dramatic increase in oil prices, to which export prices were linked, after this commitment was made, led to a decision to postpone achieving netback parity until 2015 to allow for a more gradual increase in domestic prices. In April 2014, the target date was postponed until the end of 2017 but the economic downturn in Russia meant that this target was not achieved.[19] Consequently, gas prices for household consumers are lower in Russia than they are in Europe, although according to the IEA they are around the same level as those in the US.[20]

26. While IGS gas prices still strongly correlate with regulated industrial tariffs[21], Novatek has been selling gas at a discount to this price, as is evident from Figure 9. This is partially because Gazprom is required to deliver gas to customers in more remote areas for which transport costs, and thus regulated tariffs, are higher (see Figure 4 above), but it also reflects the fact that Gazprom has to pay a higher Mineral Extraction Tax ("MET") than

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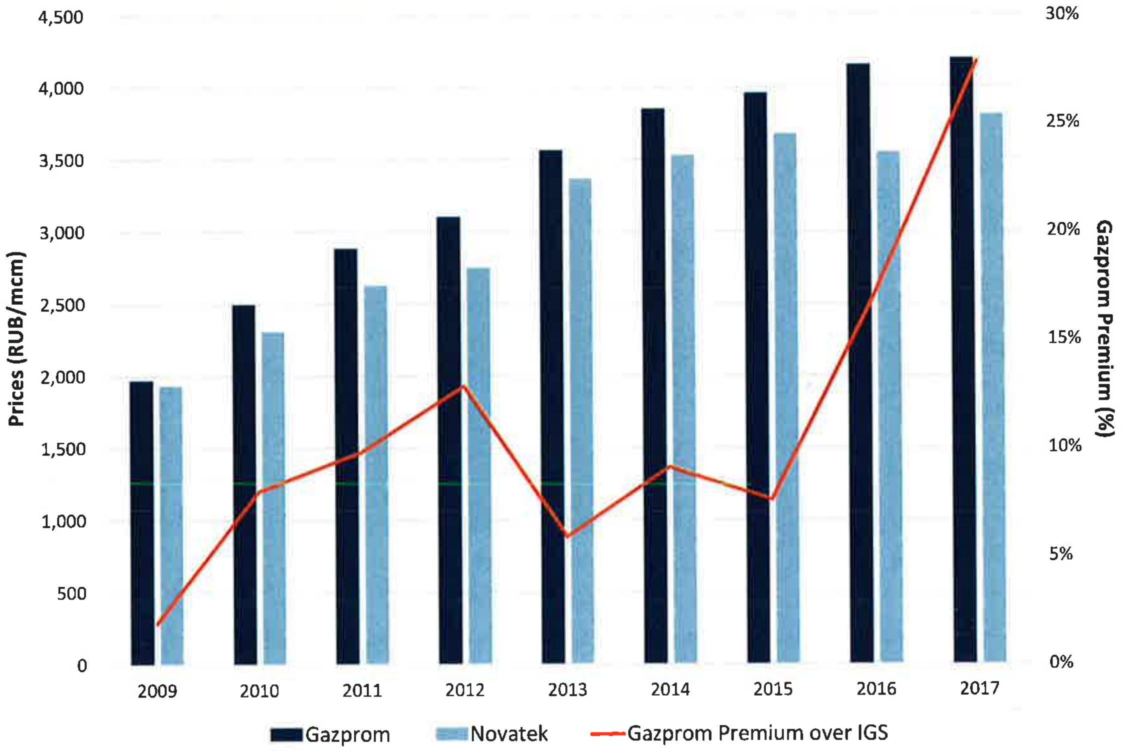
19 Simola, H. and Solanko, L., "Overview of Russia's Oil and Gas Sector", Bank of Finland BOFIT Policy Brief 5/2017, 19 May 2017, pp. 14-15.

20 Simola, H. and Solanko, L., "Overview of Russia's Oil and Gas Sector", Bank of Finland BOFIT Policy Brief 5/2017, 19 May 2017, p 15.

21 Both Novatek and Rosneft mention the increase in regulated tariffs as a driver for an increase in average sales prices in 2019; see Novatek Annual Report, p. 66 and Rosneft Annual Report, p. 131.

IGS.[22] It may also reflect an expert consensus opinion from 2015 that a "domestic market price would most likely be *below* regulated levels".[23]

Figure 9: Comparison of Gazprom and IGS industrial prices[24]



Source: Gazprom in Figures 2009-2012, 2013-2017; Novatek Annual Management Reports 2009-2017.

27. This general finding is broadly confirmed by the prices paid by the fertilizer plants of EuroChem, as shown in Figure 10 below. The premia the company paid to Gazprom in 2019 for its gas appear broadly comparable to those offered more broadly by Novatek in 2013-15 but considerably lower than that achieved by Novatek in 2016 and 2017. This may indicate that in those years Novatek was selling more gas to smaller customers, on lower tariffs, than in previous years.

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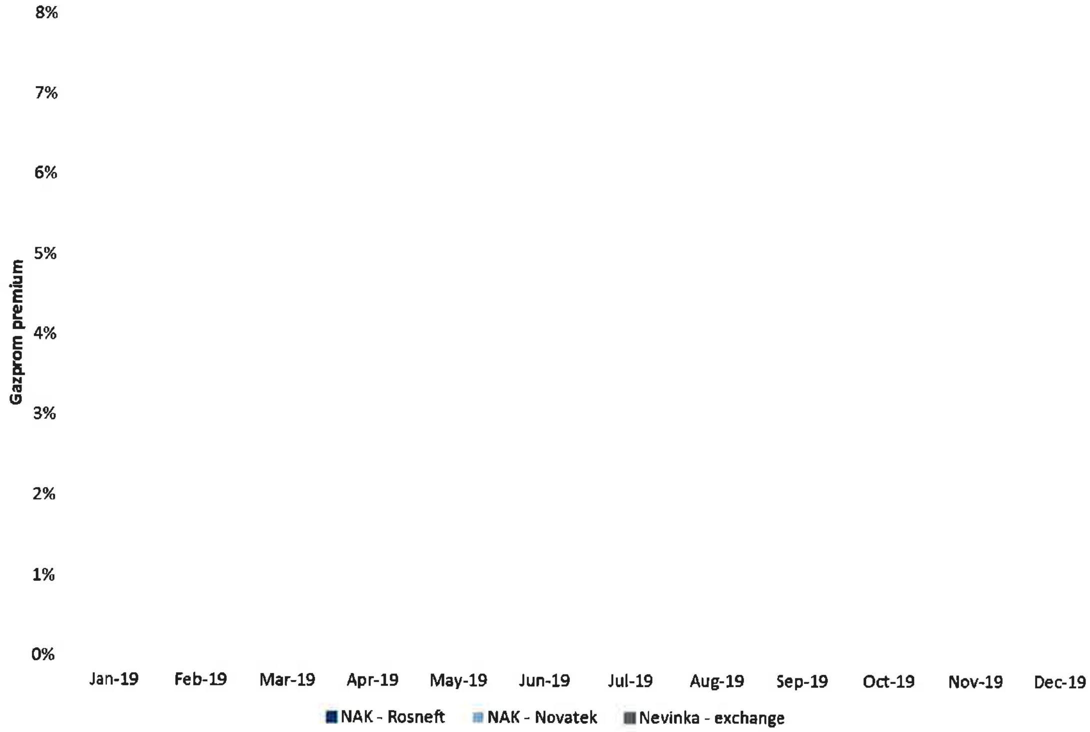
22 See Section IV.A.1 below.

23 Yafimava, K., "Evolution of gas pipeline regulation in Russia", the Oxford Institute for Energy Studies, March 2015, p. 38.

24 Novatek started exporting LNG at 2018. Its reported average sales price includes the proceeds of exports and is thus no longer representative of the average price of domestic sales. Therefore, we compare Gazprom and Novatek prices during 2009 to 2017 only.

Figure 10: Comparison of prices paid to Gazprom and IGS by EuroChem



28. Gazprom has asked the regulator to be allowed to offer gas at a discount to industrial consumers, suggesting that Gazprom would be able profitably to compete at the prices set by Novatek and Rosneft.[25] Lacking the ability to offer discounts, during 2019 Gazprom made determined efforts to win back lost consumers by offering them more attractive gas payment terms.[26] Both these facts suggest that the IGS are exerting competitive pressure on Gazprom.

29. Another indicator of competition in the Russian domestic market is the St Petersburg Gas Exchange or "SPIMEX". Gas trading on SPIMEX started in 2014. In 2019, the total traded volume amounted to 12.4 bcm, with most of the gas being traded at the Naydm balancing point in Siberia – in 2019, this balancing point accounted for 62% of month-ahead volumes and 51% of day-ahead volumes. The exchange prices have started to reflect the type of seasonal profile one would expect given the Russian climate, and the exchange prices have generally been lower than the regulated tariff.[27] Again, this is a sign of competition increasing.

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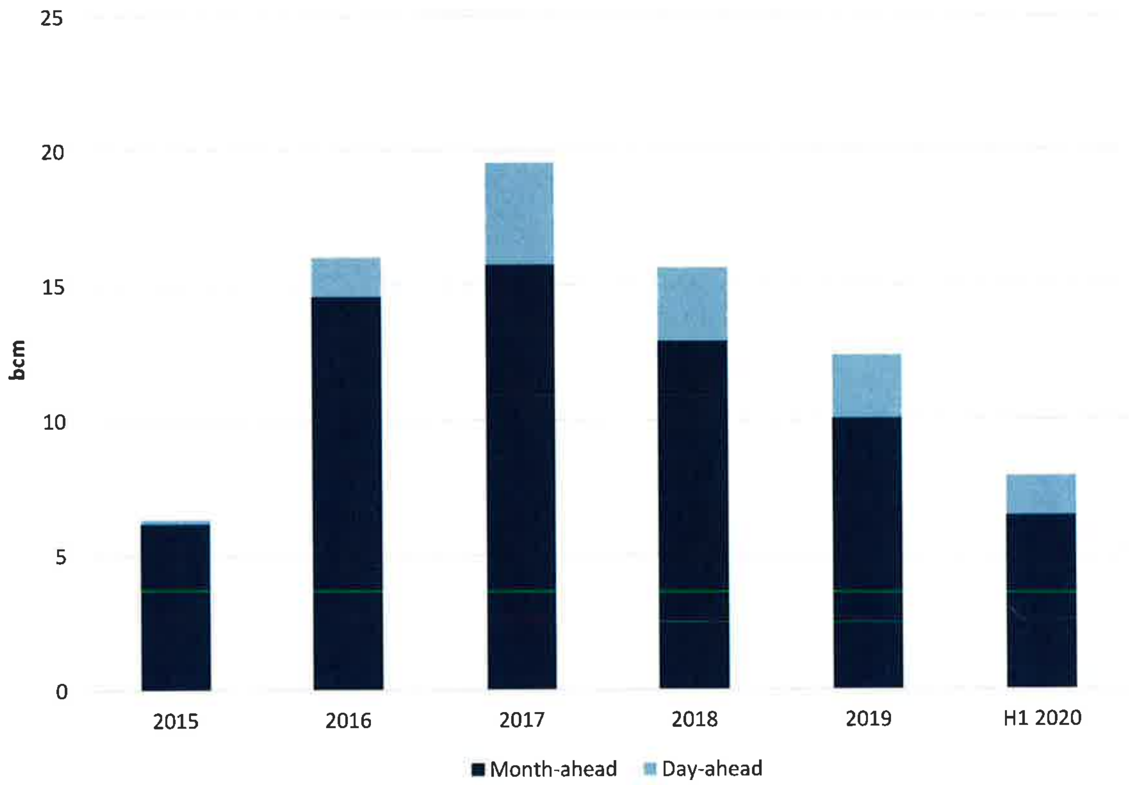
[25] Yafimava, K., "Evolution of Gas Pipeline Regulation in Russia", the Oxford Institute for Energy Studies, March 2015, p. 37.

[26] Gazprom Annual Report, p. 155.

[27] Henderson, J., Mitrova, T., Heather, P., Orlova, E., Sergeeva, Z., "The SPIMEX Gas Exchange: Russian Gas Trading Possibilities", the Oxford Institute for Energy Studies, January 2018.

Figure 11: Volumes traded on SPIMEX



Source: St. Petersburg International Mercantile Exchange.

III. Gas markets are regional

30. In this section, we answer the question whether there are world market prices for natural gas that would be available for the Russian fertilizer companies such as EuroChem. In this respect, we note that the Department of Commerce in the 2014 Russian cold rolled steel case concluded that only "prices from European and Asian markets (excluding Russia) are prices that would be potentially available to purchasers of natural gas in Russia".[28]

31. We agree that, unlike the oil market, the gas market is not global, but regional. Gas cannot readily be transported by ship – it has either to be transported by pipeline or liquefied before transportation and then regasified at its destination. Both of these transportation options are expensive and create significant price differentials between regional markets that remain, even when each individual regional market is competitive. In other words, our answer is that no world market prices exists for natural gas but Russian fertilizer companies might, in theory, be able to purchase gas from Europe or Asia, by which we mean Kazakhstan and Uzbekistan.[29]

32. In support of this view, Section III.A compares gas market prices in significant international markets whilst Section III.B analyses gas market prices in Europe.

III.A. International gas markets

33. Figure 12 compares market prices in the main international gas markets: Europe, North America and Japan.

34. US gas prices, as indicated by Henry Hub prices, have been consistently lower than other gas prices, as a result of the "shale gas revolution", which has led to a glut of gas in the US and low prices.

35. By contrast, Japan Korea Marker (JKM) prices for the Far Eastern gas market have consistently been the highest prices. The JKM prices are LNG prices, which are still predominantly linked to oil prices. In addition, much of the LNG consumed in the Far East is not produced locally – some even comes from the US – and so transport costs play a significant role. JKM prices have also been affected by the growth in Chinese demand for gas.

36. European hub prices, as represented by prices at the most liquid market hub in Europe, the Title Transfer Facility (TTF) in the Netherlands, lie between these two extremes. However, all three markets are generally held to be competitive and no-one would suggest that the Henry Hub price is unfairly low because it is lower than the TTF price.

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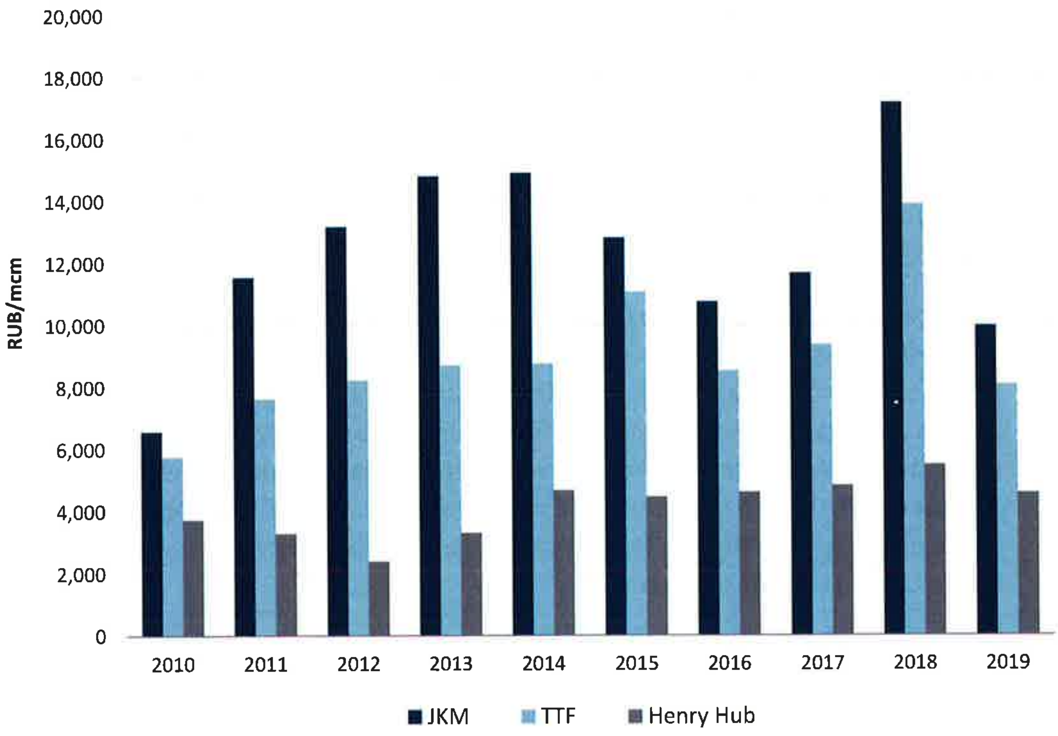
28 Marsh, C., "Countervailing Duty Investigation of Certain Cold-Rolled Steel Flat Products from the Russian Federation", 15 December 2015, p. 18.

29 In 2019, the Russian federation imported 20.6 bcm from Kazakhstan and 6.2 bcm from Uzbekistan, up from 10.9 bcm and 4.1 bcm respectively in 2014. It did not import any gas from Turkmenistan or Azerbaijan in 2019 compared to 9 bcm and 0.2 bcm respectively in 2014; see BP Statistical Review of World Energy 2020, p. 43.

Figure 12: International gas market prices: Henry Hub, TTF and JKM



Source: BP Statistical Review of World Energy 2020, p. 39.

37. The spread between the benchmark gas prices increased from 2011 to 2013 as a result of the Fukushima accident in Japan and the start of the shale gas revolution in the US. From 2014 onwards, the spread between JKM and TTF prices decreased because of weaker demand in Asia, increasing global LNG supplies and falling oil prices. Whilst the spreads declined, they never disappeared.

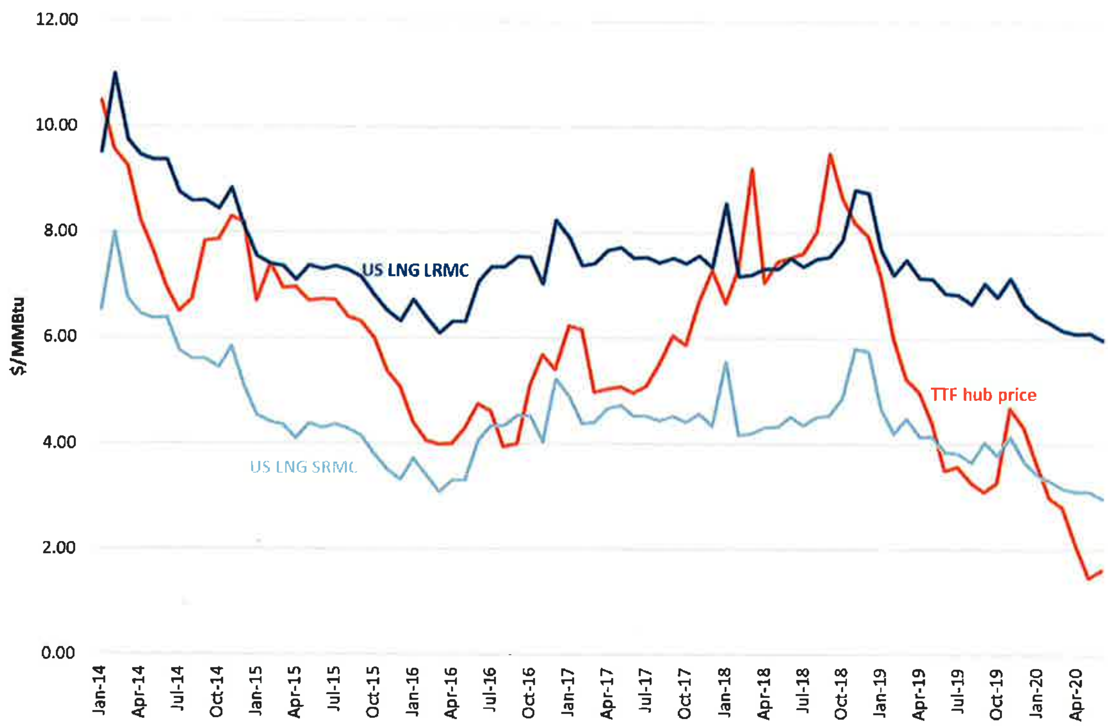
38. Indeed, the regional differences in gas prices are discussed in a recent European Commission report on energy prices and costs in Europe.[30] The authors note that while "international prices have converged since 2015 […], [the] differences proved persistent." These persistent differences indicate the existence of separate regional markets. If this were not the case, market participants could exploit the price differentials for profits by buying cheap US gas and selling it in Europe or the Far East if the price differentials were equal to or greater than the costs of transporting the gas from one market to the other. This can be seen from Figure 13, which primarily compares European gas prices (TTF prices) and US LNG prices, include the costs of transporting the LNG to Europe and regasifying it.[31] The difference between the long run marginal cost (LRMC) of US LNG and the short-run marginal cost (SRMC) is simply the cost of liquefying the gas in the US.

30 "Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Energy Prices and Costs in Europe, Part 1/11", Commission Staff Working Document, 9 January 2019.

31 The LRMC is calculated according to the Cheniere formula: 1.15 x Henry Hub price + 3 $/mBTu liquefaction fee + 0.7 $/mBTu transport costs to Europe + 0.4 $/mBTu regasification costs.

39. European prices have generally remained between the LRMC and SRMC US LNG prices. This means that it has generally not been economic for additional LNG to be imported from the US. Indeed, in the second half or 2019, TTF prices were so low that they were equal to or below the SRMC price, making even spot exports of US LNG uneconomic.

Figure 13: Comparison of Russian, TTF and US LNG prices



Source: ICIS Heren; EIA; SRMC: 1.15x Henry Hub + 0.7 (transport) + 0.4 (regasification); LRMC: SRMC+ 3.0 (liquefaction).

40. We have not been able to find any data on Kazak or Uzbek gas prices, so we are unable to include these in our comparison. However, we note that, as far as we are aware, all the Asian gas exported to Russia is purchased by Gazprom,[32] so it is unclear whether Asian gas can be considered to provide a suitable benchmark.

41. For this reason, it makes relatively little sense to compare tariffs paid by the Russian fertilizer industry to market prices outside of Europe.

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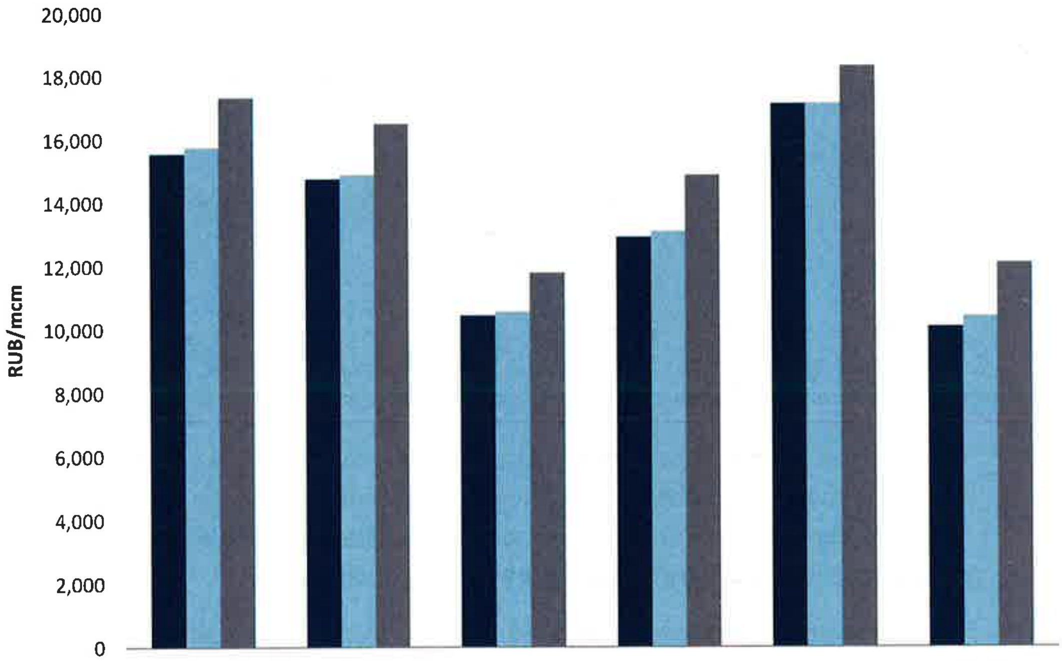
[32] In 2018, for example, Gazprom imported 12.3 bcm of natural gas from Kazakhstan and 3.8 bcm from Uzbekistan; see Gazprom Annual Report 2019, p. 117. In the same year, total Kazakhstan natural gas exports to/through Russia were 12.3 bcm and total Uzbekistan exports to/through Russia were 3.8 bcm; see Pirani, S., "Central Asian Gas: Prospects for the 2020s", the Oxford Institute for Energy Studies, December 2019, p. 23 and p. 15. For the years 2010-2018, all the central Asian gas exported to Russia was purchased by Gazprom.

III.B. European gas markets

42. Even within Europe, there are price differences within markets but these differences are mostly, but not always, explained by the dominant direction of flow of gas[33] and gas transportation costs. For example, as shown in Figure 14, prices at the Italian hub (PSV) have consistently been higher than those at the Dutch (TTF) and main German (NCG) hubs because gas travels from these northern markets down to Italy. However, congestion between markets can lead to larger price differentials.

43. The EC recognizes that "[l]ower oil prices, the decreasing role of oil-indexation and, in some cases, new supply sources (e.g. LNG in Lithuania and Poland) contributed to converging wholesale prices in Europe in 2015-2017."[34] The result is that hub prices are now the relevant gas price benchmark in most of the European markets, particularly in the Central and North-Western Europe, and hub prices in these markets are normally very highly correlated (over 90% correlation).

Figure 14: Comparison of European hub prices: PSV, TTF and NCG



Source: ICIS Herren Database.

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33 Dutch and Norwegian gas originates in the north-west of Europe and flows south and east. Russian gas enters Europe in the north and east and so mainly flows south and west. LNG enters Europe in an arc from the west round to the south east.

34 "Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Energy Prices and Costs in Europe, Part 1/11", Commission Staff Working Document, 9 January 2019, p. 54.

44. In considering a comparison between European prices and the prices paid by EuroChem, three important points have to be considered.

45. First, European gas markets are supplied by four main sources, LNG from the Middle East and Africa, and pipeline gas predominantly from Russia, Norway and the Netherlands. Of these producers, Russia is widely recognized as the lowest cost producer and yet European gas prices will reflect the higher marginal cost of other gas supplies.[35]

46. Second, gas can be purchased at hubs for delivery over different periods out into the future such as day-ahead, month-ahead, quarter-ahead, year-ahead and so on. The prices of these different products vary over time and gas buyers pursue different strategies for purchasing their requirements. These different purchasing strategies can result in companies paying very different prices for deliveries over the same period. For example, the forward price for gas to be delivered at NCG over calendar year 2019 rose from an average of 12,044 RUB/mcm in 2016 to 14,487 RUB/mcm in 2018 whilst day-ahead NCG prices during 2019 averaged only 10,430 RUB/mcm,[36] see Figure 15.

Figure 15: Prices for 2019 deliveries at NCG

Source: ICIS Herren Database.

47. Third, it was physically impossible to import gas from Europe to Russia in 2019. To do so would have required Russian gas consumers to have access to exit capacity from Europe on one of three routes:

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[35] Yermakov, V., "Russian Gas: The Year of Living Dangerously", the Oxford Institute for Energy Studies, September 2020, p. 8.

[36] In both cases, we have converted the prices from Euros to Rubles using the average exchange rate that would have been paid when the gas was delivered.

a. via Nordstream and the Greisfwald interconnection point in Germany;

b. via the EuRoPol and Yamal pipelines and the Kondratki interconnection point in Poland; or

c. via Slovakia and Ukraine making use of the Ukrainian interconnection points with Russia.

48. No exit capacity was available at any of these interconnection points in 2019.[37] So access to European gas would only have been possible via swaps with Gazprom.[38]

IV. Do Gazprom's prices cover its costs?

49. In order to answer the question whether Gazprom's prices are set on market principles, we carry out two separate calculations. In this section, we analyse whether the prices paid by EuroChem cover the costs that Gazprom incurs in supplying them. In the next section, we consider whether the companies would have paid more if their plants had been located in the competitive gas market of north-western Europe, taking into account the impact of different transportation distances.

IV.A. Gas production costs

50. In addition to considering Gazprom's production costs, we have also analysed those of Novatek, the largest IGS,[39] to provide a benchmark to Gazprom's costs. We first estimate their operating costs. We then estimate the unit costs associated with providing a fair return on and of the capital employed by the companies' gas production assets.[40] We calculate the ***all-in costs*** by summing both costs.

51. The unit costs associated with gas production represent the current operating costs for this activity – in other words, they represent the minimum unit cost that any company must earn from gas production to remain solvent. However, we consider the second measure of costs – the unit costs associated with operating costs, depreciation and a fair return on the assets employed – to be a more realistic view of the unit costs that any company needs to earn from its gas production business to remain financially robust in the short to medium term.

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37 The European Network of Transmission System Operators – Gas ("ENTSO-G") transparency website shows some technical reverse flow capacity for the first half of 2019 but no available or booked capacity. For the Polish and Ukrainian routes there was no technical capacity.

38 Swaps with IGS would have been problematic given Gazprom's export monopoly – the IGS would not have had gas in Europe to swap with gas in Russia.

39 We consider Novatek's production costs to be representative of the other IGS.

40 By "return of capital employed" we mean depreciation.

52. To check that the data for 2019 are not anomalous, we also estimate the 2018 costs for Gazprom and Novatek.

IV.A.1. Gas production operating costs

IV.A.1.a. Novatek

53. Novatek's financial statements provide cost data for its oil and gas production activities. We rely on these data to estimate Novatek's production operating costs; see Table 1. We include Novatek's lifting costs, exploration expenses and taxes to calculate its operating costs. Although Novatek predominantly produces natural gas, [41] it also produces hydrocarbon liquids. Novatek does not provide a detailed breakdown of its production and overhead costs between natural gas and hydrocarbon liquids. We conservatively assume that the total lifting and exploration costs are attributable to the production of natural gas. Row [5] in Table 1 shows Novatek's operating costs excluding the MET. We consider the MET independently because it has a significant weight in the operating costs and so it is particularly important to arrive at a reasonable estimate.

54. We find that Novatek's gas production operating costs in 2019 were no more than 1,486 RUB/mcm and that these were in line with its 2018 operating costs.

Table 1: Novatek's gas production operating costs based on its accounts

				2018	2019
Lifting Expenses	RUB mln	[1]	See Note	14,938	16,045
Exploration Expenses	RUB mln	[2]	See Note	7,012	8,386
Property and Other Taxes	RUB mln	[3]	See Note	4,124	4,046
General and Adminstrative Expenses	RUB mln	[4]	See Note	22,282	24,568
Operating Costs Excluding MET	RUB mln	[5]	[1]+[2]+[3]+[4]	48,356	53,045
Gas Production	bcm	[6]	See Note	69	75
Operating Costs Excluding MET	RUB/mcm	[7]	[5]/[6]	703	710
Mineral Extraction Tax	RUB mln	[8]	See Note	54,644	57,935
Mineral Extraction Tax	RUB/mcm	[9]	[8]/[6]	794	776
Operating Costs	RUB/mcm	[10]	[7]+[9]	1,497	1,486

Notes and sources:
Thousand cubic meters are *mcm* and billion cubic meteres are *bcm*
[1], [2]: PAO Novatek IFRS Consolidated Financial Statements 2019, p. 71.
[3]: PAO Novatek IFRS Consolidated Financial Statements 2019, p. 41.
[4]: PAO Novatek IFRS Consolidated Financial Statements 2019, p. 42.
[6]: PAO Novatek Annual Report 2019, p. 20.
[8]: PAO Novatek IFRS Consolidated Financial Statements 2019, p. 41.

41 Natural gas was 77% of Novatek's output in 2019; see PAO Novatek Annual Report 2019, p. 20.

IV.A.1.b. Gazprom

55. We have used a similar approach to calculate Gazprom's operating costs based on its financial data, using both "external expenses" and "inter-segment" expenses; see Table 2. However, we consider that these calculations need to be treated with caution since Gazprom's 2019 financial report notes that the internal transfer prices used to determine inter-segment expenses are "*established by the management of the Group with the objective of providing specific funding requirements of the individual subsidiaries within each segment*".[42]

56. We find that Gazprom's 2019 operating costs are 1,589 RUB/mcm. One important reason that Gazprom's operating costs are higher than Novatek's costs is because Gazprom pays a significantly higher average MET; Novatek paid approximately 776 RUB/mcm in 2019, whereas Gazprom paid approximately 1,100 RUB/mcm.[43] To check the effect that the different rates of MET have on operating costs, we have performed a sensitivity where we calculate Gazprom's costs using Novatek's MET rate and we find that this adjustment reduces its gas production operating costs below those of Novatek.[44]

Table 2: Gazprom's gas production operating costs based on its accounts

				2018	2019
Segment Revenues	RUB mln	[1]	See Note	1,017,044	973,657
Segment Result	RUB mln	[2]	See Note	3,106	4,984
Segment Expenses	RUB mln	[3]	[1]-[2]	1,013,938	968,673
Depreciation	RUB mln	[4]	See Note	180,753	172,233
Operating Costs	RUB mln	[5]	[3]-[4]	833,185	796,440
Gas Production	bcm	[6]	See Note	499	501
Operating Costs	RUB/mcm	[7]	[5]/[6]	1,671	1,589

Notes and sources:
[1], [2], [4]: Gazprom Financial Report 2019, pp. 108-109.
[6]: Gazprom in Figures 2015-2019, p. 26.

57. In a 2018 presentation, Gazprom estimated its "prime costs of gas production" for 2017 as 1,955 RUB/mcm.[45] Whilst these costs are higher than our estimates, it is not clear precisely what costs Gazprom has included as prime costs. Prime costs normally cover direct costs, such as materials and labour directly used in production, but they can also include depreciation if this is considered a direct (rather than an indirect or allocated cost). It seems logical, therefore, that at least some depreciation costs are included in

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42 Gazprom Financial Report 2019, p. 108.

43 PAO Novatek IFRS Consolidated Financial Statements 2019, p. 41; Yermakov, V., "Russian Gas: the year of living dangerously", The Oxford Institute for Energy Studies, September 2020, figure 15, p. 13.

44 See Appendix C.

45 Gazprom's Financial and Economic Policy Press Conference presentation, 28 June 2018, p. 5. The 2017 prime cost estimate is used for 2018 and 2019 in Table 4 due to no data availability.

Gazprom's figures since the costs of drilling and associated equipment are a direct cost of gas production, when they are not also used for oil production. To be conservative, we consider this estimate to be an upper bound for Gazprom's operating costs.

IV.A.2. Gas production all-in costs

58. To calculate "all-in costs", we have to determine the unit costs associated with covering the depreciation of each company's gas production assets (the return *of* its assets), and allowing them to earn a fair return *on* those assets. These calculations rely in part on our estimate of the appropriate weighted average cost of capital ("WACC") for each company's gas production business; see Table 15 and Table 16 in Appendix D. Table 3 shows the result of our calculations. The two companies have relatively similar unit capital costs in 2018, but Novatek's costs are higher in 2019. This is because the value of its property, plant and equipment ("PPE"), line [4] of Table 3, increased by 37% whereas Gazprom's PPE was essentially unchanged between the two years.

Table 3: Return on and of the assets of Novatek's and Gazprom's gas production

				2018	2019
Exchange Rate	RUB/USD	[1]	Eurostat	62.69	64.72
Novatek					
Depreciation, Depletion, and Amortisation	RUB mln	[2]	See Note	27,051	25,280
Depreciation, Depletion, and Amortisation	USD mln	[3]	[2]/[1]	431	391
Property, Plants, and Equipment	RUB mln	[4]	See Note	408,201	556,798
Property, Plants, and Equipment	USD mln	[5]	[4]/[1]	6,511	8,603
WACC	%	[6]	Table 17	8.03%	8.03%
Return on Assets	USD mln	[7]	[5]x[6]	523	691
Capital Costs	USD mln	[8]	[3]+[7]	954	1,081
Gas Production	bcm	[9]	See Note	69	75
Capital Costs	USD/mcm	[10]	[8]/[9]	14	14
Capital Costs	RUB/mcm	[11]	[10]x[1]	870	937
Gazprom					
Depreciation	RUB mln	[12]	Table 2	180,753	172,233
Depreciation	USD mln	[13]	[12]/[1]	2,883	2,661
Segment Assets	RUB mln	[14]	See Note	2,743,944	2,736,680
Segment Assets	USD mln	[15]	[14]/[1]	43,767	42,284
WACC	%	[16]	Table 16	8.17%	8.17%
Return on Assets	USD mln	[17]	[15]x[16]	3,576	3,455
Capital Costs	USD mln	[18]	[13]+[17]	6,459	6,116
Gas Production	bcm	[19]	See Note	499	501
Capital Costs	USD/mcm	[20]	[18]/[19]	13	12
Capital Costs	RUB/mcm	[21]	[20]x[1]	812	790

Notes and sources:
[2]: PAO Novatek Consolidated IFRS Statements 2019, p. 71.
[4]: PAO Novatek Consolidated IFRS Statements 2019, p. 10.
[9]: PAO Novatek Annual Report 2019, p. 20.
[14]: Gazprom Financial Report 2019, p. 110.
[19]: Gazprom in Figures 2015-2019, p. 26.

59. We combine these capital costs with the operating costs calculated in the previous section to derive the all-in costs, as shown in Table 4. Since we have derived two operating costs for Gazprom (that derived from its accounts and its prime costs), Table 4 shows both a minimum and a maximum value.[46] It also demonstrates that our cost estimates for 2019 are similar to those for 2018.

46 There is no range of operating costs for Novatek. Therefore, the minimum and maximum values for Novatek are the same in Table 4.

Table 4: All-in costs for Novatek and Gazprom gas production

		2018		2019	
		Min	Max	Min	Max
Novatek					
Operating Costs	[1] Table 1	1,497	1,497	1,486	1,486
Return of and on Assets	[2] Table 3	870	870	937	937
All-in Costs	[3] [1]+[2]	2,367	2,367	2,423	2,423
Gazprom					
Operating Costs	[4] See Note	1,671	1,955	1,589	1,955
Return of and on Assets	[5] Table 3	812	812	790	790
All-in Costs	[6] [4]+[5]	2,483	2,767	2,379	2,745

Notes and sources:
All values are in RUB/mcm.
[1]-[3]: No ranges are used for Novatek.
[4]: Minima are from on Gazprom's accounts. See Table 2.
Maxima are from Gazprom's Financial and Economic Policy Press Conference Presentation 2018, p. 5. 2017 maxima is used for 2018 and 2019 due to no data.

60. A recent report by the Oxford Institute of Energy Studies, estimates that the current marginal cost of production at new or relatively new fields is around 37-41 \$/mcm,[47] which equates to around 2,100-2,400 RUB/mcm, which is broadly comparable to our all-in cost estimates.

47 Yermakov V. and Kirova D., "Gas and Taxes: 'The Impact of Russia's Tinkering with Upstream Gas Taxes on State Revenues and Decline Rates of Legacy Gas Fields'", the Oxford Institute for Energy Studies, October 2017, Figure 11, p. 9.

IV.B. Gas transportation costs in Russia

61. The prices paid by EuroChem need to cover the costs that Gazprom incurs in transporting gas from its production fields to their phosphate and fertilizer plants. Whilst transportation tariffs are published, these regulated prices are paid by IGS and not by Gazprom, whose transportation costs are unregulated. We first derive an estimate of the third-party transportation costs and we then estimate Gazprom's transport costs based on data in its annual and financial reports.

62. In both cases, we estimate the transport costs for delivering gas to EuroChem's BMU, Phosphorit, and Nevinnomysskiy Azot (Nevinka) phosphate plants, EuroChem's North-West, Novomoskovskiy Azot (NAK), and Usolskiy potash mine (UKK) plants, As shown in Figure 16, the locations of these plants differ widely.

Figure 16: Location of the plants owned by EuroChem

Source of Map: 2020 © Google.

IV.B.1. Third-party tariffs

63. We assume that all the plants are supplied with gas from Novatek's Urengoy field, in the Yamal peninsula but that the routes to the various plants differ. EuroChem's Phosphorit and North-West plants are located in the Leningrad region and its NAK plant is located in the Tula region. For these three plants, we assume that supply route is via Ukhta and Gryazovets.[48] The BMU and Nevinka plants are located in the Krasnodar and Stavropol regions respectively and we assume they are supplied via Petrovsk. Finally, the UKK plant is located in the Perm region and we assume it is supplied via Surgut and Tyumen.

64. We estimate the distance from Novatek's fields to EuroChem's BMU plant to be 3,600 km, to the Phosphorit plant to be 2,770 km, to the North-West plant to be 2,770 km, to

[48] We use Novatek's Urengoy (Articgas) field because it is currently Novatek's largest natural gas field.

the Nevinka plant to be 3,558 km, to the NAK plant to be 2,440 km and to the UKK plant to be 2,220 km. We derive these distances using precise pipeline lengths where possible but we have to rely on estimates for some pipeline sections.[49]

65. Gazprom reports the average transportation tariff charged to third parties as 65.20 RUB/mcm/100km.[50] Multiplying this tariff by the average transportation distances to the plants results in transportation all-in costs for IGS that lie between 1,447 RUB/mcm (UKK) and 2,347 RUB/mcm (BMU), see Table 5.

Table 5: Third party estimate of gas transportation costs in Russia

				EuroChem					
				BMU	Phosphorit	North-West	Nevinka	NAK	UKK
Transportation Tariff to Third Parties	RUB/mcm/100 km	[1]	See Note	65.2	65.2	65.2	65.2	65.2	65.2
Distance from Novatek's fields	km	[2]	See Note	3,600	2,770	2,770	3,558	2,440	2,220
Prime cost of gas transmission	RUB/mcm	[3]	([1]x[2])/10(	2,347	1,806	1,806	2,320	1,591	1,447

Notes and sources:
All values are for 2019.
[1]: Gazprom Annual Report 2019, p. 121.
[2]: Authors' calculations using Gazprom pipeline distances.

IV.B.2. Transfer price estimate

66. Gazprom has two large fields, Bovanenkovo and Urengoy, located in the Yamal peninsula. Gazprom also has a large field, Astrakhan, located in South-West Russia. In terms of the fields used to supply the various plants, we assume that EuroChem's Phosphorit, North-West and NAK plants are supplied from the Bovanenkovo field, whilst its UKK plant is supplied from its Urengoy field via Surgut and then Tyumen. Finally, for the BMU and Nevinka plants, we assume that gas is supplied from the near-by Astrakhan field via Stavropol.

67. Gazprom reported that its "unit prime costs of gas transmission" was 67.43 RUB/mcm/100 km in 2019.[51] We explained in the previous section on production costs that the exact components included by Gazprom in its prime costs are not clear, and that probably they include some depreciation.[52] For this reason, we interpret the prime costs as an upper bound on Gazprom's transportation operating costs. We follow the same distance-based approach as for IGS to derive a prime cost of gas transmission for Gazprom. As shown in Table 6, we estimate Gazprom's prime cost of gas transmission to lie between 536 RUB/mcm (Nevinka) and 2,070 RUB/mcm (Phosphorit, North-West), see Table 6.

49 We estimate linear distances using Google Maps' distance measurement tool.

50 Gazprom Annual Report 2019, p. 121.

51 Gazprom Annual Report 2019, p. 78.

52 See ¶57 above.

Table 6: Estimate of gas transportation costs in Russia for Gazprom

				EuroChem					
				BMU	Phosphorit	North-West	Nevinka	NAK	UKK
Unit prime cost of gas transmission	RUB/mcm/100 km	[1]	See Note	67.4	67.4	67.4	67.4	67.4	67.4
Distance from Gazprom facilities	km	[2]	See Note	975	3,070	3,070	795	2,740	2,220
Prime cost of gas transmission	RUB/mcm	[3]	([1]x[2])/10C	657	2,070	2,070	536	1,848	1,497

Notes and sources:
All values are for 2019.
[1]: Gazprom Annual Report 2019, p. 78.
[2]: Authors' calculations using Gazprom pipeline distances.

IV.C. Conclusions

68. In the previous sections, we estimated the unit costs associated with Novatek and Gazprom's gas production and the unit costs of delivering gas to EuroChem's plants. In this section, we compare the sum of these costs to the prices that EuroChem paid to the IGS and Gazprom.

69. Strictly speaking, our calculations only apply in relation to the average unit costs that Novatek and Gazprom earn across all their gas sales. However, residential consumers often impose additional costs on their suppliers because they have a very "peaky" demand for gas, which can only be met by flexing gas production up in winter and down in summer, or making use of gas storage facilities. In our analysis, we have not attempted to identify separately the unit costs that industrial and domestic consumers should pay. To the extent that the operating costs we include in our estimates include allowances for the costs of flexibility, we may have over-estimated the costs that Novatek and Gazprom face in supplying industrial customers.

IV.C.1. Delivered all-in costs

70. Based on the analysis described in sections IV.A and IV.B, we can calculate the delivered all-in costs of producing and transporting gas to the EuroChem plants – the costs of supplying gas to each plant.

71. We use the combination of Novatek production costs and the third-party transportation cost estimate as a proxy for the costs that an IGS would incur in supplying these plants.

72. We estimate a range of values for Gazprom's delivered all-in costs because we have estimated a range of production costs, which we combine with our estimate of transportation costs. Table 7 below shows the results of these calculations.

Table 7: Delivered all-in costs for Novatek and Gazprom

			EuroChem											
			BMU		Phosphorit		North-West		Nevinka		NAK		UKK	
			min	max	min	max	min	max	min	max	min	max	min	max
Gazprom														
Production	[1]	Table 4	2,379	2,745	2,379	2,745	2,379	2,745	2,379	2,745	2,379	2,745	2,379	2,745
Transportation	[2]	Table 6	657	657	2,070	2,070	2,070	2,070	536	536	1,848	1,848	1,497	1,497
Delivered costs	[3]	[1]+[2]	3,036	3,402	4,449	4,815	4,449	4,815	2,915	3,281	4,226	4,592	3,876	4,242
Novatek														
Production	[4]	Table 4	2,423	2,423	2,423	2,423	2,423	2,423	2,423	2,423	2,423	2,423	2,423	2,423
Transportation	[5]	Table 5	2,347	2,347	1,806	1,806	1,806	1,806	2,320	2,320	1,591	1,591	1,447	1,447
Delivered costs	[6]	[4]+[5]	4,770	4,770	4,229	4,229	4,229	4,229	4,742	4,742	4,014	4,014	3,870	3,870

Notes and sources:
All values are RUB/mcm.

IV.C.2. Comparison with the prices EuroChem paid

73. We conclude that the prices paid by EuroChem enable Gazprom to cover its minimum all-in delivered costs; see Table 8. The prices they pay exceed the minimum costs that Gazprom incurs in supplying them by at least [ ]% (North-West).

74. For all bar one plant (North West), the prices the companies pay to Gazprom also exceed its maximum all-in delivered costs by at least [ ]% (NAK). Moreover, the prices paid by EuroChem's North-West plant are only [ ]% less than Gazprom's maximum supply costs to that plant. We consider that this possible shortfall is insignificant, given the necessarily approximate nature of our estimates of transportation distances.

Table 8: Comparison of Gazprom's delivered all-in costs with tariffs[53]

			EuroChem					
			BMU	Phosphorit	North-West	Nevinka	NAK	UKK
Industrial price	[1]	See Note						
Minimum delivered cost	[2]	Table 7	3,036	4,449	4,449	2,915	4,226	3,876
Overall maximum margin	[3]	[1]-[2]						
Overall maximum margin	[4]	[3]/[2]						
Maximum delivered cost	[5]	Table 7	3,402	4,815	4,815	3,281	4,592	4,242
Overall minimum margin	[6]	[1]-[5]						
Overall minimum margin	[7]	[6]/[5]						

Notes and sources:
All values in RUB/mcm for 2019. Prices are weighted by volumes.
[1]: All data provided by the client.

75. The prices paid by EuroChem's plants, with the exception of UKK, would also enable IGS' to cover their gas production and transportation costs, see Table 9. The BMU and

53 The margins at EuroChem's BMU and Nevinka plants are large because of their close proximity and, in turn, minimal transport costs, to the Astrakhan gas field.

Phosphorit plants did not buy gas from IGS and so for these plants we have used the prices they paid to Gazprom in our comparison. The price paid by the UKK plant is only 1.8% below our estimate of Novatek's supply costs for this plant, and again we consider this to be immaterial given the approximate nature of our transportation distance estimates.

Table 9: Comparison of Novatek's delivered all-in costs with tariffs[54]

			EuroChem					
			BMU	Phosphorit	North-West	Nevinka	NAK	UKK
Industrial price to IGS	[1]	See Note						
Delivered cost	[2]	Table 7	4,770	4,229	4,229	4,742	4,014	3,870
Overall margin	[3]	[1]-[2]						
Overall margin	[4]	[3]/[2]						

Notes and sources:
All values in RUB/mcm for 2019. Prices are weighted by volumes.
[1]: All data provided by the client.
[1]: For EuroChem's BMU and Phosphorit plants we use the price which they paid to Gazprom because they do not purchase gas from IGS.

76. Finally, to ensure the robustness of our baseline results, we use estimates for the prime production and transportation cost for Gazprom as reported in a recent OIES report.[55] We follow a method which is identical to that described in sections IV.A and IV.B to derive an alternative estimate for Gazprom's delivered costs to the EuroChem plants. The results presented in Table 10 support our findings; Gazprom's pricexs exceed their costs of producing and supplying gas to most EuroChem plants by at least [ ]% (NAK) and at most [ ]% (BMU). However, Gazprom's prices are [ ]% below the cost of producing and supplying gas to the North-West plant. Once again, we consider this to be an insignificant shortfall.

54 EuroChem's BMU and Phosphorit plants purchase gas exclusively from Gazprom. In Table 9, we compare the prices which these plants paid to Gazprom with the IGS costs of producing and supplying gas. This approach allows us to determine whether IGS could supply gas profitably to EuroChem's BMU and Phosphorit plants.

55 Yermakov, V., 'Russian Gas: The Year of Living Dangerously', the Oxford Institute for Energy Studies, September 2020, figures 15 and 16, pp. 13-15.

Table 10: OIES comparison of Gazprom prices to costs

			EuroChem					
			BMU	Phosphorit	North-West	Nevinka	NAK	UKK
Industrial price	[1]	See Note						
Delivered cost	[2]	See Note	3,323	4,733	4,733	3,202	4,511	4,161
Overall margin	[3]	[1]-[2]						
Overall margin	[4]	[3]/[2]						

Notes and sources:
All values in RUB/mcm for 2019. Prices are weighted by volumes.
[1]: All data provided by the client.
[2]: Yermakov, V., 'Russian Gas: the Year of Living Dangerously', the Oxford Institute for Energy Studies, September 2020.

V. Comparison of EuroChem's prices to European prices

77. Our other test of whether Gazprom's prices are set in accordance with market principles is to compare the prices which EuroChem paid with what they would have paid had their plants been located in Europe, taking into account the impact of different transportation distances. In other words, we calculate what price at the EuroChem plants would be consistent with the price that would have been paid by similar companies in Europe, taking into account the costs of transporting the gas to the Russian border, export duties and transportation costs outside Russia. Figure 17 shows conceptually the comparison that we make. In making these comparisons, we have focused on the prices that the plants have paid to Gazprom[56] and on those plants with the highest gas consumption which consumed gas through 2019.

56 In Section IV, we have demonstrated that the prices paid to IGS are sufficient to cover their costs and enable them to earn a reasonable return. Consequently, we focus on a comparison to the Gazprom prices since these are regulated and could, in theory, contain subsidies.

Figure 17: Netback comparison

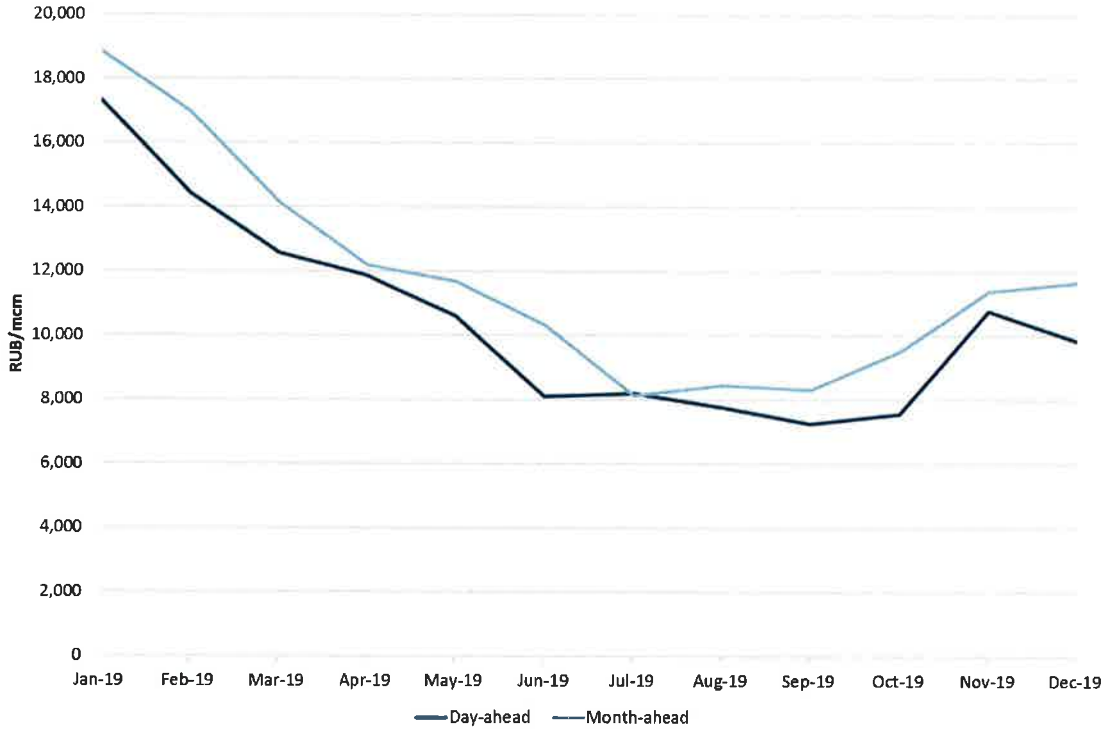
Source of Map: 2020 ©Google.

V.A. An appropriate European price

78. We rely on German hub prices because the German market is the nearest liquid competitive market to Russia but, as we have already discussed, all hub prices in north-west Europe are closely correlated so the results would not differ materially if we had chosen another hub price. We focus on hub prices rather than prices for industrial consumers because the publicly available data, for example from Eurostat, generally relates to much smaller consumers. Fertilizer plants, and other large consumers, often buy their own gas at hub prices or, at any rate, are only prepared to pay hub prices to a supplier.

79. We have carried out our analysis using two alternative views of what a fertilizer plant in Germany would have been paying month-ahead and day-ahead prices. We understand that Russian companies, like EuroChem, do not generally purchase gas very far in advance and so these seem the most appropriate comparators. It is also the case that many European industrial consumers also purchase gas via contracts under which they pay month-ahead or day-ahead prices, even if the contracts themselves have been signed further in advance. Figure 18 shows the prices on which we rely.

Figure 18: NCG hub prices[57]



V.B. Cost of transport and export duty

80. Russian gas arrives in Germany via three main pipeline routes; (1) Ukraine, Slovakia and Czechia, (2) Nordstream and (3) Belarus and Poland. European gas transmission tariffs are regulated and applicable upon entry and exit of a market zone[58] and the Agency for Cooperation of Energy Regulators (ACER) publishes the effective transport costs for all the cross-border points in the European Union. Nordstream is not subject to European regulation and its operator does not publish tariffs but ACER provides an estimate of its unit costs. Figure 19 shows the figures on which we have relied.

81. For the Yamal route through Belarus and Poland, Gazprom has had long-term transit agreements in place with its subsidiary OAO Gazprom Transgaz Belarus and Polish Europol. We estimate the applicable unit tariff from 2019 data on the total payment Gazprom made to OAO Gazprom Transgaz Belarus for transit services, $345 million,[59] and the total transit volume, 40.5 bcm. These figures result in a tariff estimate of 551 RUB/mcm on the 575 km Belarus segment of the Yamal pipeline.[60] A similar approach yields a transit tariff of 398 RUB/mcm for the Polish segment. We obtain the remaining tariff information from the map shown in Figure 19.

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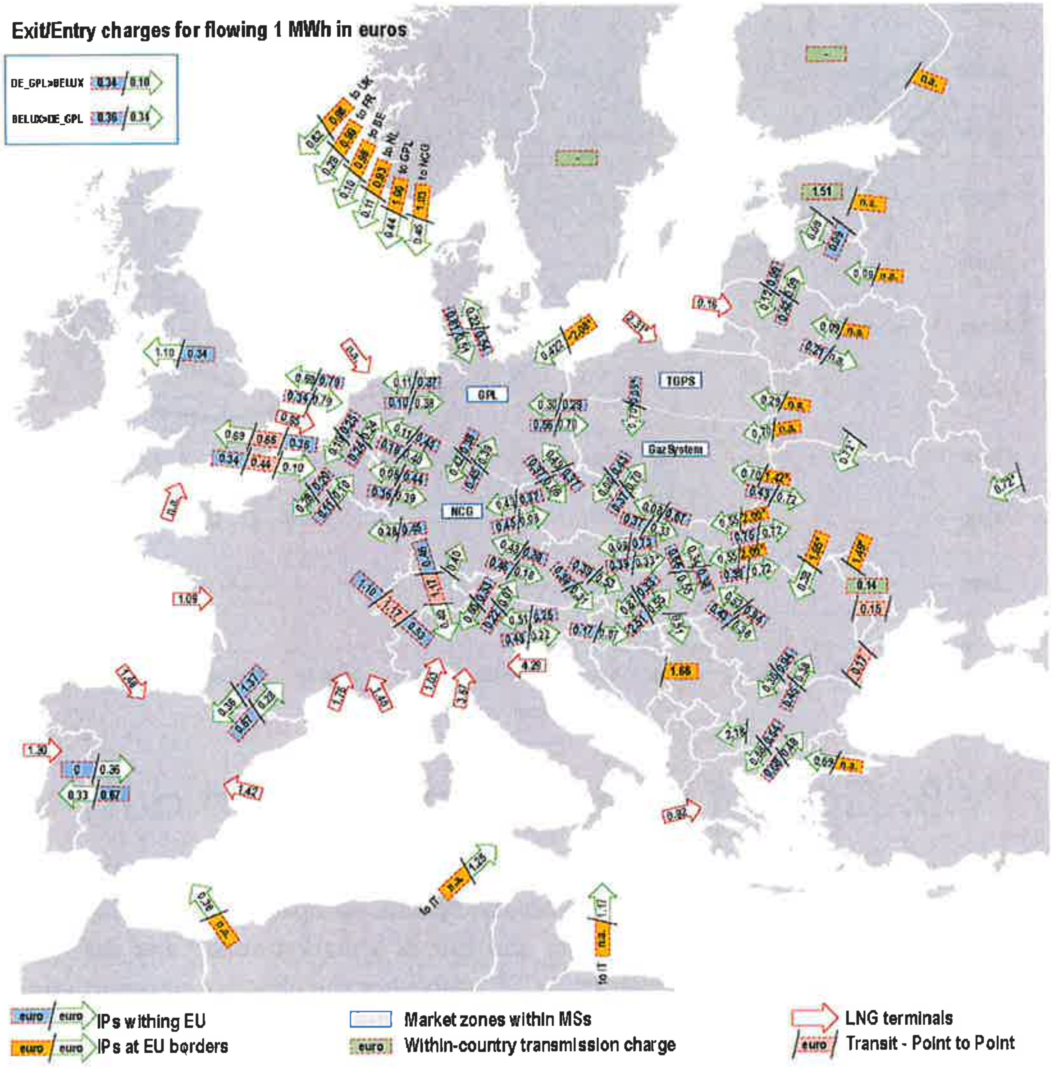
57 The data underlying this figure are provided in Appendix E.

58 Most market zones are congruent with national borders. However, Germany has two separate market zones, NetConnect (NCG) and Gaspool.

59 Gazprom, 'Report on PJSC Gazprom related party transactions made in 2019', p. 58.

60 Gazprom in Figures 2015-2019.

Figure 19: ACER Effective Transport Tariffs 2019 – Excerpt from Monitoring Report[61]



82. We also take into account the fact that Russia imposes a 30% export tax (customs duty) on all gas exported from Russia. This tax is applied to the price of gas once it has been transported to the relevant border. By deducting transportation costs to the Russian border and the export tax, we arrive at a price for the Russian side of its border. The average netback cost for 2019 ranges from 5,317 (4,347) RUB/mcm on the Ukraine route to 7,672 (6,701) RUB/mcm on the Yamal route based on forward price (day-ahead) basis.

V.C. Russian transport costs

83. One last step remains to make the netback price comparable to the prices paid by EuroChem. We need to account for the difference between the transport costs within Russia for exports via Nordstream, Poland and Ukraine and the transport costs for deliveries to EuroChem's plants.

61 Agency for the Cooperation of Energy Regulators, 'ACER Monitoring Report 2018 – Gas Wholesale Market Volume', October 2019, p. 55. Note that the report for 2018 contains prices for 2019.

84. To do this we need to know the transportation distances to the export border points, which we find to be: 3,070 km for Bovanenkovo – Nordstream, 2,900 km for the Russian segment of the Yamal pipeline, 3,283 km from the Urengoy fields to the Sudzha border point with Ukraine and 1,352 km from the Ashtrakan field to Ukraine.[62] We offset these distances by the plant delivery distances starting from the production field we identify as being most suitable for a particular export route taking into account the location of each plant. For example, for the EuroChem's Phosphorit plant we assumed that gas would be delivered from Bovanenkovo. However, when we make the netback comparison for the Ukrainian export route, we consider the distance associated with delivery to the Phosphorit plant from Urengoy, since Urengoy is closer to Ukraine than Bovanenkovo. But when we make a netback comparison for the BMU and Nevinka plants, we assume that exports via Ukraine would be based on supplies from the Astrakhan field since it would make no sense to supply these plants from Urengoy.

85. We then calculate the additional transport costs for the exports as the difference between the export distances and the distances to each plant multiplied by our estimate of Gazprom's transport unit cost, 67.4 RUB/mcm/100km.[63] The resulting transportation cost differentials are summarized in Table 11. For EuroChem's BMU and Nevinka plants, we only consider the Ukrainian route as a suitable benchmark because these plants are located very close to the eastern Ukrainian border.

Table 11: Transport cost differentials

		Nordstream route	Ukranian route	Yamal route
EuroChem's plants				
Phosphorit	[1]	0	351	-113
BMU	[2]	n.a.	254	n.a.
North-West	[3]	0	351	-113
Nevinka	[4]	n.a.	376	n.a.
NAK	[5]	223	574	109

Notes and sources:
All values are in RUB/mcm

V.D. Netback comparison

86. The final step in the netback comparison is to take the (simple) average of our netback prices for each plant and compare them to the prices that EuroChem actually paid in 2019. Figure 20 presents the results for the netback price based on month-ahead NCG

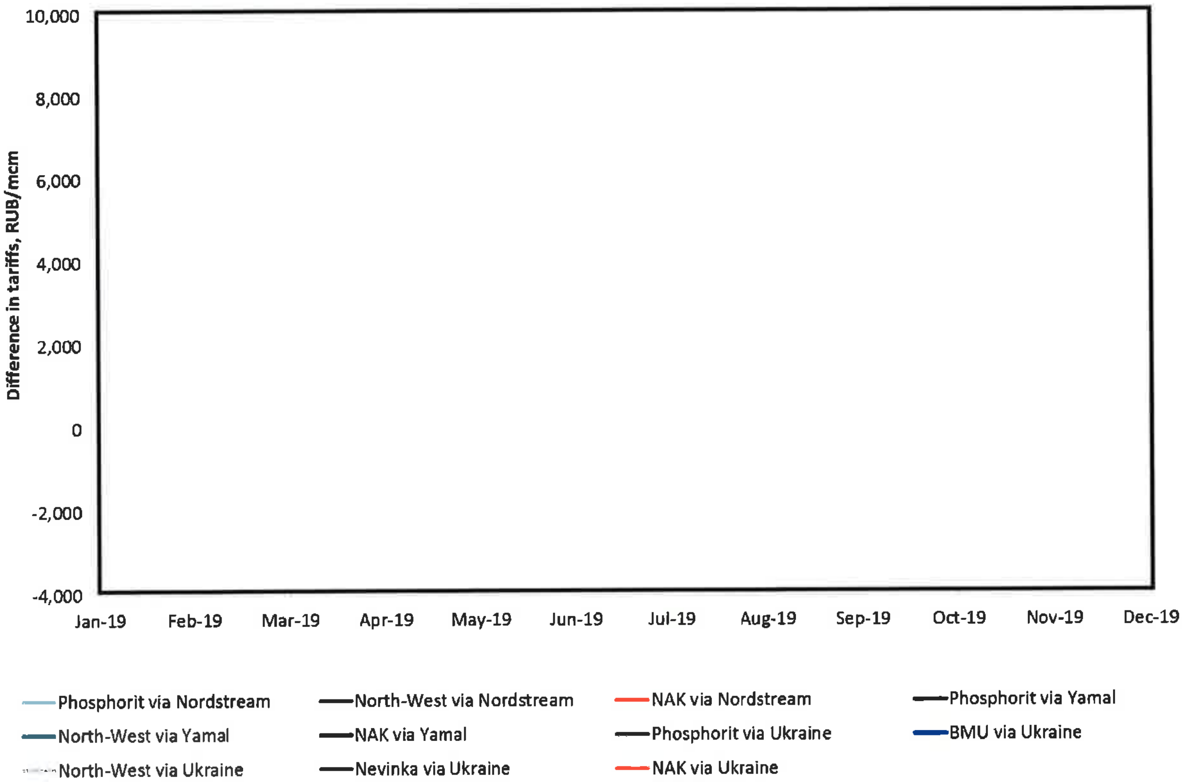
62 We compute these distances based on Gazprom figures presented on various project websites; for instance, see Gazprom Website, "Bovanenkovo-Ukhta and Bovanenkovo-Ukhta 2" (Accessed 16/10/2020).

63 See Section IV.B.2.

prices for calendar year 2019. On average across the course of the year,[64] EuroChem's prices were between [ ]% lower than the comparable prices for a European fertilizer company. Comparing EuroChem's prices to a European fertilizer company purchasing gas at day-ahead prices, we find that on average, they were between [ ] higher than the netback price, see Figure 21.

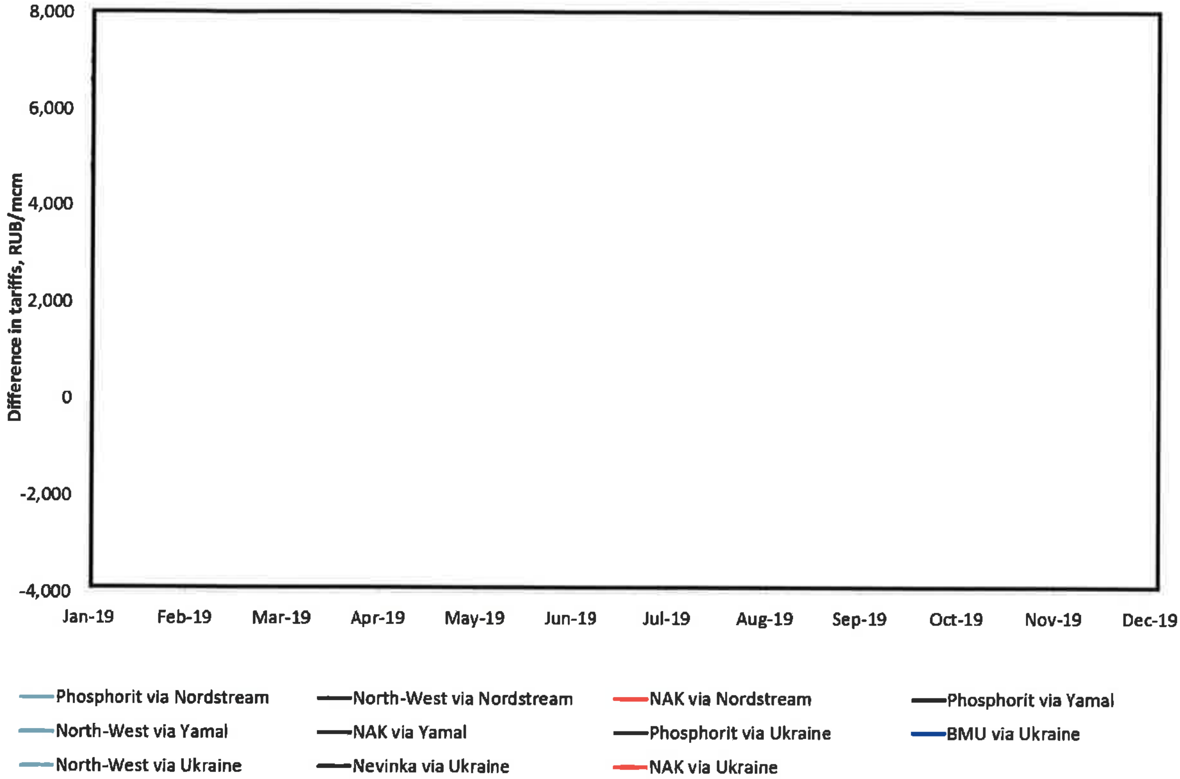
87. European prices were higher than Russian prices for the first half of the year, they were then generally lower than Russian prices for the months July 2019 to October 2019 before being higher again for the last two months of the year. However, assuming that the prices EuroChem has paid in 2020 are similar to those that they paid in 2019, we find that European prices have been lower than the prices paid by the phosphate plants since February 2020.

Figure 20: Netback based on month-ahead prices



64 We compare the average netback price for 2019 to the average tariff each plant paid in 2019.

Figure 21: Netback based on day-ahead prices



Appendix A. The Brattle Group

The Brattle Group consists of over fifty principals and a supporting staff of approximately three hundred professionals. The Brattle Group also works on an exclusive basis with leading academics at MIT, Stanford, UC Berkeley and the London Business School. We have offices in London, Brussels, Massachusetts, California, and Washington DC.

The Brattle Group is recognized for its rigorous intellectual standards. The consulting staff of the London office consists almost exclusively of graduates from Harvard, Oxford, Cambridge, Imperial College and The London School of Economics. We are repeatedly called upon to provide testimony as expert witnesses in major commercial litigations, and to write reports on important regulatory issues in the energy sector. We have extensive experience preparing reports on high profile matters that are subject to rigorous public scrutiny. Principals of The Brattle Group also publish frequently in academic journals and have written major textbooks. Stewart Myers, a principal of The Brattle Group, and Richard Brealey, a Senior Advisor, co-authored Principles of Corporate Finance, the world's best-selling textbook in corporate finance. Another of our principals is Dan McFadden, who recently received the Nobel Prize in Economics, and who also teaches at the University of California at Berkeley.

As regards our well-recognised gas market expertise, we provide services in the following areas:

(1) Signing and Renegotiating Natural Gas Contracts

We advise clients on the optimal strategies for signing and renegotiating natural gas contracts. We provide commercial advice based on industry knowledge, as well as rigorous economic analysis based on objective data. In some engagements, we perform detailed analyses of market demand, transportation tariffs and the prices of competing fuels to inform decisions and renegotiation strategies.

(2) Market Analysis and Forecasting

We analyse the supply and demand for pipeline gas and LNG, monitoring market developments closely. We advise companies on likely market trends, as well as possible changes in prices in Europe and the United States.

(3) Analysing Natural Gas Flexibility

Underground storage, LNG tanks, line-pack, and gas contracts provide alternative ways of meeting fluctuating customer demand. We have developed sophisticated models to estimate the costs of alternative flexibility options, to optimise such costs, and to measure the value of flexibility offered in gas supply contracts. We have also advised clients on the value of storage services and economics.

(4) Regulatory Economics

Many companies face major strategic questions stemming from regulatory uncertainties. We advise gas companies that seek to play an active role in the regulatory process, helping them to develop and assess specific proposals or to critique existing regulations. For other companies, we analyse how potential regulatory developments should affect their commercial strategy. We offer particular insight because of our work advising government agencies directly on regulatory issues.

(5) Valuing Businesses and Infrastructure Investments

We have valued entire gas transportation and distribution companies on behalf of potential investors, as well as infrastructure investments such as potential new pipelines connecting different market areas.

(6) Analyses of Competition

Competition officials often investigate claims of anti-competitive behaviour, or proposed mergers and acquisitions in the natural gas industry. We have analysed proposed mergers on behalf of private clients, providing reports to competition authorities in several different countries. We have also analysed the economic bases for claims that particular contractual clauses or behaviours are anti-competitive.

Appendix B. Prices paid by EuroChem

88. Table 12 below shows the prices that EuroChem's plants paid to Gazprom and IGS.

Table 12: EuroChem plant prices

Plant	Phosphorit	BMU	North-West	NAK			EC-Energo						Nevinka		UKK	
Supplier	Gazprom	Gazprom	Gazprom	Gazprom	IGS		Gazprom	IGS					Gazprom	IGS	Gazprom	IGS
					Rosneft	Novatek		Rosneft	Novatek	TKI	Gaz-oil	Yangpur		Exchange		Novatek
Jan-19																
Feb-19																
Mar-19																
Apr-19																
May-19																
Jun-19																
Jul-19																
Aug-19																
Sep-19																
Oct-19																
Nov-19																
Dec-19																
Gas consumption																

Notes and sources:
All values are RUB/mcm, except gas consumption which are mcm.

Appendix C. MET Sensitivity

89. To illustrate the sensitivity of Gazprom's production costs to the mineral extraction tax (MET), we repeat the analysis in section IV.A.1.b with Gazprom but instead taking Novatek's MET rate, see Table 13.

Table 13: Gazprom's gas production operating costs with Novatek's MET

				2018	2019
Segment Revenues	RUB mln	[1]	See Note	1,017,044	973,657
Segment Result	RUB mln	[2]	See Note	3,106	4,984
Segment Expenses	RUB mln	[3]	[1]-[2]	1,013,938	968,673
Depreciation	RUB mln	[4]	See Note	180,753	172,233
Operating Costs	RUB mln	[5]	[3]-[4]	833,185	796,440
Gas Production	bcm	[6]	See Note	499	501
Operating Costs	RUB/mcm	[7]	[5]/[6]	1,671	1,589
Gazprom MET	RUB/mcm	[8]	See Note	1,128	1,100
Novatek MET	RUB/mcm	[9]	Table 1	794	776
Operating Costs with Novatek MET	RUB/mcm	[10]	[7]-[8]+[9]	1,337	1,264

Notes and sources:

[1], [2], [4]: Gazprom Financial Report 2019, pp. 108-109.

[6]: Gazprom in Figures 2015-2019, p. 26.

[8]: Yermakov, V., "Russian Gas: the year of living dangerously", The Oxford Institute for Energy Studies, September 2020, p. 13.

90. We then adjust Gazprom's prime cost of gas production (row [4] in Table 4) by its new MET rate to derive its maximum production cost. We then add our estimate of Gazprom's return *of* and on assets (row [21] in Table 3) to Gazprom's operating costs to estimate its all-in production costs with the alternative MET rate. We then add the plant-specific transportation costs (row [3] in Table 6) to derive the alternative delivered costs for Gazprom. Finally, we compare these delivered costs with the prices which EuroChem paid to Gazprom in 2019, see Table 14.

Table 14: Comparison of Gazprom prices to costs with Novatek's MET

			EuroChem					
			BMU	Phosphorit	North-West	Nevinka	NAK	UKK
Industrial price	[1]	See Note						
Minimum delivered cost	[2]	See Note	2,711	4,124	4,124	2,590	3,902	3,551
Overall maximum margin	[3]	[1]-[2]						
Overall maximum margin	[4]	[3]/[2]						
Maximum delivered cost	[5]	See Note	2,910	4,323	4,323	2,789	4,100	3,750
Overall minimum margin	[6]	[1]-[5]						
Overall minimum margin	[7]	[6]/[5]						

Notes and sources:
All values in RUB/mcm for 2019.
[1]: Data provided by EuroChem.
[2], [5]: Based on Table 13, Table 3, Table 4, and and Table 6.

91. The results presented in Table 14 support our claim that Gazprom's costs and, in turn, their margins relative to prices paid are sensitive to the rate of MET. For example, EuroChem's Phosphorit plant would pay [ ] more than Gazprom's minimum delivered costs with Novatek's rate of MET applied. This is significantly greater than the [ ] margin reported for EuroChem's Phosphorit plant in Table 8.

Appendix D. Our WACC calculations

92. To calculate the Weighted Average Cost of Capital ("WACC") we use the cost of debt, R_D, the cost of equity, R_E, the corporate tax rate, τ, the percentage of the value of the company corresponding to debt, $\%D$, and equity, $\%E$, using the following formula:

$$WACC = R_D \times (1 - \tau) \times \%D + R_E \times \%E$$

93. We base the calculation for Gazprom's WACC on three Russian oil/gas production companies: Novatek, Tatneft and Slavneft-Megionneftegaz. We base the calculation for Novatek's WACC on three Russian oil/gas production companies: Gazprom, Tatneft, and Slavneft.[65]

94. We calculate the cost of equity using the Capital Asset Pricing Model ("CAPM"), which requires the use of the long-term risk-free rate, r_f, the market risk premium, MRP, and the equity beta value, β:

$$R_E = r_f + \beta \times MRP$$

95. First we calculate the two-year daily equity betas at the end of 2019. The equity betas range from 0.91 for Slavneft-Megionneftegaz to 1.50 for Tatneft. We then convert to asset betas using the following formula:

$$\beta_{asset} = \frac{\beta_{equity}}{[1 + (1 - \tau) \times \left(\frac{Debt}{Equity}\right)]}$$

96. The asset betas range from 0.52 to 1.40 with an average of 1.01 for Gazprom and 0.93 for Novatek. The average asset beta is then converted to an equity beta using the average ratio of debt to equity. We take the US 20-year government bond yield as the risk free rate, which was 2.30% on average in 2019. For market risk premium we use 5.5%.[66] Our calculations produce a cost of equity of 8.82% for Gazprom and 9.09% for Novatek.

97. We calculate the cost of debt as the sum of:

    a. The risk free rate of 2.30%.

    b. The spread for 30-year US industrial bonds relative to 30-year US treasury bonds. We use the average of 2019 spreads for "BBB" and "BBB-" rated bonds,[67] which equals 1.90% for Gazprom and 2.12% for Novatek.

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[65] We calculate the WACC for Gazprom and Novatek based on a peer group of similar companies. Gazprom's WACC is based on Novatek, Tatneft, and Slavneft- Megionneftegaz. Novatek's WACC is based on Gazprom, Tatneft, and Slavneft- Megionneftegaz.

[66] The Brattle Group, "Report to the European Commission: Review of approaches to estimate a reasonable rate of return for investments in telecoms networks in regulatory proceedings and options for EU harmonization", 2016, pp. 9-10.

[67] The bond rating for Novatek is "BBB" and for Tatneft is "BBB-".

c. The sovereign spread. This is the country risk premium associated with operations in Russia. Moody rates the Russian sovereign bond as Baa3 and the default spread for this rating class is 2.58%.

d. A non-interest fee of 0.15%.

98. Our calculations arrive at a cost of debt of 6.93% for Gazprom and 7.15% for Novatek.

99. Using the corporate tax rate of 20%, our calculations produce an after-tax WACC of 8.17% for Gazprom, as shown in Table 15, and 8.03% for Novatek, as shown in Table 16.

Table 15: WACC for Russian production business – Gazprom

Risk Free Rate	[1]	See Note	2.30%			
Market Risk Premium	[2]	See Note	5.50%			
Russian Corporate Tax Rate	[3]	See Note	20.00%			
Country Risk Premium - Russia						
Moody's Rating for Russia	[4]	See Note	Baa3			
Default Spreads for Sovereign Bonds	[5]	See Note	2.58%			
			Novatek NVTK RM Equity [A]	Tatneft TATN RM Equity [B]	Slavneft-Megionnefte Gaz MFGS RM Equity [C]	Average [D]
Cost of Equity						
Equity beta	[6]	See Note	1.15	1.50	0.91	1.19
Asset beta	[7]	See Note	1.12	1.40	0.52	1.01
Cost of Equity	[8]	[1]+[2]x[6]	8.62%	10.52%	7.33%	8.82%
Percent of Common Equity	[9]	See Note	97.21%	92.17%	50.75%	80%
Percent of Preferred Equity	[10]	See Note	0.00%	0.09%	0.00%	0.03%
Percent Equity	[11]	[9]+[10]	97.21%	92.27%	50.75%	80.08%
Cost of Debt						
Bond Rating	[12]	See Note	BBB	BBB-	No rating	
Spread over Risk Free Rate	[13]	See Note	1.67%	2.12%	1.90%	1.90%
Non-Interest Fee	[14]	Assumed	0.15%	0.15%	0.15%	0.15%
Debt Country Risk Premium	[15]	[5]	2.58%	2.58%	0.0258	2.58%
Cost of Debt	[16]	See Note	6.70%	7.15%	6.93%	6.93%
Percent Debt	[17]	See Note	2.79%	7.73%	49.25%	19.92%
After-tax WACC	[18]	See Note	**8.53%**	**10.15%**	**6.45%**	**8.17%**

Notes and Sources:

[1]: Average US Treasury 20-year bond yield for 2019.

[2]: The Brattle Group (2016) Report to the European Commission: Review of approaches to estimate a reasonable rate of return for investments in telecoms networks.

[3]: KPMG Corporate tax rates table (Accessed: 16/09/2020: https://home.kpmg.com/xx/en/home/services/tax/tax-tools-and-resources/tax-rates-online/corporate-tax-rates-table.html).

[4]: New York University Country Default Spreads and Risk Premiums Database.

[5]: New York University Country Default Spreads and Risk Premiums Database.

[A]-[C]:

[6]: Five-year weekly returns equity beta against FTSE all-world, final day is last trading day of 2019.

[7]: [6]/(1+(1-[3])x(1-[11])/[11])

[9], [10], [17]: Average capital structures 2017-2019 (year-end), see Table A2.

[12]: 2019 credit ratings averaged from S&P, Moodys, and Fitch.

[13]: Spread of yields of similarly rated US Industrial bond indices (20-year maturity) over the average 20-year Treasury yield in 2019. If not available, take average of remaining.

[16]: [1]+[13]+[14]+[15]

[18]: [8]x[11]+(1-[3])x[16]x[17]

[D]: Average of [A]-[C].

Table 16: WACC for Russian production business - Novatek

Risk Free Rate	[1]	See Note	2.30%			
Market Risk Premium	[2]	See Note	5.50%			
Russian Corporate Tax Rate	[3]	See Note	20.00%			
Country Risk Premium - Russia						
Moody's Rating for Russia	[4]	See Note	Baa3			
Default Spreads for Sovereign Bonds	[5]	See Note	2.58%			

			Gazprom GAZP RM Equity [A]	Tatneft TATN RM Equity [B]	Slavneft-Megionnefte Gaz MFGS RM Equity [C]	Average [D]
Cost of Equity						
Equity beta	[6]	See Note	1.29	1.50	0.91	1.23
Asset beta	[7]	See Note	0.88	1.40	0.52	0.93
Cost of Equity	[8]	[1]+[2]x[6]	9.41%	10.52%	7.33%	9.09%
Percent of Common Equity	[9]	See Note	62.63%	92.17%	50.76%	68.52%
Percent of Preferred Equity	[10]	See Note	0.00%	0.09%	0.00%	0%
Percent Equity	[11]	[9]+[10]	62.63%	92.27%	50.76%	68.55%
Cost of Debt						
Bond Rating	[12]	See Note	BBB-	BBB-	No rating	
Spread over Risk Free Rate	[13]	See Note	2.12%	2.12%	2.12%	2.12%
Non-Interest Fee	[14]	Assumed	0.15%	0.15%	0.15%	0.15%
Debt Country Risk Premium	[15]	[5]	2.58%	2.58%	0.0258	2.58%
Cost of Debt	[16]	See Note	7.15%	7.15%	7.15%	7.15%
Percent Debt	[17]	See Note	37.37%	7.73%	49.24%	31.45%
After-tax WACC	[18]	See Note	**8.03%**	**10.15%**	**6.54%**	**8.03%**

Notes and Sources:

[1]: Average US Treasury 20-year bond yield for 2019.

[2]: The Brattle Group (2016) Report to the European Commission: estimate for a reasonable rate of return for investments in telecoms networks.

[3]: KPMG Corporate tax rates table (Accessed: 16/09/2020: https://home.kpmg.com/xx/en/home/services/tax/tax-tools-and-resources/tax-rates-online/corporate-tax-rates-table.html).

[4]: New York University Country Default Spreads and Risk Premiums Database.

[5]: New York University Country Default Spreads and Risk Premiums Database.

[A]-[C]:

[6]: Five-year weekly returns equity beta against FTSE all-world, final day is last trading day of 2019.

[7]: [6]/(1+(1-[3])x(1-[11])/[11])

[9], [10], [17]: Average capital structures 2017-2019 (year-end), based on Bloomberg data.

[12]: 2019 credit ratings averaged from S&P, Moodys, and Fitch.

[13]: Spread of yields of similarly rated US Industrial bond indices (20-year maturity) over the average 20-year Treasury yield in 2019.

[16]: [1]+[13]+[14]+[15]

[18]: [8]x[11]+(1-[3])x[16]x[17]

[D]: Average of [A]-[C].

Appendix E. European Hub Prices

100. Figure 22 shows the NCG day-ahead and month-ahead prices which we use for the net-back analysis in section V. To convert NCG prices from €/MWh to RUB/mcm, we use exchange rate (column [A]) and gross calorific value of natural gas (row [3]) multipliers.

Figure 22: NCG Prices

Russian calorific value	kcal/m^3	[1]	See Note	8,850
Conversion factor	kWh/kcal	[2]	See Note	0.0012
Gross calorific value	kWh/m^3	[3]	[1]x[2]	10.29

	Exchange rate RUB/€ [A] Eurostat	Day-ahead price €/MWh [B] ICIS	Day-ahead price RUB/mcm [C] [B]x[A]x[3]	Month-ahead price €/MWh [D] ICIS	Month-ahead price RUB/mcm [E] [D]x[A]x[3]
Jan-19	76.31	22.06	17,326	23.99	18,845
Feb-19	74.72	18.76	14,431	22.07	16,972
Mar-19	73.63	16.57	12,556	18.65	14,130
Apr-19	72.66	15.86	11,858	16.30	12,190
May-19	72.62	14.17	10,594	15.62	11,678
Jun-19	72.40	10.87	8,098	13.86	10,326
Jul-19	70.91	11.23	8,197	11.12	8,113
Aug-19	73.22	10.33	7,782	11.22	8,453
Sep-19	71.41	9.87	7,258	11.31	8,311
Oct-19	71.09	10.33	7,561	12.99	9,503
Nov-19	70.58	14.82	10,768	15.66	11,377
Dec-19	69.99	13.69	9,862	16.19	11,665
Jan-20	68.77	11.67	8,257	14.63	10,358
Feb-20	69.91	9.86	7,091	11.61	8,355
Mar-20	82.43	9.12	7,740	9.62	8,162
Apr-20	81.75	7.11	5,979	8.72	7,334
May-20	79.23	5.20	4,237	7.01	5,721
Jun-20	78.01	4.95	3,978	5.19	4,167
Jul-20	82.02	5.07	4,280	5.37	4,535
Aug-20	87.35	6.56	5,895	5.37	4,829
Annual average 2019	72.46	14.03	10,461	15.72	11,723

Notes and sources:
[1]: For comparability we use the Russian Gross Calorific Value provided by Gazprom, see: Gazprom in Figures 2015-2019, p. 101.
[2]: IEA's unit converter.

Appendix F. Exhibit List

- Agency for the Cooperation of Energy Regulators, 'ACER Monitoring Report 2018 – Gas Wholesale Market Volume', October 2019.
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- Gazprom in Figures 2015-2019.
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