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# Russia-China energy relations since 24 February: Consequences and options for Europe

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## Executive summary

This report examines the development of key dimensions of Russia-China energy relations since 24 February 2022, and explores potential future trajectories and their implications for Europe. Following Russia's invasion of Ukraine, the Russia-China energy relationship is at a critical juncture. Its future trajectory is fundamental to the success or failure of Europe's attempts to undermine the Russian economy through energy sanctions, as well as to the wider Europe-Russia-China trilateral balance.

The report's findings reveal that China has initially adopted a cautious approach, only moderately increasing its oil and gas trade with Russia. China has refrained from signing new long-term supply contracts and has not invested in the Russian upstream sector since the beginning of the war, even as Western companies have withdrawn. In terms of sanctions compliance, China has continued to buy Russian oil above the Western price cap, but only through third parties or domestic independent companies. It has not used its main state-owned tanker fleet since the price cap implementation date. Nor has it provided alternative shipping insurance. This cautious stance is probably the result of three factors: the threat of Western sanctions, China's energy diversification strategy and its ability to adopt a wait-and-see approach.

China is consequently balancing between supporting its most important strategic partner in its challenge of the Western-led world order and looking after its own more self-centred interests, which include maintaining economic ties with its Western trade partners. This balancing act might be unsustainable, however, which foreshadows difficult future policy choices for Europe.

China's wider relationship with the West is probably the most important factor shaping future Russia-China energy relations. If current relations can be maintained, China might continue its balancing act. If relations deteriorate, a stronger Russia-China axis is likely to form through increased energy trade and cooperation, further undermining sanctions on Russian energy.

If Europe is to successfully implement its Russia policy, it should encourage China to maintain its initially cautious stance. This might be achieved by a combination of incentives and deterrents, aimed at preserving economic ties and collaboration while at the same time upholding a credible threat of secondary sanctions.

As deterrents, Europe could prepare for a potential deterioration in relations by securing critical supply chains, and by preparing potential secondary sanctions, for example, aimed at entities evading the oil price cap. In terms of incentives, Europe could continue to structure its Russia sanctions in a way that rewards China's compliance while also seeking opportunities for collaboration, for example on low-carbon energy technology.

In addition, Europe must establish its red lines regarding unacceptable levels of sanctions evasion and Russia-China energy collaboration, while also determining proportional responses with regard to the acceptable costs and risks associated with escalation with China.

Finally, Europe must also address its own domestic energy concerns and long-term position vis-à-vis China in terms of energy security, affordability and competitiveness.

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## Introduction

Russia's abundant oil and gas resources and China's expanding energy needs make them natural partners in the energy sector. Geographical proximity and shared interests in many areas underpin the potential for collaboration still further. The energy relationship is often praised in official rhetoric but has not been without complications in practice. Russia's invasion of Ukraine and the West's collective response have put the energy relationship to its most important test yet. On the one hand, China might be inclined to deepen cooperation, providing an economic lifeline to its strategic partner while securing cheap supplies for itself. On the other hand, Beijing might prefer a more cautious approach, balancing between its more self-centred interests and Russia's position as a useful long-term partner. Factors such as international reputation, potential Western sanctions and China's long-term risk diversification strategy could all restrain engagement.

This report illuminates these and other related issues by mapping the development of Russia-China energy relations since 24 February 2022 in four key dimensions, and explores possible future trajectories and their implications for Europe, particularly in terms of relations with Russia and China. The report addresses the following three questions:

- How have Russia-China energy relations developed since 24 February 2022, with respect to trade flows, upstream investments, midstream deals and sanctions compliance?
- What are the potential future pathways for Russia-China energy relations?
- What are the potential implications and policy options for Europe with regard to evolving Russia-China energy relations, in particular in its efforts to weaken the Russian economy?

To answer the first question, the report compiles data on oil and gas trade flows, upstream oil and gas investments, long-term sales and pipeline agreements, and shipping operations. The results of this investigation are presented in chapter 4. To answer the second question, quantitative projections of possible future Chinese import needs are derived, and likely future Russian shares are discussed with regard to key factors shaping future relations, including scenarios for the development of China's wider relations with the West. The result of this analysis is presented in chapter 5. Based on these analyses of past and potential future Russia-China energy relations, the report attempts to answer the third and final question by identifying key implications for Europe and making policy suggestions. This discussion is presented in chapter 6. In addition, chapters 2 and 3 provide background on Russia-China energy relations and an overview of recent events. Chapter 6 summarises the answers to all three questions and provides the report's main conclusions.

## Background: Russia-China energy relations

### Russia's energy strategy

Russia's energy strategy aims to leverage the use of its vast energy resources for both domestic and foreign policy objectives.<sup>1</sup> Energy plays a key part in both its economic and security strategies. Russia is the world's second most resource-rich country in terms of combined oil and gas recoverable resources.<sup>2</sup> In 2021, revenues from oil and gas accounted for 25 percent of Russian gross domestic product (GDP), and the government's share of these revenues corresponds to around 50 percent of the federal budget. In terms of trade,

oil and gas account for 65 percent of the country's exports. This immense resource rent – the surplus after production costs and normal returns – is fundamental to the Russian economy and, in turn, to its ability to maintain regime support as well as military power.

Energy is also used more directly as a tool for political influence.<sup>3</sup> While oil exports have historically provided the main bulk of resource rents, gas exports have provided outsized political influence. The rigidity of pipeline infrastructure and controllability of flows make gas deals and prices an effective political tool in relations with other countries, both as carrot and stick. Over time, Russian gas politics has built up significant import dependencies in several European countries, which were utilized and exploited in preparation for and during the 2022 invasion of Ukraine. However, these dependencies defuse as Europe turns its back on Russian gas, and the inflexibility of its pipeline infrastructure becomes a vulnerability when Russia loses its biggest market. The key energy concern for Russia is to maintain its status as an “energy superpower”, which most importantly involves maintaining its oil and gas resource rents and maintaining the infrastructural dependencies of other countries.<sup>4</sup>

Historically, the main obstacles to this pursuit have been resource depletion and access to production technology and capital, as well as volatile international markets. Following the break-up of the Soviet Union, all four factors contributed to a long decline in production. It was not until the early 2000s that Russian oil production began to increase again, and not until 2016 that output was back to its 1986 high.<sup>5</sup> Rising global prices during this period meant that government income from oil and gas grew dramatically, supporting the new Russian economy and providing a base for President Vladimir Putin's consolidation of power.<sup>6</sup> Before the invasion, the long-term outlook for oil and gas production was one of continued growth, despite the impact of earlier Western sanctions on oil and gas production technology, which were imposed following the 2014 annexation of Crimea.<sup>7</sup>

Before 24 February, the main obstacle to Russia's long-term energy strategy, besides resource depletion, was climate change and the global energy transition, a development that will ultimately result in lower fossil energy demand and prices. Remarkably, it was not until recently that Russia officially acknowledged this essential threat.<sup>8</sup> In the medium term, the main threat to Russia's dominant gas export position in Europe was from liquefied natural gas (LNG), specifically from cheap and abundant US shale gas. Following the full-scale invasion of Ukraine and the collective response of the West, the threats to Russia's position as one of the world's top energy superpowers have increased significantly,<sup>9</sup> as is explored further below.

### **China's energy strategy**

China's population of almost 1.5 billion and a rapidly growing economy make it the top energy consumer in the world. Its economy is still relatively energy-intensive. Access to reliable and affordable energy to support its economic prosperity is therefore the fundamental goal of China's energy policy.

Historically, this quest has been pursued through self-sufficiency, relying mainly on domestic coal but also on oil.<sup>10</sup> China developed its own domestic oil resources in the 1970s following its negative experience of import dependence, involving blockades from both Western powers and the Soviet Union. However, by 1993 domestic oil production could no longer keep pace with the accelerating Chinese economy, and China once again became dependent on energy imports. No longer able to rely on self-sufficiency, China began to pursue security

through diversification – importing oil from several sources, investing in resources abroad and building up a significant oil tanker fleet of its own.

With coal causing both local air quality problems as well as global climate change, recent Chinese energy policy has moved on to restraining coal and ultimately reducing it in line with new climate targets to reach peak emissions before 2030 and achieve net zero by 2060.<sup>11</sup> To support and secure this shift, China aims to be the leader in resources and technologies for low-carbon energy, through a massive domestic build-out of hydro, nuclear, wind and solar power and electric vehicles, as well as global exports.<sup>12</sup>

However, this shift will take time, and coal and oil will remain in China's energy supply mix in significant quantities for decades to come.<sup>13</sup> Gas also has a future role in China's plans, where it is seen as a “bridge fuel” that can improve air quality while lowering carbon emissions by replacing coal. China is also pursuing security through diversification for gas, by investing in both pipelines and LNG imports. Maintaining its preferred self-sufficiency paradigm, China is also aggressively pursuing domestic production, including of shale gas. Oil, gas and coal are all classified as strategic minerals in China, and their supply chains have long been the subject of securitization processes.<sup>14</sup>

### **A perfect match? The debate on the Sino-Russian energy relationship**

Russia's abundant energy supply and China's ever-increasing demand make energy collaboration and trade between the two neighbours seemingly a natural fit. Nonetheless, energy trade between the countries is a relatively recent phenomenon. The oil trade began to increase in earnest only after 2013, after a relatively slow start in the early 2000s, and pipeline gas imports did not begin until 2019. There is clearly unfulfilled potential if the benchmark is pre-invasion European-Russia energy trade. Several potential reasons for this restrained growth are discussed in the literature, in relation to both specifically energy-related issues and the state of wider Sino-Russian relations.

The literature on the broader Sino-Russian relationship contains a rich academic and policy discussion.<sup>15</sup> According to Christopher Weidacher Hsiung, three overarching themes characterize the current state of the debate.<sup>16</sup> First, there is a divide among scholars between what Bobo Lo describes as believers and sceptics.<sup>17</sup> Believers in the relationship emphasize positive developments in political, economic and normative convergence between China and Russia since the end of the Cold War, while sceptics highlight the underlying tensions and challenges that limit the relationship, such as a history and mutual suspicion, competing regional interests, limitations on economic exchange and different approaches to the future global order. There is also a debate on the main drivers of cooperation. Some analysts attribute the growth in China-Russia cooperation to shared threat perceptions and efforts to counterbalance US hegemony.<sup>18</sup> Others believe that growing economic and trade interdependence, particularly in the energy and resources sectors, is driving the relationship.<sup>19</sup> In addition, some scholars focus on domestic political factors, such as regime type, normative convergence and shared national identities.<sup>20</sup> Third and finally, there is a tendency to focus on the Russian side of the bilateral relationship, which risks overlooking important aspects and drivers on the Chinese side.<sup>21</sup>

These themes also emerge in the energy-focused literature, where there is an important discussion on the level of strategic considerations as opposed to mere commercial interests and competition driving and shaping energy relations.<sup>22</sup>

Another key aspect of the energy and trade literature is the balance of the relationship, including the levels of and shifts in interdependence and asymmetry between the two countries. Some commentators, many of them Russian, are concerned that Russia might become nothing more than a resource puppet state, fuelling the rise of its economic superpower neighbour.<sup>23</sup> Despite all this, energy trade is viewed as one of the last areas where Russia is still significant to China, as Russia's overall economic importance to China is seen as in a state of continual decline.

Numerous domestic issues also affect the energy relations, such as the conflicts within the Russian energy industry between state-owned and independent companies, as well as the broader tensions between state regulation and planning, and liberal markets.<sup>24</sup> These tensions can result in conflicting priorities and goals, such as with regard to domestic and foreign policy objectives, economic efficiency and industrial profitability.<sup>25</sup> Similar dynamics are present in China, although independent non-state companies play a much smaller role. Nonetheless, China has various wider energy factions, such as a significant coal industry which may have different priorities to oil and gas companies.<sup>26</sup> The "anti-corruption" purges of factions opposed to Xi Jinping in the powerful oil companies have probably also affected China's appetite for and attention on further Russian energy deals, making managers cautious to avoid providing motives for prosecution.<sup>27</sup> Corruption in general, especially on the Russian side, has been highlighted as a limiting factor on collaboration and investment.<sup>28</sup>

Since the invasion, there has been a flurry of analysis and comment on the impact on and future of China-Russia relations. Some observers believe the invasion has strained relations, making China more selective in its engagement and support.<sup>29</sup> Others see the two countries' relationship as growing closer.<sup>30</sup> Still others perceive China to be balancing between preserving the Sino-Russian partnership and maintaining its ties with the West.<sup>31</sup> A common observation is that the shifting balance of power is tilting towards Beijing.<sup>32</sup>

On the energy side, the outlook for Russia is often seen as bleak. Russia's status as an energy superpower is often seen as waning.<sup>33</sup> Energy market analyses point out that despite short-term volatility, China is likely to benefit from Russian isolation through attractive energy deals.<sup>34</sup> Thus far, however, no such major deals have materialized, suggesting a limit to Chinese engagement. Among the possible reasons for this, according to analysts, are caution about sanctions, China's pursuit of a diversification strategy and a wait-and-see approach to how Western energy sanctions unfold.<sup>35</sup>

This report contributes to the existing literature by providing a comprehensive compilation and analysis of recent data on the energy relationship.

## **A brief overview of recent events**

### **Russia's weaponization of energy**

In 2021, Russia's Gazprom reduced gas exports to Europe and limited its seasonal storage refill within the European Union, blaming pandemic-related production issues and citing domestic prioritization.<sup>36</sup> However, suspicions arose as gas prices in Europe surged in the absence of additional Russian supply.<sup>37</sup> As tensions around Ukraine escalated, these suspicions intensified.<sup>38</sup>

Nonetheless, Europe would probably have experienced a serious energy crisis even without Russian involvement. In 2021, a combination of short-term pandemic-induced factors and long-term structural aspects of the global energy system contributed to a tight market.<sup>39</sup> Overall, this provided Russia with an excellent opportunity to leverage its energy weapon. While Russia's motives are unclear, it is plausible that the supply cuts were intentional and aimed at weakening Europe ahead of the Ukraine crisis.

European gas prices soared following the full-scale invasion, linked to fears of further supply cuts or embargoes. In the following days and weeks, a number of sanctions were imposed on Russia by Western countries, but energy flows were exempt.<sup>40</sup> Russian gas exports to Europe initially increased before prices rose again when some EU countries refused to comply with Russia's new requirement to make gas payments in rubles.<sup>41</sup> Later, prices reached all-time highs as Russian gas flows through the Nord Stream 1 pipeline decreased and were eventually shut down, according to Russia due to technical issues.<sup>42</sup> About a month later, on 26 September, both the Nord Stream 1 and the unused Nord Stream 2 (NS2) pipelines were sabotaged using explosives, although one of the two pipes of NS2 was left undamaged.<sup>43</sup>

Since then Russia's pipeline gas exports to the EU have remained at a low but roughly constant level of around 20% of pre-war flows, through Ukrainian transit and the Turkstream pipeline.<sup>44</sup> Europe has managed to cope with the Russian supply shortfall by importing record amounts of LNG and reducing demand, but at a high cost, risking recession and the loss of some energy-intensive industries.<sup>45</sup> China's reduced LNG imports in 2022 due to covid lockdowns and high prices were an important factor in freeing up LNG for Europe.

### **The West's response**

In the days following the invasion, a barrage of new sanctions was unleashed on Russia by the EU, the US, the UK, Australia, Canada and Japan, among others.<sup>46</sup> The first wave of EU sanctions was aimed at the financial sector, the energy, transport and technology sectors, dual-use goods, visa policies and high-ranking Russian individuals. Initially, the energy sector was only targeted indirectly through restrictions on technology, while Russian energy export flows remained unaffected. However, on 8 March the European Commission proposed REPowerEU, a plan to make Europe independent of Russian fossil fuels well before 2030, with an initial focus on its gas dependence.<sup>47</sup> The plan sought to diversify gas supplies, mainly through use of LNG, reduce gas demand and speed up the deployment of non-fossil energy. The Commission estimated that the short-term effects of the plan would reduce EU demand for Russian gas by two-thirds by the end of the year.

On 3 June, the most drastic energy sanctions yet were implemented in the Sixth package: an import ban on Russian crude oil and refined petroleum products, with only limited exceptions. The crude ban took effect on 5 December 2022 and the ban on refined products on 5 February 2023.

The Sixth package also included a ban on EU companies insuring and financing the maritime transport of Russian oil to third countries. This move was coordinated with the UK, which together with the EU is host to the majority of the world's shipping insurance industry. The double hit of the EU's import ban and the EU-UK shipping insurance ban raised the probability of a significant reduction in Russian oil exports, since the longer routes imposed by the import ban would require more tankers meanwhile there would be fewer tankers available due to the insurance and financing ban.



For some countries, the prospect of a significant reduction in Russian exports was not seen as solely positive. Less supply to the world oil market means higher prices. Reducing Russian revenues through export volume restrictions is difficult in the short term and comes with a high cost for oil importing countries.<sup>48</sup>

Due to the already high energy prices globally, the United States and other countries recognized the risks posed to the global economy by the European policy and proposed a moderating 'price cap' as an alternative. This price cap was designed to maintain Russian oil flows to the world market while limiting Moscow's revenues by providing an exception to the finance and insurance ban on any shipment of Russian oil sold for less than a pre-set price.<sup>49</sup> The G7 countries picked up the idea in late June, and the group confirmed its intention to apply the cap on 2 September. After long discussions, the price cap level for crude oil was set at \$60/barrel on 3 December, just two days before its implementation.<sup>50</sup>

### **China in the crossfire**

On 4 February 2022, the opening day of the Winter Olympics, China's leader Xi Jinping met with Putin in Beijing. In a joint statement, the leaders spoke about their countries' collaborative international leadership in a "new era", their misgivings regarding the US-led system and their cooperation on a variety of issues, including energy and trade. The leaders stated that the friendship between the two countries has "no limits" and that there are "no 'forbidden' areas of cooperation".<sup>51</sup> The two countries also agreed on a new long-term gas deal to supply 10 Bcm/yr of pipeline gas to China from Russia's Far East for 25 years, complementing the Power of Siberia 1 deal for 38 Bcm/yr for 30 years signed in 2014.

A few weeks later, Russia launched its full-scale invasion of Ukraine. Initial Chinese reactions were ambiguous. China acknowledged that the sovereignty of all countries should be respected on the one hand, while expressing an understanding of the "special historical complexities of the Ukraine issue" and Russia's "legitimate security concerns", on the other.<sup>52</sup> China also repeated the Russian narrative blaming NATO and the US for having provoked the "operation".<sup>53</sup> In addition, Chinese officials made it clear that they did not support Western sanctions and would continue normal trade.

According to later reports citing anonymous Chinese, Russian and US officials, however, Russia was raising "increasingly frustrated requests" for greater support from Beijing. Although President Xi had reportedly tasked his closest advisers with devising ways to support Russia financially without violating Western sanctions, this was not seen as enough by the Russian side.<sup>54</sup> One Chinese official noted that the war had dragged on longer than expected, and that China had informed Moscow that an end to the conflict would make it easier for China to oppose sanctions and grow its support and ties with Russia.<sup>55</sup>

In September, Xi and Putin met for the first time since the invasion at the 2022 Shanghai Cooperation Organization Summit in Samarkand, Uzbekistan. The rhetoric was toned down compared to the February "no limits declaration", and China raised "questions and concerns" about Russia's so-called special military operation.<sup>56</sup>

In November, both Xi and Putin sent congratulatory letters to the fourth China-Russia Energy Business Forum. Xi said that China was ready to "forge a closer partnership in energy cooperation", and "Energy cooperation is an important cornerstone of practical cooperation between China and Russia".<sup>57</sup> However, no major energy deals were closed. Even during Xi's

three-day state visit to Moscow in March 2023, no new energy agreements were signed.<sup>58</sup>

Official rhetoric, reports from government representatives or even actual developments do not provide a simple, coherent or clear-cut picture of the current state of Sino-Russian energy or broader relations. The following chapter seeks to provide increased visibility on the topic by taking a more quantitative approach to recent post-invasion energy developments. Mapping the energy relationship along four key dimensions provides a basis by which the relationship can be more clearly evaluated and the rhetoric can be judged.

# Russia-China energy relations since the full-scale invasion: A quantitative look

## Key findings

This chapter maps recent developments in Russia-China energy relations along four dimensions: oil and gas trade flows, upstream investments, midstream deals and sanctions compliance. The key findings from the investigated data are summarized below.

### Trade flows

- China has only moderately increased oil imports from Russia since the invasion, despite an average discount of 11 percent.
- Chinese imports of Russian pipeline gas have been ramping up gradually according to existing plans, with no apparent changes linked to the invasion.
- Russian pipeline gas is China's cheapest source of gas, reflecting a favourable underlying contract.
- China has increased Russian LNG imports while decreasing non-Russian cargoes, due to lower demand, high prices and resale to Europe.
- The value of the energy trade has increased significantly due to higher global prices; the oil and gas trade was worth \$69 Bn in 2022, up 54% from 2021. Oil constituted \$58 Bn, LNG \$6.7 Bn and pipeline gas \$4 Bn.
- Russia has seen a dramatic shift from European to Asian customers and China is now Russia's largest customer.
- The asymmetry in Russia-China energy trade relations has increased significantly. In terms of value, China's share of Russian energy exports has doubled from 15% to 30%, while Russia's role in Chinese imports of oil and gas has only increased from 14% to 16%.

### Upstream Investments

- Chinese companies have not made any new upstream investments or undertaken any new transactions in Russia since the invasion.
- Following the departure of many Western companies, existing Chinese investments now make China the number one foreign resource holder in Russia.
- Nonetheless, Russia only ranks seventh in China's total foreign oil and gas investments, constituting 5.9% of its foreign holdings.

### Midstream deals

- No new oil or gas pipeline deals or long-term import contracts have been announced since the war.
- Russia has signalled that the important Power of Siberia 2 gas pipeline project is approaching final agreement but China has remained silent on the topic.

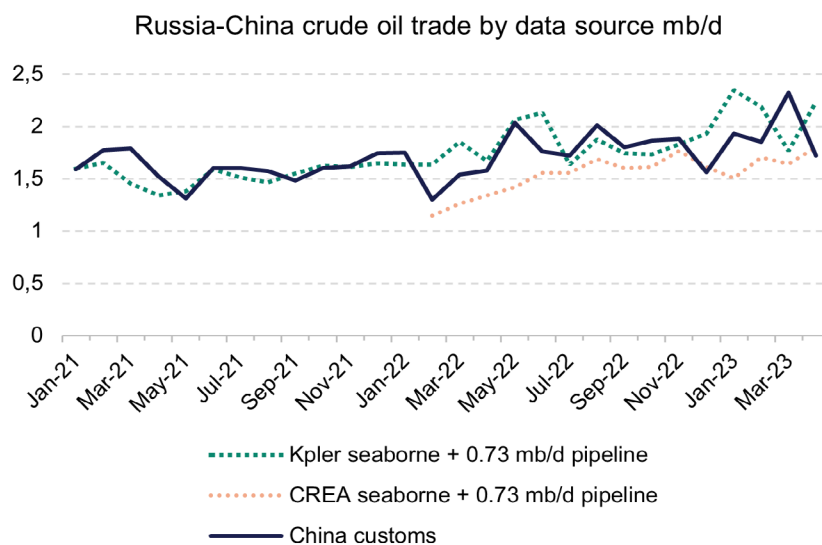
## Sanctions compliance

- China has not engaged its main state-owned tanker fleet in the Russia oil trade since sanctions were implemented on 5 December.
- China buys Russian oil above the Western price cap but through third parties or smaller private Chinese companies. China has not provided alternative shipping insurance.

## Trade flows: Chinese imports and Russian exports

### Oil trade

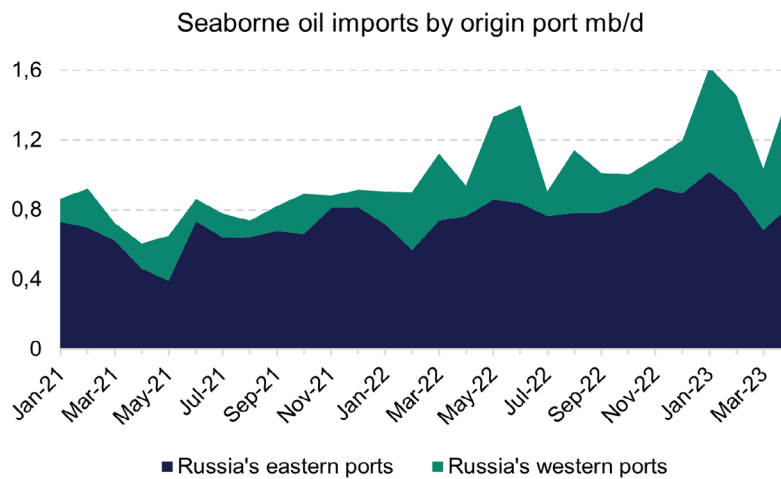
Figure 1 shows Chinese crude oil imports from Russia from three primary data sources: official Chinese customs data, and shipping tracking data by the market intelligence firm Kpler and an independent research organization, the Centre for Research on Energy and Clean Air (CREA). Publication of Chinese customs data lags behind the almost real-time estimates provided by Kpler and CREA, but the most recent of the real-time estimates are also more uncertain and subject to revision. Kpler and CREA only cover seaborne oil, while China customs reports aggregate seaborne and pipeline imports. For comparative purposes, a constant estimate of pipeline oil at 0.73 million barrels per day (mb/d) is added to the Kpler and CREA figures, based on historical averages. The three datasets are somewhat similar, which provides some confidence in their accuracy and makes it possible to rely on each for different purposes throughout the report. Appendix 1 discusses data sources and handling in more detail.



**Figure 1** Chinese imports of Russian crude oil (mb/d) by data source, January 2021 to April 2023.

Sources: Kpler (retrieved 27 April), CREA (retrieved 25 May) and China customs (retrieved 25 May).



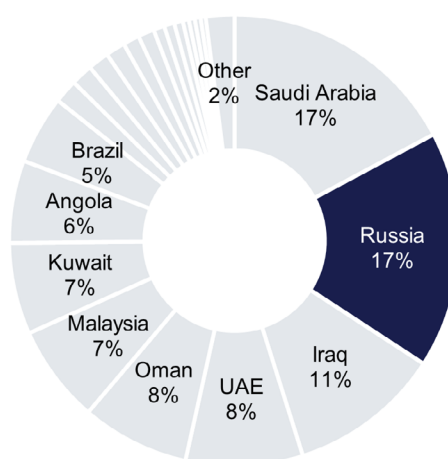


**Figure 2** Chinese seaborne imports of Russian crude oil (mb/d) by origin port, January 2021 to April 2023.

Source: Kpler (retrieved 27 April).

According to the customs data, total imports (seaborn and pipeline) of Russian crude oil averaged 1.73 mb/d in 2022, around 17% of China's total imports of 10.2 mb/d and 12% of total oil demand of 14.8 mb/d.<sup>59</sup> Chinese domestic crude production stood at 3.9 mb/d.<sup>60</sup> In the first four months of 2023, Russian imports averaged 1.95 mb/d, accounting for around 18% of total imports.

The distribution of imports from other countries is shown in Figure 3. Russia and Saudi Arabia have nearly identical shares, but Saudi Arabia's is slightly larger. The remaining imports are diversified in terms of source country. China imported crude oil from 48 different states in 2022. In terms of transport routes, however, China's oil supply is less diversified and more vulnerable. A large share of the oil originates from the Middle East and all oil apart from the Russian flow and the relatively small Kazakhstani and Myanmar flows are dependent on seaborne trade through the Malacca Strait and other chokepoints vulnerable to naval blockades.



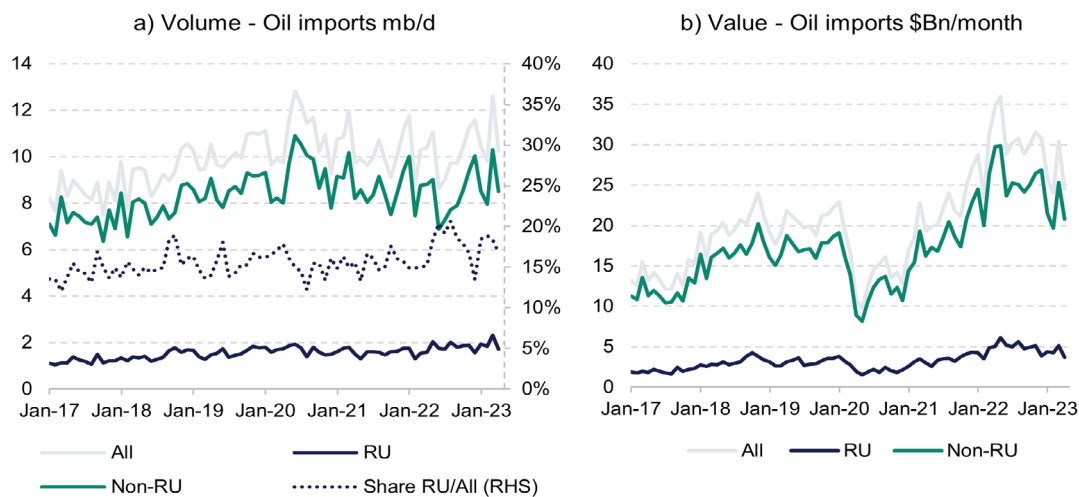
**Figure 3** Chinese imports of crude oil (mb/d) by origin country, 2022.

Source: China customs.

## China customs data

A closer look at the customs import data in terms of both volume and value, and the resulting average import price, reveals some interesting trends (Figures 4a, 4b and 5). During the pandemic, China's ever-increasing demand for oil and oil imports was temporarily paused and even experienced a slight decline. During this time, the Russian share remained relatively stable at around 15% (see Figure 4a), resulting in an equally slight decline in both Russian and non-Russian imports. In 2022, the Russian share increased to an average of 17% as a function of both moderately increased Russian imports and slightly reduced non-Russian imports.

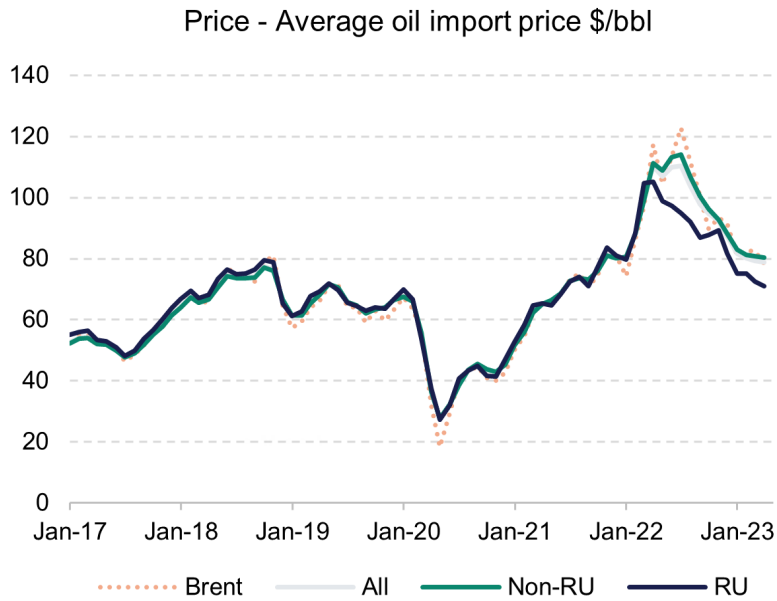
Russian oil imports in terms of value increased dramatically from pandemic-related lows of \$1.5 Bn/month in May 2020, to a post-invasion high of \$5.2 Bn/month in June 2022, as a function of volatile global oil prices (see Figure 4b). The value of the trade has since decreased as world oil prices have fallen back. The changing discount on Russian oil has also affected the value of the trade.



**Figure 4a** Monthly Chinese crude oil imports from Russia and other countries in mb/d, January 2017 to April 2023. **Figure 4b** Crude oil imports by of value, US\$ billion/month.

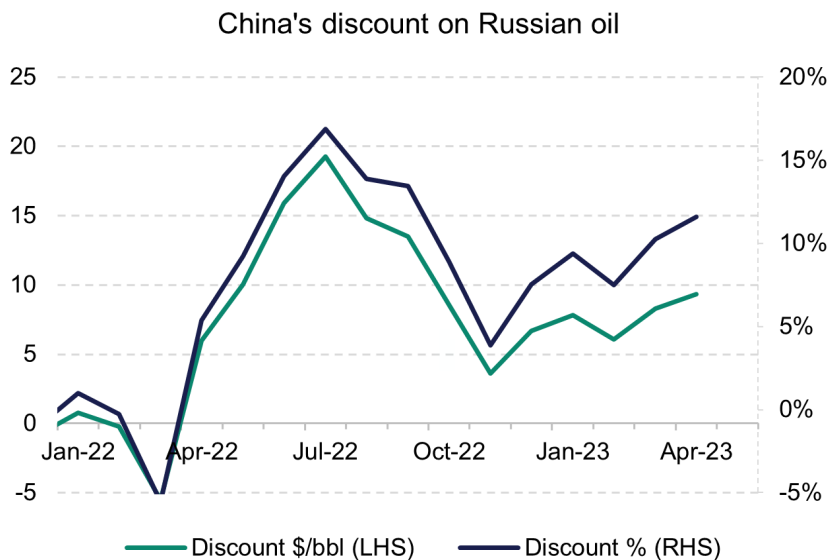
Source: China customs.

The average import price of Russian oil was decoupled from average import prices of non-Russian oil following the invasion, due to the price discount driven by the self-sanctioning behaviour of market participants, which reduced engagement with Russia on a voluntary basis, and subsequent formal EU and G7 sanctions (Figure 5). The resulting Chinese discount on Russian oil compared to non-Russian reached \$19/barrel (17%) in July 2022 (see Figure 6). Since April 2022, when the discount appeared in the lagged import figures, China has saved \$7.3 Bn through discounts on Russian oil, yielding an average discount of 11% over the period.



**Figure 5** Average import price in \$/barrel (\$/bbl) derived from China customs data for Russian, non-Russian and all crude oil imports, as well as average monthly Brent spot prices for comparison, January 2017 to April 2023.

Source: China customs, EIA.

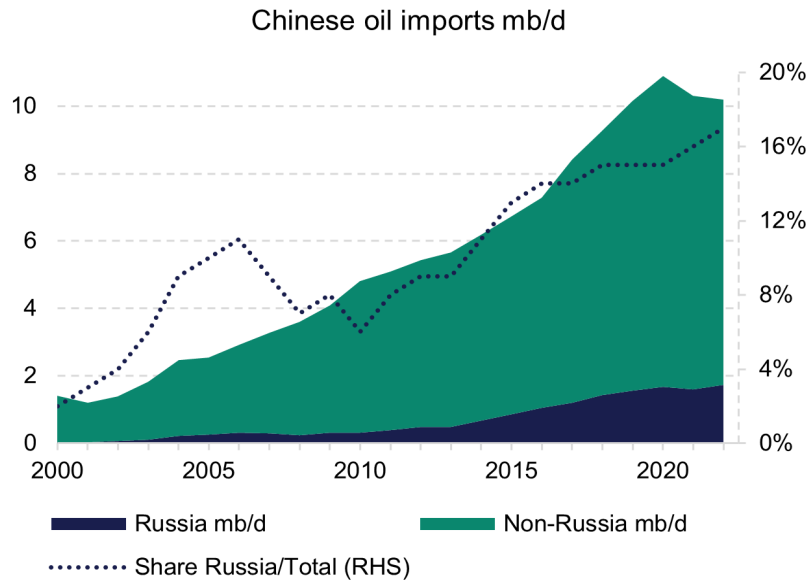


**Figure 6** Chinese discount on imported Russian crude oil compared to non-Russian imports, absolute and percentage, January 2022 to April 2023.

Source: China customs.

In sum, the Russia-China crude oil trade remained relatively steady in terms of volume during both the pandemic and the first part of the post-invasion period, with only a moderate 8.2% increase in 2022 on 2021 (whereas 2021 saw a decrease on 2020 of 4.5%). The trade has been mostly limited to the capacities of existing pipelines and Russia's eastern ports. However, a recent increase in cargoes from western ports demonstrates a potential shift, in particular if China's oil demand resumes growth following the pandemic period. In the first four months of 2023, Russian imports averaged 1.95 mb/d, 12% higher than the 2022 average. However, as non-Russian imports also saw an increase, the proportion

of Russian imports remained at around 18% of total imports. Figure 7 provides a long-term perspective on these recent developments, showing imports on an annual basis.



**Figure 7** Chinese crude oil imports on a long-term annual basis, 2000–2022.

Source: China customs, UN COMTRADE.

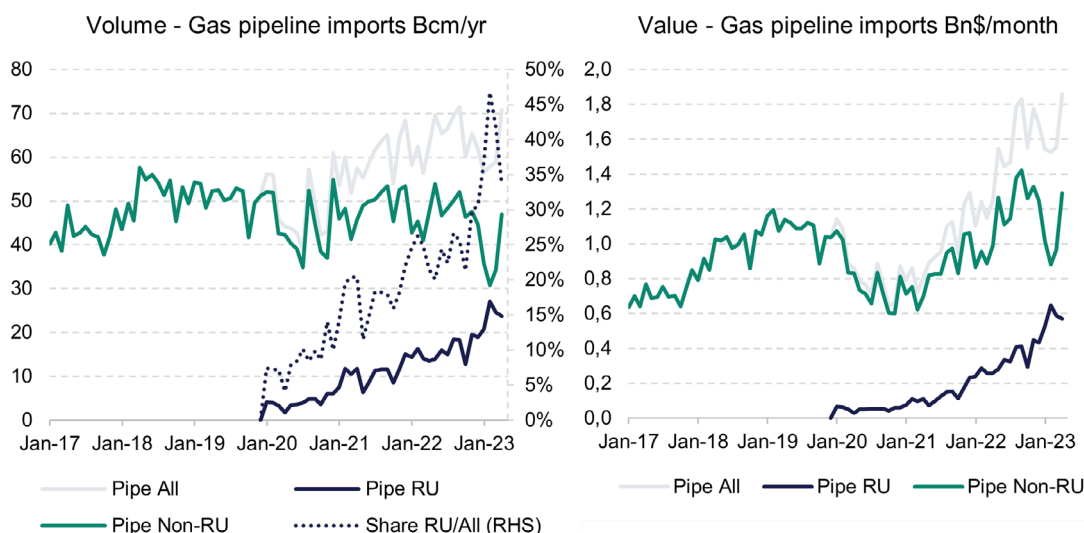
## Gas trade

### Pipeline gas

China has stopped providing country-by-country volume data on its pipeline gas imports. The last reported data was for December 2021. China still provides total volumes, as well as country-by-country value data. By using a price-volume model (see Appendix 1 for details) linked to global oil prices, Russian and non-Russian volumes can be estimated from reported value data. This introduces some uncertainty to the post-December 2021 pipeline figures but should provide a fairly accurate picture based on historical patterns.

Following first deliveries in December 2019, pipeline gas imports from Russia reached 18.9 Bcm/yr in December 2022 (Figure 8a). This is in line with the terms of the 2014 contract for Power of Siberia 1, which stipulates a gradual increase to full capacity of 38 Bcm/yr by 2025.<sup>61</sup> Non-Russian pipeline gas, primarily from Turkmenistan, has remained fairly stable at around 45 Bcm/yr, except for a sharp and seemingly temporary drop in early 2023. The share of Russian gas in the Chinese pipeline import mix is increasing rapidly, reaching 25% for the full year 2022 and 34% in April 2023.



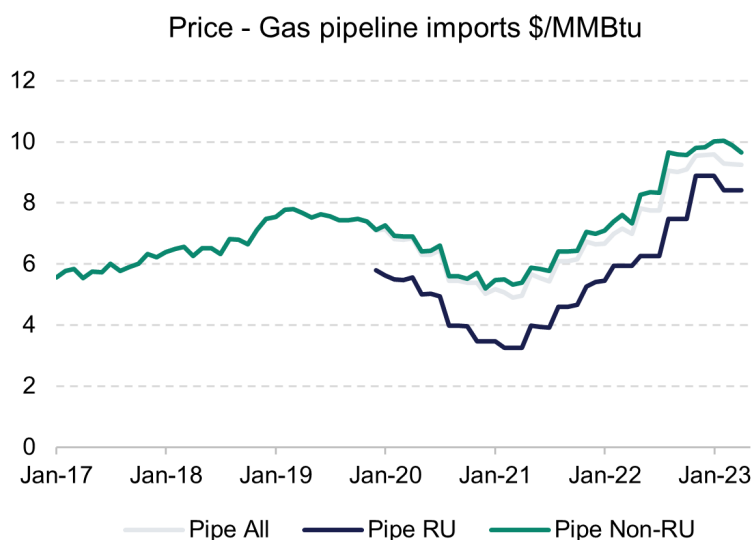


**Figure 8a** Monthly Chinese pipeline gas imports from Russia and other countries in Billion cubic metres/year, January 2017 to April 2023. **Figure 8b** Pipeline gas imports by value, US\$ billion/month.

Note: Russian and non-Russian volume figures for 2022 and onwards are modelled based on reported value data and oil-linked prices, see Appendix for details.

Source: China customs and author's model.

Russian pipeline gas is currently China's cheapest source of gas. China's pipeline gas is bought on long-term contracts which are indexed to global oil prices. The average import prices for pipeline gas (Figure 9) have therefore not increased as dramatically as spot LNG prices (Figure 10). Russian pipeline gas had an average import price of \$5.4/Metric Million British thermal units (MMBtu) in December 2021, the last month for which both reported volumes and value data are available from Chinese customs. According to the price-volume model derived for this research (See Appendix 1 for the methodology), pipeline prices only reached \$8.9/MMBtu in December 2022, a modest increase compared to the price movements of for example European gas prices or north-east Asian spot LNG prices, which peaked at \$54/MMBtu in August 2022 (see Figure 10). Furthermore, Russian pipeline gas is the cheapest of China's pipeline prices, at around \$1.7/MMBtu lower than the average price for non-Russian pipeline gas, which illustrates the favourable deal China got in 2014 on Power of Siberia 1 deliveries. This rather low price meant that the value of the pipeline gas trade reached only \$0.6 Bn/month in February 2023, up from \$0.2 Bn/month in December 2021 (see Figure 8b).



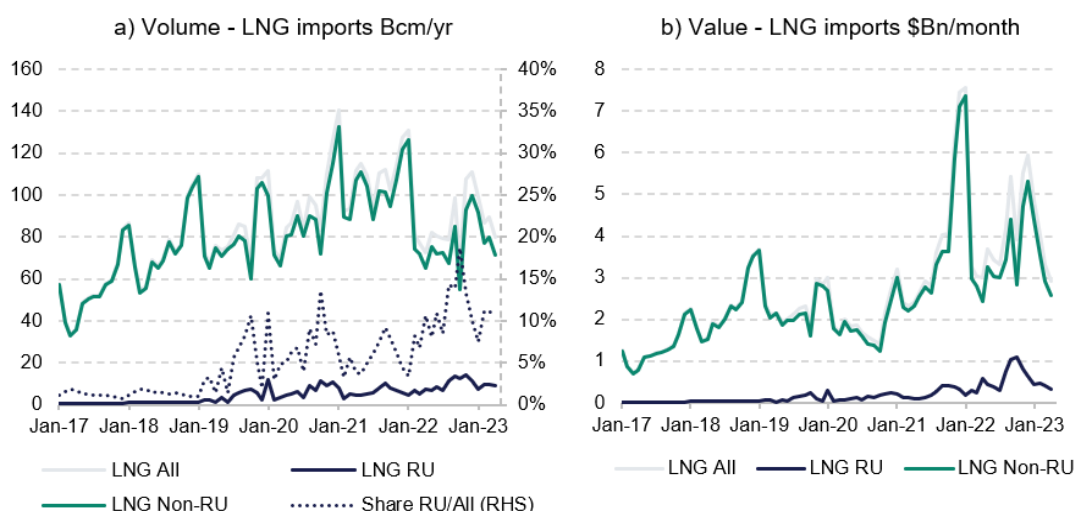
**Figure 9** Average import price in \$/MMBtu derived from China customs data for Russian, non-Russian and all pipeline gas imports, January 2017 to April 2023.

Note: Russian and non-Russian prices for 2022 onwards are modelled on reported value data and oil-linked prices, see Appendix for details.

Source: China customs, EIA and author's model.

### LNG

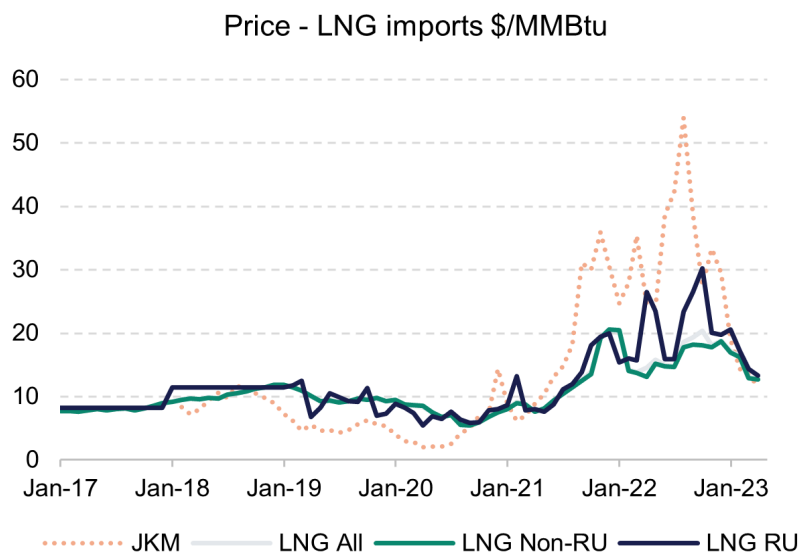
Chinese imports of both Russian and non-Russian LNG are more volatile (see Figure 10). China increased its Russian LNG imports from 4.4 Bcm/yr in January 2022 to 13.7 Bcm/yr in September 2022. Meanwhile, volumes from non-Russian sources decreased from 127 Bcm/yr to 55 Bcm/yr in October 2022 – a significant drop. The share of Russian LNG in total LNG imports has averaged 11% since February 2022.



**Figure 10a** Monthly Chinese LNG imports from Russia and other countries in Bcm/year, January 2017. **Figure 10b** LNG imports by value, US\$ billion/month.

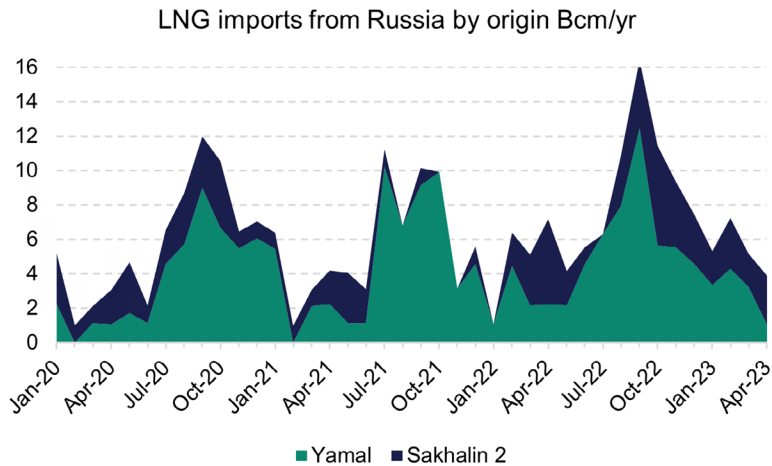
Source: China customs.

Average import prices for LNG have been much higher than for pipeline gas. Russian LNG reached 30 \$/MMBtu in October 2022 while non-Russian LNG was significantly cheaper at \$18/MMBtu in the same month (see Figure 11). On the surface, it may seem strange to import more expensive Russian LNG while importing less of the cheaper non-Russian cargoes. However, this is partly due to China re-selling LNG cargoes on long-term contracts for higher spot market prices in Europe and other markets.<sup>62</sup> Most of China's LNG imports are on long-term contracts and less exposed to spot market price movements.<sup>63</sup> China's LNG imports from the Russian Yamal in the Arctic are mostly on a long-term basis, while the cargoes bought from Sakhalin are mostly spot. This explains the higher average import prices for Russian LNG compared non-Russian sources, which are mostly on a long-term basis.<sup>64</sup> Figure 12 shows how the amount of spot purchases of Russian LNG from Sakhalin increased in 2022 compared to 2021. Higher LNG prices and higher volumes significantly increased the value of the Russia-China LNG trade from US\$0.2 Bn/m in January 2022 to US\$1.1 Bn/m in October 2022 (Figure 10b).



**Figure 11** Average monthly import price in \$/MMBtu derived from China customs data for Russian, non-Russian and all LNG imports, as well as average monthly JKM (Japan/Korea Marker Platts Futures) spot price for comparison, January 2017 to April 2023.

Source: China customs, Platts.



**Figure 12** Chinese LNG imports from Russia by origin, January 2020 to April 2023.

Source: Kpler (retrieved 27 April).

### Total oil and gas trade

The Russia-China oil and gas trade was worth \$69 Bn in 2022, a 54% increase on 2021. Oil constituted \$58 Bn, LNG \$6.7 Bn and pipeline gas \$4 Bn. In terms of volume, the oil trade increased by 8.3%, LNG by 44% and pipeline gas by 50%, although gas imports increased from a low base. Most of the value increase was linked to higher prices, as average prices for imports from Russia increased by 33% for oil, 67% for LNG and 75% for pipeline gas. In sum, the Russia-China oil and gas trade has increased moderately in terms of volumes in 2022 but dramatically in terms of value due to higher prices. China's total oil and gas import bill stood at \$436 Bn in 2022, of which Russia had a 16% share.

### Russia's energy exports and changing dependencies

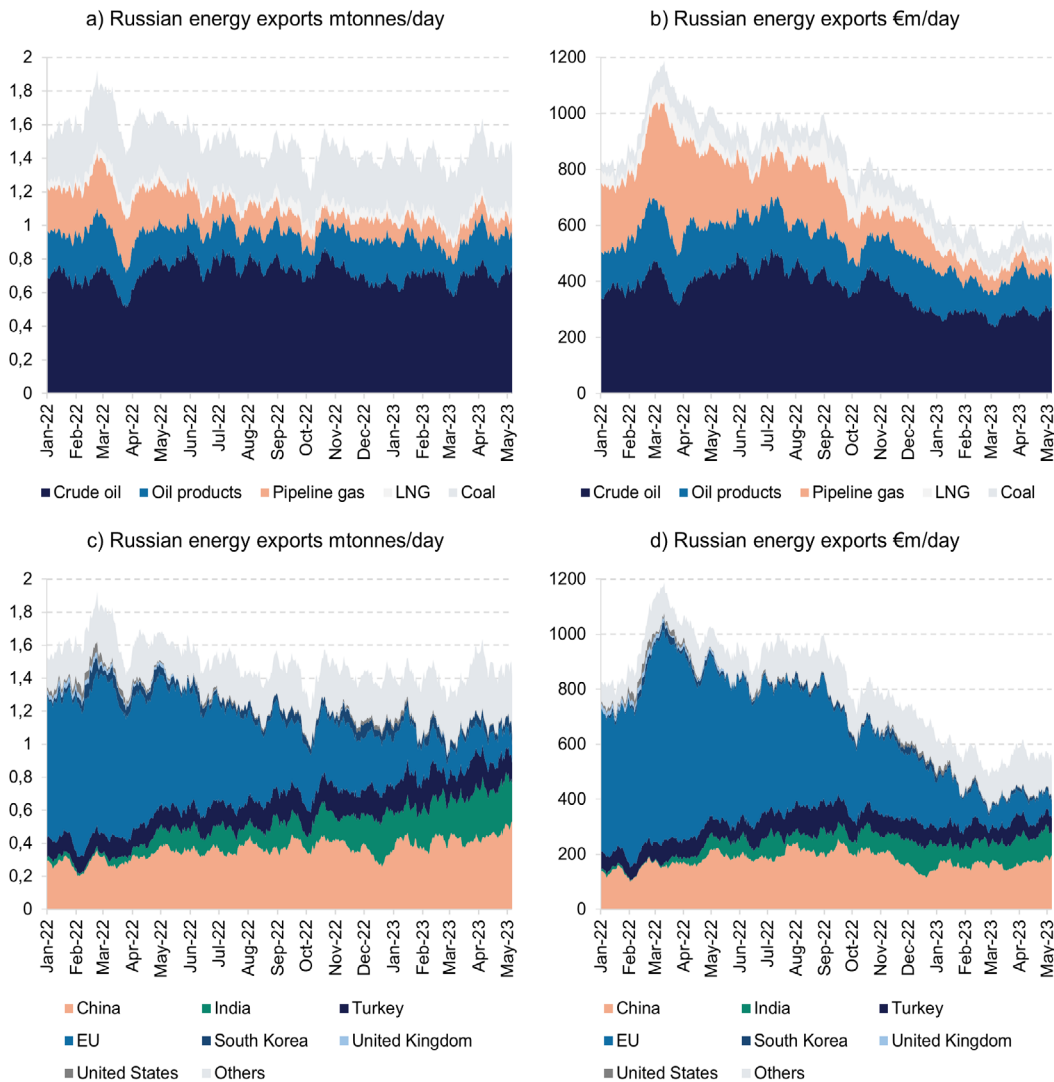
Russia enjoyed record-high energy export revenues in 2022. The value of its exports has been decreasing steadily, however, and nearly halved since the spring all-time high, due to the near elimination of pipeline gas exports to Europe, falling global energy prices and increasing sanctions-driven discounts on Russian oil.

Figure 13 shows CREA estimates of Russian energy exports by fuel and destination in terms of both volume and value. The total value of Russia's oil and gas exports has been decreasing steadily since the spring high of around €1000 million/day (€370 Bn/year) to around €500 million/day (€180 Bn/year) in 2023. Note that CREA's data also include coal, which adds an additional €100 million/day to the spring oil and gas all-time high.

The volume of Russian energy flows has remained stable, with the exception of a near complete halt in EU pipeline flows. Crude oil exports fell temporarily following the invasion but quickly recovered as new actors entered the Russian oil trade, and some initially hesitant Western actors re-entered as the response of Western governments became clearer and no immediate sanctions targeted energy flows directly. Crude exports fell again as the implementation date for the EU oil import embargo and the G7 price cap neared. Once again, however, exports picked up in January 2023 as new actors increased their Russian trade and initially hesitant Western actors began transporting Russian oil under the price cap, in line with Western sanctions.



Exports of refined products to Europe held up all the way until 5 February 2023, the implementation date of the import embargo and price cap on refined fuels. The reshuffling of this trade flow is now underway and initial data shows volumes going to Asia, Turkey, Africa, the Middle East and Latin America.<sup>65</sup> Total Russian pipeline gas exports fell by around 70% between March 2022 and January 2023 as exports to the EU fell by nearly 80%. LNG exports have remained relatively stable, as there are no sanctions yet and Europe remains the biggest customer. Coal exports have remained relatively stable too.



**Figure 13a** Russian energy exports by fuel, by volume (million tonnes/day), 14 January 2022 to 19 May 2023. **Figure 13b** Russian energy exports by fuel, by value (€ million/day). **Figure 13c** Russian energy exports by destination (million tonnes/day). **Figure 13d** Russian energy exports by destination (€ million/day).

Source: CREA (retrieved 26 May).

Russia saw a dramatic shift in customers as the EU went from buying 55% of Russian energy exports by volume at the beginning of 2022 to only 10% in May 2023 (see Figure 13c). China, India and Turkey increased their collective share from around 25% to 60%. China is now Russia's biggest energy customer, increasing its share of Russian energy exports from 15% to 30% in terms of value.

Accordingly, the asymmetry in Russia-China energy trade relations has increased significantly, as Russia is now much more dependent on China as a buyer than China is on Russia as a seller. China's share in Russian energy exports has doubled from 15% to 30%, in terms of value, while Russia's role in Chinese imports of oil and gas has only increased from 14% to 16%.

## **Upstream assets: Investments in oil and gas fields**

### **Existing Chinese upstream investments in Russia**

It was not until the 1990s and 2000s that foreign companies were allowed to enter Russia.<sup>66</sup> Shell and ExxonMobil were some of the early entrants, followed by BP, Total and Japanese companies. Later, Indian and Chinese companies followed.<sup>67</sup> The main Chinese investments were Sinopec's 49% stake in Udmurtneft in 2006, CNPC's 20% stake in Novatek's Yamal LNG project in 2013, state investment vehicle Silk Road Fund's 10% stake in the same project in 2016, Beijing Gas's 20% stake in Verkhnechonskneftegaz in 2017, and CNPC's and CNOOC's 10% stakes in Novatek's Arctic LNG 2 project in 2019.<sup>68</sup>

These Chinese and other foreign-owned assets still constitute a rather small part of total Russian assets. Just before the invasion, in January 2022, foreign direct ownership of Russian oil and gas resources stood at 17.8 Giga barrels of oil equivalent (Gboe), 6.1% of total Russian discovered remaining recoverable resources, and Chinese companies were the biggest owners.<sup>69</sup> However, the two largest foreign holdings in Russia before the war were indirect, through BP's 19.75% minority stake in the state-owned giant Rosneft, and TotalEnergies' 19.4% stake in Russian independent Novatek, in addition to its direct asset investments. Counting these stakes, the foreign share of Russian resources was 10.9% before the invasion, with UK BP and French Total numbers one and two (see Figure 14a).

Foreign investment in the Russian oil industry has been complicated and to some degree restricted, and has remained at a relatively low level. Foreign investment has mostly been allowed only in more difficult or frontier areas, such as offshore, arctic, shale and LNG assets.

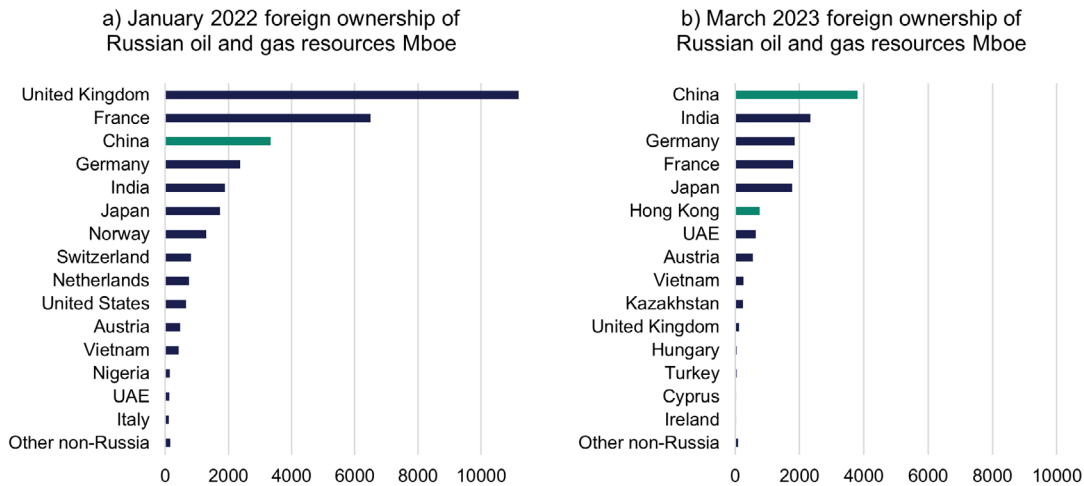
### **Developments since the invasion: Western exodus, Eastern caution**

Several Western companies such as BP, Total, Wintershall Dea, Equinor, Shell, ExxonMobil and OMV, as well as Western traders such as Vitol and Trafigura, held significant stakes in Russia at the start of the war. Many of these companies announced exit plans early on, and some had time to deploy them before a Russian presidential decree halted all such divestments.<sup>70</sup> The status of remaining Western assets is uncertain, with many companies facing substantial losses.<sup>71</sup>

Thus far, these assets have mostly been taken on by Russian companies or the Russian government, which has reduced foreign-controlled resources to just 4.8 percent as of March 2023 (Figure 14b). Some assets have been bought by the Abu Dhabi National Oil Company (ADNOC) or by obscure Dubai- (Fossil Trading Ltd) and Hong Kong-based (Nord Axis Ltd) traders.<sup>72</sup>

Chinese companies have thus far not made any transactions but still control 3.8 Gboe of oil and gas, with a present value of \$57.8 billion. The Western pull-out makes China the

number one foreign resource holder in terms of both present value and volume. According to Reuters, officials from the three Chinese state energy giants CNPC, Sinopec and CNOOC were summoned to the Ministry of Foreign Affairs in March 2022 and urged not to make any rash moves in purchasing Russian assets, to avoid running foul of potential sanctions.<sup>73</sup> According to these sources, this led Sinopec to suspend advanced talks on a major \$0.5 Bn petrochemical investment.



**Figure 14a & Figure 14b** Foreign ownership of Russian oil and gas resources: Discovered remaining recoverable resources in million barrels of oil equivalent (Mboe) as of January 2022 and March 2023.

Source: Rystad Energy UCube.

Chinese oil companies, led by state-owned giants CNPC, CNOOC and Sinopec, own 143 Gboe of oil and gas resources globally, with a present value of \$2 523 Bn, according to Rystad UCube data. In terms of value, 61.1% of these resources are located in China and 38.9% abroad. In terms of value, Russia is only in 7th place in China's foreign oil and gas investments, constituting 2.3% of its total holdings and 5.9% of its foreign holdings. China also has significant stakes in Western countries, with \$128 Bn (13% of its overseas assets) in combined resources in Canada, Australia, the US and the UK.

## Midstream deals: Pipelines and import contracts

### Oil: Existing pipelines and contracts

The first land-based trade in Russian eastern oil with China was by rail in relatively small volumes but construction of the Russian Eastern Siberia-Pacific Ocean (ESPO) oil pipeline in 2006–2012 increased Chinese imports of Russian oil significantly, through direct pipeline flows and seaborne cargoes from Russia's eastern ports. The first ESPO branch to China was completed in 2010, and a second in 2018.<sup>74</sup> Chinese loans and prepayment deals amounting to \$90 Bn and long-term contracts for oil trade valued at around \$500 Bn at \$80/barrel were an important enabler of Russia's eastward expansion.<sup>75</sup> The ESPO-China branches currently carry around 0.6 mb/d.

A smaller Kazakhstan-China pipeline in the north-west also connects Russia to China. This pipeline is currently contracted to transport 0.2 mb/d of Russian oil, of a total capacity of 0.4 mb/d.<sup>76</sup> The China section was commissioned in 2006 and completed in 2009.

### **Recent developments: New pipeline plans for oil?**

No new oil pipeline deals or long-term oil import contracts have been announced since the start of the war. There are also no known concrete official plans or advanced discussions on such deals. However, statements made by President of Mongolia Ukhnaagiin Khurelsukh at the Shanghai Cooperation Organisation summit in Samarkand on 15 September 2022 indicate that there may be tentative plans in the works. Following meetings with Putin and Xi, the Mongolian president stated that his government supports the construction of not only gas oil pipelines through the country's territory.<sup>77</sup> The prospects for new oil pipelines are discussed further in the Outlook chapter.

### **Gas: Existing pipelines and contracts**

Negotiations between Russian and Chinese companies over gas sales, specifically the Power of Siberia 1 pipeline, have been ongoing since the 1990s. Disagreements over price, routes and financing prevented a deal until Putin's intervention in 2014.<sup>78</sup> Putin's involvement followed Russia's increasing international isolation after the annexation of Crimea. In May 2014, Putin and Xi oversaw the signing of a Gazprom-CNPC sales agreement in Shanghai, valued at around \$400 Bn for 38 Bcm/yr over 30 years. The agreed price formula, although secret, was seen as below Russian expectations, potentially barely covering Gazprom's costs.<sup>79</sup> In contrast to the ESPO, Gazprom financed and constructed the gas pipeline without Chinese loans, while the CNPC funded and built the section on the Chinese side of the border.<sup>80</sup>

On 4 February 2022, Putin and Xi met once again in Beijing. In addition to their "no limit friendship" joint declaration, the two presidents oversaw the signing of several business deals. Among these was a 10 Bcm/yr, 25-year gas deal between Gazprom and the CNPC, facilitated by the construction of the new Far Eastern pipeline. This deal had been under negotiation for many years, and was in fact an extension of the 2014 agreement with what is thought to be a similar price formula.<sup>81</sup>

### **Existing LNG import capacity and contracts**

The key competitor to Russian pipeline gas in China is seaborne LNG. In 2021, China overtook Japan as the world's largest LNG importer at 111 Bcm, even higher than Europe's combined imports of 105 Bcm that year,<sup>82</sup> covering around 30% of total Chinese gas consumption of 379 Bcm. In 2022, LNG imports fell to 90 Bcm due to higher prices, Covid-19 lockdowns, increasing pipeline volumes and resale to Europe.

A fast build-out of LNG regasification capacity is enabling these import volumes. It is estimated that terminals and facilities that convert LNG to a gaseous state, which had a capacity of 122 Bcm/yr in 2020, will reach 217 Bcm/yr in 2023 and 406 Bcm/yr in 2028.<sup>83</sup> This would provide a significant overcapacity in all plausible Chinese gas demand futures. Energy consultancy Rystad estimates a regasification capacity utilization rate of just 40–50% in the second half of the decade.<sup>84</sup> This overcapacity provides a buffer for the uncertainty surrounding future Chinese consumption and import needs.

China is relying on a mix of spot and short-term contracts, and long-term contracts for its LNG supply. Long-term contracts constituted around 54% of total LNG imports in 2021.<sup>85</sup> This share will increase in the coming years after China's unprecedented contracting activity in 2021 and 2022. China accounted for 40% of all contracted volumes globally in 2021.<sup>86</sup> According to a comprehensive compilation as of August 2022, China had secured long-term LNG imports of 122 Bcm/yr for 2026, up from 84 Bcm/yr in 2022, and 68 Bcm/yr in 2021.<sup>87</sup> It is estimated that 95 Bcm/yr is under long-term contract for 2023. Russian contracts only constitute around 11 Bcm of this, with the major volumes coming from Australia, Qatar and the US among others. In November, the International Energy Agency (IEA) estimated China's LNG import contracts to be 111 Bcm/yr for 2023, of which 100 Bcm was destination-fixed.<sup>88</sup>

Since these compilations, further large LNG contracts have been signed, including a record 5.6 Bcm/yr deal for 27 years between Sinopec and QatarEnergy in November, worth around \$60 Bn. There is also potentially a similar deal by CNPC in the making.<sup>89</sup> China Gas Holdings, one of China's largest independent gas distribution companies, has also struck a major deal with the US company Venture Global for 2.8 Bcm/yr for 20 years.<sup>90</sup> It is noteworthy that China has not signed any long-term contracts with Russia since the invasion, even as it has been signing record amounts of LNG contracts around the world, including with the US.

### **New gas pipelines: Power of Siberia 2?**

The proposed Power of Siberia 2 pipeline would be the largest gas pipeline to China yet. It would provide Russia with an important export route from its northern Yamal gas fields, which are currently connected to the western pipeline system designed to supply gas to Europe. Following the breakdown in the Euro-Russian gas relationship, these fields risk being stranded as LNG export capacities are limited, and are difficult, expensive and time-consuming to develop. Before the split with Europe, the Power of Siberia 2 pipeline would have put Russia in a better price bargaining position, as it would have two competing buyers for the same gas. Today, with Europe no longer a long-term option, the Power of Siberia 2 pipeline might be needed to be able to sell the gas at all.

Before the invasion, the progress of Power of Siberia 2 was not a particularly high priority for either side, but things have since accelerated, especially on the Russian side. A feasibility study on the Mongolian section of the pipeline was completed in early 2022, and there are proposals for construction to begin in 2024.<sup>91</sup> The earliest projected operational date for the Mongolian section is 2027 or 2028. The Chinese section is expected to become operational by 2030 at the earliest.<sup>92</sup>

Some commentators expected a final agreement to be signed during Xi's three-day visit to Moscow in March 2023.<sup>93</sup> While Putin spoke about the agreement as if it were a done deal, saying that "practically all the parameters of the agreement have been finalized", Xi remained silent on the topic. Their joint statement only said that Russia and China would "make efforts to advance work on studying and agreeing" plans to build the pipeline.<sup>94</sup> Alexander Novak, Russia's most senior energy official, later said that Russia hoped to sign a final agreement later this year. Since Xi's visit, there has been no official comment from the Chinese side.

## Sanctions compliance: Countermeasures and circumvention

The current oil sanctions regime involving Western import embargoes and price caps aims to keep Russian oil flowing to the world oil market and avoid global price increases from supply shortfalls, while at the same time reducing Russian profits. Russian margins can be pressed by leveraging the West's influence over the global tanker fleet – both tanker ownership and tanker services (financing and insurance). Russia can only use western tanker services if its oil is sold below the price cap; otherwise, it must arrange transport itself or go to costlier third parties. The import embargoes also increase transportation costs, as much longer routes bind up more tankers, which, in turn, increases tanker freight rates still further. Finally, the only two remaining major buyers of Russian crude, China and India, are in a much better bargaining position. All these factors affect the price at which Russia can sell its oil and explain the discount on Russian oil apparent since the invasion (see Figures 15 and 16).

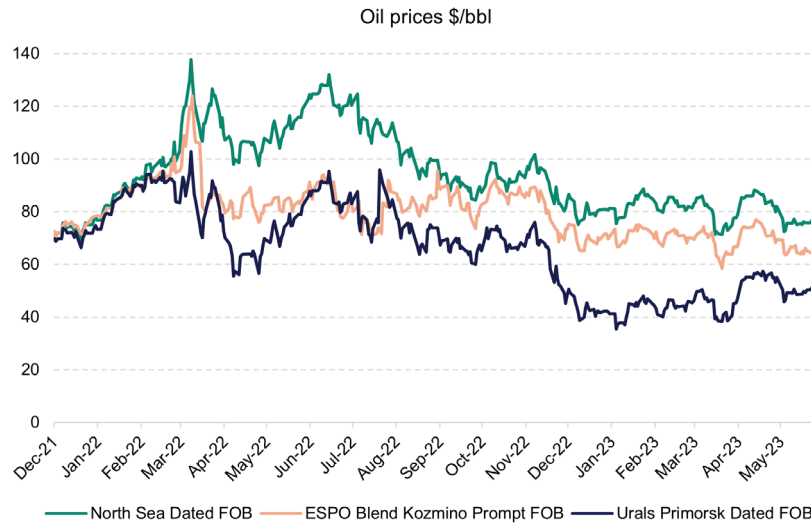
As of now, the sanctions appear to be relatively effective – on a production-weighted basis, the overall discount on Russian oil is 33% based on free-on-board (FOB) pricing data at various locations, i.e. excluding transportation costs.<sup>95</sup> Approximately half of the discount appears to benefit Chinese and Indian refiners (the main buyers of the cheaper Russian crude), while the remaining half is allocated to middlemen traders and transportation expenses. Some of these middlemen have connections to Russian interests, and a more detailed investigation of this relationship is merited.

Figures 15 and 16 show that the discounts on Russian oil compared to Brent appeared almost instantly following the invasion, reflecting immediate self-sanctioning behaviour by market participants. The discount fell back during the summer but increased again ahead of implementation of the formal Western sanctions on 5 December. The prices in Figures 15 and 16 are on an FOB basis, the price at the port with no transportation cost included. Urals grade from the western ports must go much further to India and China, and therefore requires a higher discount compared to ESPO which only has to go a short distance to China. The discount at Chinese and Indian ports, which include transportation costs, are similar at around 15%.<sup>96</sup>

However, there are possible countermeasures and circumventions of the current sanction regime, and China can play a key role in this. China and other non-Western buyers of Russian oil cannot formally “break” Western sanctions and be subject to penalties, since in their current form the sanctions only apply to Western countries and Western companies. Chinese companies would only lose access to western tanker services if they failed to comply with the price cap. The loss of access to these services is currently limited to a 90-day period, although insurance companies might independently choose to extend the ban.

Nevertheless, China and other countries could undermine the sanctions' purpose and effectiveness, for example, by purchasing large quantities of Russian oil above the price cap through intermediaries that do not comply with the cap, or by using their own tanker fleet for trade with Russia. While there are currently no formal potential penalties targeted at China apart from the loss of tanker services, this does not rule out the possibility that an aggressive Chinese deviation from the intent of the sanctions might provoke a further response from the West.

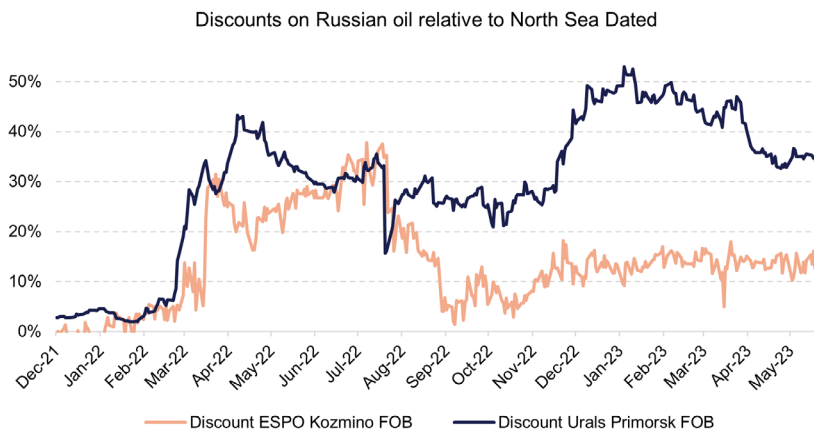




**Figure 15** Spot prices for Russia's two main oil export grades, Urals at the western port of Primorsk and ESPO at the eastern port of Kozmino, as well as North Sea Dated prices as a benchmark for non-Russian oil.

Note: All prices are on a free on board (FOB) basis, which reflects the price excluding any transportation costs.

Source: Argus Media (retrieved 23 May).



**Figure 16** Derived percentage discount of Urals and ESPO to North Sea Dated (Brent) prices.

Source: Argus Media.

### Shipping

China owns the world's second-largest tanker fleet. Chinese and Hong Kong beneficial owners control 14% in terms of fleet value as of 1 January 2022.<sup>97</sup> Greece is the largest tanker owner, with 22% of fleet value as of the same date. Russia only controlled 2% in terms of value before the invasion, which is not enough to move all of its oil. Since the invasion, many, especially older, tankers have changed hands to entities ready to move Russian oil outside the price cap.<sup>98</sup>

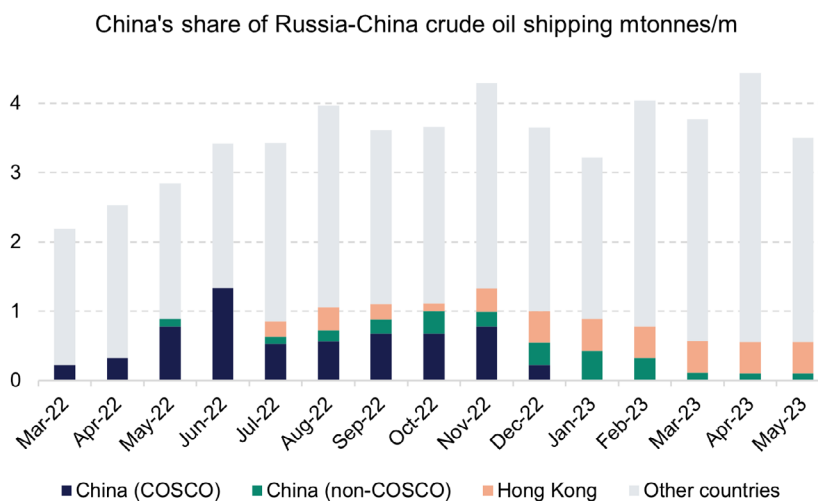
If China engaged a large part of its fleet directly in the Russian oil trade, this would probably reduce Russian transportation costs significantly, in effect reducing the Russian discount. China could also sell some of its tanker fleet, most likely its older tankers, to the third parties now moving Russian oil, increasing the size of the “shadow fleet” and pushing down its prices. China could also provide insurance and financing for the traders moving Russian oil.

Until now, according to the shipping data investigated for this research, China has not engaged its main state-owned tanker fleet (COSCO and its subsidiaries) in trade with Russia since 5 December. Even before the sanctions, this fleet was only moving relatively moderate amounts of Russian oil (Figure 17).

After the sanctions, there are still Chinese-owned tankers moving Russian oil. However, these are not part of the main state-owned COSCO fleet, but smaller independent actors, many of which are registered in Hong Kong. Some of these have been seen buying additional old tankers since the invasion.<sup>99</sup>

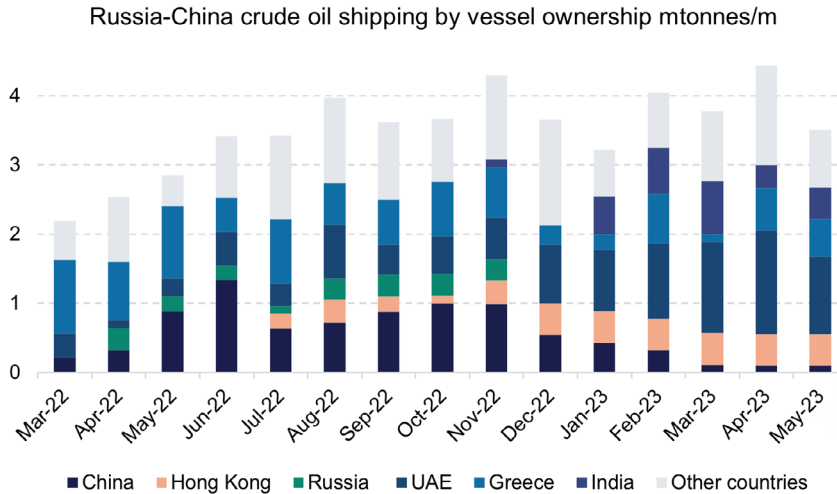
Thus, in terms of moving Russian oil, China has so far seemingly adopted an arm’s length approach where China’s major state-owned companies with global operations vulnerable to Western sanctions avoid the profitable trade, while some smaller privately owned companies opportunistically take part in it. Nonetheless, most of the Russian oil is shipped to China by Russian companies or third parties (Figure 18). The United Arab Emirates has become the leading country by ship ownership, largely due to the transfer of Russia’s main state-owned Sovcomflot fleet to UEA-based companies, in particular SUN Ship Management, which recently became subject to EU sanctions.<sup>100</sup>

A majority of China’s oil imports comes from Russia’s eastern ESPO system, where prices exceed the established price cap. As a result, China has been unable to lawfully use Western tanker services since 5 December for much of its imports. China also relies on third-party insurance and financing, even though it has the economic muscle and infrastructure to arrange these for itself.



**Figure 17** Seaborne crude oil trade between Russia and China by ship ownership country

Source: CREA (retrieved 26 May).



**Figure 18** Ship ownership by country for vessels carrying Russian crude oil to China.

Source: CREA (retrieved 26 May).

### Import volumes

Initially, Chinese state-owned oil companies continued to import oil according to existing contracts but did not increase Russian oil purchases further to any extent,<sup>101</sup> while the independent “teapot” refineries were the ones increasing imports of Russian crude.<sup>102</sup> Again, this displays a partial arms-length approach where the Chinese state-owned majors took a more cautious approach while independents quickly capitalized on the cheaper Russian oil. At the beginning of 2023, however, state-owned companies also reportedly resumed additional buying of Russian oil. The extent of this activity will be a key development to monitor.<sup>103</sup>

The volume of Chinese purchases is important. If China were to ramp up its buying of Russian oil, this would increase demand and, through competition with India and others, raise the Russian sale price. If Western control of the tanker market also continued to weaken, resulting in a larger and cheaper “grey” or “shadow fleet”, the entire Russian discount might disappear.

In other words, China’s relative restraint thus far underpins the current discount level. China could probably wipe out most of the discount singlehandedly by using its own main fleet, providing insurance and financing and purchasing larger volumes, but thus far has chosen not to do so.

### Deception

Finally, there is the deception aspect of sanctions circumvention. Some Russian oil is sold under other names or mixed with other sources. China is probably buying some Russian fuel oil rebranded in Singapore, but the estimated volumes are thus far low compared to official Russian volumes.<sup>104</sup>

A peculiar development in Chinese crude oil imports is skyrocketing imports of “Malaysian” oil from a relatively low level of 0.2 mb/d in the spring to 1.3 mb/d in December 2022,

with an even higher discount than official Russian oil, reaching \$29/bbl (26%) in August.<sup>105</sup> According to traders and oil analysts, this Malaysian oil is probably mostly rebranded Iranian oil, but some Russian and Venezuelan barrels may also be included.<sup>106</sup> Malaysia only produces around 0.4 mb/d.

It is difficult to determine the exact volume of Russian oil sold in this way. However, it is likely that the amount is relatively small, as most Russian oil is still openly sold and accounted for. If the sanctions regime were to change, such as by introducing threats of secondary sanctions for third parties involved in transporting or importing Russian oil, attempts at deception would be likely to become more widespread. In such a scenario, detecting deception would become increasingly important for maintaining the effectiveness of sanctions.

## Russia-China energy relations ahead: An explorative outlook

### Key findings

This chapter explores potential future developments in Russia-China energy relations. It provides quantitative projections of potential future Chinese oil and gas production and consumption, and the resulting import requirements, and discusses likely Russian shares in the light of key factors shaping future relations, including China's wider relations with the West. The key findings from the analyses are summarized below.

- China's reliance on substantial and vulnerable seaborne oil imports will persist for the next decade, and probably far beyond. This leaves room for further increases in the Russian oil trade, even though the Chinese diversification strategy provides an upper limit.
- China's future gas import requirements are more uncertain than those for oil due to the greater variability in both future demand and domestic production. In addition to its existing long-term LNG contracts, this uncertainty probably limits China's appetite for further Russian gas pipelines.
- China's wider relations with the West are a key factor in future Russia-China energy relations. If diplomatic and economic relations with the West do not significantly deteriorate from current levels, China might continue its balancing act, resulting in only moderate increases in energy trade with Russia and in sanctions circumvention. If relations deteriorate, a stronger and more asymmetrical Russia-China axis would probably be formed through further oil and gas trade, investment and efforts to undermine sanctions.
- Russia's position as an energy superpower is likely to weaken in all future scenarios.

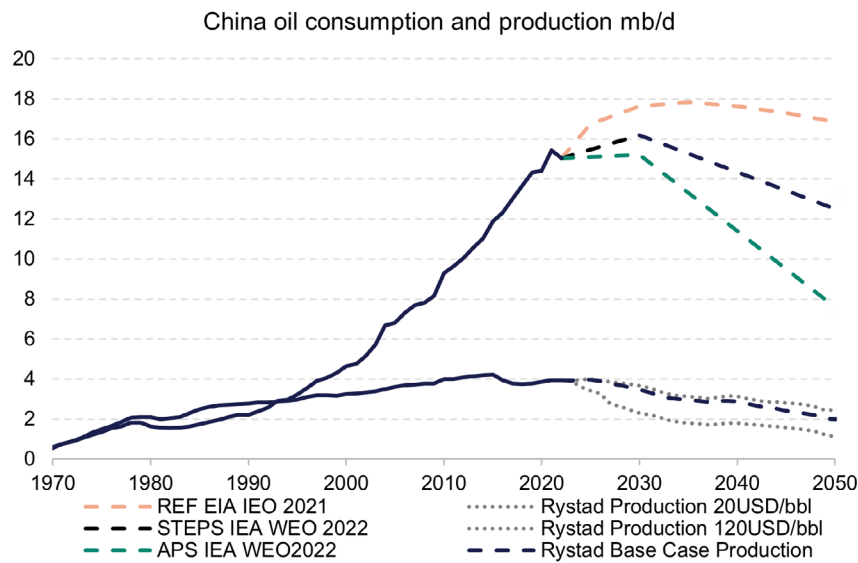
## Potential for further energy trade: China's import needs and possible Russian shares

### Oil trade projections

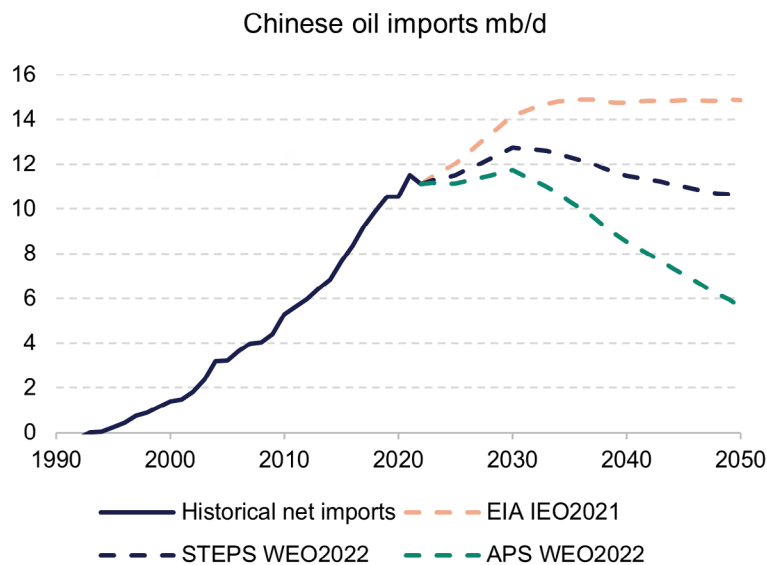
China's oil consumption is set to increase in the years ahead but a peak in demand is drawing closer. Figure 19 shows a selection of oil demand projections for China together with domestic oil production projections. These projections cover most of the potential outcomes, taking account of different climate policy ambitions and oil and gas market developments, as well as different future price levels. The projections and their underlying assumptions are described in more detail in Appendix 1. In short, the compilation shows that long-term oil demand is uncertain and closely linked to climate policy ambitions. For the period up to 2030, however, the spread of the demand outlooks is less pronounced. Furthermore, the upside potential of Chinese oil production is limited, while low global prices would make a larger share of Chinese oil unprofitable, according to the Rystad UCube model used for the projections.

Figure 20 shows the resulting net import need according to the Rystad Base case for domestic production and the different demand outlooks. Until 2030, Chinese oil imports are projected to increase in all cases. In short, China's large and vulnerable seaborne oil import

dependency will persist for the next decade, and probably far beyond.



**Figure 19** Chinese oil production and consumption, historical and projected.



**Figure 20** Chinese oil imports, historical and derived future need.

This means that there is still ample opportunity for continuing and increased oil trade with Russia. Furthermore, Russia provides supply diversification in terms of both source and route. If China's relations with the West, or in particular China's relations with the US, deteriorate, the vulnerability of the seaborne oil trade is likely to increase, since it can be subjected to sanctions and blockades. In such a scenario, which is discussed further below, it becomes more likely that China will pursue new land oil pipeline deals with Russia, which would strengthen the energy ties between the two countries still further. Russia would benefit from having an oil outlet safe from Western shipping sanctions and by reducing reliance on long and expensive sea routes. China would get a safe supply route in case of a future blockade.



Such a development would increase the asymmetry in energy relations between the countries by increasing China's share in Russian exports, while the corresponding relative increase of Russian exports in China's imports would be less impactful due to the size of the Chinese market.

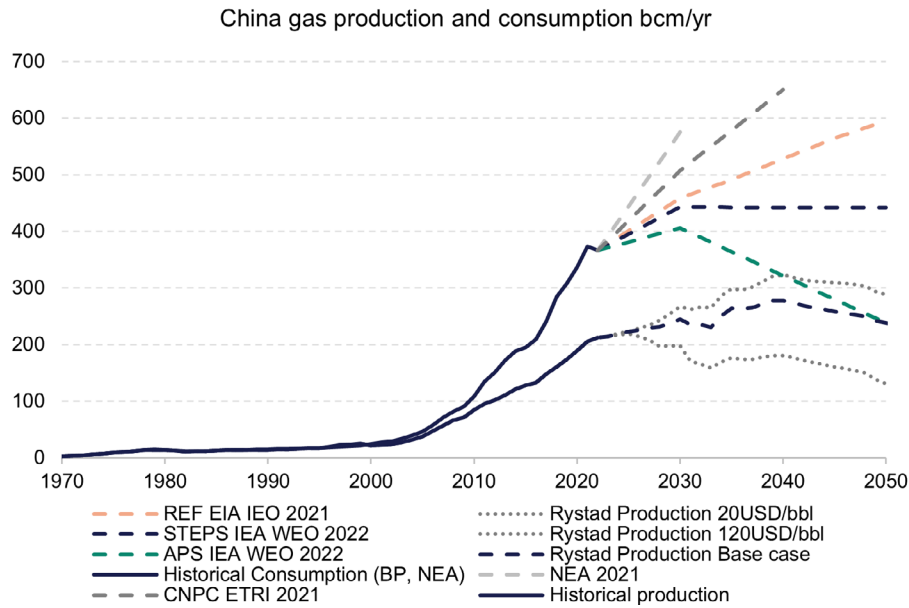
However, any new deal on an oil pipeline would take a long time to negotiate, let alone construct. Key obstacles to overcome include financing and price terms, as well as China's reluctance to expand its energy dependence on Russia.

There is of course an upper limit to potential additional pipeline capacity from Russia, and China would in all cases still be heavily dependent on seaborne oil to meet current levels of demand. The security given by pipelines compared to seaborne cargoes is also much dependent on the type and level of any potential future conflict. In a conflict involving use of military means, oil pipelines are not necessarily safer since they can be difficult to protect while seaborne cargoes can be either dispersed or defended in convoys.<sup>107</sup> In a conflict limited to economic means, fought with sanctions and embargoes, however, pipelines through friendly countries can provide additional security.

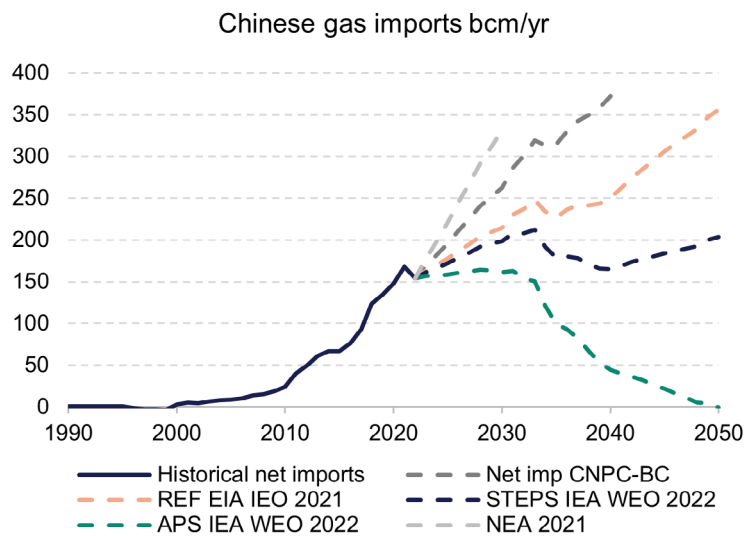
### **Gas trade projections**

Figure 21 shows a similar selection of demand outlooks for gas in China, as well as production projections based on Rystad UCube models, which are described in more detail in the methods appendix. The wider spread of gas consumption and production projections reflects a more uncertain future for Chinese gas than for oil. Production projections are more price-sensitive than for oil, which partly reflects the uncertain and price-sensitive potential of shale gas in China.

Figure 22 shows the resulting net import needs from the Rystad Base case for domestic gas production and the different demand projections. Even by 2030, the different demand outlooks already give widely different import needs. Adding variable domestic production increases the possible spread even further. This uncertainty over import demand might provide a limit to China's appetite for Russian pipelines.



**Figure 21** Chinese gas production and consumption, historical and projected.



**Figure 22** Chinese historical gas imports and derived future need.

The pipelines already currently under construction and the large number of Chinese long-term LNG contracts limit the need for additional Russian gas pipelines. Appendix 2 provides a more detailed analysis of various combinations of Chinese import needs and potential Russian gas pipelines. In most cases, there is no room for additional Russian pipelines besides Power of Siberia 2 without reducing existing contracts for LNG imports. Moreover, additional pipelines lead to probably undesirable levels of dependence on Russian gas. In sum, uncertain future demand, high levels of already committed LNG supply and the pursuit of diversification make it unlikely that China will commit to any additional Russian pipeline gas besides Power of Siberia 2. Nonetheless, Power of Siberia 2 is likely to proceed since the plans are well advanced and since China is likely to get a good deal due to Russia's weak bargaining position.

For Russia, a position where the only replacement for lost European exports is Power of Siberia 2 means significantly lower global gas exports and a significant increase in dependence on China as its main customer. In 2021, 83% of Russian pipeline gas went to Europe, 13% to Commonwealth of Independent States countries and only 4% to China.<sup>108</sup> As of early 2023, the flow to Europe is only around 20% of its pre-war level. With the flow of Power of Siberia 1 steadily increasing, it is projected that China will account for 25% of Russia's pipeline gas exports in 2023, assuming other flows remain constant. By 2026, with Power of Siberia 1 at full capacity and the additional Far Eastern pipeline online, China would constitute 44% of Russian pipeline exports. If Power of Siberia 2 were to be built, China would constitute 62% of Russian pipeline exports by the 2030s. By that time, it is possible or even likely that Russian flows to Europe will be even lower as the EU has pledged to phase out Russian gas before then. In any case, China is expected to become the main customer for Russian pipeline gas, probably at significant discounts. For China, Russian pipeline imports would only constitute around 23% of total gas imports with Power of Siberia 1 at full capacity and the Far Eastern pipeline online. If Power of Siberia 2 were to be built, the Russian share could increase to 48%.

## **Decisive factors and likely outcomes: Two scenarios**

According to the findings in chapter 4, China has adopted an initially cautious stance towards deepening Russia-China energy relations. There are several possible reasons for this, as discussed above and noted by others, such as China's relations with the West and the threat of sanctions, China's risk diversification strategy and that China can afford to take a wait-and-see approach due its relatively well-supplied energy situation.<sup>109</sup>

The future trajectory of the energy relationship is naturally linked to the development of the broader Sino-Russian relationship in the wake of the Ukraine invasion. Recent studies have mapped out possible scenarios,<sup>110</sup> ranging from a continuation of the partnership to a deterioration due to the many challenges or significantly improved relations and even a formal alliance. Based on such scenarios and on the premises for observed developments in energy relations discussed above, four interlinked factors are likely to be key to future developments in the energy relationship:

- China's relations with the West
- Russia's economic desperation/predicament
- Global and Chinese economic growth and energy market dynamics
- Time and the course of the Ukraine war

Arguably, the most important factor is China's broader overall relationship with the West, particularly with the US. If this relationship deteriorates, China will have less to lose by engaging with Russia and more to gain, especially by securing land routes for oil and gas when seaborne routes and Western sources, such as US and Australia, come with higher risk. This logic also applies to the overall relationship, where a strong Russia as a partner becomes more important in a growing conflict with the West. Second, if Russia's economy were to approach collapse, and especially if this risked regime stability, Chinese support in terms of extended energy relations might become more likely. Third, China is not in need of immediate additional supplies. However, if the global and Chinese economies recover

strongly, oil demand will rise sharply, motivating further inexpensive Russian purchases. Finally, time plays a crucial role. Some increased collaboration, which makes economic and strategic sense, is likely to be a matter of time or timing, such as the go-ahead for Power of Siberia 2, upstream investment in the wake of Western exits and long-term contracts supporting any pipeline construction. These developments are dependent on the progress of the Ukraine war, with increased energy ties more likely if the war reaches a conclusion. Should the war continue for an extended period, such increased collaboration might still occur, but at a later stage.

To fully explore the potential outcomes arising from developments among these factors is beyond the scope of this analysis. Two possible trajectories are discussed below as a function of the arguably most important factor – China's overall relations with the West.

### ***Current state of Western relations: China's balancing act***

China is likely to continue its balancing act if current relations with the West can be maintained. In the short term, some additional Russian oil imports are likely, especially as the Chinese economy recovers. This will increase the sale price of Russian oil. Chinese actors might also gradually contribute to decreasing the effectiveness of the oil sanctions, if tankers from the main state-owned fleet are transferred to Chinese independents or foreign operators. In the medium term, the Power of Siberia 2 pipeline is likely to go ahead, as well as new upstream investments in Russia, both on terms attractive to China.

Nonetheless, there will be limits to Chinese engagement, based on diversification and on the threat of sanctions, if the war in Ukraine is not yet resolved. For Russia, this trajectory will mean lower oil and gas revenues, both in the short term due to still somewhat effective sanctions, and in particular in the long term where Chinese engagement is not enough to counteract lost European markets, technology and capital. This is likely to weaken its energy superpower status and overall economy, and make it more dependent on China as both a customer and a technology and capital provider, a development that runs entirely counter to its energy goals. For China, this scenario entails some access to cheaper energy while keeping its strategic partner economically afloat and maintaining economic ties with the West. This is probably China's preferred scenario.

### ***Deteriorating Western relations: A stronger, asymmetrical axis***

If relations with the West deteriorate, due either to non-Russian factors or China overextending its support for Moscow, China is likely to reinforce its relations with Russia, as it would have less to lose and more to gain. China might increase Russian oil purchases and intensify its efforts to counteract Western sanctions by covertly or overtly engaging its main tanker fleet, as well as providing its own insurance and financing. In the medium to long term, land pipelines for both oil and gas are likely, along with Chinese financing to facilitate their construction. Further upstream acquisitions and investment are also likely to ensure a stable long-term supply, countering the increasing decline in Russian production following the impact of sanctions through postponed projects, withdrawals by Western oil service companies and restricted access to sanctioned technology.

In this scenario, Russia's dependence on China increases dramatically, but it also provides a much-needed boost to its oil and gas revenues, as well as access to capital for long-term supply. For China, this probably entails further influence over Russia and greater access to

cheap Russian resources. However, the economic cost of worsening economic relations with the West, as well as increasing risks to its seaborne energy imports makes this scenario undesirable. Despite these drawbacks, this trajectory might still be the most likely outcome if China's relations with the West deteriorate irreversibly.

## Consequences and options for Europe

For Europe, and Western countries more broadly, China's cautious stance thus far can be seen as, if not a success, at least not a failure. Western economic dominance of the tanker market has enabled implementation of energy sanctions, and its broader economic weight has probably deterred China from fully countering them. All this has been to Russia's detriment and in line with European aims to restrict the Russian economy.

However, Europe should not become complacent. Western control over the tanker market is being challenged by a growing shadow fleet and the fragmentation of the global oil market into sanctions-compliant and non-compliant segments. Furthermore, as discussed above, China's stance could shift if its relations with the West deteriorate, or if the Russian economy nears a regime-threatening collapse.

To maintain effective oil sanctions on Russia, Europe could design ways to limit the resale of tankers to suspected non-compliant actors, including Chinese companies. Europe could also consider strengthening energy sanctions by reducing existing oil price caps or even imposing a complete transport embargo, in line with the original EU idea. A similar import embargo and price cap on Russian LNG could also be implemented.

However, all these measures can be undermined to various degrees by China due to its large market share and tanker fleets. China could also counteract Western capital and technology sanctions on Russia through its financial muscle and advanced oil and gas industry.

To ensure the effectiveness of its Russia policy, Europe must therefore find ways to encourage China to maintain its initially cautious stance. Achieving this will require a delicate balance of incentives and deterrents, aimed at preserving economic ties and constructive diplomatic relations with Beijing, while at the same time maintaining a credible threat of various sanctions. This balancing act is likely to prove challenging and must be executed without compromising other long-term strategic goals. Maintaining economic ties is important both for fostering incentives for cooperation and for preserving the deterrent effect of potential future sanctions.

At the same time, Europe should also prepare for the worst, both in case of deteriorating relations with China and to keep the sanctions threat credible. This preparation should involve both defensive and offensive measures, such as securing and re-shoring critical supply chains ahead of a potential economic decoupling and Chinese countermoves, as well as designing and coordinating potential secondary sanctions. A wide array of conceivable secondary sanctions is possible, of various levels of impact and directed at different parts of the economy. As a first step, Europe could consider secondary sanctions on entities circumventing the oil sanctions, such as entities that repeatedly transport Russian oil above the price cap. The US imposed sanctions on Chinese companies accused of evading Iranian oil sanctions in 2019 and 2023, including tanker subsidiaries of state-owned shipping giant COSCO.<sup>111</sup> Similar measures on Russian oil could be considered, but this will require careful deliberation and most likely a political compromise on what constitutes European red lines in terms of sanctions circumvention and unacceptable levels of Russia-China energy cooperation – as well as what constitutes a proportional response. This should include an assessment of the broader costs and risks associated with a potential escalation of economic conflict with China.



In terms of incentives and cooperation, Europe could continue to structure its sanctions on Russia in a manner that rewards China for compliance, as is the case with the import embargo and price cap which results in discounts for Chinese buyers. Europe should also seek common ground with China where possible. Potential areas of increased collaboration could be on climate initiatives, low-carbon energy technology and acceleration of the energy transition. Despite the challenges posed by China's pursuit of leadership and dominance in these sectors, such cooperation could advance climate progress and limit the future revenues of Russia and other problematic fossil fuel producers.

Europe must also address its own domestic concerns and long-term position with regard to China in terms of energy security and affordability. China is likely to be able to access cheaper energy in the coming years, while Europe is likely to experience higher energy prices. This has already affected competitiveness, as some energy-intensive industries have relocated to the US or China. In general, this will entail policies on increasing domestic energy production, or production in friendly countries, and reducing fossil fuel consumption through substitution and increased efficiency. Redistribution policies might also be important to balance the economy and maintain political support for the Western stance on Russian energy.

## Conclusions

Russia-China energy relations since 24 February 2022 have been characterized by initial Chinese restraint. China has only moderately increased its energy trade with Russia in terms of volume. Most of the increase is in line with pre-invasion plans and additional increases are in line with the economic incentives provided by the discounts on Russian energy. Most of the additional imports come from private independents, while the major state-owned companies have shown restraint. On the other hand, since China has not reduced its energy trade, the record high energy prices have led to significant increases in the value of that trade.

China has so far not signed any new long-term supply contracts with Russia, even as it has signed an unprecedented amount of new LNG contracts globally, including with the US. Perhaps garnering the most attention, there has been no final agreement on the important Power of Siberia 2 gas pipeline. Nor has China invested in the Russian upstream sector, even as Western oil companies have retreated. In relation to the Western sanctions, China has kept buying Russian oil above the price cap but through third parties or domestic independents. China's main state-owned fleet has not carried Russian oil since the implementation date. Nor has China provided alternative insurance to actors trading in Russian oil.

These actions taken together point to an initially cautious, arms-length approach that is somewhat in conflict with official rhetoric. This stance is probably influenced by three main factors: China's relations with the West and the threat of sanctions, China's risk diversification strategy and the fact that China can afford to adopt a wait-and-see approach.

First, providing substantial support to Russia could provoke Western sanctions against China. Given that China's trade relations with the West are essential to its economy and, in turn, its broader strategic objectives, risking an economic conflict is not likely to be seen as worthwhile to support a partner's war in which China has no direct stake. Nonetheless, China does have indirect stakes, and probably a long-term interest in maintaining Russia as a useful strategic partner, and does not want to see a collapse of its economy, and certainly

not regime change. China is therefore likely to continue balancing between its conflicting goals.

Second, China's long-term diversification strategy acts as a constraint on any substantial, rapid change in its energy relations. Maintaining existing global energy trade relationships is in China's interest, while also ensuring that its dependence on Russia remains within acceptable limits.

Third, given that China is currently relatively well-supplied and that Russia's eagerness to enhance energy ties is likely only to grow over time, China can afford to adopt a wait-and-see approach. This enables China to assess the direction and resolve of the Western response while postponing the strengthening of energy ties with Russia until a less contentious period, such as following a ceasefire or even a resolution of the war in Ukraine.

In sum, China is currently balancing between supporting its most important strategic partner in its challenge to the Western-led world order and looking after its own more self-centred interests, including maintaining economic ties with its Western trade partners. However, this balancing act might prove unsustainable, and the main impact of China's response therefore lies ahead. This creates potentially difficult future policy choices for Europe, in particular on how to respond to potential Chinese actions to counteract Western energy sanctions on Russia.

China's wider relationship with the West is arguably the most important factor shaping future Russia-China energy relations. If wider diplomatic and economic relations are maintained at current levels, China may continue its balancing act, resulting in only moderate increases in energy trade and sanctions circumvention. However, if relations deteriorate, a stronger and more asymmetrical Russia-China axis is likely to be formed through increased oil and gas trade, investment and efforts to undermine sanctions.

To ensure successful implementation of Europe's policy on Russia, it is crucial to encourage China to maintain its initially cautious stance. This might be achieved by a combination of incentives and deterrents aimed at preserving economic relations and collaboration while maintaining the threat of secondary sanctions. As deterrents, Europe could prepare for a deterioration in relations by securing and re-shoring critical supply chains, and by planning and coordinating potential secondary sanctions. Furthermore, Europe needs to establish its red lines regarding unacceptable levels of sanctions evasion and Russia-China energy collaboration, along with determining proportional responses as well as the acceptable costs and risks associated with potential escalation with China.

In terms of incentives, Europe could continue to structure its Russia sanctions in a manner that rewards China's compliance, as is the case with the oil import embargo and price cap. Europe should also strive for collaboration with China where possible, for example in low-carbon energy technology.

In addition, Europe should address its own domestic energy concerns and long-term position vis-à-vis China in terms of energy security, affordability and competitiveness. This would include policies on increased domestic energy production, or production in friendly countries, and reduced fossil fuel consumption through increased substitution and efficiency. Redistribution policies might also be important to balance the economy and maintain political support for the Western stance on Russian energy.

Finally, in the likely cases analysed here, Russia's position as an energy superpower is weakening, while the asymmetry in the energy relationship between Russia and China is increasing in China's favour. This shift further strengthens Beijing's decisive role in world affairs, amplifying an already defining trend of the 21st century.

## Appendix 1. Methods and data

### Main research design and data sources

This report is based on a quantitative analysis along four dimensions of Russia-China energy relations since the 2022 invasion of Ukraine: oil and gas trade flows, upstream assets, midstream deals and sanctions compliance. This investigation is complemented by a compilation and analysis of key energy projections. Based on these two pillars and other relevant studies, a qualitative analysis of implications and possible options is presented.

The main data sources used are China customs data, CREA and Kpler shipping data, and Rystad upstream oil and gas data. China customs data is available at <http://stats.customs.gov.cn/indexEn>.

CREA compiles real-time shipping data for Russian energy exports. Aggregates of the data are available at <https://www.russiafossiltracker.com/>. For this project, access to the source data was kindly provided by Lauri Myllyvirta, lead analyst at CREA. The ship-by-ship dataset includes almost all individual energy shipments from Russia since February 2022.

Proprietary Kpler and Rystad UCube data was also used. The Rystad UCube database contains information on over 85 000 oil and gas assets globally. The database and model are described further in Wachtmeister (2020).<sup>112</sup>

### Price-volume modelling of Russian pipeline gas in 2022

The exact pricing terms for Russia-China Power of Siberia 1 flows are a commercial secret, but we know it is an oil-indexed contract, i.e. the contracted gas price is linked to a benchmark oil price and a particular factor, or slope, describes the strength of the link.

The model for the Russia-China pipeline volumes after December 2021 was established by comparing historical monthly Brent prices at various time lags with the prices for Russian pipeline gas from December 2019 to December 2021. The step-like pattern of historical gas import prices suggests the use of a formula incorporating a reference period, a time lag, and a price validity period. The commonly used 6-3-3 pricing formula fits the data well. This formula represents a contract with a reference period of 6 months, a time lag of 3 months, and a price validity period of 3 months. For instance, the gas price for January, February, and March remains constant, based on the 3-month lagged, 6-month average of oil prices from April to September. . These lagged Brent prices, multiplied by a constant of 0.08, closely match the observed Russian pipeline prices. The constant derived here, the so-called slope, is in line with initial estimates,<sup>113</sup> which put it at around 10% with a 9-month time lag.

Implied volumes for 2022 onwards can be estimated using official Chinese customs figures for the total value of Russian pipeline gas imports and the Brent to gas price model above.

### Projections of Chinese oil and gas consumption, production and import needs

The selection of projections in the section on *Potential for further energy trade: China's import needs and possible Russian shares* aims to map the full range of plausible future developments. It relies on International Energy Agency (IEA) World Energy Outlook (WEO) demand scenarios and energy consultancy Rystad Energy's UCube model for production projections, as well as scenarios from CNPC, China's main state-owned oil and gas company.

The scenarios and projections used are described further below.

The IEA WEO demand projections represent different policy ambitions on meeting climate targets.<sup>114</sup> The Stated Policies Scenario (STEPS) describes the projected outcome if governments keep to existing policies and only employ additional policies that are already under development. It can therefore be viewed as a somewhat conservative benchmark for the future, since it does not assume any further policy changes than those which are currently underway.

The Announced Pledges Scenario (APS) shows the projected outcome according to announced ambitions and targets, even though no concrete policies yet exist to underpin these developments. For China, these targets include reaching peak carbon emissions before 2030 and achieving carbon neutrality before 2060, which entails reduced oil use. A comparison of STEPS and APS shows that current and stated policies are not enough to move China towards its climate ambition, according to IEA modelling. The Reference scenario from the US EIA International Energy Outlook shows the projected outcome if no new policies were to be introduced, even those currently underway.<sup>115</sup>

Projections of oil production in China are less dependent on climate policy and more dependent on resources, technology and the economics of oil production. The production projections are derived using Rystad UCube, a state-of-the-art bottom-up field-by-field database and model.<sup>116</sup> Due to the lead times involved in oil production, from discovery to investment and production, and the long lifetime of fields which can stretch for several decades, detailed bottom-up models can provide useful supply projections with a time horizon of 1–10 years.<sup>117</sup>

A key parameter for future oil supply is future oil prices. The Rystad Base case shows the future oil price level according to the resulting balance of Rystad's own base case assessment of future demand and the model's supply response. The Rystad \$20/barrel and \$120/barrel cases show the model response to high and lower oil prices, respectively, uncoupled from future demand.

## Appendix 2. Scenarios for future gas pipelines

Table A.1 presents three gas import scenarios for 2030. The medium imports scenario based on International Energy Agency (IEA) STEPS demand and Rystad Base case domestic production. The low imports scenario is based on IEA APS demand and high Rystad production. The high imports scenario is based on CNPC demand and low Rystad production.

For each import needs scenario, there are three Russian pipeline scenarios: one with no Power of Siberia 2 (POS2), one with POS2 and a third with POS2 as well as a hypothetical additional pipeline of the same size. Long-term LNG contracts in 2030 are assumed at 120 Bcm/yr in all cases. Non-Russian pipelines are assumed at 97 Bcm/yr, and include only the non-Russian pipelines currently under construction.

The resulting balance between pipeline and long-term LNG supply, and import needs shows an oversupply in all cases except the high imports scenario. In the medium imports scenario, there is not even room for POS2 without reducing or reselling contracted LNG volumes. The resulting share of Russian gas in imports and in total demand is also shown to reach relatively high levels, something which Beijing will probably want to avoid, especially in the light of Russia's actions towards Europe.

	<i>Low imports</i>			<i>Medium imports</i>			<i>High imports</i>		
	<i>No POS2</i>	<i>POS2</i>	<i>POS2+50</i>	<i>No POS2</i>	<i>POS2</i>	<i>POS2+50</i>	<i>No POS2</i>	<i>POS2</i>	<i>POS2+50</i>
China demand	406			443			600		
China domestic production	265			237			199		
<b>Import need</b>	<b>141</b>			<b>206</b>			<b>401</b>		
	<i>No POS2</i>	<i>POS2</i>	<i>POS2+50</i>	<i>No POS2</i>	<i>POS2</i>	<i>POS2+50</i>	<i>No POS2</i>	<i>POS2</i>	<i>POS2+50</i>
Russia pipeline	48	98	148	48	98	148	48	98	148
Non-Russia pipeline	97	97	97	97	97	97	97	97	97
LNG long term	120	120	120	120	120	120	120	120	120
<b>Contracted import</b>	<b>265</b>	<b>315</b>	<b>365</b>	<b>265</b>	<b>315</b>	<b>365</b>	<b>265</b>	<b>315</b>	<b>365</b>
<b>Balance Contracted-Import need (+/-)</b>	<b>124</b>	<b>174</b>	<b>224</b>	<b>59</b>	<b>109</b>	<b>159</b>	<b>-136</b>	<b>-86</b>	<b>-36</b>
Russia pipeline share of imports	34%	70%	105%	23%	48%	72%	12%	24%	37%
Russia pipeline share of demand	12%	24%	36%	11%	22%	33%	8%	16%	25%

Notes: Low imports with demand of 406 Bcm/yr is based on IEA APS 2022, Medium with 443 Bcm on IEA STEPS 2022 and High with 600 Bcm on CNPC 2021. Low imports scenario has domestic production of 265 Bcm based on Rystad high price case, medium imports scenario based on Rystad base case and high imports scenario based on Rystad low price case. Scenario POS2+50 equal POS2 (50 Bcm) + additional hypothetical 50 Bcm pipeline. LNG long term = current long-term contracts.



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