ENERGY SUBSIDIES IN RUSSIA

Size, Impact, and Potential for Reform

Apurva Sanghi and Jevgenijs Steinbuks

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- *Chapter 1: Quantifying Energy Subsidies in Russia* was written by Olga Emelyanova, Irina Zolotova, Ilya Dolmatov, Marina Panova, and Adnan Vatansever.
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Abbreviations and Acronyms

BOFIT	Bank of Finland, Institute for Economies in Transition
BTU	British Thermal Unit
CBAM	Carbon Border Adjustment Mechanism
CGE	Computable General Equilibrium
CHP	Combined Heat and Power Plants
CIS	Commonwealth of Independent States
COVID-19	Corona Virus Disease 2019
CPI	Consumer Price Index
CPP	Condensation Power Plants
CS	Consumer Surplus
EEC	Eurasian Economic Community
EEU	Eurasian Economic Union
FAS	Federal Antimonopoly Service
FGC	Federal Grid Company
FNR	Fast-Neutron Reactors
FTS	Federal Tariff Service
GDP	Gross Domestic Product
GEMPACK	General Equilibrium Modelling PACKage
GRP	Gross Regional Product
GRR	Gross Revenue Requirement
GTAP-E	Global Trade Analysis Project-Energy
HIS	Household Income Survey
ICTD	The International Centre for Tax and Development
IEA	The International Energy Agency
IES	The Integrated energy systems
IFC	The International Finance Corporation
IISD	The International Institute for Sustainable Development
IMF	The International Monetary Fund
IP	Industrial Production
LNG	Liquid natural gas
LOB	Lines of Business
MRET	Mineral Resource Extraction Tax
NAO	Nenets Autonomous Okrug
NPP	Nuclear Power Plants
OECD	Organization for Economic Co-operation and Development
PSPP	Pumped-Storage Power Plants
RAO-UES	Unified Energy System of Russia
RBMK	Reaktor Bolshoy Moshchnosty Kanalny (High-Power Channel Reactor)
RES	Renewable Energy Sources
RLMS	Russia Longitudinal Monitoring Survey
ROSSTAT	Russian Federal State Statistics Service
SAM	Social Accounting Matrix
SPIMEX	Saint-Petersburg International Mercantile Exchange
TIES	Technologically Isolated Energy Systems
TPP	Thermal Power Plants
UES	Unified Energy System
UGSS	Unified Gas Supply System
VAT	A Value-Added Tax
VCIOM	Russia Public Opinion Research Center
VIC	Vertically Integrated Companies
WCR	Water-cooled reactor
WTO	World Trade Organization

All dollar amounts are U.S. dollars unless otherwise indicated.

Overview

This report seeks to understand the size, impacts, and potential for energy subsidy reform in the Russian Federation to inform policymakers as they explore approaches to reducing such subsidies. Russia provides significant energy subsidies to both industrial and residential consumers. Previous estimates by the International Energy Agency (IEA) ranked Russia 19th among 41 countries in terms of fossil fuel subsidies as a share of Gross Domestic Product (GDP), and 4th in terms of the total dollar amount of subsidies (after Iran, China, and Saudi Arabia). As many other fossil fuel exporting economies, Russia has been reluctant to cut them because of the multiple policy objectives energy subsidies serve.

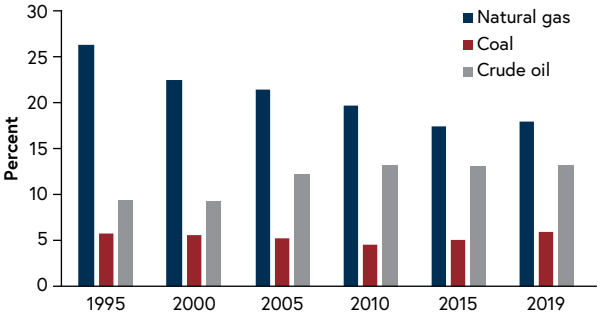
Providing relatively low-priced energy has demonstrated the government's willingness to transfer part of the nation's wealth back to the public and secure an income buffer. The government has also sought to enhance international economic competitiveness by offering cheap energy to energy-intensive sectors, such as metal processing. However, such subsidies have distortionary costs and impacts and are not necessary to achieve these well-intentioned objectives. Providing support to vulnerable populations would be better met through targeted social safety nets rather than providing universal subsidies to those who do not need them. Furthermore, regulatory policies that promote greater openness and cost efficiency are more effective at improving global competitiveness than relying on subsidized inputs.

Russia is one of the leading energy producers and exporters in the world (Figure 0.1). It is among the largest producers and exporters of natural gas, the third-largest oil producer (after the United States and Saudi Arabia), and the second-largest oil exporter after Saudi Arabia. Russia also holds significant reserves of fossil fuels: it has the world's largest natural gas reserves, the second-largest coal reserves, and the sixth-largest oil reserves. Today, the country accounts for about 5 percent of the global energy supply, according to the IEA.

Natural gas plays a crucial role in Russia's energy balance. In contrast to global trends, natural gas—rather than oil and coal—has become Russia's primary energy resource over the past few decades (Figure 0.2). The share of natural gas in Russia's energy supply is one of the highest in the world—about 54 percent. In contrast, natural gas accounts for only 23 percent of the global energy supply. In the United States, the figure is 33 percent; in Qatar, 88.5 percent; and in Canada, 35 percent (2018 figures).

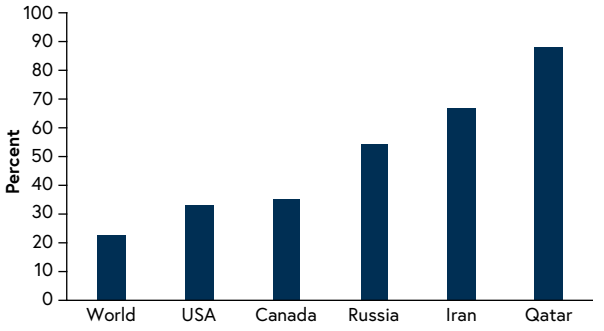
Russia's electric power generation sector relies heavily on thermal power plants. It is one of the country's biggest natural gas consumers, accounting for 34.4 percent

Figure 0.1. Russia's share of global energy production is high—especially in natural gas and oil



Source: International Energy Agency.

Figure 0.2. Share of natural gas in Russia's energy supply is one of the highest in the world



Source: International Energy Agency.

of domestic natural gas demand. Over recent decades, non-fossil fuel (mainly hydropower and nuclear plants) power sources have accounted for just one-third of the total installed capacity for electricity production.

The first two chapters of this report estimate the macroeconomic and fiscal costs of energy subsidies in Russia. These include (a) the total amount of resources spent on subsidies, (b) their indirect costs (cross-subsidies), and (c) the economy-wide impacts of removing these subsidies (including the impact on carbon emissions). Chapter 3 assesses the size and distribution of the welfare impacts of subsidies on households and changes in poverty and inequality. Chapter 4 assesses the willingness of institutional players in the Russian Federation—including key government agencies, energy companies, regional authorities, other businesses (such as energy-intensive manufacturers), and civil society—to support or oppose reductions in energy subsidies. It also provides an understanding of the country's political economy context, which is crucial for the success of policy reforms.

At 1.4 percent of GDP, Russia's energy subsidies to consumers are sizeable

Adopting a common methodology helps facilitate a collective understanding of the precise burden of subsidies and potentially identify acceptable solutions for the reform. This is important because the various stakeholders in Russia's energy sector—government agencies, industrial and residential consumers, and producers—disagree on the definition and size of energy subsidies. The methodology used in this report employs the price-gap approach (that is, assessing the difference between the observed and the "competitive market" price for an energy commodity) and focuses on consumer subsidies in natural gas, electricity, and oil products. The headline findings are as follows:

- In 2019, direct subsidies for natural gas were estimated at $11.3 billion, or 0.7 percent of Gross Domestic Product (GDP), of which $3.7 billion, or 0.2 percent of GDP, was allocated to electricity production.
- Cross-subsidies in electricity and natural gas amounted to a further $6.2 billion, or 0.3 percent of GDP, respectively.
- Subsidies in petroleum, stemming from the reverse excise tax, amounted to $6.6 billion, or 0.4 percent of GDP.

Total consumer subsidies are estimated to be around 1.4 percent of GDP. The remainder of this section provides further details of consumer subsidies in gas, electricity, and petroleum.

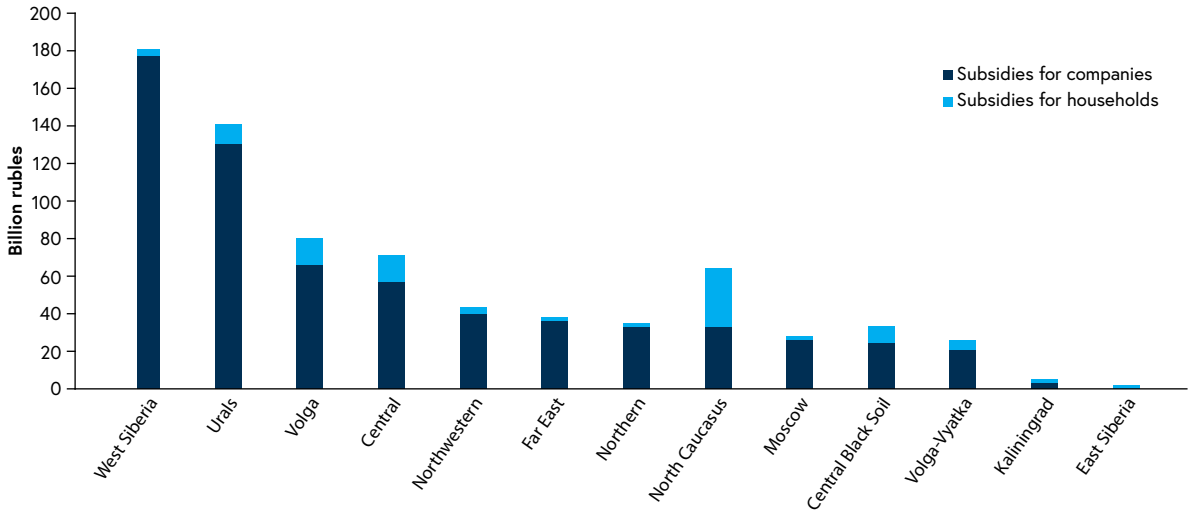
Gas subsidies, at 0.7 percent of GDP, are mostly direct

Domestic gas price formation is broadly shaped by the state in a two-tier market. The first tier is represented by state-owned Gazprom and affiliated companies—the industry's largest producer and operator of the national pipeline network and storage facilities. Gazprom meets about 43 percent of domestic gas consumption and accounts for about 68 percent of natural gas production in Russia. The second tier of the market is composed of the remaining gas producers. These are mainly independent gas producers, such as the private company Novatek and Russian oil companies that produce natural gas.

The Federal Antimonopoly Service (FAS) regulates the price of gas sold by Gazprom to residential consumers and all other consumers, broadly categorized as "industrial." These tariffs are set below the economically justified levels. Based on a price gap approach (Chapter 1), the resulting direct subsidies to residential and industrial consumers are estimated at $11.3 billion (Rub 732.2 billion) or 0.7 percent of GDP in 2019.

Other gas producers not subject to federal regulation commonly sell the natural gas at different prices than

Figure 0.3. The West-Siberia region receives the most gas subsidies



Source: World Bank estimates.

Gazprom, whose wholesale prices are regulated. Additionally, tariffs for residential consumers are set below tariffs for industrial consumers, even though the cost of gas delivery to the latter is typically lower. This effectively results in a cross-subsidy (also known as a social subsidy) whereby industrial consumers are responsible for subsidizing residential consumers. Natural gas cross-subsidies paid by industrial consumers are estimated at $0.4 billion (Rub 24.8 billion) in 2019, which is considerably lower than direct subsidies received industrial consumers (Figure 0.3) Russian regions benefit differently from gas subsidies: the West-Siberia region was estimated to gain the most from current gas subsidies.

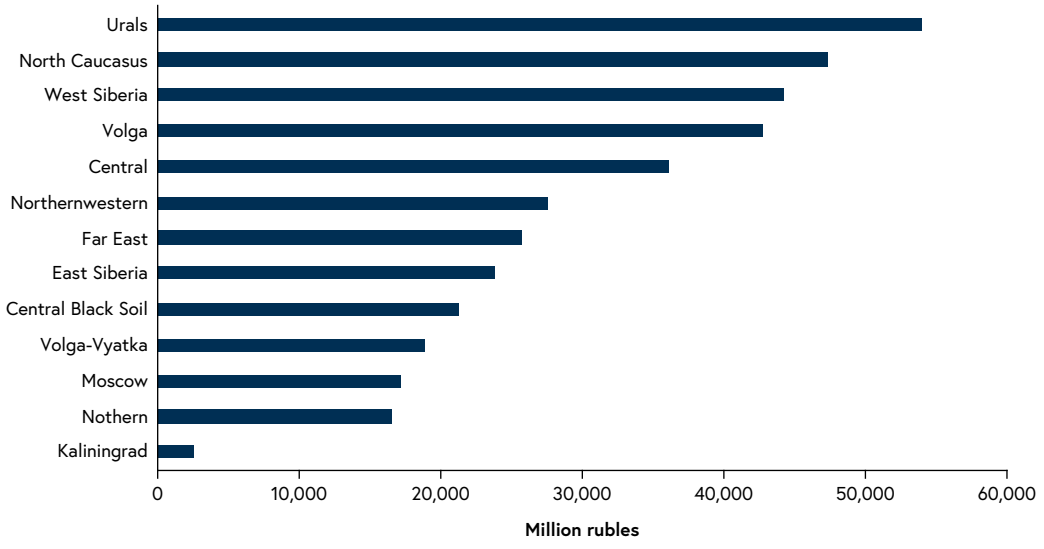
Cross-subsidies in electricity, at 0.3 percent of GDP, vary significantly by region

Russia's electricity sector development is shaped by its vast geographical area and climatic diversity. The sector produces over 45 percent of heat energy for communal heating in the winter period, plus hot water supply, and heat for production processes, in addition to supplying power. Uneven population distribution and industrial production have resulted in three tiers of power supply systems (Box 0.1).

Tariff setting—and consequently, estimating subsidies and cross-subsidies in the electricity sector—is complicated given these geographical and climatic differences. Direct subsidies in the electricity sector (stemming from natural gas consumption) in 2019 are estimated at $3.7 billion (Rub 238.7 billion), or 0.2 percent of GDP. Currently, electricity power tariffs in Russia in the residential sector are on average 1.3 times lower than for other consumers. Other consumers (mainly large industrial enterprises) carry an extra tariff burden paying for a portion of the cost of electric power supplied to the residential sector, resulting in a cross-subsidy. These cross-subsidies in the electricity sector are estimated at $5.8 billion (Rub 377.3 billion), or 0.3 percent of GDP (2019 figures).

Three macroregions account for almost 38.6 percent of the total amount of cross-subsidization (Rub 145.5 billion). These are the Ural, North Caucasus, and West-Siberian macroregions (Figure 0.4). The average cost-recoverable tariff for households in Russia is calculated as Rub 5.23 ruble per kilowatt-hour, which is 1.6 times higher than the actual tariff rate. Given the limited scope for a reduction in the cost of electric service, bringing households' tariffs to this economically justified level will require increasing actual tariffs. In Moscow, for example, residential tariffs would have to increase by 10 percent, and in the East Siberia region, by 145 percent. At the same time, eliminating the cross-subsidy would lead to significant decreases of around 9.5 percent on average in nonresidential consumer prices across all regions, with the most significant reduction in Kaliningrad (by around 18,9 percent), the North Caucasus macroregion (15 percent), and the Far East macroregion (13,7 percent).

Figure 0.4. Electricity cross-subsidies by region



Source: World Bank calculations.

Box 0.1. Russia's complex spatial and climatic diversity has led to a three-tier power supply system

- Russia's Unified Energy System (UES) oversees the operation of hundreds of power plants in the European part of Russia and the southern areas of the Siberian and the Far East federal districts in parallel through electricity grids of various voltages and a unified dispatch control system. Ninety-three percent of installed electric power capacity is connected to UES and accounts for 96.5 percent of electricity production. The UES consists of seven integrated energy systems (IES), with five systems forming the European part of the UES.
- Technologically isolated energy systems (TIES) are not connected to the UES of Russia through electricity grids, primarily because they operate in remote regions (Chukotka, Kamchatka, Sakhalin, the Magadan region, the Norilsk node of the Krasnoyarsk region, and, until recently, Republic of Sakha (Yakutia)). Each of these energy systems has a centralized dispatch center with power fed to the unified electricity grid to be distributed among consumers. In 2019, the TIES accounted for 2.4 percent of total installed electric power generation capacity and 1.6 percent of electricity generation.
- The zone of decentralized power supply covers vast areas in the eastern regions of the country and the northern regions of European Russia, where population and production centers are remotely located and widely distributed. The need for electric power is met by local power plants not connected to energy sources in other settlements. The total capacity concentrated in this zone comprises 4.6 percent of the country's total generation capacity; it accounts for 1.9 percent of electric power generation.

Petroleum subsidies, at 0.4 percent of GDP, are driven by domestic policy interventions

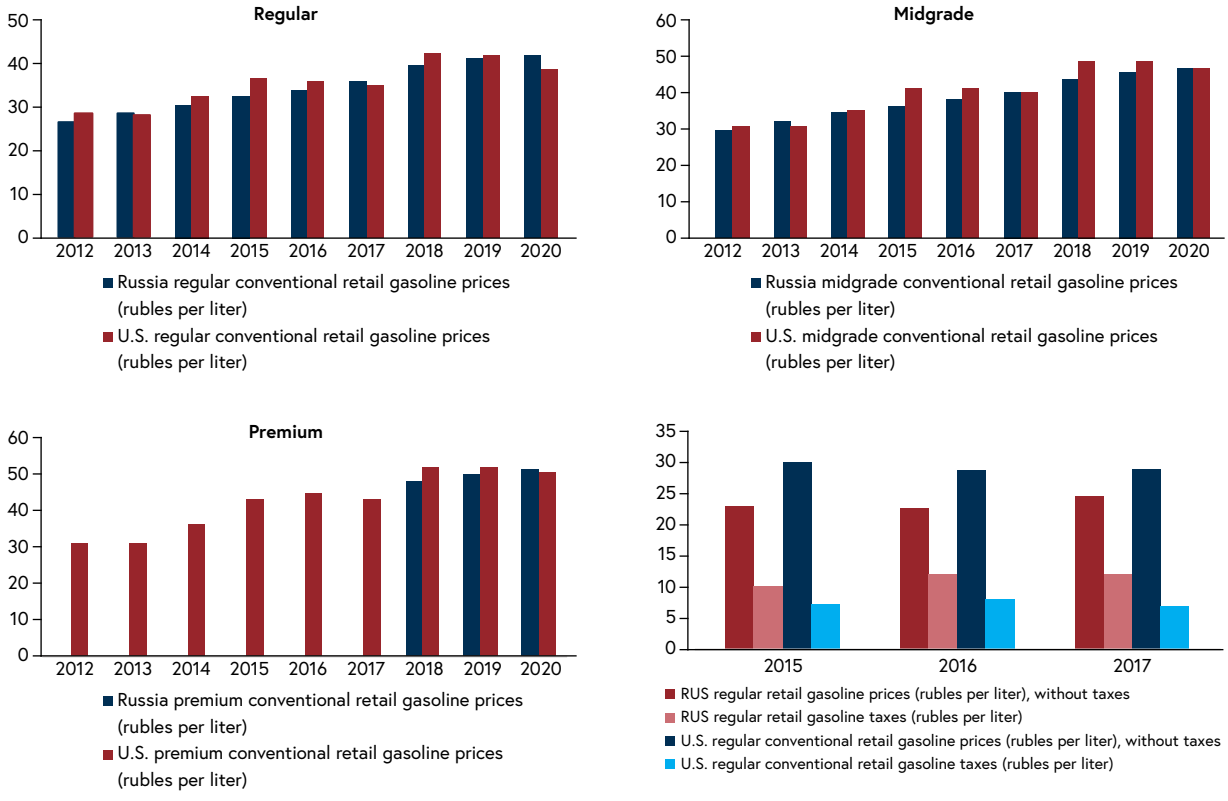
The price-gap approach was used to compare retail prices for petroleum in Russia and the United States. U.S. prices are highly competitive, capture the hyper-efficiency of the downstream sector, and are subject to low taxes. The findings do not reveal significant differences (Figure 0.5), and retail petroleum prices in Russia appear to be broadly in line with the U.S. benchmark.

Prices in the Russian oil market were liberalized in the mid-1990s, and formally, they are market-determined. However, substantial export duties created market distortions by driving a wedge between domestic and international petroleum prices, mostly benefiting refineries. Government policies to gradually phase out these export duties (by 2024) put upward pressure on domestic prices. That has led the government to intervene through new policy instruments, such as the reverse excise tax with a damping mechanism (Chapter 1), aiming to keep petroleum prices for consumers at a relatively lower level. Subsidies from such interventions amounted to $6.6 billion (Rub 428 billion), or 0.4 percent of GDP in 2019.

Estimated subsidies are conservative

Producer subsidies in this report were excluded due to data limitations and time constraints. However, in other assessments—notably by the Organization for Economic Co-operation and Development (OECD)—producer subsidies are estimated at around 0.7 percent of GDP (2019 figures). Oil production accounts for the largest GDP share of producer subsidies and dwarfs natural gas extraction and coal mining. Moreover, measurement issues arising from the lack of reliable metering make it difficult to estimate the amount of subsidies going to communal services, notably district heating. These measurement difficulties were also compounded by poor payment discipline in the residential segment of the gas market. Russian district heating companies are also notably associated with

Figure 0.5. Retail petroleum prices in Russia are broadly in line with the benchmark



Source: Rosstat, U.S. Energy Information Administration.
Note: Comparison of Russian and U.S. gasoline prices (rubles per liter).

non-payment or delayed payments; consequently, local and regional governments have regularly had to subsidize district heating companies. There may be other implicit subsidies such as subsidized transportation costs and environmental externalities that are not fully accounted for. For these reasons, subsidy estimates presented in this report should be deemed conservative.

Removing energy subsidies would boost GDP and jobs, benefit regional economies, and lower carbon emissions

Given the size of energy subsidies in Russia, what would happen to key economic indicators and carbon emissions if subsidies were removed, both at national and sub-national levels? Key findings are as follows:

- Eliminating energy subsidies would reduce energy demand in certain sectors of the economy and boost economic activity at both national and regional levels. More economic activity leads to higher emissions, suggesting that overall carbon emissions could increase.
- Instead, owing to energy demand reduction, emissions decrease, although the decline is modest. Put together, these two findings indicate a boost in economic activity with limited climate benefits.
- There are significant variations in economic activity and carbon emissions at sub-national levels, with poorer regions experiencing a bigger boost in economic activity (in relative terms).

These findings stem from the original and novel modeling work undertaken for this report (Chapter 2). The computable general equilibrium (CGE) model was calibrated to include intricate details of 13 macroregions of the Russian Federation, namely, Central, Central Black Soil, East Siberia, Kaliningrad, Moscow, Northern Russia, North Caucasus, Northwestern, Volga, Ural, Volga-Vyatka, and West Siberia. It was further extended to quantify the impact of subsidy removal on carbon emissions.

Three scenarios were designed to estimate the impact of subsidy eliminations on various attributes such as GDP, employment, investment, output, trade, market prices, and consumption:

- **Base case scenario:** In Scenario 1 (the base case), all subsidies are eliminated on industrial and private household consumption. Removing subsidies results in positive allocative efficiency gains reallocated back to the regions through government transfers, in proportion to the government revenues received.
- **Regional support scenario:** Scenario 2 builds on the base case and transfers subsidy expenditures saved to the three economically weaker regions, namely the Volga-Vyatka, the North Caucasus, and the Central regions.
- **Investment support scenario:** Abolishing energy subsidies for energy-consuming industries may reduce their economic efficiency and adversely affect their competitiveness in world markets. Scenario 3 implements the base case scenario (Scenario 1) and simultaneously compensates energy-consuming industries for the loss of subsidies. It is assumed that such measures, in total, will stimulate the economy and ensure the economic efficiency of energy-intensive industries. Government transfers are allocated to these sectors to ensure that investments in them do not fall, while investments in other sectors may be allowed to rise or fall organically.

Impact on GDP: national GDP could increase by about 0.55 percent with wide regional variations

Based on this analysis, a reasonably positive outlook for Russia emerges in the baseline scenario, which may further be bettered by compensating the poorer regions more (Scenario 2) or else compensating those hurt by the reform (Scenario 3). In the baseline scenario, when subsidies are eliminated, Russia's GDP could increase by 0.52 percent, private consumption by 0.5 percent, government expenditure by 0.54 percent, and exports by 0.43 percent. Investment and imports are estimated to decline by 0.83 percent and 0.46 percent, respectively. Gross regional product (GRP) increases in all regions. In the North Caucasus, Volga-Vyatka, and West Siberian regions, for example, GRP increases by 1.52 percent, 1.36 percent, and 0.92 percent, respectively. In absolute terms, the per capita GRP of the West Siberian macroregion increases by $116, that of Volga-Vyatka by $72, and North Caucasus by $68 (Figure 0.6). Chapter 2 provides more results on the impact on trade, investment, and oil, gas, and electricity prices.

Figure 0.6. Regional economies would benefit from the removal of energy subsidies

Percentage change in GDP

Percentage change in investment

Source: Rosstat, World Bank staff calculations.
Note: Base case scenario results.

In Scenario 2, national GDP increases by 0.55 percent, and there is an increase in the GRP of the three poorest macroregions: Volga-Vyatka (2.61 percent), North Caucasus (2.72 percent), and the Central region (0.69 percent). This is due to the greater transfer of savings from subsidy elimination to these regions. The estimated increase in the GRP of other regions is lower than the increase in Scenario 1. In Scenario 3, overall GDP also increases by about 0.55 percent, with a corresponding rise in GRP across all regions. Investment in all regions declines in Scenarios 1 and 2 but increases in Scenario 3, for which the subsidy elimination in energy-intensive sectors is compensated.

Climate impact: carbon emissions could decline by 0.43 to 0.75 percent

With the removal of subsidies, CO_2 emissions are estimated to decline by 0.43 percent in Scenario 1, 0.49 percent in Scenario 2, and 0.75 percent in Scenario 3 (Table 0.1). The greater decline in Scenario 3 is brought about by the shift in consumer preferences from emission-intensive energy sources (such as natural gas) towards cleaner sources, as energy sectors receive compensation for the subsidy removal. Eliminating subsidies would reduce CO_2 emissions across all the regions. The decline is more pronounced in the West Siberian (−2 percent), Kaliningrad (−1.2 percent), and Far Eastern (−0.74 percent) regions due to the decline in the output of oil, electricity, and energy-intensive industries and the shift in endowment commodities towards other productive sectors.

Table 0.1. Eliminating subsidies would reduce CO_2 emissions across regions

Region	Percent change	Change in million metric tons of CO_2
Central	−0.52	−1.82
Central Black Soil	−0.76	−0.53
East Siberian	−0.08	−0.03
Far Eastern	−0.74	−1.68
Northern	−0.22	−0.03
North Caucasus	−0.13	−0.14
Northwestern	−0.33	−0.50
Volga	−0.97	−1.47
Ural	−1.07	−2.43
Volga–Vyatka	−0.09	−0.03
West Siberian	−2.00	−7.97
Kaliningrad	−1.24	−0.25
Moscow	−0.15	−0.83
Russia total	−0.76	−17.70

Note: Results for base case scenario three.
Source: World Bank staff calculations.

Impact on jobs and prices: There are sizeable employment gains, whereas price changes are ambiguous

The model, which allows for a distinguishing of the impact on jobs by skill level, estimates the change in national employment to be about 0.46 percent for skilled and about 0.67 percent for unskilled labor under Scenario 1 (the magnitudes of changes are roughly similar for the other scenarios). Consumer prices decline by 0.6 to 0.7 percent in Scenarios 1 and 3 due to the excess supply of goods and services resulting from cheaper industrial energy prices. However, prices increase by 1.4 percent in Scenario 2 because some Russian regions experience substantial increases in private consumption due to high transfer amounts received for subsidy elimination. The resulting excess demand pushes up both commodity and consumer prices.

Understanding channels of impact

In general, the economic gains resulting from eliminating subsidies stem from the following factors:

- The savings available from subsidy elimination offer more fiscal space to the government and increase spending on other productive sectors of the economy.
- Because subsidies are eliminated, the energy sector uses fewer distorted resources allocated to other non-energy sectors. This increases allocative efficiency while boosting the economy.
- While subsidy elimination leads to a decline in the output and consumption of certain energy sectors, others do not experience a similar decline. They may even gain due to interfuel substitution. Because electricity and gas have cross-subsidies, there could be an increase in industrial consumption if the amount of cross-subsidy elimination exceeds the effect of direct subsidy removal.

Welfare losses from the removal of energy subsidies can be fully compensated for

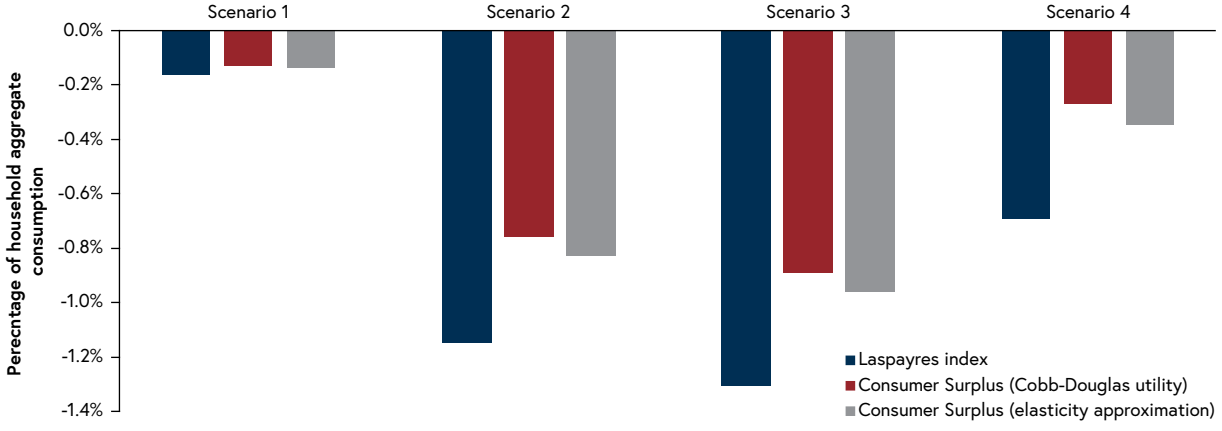
As the previous results show, subsidy reform can have beneficial macroeconomic impacts. However, such reforms will likely have a significant negative impact on the welfare of households and could lead to potential increases in poverty and inequality. Chapter 3 assesses the size and distribution of this impact and identifies changes in welfare indicators at the national level and by groups within the national population, as defined by their socioeconomic, demographic, and geographic characteristics. Notably, the analysis in this chapter does not provide a detailed roadmap for institutional reform architecture; instead, it aims to inform the potential future design of targeted, compensatory measures to avoid the unintended socioeconomic consequences of such policy reforms.

The 2019 Russian Household Budget Survey is used to estimate the distributional impact of a hypothetical removal of pipeline gas and electricity subsidies for households. Using survey data allows for the identification of welfare effects across different population groups. This is not standard practice in CGE models, and developing microeconomic estimates of social welfare losses is, therefore, a much-needed complementary approach to the macro economy-wide analysis. In addition, using the 2019 Russian Household Survey and administrative data yields a more recent estimate of the social impacts of potential subsidy reforms than previous analyses. The findings indicate that:

- Removal of subsidies would adversely affect household welfare (Figure 0.7).
- Subsidies are progressive in relative terms; they represent a larger share of household consumption among poorer than richer households.
- Subsidies are regressive in absolute terms; that is, most of the budget for subsidies goes to groups at the top of the distribution.

These findings point toward designing a compensatory policy that fully protects the poorest segments of the population from welfare losses due to subsidy removal while still leaving resources for investments in energy-efficient production and consumption. A simple simulation exercise of redistribution of only one-third of the additional revenues collected from higher utility prices through lump-sum transfers shows that the population at the bottom 40 percent of the income distribution can be fully shielded from welfare losses in the short term. This indicates that all people most vulnerable to subsidy removal can be protected from the impact of price changes in the short term, even if a large share of additional revenues caused by price hikes is directed towards investment.

Figure 0.7. Removal of subsidies would adversely affect household welfare



Source: Authors' calculations using Russian Household Budget Survey, 2019.
Note: Under Scenario 1, pipeline gas household prices are not subsidized, while electricity prices remain unchanged. Scenario 2 indicates unchanged pipeline gas prices without subsidies for the price of household electricity. Under Scenario 3, neither gas nor electricity household prices are subsidized. Scenario 4 includes an adjustment to prices due to equilibrium estimates of general consumer price changes, in addition to changes in gas and electricity prices.

Another key finding is that the welfare losses of the poorest 40 percent of the population would be fully compensated by allocating only one-third of the extra revenues collected through higher household prices of pipeline gas and electricity. This has an important policy implication since it could free the other two-thirds of revenue for other uses. For example, the additional revenue could be plowed back into the sector to promote energy efficiency, rendering long-term economic and environmental benefits. Alternative compensatory policies could also be designed to strengthen the social safety net, depending on the goals and instruments deployed. Alternatively, these revenues could be used elsewhere in the economy. Regardless, the findings demonstrate that the removal of pipeline gas and electricity household subsidies can be implemented with adequate compensatory policies.

Academic studies of gas and electricity subsidies in other countries render a similar message: the potentially regressive impact of removing general subsidies to energy products can be reversed if well-designed, targeted subsidies compensate the affected population. Recent World Bank studies also support this general message both within and outside the region, for example, in Armenia, Belarus, Kosovo, Morocco, Turkey, Tunisia, Ukraine, and various Central American countries.

The magnitude of the price correction is considerable because average subsidies represent about 40 and 90 percent of the household price in pipeline gas and electricity, respectively—and an even larger proportion in some specific regions or demographic groups. Closing the price gap in the short term would involve sizeable welfare losses for some groups and is therefore inadvisable. A more gradual approach, spread out over time, is more likely to succeed, allowing for efficiency and behavioral changes to take place.

Another relevant finding is that the main source of inequality in the distribution of subsidies is less prevalent across most demographic or geographic divisions and more so across socioeconomic groups. Welfare impacts differ little across regions: most regions have an average welfare loss of around 1.5 percent of aggregate household consumption, in relative terms, and Rub 250 per month per capita, in absolute terms. The main outlier is the case of the East Siberian macroregion, mainly due to the large implicit electricity subsidy. In contrast, the impact in the Central macroregion, despite having one of the largest household consumption expenditures across regions, is smaller than in others due to generally lower implicit subsidies (for example, 15 percent in the Moscow Oblast, from Rub 3.93 to Rub 4.52 per kilowatt-hour; and 31 percent in Moscow City, from Rub 3.94 to Rub 5.20 per kilowatt-hour).

Consequently, compensatory measures should consider household consumption levels and select beneficiaries among those more vulnerable to relatively large welfare losses. This type of targeting would enhance equity both among socioeconomic categories and across demographic and geographic groups (although a few special exceptions to this generalization can be given to some specific groups, for example, pensioners and Siberian and Far Eastern macroregions).

Russia's political economy constrains energy subsidy reform

This report updates and quantifies the size and impact of energy subsidies and demonstrates that removing subsidies would benefit the economy and reduce carbon emissions. The report also demonstrates that those adversely affected by the removal of subsidies can be fully compensated. However, such evidence, while necessary, is not sufficient to drive reform. Although concerns about future reduction in net export revenues from oil and gas (exacerated by the recent energy demand shock from the ongoing COVID-19 crisis and the growing pressures to decarbonize the economy) may create favorable conditions for subsidy reform, deep and entrenched vested interests may prevent necessary reforms. A deeper understanding of the political economy and public perceptions is crucial to understanding the (dis)incentives for reform (Chapter 4).

Distinct features of Russia's economic landscape that hold back reform

The federal budget has generally not been the major source of funding for energy subsidies. In the case of gas and electricity, one group of consumers benefits from subsidies at the expense of other consumers through a process of cross-subsidization. In the case of oil, one can refer to foregone revenues to the federal budget instead of expenditures designated to support subsidization explicitly. Regional and municipal budgets incur expenses to help consumers with their energy expenses as part of

a mechanism to assist households with communal services. However, Russia's case remains unique. It does not fit the profile of a typical oil or gas-rich state whereby the government commits substantial funds to maintain low energy prices. The lack of a substantial direct burden on the federal budget has partly alleviated the urgency for the Russian government to take action on energy subsidies. Russia's energy subsidies have not been part of the budget-making process at the federal level (unlike in countries where the government provides energy subsidies), which narrows the scope of political intervention. In settings where energy subsidies are handled through the budget, subsidy reform typically prompts political battles on reallocating economized expenses. This has not been the case for Russia. Likewise, it has been common for energy-exporting states to launch subsidy reform following a cyclical collapse in oil prices to balance their budgets. In Russia's case, boom and bust cycles in oil prices have not significantly affected the decision-makers' approach to energy subsidies due to the lack of a direct, significant burden. The oil sector appears as a partial exception since foregone revenues have prompted the political leadership to continue pursuing reform that would secure more revenues for the budget while ensuring relatively low prices for petroleum products. There is also a weak fiscal incentive for the government to pursue cross-subsidies reform. As cross-subsidies in the electricity and gas sectors are borne primarily by "industrial" consumers, there has been no significant direct burden on the federal budget. This has alleviated the urgency to take action on tariff reform.

Russia's uneven economic performance has been a significant factor in the government's approach to energy subsidies. Concerns about economic growth feature widely in Russia's political discourse on reforming energy subsidies, prompting an approach that has favored a slower increase in regulated energy prices. The economic boom of the 2000s was accompanied by bold reform measures to reorganize the electricity and gas markets. Major steps to raise domestic gas prices were also taken during this period. By contrast, the weak economic growth since 2013 has coincided with a cautious approach to further changes in the gas and electricity markets. Furthermore, economic performance has impacted domestic energy demand, indirectly affecting the government's plan for subsidy reform. It is common for energy-exporting countries to prioritize energy subsidy reform when rising domestic demand raises concerns over future energy export revenues. For instance, Iran launched a major effort to reduce oil subsidies to curb domestic growth in demand. In Russia's case, the notably strong performance during the 2000s was accompanied by significant growth in domestic energy demand—gas and electricity consumption rose by 19.6 percent and 22.9 percent, respectively, between 1999 and 2008. This exacerbated government concerns over meeting domestic and foreign gas commitments, contributing to a reform plan that incorporates a gradual upward adjustment to domestic gas prices. By contrast, stagnant energy demand has tracked the relatively weak economic performance beyond 2008. One may argue that this has weakened the incentive for the government to take decisive action on energy subsidies.

The fiscal approach of the Russian government constitutes another element of the economic context with implications for energy subsidy reform. Russia's fiscal management has oscillated between a highly expansionary approach and a strictly conservative one over the past three decades, reflecting political battles and changing the economic priorities of the leadership. The sharp decline in oil prices in 2014 and the onset of international sanctions targeting sectors of the Russian economy provided a conducive setting to reintroduce fiscally conservative elements in economic policies. This approach has largely been maintained, as evidenced by the government's choice to adhere to a fiscal rule that significantly restricts spending and its ability to balance its budget again amid relatively low oil prices. In this context, controlling inflation has remained a high priority for the Russian leadership, dampening the pace of growth in regulated energy prices. Meanwhile, a fiscally conservative approach has weakened the possibility of shifting the financial burden of energy subsidies to the state budget.

Mitigating climate change through dedicated policies to reduce energy-related emissions has not traditionally been a high priority for the Russian government. However, there has been a discernable shift in the approach of the Russian government in the recent months, demonstrating its openness for a more vigorous climate policy both at home and abroad. On October 29, 2021, the government issued a new low carbon development strategy, with the

objective of Russia becoming carbon neutral by 2060. This new context is likely to put energy subsidy reform in Russia in the spotlight.

Russia remains an upper-middle-income country where a rise in energy prices constitutes a considerable affordability challenge. With a per capita income of $11,584 in 2019, about a third of the average level for the European Union, closing the gap with international or European energy prices will necessitate the government to take significant political risks. Additionally, the question about affordability has been closely intertwined with a tendency to avoid paying for energy bills. Russian policymakers recognize affordability as a major constraint that has contributed to their cautious approach to subsidy reform. Meetings with focus groups have confirmed that respondents tend to view the current tariffs as high and unfair. Given the relatively lower income of Russian citizens compared to those elsewhere in Europe, focus group respondents have difficulty accepting that energy is underpriced in Russia. Thus, a modest increase in energy prices translates into significant discontent directed at the government. Thus, access to "cheap energy" appears to be a widely shared goal among the public.

Distinct features of Russia's political landscape that hold back reform

A broad consensus among key stakeholders is needed to implement the energy subsidy reform. Building such consensus is not a simple task given the varied and sometimes conflicting policy priorities across the branches of the Russian executive. Issues to be considered include estimating the size of subsidies, establishing benchmarks for domestic prices, and the pace and methods for reform. In areas where key stakeholders within of the executive have coalesced around a similar policy objective, proposals for subsidy reform have gained more traction. For instance, government officials have committed to maintaining a high tax burden on the Russian oil sector, which has prompted an active pursuit of new measures to meet this objective while reforming oil subsidies.

Policy reform with major distributional implications can generally prompt political leaders to adopt a more cautious approach. In Russia's case, concerns about public perceptions and social stability have often shaped approaches to reform. For instance, the Russian government attempted to abolish in-kind benefits in 2004–05, but public reaction prompted it to soften its ambitions for reform. Likewise, similar concerns in 2018 prompted the government to eventually set a less ambitious pace for pension reform. Based on these previous reform experiences, the executive may remain cautious regarding energy subsidy reforms if the public perceives them as a new financial burden.

Finally, the extent to which the Russian leadership prioritizes a specific policy reform can be generally gauged from its periodic programmatic proposals. There has been a tendency for the government to incorporate key priorities in widely publicized strategic and economic programs. Some analysts have argued that adhering to strategic plans has been a significant part of the style of governance in Russia in the past two decades. The Russian government has most recently announced a Unified Plan for Achieving Russia's National Development Goals, which encompasses the fourteen national projects and 42 socio-economic development initiatives for implementation over the period up to 2024. Reforming direct energy subsidies has not been prioritized in this or other major strategic plans. The Russian Energy Strategy to 2035 approved by the government in June 2020 calls for a gradual phase out of cross-subsidies in electricity and natural gas—a welcome positive development.

Windows of opportunity for energy subsidy reforms

There are several key reasons to believe that Russia is in a better position now than earlier to undertake energy subsidy reforms:

- The Russian government's adherence to a relatively conservative fiscal approach in recent years combined with aspirations to achieve higher economic growth, makes it more likely that the Russian government would be willing to prioritize policy options that minimize the burden on the state budget. This approach could help with new measures to extract foregone revenues through implicit subsidies and prevent a shift of the current burden of cross-subsidies onto the federal budget.

- The Russian Government has committed to achieve carbon neutrality by 2060. Energy subsidy reform can feature prominently in the government's policy framework that will spur firms and consumers to engage in climate mitigation. The government's interest in energy subsidy reform is also affected by the context of decarbonization policies implemented by other countries. For example, the European Union's recent proposal to establish a carbon border adjustment mechanism (CBAM) has drawn the attention of the Russian government to the potentially high costs to Russia of border carbon adjustment policies. This proposal has also invigorated discussions among Russian officials about possible remedies such as improved energy efficiency and greater reliance on renewable energy. Phasing out energy subsidies, in principle, can help in both areas.
- The Russian government recognizes the need to move towards a more liberalized gas market, despite disagreements among key agencies on the pace and scope of reform. Russia's official energy strategy for 2035, approved in 2020, calls for a steady increase in regulated benchmark prices, a transition towards deregulated "industrial" prices, and the gradual elimination of cross-subsidies across both types of consumers and regions. From the government's perspective, gas tariff reform presents the opportunity to alleviate some longstanding concerns about excessive gas consumption, heavy reliance on gas in the power sector, and the slow adoption of more energy-efficient technologies in key industries.
- Key stakeholders have expressed a common interest in phasing out electricity and gas cross-subsidies. Both Gazprom and independent gas producers see some significant benefits in the deregulation of "residential" gas prices. Gazprom could see this segment turn into a profit-generating business. Higher residential prices can open new business opportunities for independent gas producers and electric power providers. As Russia's industrial and commercial consumers bear the burden of cross-subsidies, key energy-intensive sectors (such as power plants, metals, chemicals, and fertilizers) have a strong incentive to see the phase-out of these subsidies. Their arguments in favor of enhancing international competitiveness through cross-subsidy reform align well with government priorities on economic diversification.
- Subsidies resulting from price distortions for oil have constituted substantial foregone revenues for the Russian government, unlike in the gas and electricity sectors. This has prompted the government to undertake a series of efforts to minimize its foregone revenues. As reforming oil sector subsidies has been directly intertwined with reforms pertaining to Russia's oil tax regime, the question about their gradual removal is likely to remain a policy priority. The government's pursuit for minimizing its foregone oil revenues can provide an opening for a more comprehensive approach to taxation of the oil industry, with the potential to address concerns across the oil value chain.

Four pathways for realizing energy subsidy reform

Russia has several options for reforming gas, oil, and electricity subsidies. These differ in terms of scope and complexity. Each path faces a different level of political and economic constraints. There is a trade-off between modest approaches and those involving more comprehensive reforms. Modest reforms may face fewer constraints but may not always be effective. Comprehensive reforms can be more effective; however, they affect the interests of a wider set of stakeholders, which can impede progress. Essentially, this report identifies four fundamental choices the Russian government will need to consider in pursuing energy subsidy reform. The choices begin with a modest approach to reform and progressively touch on a wider spectrum of policy areas:

1. **Phasing out subsidies versus redistributing their burden:** Multiple proposals by the Russian government to date have focused on redistributing the burden of subsidization among key stakeholders rather than phasing them out. Not only does this approach not end subsidies, but it also faces considerable limitations due to resistance from potentially affected players.

2. **Simple tariff reform versus comprehensive tariff reform:** Another fundamental choice centers on the scope of reforming tariff formation. The simpler approach is to enact policies that gradually raise subsidized energy prices. The alternative is to pair energy price increases with additional reforms that are directly related to price formation. One could refer to "institutional" reforms, such as enhancing the autonomy of regulatory agencies while building administrative capacity for delivering well-targeted support to the public. "Informational" reforms could further accompany institutional ones to enhance the transparency of the prevalent subsidy mechanisms while raising public awareness about the presence and extent of these subsidies.
3. **Subsidy reform in isolation versus comprehensive energy market reform:** A simple approach to subsidy reform focuses on bringing subsidized prices to market levels. Many proposals in Russia have centered on the extent of indexation of regulated energy prices to inflation. The objective has been to ensure a gradual reduction of the gap between subsidized and market prices. The more complex approach is to consider a series of reforms in the respective energy market that aim to address broader problems affecting the functioning of the market. Such reforms aim to enhance competition, where possible, and reduce costs in the long run. Subsidy reform in isolation, while simpler, may not always be feasible if key market players have brought conditionalities for further reform, as has been the case in the Russian gas sector.
4. **Energy sector, including subsidy reform versus a broader package of reforms:** The scope of reform can target the energy sector alone or address a wider set of policy reforms. Reforming subsidies can benefit from additional policy measures. A comprehensive policy would target an extensive field by addressing immediate and long-term concerns over social inequality, improvements in energy efficiency, sustainable growth, climate mitigation, and the enhancement of the economic competitiveness of key economic sectors.

Public perceptions as a key factor in reform

The above choices must be grounded in the "reality of public perceptions." This study undertook four focus group discussions to better understand public perceptions as a potential factor in energy subsidy reform. The group discussions were conducted online in April 2021. The focus groups were established to examine perceptions on energy, namely electricity and gas, in three selected regions: Moscow, Ivanovo, and Neberezhnye Chelny (Tatarstan). Respondents were asked about additional services such as heat, waste management, and municipal services. In Neberezhnye Chelny, two separate groups distinguished by income levels participated. All groups were inclusive regarding gender, housing type, household size, education level, quantity and type of energy use, and eligibility for social assistance. The focus groups provided valuable insights concerning public perceptions of energy subsidies imperative in understanding barriers to and solutions for effective subsidy reform.

The study found that public is generally not in favor of subsidy reform. Key findings related to public perceptions in energy subsidy reform are as follows:

- **Perceptions on quality of service:** The discussions revealed a considerable lack of public discontent regarding the quality of gas and electricity services. Any significant complaints were related primarily to other services such as waste management or maintenance of apartment buildings. The lack of alternative energy service providers (due to lack of competition) was mentioned as a key area for improvement. Respondents with the lowest income demonstrated the highest level of satisfaction with energy services. The overall high degree of public satisfaction with gas and electricity services is significantly different from other countries where the World Bank has engaged in subsidy reform. Existing studies have revealed that public perceptions of subsidy reform can be improved if the reform is accompanied by a significant improvement in the quality of services. This incentive appears to be lacking in Russia's case.

- **Public perceptions of gas and electricity tariffs:** While all respondents appeared well-informed about the amount they paid for electricity and gas, they tended to view current prices as excessive and unfair. The recent economic context, which respondents blamed for stagnant salaries, was one reason for this perception. However, discontent related to energy prices focused on heating services rather than gas and electricity. Heat consistently ranked as the one utility for which households paid the most. By contrast, many respondents recorded the smallest energy-related expenses on gas. Additionally, there was a widely-shared perception that utility prices would continue to rise in the near future.
- **Public awareness of subsidies:** The group discussions revealed a near-total lack of awareness of a subsidy component in the final price of electricity and gas. Many respondents questioned the definition of a subsidy, suggesting that lower-priced energy services could not be defined as a subsidy in the context of a country rich in energy resources. Most respondents identified the government when asked who bears the cost of subsidies for residential consumers (higher-income respondents were more likely to identify industrial/commercial consumers). When told that subsidies are borne mainly by industrial/commercial consumers and asked whether/how this could change, respondents were divided. Some of them favored the status quo, while others thought the government should step in and pay for the subsidies instead of industrial/commercial consumers, as the latter had the option to reflect the cost of the subsidy in the price of their products.
- **Response to an increase in tariffs following subsidy reform:** The potential reaction of respondents to tariff increases was broad, with no single option preferred. Potential reactions included cutting energy consumption, cutting other expenses, stopping paying bills, joining protests against subsidy reform, and supporting political candidates who oppose tariff increases.
- **Trust in the government to successfully implement subsidy reform:** Responses from respondents indicated a significant lack of trust in government to successfully implement subsidy reform. Many thought that targeting households based on income levels might not be implemented successfully because of eligibility issues and their negative experiences with previous reforms.
- **Perceptions on what drives subsidy reform:** Focus group respondents demonstrated a high degree of skepticism about potential motives for the Russian government to launch subsidy reform. The skepticism related to assertions that the government aimed to help businesses, help improve public welfare, and address climate change concerns. A few respondents thought that further raising the profits of service-providing companies might constitute the actual motive behind potential subsidy reform. Finally, many respondents suspected that the government's motive was to raise further tax revenues through higher energy and communal services prices.

Faced with multiple options for reform versus maintaining the status quo, focus group respondents overwhelmingly supported the latter. Respondents were also asked to choose from four reform alternatives in exchange for removing subsidies. These were (a) expand government services for the public, (b) compensate only low-income households, (c) receive government support to improve residential energy efficiency, and (d) adjust tariffs based on consumption levels, where households with low energy consumption pay lower prices and those with high energy consumption pay more. Responses were notably lukewarm to the possibility of having the government commit to providing more services and helping with energy efficiency improvements. To endorse these options, respondents needed more specific government commitments (such as energy subsidies or eligible appliances). The most supported option was adjusting tariffs based on consumption levels. Lower-income respondents were more supportive than their high-income peers in this regard. Some were uncomfortable with the definition of eligibility. Others noted that low-income families already receive allowances from the state, and it was unclear how a targeted subsidy would take this into account or make a difference. These findings underscore the need to shape public perceptions.

Ten policy options for policymakers to consider

In the context of reform options and public perceptions, the report concludes with the following ten policy recommendations:

1. **Focus on proposals that gradually eliminate cross-subsidies instead of redistributing the burden:** Redistributing the burden of a subsidy can often appear as an appealing policy option. However, this approach only helps to delay actual reform. Moreover, it generates new sets of challenges for affected stakeholders. New redistribution patterns can become entrenched and hard to reverse.
2. **Comprehensive tariff reform is more likely to be effective than simple tariff increases:** Supplementing policy initiatives to raise regulated prices for residential consumers with additional institutional and informational reforms can ensure a stable and effective tariff policy. Consumers can be provided with utility (gas, electricity) bills that include a breakdown of the charges and indicate the extent of the subsidy in the final price. Improving awareness about who bears the actual burden of the subsidy can help address misconceptions and potentially enhance public support for reform.
3. **Subsidy reform is more likely to succeed if accompanied by additional energy market reforms:** A comprehensive set of sectoral reforms could support subsidy reform. Progress in each of them can facilitate finding a lasting solution on energy subsidies. In addition, further reforms both in the power and gas sectors can help accomplish effective subsidy reform.
4. **Promote additional reforms in the power sector:** While the power market has mainly been liberalized, many remaining issues constrain the scope for tariff reform. Promoting broader competition, encouraging more private companies' involvement in power generation, and fostering more competition in the retail sector, along with measures that make it easier to switch suppliers, can constitute significant steps. Measures improving the transparency of grid tariffs and establishing benchmarks for the expenditures of grid companies could encourage lower costs.
5. **Promote additional reforms in the gas market:** The two-tier market that has evolved in Russia's gas industry has given rise to largely conflicting interests between Gazprom and independent gas producers. There is no easy way to break the stalemate that has emerged between these players. Yet, moving forward with tariff reform necessitates the government to strike a new balance between these interests. Initial steps could include improved transparency regarding Gazprom's gas transportation tariffs in exchange for deregulating its "industrial" prices, while unbundling transportation services could be considered a subsequent measure. Meanwhile, comprehensive reform in the gas sector will necessitate incremental steps that consider affordability for consumers, sector investment needs to meet potential growth in export demand and seasonal peak demand at home, plus the government's targets for further gasification of the country. Expanding the effectiveness of SPIMEX as a platform for trading gas can also help build a better functioning gas market.
6. **Promote social protection and energy efficiency policies that help vulnerable consumers:** Previous pilot projects for establishing a "social consumption norm" for electricity revealed the need to develop a thorough methodology based on a larger number of parameters that better identify consumers needing support. Expanding peak-load electricity pricing and smart meters can also assist cost-conscious consumers in lowering their bills. Consumers can be provided with assistance for installing smart meters. While establishing a targeted approach to subsidies, the government can also put more effort into advancing the administrative capacity of regional authorities in the provision of targeted allowances. Introducing seasonality in gas pricing for residential consumers can also help strike a better balance between the interests of these consumers and the gas industry.
7. **Promote additional reforms affecting the pricing of petroleum products:** The Russian government has taken steps to gradually transition towards an oil tax regime that targets profits rather than gross revenues. However, the government may need to

focus on improving its administrative capacity to enforce profit-based taxation. A common practice in countries with a profit-based tax regime is to allow the finance ministry to benefit from the expertise of other ministries (such as the Ministry of Energy) in areas such as geology and engineering. Additionally, the Russian government could review its approach to supporting an oversized refining sector that includes many geographically mislocated refineries. Establishing clarity about the optimal amount of refinery throughput for Russia as a whole can be helpful. The government could also establish a schedule for phasing out negative excise taxes and damping mechanisms, setting a credible target for the refining industry to adapt. Finally, higher taxes on the consumption of petroleum products could provide significant scope to collect more revenue for the budget while helping build a mechanism that offers additional room for responding to fluctuations in international oil prices.

8. **Develop a comprehensive approach to economic reforms as a factor facilitating subsidy reform:** The Russian government has multiple tools at its disposal to facilitate progress in subsidy reform. Tools such as assistance with energy efficiency or a targeted approach to providing social assistance could help stakeholders negatively affected by tariff increases. Other tools can help align subsidy reform with broader, long-term policy objectives. Incorporating these tools in a broader strategy can help secure a more successful approach to subsidy reform. For instance, the policy agenda on energy efficiency can be integrated into the policy discourse on energy subsidies, identifying clear targets for each area.
9. **Incorporate subsidy reform among nationally set priorities:** For over two decades, the government has incorporated economic and social priorities in strategic and economic programs. Incorporating energy subsidy reform in a strategic document, such as the Unified Plan for Achieving Russia's National Development Goals, could prompt Russian institutions to act on measures supporting subsidy reform.
10. **Develop an effective communication strategy to gain public trust and support for tariff reform:** In the broadest terms, it is possible to suggest that the Russian public remains reluctant to support tariff reforms that will raise energy prices. Furthermore, there is a considerable lack of trust in the government's ability to develop mechanisms to adequately compensate significantly affected households. Public surveys could reveal what aspects of subsidy reform might appeal to the public while identifying policies and other ways to build trust in government. These steps could form the basis of an effective communication strategy that would help the government gain public confidence in its ability to accomplish tariff reform fairly and effectively.

Ultimately, issues surrounding the removal of energy subsidies in Russia need to be thought through carefully as part of a package of competitiveness, efficiency, governance, and social protection reforms, as Russia strives to join the ranks of high-income nations.

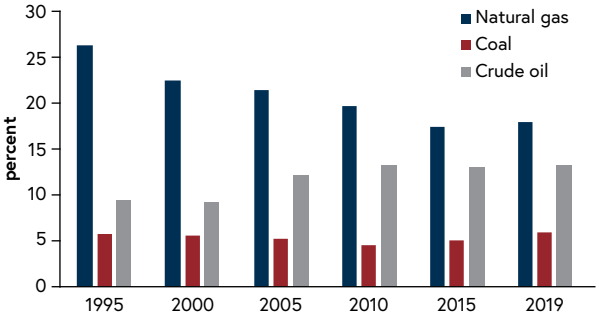
1 Quantifying Energy Subsidies in Russia

This chapter quantifies the amount of energy (consumer) subsidies in Russia. Natural gas subsidies totaled $11.3 billion (Rub 732.2 billion), or 0.7 percent of GDP in 2019. The natural gas "cross-subsidy" in favor of households was estimated at $0.4 billion (Rub 24.8 billion), or 0.02 percent of GDP. An important consumer of natural gas, the electricity production sector gained $3.7 billion (Rub 238.7 billion), or 0.2 percent of GDP, through natural gas subsidies. Cross-subsidization in electricity was estimated at $5.8 billion (Rub 377.4 billion), or 0.3 percent of GDP. Oil product subsidies amounted to $6.6 billion (Rub 428 billion), or 0.4 percent of GDP in 2019. In 2019, energy subsidies (gas, electricity, oil) totaled $23.7 billion, or 1.4 percent of GDP.

Russia is one of the leading energy producers and exporters in the world (Figure 1.1). Russia is the third-largest primary energy producer in the World after China and the United States and accounts for 10.3 percent of global primary energy production.[1] The country holds the world's largest natural gas reserves, the second-largest coal reserves, and the sixth-largest oil reserves. Russia is among the largest producers and exporters of natural gas, the third-largest oil producer (after the United States and Saudi Arabia), and the second-largest oil exporter after Saudi Arabia. The country accounts for about five percent of the global energy supply,[2] with natural gas being the primary source of total energy supply in Russia (Figure 1.2). Phasing out fossil fuel subsidies remains a major global challenge. These subsidies contribute significantly to carbon emissions that cause global warming. And their intended beneficiaries—the poor—gain significantly less from these subsidies than the wealthy, who generally consume more energy. Subsidizing fossil fuels also reduces public money available for schools, hospitals, and social programs to help poor and vulnerable populations. This chapter aims to quantify fossil fuel energy subsidies in Russia.

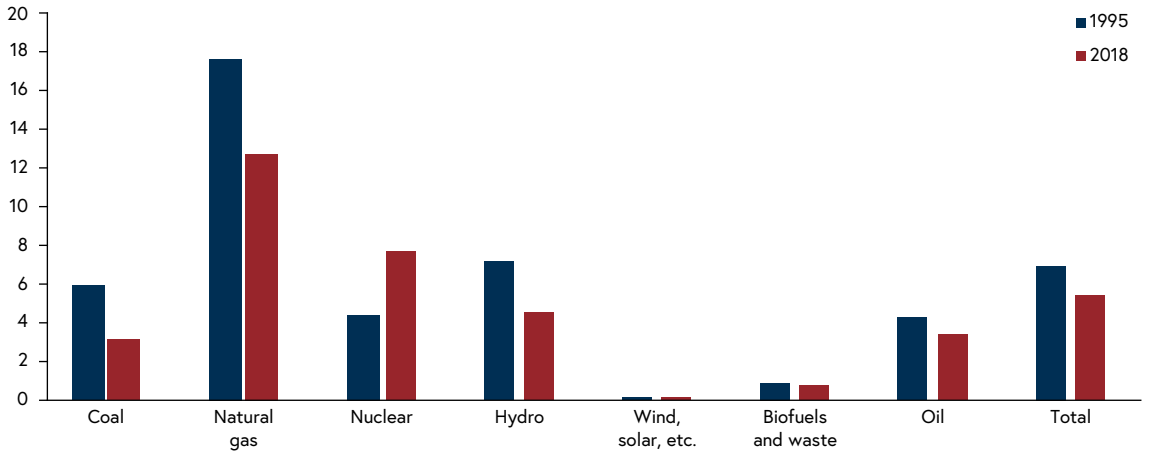
Fossil fuel subsidy estimates have relied on two main strategies: quantifying the value transferred to market participants from particular government activities (program-specific or inventory approach) and assessing the difference between the observed and the "free market" price for an energy commodity (price-gap approach).[3] For the inventory approach, the strong sides include the possibility to capture all transfers (affecting end-market prices or not) as well as the opportunity to

Figure 1.1. Russia's share in global production of natural gas, crude oil, and coal



Source: International Energy Agency.

Figure 1.2. Russia's share in global energy supply by source



Source: International Energy Agency.

account for risk transfers through lending or insurance subsidies. Weak sides of the approach suggest that it does not address questions of ultimate incidence of price distortions, requiring detailed program-level data. The price-gap approach adopted in this Report addresses pricing distortions and does not require detailed data but is sensitive to assumptions regarding "free market" reference prices and transportation prices. It shows a lower-bound estimate of support that ignores transfers that do not affect end-market prices, increasing the revenues that energy producers retain.

This chapter accounts for energy subsidies for natural gas, electricity, and oil products. Coal subsidies were excluded from our research due to data limitations and time constraints. Indirect costs of externalities (for example, health impacts due to greater pollution) in the definition of energy subsidies[4] are also excluded and could be a topic for future exploration. The producer subsidies for oil and gas extraction, processing, transportation and distribution, infrastructure subsidies such as gasification are also beyond the scope of this study and are covered by the OECD fossil fuel subsidy assessment.

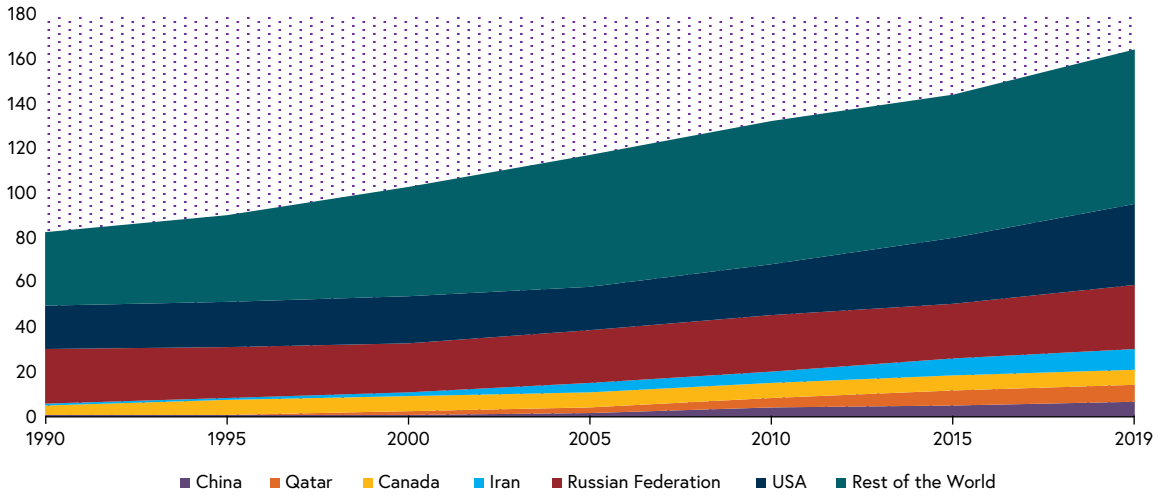
Natural gas: direct subsidies and cross-subsidies

In 2019, Russia was the second-largest producer and the largest exporter of natural gas. State-owned companies, mainly the Gazprom group, dominate the gas extraction sector in Russia. While some market elements in domestic gas price formation have been introduced, it is broadly shaped by the state. Since the mid-2000s, the state proceeded with gas pricing reforms to reach the netback parity with the European gas markets. However, these reforms were interrupted by oil price increases and the 2014 crisis, which resulted in recession and significant ruble depreciation. In 2019, direct subsidies for natural gas were estimated at $11.3 billion (Rub 732.2 billion), or 0.7 percent of GDP. The natural gas "cross-subsidy" in favor of households was estimated at $0.4 billion (Rub 24.8 billion).

In 2019, Russia was the second-largest producer (Figure 1.3) and the largest exporter of natural gas. While Russia's share in global natural gas production has decreased compared to 1995, it still accounts for about 18 percent[5] of global natural gas production. The percentage of natural gas in the total energy supply for Russia is among the highest in the world—about 54 percent (Figure 1.4). This is compared to about 23 percent globally, about 33 percent in the United States, 88.5 percent in Qatar, and 35 percent in Canada.[6] The largest share of domestically consumed gas goes to heating and electric energy production (37 percent), 15 percent is consumed by households, 9 percent—by firms of the fuel energy sector, 8 percent—by communal and housing sector, 6 percent—metallurgy, 25 percent—other sectors.[7]

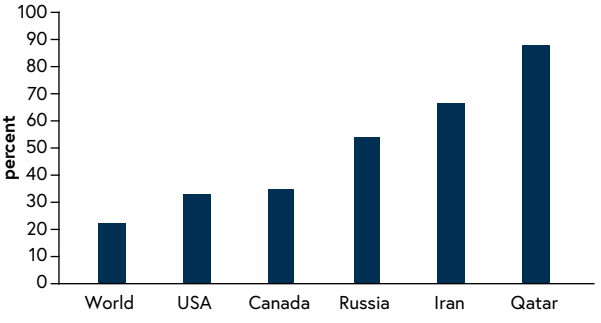
In 2019, Russia exported about one-third of extracted natural gas, with the European Union being the main export destination (Figure 1.5). Within the

Figure 1.3. Key natural gas producers worldwide (Terajoules, millions)



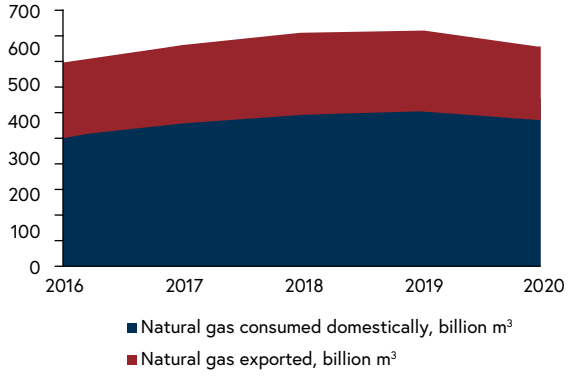
Source: International Energy Agency.

Figure 1.4. Share of natural gas in the total energy supply (percent)



Source: International Energy Agency.

Figure 1.5. Russia exports about one-third of extracted natural gas



Source: CBR, Rosstat.

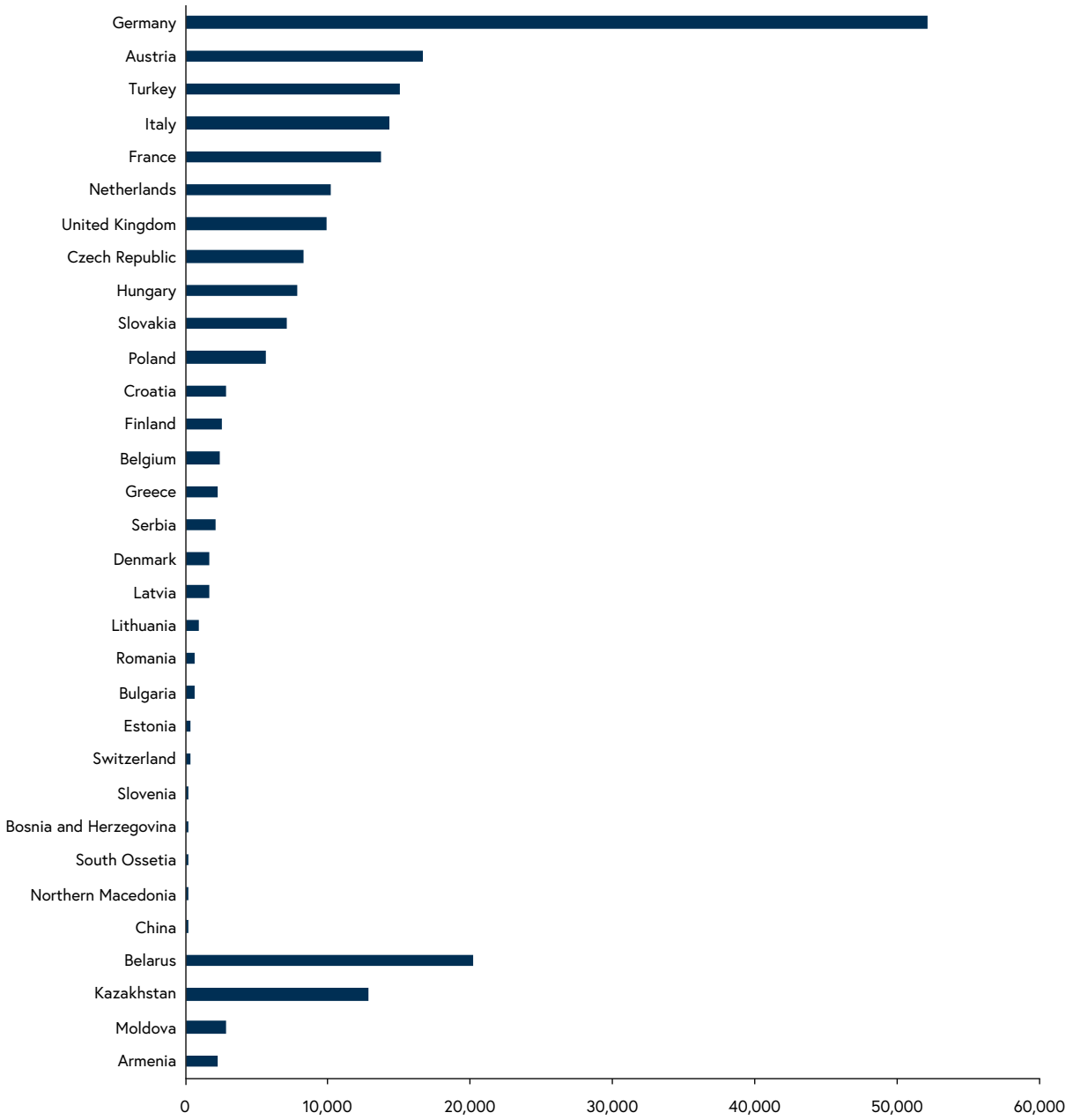
European Union, Germany, Austria, Italy, and France (Figure 1.6) imported the most natural gas from Russia. Belarus and Kazakhstan were the largest importers among CIS countries. Russia's pipeline gas share in the European gas market stood at about 36 percent in 2019. Considering liquid natural gas (LNG) exports, the share of gas supplied by Russia totaled about 39 percent in the European market in 2019.

State-owned companies, mainly the Gazprom group, dominate the gas extraction sector in Russia. At the beginning of 2021, there were 260 companies involved in the extraction of natural gas, of which 76 companies were part of vertically integrated holdings, while 158 were independent oil/gas extraction companies. Despite the share of natural gas produced by Gazprom (50.2 percent of the company controlled by the state) decreasing from 80 percent in 2009 to 68 percent in 2019, it remains high. Another state-owned company, Rosneft, accounted for about 9 percent of total gas production in 2019. Gazprom's group share of natural gas used domestically has been decreasing, although it still reached about 43 percent in 2019. Gazprom is the owner of the Unified Gas Supply System of Russia,[8] through which about 74 percent of natural gas was supplied within Russia in 2019. In addition, Gazprom is the only authorized exporter of pipeline gas. LNG production has been growing quite rapidly since 2009, increasing eightfold in real terms. LNG is mainly supplied for exports (in equal shares to European and

Asian gas markets). There is no monopoly of Gazprom Group over the exporting of LNG (Gazprom Group accounts for about 20 percent of LNG exports).[9]

While some market elements in domestic gas price formation have been introduced, it is broadly shaped by the state. Essentially, the Russian gas market has two tiers that determine how gas is priced. The first tier is represented by state-owned Gazprom and affiliated companies—the industry's largest producer—and the operator of the national pipeline network and storage facilities. The second tier of the market is composed of all of the remaining gas producers. These are mainly independent gas producers, such as the private company Novatek and Russian oil companies that produce natural gas. What

Figure 1.6. The main destination of the Russian gas is the E.U. (natural gas exports, million m^3)



Source: Russian customs statistics.

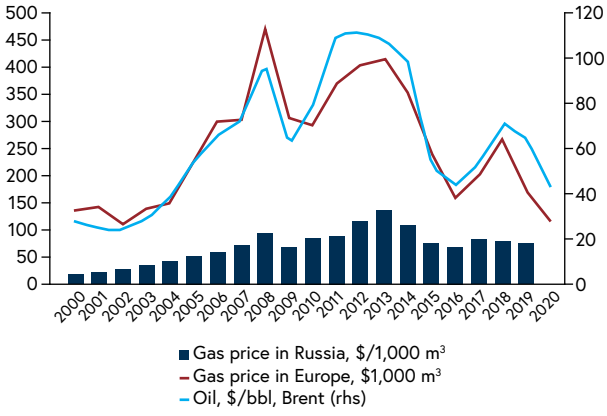
distinguishes Gazprom from other gas producers is that they commonly sell gas at different prices. Gazprom's wholesale prices are regulated. FAS regulates the price of gas sold by Gazprom to residential consumers and all other consumers, broadly categorized under the term "industrial."[10] Tariffs for residential consumers are set below those for industrial consumers, even though gas delivery costs to the latter can be typically lower. This effectively results in a cross-subsidy whereby industrial consumers subsidize residential consumers. By contrast, other producers can sell their gas to industrial consumers at unregulated prices (see Annex 1A). In 2014, organized gas trade was introduced at the Saint-Petersburg International Mercantile Exchange. At the exchange, Gazprom sells natural gas at an unregulated price, as do other suppliers. However, the volume of gas sold at the exchange is less than 10 percent of the domestic gas market. Independent gas producers have progressively expanded their market share at the expense of Gazprom, thanks to their ability to sell gas at lower prices.[11] In 2019, Gazprom Group satisfied about 43 percent of domestic gas consumption, compared to 62.6 percent in 2010.

Additionally, Gazprom's pricing involves cross-regional subsidization. The FAS determines transportation charges. However, the variation of wholesale prices across regions does not fully reflect geographic distances, indicating that transportation charges are not well-aligned with costs. The result has been the emergence of significant disparities in profitability in Russia's regions.

The state plays defining role in price formation. Gazprom satisfies about 43 percent of domestic gas consumption and state-regulated tariffs for gas transportation through Russia's Unified Gas Supply System, which channeled about 74 percent of domestically supplied gas in 2019. In addition, as the owner of the Unified Gas Supply System, Gazprom decides the route for gas transportation for third parties. In doing so, it takes into account the parameters and balance of the whole system. The law therefore does not require transport by the shortest route.[12]

Since the mid-2000s, the state proceeded with gas pricing reforms to reach the netback parity approach[13] with the European gas markets. These reforms were interrupted by an increase in oil prices in 2011–13 and the 2014 crisis, which resulted in significant ruble depreciation. The average ruble price for natural gas for Russian IP

Figure 1.7. Gas prices in Russia and Europe, US$ per 1,000m^3



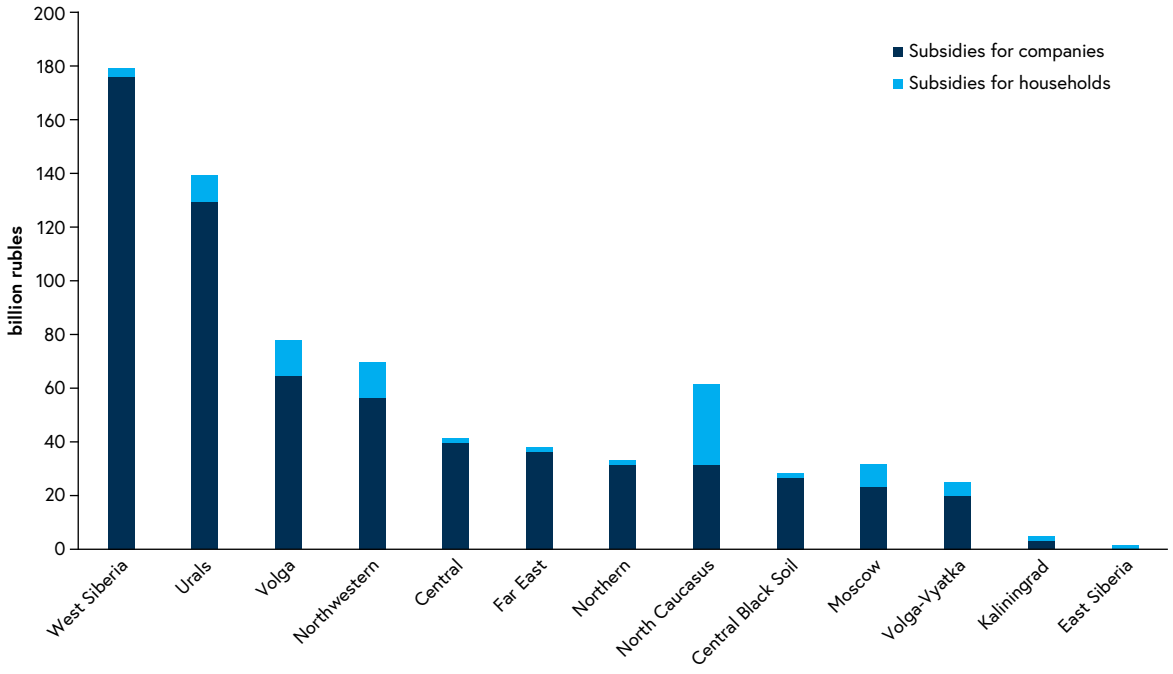
Source: Rosstat, World Bank Commodity Outlook, Haver.

producers in 2015–19 increased by 66 percent, compared to the average of 2006–14. However, it dropped in U.S. dollar terms due to the ruble depreciation (Figure 1.7).

The methodology for quantifying direct subsidies in wholesale gas prices was based on the price-gap approach (see Annex 1B for details). Direct subsidies were calculated using the netback parity price and 2019 data: the price of natural gas exports to the "far-abroad" countries, adjusted for transportation costs and export duty, was used as a benchmark. The calculation was conducted for each region to account for Russia's vast geographic size and thus different transportation costs within Russia. Direct subsidies for natural gas were estimated at Rub 732.2 billion ($11.3 billion), or 0.7 percent of GDP in 2019 (Figure 1.8).

The quantification of cross-subsidization in the natural gas market is methodically challenging and based on a rigorous approach calculating sector imbalances (see Annex 1C for details). Traditionally, cross-subsidization is exercised by setting lower (compared to cost-recoverable or "economically justified") tariffs for certain consumer groups at the expense of others. However, the netback parity gas price (used as the economically justified price) exceeds the wholesale gas price for both households and other consumers. Therefore, the full amount of the price imbalance (that is, the difference between actual tariffs for households and other consumers) cannot be considered cross-subsidization (as in this case, lower prices

Figure 1.8. Natural gas subsidies received by Russian regions



Source: World Bank estimates.

for households are not offset by higher set prices for all other consumers). The cross-subsidy was calculated as a difference between the direct household subsidies and average subsidies weighted by residential sector natural gas consumption. Cross-subsidies are estimated at $0.4 billion (Rub 24.8 billion).

Electricity: direct subsidies and cross-subsidies

Russia's unique geographic and climate characteristics have a profound effect on the organization of the national power sector. Historically, thermal power plants (TPP) combusting fossil fuels have formed the basis of the country's electric power sector. A significant consumer of natural gas, the electricity production sector gained $3.7 billion (Rub 238.7 billion), or 0.2 percent of GDP, through natural gas subsidies in 2019. Cross-subsidization in electricity was estimated at $5.8 billion (Rub 377.3 billion), or 0.3 percent of GDP.

Main characteristics of Russia's power generation sector

Russia's vast geographical area and climatic diversity define the distinctive features of the national electric power sector. Along with its primary function of supplying electricity, the sector also produces more than 45 percent of heat energy for communal heating during winter, the hot water supply, and heat for production processes. Uneven distribution of population and industrial production has resulted in the operation of three distinct types of power supply systems in the Russian electric power sector:

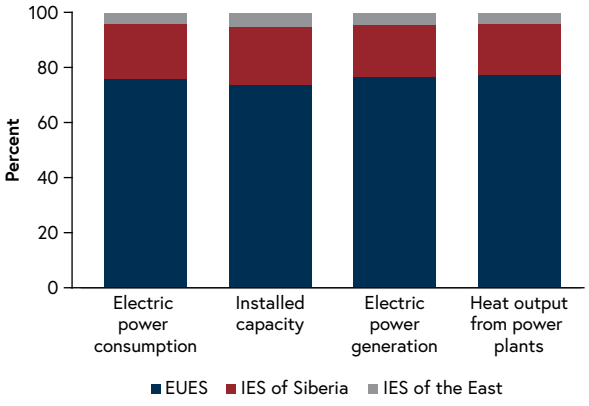
- The Unified Energy System (UES) of Russia ensures the operation of hundreds of power plants located in European Russia and southern areas of the Siberian and the Far East federal districts in parallel via electric grids of different voltage levels and a unified dispatch control system. Ninety-three percent of installed electric power capacity is connected to UES, accounting for 96.5 percent of produced electricity. At the same time, most generation capacity is concentrated in the European part of the UES (EUES) (Figure 1.9). The UES consists of seven integrated energy systems (IES), with five systems forming part of the EUES.
- Technologically isolated energy systems (TIES) are not connected to the UES of Russia through electric grids, primarily because they operate in

remote regions (Sakhalin, Kamchatka, Chukotka, the Magadan region, the Norilsk node of the Krasnoyarsk region, and, until recently, Republic of Sakha (Yakutia). Each of these energy systems has its centralized dispatch center with power fed to the unified electric grid to be distributed among consumers. In 2019 the TIES accounted for 2.4 percent of total installed electric power generation capacity and 1.6 percent of electric power generation.

- The zone of decentralized power supply covers vast areas in the eastern regions of the country and the northern regions of the European part, where population and production centers are located with low density and highly distributed. In contrast, the need for electric power is met by local power plants not connected to energy sources in other settlements. The total capacity concentrated in this zone makes up 4.6 percent of the total generation capacity in the country; the share of such power plants in electric power generation is 1.9 percent.

Net export of electric power comprises merely 2 percent of total electric power generation. In 2020, total electric power generation in Russia stood at about 1,000 billion kilowatt-hours, including 1,050 to 1,080 billion kilowatt-hours generated by the UES of Russia (Table 1.1). In contrast to the fuel subsectors of the energy sector that actively export energy products, the net export of electric power is merely 2 percent of total electric power generation. The UES of Russia has connections via cross-border transmission lines with all bordering states (historically, former Soviet republics were integrated with the UES of the Soviet Union). Finland and China are major power importing countries (Table 1.1).

Figure 1.9. Distribution of key production indicators in the UES of Russia in 2019



Source: UES System Operator.

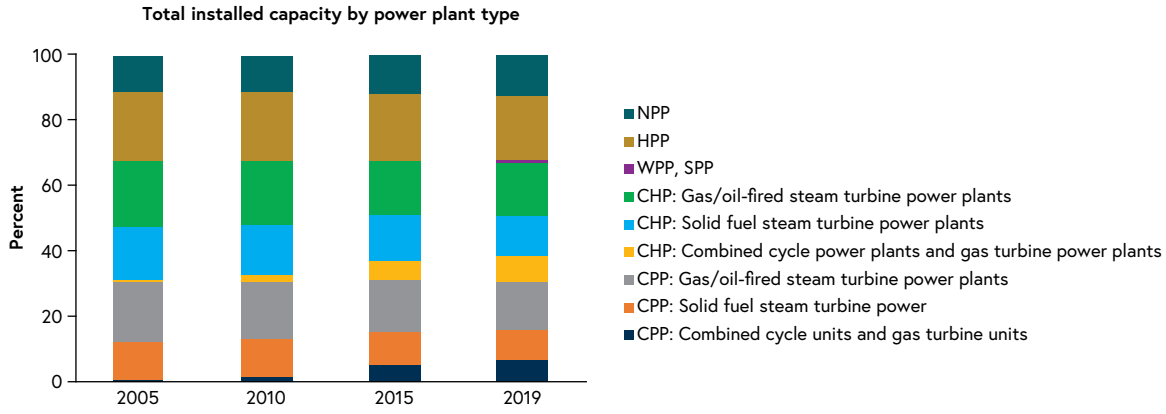
Historically, thermal power plants (TPP) combusting fossil fuels have formed the basis of the country's electric power sector. The total share of TPPs installed generation capacity of the UES of Russia is around 66.8 percent (Figure 1.10). It is important to note that

Table 1.1. Generation, consumption, and net export of electric power in the UES of Russia

	2005	2010	2015	2016	2017	2018	2019	2020
Home consumption of electric power, bln kWh	907.3	989.0	1,008.3	1,026.9	1,039.9	1,055.6	1,059.4	1,033.7
Electric power generation, bln kWh	918.5	1004.7	1,026.9	1,048.5	1,053.9	1,070.9	1,080.6	1,047.0
Heat generation by power plants, MM Gcal	563.0	583.2	537.7	559.1	553.5	571.3	548.7	n/a
Balance of export/import of electric power, bln kWh	11.2	15.8	18.6	21.6	14.0	15.4	21.2	13.3
Including major net importers								
Finland	10.3	10.5	3.9	5.9	5.8	7.9	7.6	3.0
Baltic countries	-3.2	1.3	1.0	1.9	2.3	4.0	4.9	1.7
China	0.5	1.0	3.3	3.3	3.3	3.1	3.1	3.1

Source: UES System Operator.

Figure 1.10. Total installed capacity by power plant type



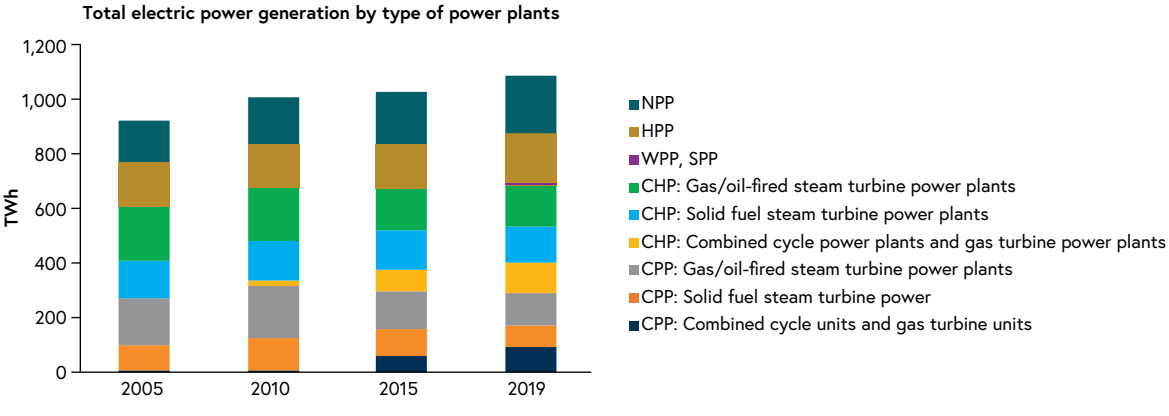
NNP = Nuclear power plant; HPP = Hydro power plant; WPP = Wind power plant; SPP = Solar power plant
Source: UES System Operator, Institute for Energy Studies (Russian Academy of Sciences).

natural gas, rather than coal, has been the main energy resource for several decades, in contrast to global trends. Another specific feature is that more than half of TPP capacity is combined heat and power plants (CHP), which generate both electric power and heat for industrial and heating needs and domestic hot water. The share of single-product condensation power plants (CPP) is around 45 percent. Currently, around two-thirds of electric power is generated by TPPs. TPPs based on combined cycle power plants and gas turbine power plants are the fastest-growing sector being more efficient and having a "priority" commitment status due to lower fuel costs (Figure 1.11).

In the past 10–15 years, non-fossil fuel power sources have been a steady one-third of the total installed capacity of UES of Russia. Hydropower plants (HPP) are the largest segment of the non-fossil fuel power sector. According to IEA data, Russia takes fifth place (52 million kilowatts) in the ranking of hydroelectric installed capacity and hydropower generation. Russia also has two pumped-storage power plants (PSPP).

Nuclear power plants (NPP) are the next largest non-fossil fuel power segment in Russia. According to *Rosenergoatom* data, 11 NPPs are operating in the country with a total capacity is 30.3 million kilowatts. In terms of electric power generation and installed capacity, the Russian nuclear power sector ranks fourth and fifth, respectively. Various reactor types are used to produce electric power. Water-cooled reactors (WCR) account for almost one-third of NPP capacity (21 units out of

Figure 1.11. Total electric generation by type of power plant



NNP = Nuclear power plant; HPP = Hydro power plant; WPP = Wind power plant; SPP = Solar power plant
Source: UES System Operator, Institute for Energy Studies (Russian Academy of Sciences).

37), high-power channel-type reactors such as Reaktor Bolshoy Moshchnosty Kanalny (RBMK) that have been gradually taken out of service account for a further 30 percent. And separately, a new generation of reactors such as fast-neutron reactors (FNR) has been developing in Russia; these reactors will assist in the transition to the so-called closed fuel cycle.

Currently, the input of the modern renewable energy sources sector (RES) in Russian installed capacity is small. In 2019 total modern renewable installed capacity, including wind and solar power plants, stood at 1.5 million kilowatts, or around 1 percent of total capacity.

Uneven distribution of energy resources across the country defined the uneven nature of the generation mix in the electric power sector in the European and the eastern part of Russia (Figure 1.12). While gas/oil-fired TPP and NPP dominate in the European part of UES (EUES), the electric power sector of the regions in Siberia and the Far East is characterized by the predominance of HPPs and coal-fired plants owing to the high hydro potential of Siberian rivers and location of main deposits of coal in that part of the country.

Specific features of electric power pricing

The organization of electric power pricing in the Russian Federation reflects the outcomes of pro-market reforms that have been taking place in the country in recent years. These reforms include the transition from state vertically integrated utility to the creation of power markets, including the unbundling of operations into competitive activities (electric power generation) and regulated natural monopolies (electric power transmission and distribution) related to the electric power supply to retail consumers (end users).

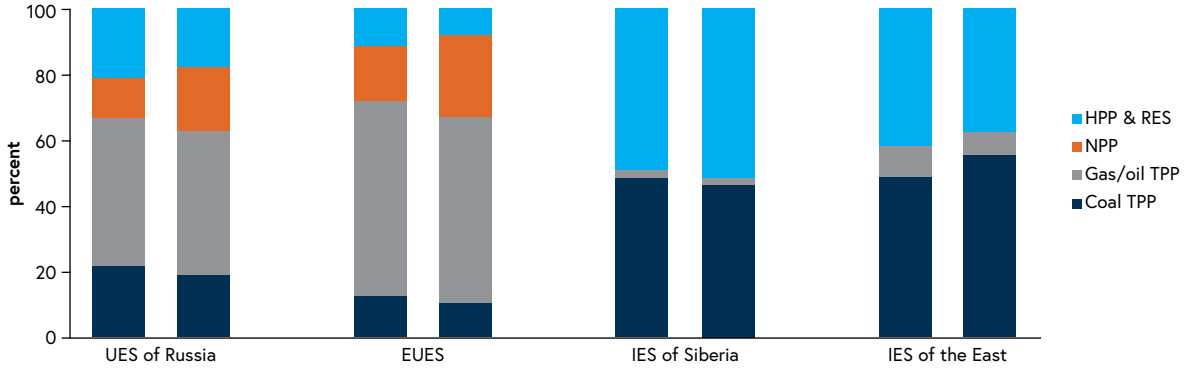
The retail price for electric power for end-users takes into account the following factors reflecting basic business processes:

- The price for electric power (including capacity payments) in the competitive wholesale market (and/or purchases from retail generators)
- The tariff for electric power transmission
- Sales markup by the guaranteed supplier (or a fee for services provided by independent power providers)
- Tariffs for services provided by distribution companies, which are an integral part of the process of supplying electric power to end consumers

Some components of the final retail price for electric power are set through state regulations (for example, transmission and distribution services tariffs and sales markups of guaranteed suppliers), while others are determined by the market mechanisms (such as electricity prices in the wholesale market), contractual relations between market participants.

Tariffs for electric power supplied to households continue to be regulated. The same applies to tariffs in the Russian regions where the electric power market and the capacity market have some operational specifics (liberalization started in 2018 and will proceed in phases through 2022), tariffs in the non-price zones of the market, and isolated areas.

Figure 1.12. Generation installed capacity mix (left columns) and electric power generation (right columns) in UES (2019)



Source: UES System Operator; database of the Institute for Energy Studies (Russian Academy of Sciences).

The single "pot" principle of tariff setting (or "boiler" tariff) for services of electric grid companies is used in regards to the cost of electric power transmission services in the Russian Federation. The required amounts of (planned) revenues (gross revenue requirement, GRR) of electric grid companies operating in each region for relevant voltage levels are summed up at each voltage level to set single pot tariffs for each Russian region. GRR considers the required costs of regional electric grid companies, as well as services provided by the Federal Grid Company, and electricity (capacity) bought in the wholesale market in compensating for losses in electric grids. The gross revenue requirement of electric grid companies is calculated based on the return on capital and long-term indexation. The cost of electric power (capacity) bought from the wholesale market is a substantial component of the retail price for electric power bought from the wholesale market.

The wholesale market for electric power and capacity operates in the regions bundled into two price zones. The zones are determined by specific planning features, different operating modes, and grid transmission constraints related to electric power transfers from one price zone to another. The first price zone includes the European part of Russia and the Urals (the Central Urals and the North-West Urals (except for areas referred to as the non-price zones), the Southern, the North-Caucasus, and the Ural Federal Districts). The second price zone includes Siberia (the Siberian Federal District). There are also several non-price zones (the Archangelsk region, the Kaliningrad region, the Komi Republic, the regions of the Far East). These are the areas where, due to technological constraints, competitive wholesale markets haven't yet been established, and electric power and capacity are sold according to special rules set by the regulator. Since January 1, 2019, the Western and Central districts of the electric power system in the Republic of Sakha (Yakutia) have been included in the Far East non-price zone. Electric power within the price zones of the wholesale market for electric power and capacity can be sold at regulated prices (under-regulated contracts) at competitive (non-regulated) prices in the day-ahead market, the real-time balancing market, and under free trade (bilateral) contracts.

Since 2011, regulated contracts have been only used for electricity supply to households, similar consumer groups, and buyers operating in areas with special operation conditions in the wholesale and retail markets for electricity and capacity (republics of the North Caucasus, the Republic of Tyva, the Republic of Karelia, and Buryatia). The prices (tariffs) for the supply of electric power and capacity under regulated contracts are calculated based on price indexation formulas determined by the regulator (FAS of Russia). Amounts of electric power and capacity supplied under regulated contracts are determined according to the projected consolidated balance of electric power generation and supplies prepared by the regulator. Supplies under regulated contracts should not exceed 35 percent of the total amount of electric power (capacity) supplied to the wholesale market specified in a generation/supply balance decision for a relevant generator.

Electric power not covered by regulated contracts is sold at competitive prices under the terms of bilateral contracts, in the day-ahead market and the real-time balancing market. The day-ahead market price is set for each of more than 8,500 nodes of both price zones. The day-ahead market determines quantities of electric power sold and included in scheduled generation based on the lowest bids by the suppliers one day before delivery. It also ranks electric power buyers willing to purchase at the highest price or be included in price-taking bids (which reflects the willingness of the buyer to pay for electric power at prices set in the day-ahead market). Prices in the day-ahead market are affected by changes in fuel prices (including heavily subsidized natural gas) and the operating efficiency of power plants. The electricity generation sector, an important consumer of natural gas (165.7 billion cubic meters), gained Rub 219.9 billion (0.2 percent of GDP) through natural gas subsidies in 2019. Trade-in differences between the market schedule and actual system demand are conducted in real-time in the balancing market. Every three hours and one hour before the actual delivery, the Transmission System Operator selects additional competitive bids for sales, taking into account updated consumption forecast for the electric power system, cost-efficient unit commitment, and requirements to system reliability.

A wholesale market participant can require that the capacity provider commits to delivering required electric power of preset quantity, when required, to meet power demand. The capacity payment is allocated

through the competitive selection of generating units considering rotation due to scheduled upgrades of generation turbines of thermal power plants. The capacity sold under capacity purchase agreements is allocated among all consumers within the price zone. The capacity sales treated as must-run generation due to the threat of electric supply shortages are paid for by consumers of a relevant low-voltage transmission zone.

Mechanism of cross-subsidies formation. By law, there is only one channel for cross-subsidies between different consumer groups—through tariffs for electric power distribution and sales markup of the guaranteeing supplier. Household tariffs for electric power distribution are set lower than for other groups of consumers. At the same time, the provision of electric energy to households at regulated tariffs requires the supply of electric energy and capacity under regulated contracts. These contracts are mandatory for all wholesale suppliers. Tariffs for such contracts are defined by FAS (including both electric power and capacity allocation). The important feature of these contracts is that capacity payment tariffs for households are reflective of operational costs only and disregard other cost components, thus overlaying them to other customer groups (see Annex 1D to this chapter for methodology on details of quantifying cross-subsidies). Cross-subsidization in electricity was estimated at Rub 377.4 billion (0.3 percent of GDP).

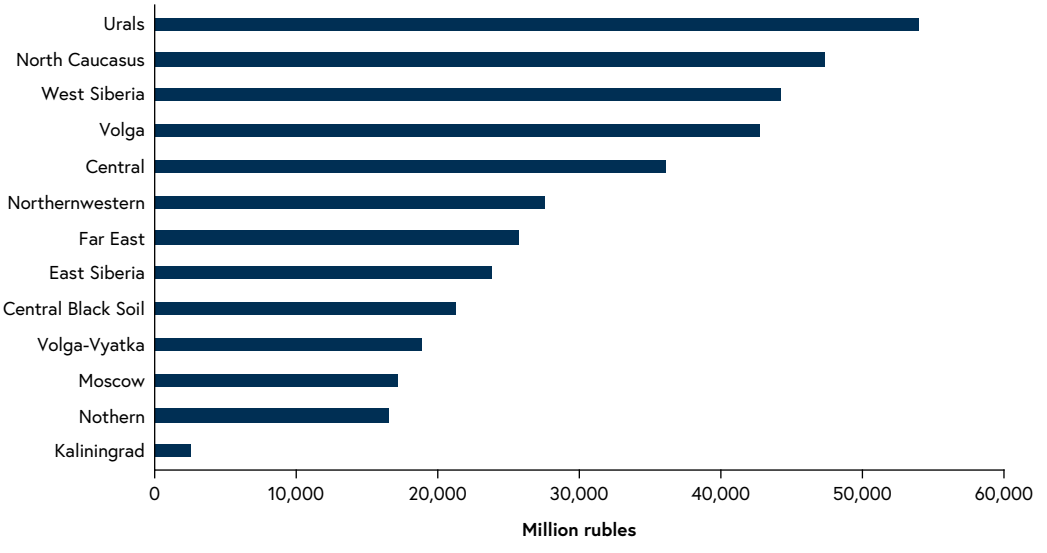
Key results (based on 2019 reporting data)

Three macroregions account for 38.6 percent (Rub 145.5 billion) of total cross-subsidies. These are the Urals (14.3 percent), the North Caucasus (12.5 percent), and West Siberia (11.7 percent), as shown in Figure 1.13.

Contradicting efficient pricing principles, residential electric power tariffs in Russia are currently 1.3 times lower than for other consumers on average. Other consumers (mainly large industrial enterprises) carry an extra tariff burden paying for a portion of the cost of electric power supplied to the residential sector. The range varies by macroregions between 1 and 2.2. The largest rate gap between actual tariffs for studied consumer groups is observed in the East Siberia macroregion (compared with electric power tariffs for other consumers of electric power, the tariffs for households are 2.2 times lower), the Volga-Vyatka macroregion (by 1.7 times), the North Caucasus region (1.6 times) and the Central Black Soil macroregion (1.57 times).

At 5.23 rubles per kilowatt-hour, the average calculated economically justified tariff for households in Russia is 1.6 times higher than the actual tariff rate. Bringing tariffs set for households to the cost recovery level will require increasing actual tariffs by 10 percent (Moscow) to 145 percent (the East Siberian region). In Moscow, the electric power tariff for residents living in apartments with gas range cookers is the closest to the

Figure 1.13. Cross-subsidies in electric energy by region, million rubles



Source: World Bank calculations.

cost recovery rate: the existing tariff rate gap is mainly due to the decreasing coefficient of 0.7. Bringing tariffs for households to the cost recovery rate would lead to tariff reductions for other consumers (other things being equal, by excluding cross-subsidized quantities alone),[14] on average, by 9.5 percent. The most significant decrease in relevant prices can be expected in Kaliningrad (by around 18,9 percent), the North Caucasus macroregion (15 percent), and the Far East macroregion (13.65 percent). The average calculated economically justified electric power tariff for households for entire Russia is higher than the cost recovery tariff for other consumers by 33.9 percent, a fair price ratio for the studied consumer groups based on the composition of costs to supply electricity. Given region-specific features of generation capacity and electric power grids, and the distinctive pricing features in certain Russian regions, this ratio is within the range of 13.1 percent (the Central macroregion) to 68.3 percent (Kaliningrad).

Petroleum: direct subsidies

Russia is one of the world's largest oil producers. Substantial export duties for crude oil have helped the government keep domestic oil prices lower than abroad, with the refinery sector being the main beneficiary. In 2019, the government proceeded with reforms to gradually replace oil export duties with an equivalent mineral extraction tax by 2024. This would have created a level playing field between domestic and export markets. However, the government introduced explicit subsidies to domestic refining and consumption in a "reverse excise" with a damping component. The subsidy amounted to $6.6 billion (Rub 428 billion), or 0.4 percent of GDP in 2019.

In 2019, Russia's oil production equaled 561 million tons representing 13.4 percent of total global production. Exports of crude oil totaled 48 percent of domestic production. In 2019, Russia exported 142.8 million tons of oil products. Guided by the price-gap approach, retail petroleum prices are compared for Russia and the United States. U.S. prices are highly competitive, capture super-efficiency of the downstream sector, and are subject to low taxes. The price-gap approach does not reveal significant differences (Figure 1.14).

Prices in the Russian oil market were liberalized in the mid-1990s and are set by the market. However, substantial export duties have helped the government to impact Russia's domestic oil prices. Export duties, by definition, do not qualify as a subsidy. However, they create market distortions that result in significantly lower domestic prices than abroad. These duties have been at the core of an export parity mechanism that has guided prices for crude oil and petroleum products in the domestic market. This mechanism refers to the price point where the Russian oil sector becomes indifferent between exporting and selling oil in the domestic market.

The formation of prices in Russia's domestic market has been further complicated by a government policy of setting different export duty rates for crude oil and petroleum products. This was particularly the case until 2011, when the Russian government undertook a series of measures to minimize the further distortions created by such differentiation in export duty rates. Evidently, Russian refineries could reap extra benefits when the government set export duties for petroleum products lower than for crude oil. They could get crude oil at relatively low prices and export refined products abroad, facing comparatively lower export duties. Furthermore, the relatively lower export duties on petroleum products have ensured that the wedge between international product prices and Russia's domestic prices is also relatively smaller.

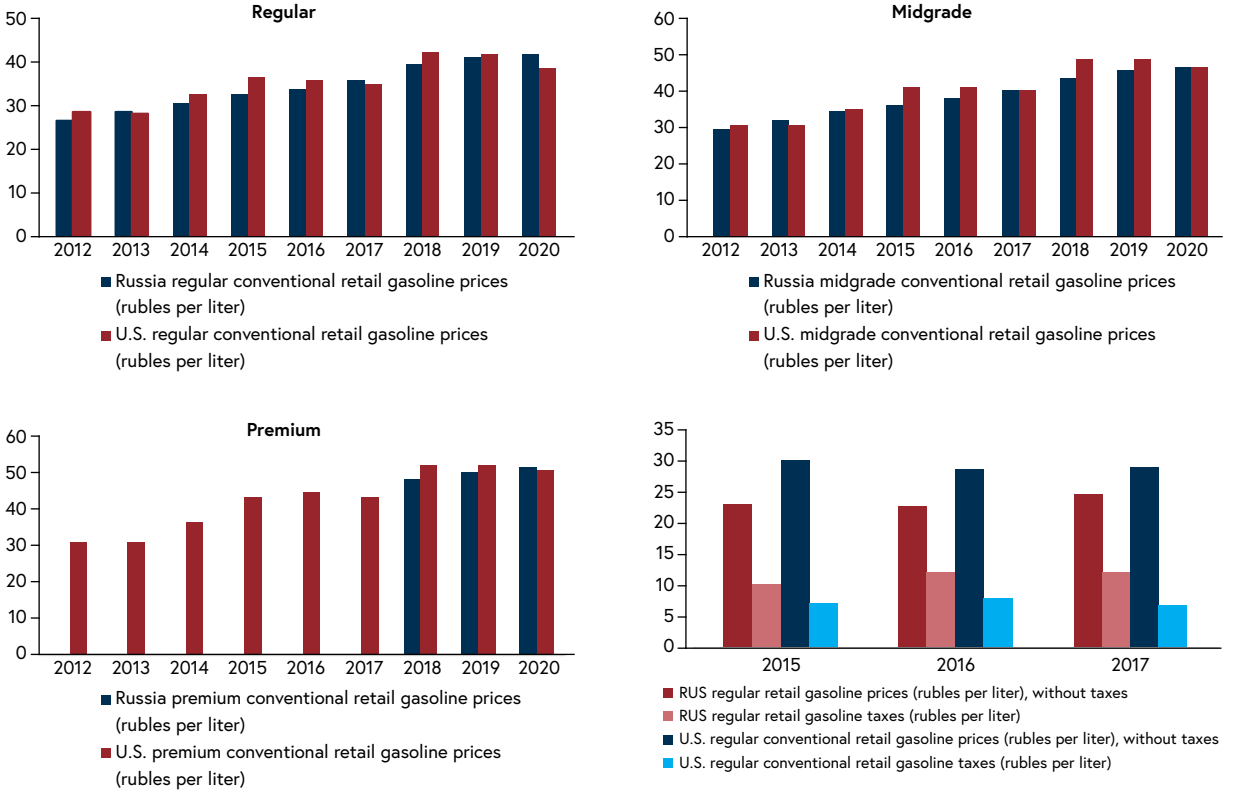
Russian refineries have been primary beneficiaries of the distortions created by the government's choice to adhere to export duties as a fiscal tool.[15] This has been determined through a comparison of the retail petroleum prices with international benchmarks. In 2019, the government proceeded with reforms to gradually replace crude oil and oil product export duties with an equivalent mineral extraction tax for oil by 2024. This would have created a level playing field between domestic and export markets, increasing the efficiency of the oil refinery sector. Given higher export duties for oil products than for crude oil, the oil industry tax maneuver would have increased crude oil prices much higher than the prices for oil products with the reduction of export duties. To avoid a substantially negative effect on oil refineries, the government introduced explicit subsidies to domestic refining and consumption in the form of a "reverse excise," conditional on the remoteness of each oil company or refinery, and whether it has an approved modernization plan, or is targeted by sanctions.

The formula for this reverse excise tax suggests its gradual increase in line with a decrease of export duties. The reverse excise also contains a "damping component,"

which compensates oil companies for a portion of the difference between domestic and international fuel prices to incentivize them to maintain stable prices for domestic consumers (Box 1.1).

In August 2019, the damping component was introduced for jet kerosene. Reverse excise for oil refineries was accounted as a consumer subsidy for oil products.

Figure 1.14. Comparison of Russian and U.S. gasoline prices (rubles per liter)



Source: Rosstat, US Energy Information Administration.

Box 1.1. Parameters for the damping component

- The damping component aims to compensate 0.68 percent of the difference between the netback price for petroleum (AI-92 class 5) and domestic petroleum price at Rub 53,600 per ton in 2020, Rub 56,300 per ton in 2021, Rub 59,000 rubles per ton in 2022, Rub 62,000 per ton in 2023, and Rub 65,000 per ton in 2024.
- The damping component aims to compensate 0.68 percent of the difference between the netback price for diesel (class 5) and domestic diesel price at Rub 48,300 per ton in 2020, Rub 50,700 per ton in 2021, Rub 53,250 per ton in 2022, Rub 56,000 per ton in 2023, and Rub 58,700 per ton in 2024.
- If the average wholesale price for petroleum (automobile class 5) exceeds the reference price by more than 10 percent in the specified tax period, the damping component is set to zero (the same condition applies if the average wholesale price for class 5 diesel exceeds the reference price by more than 20 percent).

All in all, the petroleum subsidy due to the dumping component of the reverse excise tax amounted to Rub 428 billion ($6.6 billion), or 0.4 percent of GDP in 2019.

In 2019, consumer energy subsidies (gas, electricity, oil) totaled $23,7 billion, or 1.4 percent of GDP, in line with estimates from other international organizations (Table 1.2).

Conclusion

Natural gas is Russia's primary energy resource and plays a crucial role in Russia's energy balance. Domestic gas prices are determined by the state in a two-tier market. The first is represented by state-owned Gazprom and affiliated companies, and the second tier by the remaining gas producers. Based on a price gap approach (Chapter 1), direct subsidies are estimated at $11.3 billion (Rub 732.2 billion) or 0.7 percent of GDP (2019 data). While some market elements in domestic gas price formation have been introduced, it is broadly shaped by the state. The FAS regulates the price of gas sold by Gazprom to residential and industrial consumers (except for sales through the commodity exchange). Tariffs for residential consumers are set below tariffs for industrial consumers, resulting in a cross-subsidy. Natural gas cross-subsidies are estimated at $0.4 billion (Rub 24.8 billion) in 2019. Cross-subsidies in electricity, at 0.3 percent of GDP, vary significantly by region.

Russia's electricity sector produces over 45 percent of heat energy for communal heating, hot water supply, heat for production, and supplying power. Russia's unique geographic and climate characteristics—which vary significantly across the country, significantly influence tariff setting, subsidies, and cross-subsidies in the electricity sector. The Unified Energy System dominates the sector, accounting for 96.5 percent of produced electricity. Direct subsidies in the electricity sector (stemming from natural gas consumption) in 2019 are estimated at $3.7 billion (Rub 238.7 billion), or 0.2 percent of GDP. On average, residential electric power tariffs in Russia are 1.3 times lower than for industrial consumers, which carry an extra tariff burden to pay for a portion of the cost of electric power supplied to the residential sector. These cross-subsidies in the electricity sector are estimated at $5.8 billion (Rub 377.3 billion), or 0.3 percent of GDP (2019 figures).

Table 1.2. Comparing energy subsidies estimates produced by different international organizations, percentage of GDP

	IEA 2019	IMF 2017	World Bank 2019
Consumer subsidies			
Oil			0.4
Electricity	0.8	1.2	0.55
Gas	0.6	0.6	0.45
Coal			
Total	**1.4**	**1.8**	**1.4**

Source: International Energy Agency (https://www.iea.org/topics/energy-subsidies#methodology-and-assumptions), IMF (https://www.imf.org/en/Topics/climate-change/energy-subsidies).
Note: The IEA, the IMF, and the World Bank use the price-gap approach to estimate consumer electricity and gas subsidies.

Oil products are also heavily subsidized in Russia. Export duties for crude oil help the government keep domestic oil prices low, which primarily benefits the refinery sector. In 2019, the government proceeded with reforms to gradually replace oil export duties with an equivalent mineral extraction tax by 2024. This would have created a level playing field between domestic and export markets. However, the government introduced explicit subsidies to domestic refining and consumption in a "reverse excise" with a damping component. The subsidy amounted to $6.6 billion (Rub 428 billion), or 0.4 percent of GDP in 2019.

The Russian Federation is exploring approaches to reducing energy subsidies—specifically, in natural gas, electricity, and oil—to industrial and residential consumers. In 2019, energy subsidies (gas, electricity, oil) totaled $23.7 billion, or 1.4 percent of GDP. In U.S. dollar terms, Russia ranks fourth globally in terms of energy subsidies, after China, Iran, and Saudi Arabia. These subsidies impose significant macroeconomic and fiscal costs. They disproportionally benefit the wealthy while reducing resources for schools, hospitals, and social programs. In addition, energy subsidies contribution to global warming. Despite these drawbacks, policymakers have been reluctant to reduce subsidies because of the policy objectives energy they serve. Understanding the size, impacts, and potential for energy subsidy reform is critical for policymakers seeking optimal approaches to reducing subsidies.

Notes

[1] The sum of energy from extracted coal, crude oil, natural gas, nuclear, hydro, wind, solar, biofuels and waste, and heat. Source: IEA, 2018.

[2] Total energy supply is made up of production + imports – exports – international marine bunkers – international aviation bunkers ± stock changes (source: IEA, https://www.iea.org/reports/world-energy-outlook-2020).

[3] Koplow (2009).

[4] Coady et al. (2015).

[5] Data for 2018.

[6] Data for 2019.

[7] Skolkovo Business School. 2019.

[8] The Unified Gas Supply System is a unique engineering complex encompassing gas production, processing, transmission, storage and distribution facilities in European Russia and Western Siberia.

[9] Yermakov (2020).

[10] This system is a legacy of the Soviet era. Back then, prices of all the gas produced and consumed within the country were regulated. In 1989, Gazprom was created on the basis of the Ministry of Gas Industry. It became the Soviet Union's first state-run corporate enterprise. It accounted for about 94% of Russia's gas production. Gazprom was also the largest enterprise in Russia's economy in 1991. This explains why, while other commodity prices were already liberalized in the early 1990s, it was decided that gas prices charged by Gazprom needed to remain regulated by the State. They were initially set by the Ministry of Energy. See Henderson (2011).

[11] Loe (2019).

[12] Yafimava (2015).

[13] Netback price is defined as wholesale price at the European border minus export duties and transportation costs.

[14] The slower rate of electric power tariff increase for these consumers against tariffs for population can be considered an alternative.

[15] The benefit of the refineries was estimated at about 4 percent of GDP in Strategy 2020.

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2 General Equilibrium Effects of Energy Subsidy Reform

This chapter provides an analysis of the general equilibrium impacts of energy subsidy reform in the Russian Federation. It aims to generate a simulation-based approach to enable and equip policymakers to make well-informed and calculated decisions to reduce or eliminate the energy subsidies that weaken the country's long-term goal of promoting sustainable development. The key finding of this chapter is that removing subsidies would increase national GDP and benefit regional economies, albeit with significant variations across the Russian Federation's 13 macroregions. In addition, carbon emissions would decline.

This chapter introduces a regionally disaggregated Computable General Equilibrium (CGE) Modelling framework for the Russian Federation. This model is used to analyze the economic impact of removing subsidies in the country's oil, gas, and electricity sectors. It also estimates opportunity costs, which need to be accounted for when assessing the impact of fuel subsidy reform. In addition, the CGE model evaluates the effectiveness of fuel substitution options in response to energy price shocks at the regional and sectoral levels. The objectives of the analysis in this chapter are to

- estimate the fiscal and climate costs of energy subsidies at the aggregate and regional levels,
- evaluate potential economic gains of alternative energy subsidy reform scenarios, and
- undertake a thorough, regionally disaggregated representation of the Russian economy, with a special focus on the country's energy sector using the CGE framework, based upon recent data on intra-regional trade flows, government transfers, Russia's production structure, and construction of the novel Social Accounting Matrix.[1]

The latest GTAP 11 (Global Trade Analysis Project) database of 142 countries and 65 sectors is used to build the GTAP-E CGE model, using 2017 as the reference year. The model is calibrated to include the details of the 13 regions of the Russian Federation: Central, Central Black Soil, East Siberia, Kaliningrad, Moscow, Northern, North Caucasus, Northwestern, Volga, Ural, Volga-Vyatka, and West Siberia. The model is adjusted to reflect the latest data with high levels of accuracy using the Russian Social Accounting Matrix (SAM) for 2019 and the Rosstat data on GDP, output, investment, and intra-regional and inter-regional trade in the agricultural, energy, manufacturing, and other sectors for each region. Furthermore, the model is extended to build an emissions dataset by including GTAP-E elasticities, assuming that the level of Russia's CO_2 emissions holds for the oil, gas, coal, and petroleum/coke product sectors in all regions. We also assume that Russia's inter-fuel substitution parameters are similar across all 13 regions.

Three scenarios are developed based on the GTAP-E model. These provide estimates of the impact of subsidy eliminations on GDP, employment, investment, output, trade, market prices, and consumption. In the first scenario, all subsidies are eliminated on industrial and private household consumption, treating cross-subsidies

as additional subsidies to private household consumers coupled with taxes on industrial consumers. Scenario 2 executes Scenario 1 while treating subsidy expenditures saved in other regions as government transfers to the three economically weakest macroregions, namely, the Volga-Vyatka, the North Caucasus, and the Central regions. Scenario 3 considers the implementation of Scenario 1 while allocating the government transfers to energy-intensive sectors to compensate them for the eliminated subsidies (the investment implicit energy scenario).

The key findings of the analysis of the three scenarios are as follows:

- Scenario 1 reveals an increase in GRP in all regions when subsidies are eliminated. The North Caucasus, Volga-Vyatka, and West Siberian regions showed remarkable GRP growth of 1.52 percent, 1.36 percent, and 0.92 percent, respectively. Nationally, the increase is estimated to be 0.52 percent. Investment and imports decline in all regions, while government expenditures and household consumption increase.
- The increase in GRP is estimated to be bigger under Scenario 2 than under Scenario 1 in the three poorest regions—Volga-Vyatka (2.61 percent), North Caucasus (2.72 percent), and the Central region (0.69 percent)—to which savings are transferred from the subsidy elimination. However, the estimated increase in GRP in the remaining regions is less than the increase in Scenario 1.
- The GRP of all regions increases under Scenario 3 and is greater than the increase under Scenario 1. Investments in all regions decline under Scenarios 1 and 2 but increase in Scenario 3 because of compensation for the subsidy elimination in energy-intensive sectors. The overall GDP of the Russian Federation is estimated to increase by 0.55 percent in both Scenarios 2 and 3.
- With the subsidy removal, CO_2 emissions are estimated to decline by 0.43 percent in Scenario 1, by 0.49 percent in Scenario 2, and by 0.75 percent in Scenario 3. The more significant decline in Scenario 3 results from the shift in consumer preferences from carbon emissions-intensive sectors towards the cleaner sectors of the economy.

The methodology is described in detail in this chapter, including the various assumptions and calculations involved in the model's design. The chapter explains the steps involved in building the GTAP-E model and analyzes the details of the executed scenarios. It also captures the impact of the shocks on various economic attributes and parameters under the three scenarios, including GDP, output, trade, employment, market prices, and consumption.

Methodology

The CGE model

Using a regional CGE model has several notable advantages in conducting energy subsidy reform analysis. First, it can estimate the cumulative effect of eliminating fuel subsidies. Second, it can capture the general equilibrium links between the economic agents (for example, households, governments, industries, and the rest of the world), estimate opportunity costs of subsidies, and identify substitution possibilities that multiply overall wealth accumulation and distribution. Third, it captures interregional linkages, which is important because the Russian Federation is vast, and its regions have different economic structures. Apart from the above, the CGE model can estimate the increase in market prices and the decline in consumption of fossil fuels—oil, gas, and electricity—resulting from eliminating subsidies in these sectors. The disaggregated nature of the CGE model thus makes it a powerful tool for analyzing the impact of energy price shocks resulting from subsidy reforms on the economy as a whole or focusing on its specific sectors.

Several studies previously instituted to investigate the impact of subsidy reforms relied on the CGE model. Gharibnavaz and Waschik (2015) and Manzoor et al. (2012) analyze the impact of energy subsidies reform in Iran using the CGE model, revealing that energy demand could decline when energy subsidies are eliminated, and that targeted compensation for lower-income households is needed. Roos and Adams (2020) analyze the economy-wide impact of the subsidy elimination and reforms in the Gulf Cooperation Council (GCC) regarding Saudi Arabia. The study shows that a gradual removal of subsidies on refined petroleum and electricity promotes the optimal use of resources and removes distortions. It shows that the real GDP of the region increases, despite falling

employment and capital accumulation levels. Timilsina et al. (2020) use the CGE model to examine the economy-wide impact of energy subsidy reforms in Bangladesh. The study shows that direct subsidies in the electricity sector and indirect subsidies in the natural gas sector increase the GDP. It also highlights that recycling the savings from subsidy elimination by productively investing in other sectors could benefit the economy. Kerkela (2004) analyzes the distortion costs and effects of price liberalization in Russian energy markets using the CGE-GTAP framework. The results reveal that subsidies absorb about 6 percent of its GDP. To reduce consumption and price distortions, the country must increase its electricity price by 6 percent and gas price by 10 percent.

Regional CGE models in developing countries are scarce, with only several models built for China. Zhang et al. (2013) built a global CGE model covering the 30 provinces in China and incorporated energy system intricacies into the model to analyze the impact of government-mandated energy and CO_2 targets. Fan et al. (2017) used a multi-region CGE model of China to analyze the overlaps in renewable energy standards in the power sector and the government's national emission trading program to achieve greenhouse gas mitigation targets. The study concludes that introducing a separate standard policy for renewable energy would accelerate greenhouse gas mitigation. Wang and Wei (2019) analyzed the energy subsidy reform scenarios to predict the impact of the rebound on energy-saving measures. It shows that reducing oil and coal subsidies would amplify the production-side rebounds.

Academic studies have largely focused on analyzing the impact of energy subsidy reform at the global or multi-regional levels. However, they differ in time frame, geographical/sectoral coverage, assumptions, and the framework used to execute the CGE model. The model used in this chapter is unique. It is the first regional CGE model built to assess energy subsidies focusing on the Russian Federation. The model is calibrated based on the latest social accounting matrix, intra-regional trade flows, government transfers, and production structure for each of the 13 regions in the Federation.

Development of the GTAP-E model

The Global Trade Analysis Project (GTAP) model is a multiregional, multisector, computable general equilibrium (CGE) model. It is characterized by perfect competition, constant returns to scale, and Armington trade elasticities. This model captures the supply-chain effects, macroeconomic aspects, economy-wide equilibrium constraints, linkages between different sectors and countries, and the factor-use effects of various commodities. Among other notable aspects, the model also accounts for the potential substitution of one sector by another. The standard GTAP framework, designed and developed by the Global Trade Analysis Project from Purdue University for researchers and economists to make informed policy decisions, forms the cornerstone of our model. The model generates impact results for national account aggregates, industry output and prices, factor inputs and prices, and trade flows. For a technical description of the GTAP model, see Hertel (1997); for a discussion of the degree of confidence in CGE estimates, see Hertel et al. (2003).

The GTAP-E model is an extension of the GTAP framework. Developed by Burniaux and Truong (2002) and then revised by McDougall and Golub (2007), it is used to evaluate the costs of abatement and to assess the spill-over effects of greenhouse gases (GHG) abatement policies via international trade and sectoral interaction. The main change in the GTAP-E model concerning the traditional GTAP model is an increased emphasis on energy sectors by incorporating the energy substitution parameters in both the production and consumption structure. In other words, it is an energy-environmental version of the standard GTAP model, which allows for the possibility of inter-fuel and inter-factor substitution both in the production structure of firms and in the consumption behavior of private households and the government sector. This model allows the capture and highlighting of the macroeconomic effects arising from changes in energy-environmental policy strategies. The GTAP-E model constructed and used in this study captures both the direct and indirect linkages in the economy and thus holds the potential to estimate the inter-sectoral, inter-regional, and inter-temporal effects induced by policy changes and reforms such as subsidy elimination. The model also assumes that labor is not fully employed at an

aggregate level while real wages are fixed. Overall, it can provide more detailed welfare analyses that influence actual policymaking.

Data Calibration

This study uses the most up-to-date and publicly available data from the GTAP 11 database.[2] This includes global trade data for the year 2017, with input-output tables and bilateral trade details. The GTAP 11 database covers 142 regions and countries and 65 sectors. For this regionally focused analysis, countries are aggregated into two countries/regions—the Russian Federation and the rest of the world. To ensure consistency with Russia's industrial classification, original GTAP sectors are aggregated to 21 sectors: accommodation and food services, agriculture, business services, coal, coal products, communication, construction, education, electricity, financial and insurance services, gas, human health and social work, manufacturing, oil, other minerals, petroleum, public administration, real estate services, recreational services, trade, transportation and storage, and water. The data for these sectors are aggregated and distributed by the individual sectors in GTAP based on the factor income (EVFA) from GTAP to preserve the model accuracy.

A Social Accounting Matrix (SAM) assesses transactions that generate the income and expenses of various institutional sectors. It also forecasts indicators of the system of National Accounts part of the CGE model.[3] An aggregated SAM for the Russian Federation was developed by breaking down the critical Lines of Business (LOB) for the current period. As the model focuses on energy and fossil fuels, we disaggregate the high-level LOBs to cover more specialized power industries such as coal production, oil production, natural gas and gas condensate production, and the production and distribution of gaseous fuel. Statistical sources published by ROSSTAT—the Russian Statistical Yearbook, national accounts of Russia, and tables of supply and dispositions of goods and services for 2018—together fed data into the matrix. For the macroeconomic regions, the SAM is divided into 13 matrices, each describing the economy of the specific region. Agriculture, accommodation, and food service activities, business services not elsewhere classified, coal, coal products, communication, construction, education, electricity, financial and insurance activities, forestry and fishing, gas, human health and social work activities, manufacturing, oil, other minerals, petroleum, public administration and defense, real estate activities, recreational and other services, trade, transportation and storage, and water were selected for the study. The conceptual structure of the SAM is shown in Table 2.1.

Data for all 13 regions is adjusted before running simulations. Once the regions and sectors are aggregated, the GTAP data for 2017 is adjusted with the data of input-output shares, output, exports, and imports of each sector from the 2019 Russian SAM. Using the SAM, transactions are assessed that generate income and expenses of various institutional sectors and forecast indicators of the System of National Accounts being a part of the CGE model. This includes GDP, production, investment, household consumption, and government expenditure data. In addition, ROSSTAT data was used to adjust data based on the intra-regional trade flows for the power sectors—gas, oil products, coal, and the agriculture, manufacturing, and services sectors. Export between each of the 13 regions in the Russian Federation and the rest of the world is adjusted by distributing exiting export data (2017) to each sector based on the export ratio in the SAM by sector. Finally, the transfers and tax data from ROSSTAT are fed into the model. Wherever datasets are aggregated by region or sector, they are disaggregated as appropriate, assuming uniform shares or rates. The standard GTAP dataset is used without the emissions headers or GTAP-E elasticities. Then, by assuming that Russia's CO_2 emissions intensity holds good for the coal, oil, gas, and petroleum/coke products sectors in all regions, the emissions dataset is developed at the regional level. In addition, it is assumed that Russia's inter-fuel substitution parameters hold good across the 13 regions of the Russian federation. The performance of the GTAP-E model is analyzed by simulating three shocks simultaneously—the elimination of oil, gas, and electricity subsidies. Once the region-specific data is incorporated, simulations are carried out using the GTAP-E model. This model can capture the change in macroeconomic variables like GDP, employment, output, investment, exports, imports, and government expenditures at the regional and sectoral level due to fossil fuel subsidy elimination.

Table 2.1. The conceptual structure of SAM

		Goods	Industries	Labor	Capital	Households	Public expenses	Extra-budgetary funds	Expenses of non-profit organizations rendering services to households	Investments	Exports
		1	2	3	4	5	6	7	8	9	10
Goods	1		I			II	III		IV	V	VI
Industries	2	VII									
Labor	3		VIII								
Capital	4		IX								
Households	5			X	XI		XII	XIII			XIV
Budget	6		XV		XVI	XVII					
Extra-budgetary funds	7			XVIII			XIX				
Non-profit organizations rendering services to households	8					XX					
Savings	9				XXI	XXII	XXIII				
Imports	10	XXIV				XXV				XXVI	

I: A 21 x 21 matrix containing volumes of industry-specific intermediate consumption

II: Ultimate consumption by households

II: Public procurement

IV: Expenses of non-profit organizations rendering services to households

V: Gross fixed capital formation

VI: Exports of goods and services

VII: A 21 x 21 matrix containing volumes of industry-specific production for internal consumption

VIII: Industry-specific wage bill

IX: Industry-specific gross profit

X: Salary income of households

XI: Property income of households

XII: Other payments to households

XIII: Payments to households from extra-budgetary funds

XIV: Exports of finished goods

XV: Taxes net of subsidies for products and production

XVI: Property income

XVII: Taxes imposed on households net of subsidies on products

XVIII: Social security dues

XIX: Allocations from the budget

XX: Social transfers in kind granted by non-profit organizations rendering services to households

XXI: Investments

XXII: Savings of households

XXIII: Difference between public revenues and expenses

XXIV: Imports

XXV: Difference between purchases of residents abroad and purchases of non-residents in the domestic market

XXVI: Capital outflow

Scenario design

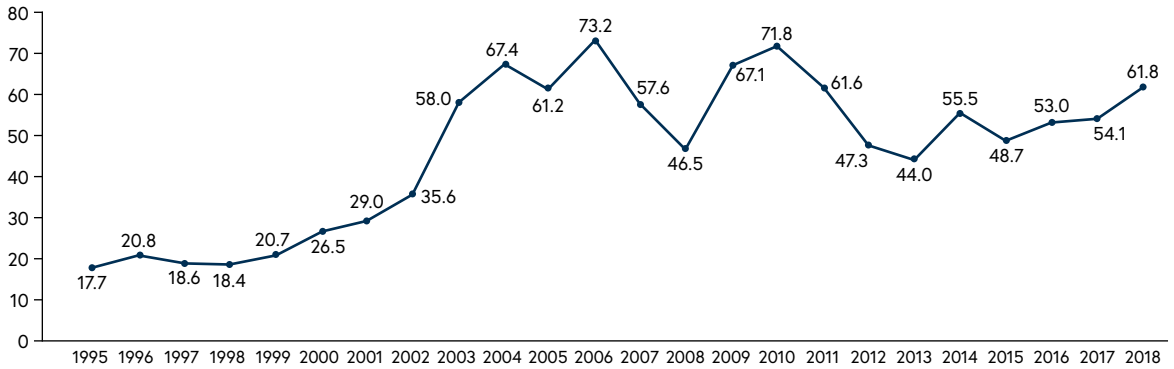
Scenario 1—Base Case: The base case scenario sees the elimination of energy subsidies for all Russia's macroeconomic regions considered in the model. The working hypothesis is that this mechanism may encourage economic growth at the level of the country and of the individual regions due to

- a change in the production structure in favor of sectors of higher added value, and
- a change in the energy consumption model entailing an efficiency improvement in production processes and, presumably, a cost reduction in the manufacturing of products.

For natural gas, all the subsidies on industrial and private household consumption are eliminated. We treat cross-subsidies as the subsidies on private household consumers coupled with taxes on industrial consumers; therefore, cross-subsidies from households are removed, and taxes are reduced on industrial consumers correspondingly. For electricity, all subsidies are cross-subsidies, and the scenario construction follows the same approach as for gas cross-subsidy. As regards oil, all subsidies concerning industrial and household consumption of petroleum products were removed. Most of the subsidies' estimates are available at the regional level (see Chapter 1). Whenever they are not, the national level subsidy is distributed to states as lump-sum transfers based on their value-added shares. We assume that fiscal savings from subsidy elimination in each region enhance regional income commensurately, giving some fiscal room for other non-subsidy government expenditures.

Scenario 2—Base case scenario with compensation for subsidy elimination for three macroeconomic regions with the worst economic development indicators: There is a high level of differentiation across Russian regions in terms of their socio-economic development (such as social, innovative, investment, and economic potential), geographic features, and infrastructure development (including physical, but also, social, and institutional infrastructure). Several studies have analyzed the reasons for this gap that prevails among the regions. For this study, the key indicator from previously performed studies and papers is considered, that is, Gross Regional Product (GRP) per capita. Figure 2.1 shows the ratio of the maximum to the minimum values of this indicator—GRP per capita—for all Russian regions from 1995 to 2018. It should be noted that the difference between the maximum and minimum has significantly grown when compared to the 1990s. This disproportion in the regional development showed a clear need for the adoption of the Strategy of Spatial Development of the Russian Federation for the period up to 2025. This strategy was approved by order of the Russian Federation Government dated February 13, 2019, No. 207-r (version dated March 23, 2021). As per this document, *"The goal of the spatial development of the Russian Federation is to ensure the sustainable and balanced spatial development of the Russian Federation aimed at* ***reducing inter-regional differences*** *in the level and social standard of living, of enhancing economic growth and technological development, as well as of supporting national*

Figure 2.1. Differences in GRP per capita in Russian regions (ratio of maximum and minimum value of GRP per capita)



security." Several problems should be solved to achieve the above-mentioned goal, the key one being "*to narrow **inter-regional disparities** in the socio-economic development of constituents of the Russian Federation, as well as to bridge inter-regional socio-economic gaps*."

Providing tax exemptions and subsidies and other target transfers from the federal budget to budgets of regional constituents of the Russian Federation is one of the mechanisms for solving this problem. Within the framework of simulations using the model, the implications are calculated using the base case scenario, but with compensation for subsidy abolishment for the three economic districts with the worst economic development indicators. By doing this, the effect of subsidy elimination is assessed, as is the possibility of narrowing inter-regional gaps with a breakdown into key indicators. Here, Scenario 1 is implemented, but the three economically weaker regions, based on per capita income, are allocated the total subsidy expenditure saved by all other regions as an inter-regional government transfer. In other words, the scenario pools all the subsidy expenditure saved across the regions and then allocates all of them to the three poorest regions, based on their relative per capita GRP—with the most impoverished region receiving the largest slice of the pie.

Scenario 3—Base case scenario with compensation for subsidy elimination in energy-consuming industries: The Russian economy is noted for extremely high domestic energy consumption.[4] This is primarily due to natural and climatic conditions, the domination of energy-consuming enterprises in the industrial structure, and technological underdevelopment. The abolishment of energy subsidies for energy-intensive industries may reduce their economic efficiency and adversely affect their competitiveness in world markets. Therefore, in Scenario 3, the base case scenario (Scenario 1) is implemented with simultaneous compensation for the subsidy abolishment for energy-consuming industries. It is assumed that such measures in totality will become incentives for the economy and ensure the economic efficiency of such energy-intensive industries. Allocating government transfers to these sectors ensures that investments in them do not fall. Investments in other sectors may be allowed to rise or fall organically. It is, therefore, modeled as an implicit investment subsidy scenario. In the GTAP-E model, substitution between capital and energy captures the possibilities of reducing dependence on fossil fuels by increasing capital use. However, reducing oil, gas, and electricity subsidies has the potential unintended impact on energy-intensive industries moving towards coal or away from energy consumption altogether, leading to reduced capital investment. To alleviate such suboptimal impact, this boost to capital investment was provided, potentially raising the use of non-fossil fuel technologies that are capital-intensive.

Analysis and results

Scenario 1

Under the base case scenario, energy subsidies for all economic regions considered within the model are eliminated.

Change in GRP and investment: The model estimates that eliminating oil, gas, and electricity subsidies increases GRP in all regions. In the North Caucasus, GRP increases by 1.52 percent, by 1.36 percent in Volga-Vyatka, and by 0.92 percent in the West Siberian region. In general, the economic gains resulting from the subsidy reduction result from the following:

- The savings available from subsidy elimination offer more fiscal space to the government, which increases spending on other productive sectors in the economy.
- Because subsidies are eliminated, the distorted use of resources by energy sector (such as natural resources, labor, and capital) is avoided. Such resources are allocated to other non-energy sectors in the economy. This increase in allocative efficiency averts the GDP losses that could otherwise occur.
- While subsidy elimination leads to a decline in the output and consumption of some energy sectors, others do not experience a similar decline and may even gain due to inter-fuel substitution. As a result, overall energy consumption does not fall substantially. For instance, the consumption of coal, which is excluded from the subsidy analysis in Chapter 1, does not decline. When subsidies are removed from other energy sectors, coal may substitute for other energy products. As electricity and gas both have cross-subsidies, there is a rise in industrial consumption when the amount of cross-subsidy elimination, thus lower industrial energy end-use price, exceeds that of removing the direct subsidy.
- Potential losses to GDP are averted because of a better performance of non-energy sectors.

Weaker regions experience the highest relative gains. The GRP per capita of the West Siberian macroregion increases by $116; that of Volga-Vyatka increases by $72.47; and North Caucasus by $68.18 (Table 2.2). The North Caucasus and Volga-Vyatka macroregions are relatively small economically. Hence, even a minor absolute change in the real GRP value and other economic indicators results in a higher gain in relative terms. These regions also offer higher gas and electricity subsidies when compared to other regions; hence, when these subsidies are eliminated, the impact appears to be higher.

Nevertheless, we also note that the economic disparities assessed based on per capita GRP fall slightly from 5.340 to 5.336; this is measured as the ratio of the per capita GRP of the richest region to that of the poorest, before and after this scenario is applied. This amounts to a disparity reduction of about 0.08 percent. This slight improvement is due to the fact that the poorest regions benefit from the subsidy removal more in relative terms than the wealthiest regions. Investments in almost all regions; however, decline due to the reduced incentives offered to firms and consumers through subsidies.

Change in market price: The market price of oil increases in all regions due to the removal of subsidies. The market price of gas rises in North Caucasus, Volga-Vyatka, West Siberian, and Moscow and declines in other regions. These four regions subsidize gas at a relatively higher rate than other regions. When these subsidies are removed, the market price of gas in these regions increases, while the other regions experience a decrease in natural gas prices owing to increased intra-regional imports of excess natural gas. The market price of electricity falls in the East Siberian, Northern, North Caucasus, and Volga-Vyatka regions. This effect is caused by the substitution effect away from electricity and the relatively lower electricity subsidies for these regions.

Change in output: As shown in Figure 2.3, the output of the oil sector declines in all the regions due to the increase in domestic market price, while the output of the natural gas sector declines only in the North Caucasus,

Table 2.2. Per capita change in GRP by region—Scenario 1

Region	Percent change in GRP	Base value (US$, millions)	Final value (US$, millions)	Population	Per capita GRP before (US$)	Per capita GRP after (US$)	Absolute change in per capita GRP (US$)	Difference from Russian avg. (US$)
Central	0.24	130,103	130,416	32,310,000	4,027	4,036	9.70	–4,163
Central Black Soil	0.47	48,791	49,021	7,123,000	6,850	6,882	32.35	–1,317
East Siberian	0.58	57,618	57,955	6,119,000	9,416	9,471	55.00	1,272
Far Eastern	0.21	74,809	74,966	6,122,000	12,220	12,245	25.64	4,046
Kaliningrad	0.38	7,154	7,181	1,013,000	7,062	7,089	27.00	–1,110
Moscow	0.14	268,957	269,325	12,506,468	21,505	21,535	29.36	13,336
North Caucasus	1.52	101,614	103,157	22,629,000	4,490	4,559	68.19	–3,641
Northern	0.47	42,943	43,146	4,473,000	9,601	9,646	45.44	1,447
Northwestern	0.20	89,028	89,206	8,497,000	10,478	10,499	20.95	2,299
Ural	0.43	131,315	131,874	18,699,000	7,023	7,052	29.91	–1,147
Volga	0.45	104,960	105,429	15,807,000	6,640	6,670	29.68	–1,529
Volga-Vyatka	1.36	38,158	38,677	7,153,000	5,335	5,407	72.47	–2,792
West Siberian	0.92	186,897	188,617	14,756,000	12,666	12,782	116.61	4,583
Total Russia	0.52	1,282,347	1,288,970	157,207,468	8,157	8,199	42.13	0
Disparity ratio					5.340	5.336		

the Volga-Vyatka, and the West Siberian macroregions, and the city of Moscow. The decline in the natural gas sector output can be attributed to demand decline owing to the rise of the market price of gas in these four regions. In all other regions, the output of gas increases as it could be used as a substitution commodity for oil and electricity. The output of electricity increases in those regions where its market price decreases—East Siberian, Northern, North Caucasus, and Volga-Vyatka. There is a decrease in electricity output in other regions where the market price is estimated to increase. All in all, when subsidies are eliminated, there is a decline in the output of energy

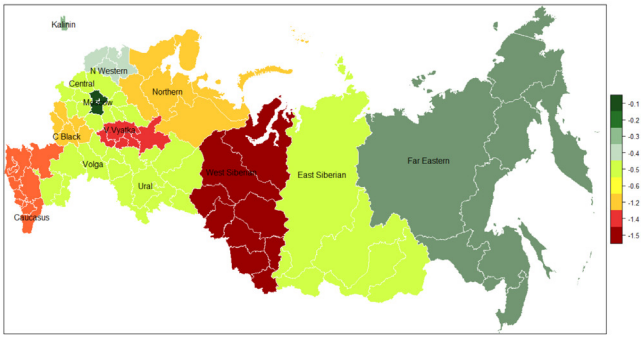
Figure 2.2. Maps of macroeconomic results—Scenario 1

Percentage change in GDP

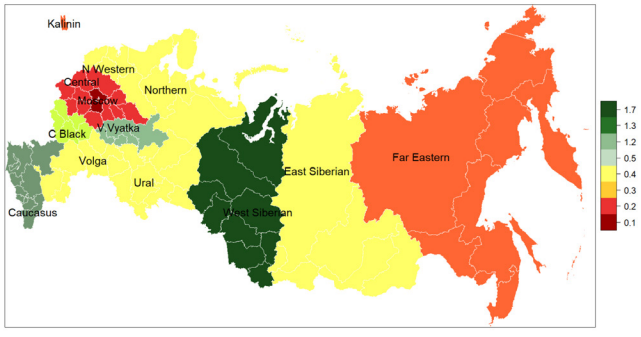
Percentage change in investment

Percentage change in export

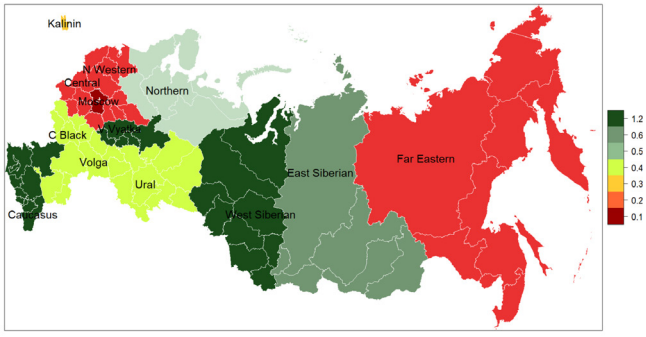
Percentage change in import



Percentage change in government consumption



Percentage change in private consumption



and energy-intensive sectors. At the same time, there is an increase in the output of other commodities due to the diversification of investments and resources.

Change in consumption: Private consumption and government expenditures also increase. The North Caucasus, West Siberian, and Volga-Vyatka macroregions experience an increase of 1.21 percent, 1.21 percent, and 1.15 percent in private consumption and an increase of 1.33 percent, 1.65 percent, and 1.25 percent in government expenditures, respectively (Table 2.3). A deeper look at the estimate of government expenditures by sector reveals an increase in government spending in other productive sectors in almost all regions with the savings realized from subsidy eliminations. The West Siberia region diversifies its expenditures across real estate, transportation, communication, education, and health care, leading to an overall increase of 1.65 percent in government expenditures. In the Central, the North Caucasus, the Volga-Vyatka, the West Siberian macroregions, and Moscow, there is a decline in the private consumption of natural gas and an increase in the consumption of oil and electricity. These are the regions that heavily subsidize natural gas (Chapter 1). Hence, once the subsidies are eliminated, there is a tendency among households to substitute other energy commodities for natural gas. However, private consumption and preferences in regions such as the Volga and Urals that offer higher subsidies to electricity production and consumption tend to shift towards oil and gas consumption upon subsidy elimination.

Change in trade: As shown in Figure 2.3, there is an increase in overall exports in almost all regions except the North Caucasus. The increase in export results from the rise in output due to the distribution of resources, investment, and endowment commodities like land, labor, and capital from energy-intensive sectors towards other productive sectors. The exports of non-energy commodities become more competitive as there is a reduction in their market prices brought about by this re-allocation of investment and endowment commodities. In contrast, there is a decrease in imports in all regions. The decrease in the import of energy commodities is due to the fall in demand for raw materials and other inputs required to produce energy commodities. There is also a decrease in the import of other non-energy commodities in all regions as the output of other sectors rises on the re-distribution of resources from energy sectors. Their ability to meet domestic demand increases.

Table 2.3. Percentage change in Macroeconomic indicators by region—Scenario 1

Region	GRP	Investment	Export	Import	Government consumption	Private consumption
Central	0.24	–0.48	–0.06	–0.45	0.23	0.15
Central Black Soil	0.47	–0.90	0.54	–0.59	0.46	0.45
East Siberian	0.58	–0.33	0.60	–0.54	0.45	0.62
Far Eastern	0.21	–0.49	0.50	–0.19	0.32	0.18
Kaliningrad	0.38	–0.74	0.40	–0.29	0.31	0.29
Moscow	0.14	–0.45	0.07	–0.15	0.11	0.09
North Caucasus	1.52	–6.83	–1.91	–1.16	1.33	1.21
Northern	0.47	–0.17	0.55	–0.59	0.35	0.48
Northwestern	0.20	–0.14	0.48	–0.39	0.35	0.25
Ural	0.43	–1.32	0.64	–0.52	0.41	0.42
Volga	0.45	–1.05	0.72	–0.48	0.44	0.45
Volga-Vyatka	1.36	–2.53	0.23	–1.40	1.25	1.15
West Siberian	0.92	–1.20	1.33	–1.47	1.65	1.21
Total Russia	0.52	–0.83	0.43	–0.46	0.54	0.50

Change in emissions: As shown in Table 2.4, eliminating fossil fuel subsidies produces a notable reduction in CO_2 emissions across all the regions. The decline is more pronounced in the West Siberian (−1.51 percent), the Kaliningrad (−0.98 percent), and the Far Eastern (−0.42 percent) regions. In absolute terms (measured in CO_2 Metric tons), the reduction in the city of Moscow (−1.25 metric tons) is also notable. For the Russian Federation as a whole, the model estimates a decline of 0.43 percent in CO_2 emissions. In the West Siberian and the Far Eastern regions, and the city of Moscow, the reduction in emissions is more significant as these regions heavily subsidize fossil fuels. The Kaliningrad region has a very low initial level of CO_2 emissions, whereby even a small decline of emissions in absolute terms produces a notable decrease when measured in relative terms.

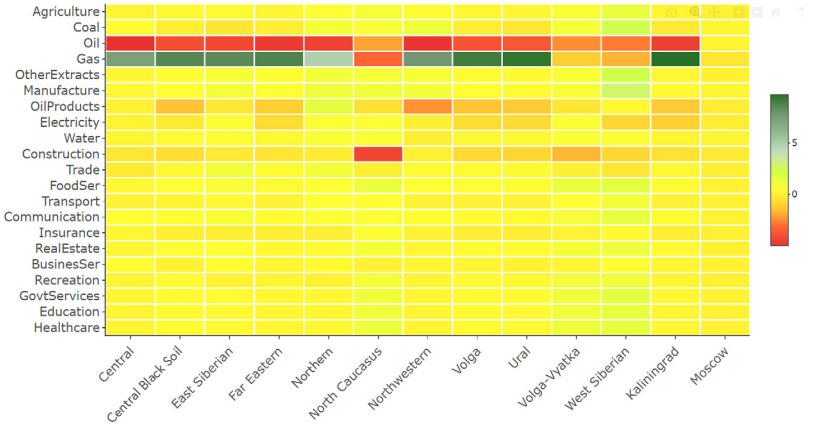
Table 2.4 shows a decline in household emissions and an increase in emissions from industrial producers. There are several reasons for this. First, many subsidies involve cross-subsidization, meaning that household consumer subsidies are reduced while industrial consumption prices are also reduced simultaneously. The emissions reduction occurs in the household sector, which constitutes about 12.5 percent of total emissions. In contrast, in the industrial sector, the emissions increase slightly due to the greater consumption of fossil fuels. Second, eliminating subsidies expands general economic activity due to better allocation of resources, as observed from the increase in GDP, among other variables. This again implies greater consumption of energy, including fossil fuels, by industries, which, in turn, increases emissions. Finally, the coal sector contributes to about 20 percent of all emissions. As this report doesn't account for any subsidies associated with this sector, there is a slight reorientation of the energy mix in favor of coal consumption. This causes a further increase in emissions. Nevertheless, the emissions reduction from other sources outweighs the tendencies to increase emissions by the channels above.

Table 2.4. Change in CO_2 emissions—Scenario 1

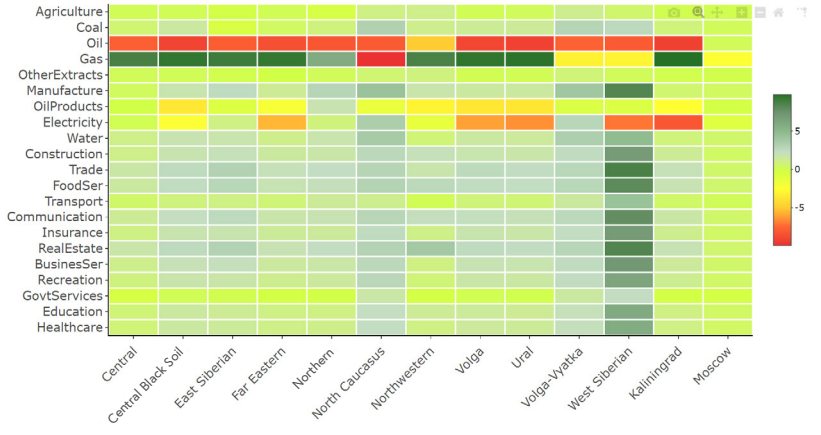
Region	Total emissions		Household emissions		Producer emissions	
	Percent change	Change in million $MTCO_2$ (metric tons of CO_2)	Percent change	Change in million $MTCO_2$	Percent change	Change in million $MTCO_2$
Central	– 0.11	–0.39	–1.03	–3.60	0.91	3.21
Central Black Soil	–0.08	–0.05	–0.83	–0.58	0.75	0.53
East Siberian	–0.05	–0.02	–0.27	–0.08	0.22	0.07
Far Eastern	–0.42	–0.95	–8.62	–19.52	8.20	18.58
Kaliningrad	–0.98	–0.19	–52.03	–10.35	51.06	10.16
Moscow	–0.22	–1.25	–1.39	–7.80	1.17	6.55
North Caucasus	–0.16	–0.17	–4.89	–5.10	4.73	4.94
Northern	–0.25	–0.04	–5.89	–0.83	5.64	0.79
Northwestern	–0.03	–0.05	–0.90	–1.34	0.87	1.30
Ural	–0.16	–0.36	–1.58	–3.60	1.42	3.24
Volga	–0.30	–0.45	–3.61	–5.45	3.31	5.00
Volga-Vyatka	–0.18	–0.06	–2.74	–0.88	2.56	0.83
West Siberian	–1.50	–5.99	–7.68	–30.54	6.17	24.56
Total Russia	–0.43	–9.95	–3.84	–89.69	3.41	79.74

Figure 2.3. Heatmaps of output, consumption, exports, and imports by sector

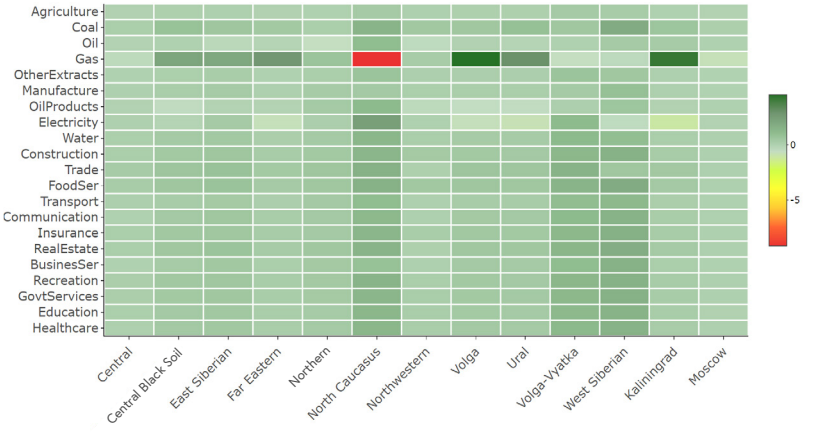
Percentage change in output by sector



Percentage change in private household consumption by sector



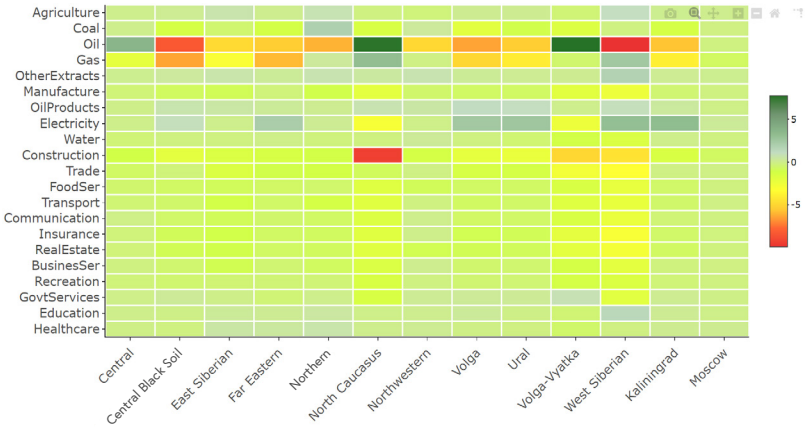
Percentage change in export by sector



(continued)

Figure 2.3. Continued

Percentage change in import by sector



Change in employment and consumer price index: As shown in Table 2.5, eliminating fossil fuel subsidies in Scenario 1 leads to an increase in the employment of both skilled and unskilled labor in all regions. There is a notable increase in employment in the Northern (1.83 percent in skilled and 2.27 percent in unskilled), the East Siberian (1.35 percent in skilled and 1.73 percent in unskilled), the North Caucasus (1.05 percent in skilled and 1.07 percent in unskilled), and the Volga-Vyatka (1.32 percent in skilled and 1.02 percent in unskilled) regions. This could be attributed to economic growth in these regions resulting from the increase in output of non-energy-intensive sectors. Some of these expanding sectors are also labor-intensive. However,

Table 2.5. Percentage change in employment by region

Region	Scenario 1		Scenario 2		Scenario 3	
	Skilled labor	Unskilled labor	Skilled labor	Unskilled labor	Skilled labor	Unskilled labor
Central	0.182	0.105	0.523	0.301	0.621	0.358
Central Black Soil	0.265	0.758	0.106	0.305	0.325	0.93
East Siberian	1.35	1.725	0.046	0.059	1.525	1.948
Far Eastern	0.255	0.531	0.049	0.101	0.474	0.987
Kaliningrad	0.109	0.168	0.091	0.14	0.159	0.246
Moscow	0.026	0.036	0.013	0.019	0.117	0.164
North Caucasus	1.049	1.072	1.878	1.921	0.449	0.459
Northern	1.838	2.268	0.039	0.048	2.835	3.498
Northwestern	0.061	0.035	0.009	0.005	0.174	0.098
Ural	0.663	1.757	0.14	0.371	0.716	1.898
Volga	0.697	0.991	0.14	0.199	0.779	1.108
Volga Vyatka	1.316	1.016	2.528	1.952	1.473	1.137
West Siberian	0.472	0.735	0.513	0.799	0.021	0.032
Total Russia	0.457	0.674	0.379	0.43	0.476	0.655

Box 2.1. Summary of Scenario 1

Overall, the model estimates that when energy subsidies are eliminated, the GDP of the Russian Federation increases by 0.52 percent, private consumption by 0.5 percent, government expenditures by 0.54 percent, and exports by 0.43 percent. Investment and imports of the country decline by –0.83 percent and –0.46 percent, respectively. Total CO_2 emissions decline by 0.43 percent and specifically, household emissions decline by 3.84 percent, though the industrial emissions increase by 3.41 percent due to the removal of cross-subsidies, a robust coal sector, and the expansion of economic activity.

irrespective of their labor intensity, their expansion leads to increased labor demand and more significant employment. The model estimates a fall in consumer prices in all regions. The decrease is greatest in the Volga-Vyatka (−1.80 percent), the North Caucasus (−1.45 percent), and the East Siberian macroregions (−1.39 percent). The transfer of resources from the more energy-intensive sectors to the less energy-intensive ones increases production and creates excess supply in these sectors. The prices in less energy-intensive sectors decline to achieve equilibrium and reduce this excess supply to zero. Removal of the cross-subsidy for industrial consumers also contributes to a price reduction as direct energy input costs decline. The estimated total decline in consumer prices for the Russian Federation is 0.61 percent.

Scenario 2

Along with subsidy elimination shock as in Scenario 1, the North Caucasus, Volga-Vyatka, and Central regions are the three poorest regions based on per capita income. The total fiscal revenue savings from subsidy elimination are reallocated to these three regions in a government transfer based on the regional shares of per capita income.

Change in GRP and investment: Owing to the reallocation of savings to the three regions—North Caucasus, Volga-Vyatka, and Central—their GRPs increase by 2.72 percent, 2.61 percent, and 0.69 percent, respectively. This increase is far greater than the GRP increase under Scenario 1, whereas other regions experience relatively lower GRP increases. In terms of per-capita GRP, the Volga-Vyatka macroregion experiences an increase of $139.47, the West Siberia macroregion by $126.36, the North Caucasus macroregion by $122.17, and the Central region by $27.70. The disparities in terms of per capita GRP decline as compared to the first scenario. This is because economically weaker regions like the Central, the North Caucasus, and the Volga-Vyatka regions experience a greater increase in per-capita GRP. The relatively well-off regions, like Moscow city and the Far Eastern, the Northwestern, the Northern, and the East Siberian macroregions experience smaller GRP increases as compared to Scenario 1. However, the relatively poorer Kaliningrad and Ural regions also experience a more minor GRP increase than Scenario 1. The GRP of the West Siberian region also experiences a rise of 1 percent (Table 2.6). The computed disparity ratio falls to 5.309, a relative reduction of 0.58 percent, the largest reduction across all three scenarios. This is because the subsidy expenditures saved are transferred to the poorest regions. Investment in the Central region increases by 0.13 percent and in the Volga-Vyatka region by 6.44 percent, while that of the North Caucasus region declines by 1.18 percent. This decline in the North Caucasus region estimated in Scenario 2 is significantly lower than the decline of 6.83 percent estimated in Scenario 1. For Volga-Vyatka, the model estimates a 2.53 percent decline in investment in Scenario 1 compared to a rise of 6.44 percent in Scenario 2. The Volga-Vyatka region is the poorest among all Russian economic regions. It thus receives the highest transfers from subsidy elimination amongst the other three regions, resulting in a significant uptake in investment. The Central region is estimated to face an investment decline of 0.48 percent in Scenario 1, while in Scenario 2, it increases by 0.13 percent.

Change in consumption: There is an increase in private consumption for all regions. However, the increase in North Caucasus and Volga-Vyatka is remarkable—2.15 percent and 2.34 percent, respectively, which is greater than the increase of 1.33 percent and 1.25 percent under

Table 2.6. Change in per capita GRP—Scenario 2

Region	Percent change in GRP	Base value (US$, millions)	Final value (US$, millions)	Population	Per capita GRP before (US$)	Per capita GRP after (US$)	Absolute change in per capita GRP (US$)	Difference from Russian avg. (US$)
Central	0.69	130,103	130,998	32,310,000	4,027	4,054	27.70	–4,148
Central Black Soil	0.19	48,791	48,882	7,123,000	6,850	6,863	12.76	–1,340
East Siberian	0.02	57,618	57,627	6,119,000	9,416	9,418	1.48	1,215
Far Eastern	0.04	74,809	74,837	6,122,000	12,220	12,224	4.55	4,022
Kaliningrad	0.32	7,154	7,177	1,013,000	7,062	7,085	22.84	–1,117
Moscow	0.07	268,957	269,154	12,506,468	21,505	21,521	15.76	13,319
North Caucasus	2.72	101,614	104,378	22,629,000	4,490	4,613	122.17	–3,590
Northern	0.01	42,943	42,948	4,473,000	9,601	9,602	1.18	1,399
Northwestern	0.03	89,028	89,055	8,497,000	10,478	10,481	3.19	2,278
Ural	0.09	131,315	131,437	18,699,000	7,023	7,029	6.54	–1,173
Volga	0.09	104,960	105,057	15,807,000	6,640	6,646	6.13	–1,556
Volga-Vyatka	2.61	38,158	39,156	7,153,000	5,335	5,474	139.47	–2,728
West Siberian	1.00	186,897	188,761	14,756,000	12,666	12,792	126.36	4,590
Total Russia	0.55	1,282,347	1,289,468	157,207,468	8,157	8,202	45.30	0
Disparity ratio					5.340	5.309		

Scenario 1. The high relative increase in household consumption in these regions can be attributed to the above-mentioned rise in regional transfers. These regions are the smallest economically. Therefore, even a very small change in absolute values could produce a large increase in relative terms. These three regions are highly consumption-driven. The percentage share of private consumption to GRP for the North Caucasus, the Volga Vyatka, and the Central macroregions —the top three consumption-driven regions in Russia—are 105 percent, 81 percent, and 80 percent, respectively.

Change in market prices and output: There is an increase in the domestic price of oil and a decrease in the price of natural gas and, correspondingly, reduced oil output and increased gas output. This furthers the consumption of imported petroleum products, which could add to already higher market costs. Although oil output decreases in almost all regions in this scenario, the output in the natural gas sector increases in some regions, including the Central, the Far Eastern, the North Caucasus, the Northwestern, the Ural, and the Volga-Vyatka regions. This is due to interfuel substitution resulting from the rising price of oil and the declining price of natural gas. In the North Caucasus region, the market price of oil in Scenario 2 increases by 3.32 percent compared to 2.57 percent under Scenario 1. The price of natural gas decreases by 4.95 percent under Scenario 2 compared to a 9.89 percent increase in Scenario 1. A similar pattern is observed in the Volga-Vyatka region, where the price of oil increases by 6.17 percent, and that of natural gas declines by 9.57 percent in Scenario 2, compared to an increase in the oil price of 2.46 percent and natural gas of 0.75 percent in Scenario 1. Again, these changes could be attributed to the inter-fuel substitution effect.

Change in trade: The model estimates that imports to the North Caucasus and the Volga Vyatka regions increase by 1.13 percent and 9.6 percent, respectively. This is primarily caused by increased imports of energy commodities, such as oil and petroleum products and electricity services, to accommodate the rise in private consumption (Table 2.7).

Table 2.7. Percentage change in private consumption by sector and region—Scenario 2

Private household consumption	Central	Central Black Soil	East Siberian	Far Eastern	Northern	North Caucasus	Northwestern	Volga	Ural	Volga-Vyatka	West Siberian	Kaliningrad	Moscow
Agriculture	0.38	−0.09	−0.15	−0.06	−0.14	1.11	0.00	−0.11	−0.09	1.67	0.29	0.02	0.01
Coal	0.83	0.31	0.51	0.28	−0.37	2.33	0.32	0.24	0.51	5.24	1.67	0.62	0.00
Oil	0.68	−0.38	−0.67	−0.3	−1.21	1.99	−0.64	−0.26	−0.4	4.74	0.31	0.30	−0.08
Gas	1.71	0.11	−2.58	1.52	−2.56	6.79	0.18	0.76	0.74	9.97	1.20	3.53	0.17
Other extracts	0.87	−0.32	−0.35	−0.18	−0.39	2.41	−0.13	−0.33	−0.33	4.58	0.54	0.01	0.02
Manufacturing	0.71	−0.06	−0.01	−0.05	−0.13	2.01	0.04	−0.15	−0.11	4.64	0.85	0.05	0.02
Oil products	0.66	−0.81	−0.36	−0.2	−0.06	2.08	−0.56	−0.74	−0.7	4.87	0.55	−0.05	−0.01
Electricity	1.11	−0.57	0.06	−0.91	−0.39	2.05	−0.11	−1.23	−1.33	1.50	−0.43	−1.16	0.09
Water	0.89	0.13	0.03	0.02	0.05	2.62	−0.04	0.06	0.05	2.93	0.95	0.16	0.09
Construction	0.85	0.21	0.16	0.14	0.14	2.61	0.18	0.16	0.16	2.86	1.48	0.27	0.09
Trade	0.90	0.36	0.26	0.28	0.28	2.84	−0.06	0.30	0.29	2.86	0.57	0.42	0.11
Accommodation	0.90	0.31	0.23	0.23	0.22	2.84	0.3	0.26	0.25	2.92	1.82	0.38	0.10
Transport	0.82	0.03	−0.02	0.03	−0.08	2.33	−0.03	−0.01	−0.01	2.83	1.18	0.13	0.06
Communication	0.82	0.15	0.16	0.12	0.17	2.46	−0.05	0.15	0.15	2.91	1.46	0.2	0.07
Financial services	0.90	0.24	0.21	0.13	0.23	2.75	0.07	0.2	0.19	2.95	1.52	0.28	0.09
Real estate	0.85	0.32	0.24	0.23	0.28	2.64	−0.05	0.26	0.24	2.65	1.77	0.36	0.10
Business services	0.95	−0.04	−0.01	0.00	0.12	2.78	−0.06	0.06	0.04	4.27	1.53	0.14	0.06
Recreation	0.92	0.21	0.14	0.09	0.10	2.81	0.03	0.15	0.14	2.99	1.46	0.27	0.09
Public administration	0.92	0.22	0.19	0.09	0.20	2.81	0.00	0.18	0.17	2.97	1.45	0.28	0.10
Education	0.93	0.19	0.20	0.04	0.21	2.8	−0.01	0.15	0.14	2.99	1.32	0.25	0.04
Health services	0.93	0.18	0.17	0.05	0.16	2.8	−0.01	0.15	0.14	3.00	1.34	0.25	0.09

Change in CO_2 emissions: The model estimates a reduction of 0.49 percent in total CO_2 emissions across the Russian Federation under Scenario 2 (Table 2.8). In the three economically weakest macroregions—the Volga-Vyatka, the North Caucasus, and the Central regions—the estimated decline is about 0.53 percent, 0.12 percent, and 0.15 percent, respectively. Apart from these regions, the West Siberian (−1.22 percent), the Kaliningrad (−1.008 percent), and the Volga (−0.76 percent) regions experience a notable decrease in CO_2 emissions due to the elimination of fossil-fuel subsidies. This results from the decrease in the production of oil, oil products, and other energy-intensive industries. There is also a reduction in household emissions and an increase in emissions from industries. Households' emissions decline by 5.75 percent, and producers' emissions increase by 5.26 percent.

Change in employment and consumer price index: Under Scenario 2, there is an increase in employment in all regions. However, the economically weaker regions that receive compensation for subsidy elimination—the North Caucasus, the Volga-Vyatka, and the Central macroregions—experience a greater increase in employment compared to Scenario 1. In the North Caucasus region, there is an increase in the employment of skilled labor of 1.88 percent and unskilled labor of 1.92 percent. The increase in unskilled and skilled labor employment is 2.53 percent and 2.96 percent in the Volga-Vyatka region and 0.52 percent and 0.30 percent in the Central region. The Central Black Soil, East Siberian, Far Eastern, Kaliningrad, Northern, Northwestern, Volga, and Ural regions, as well as the city of Moscow, experience a smaller increase than under Scenario 1. The West Siberian region experiences a slightly greater increase in employment under Scenario 2 compared to Scenario 1.

The model estimates that there is a notably higher price increase in the Volga-Vyatka region (11.12 percent), the North Caucasus region (3.51 percent), and the Central region (0.76 percent) in Scenario 2. These regions experience the highest increase in private consumption in this scenario due to the compensation they receive for subsidy elimination. The resulting increase in aggregate demand drives up commodity prices and thus leads to an increase in aggregate prices. When the entire Russian Federation is accounted for, the rise in consumer prices is 1.41 percent.

Table 2.8. Change in CO_2 emissions—Scenario 2

Region	Total emissions		Household emissions		Producer emissions	
	Percent change	Change in CO_2 per metric ton	Percent change	Change in CO_2 per metric ton	Percent change	Change in CO_2 per metric ton
Central	−0.16	−0.55	−1.44	−5.05	1.29	4.50
Central Black Soil	−0.48	−0.34	−5.15	−3.60	4.67	3.26
East Siberian	−0.01	−0.00	−0.03	−0.01	0.03	0.01
Far Eastern	−0.61	−1.39	−12.67	−28.69	12.05	27.30
Kaliningrad	−1.01	−0.20	−53.44	−10.63	52.43	10.43
Moscow	−0.18	−0.10	−1.12	−6.22	0.93	5.23
North Caucasus	−0.12	−0.13	−3.76	−3.93	3.64	3.80
Northern	−0.06	−0.01	−1.35	−0.19	1.29	0.18
Northwestern	−0.01	−0.02	−0.32	−0.48	0.31	0.46
Ural	−0.72	−1.64	−7.15	−16.28	6.43	14.65
Volga	−0.76	−1.15	−9.17	−13.84	8.41	12.70
Volga–Vyatka	−0.53	−0.17	−7.94	−2.56	7.41	2.39
West Siberian	−1.22	−4.87	−10.75	−42.74	9.52	37.88
Russia total	−0.49	−11.44	−5.75	−134.22	5.26	122.78

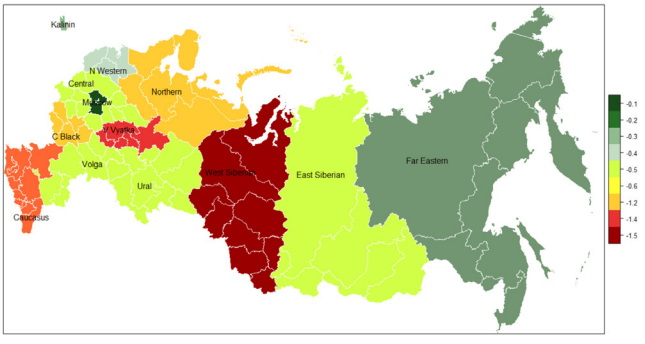
Figure 2.4. Maps of macroeconomic results—Scenario 2

Percentage change in GDP

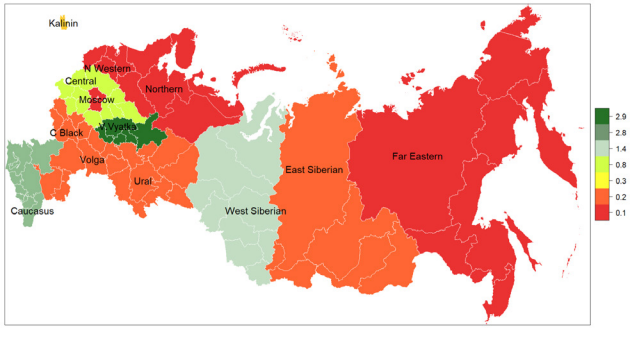
Percentage change in investment

Percentage change in export

Percentage change in import



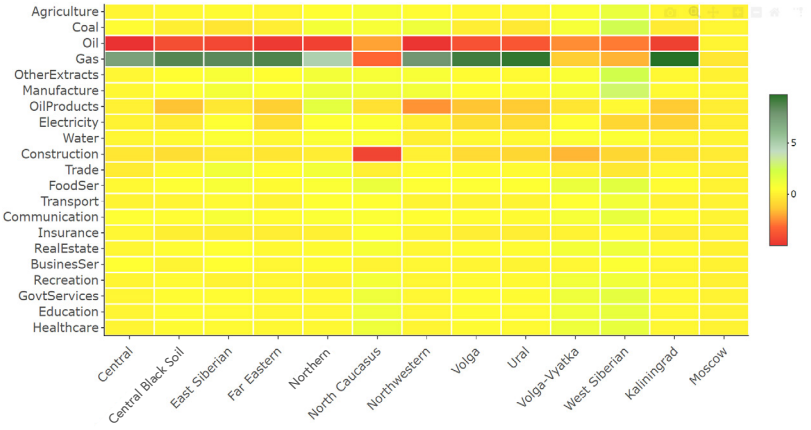
Percentage change in government consumption



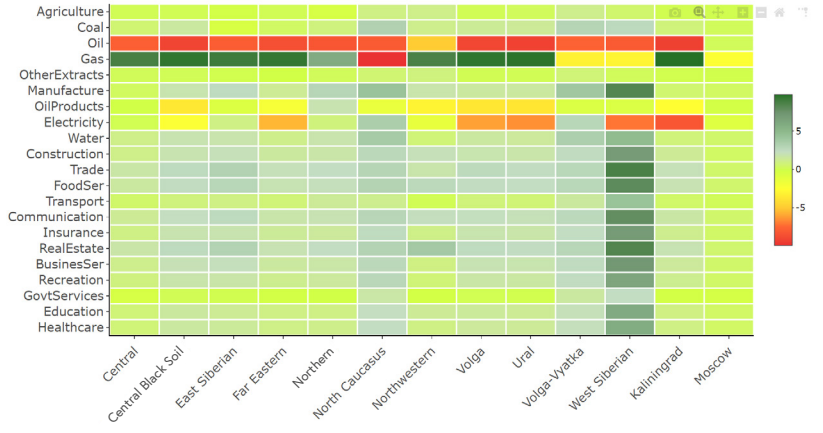
Percentage change in private consumption

Figure 2.5. Heatmaps of outputs, household consumption, exports, and imports by sector

Percentage change in output by sector



Percentage change in private household consumption by sector



Percentage change in export by sector

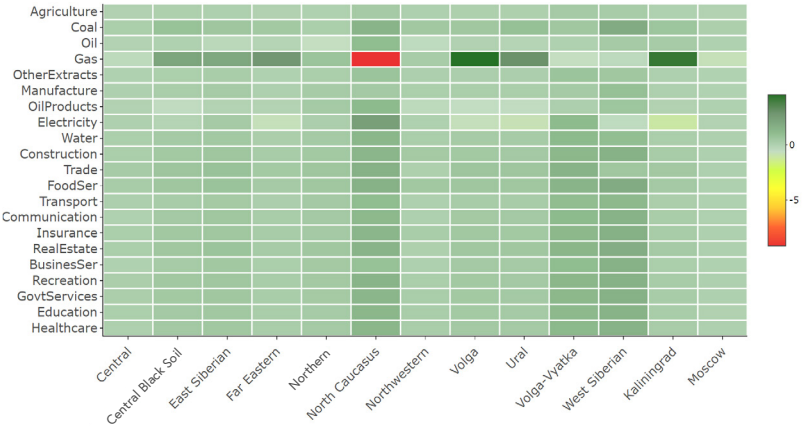
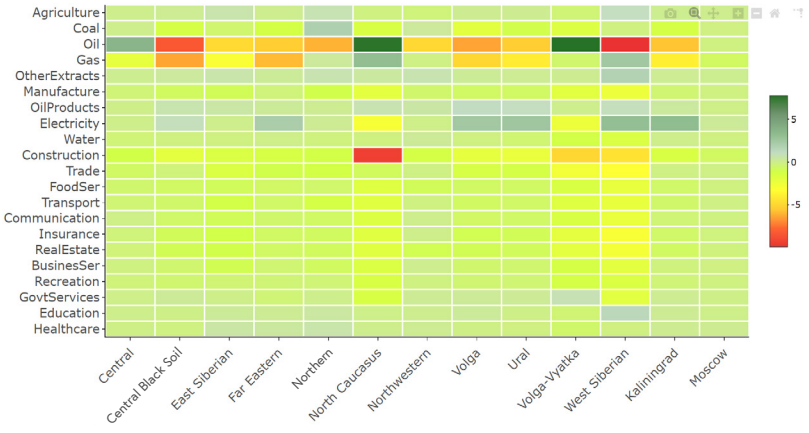


Figure 2.5. Continued

Percentage change in import by sector



Box 2.2. Summary of Scenario 2

The three economically weaker regions—the Volga Vyatka, the Northern Caucasus, and the Central macroregions—are selected based on the GRP and are compensated for the elimination of subsidies from the savings realized from other regions.

The model estimates that Russia's GDP, exports, private consumption, and government expenditures will increase by 0.55 percent, 0.41 percent, 0.73 percent, and 0.58 percent, respectively—slightly higher than the increase observed in Scenario 1. Investment declines by 0.67 percent and imports decline by 0.07 percent, slightly less than the decline in Scenario 1.

The model estimates an increase in the GRP of 0.69 percent, 2.72 percent, and 2.61 percent in the Central, the Northern Caucasus, and the Volga-Vyatka macroregions, respectively. These are much higher than the increases estimated under Scenario 1. The gain in per-capita GRP is significantly higher than in Scenario 1 in these regions and lower in other regions, indicating a reduction in regional disparities. The model estimates a per-capita GRP increase of $139 in the Volga-Vyatka macroregion, $122 in the Northern Caucasus macroregion, and $27.7 in the Central macroregion. There is also an increase in overall consumption in these regions, mainly driven by the increase in natural gas consumption. The estimated decline in total CO_2 emissions in the Russian Federation is 0.49 percent.

Scenario 3

Under Scenario 3, energy subsidies are eliminated as in the previous two scenarios; however, to ensure this does not adversely affect the economic efficiency and competitiveness of energy-intensive sectors, the removal of subsidies is compensated for in the form of government transfers to these sectors.

Change in GDP and investment: The model estimates an increase in the GRP of all regions, notably that of the Volga-Vyatka region, which increases by 1.52 percent, the Central region by 0.82 percent, and the Northern region by 0.73 percent. This GRP increase is higher than the increase estimated under Scenario 1. As shown in Table 2.9, Moscow gains the biggest per capita rise in GRP of $132. This is followed by the Volga-Vyatka macroregion, which experiences an increase of $81.2, and the Northern macroregion, with an increase of $69.89. Under this scenario, almost all regions experience a greater increase in per capita GRP than Scenario 1. Only the West Siberian and the North Caucasus macroregions see an increase in per capita GRP lower than that under Scenario 1. The disparity ratio for per-capita GRP falls slightly under this investment stabilization scenario because of the relatively larger increase in per capita GRP in the poorest regions compared to the richest ones. This ratio changes from 5.34 to 5.33, marking a relative decrease of 0.2 percent. The investment fares better as compared to Scenario 1. When capital investments in energy-intensive sectors are prevented from falling, this results in two opposing effects. First, the capital available for investment in other sectors is reduced, resulting in a potential reduction in their output. Second, production in sectors that have forward and backward linkages with energy sectors gets a boost. The model simulation results show that the latter effect outweighs the former, resulting in an overall increase in investment, particularly in the North Caucasus, Moscow, and the Ural regions.

Change in market prices and output: As seen in Table 2.10, the market price of oil and gas increases in all regions, while the price of electricity increases in all regions except the East Siberian, the Northern, the North Caucasus, the Northwestern, and the Volga-Vyatka macro-

Table 2.9. Increase in per capita GRP by region—Scenario 3

Region	Percent change in GRP	Base value (US$, millions)	Final value (US$, millions)	Population	Per capita GDP before (US$)	Per capita GRP after (US$)	Absolute change in per capita GRP (US$)	Difference from Russian avg. (US$)
Central	0.82	130,103	131,169	32,310,000	4,027	4,060	32.99	–4,142
Central Black Soil	0.58	48,791	49,075	7,123,000	6,850	6,890	39.81	–1,312
East Siberian	0.66	57,618	57,997	6,119,000	9,416	9,478	61.89	1,277
Far Eastern	0.39	74,809	75,098	6,122,000	12,220	12,267	47.29	4,066
Kaliningrad	0.56	7,154	7,194	1,013,000	7,062	7,102	39.72	–1,100
Moscow	0.62	268,957	270,614	12,506,468	21,505	21,638	132.42	13,436
North Caucasus	0.65	101,614	102,277	22,629,000	4,490	4,520	29.33	–3,682
Northern	0.73	42,943	43,256	4,473,000	9,601	9,670	69.89	1,469
Northwestern	0.57	89,028	89,535	8,497,000	10,478	10,537	59.73	2,336
Ural	0.46	131,315	131,919	18,699,000	7,023	7,055	32.29	–1,147
Volga	0.50	104,960	105,485	15,807,000	6,640	6,673	33.21	–1,528
Volga-Vyatka	1.52	38,158	38,739	7,153,000	5,335	5,416	81.20	–2,786
West Siberian	0.04	186,897	186,969	14,756,000	12,666	12,671	4.89	4,469
Total Russia	0.55	1,282,347	1,289,327	157,207,468	8,157	8,201	44.40	0
Disparity ratio					5.340	5.330		

Table 2.10. Percentage change in market prices by sector and region—Scenario 3

Market price	Central	Central Black Soil	East Siberian	Far Eastern	Northern	North Caucasus	Northwestern	Volga	Ural	Volga-Vyatka	West Siberian	Kaliningrad	Moscow
Agriculture	–0.37	–0.17	0.01	–0.17	–0.06	–0.08	–0.78	–0.11	–0.16	–0.77	–0.21	–0.09	–0.11
Coal	–0.33	–0.55	–0.62	–0.44	–0.49	–0.64	–0.75	–0.48	–0.48	–1.40	–1.26	–0.42	–0.24
Oil	1.02	1.86	1.39	1.48	1.42	2.48	0.63	1.84	1.91	1.89	1.36	2.04	–0.07
Gas	2.76	4.68	2.17	2.01	2.23	8.762	1.10	2.90	2.99	9.49	8.56	2.24	2.09
Other extracts	–0.32	–0.18	–0.26	0.00	–0.36	0.23	–1.1	–0.10	–0.15	–1.07	–0.26	–0.04	–0.16
Manufacturing	–0.26	–0.63	–0.80	–0.53	–0.68	–0.66	–0.61	–0.58	–0.57	–1.54	–1.55	–0.49	–0.12
Oil products	0.08	0.05	–0.65	–0.38	–1.47	0.22	–0.39	0.07	0.07	–0.61	–0.65	–0.22	0.05
Electricity	1.93	0.48	–0.45	0.49	–0.47	–0.82	–0.22	0.81	1.16	–0.69	1.16	0.99	1.28
Water	–0.29	–0.46	–0.79	–0.77	–0.85	–0.56	–0.79	–0.41	–0.37	–1.45	–1.43	–0.33	–0.14
Construction	–0.56	–0.67	–0.68	–0.54	–0.71	–0.68	–1.19	–0.64	–0.61	–1.64	–1.87	–0.54	–0.23
Trade	–0.94	–0.79	–0.76	–0.64	–0.83	–0.75	–1.20	–0.76	–0.73	–1.81	–2.21	–0.65	–0.39
Accommodation	–0.85	–0.76	–0.75	–0.61	–0.79	–0.74	–1.43	–0.72	–0.70	–1.77	–2.06	–0.62	–0.37
Transport	–0.36	–0.71	–0.94	–0.68	–1.01	–0.73	–0.73	–0.67	–0.64	–1.63	–1.80	–0.65	–0.26
Communication	–0.71	–0.70	–0.66	–0.56	–0.73	–0.69	–1.39	–0.66	–0.64	–1.69	–2.01	–0.56	–0.34
Financial services	–0.53	–0.59	–0.54	–0.49	–0.63	–0.59	–0.92	–0.57	–0.54	–1.51	–1.80	–0.50	–0.33
Real estate	–0.85	–0.76	–0.74	–0.60	–0.80	–0.75	–2.02	–0.72	–0.68	–1.77	–2.11	–0.62	–0.37
Business services	–0.62	–0.66	–0.61	–0.51	–0.67	–0.66	–0.73	–0.62	–0.59	–1.59	–1.87	–0.52	–0.31
Recreation	–0.49	–0.66	–0.69	–0.55	–0.73	–0.64	–0.77	–0.61	–0.58	–1.60	–1.78	–0.53	–0.31
Public administration	–0.41	–0.56	–0.53	–0.46	–0.58	–0.53	–0.99	–0.52	–0.49	–1.45	–1.71	–0.45	–0.23
Education	–0.32	–0.47	–0.42	–0.38	–0.47	–0.47	–1.13	–0.42	–0.40	–1.33	–1.55	–0.36	–0.18
Health services	–0.40	–0.52	–0.50	–0.42	–0.54	–0.50	–0.81	–0.48	–0.45	–1.38	–1.58	–0.41	–0.22

regions when subsidies are removed and investments in energy sectors are retained. This increase in market prices reduces oil sector output, although the decrease is lower than the output decline estimated under Scenario 1. The output of the gas sector, however, falls to a greater extent than in Scenario 1 as the market price rises more compared to the first scenario.

Change in consumption: Private consumption and government expenditure increases for all regions. The increase is slightly higher than that in Scenario 1. This is driven by a relatively lower decline in the consumption of energy-intensive sectors compared to Scenario 1 because the removal of subsidies in these sectors is compensated for by allocating government transfers to them. In the West Siberian macroregion, private consumption increases by 1.38 percent and in Volga-Vyatka macroregion by 1.33 percent, while government expenditures in these two regions rise by 1.73 percent and 1.47 percent, respectively. This increase in overall private consumption is also driven by greater oil consumption and other non-energy commodities than in Scenario 1. The same pattern holds good for government expenditures.

Change in trade: There is a decline in overall exports of all regions except for the Northwestern macroregion. This decline is higher than the decline under Scenario 1. The decline is predominant in the Volga-Vyatka (–2.7 percent), the West Siberian (–2.59 percent), and the North Caucasus (–2.58 percent) macroregions. A higher market price for energy commodities resulting from the removal of subsidies reduces demand for them in other regions. Major natural gas exporting regions, such as the West Siberian macroregion, experience a slump in overall exports. Other exports also decline as energy-intensive sectors lose competitiveness in the global market when the domestic input price of energy commodities increases.

Change in CO_2 emissions: Table 2.11 shows that CO_2 emissions decline by 2 percent in the West Siberian macroregion, by 1.07 percent in the Ural region, and by 0.97 percent in the Volga region. This decline is much higher than the estimated decline under Scenario 1. At this juncture, it is important to note that there is a greater decline in the consumption of natural gas in almost all regions compared to Scenario 1. In Scenario 3, the increased reduction in emissions results from a change in consumer

Table 2.11. Change in CO_2 emissions—Scenario 3

Region	Total emissions		Household emissions		Producer emissions	
	Percent change	Change in CO_2 per metric ton	Percent change	Change in CO_2 per metric ton	Percent change	Change in CO_2 per metric ton
Central	–0.52	–1.82	–4.79	–16.76	4.27	14.94
Central Black Soil	–0.76	–0.53	–8.21	–5.74	7.45	5.20
East Siberian	–0.08	–0.03	–0.46	–0.14	0.38	0.12
Far Eastern	–0.74	–1.68	–15.36	-34.79	14.62	33.11
Kaliningrad	–1.24	–0.25	–65.93	-13.12	64.69	12.87
Moscow	–0.15	–0.83	–0.92	-5.17	0.77	4.34
North Caucasus	–0.13	–0.14	–4.06	-4.23	3.92	4.09
Northern	–0.22	–0.03	–5.11	-0.72	4.89	0.69
Northwestern	–0.33	–0.50	–9.67	-14.42	9.34	13.93
Ural	–1.07	–2.43	–10.63	-24.22	9.56	21.79
Volga	–0.97	–1.47	–11.75	-17.74	10.78	16.27
Volga–Vyatka	–0.09	–0.03	–1.34	-0.43	1.25	0.40
West Siberian	–2.00	–7.97	–14.39	-57.21	12.38	49.25
Russia total	–0.76	–17.70	–8.34	-194.70	7.58	177.00

preferences and greater reallocation from emission-intensive sectors, such as the natural gas sector, towards other sectors of the economy. Household emissions in the Russian Federation decline by 8.34 percent, while industrial emissions increase by 7.58 percent. There is a notable increase in the consumption and output of coal, which drives industrial emissions.

Change in employment and consumer price index: The rise in employment of skilled and unskilled labor under Scenario 3 is higher than under Scenario 1 for most regions. It is notable in the East Siberian (a 1.53 percent increase in skilled labor and 1.95 percent in unskilled labor), the Northern (a 2.84 percent increase in skilled labor and 3.5 percent in unskilled labor), and the Volga-Vyatka regions (a 1.47 percent increase in skilled labor and 1.14 percent in unskilled labor). This is due to the allocation of government transfers to the energy-intensive sectors under Scenario 3, where production in sectors with forward and backward linkages with energy sectors may get a boost leading to an increase in employment. In the Russian Federation as a whole, the estimated change in the employment of skilled and unskilled labor is 0.48 percent and 0.66 percent, respectively, under Scenario 3.

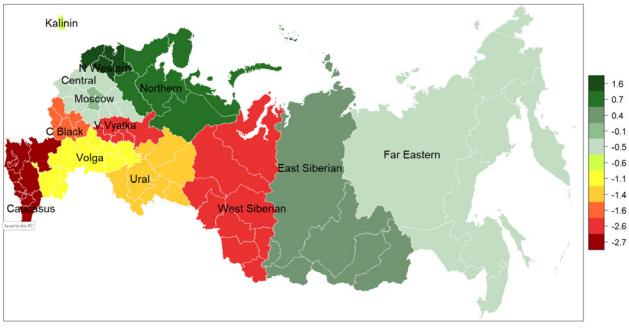
Under Scenario 3, consumer prices decline in all regions. The decrease is predominant in the Volga-Vyatka (−1.70 percent), the East Siberian (−1.5 percent), the North Caucasus (−1.44 percent), and the Northern (−1.07 percent) macroregions. This could be attributed to the allocation of government transfers to energy-intensive and related sectors, which results in excess supply in some regions and sectors such as coal, oil products, and electricity. This general equilibrium effect results in a decline in consumer prices whereby excess supply is eliminated. The model estimates that consumer prices in the Russian Federation could fall by 0.71 percent.

Figure 2.6. Maps of macroeconomic results—Scenario 3

Percentage change in GDP

Percentage change in investment

Percentage change in export



Percentage change in import

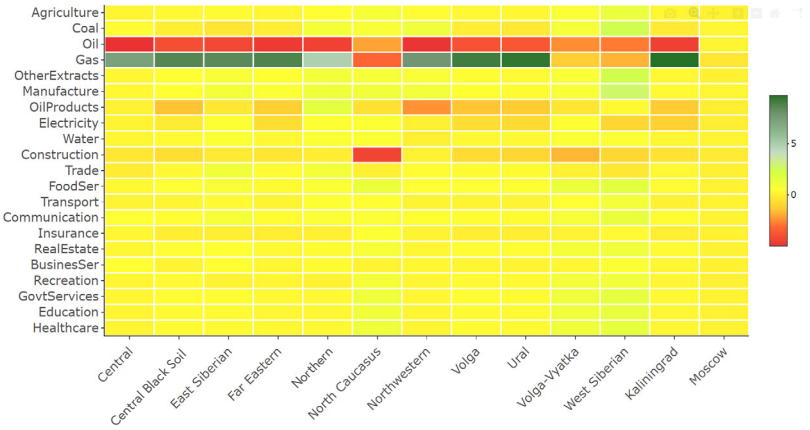
Figure 2.6. Continued

Percentage change in government consumption

Percentage change in private consumption

Figure 2.7. Heatmaps of output, household consumption, exports, and imports by sector

Percentage change in output by sector



Percentage change in private household consumption by sector

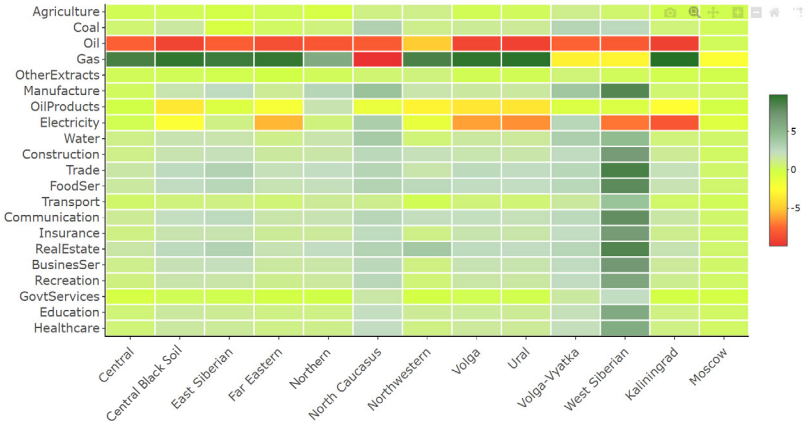
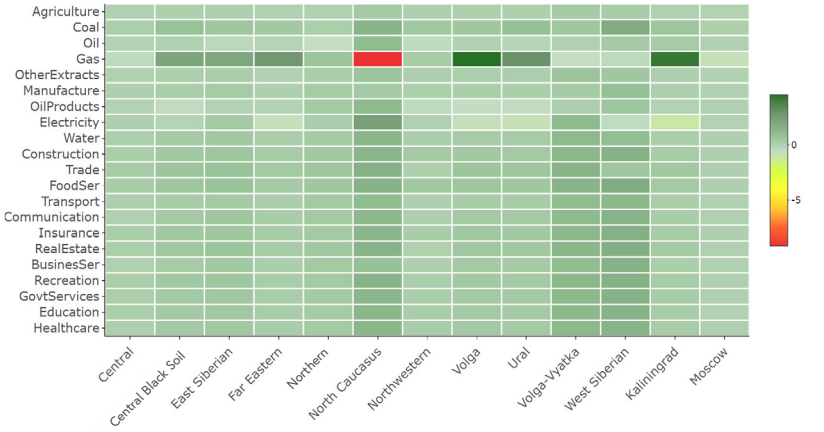
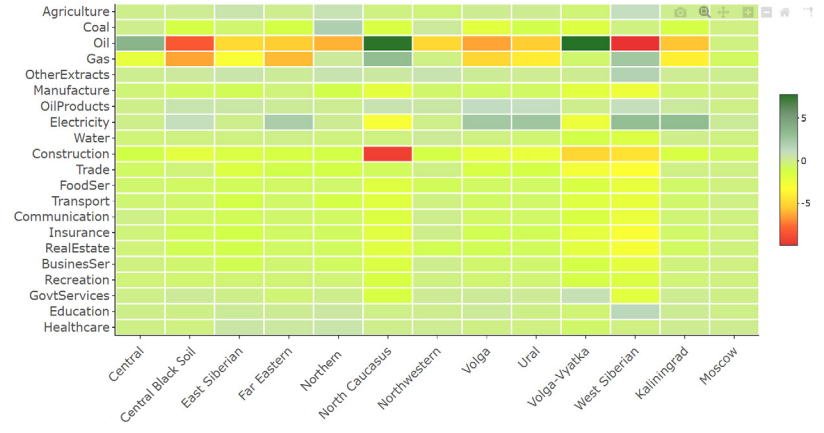


Figure 2.7. Continued

Percentage change in export by sector



Percentage change in import by sector



Box 2.3. Summary of Scenario 3

Overall, the GDP of the Russian Federation is estimated to increase by 0.55 percent, investment by 0.75 percent, government expenditures by 0.67 percent, and private consumption by 0.51 percent. Exports decline by 0.80 percent and imports by 0.93 percent. When compared to Scenario 1, most regions experience a greater increase in the per capita GDP. The CO_2 emissions of the Russian Federation decline by 0.76 percent, which is greater than in Scenario 1. These results suggest that the often-discussed tradeoff between investment and consumption is greatly diminished in the general equilibrium framework. When investments in energy-intensive sectors are supported, the resulting multiplier effects boost the productive capacity and output, even though some certain sectors experience investment decline owing to capital constraints. This boost in output results in more consumer disposable income and employment opportunities for the people at large, which, in turn, increases consumption. Furthermore, the investment support in energy-intensive sectors coupled with subsidy removal leads to a less carbon-intensive allocation of energy commodities, thereby reducing emissions even further. In contrast, supporting consumption leads to a boost in demand, but not sufficiently so as to raise investment or output substantially or facilitate a tilt towards cleaner fuels.

Conclusion

This chapter examines the different policy scenarios of energy subsidy reform in Russia's regional economies. For this purpose, a detailed regional CGE model based on the GTAP-E framework was developed, incorporating a wide range of subsidies in the model structure before simulating their removal. Simply removing subsidies may result in positive allocative efficiency gains, but at the same time, it also causes certain sectors and regions to dip more than others. To mitigate these negative effects, three scenarios are examined that combine this subsidy elimination with certain compensation mechanisms to compare and contrast the pros and cons of these different policy options.

Based on this analysis, the outlook for Russia's post-elimination of subsidies period is positive. This may further be improved by compensating the poorer regions (Scenario 2) and losers in terms of investments (Scenario 3). Under Scenario 2, compensation of the governments of the three poorest regions in terms of GRP per capita is assumed using the fiscal revenues from subsidy reform. Under Scenario 3, it is assumed that the investments in energy-intensive sectors do not decline, despite the energy subsidy removal. In short, Scenario 2 can be interpreted as consumption support and Scenario 3 as investment support. GRP increases roughly by half a percentage point, mainly fueled by increased consumption of all non-fossil fuel sectors. These gains are facilitated by additional resources released by removing distortions in energy sectors and government revenues gained from subsidy elimination. Although imperfect competition or other drivers of endogenous productivity changes are not captured in this model, positive impacts are observed, mainly arising from the major allocative efficiency gains that arise from this subsidy removal. In this sense, the positive impact may be considered conservative and close to the lower bound of actual possibilities.

Subsidy elimination leads to some decline in investment in all three scenarios. However, the countermeasures applied under Scenarios 2 and 3 help mitigate some of the investment losses. The additional resources provided to the poorer regions under Scenario 2 lead to a slightly higher overall increase in GRP and more inclusive growth. This is due to a considerable rise in consumption with a slight increase in total investment. But this scenario does not ensure that these investments are utilized, thereby keeping the energy sectors intact. Furthermore, the gains in other regions that transfer their savings to the poorest regions are undermined in this scenario.

The final scenario acts as a cushion to the fall in investment due to the elimination of subsidies. It prevents the energy sector from experiencing a major investment slump. This scenario also leads to an overall improvement in GRP similar to Scenario 2 while slightly increasing government expenditures. Investment effects are positive in this scenario as investment losses are compensated for. The stability of energy-intensive sectoral investments provided in Scenario 3, relative to Scenario 1, also promotes consumption by enhancing inputs available for production and market for inputs used by energy-intensive sectors. Another positive feature of this scenario is that carbon emissions also fall to a greater extent than Scenario 1 because of the cleaner allocation of fuels within the mix of energy sectors. Per capita income disparity ratios, defined as the ratio of the per capita GDP of the highest to that of the lowest region, fall in all scenarios, by 0.1 percent, 0.6 percent, and 0.2 percent respectively under Scenarios 1, 2, and 3.

Elimination of fossil fuel subsidies leads to an increase in employment in all three scenarios. The gain in employment is relatively higher under Scenario 3 because the allocation of government transfers to energy-intensive sectors leads to an increase in output and employment in sectors that have forward and backward linkages. Under Scenario 2, the increase in employment is predominant in the three economically weakest regions—the North Caucasus, the Volga-Vyatka, and the Central regions. Consumer prices fall in all regions under Scenarios 1 and 3 to eliminate excess supply in less energy-intensive sectors. Under Scenario 2, however, consumer prices increase in the three weakest regions due to increased consumption, which leads to excess demand that pushes up commodity prices.

The elimination of fossil fuel subsidies could benefit all regions in Russia. Policymakers may examine several ways to compensate the losers, of which two broad options were analyzed. If the energy-intensive sectors that lose are compensated for the loss of subsidies (Scenario 3), they could further benefit by increasing investments in low-carbon energy. Energy subsidy reform leads to slightly lower, but more inclusive economic gains if the poorest

regions receive transfers from Russia (Scenario 2). Going beyond the scope of the analysis in this chapter, one can also argue that gains from energy subsidy reform could be used to support investments in renewable energy. This could further boost the economy by raising energy availability, despite shrinkage in the consumption of fossil fuels. It may be imperative in paving the way to green growth in the Russian regions.

Notes

[1] The Social Accounting Matrix captures all the economic transactions taking place within an economy during a particular year.

[2] Aguiar et al. (2019).

[3] In Russia, earlier efforts were made to build regional SAMs, rather than an aggregated one. These include SAMs for the Central Region (Central Federal District) for 2001; the Northern Region (Far-Eastern Federal District, Northwestern Federal District, Siberian Federal District, Ural Federal District) for 2001; the Southern District (Volga Federal District, South Federal District) for 2001 (N. Volchkova, E. Gorshkova, S. Lobanov, A. Makrushin, N. Turdyeva, Ju. Khaleeva); the Khabarovsk region for 2007 to 2010 (L.I. Vlasuk, N.G. Zakharchenko, V.D. Kalashnikov); Krasnodar krai for 2010 (O.V. Gromova); the Sverdlovsk region for 2012 (D.A. Tatarkin, E.N. Sidorova, A.V. Trynov), and the Vologda region for 2016 (I.V. Naumov, A.V. Trynov). The latest relevant SAM for Russia was developed by A.R. Belousov, the Acting Deputy Chairman of the Russian Federation Government, and E.A. Abramova for 1988–98 using several regional SAMs and a 2003 SAM for Russia developed by A.S. Akopov and G.L. Beklarian.

[4] See https://yearbook.enerdata.ru/total-energy/world-energy-intensity-gdp-data.html.

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Pipeline Gas and Electricity Subsidies in Russia: The Distributional Effect of Subsidies for Households

This chapter complements the macro-approaches presented in previous ones and adopts a microeconomic approach to assess what would happen to household welfare if energy subsidies were removed. It aims to identify changes in welfare indicators at the national level and by groups within the national population defined by their socioeconomic, demographic, and geographic characteristics. The key finding is that while there is a loss in household welfare from the removal of energy subsidies, targeted and compensatory measures, in principle, could avoid the socioeconomic consequences of such reforms.

Russia has one of the lowest GDP/units of energy and among the world's highest CO_2 emissions per capita. This is a key finding of a 2014 report on Energy Efficiency in Russia prepared by the International Finance Corporation (IFC) and the World Bank, titled Energy Efficiency in Russia, Untapped Reserves. This low efficiency is only partly explained by the climatic or geographic specificities of the country and is mostly due to economic and organizational inefficiencies that can be reversed. The report also indicates that the largest reduction in end-use energy consumption is potentially achievable in residential energy. Household consumption of central heating, gas, and electricity could be reduced by more than 50 percent. Three key obstacles must be addressed to achieve this efficiency: insufficient tariffs, poor enforcement of federal construction standards, and homeowners' limited understanding of environmental and economic efficiency. Regarding tariffs, the report states:

> Customer tariff levels are below the long-term sustainable cost of production and delivery. Tariff structures allow for continued cross-subsidization of residential customers with revenues from larger customers. Moreover, tariff design, in some cases, remains based on norms (for example, the size of the customer's dwelling served, or the number of residents in the customer's dwelling served) rather than actual consumption. Increasing the cost of energy to consumers is a politically and socially contentious policy move, but continuing to subsidize energy prices for every consumer across the board, is not a sustainable practice for the Russian government in the long run.[1]

This chapter uses the 2019 Russian Household Budget to estimate the distributional impact of a hypothetical removal of pipeline gas and electricity subsidies for households. It consists of three parts: (a) a description of the results of recent studies on energy subsidies for Russia and other countries, (b) a review of the methods and data used to analyze the distributional impact of gas and electricity subsidies, and (c) an analysis of the potential distributional impact of removing electricity and pipeline gas subsidies. It confirms the findings of previous

Russian and international literature indicating that subsidies for these utilities are progressive in relative terms; that is, they represent a larger share of household consumption among poorer than richer households. The analysis has four main findings:

1. As of 2019, household tariffs have an average subsidy of 40 percent in pipeline gas and 90 percent in the case of electricity. Despite these subsidies, 18 percent of the population lives in energy poverty (gas, electricity, and heating represent more than 10 percent of their total expenditures).
2. The subsidies represent a larger share of expenditures among the poorest than more affluent households. Yet total subsidies going to the third richer share of the population is larger than to the poorest third. Namely, the subsidies are progressive in relative terms but regressive in absolute terms.
3. The consequence of this is that the removal of these subsidies would have a larger welfare impact on the poorest households (about 4 percent of consumption expenditures for the bottom decile, in the short term) than on the richest households (about 0.5 percent in the top decile, in the short term).
4. Because of the large subsidies and their concentration at the top of the distribution, an allocation of one-third of the extra revenues collected through higher household pipeline gas and electricity prices would almost fully compensate for the welfare losses of the poorest 40 percent of the population. This would potentially leave the other two-thirds of revenue for investments in energy efficiency, which could yield long-term economic and environmental benefits. Alternative compensatory policies can be designed with different instruments and goals. Still, this exercise shows that the removal of pipeline gas and electricity household subsidies can be implemented with a compensatory policy that diminishes its socio-economic impact among the poorest in the population.

Welfare losses are estimated in terms of the Laspeyres Index and Consumer Surplus for the whole nation and for population groups according to socioeconomic, demographic, and geographic characteristics using estimates of price gaps in these utilities and information about household consumption patterns. Moreover, as the subsidies are regressive in absolute terms (that is, most of the subsidy budget goes to groups at the top of the distribution), a compensatory policy can be designed to fully protect the poorest segments of the population from welfare losses due to subsidy removal. This would still leave resources for investments in energy-efficient production and consumption.

Background and other studies

Recent studies underline the distributional impact of removing the gas subsidies to households in Russia and potential policies to remedy it. Using a Computable General Equilibrium model, Orlov (2017) estimates the impact of closing the price gap between export netback prices and retail prices on consumption and incomes across population deciles. The author estimates that the implicit subsidy is about 40 percent and finds that:

> …increasing the regulated domestic gas price in Russia could induce a strong adverse impact on poor households, as they spend a larger share of their income on gas, electricity, and heating than wealthy households do. Nevertheless, using additional government revenues from increased gas prices to raise the income of low- and middle-income households could offset the adverse impact of increased energy prices and increase the private welfare of these household income groups.[2]

These results are robust to changing assumptions about the price and income elasticity of gas. The change in consumer gas consumption is in reaction to price or income changes and the compensation policy. Regarding the latter, the author also simulates an alternate investment policy in energy-efficient housing refurbishment (rather than lump-sum transfers), which, although regressive during the first year, ends up being progressive three years after implementation. This leads to a more significant reduction of greenhouse gas emissions than the lump-sum transfer policy would. Heyndrickx, Alexeeva-Talebi, and Tourdyeva (2012) also adopt a Computable General Equilibrium model to assess the distributional impact of reducing implicit gas subsidies. In this case, separating the

effect by population distribution (low, middle, and upper class), the authors include several compensatory policies (such as lump-sum transfers and a reduction in labor taxes) and alternative uses of collected funds (for example, investments in Gazprom infrastructure, or general government expenditures), and the extension of the elimination of subsidies (for example, to households, firms, or households and firms together). The conclusion from this study is similar to Orlov's:

> Deregulating natural gas pricing, notwithstanding, is a regressive policy (…) rooted in the fact that gas consumption represents a non-negligible, albeit still a rather small, share of direct living costs to the middle class and the poor. In our reference scenario, where Gazprom retains revenues generated through gas prices increases for infrastructure investments, the welfare losses for low income households are among the highest. That is because ultimately the non-poor are the true beneficiaries capitalizing on higher returns in the future if Gazprom's investment flows increase today. But recycling revenues to increase the governmental spending makes the poor even worse off. All other recycling measures reduce the adverse impacts on the poor and the middle class, with lump-sum payments making the case as a most suitable mechanism to address the distributional concerns.[3]

Several studies underline the social impact of the potential removal of electricity subsidies. An early study by the Organisation for Economic Co-operation and Development (OECD) and the International Energy Agency (IEA) report a large subsidy to households, albeit accompanied by rising payment defaults:

> A comparison of current average regulated residential prices with a rough cost-reflective price estimate suggests that residential prices may need to nearly double to reach cost-reflective levels. Despite the subsidy, evidence is emerging of growing payment defaults, suggesting that there may be little scope for further rapid and substantial tariff rebalancing at this time.[4]

This is the case even though household prices for electricity in Russia are among the lowest in Europe. A brief by Dolmatov and Zolotova (2018) indicates that household prices in Europe as of 2015, excluding VAT, range from €0.08 per kilowatt-hour in Bulgaria to €0.18 per kilowatt-hour in Belgium, Spain, and the United Kingdom. In contrast, in Russia, prices remain below €0.03 per kilowatt-hour. Moreover, household prices are well below prices for firms, a feature not seen in most European countries, which Russia shares with only a few countries in the world.

A more recent study by Proskuryakova, Starodubtseva, and Bianco (2020) confirms the continuity of these distortions. To explore optimal pricing, the study revises extensive literature and data sources and reports that only seven out of a sample of 50 countries have a household-to-industry price ratio of below one, with Russia and Indonesia being the only countries with a ratio substantially below parity. It also comments that the poor are still often unable to pay; there are reports of growing unpaid utility bills (Rub 1,400 billion in 2018). Moreover, because electricity subsidies are distributed according to per capita consumption, and the volume of energy consumption increases with income, then "… more affluent households receive a higher share of subsidies than poorer ones…"[5] This focus on the absolute rather than relative incidence of subsidies is not common in academic and policy research. Yet, it is crucial to understanding why the removal of energy subsidies can be both an efficient and equitable policy: lower subsidies lead to additional revenues, which can then be used to fully compensate the poorer segments of the population.

Studies concerning gas and electricity subsidies in other countries deliver a similar message. The potentially regressive impact of removing general energy product subsidies can be reversed if well-designed, targeted subsidies compensate for the affected population. Recent World Bank studies support this general message both within and outside the region, for example, in Armenia (Ersado 2012), Belarus (Grainger, Zhang, & Schreiber 2015), Kosovo (Robayo-Abril 2019), Ukraine (World Bank 2013), and (Alberini & Umapathi 2020), Turkey and Bangladesh (Timilsina, Pargal, Tsigos, & Sahin 2018), Morocco (Verme & El-Massnaoui 2015), Tunisia (Cuesta, El-Lahga, & Lara Ibarra 2015) and Central American countries (Hernandez Ore et al. 2017).

In this study, the simulation methodology applied differs from the previous studies for Russia reported above. This methodology uses a survey on household consumption expenditures for utilities and administrative data on tariffs, prices, and production costs to simulate the potential impact of removing energy subsidies on different welfare measures across different population segments. The use of survey data allows for identifying welfare effects across different population groups (something not usually done in CGE models). In addition, by using the 2019 Russian Household Survey and administrative data, a more recent estimate of the social impacts of potential subsidy reforms is provided than in previous literature.

Moreover, this type of analysis complements the work done in Chapter 2 of this report. An Extended Global Trade Analysis Project (GTAP-E) computable general equilibrium model has been developed to capture the energy sector and the overall economic structure of each economic region under the Russian Federation. As will be explained in the following section, while the GTAP-E model of Chapter 2 concentrates on the impacts of subsidy removal on national and regional GDP and its components, this chapter assesses the impact on household consumption through microeconomic estimates of social welfare losses by socio-economic, demographic and geographic groups in Russia.

Methods and data

Microeconomic assessment of welfare effects due to changes in prices of goods and services are of four general types. These depend on how many prices change and whether changes in income are included or not. Welfare change estimates are of four types based on the combination of partial (only one price) or general (more than one price change) analyses and direct (only changes in consumption) or indirect (also includes changes in income) analyses. These effects need not be mutually consistent (for example, welfare changes in consumption can be accompanied by welfare changes in incomes of different magnitude and direction) and refer to different analysis perspectives.[6] From a computational viewpoint, several welfare measures are regularly adopted to measure the distributional impact of price changes. These are Laspeyres and Paasche indexes and Consumer Surplus, Equivalent, and Compensating variations. In addition, there are several computational mechanisms for each of these welfare measures. These range from statistical indexes to econometric estimates of the full demand function, elasticities from secondary sources, and numerical approximations.[7]

Direct welfare changes are the focus of this chapter. Specifically, changes in households' consumption expenditures but do not include an assessment of impacts on the disposable incomes of household members. The analysis is mostly partial, with special attention to price changes of pipeline gas and electricity due to changes in the implicit subsidies of these two utilities. Some general analysis is included from the general equilibrium analysis of Chapter 2 by incorporating changes in the general consumer price index derived from that exercise. Finally, to test the robustness of results to different methods, both Laspeyres and Consumer Surplus measures are computed, including, for the case of the latter, formulas based on assumptions about utility functions of households and the price-elasticity of gas and electricity. The inclusion of general CPI changes and consumer surplus estimates can also be interpreted as a channel to gauge long-term effects, rather than the short-term impact implicit in Laspeyres indexes, for a more complete interpretation of potential impacts.[8]

Data

The source of data for this type of analysis is the Russian Household Budget Survey. Other publicly available surveys from the Russian Federal State Statistics Service (ROSSTAT), such as the Household Income Survey (HIS), only capture income information and do not include consumption expenditures. In contrast, the Russia Longitudinal Monitoring Survey (RLMS), a nationally representative survey run by the National Research University Higher School of Economics, has a specific question on household expenditures. However, all utilities are grouped, making a separate assessment of each product impossible. The Russian Household Budget Survey, however, has a limitation—although it includes information

about utility expenditures by component (such as gas, water, and heating), the information is only available for households living in multi-apartment buildings.

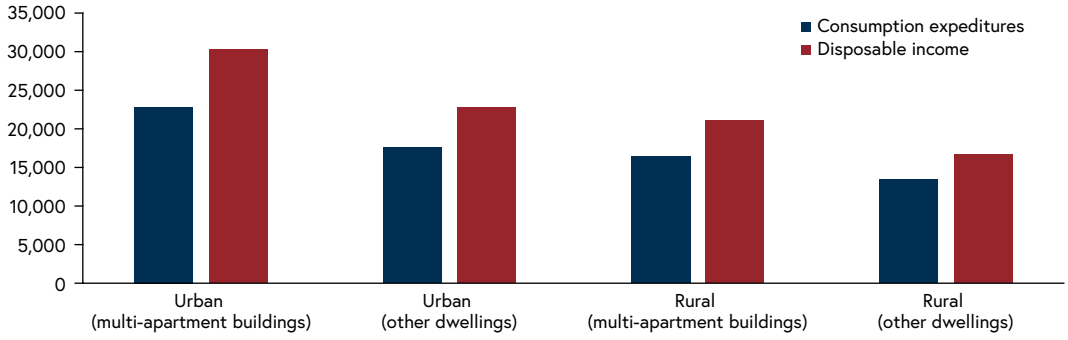
According to the Russian Household Budget Survey of 2019, about two-thirds of the Russian population lives in multi-apartment buildings. This proportion is seen across all family types except for couples with three children or more, as only 40 percent of such families live in multi-apartment buildings. The difference is more pronounced between urban and rural households: 23 percent of rural households live in multi-apartment dwellings, whereas 77 percent of urban households do. This urban/rural divide translates into coverage by geographic regions. The population share living in multi-apartment buildings ranges from only 38 percent in North Caucasus to 90.5 percent in the Northwestern region (Table 3.1).

Table 3.1. Distribution of population according to household budget survey, 2019

	Total		Multi-apartment buildings		Other buidings		Proportion of the total living in multi-apartment buildings
	population	%	population	%	population	%	
Total population	146,002,705	100	93,504,671	100	52,498,034	100	64.0
Type of household							
Couple 1 child	32,835,688	22	21,615,786	23	11,219,902	21	65.8
Couple 2 children	27,386,731	19	16,746,674	18	10,640,057	20	61.1
Couple 3+ children	8,443,295	6	3,443,543	4	4,999,752	10	40.8
Lone parents	8,396,757	6	5,396,670	6	3,000,086	6	64.3
Only adults	31,150,831	21	20,932,130	22	10,218,700	19	67.2
Only pensioners	19,221,467	13	12,880,289	14	6,341,179	12	67.0
Mixed	18,567,936	13	12,489,579	13	6,078,357	12	67.3
Area							
Urban	108,936,395	75	84,675,761	91	24,260,634	46	77.7
Rural	37,066,309	25	8,828,910	9	28,237,399	54	23.8
Macroeconomic regions							
Central	31,651,176	22	26,257,672	28	5,393,504	10	83.0
Central Black Soil	7,150,024	5	3,021,257	3	4,128,767	8	42.3
East Siberian	8,205,454	6	4,116,945	4	4,088,509	8	50.2
Far Eastern	6,164,616	4	4,598,864	5	1,565,752	3	74.6
Kaliningrad	1,002,341	1	714,183	1	288,158	1	71.3
North Caucasus	22,424,110	15	8,598,621	9	13,825,489	26	38.3
Northern	4,505,872	3	3,733,915	4	771,958	1	82.9
Northwestern	8,455,289	6	7,650,027	8	805,262	2	90.5
Ural	18,766,766	13	11,828,314	13	6,938,452	13	63.0
Volga	15,871,054	11	10,112,750	11	5,758,304	11	63.7
Volga-Vyatka	7,172,913	5	4,686,444	5	2,486,468	5	65.3
West Siberian	14,633,089	10	8,185,679	9	6,447,410	12	55.9

Source: Authors' calculations using Russian Household Budget Survey, 2019.

Figure 3.1. Household disposable income and consumption expenditures per capita (rubles per month of 2019)

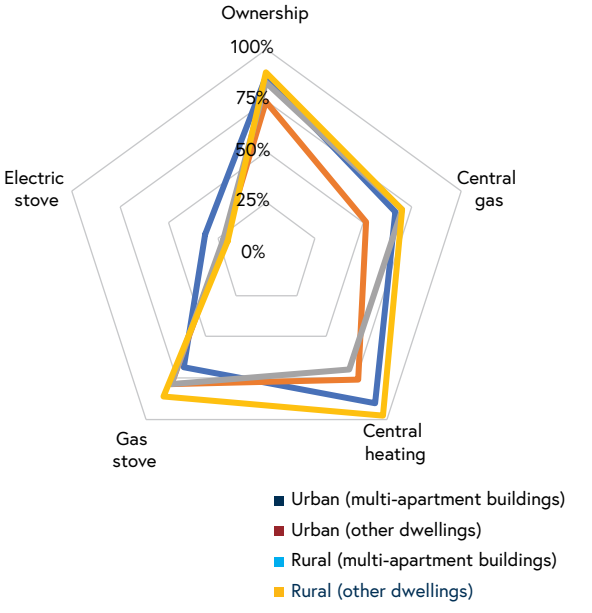


Source: Authors' calculations using Russian Household Budget Survey, 2019.

People living in urban areas have, on average, higher income and consumption expenditures per capita than people living in rural areas. This is independent of the type of dwelling. People living in urban multi-apartment buildings have disposable income and consumption expenditure levels 20 to 45 percent higher than those living in other areas or dwelling types (Figure 3.1). In terms of average size, multi-apartment buildings (both urban and rural) are smaller: around 50 square meters versus 75 square meters in other dwellings. However, electricity connections are nearly universal across households, and connections to central heating or gas pipelines are similar across types of dwellings. The use of electric stoves is more likely in urban multi-apartment buildings than other groups, although usage is less than other uses of energy across the board (Figure 3.2).

These similarities across areas and dwellings hide important differences across geographic regions. For instance, even among dwellers of multi-apartment buildings, connection rates to central pipeline gas range from 3 percent in East Siberia, 13 percent in Far Eastern and 17 percent in West Siberia, to above 90 percent in the Volga and Central Black Soil regions. Regarding other dwelling types, the difference is starker: there are no connections to pipeline gas in East Siberia, while there is 91.4 percent connection in the Central Black Soil region. Though smaller in range, similar regional disparities are seen for central heating connections and the use of electric and gas stoves (Table 3.2). In contrast, differences across family types are far less pronounced.[9] In Russia, as was reported in the previous section for multiple countries, the share of expenditures in these three utilities is higher among the poorer populations. However, these are larger in absolute terms (in Russian rubles) in the middle and top ranks of the distribution. The share of consumption expenditures in gas ranges from 1.1 to 0.2 percent across the deciles of the disposable income distribution, from 1 (poorest) to 10 (richest). The range for electricity is from 2.8 to 0.8 and for central heating, from 5.9 to 1.8 percent (Table 3.3).[10]

Figure 3.2. Dwelling ownership and access/use of public utilities (percent)



Source: Authors' calculations using Russian Household Budget Survey, 2019.

Table 3.2. Distribution of access and use of public utilities by dwelling and region, 2019

	Welfare measures		Average household size (number of members)	Dwelling characteristics					
	Household consumption per capita (in 2019 Rubles)	Household income per capita (in 2019 Rubles)		Size (in M2)	Ownership (%)	Central gas (%)	Central heating (%)	Gas stove (%)	Electric stove (%)
Total population living in multi-apartment buildings									
Macroeconomic regions									
Central	29,609	37,485	3.1	55	88.0	72.5	89.9	70.3	30.2
Ural	18,928	26,019	3.0	53	83.5	79.5	95.3	78.6	21.3
North Caucasus	17,520	21,495	3.2	57	94.1	89.5	75.8	92.0	9.7
Volga	17,935	22,872	3.1	54	84.5	90.1	82.2	87.2	11.8
West Siberian	17,938	26,618	3.0	54	80.1	17.3	91.4	31.7	68.2
East Siberian	19,630	26,346	3.2	54	82.3	3.3	91.4	13.1	88.5
Volga-Vyatka	16,307	22,891	3.0	54	91.3	87.3	87.0	91.9	9.2
Northwestern	23,810	33,024	3.0	53	87.6	82.1	98.6	86.7	13.8
Central Black Soil	17,670	24,977	2.9	54	84.6	91.8	71.1	89.3	9.7
Far Eastern	24,244	32,321	3.1	54	84.1	13.0	90.6	22.4	78.2
Northern	20,908	29,709	3.0	54	81.1	38.5	87.4	59.4	43.2
Kaliningrad	15,337	19,047	3.2	53	83.6	46.7	36.5	91.1	12.0
Total population living in other buildings									
Macroeconomic regions									
Central	18,768	22,728	3.1	79	83.1	73.3	85.0	93.2	5.6
Ural	15,476	19,326	3.4	68	79.9	56.9	84.5	80.0	22.5
North Caucasus	14,249	17,017	4.1	94	85.6	88.1	92.7	95.8	7.7
Volga	14,338	18,638	3.4	74	84.6	87.5	89.5	96.5	4.2
West Siberian	14,668	19,271	3.2	67	87.8	18.9	91.7	70.4	36.6
East Siberian	15,469	20,291	3.4	65	71.3	0.0	81.8	27.7	86.6
Volga-Vyatka	12,849	16,661	3.1	69	82.0	70.9	87.9	94.8	4.8
Northwestern	20,008	29,497	2.7	52	56.9	2.5	48.5	86.8	12.3
Central Black Soil	15,615	20,249	3.2	77	89.4	91.4	95.6	97.3	4.1
Far Eastern	20,018	27,780	3.2	61	66.6	2.0	72.3	33.9	72.8
Northern	18,960	24,080	2.8	61	59.2	14.0	62.9	54.7	45.6
Kaliningrad	14,748	18,914	3.4	71	67.0	18.6	69.9	97.2	9.1

Source: Authors' calculations using Russian Household Budget Survey, 2019.

This observation contrasts with consumption value. For electricity, this ranges from Rub 158 to Rub 497 per month per capita, from the poorest to the richest decile of the distribution; for central heating, it ranges from Rub 60 to Rub 108 for gas, and from Rub 332 to Rub 1,173. These large differences are not seen across groups by type of family, area, or region for electricity; however, in terms of gas and central heating, even larger ranges in expenditures and bills are observed across regions. For gas, this is due to the lower proportion of gas connections in the East Siberia, West Siberia, and Far Eastern regions. Regarding central heating, the wider range is observed because of the Kaliningrad region; without it, most regions have similar consumption patterns for this utility. This indicates that consumption patterns on gas and electricity are driven more by socio-economic conditions than demographics or geography. The description of living standards and expenditure patterns above does not suffice to compute differences in the incidence of subsidies. First, it is necessary to define how to approach the lack of information on expenditure patterns for households not living in multi-apartment buildings. Second, there is a need to describe tariffs and subsidies because, if subsidies vary by group, the removal of the subsidy may have incidence impacts that are not proportionate to the share of expenditures.

Households that do not live in multi-apartment buildings are assumed to have the same average share of gas and electricity expenditures as those in multi-apartment buildings. The population is divided into deciles by disposable income. The average share of expenditures of electricity and pipeline gas of households living in multi-apartment buildings in a given decile of the distribution is applied to households not living in apartment buildings but in the same decile of the distribution. This is provided that the household reports having a connection to pipeline gas (universal electricity connection is assumed). It follows the evidence shown above that the position in the decile of the distribution explains differences in the share of energy expenditures, and not family type, area, or region (except for Siberian and Far Eastern regions). For differences in tariffs and subsidies by groups and regions, additional research commissioned for the Report (see Chapter 1) is needed. The retail price of pipeline gas for households is affected by several factors. A metered household pays an amount calculated by cubic meters consumed times the regulated gas price (which includes a VAT rate of 20 percent). Some regions include price brackets for different consumption volumes. However, other regions have established a standard gas consumption amount per person per month. In such cases, households pay an amount calculated by the number of people living in a household multiplied by the standard gas consumption rate multiplied by the regulated gas price. In some provinces, gas prices also depend on whether gas is used for boilers, heating, or other uses. In other cases, there is no retail price for pipeline gas due to the lack or limited service (for example, in the Magadan and Amur regions).

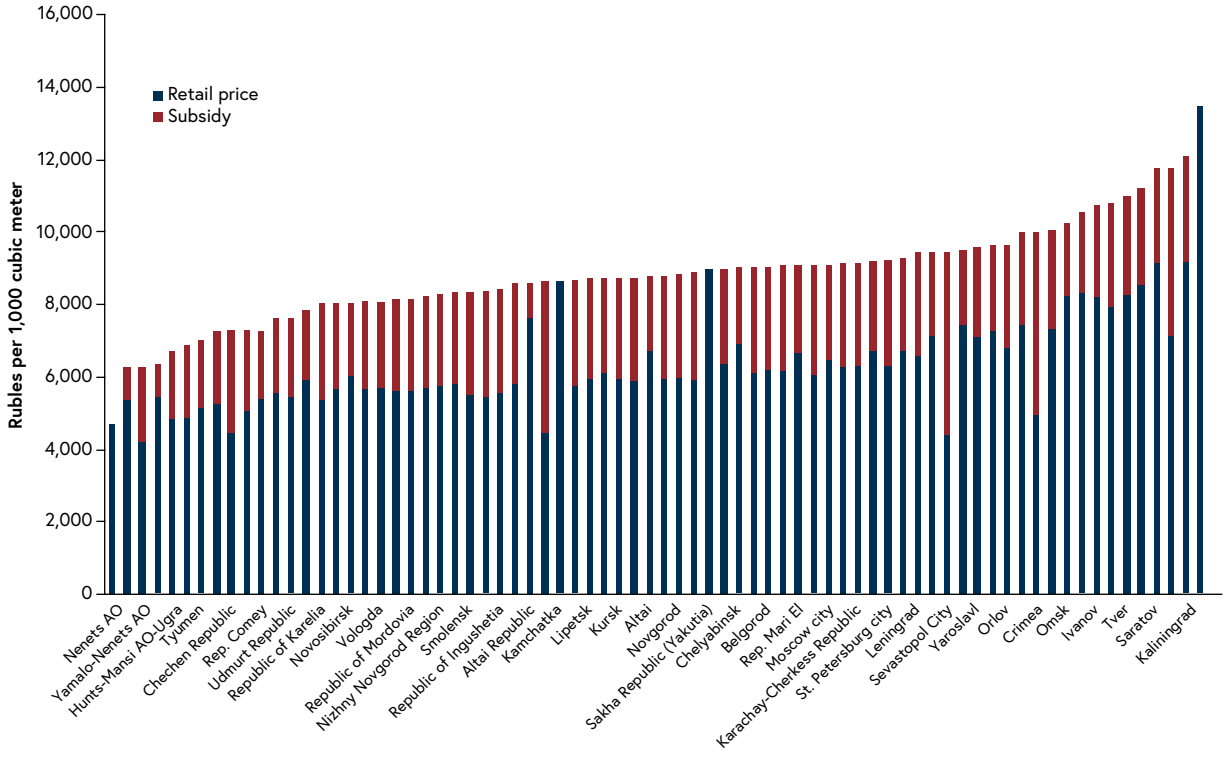
In this study, the retail price s reported in the ROSSTAT consumer price index is used as the price "with-subsidy." Since there is no information in the survey on whether a given household has a meter, whether it uses pipeline gas, or what share of it is used for heating, boiling, or some other use at a special price, tariffs cannot be differentiated. Therefore, the regional average price reported by ROSSTAT for every household living in a given federal entity is used.[11] The gas price "without-subsidy" is derived from a study commissioned for this report on "netback" prices as an approximation of the opportunity cost of pipeline gas and how this would transfer into "without-subsidy" retail prices. This method of deriving "without-subsidy" prices starts with GAZPROM export prices to distant countries (mostly outside of the former Soviet Union). It deducts custom duties and the average net differential transportation costs to foreign countries (rather than to local markets.)[12] This "netback" price is defined at wholesale prices, whereby the difference between the "netback" price and the officially approved wholesale price is the subsidy amount at wholesale prices. With a VAT of 20 percent, this subsidy is subtracted to the "with-subsidy" retail price to derive a "without-subsidy" retail price of pipeline gas. The difference between these "with" and "without" prices is the price difference used for the welfare change formulas of the previous section. This assumes the full removal of the implicit subsidy for households, leaving intact whatever other implicit subsidies in storage or transportation are associated with pipeline gas service delivery.

Simulation results

Four main experiments are analyzed. Scenario 1 includes removing subsidies for pipeline gas only, Scenario 2 for electricity, and Scenario 3 for both. Scenario 4 adds the welfare impact of changes on general consumer prices by geographic region derived from a companion study's Computable General Equilibrium (CGE) exercise.[13] For each scenario, estimates of the welfare loss due per the Laspeyres Index and Consumer Surplus are included, where the with- and without-subsidy prices are estimated following the methods described in the previous section (see formulas in Annex 3A: Formulas for welfare changes). Scenarios 1 to 3 under the Laspeyres index can be interpreted as short-term impacts of subsidy removal since pipeline gas and electricity expenditures remain constant. In contrast, Scenario 4 under consumer surplus can be interpreted as a more medium-term impact. Ultimately, because it implies that consumers have changed consumption in reaction to price changes in gas and electricity and the general equilibrium effects of changes in other prices are also incorporated.

The average difference between with and without subsidy pipeline gas prices for households across federal entities is 40 percent. Most provinces have subsidies close to this average, with only a few above the 60 percent mark (for instance, the cases of Sakhalin oblast, Khabarovsk oblast, the Chechen Republic), and a few below the 20 percent mark (Astrakhan oblast, Republic of Dagestan, Irkutsk oblast, and Kamchatka krai; the Altai Republic and Republic of Sakha [Yakutia]; and the Nenets Autonomous District). This involves removing subsidies that would not change the dispersion of pipeline gas prices across regions (the standard deviation would remain at Rub 1,400 before and after the removal of the subsidy). Average retail prices per the ROSSTAT consumer price index and estimated subsidies by region are illustrated in

Figure 3.3. Household pipeline gas: average retail prices and estimated subsidy by a federal entity (2019)



Source: Authors using data on implicit subsidies from Chapter 1 of this report.

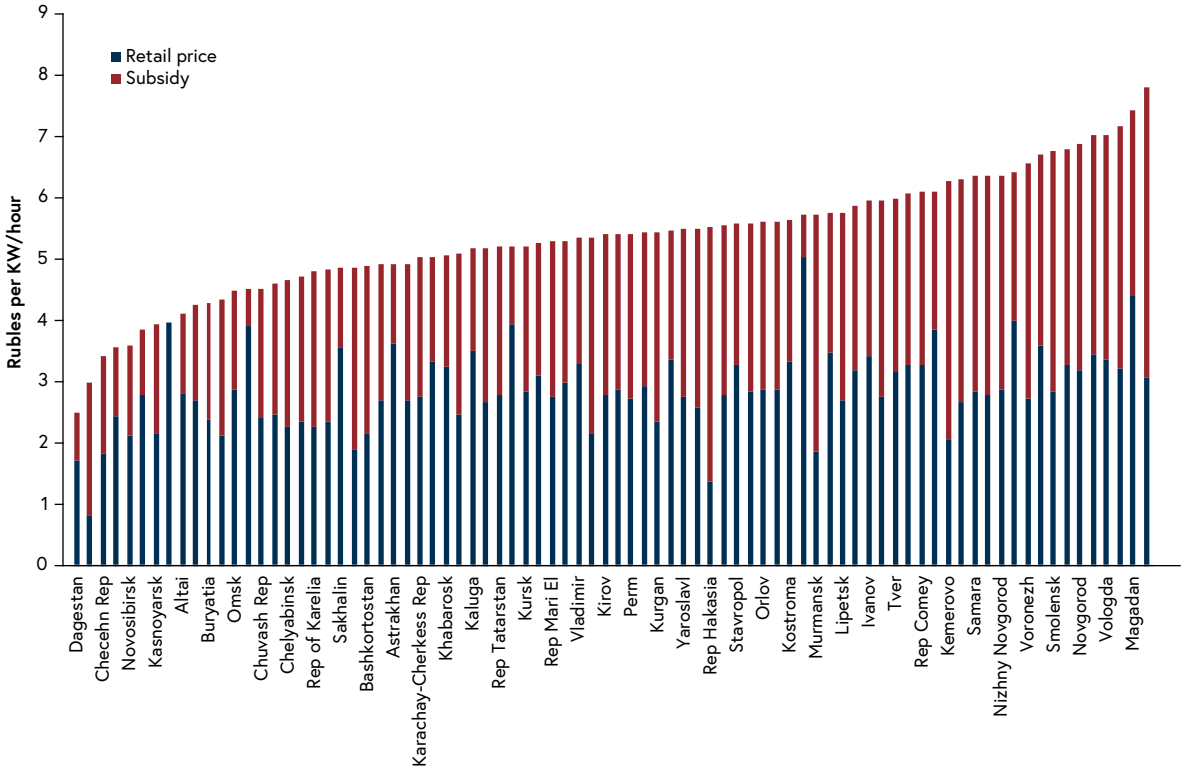
Note: Retail price refers to the pipeline gas average price for households per consumer price index per region. Subsidy refers to the difference between an estimate of level netback export prices from Gazprom and the retail price.

Figure 3.3. In the case of household electricity consumption, there are also region-specific "with" and "without" prices. "Without-subsidy" prices are estimates of "cost recovery" prices for household electricity services which range from Rub 2.49 per kilowatt-hour (Dagestan Republic) to Rub 7.82 per kilowatt-hour (Leningrad oblast), with a median of Rub 5.41 and an average of Rub 5.36 per kilowatt-hour.[14] "With-subsidy" prices are collected from ROSSTAT consumer price indexes. Households that use an electric stove, or those in rural areas, have a preferential rate that equals 70 percent of the approved official rate for the region. These characteristics can be identified among households in the survey and consequently apply the respective preferential rates in our computations.

The average difference between electricity prices with and without subsidies for households across federal entities is 93 percent. In contrast to the case of pipeline gas, subsidies to household electricity prices vary substantially across regions. These range from less than 40 percent in the Astrakhan, Moscow City, Moscow Region, the Nenets Autonomous District, and Sakhalin regions, to more than 150 percent in Irkutsk, Khakassia, Leningrad, Mordovia, Orenburg, and Murmansk regions. Because of this, and again in contrast to gas prices, the removal of subsidies would lead to more dispersions of electricity prices across regions (the standard deviation of prices would go from 0.65 to 0.99). Average retail household electricity prices and estimated subsidies by region are illustrated in Figure 3.4.

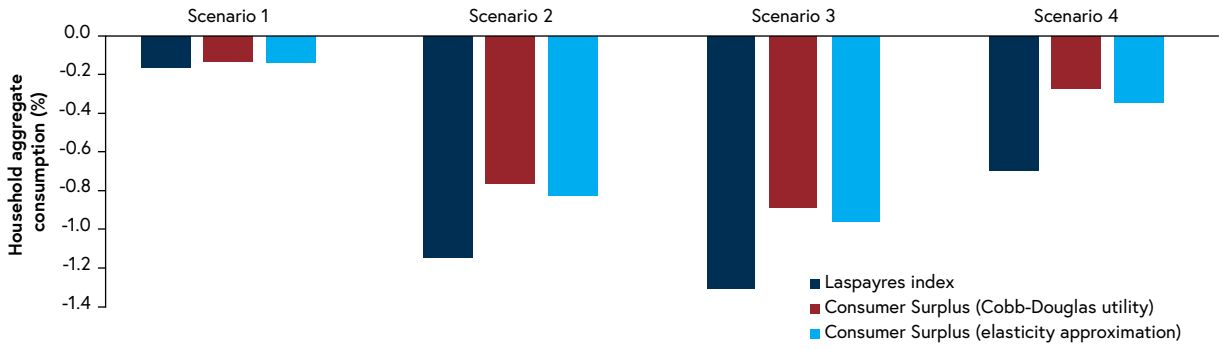
Because of the relative share of expenditures and size of potential changes in prices caused by the removal of subsidies, the size of our simulations of welfare losses is mostly due to changes in electricity prices. Welfare losses caused by changes in pipeline gas prices represent less than 0.2 percent of aggregate household expenditures, while losses to electricity prices range from 0.76 to 1.15 percent. Together, they represent welfare losses of between 0.89 and 1.31 percent of aggregate household consumption. Finally,

Figure 3.4. Household electricity: average retail price and estimated "cost recovery" subsidy (2019)



Note: "Retail price" refers to the average tariff for electricity for the population, considering the reduced rates for certain population groups (without VAT). "Subsidy" refers to the difference between "economically justified tariff for the whole population (without VAT)" and the retail price.

Figure 3.5. Welfare impact of the removal of pipeline gas and electricity household subsidies



Source: Authors' calculations using Russian Household Budget Survey, 2019

Note: Under Scenario 1, pipeline gas household price without subsidy, while electricity price remains unchanged. Scenario 2 refers to the pipeline gas price remains unchanged, while electricity household price is without subsidy. Scenario 3—both gas and electricity household prices have no subsidy. Scenario 4 includes, in addition to changes in gas and electricity prices, an adjustment in general prices due to general equilibrium estimates of general consumer price changes.

if including price reductions in the rest of the economy, losses range between 0.27 and 0.69 percent of aggregate household consumption (Figure 3.5).[15]

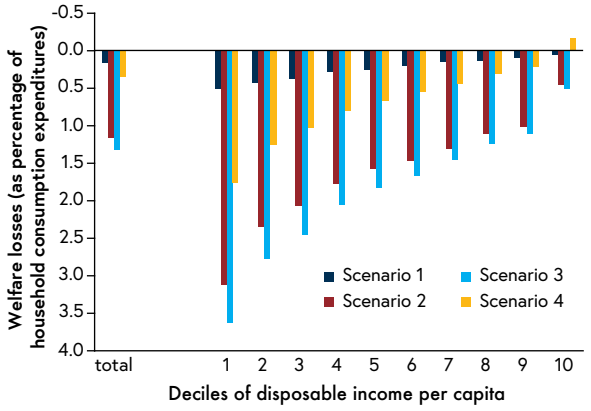
These results indicate that in the short term, the impact can be sizeable. The impact can reach as high as 1.3 percent of aggregate household consumption before consumers adapt their budgets to substitute energy sources or enjoy general efficiency benefits through lower general consumer prices. After some time, welfare losses are reduced (up to 0.7). However, even after these medium-term effects materialize, there remain some losses, albeit small.[16] Notwithstanding these aggregate effects, the impacts can vary significantly across socioeconomic, demographic, and geographic groups. We concentrate on short-term effects. These effects using the Laspeyres index are useful for two reasons. First, the short-term effects represent the upper boundary of welfare losses and hence serve as an indicator of the maximum size of compensatory measures necessary to ameliorate welfare losses. Second, the ranking of groups affected by prices would not be impacted by different welfare measures, whereby those groups most—or least—affected by subsidy changes will remain in their relative positions with respect to other groups, both in the short and long terms.

Welfare losses are larger in relative terms at the bottom of the distribution but larger in absolute terms at the top when ordering households by deciles of disposable income. This indicates that households' subsidies are progressive in relative terms (that is, they represent a larger share of household consumption among poorer than richer households) but regressive in absolute terms (meaning that a larger share of the total budget in subsidies goes to richer, rather than poorer, households), which coincides with previous findings for Russia and other countries as reported in section II above. The difference is more pronounced in electricity than in pipeline gas.[17] The average welfare loss in pipeline gas is Rub 28 per month per capita in the bottom decile and Rub 35 per month per capita in the top decile (0.5 and 0.05 percent of household consumption expenditures, respectively). For electricity, it ranges from Rub 173 to Rub 283 per month per capita (that is, from 3.1 to 4.5 percent of household consumption expenditures, respectively). Figure 3.6 illustrates these effects, separately and jointly, in relative terms in the left panel and in absolute terms in the right panel.

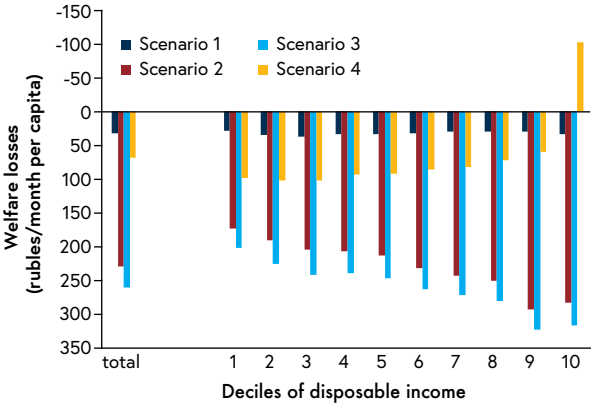
In adding the impact of general price reductions, the effect is subdued across all deciles of the distribution. However, only the top deciles experience a welfare gain. This is because of the large difference in average consumption per capita between the ninth and tenth deciles, which makes the share of non-utilities in the budget sufficiently large for the general price welfare gain to fully compensate welfare losses caused by higher utility prices. From this longer-term perspective, there may be some substitution effects across households (computed through the change in the consumer surplus). Although smaller, negative

Figure 3.6. Distributional impact of subsidy removal by socio-economic group

Relative incidence of household subsidy removal by socio-economic groups



Absolute incidence of household subsidy removal by socio-economic groups



Source: Authors' calculations using Russian Household Budget Survey, 2019.

Note: Under Scenario 1, pipeline gas household price without subsidy, while electricity price remains unchanged. Scenario 2 refers to the pipeline gas price unchanged, while electricity household price without subsidy. Scenario 3—both gas and electricity household prices have no subsidy. Scenario 4 includes, in addition to changes in gas and electricity prices (measured by consumer surplus), an adjustment in general prices due to the general equilibrium estimates of general consumer price changes.

welfare effects remain among most of the population, even in the long term.[18]

The comparison of welfare effects across family types renders smaller but important differences. Pensioners living alone endure more considerable welfare losses than other family groups, both in relative and absolute terms. This is associated with a combination of a higher share of expenditures on utilities and higher consumption expenditures per capita than other groups (see Table 3.3). In contrast, couples with children have the lowest incidence, primarily because of economies of scale (children do not necessarily consume more gas or electricity per capita than adults). These differences may call for family category-specific compensatory policies. Yet it is also worth noting that the range in relative incidence across family types is less than two percentage points, whereas across deciles is three percentage points (Figure 3.7.) Thus, targeting the poor may alleviate differences in welfare impact more than targeting family types.

Welfare impacts differ little across regions, with a few noticeable exceptions. Most regions have an average welfare loss of around 1.5 percent of aggregate household consumption, in relative terms, and Rub 250 per month per capita, in absolute terms (Figure 3.8). The main outlier is the East Siberian region, which has a welfare loss under scenario 3—both relative and absolute—larger than all other regions, despite having no welfare loss impact through pipeline gas price changes. This is mainly due to the large implicit electricity subsidy, despite low tariffs, in several of the federal entities that constitute this region (for example, in Irkutsk with- and without-subsidy prices range from Rub 0.82 to Rub 3.00 per kilowatt-hour for a 265 percent subsidy; in Khakassia, a 302 percent subsidy stems from a with- and without-subsidy price difference from Rub 1.38 to Rub 5.54 per kilowatt-hour). In contrast, the impact in the Central Region, despite having one of the largest household consumption expenditures across regions, is smaller than in others due to generally lower implicit subsidies (for example, Moscow Region 15

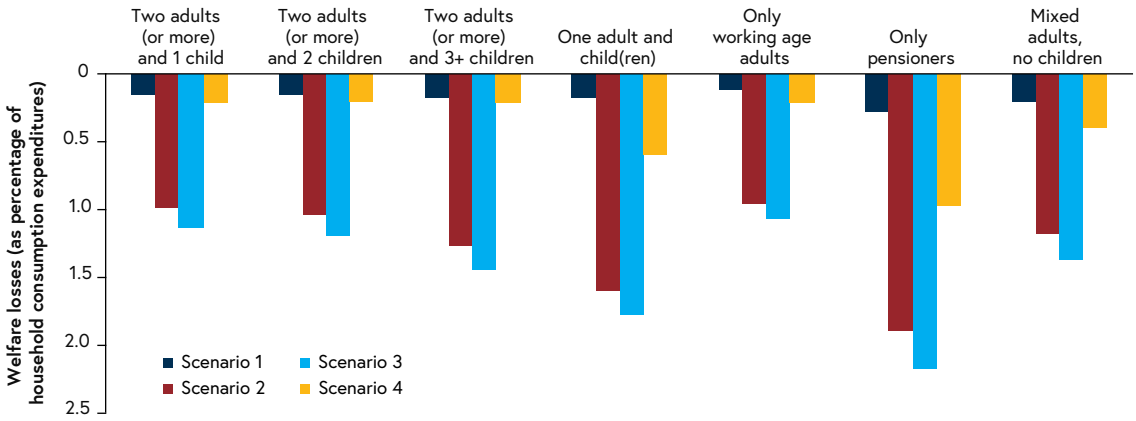
Table 3.3. Distribution of household expenditures in gas and electricity, 2019

	Total population living in multi-apartment buildings					
	Energy consumption (in 2019 rubles per capita per month)			Energy consumption (as share of household consumption expenditures)		
	Electricity	Gas	District heating	Electricity (%)	Gas (%)	District heating (%)
National	269	70	649	1.6	0.5	3.9
Deciles						
1	158	60	332	2.8	1.1	5.9
2	187	73	430	2.3	0.9	5.3
3	208	79	497	2.1	0.8	5.0
4	222	71	568	1.9	0.6	4.9
5	236	73	618	1.7	0.5	4.6
6	254	68	652	1.6	0.4	4.1
7	269	62	680	1.4	0.3	3.6
8	300	65	729	1.3	0.3	3.2
9	333	69	785	1.1	0.2	2.7
10	497	108	1,173	0.8	0.2	1.8
Type of household						
Couple 1 child	231	69	491	1.5	0.4	3.2
Couple 2 children	185	52	403	1.4	0.5	3.1
Couple 3+ children	160	42	330	1.7	0.5	3.4
Lone parents	227	58	553	1.9	0.6	4.6
Only adults	352	73	819	1.5	0.4	3.5
Only pensioners	362	100	1,106	2.1	0.6	6.4
Mixed	258	74	623	1.7	0.5	4.1
Area						
Urban	271	65	655	1.6	0.4	3.9
Rural	249	118	590	1.8	0.9	4.0
Macroeconomic regions						
Central	317	88	710	1.6	0.6	3.7
Central Black Soil	260	102	540	1.8	0.7	3.6
East Siberian	192	2	756	1.3	0.0	4.7
Far Eastern	430	8	910	2.3	0.0	4.9
Kaliningrad	349	90	202	2.8	0.8	1.4
North Caucasus	288	110	508	2.0	0.8	3.4
Northern	270	33	861	1.7	0.2	5.2
Northwestern	244	67	550	1.3	0.4	2.9
Ural	200	57	650	1.4	0.4	4.3
Volga	245	100	540	1.7	0.8	3.7
Volga-Vyatka	206	93	620	1.5	0.7	4.5
West Siberian	227	16	625	1.6	0.1	4.3

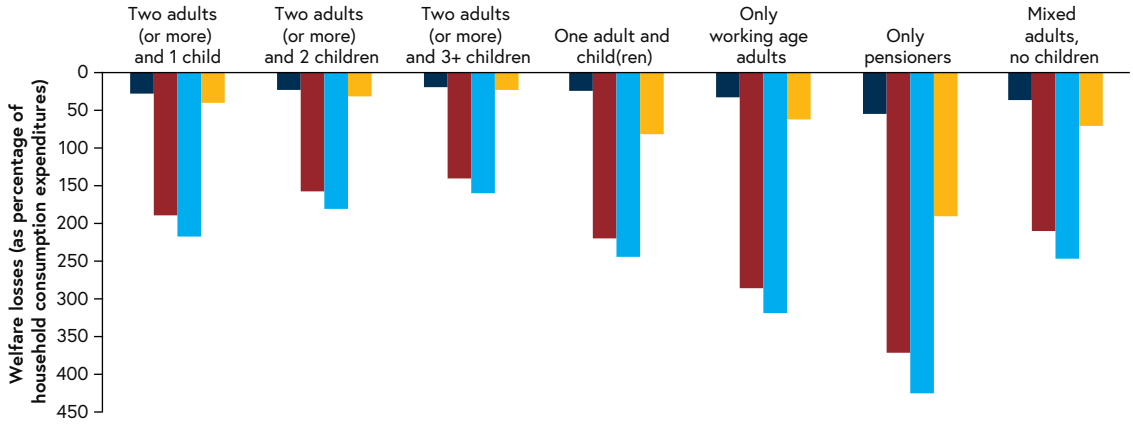
Source: Authors' calculations using Russian Household Budget Survey, 2019.

Figure 3.7. Distributional impact of subsidy removal by demographic group

Relative incidence of household subsidy removal by demographic groups



Absolute incidence of household subsidy removal by demographic groups



Source: Authors calculations using Russian Household Budget Survey, 2019.

Note: Under Scenario 1, pipeline gas household price without subsidy, while electricity price remains unchanged. Scenario 2 refers to the unchanged pipeline gas price, while electricity household price is without subsidy. Scenario 3—both gas and electricity household prices have no subsidy. Scenario 4 includes, in addition to changes in gas and electricity prices (measured by consumer surplus), an adjustment in general prices due to the general equilibrium estimates of general consumer price changes.

percent, from Rub 3.93 to Rub 4.52 per kilowatt-hour and Moscow City 31 percent, from Rub 3.94 to Rub 5.20 per kilowatt-hour). Interestingly, Volga-Vyatka is the only region with a positive net welfare gain when accounting for general price index change, experiencing the largest CPI decline.[19]

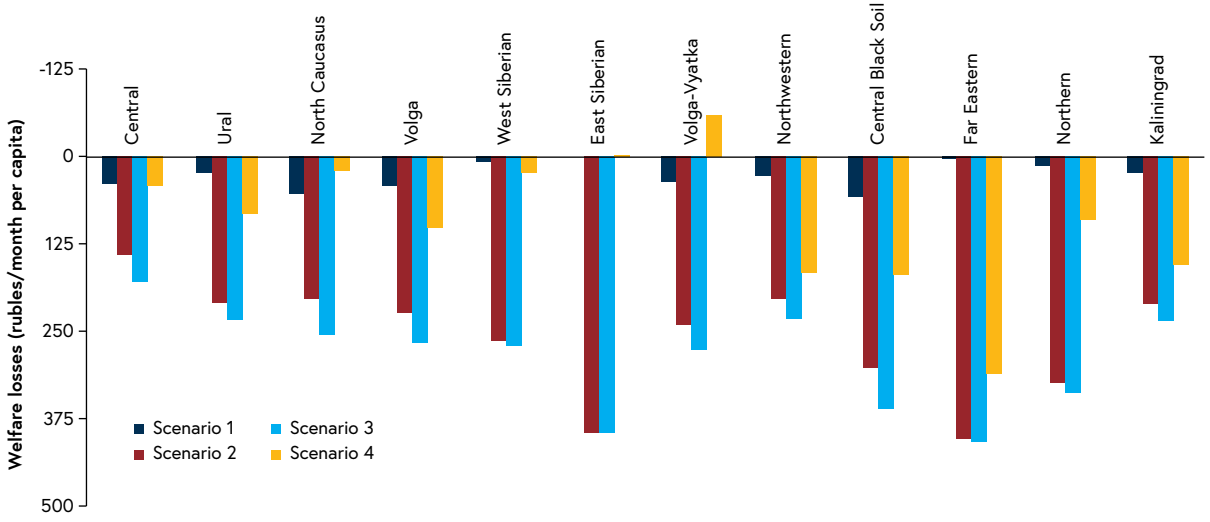
Energy poverty

Energy poverty is a variable that indicates the proportion of the population spending a share of their budget on energy products. This includes gas, electricity, heating, and fuel above a previously determined threshold. As indicated in the World Bank framework for assessing energy reforms:

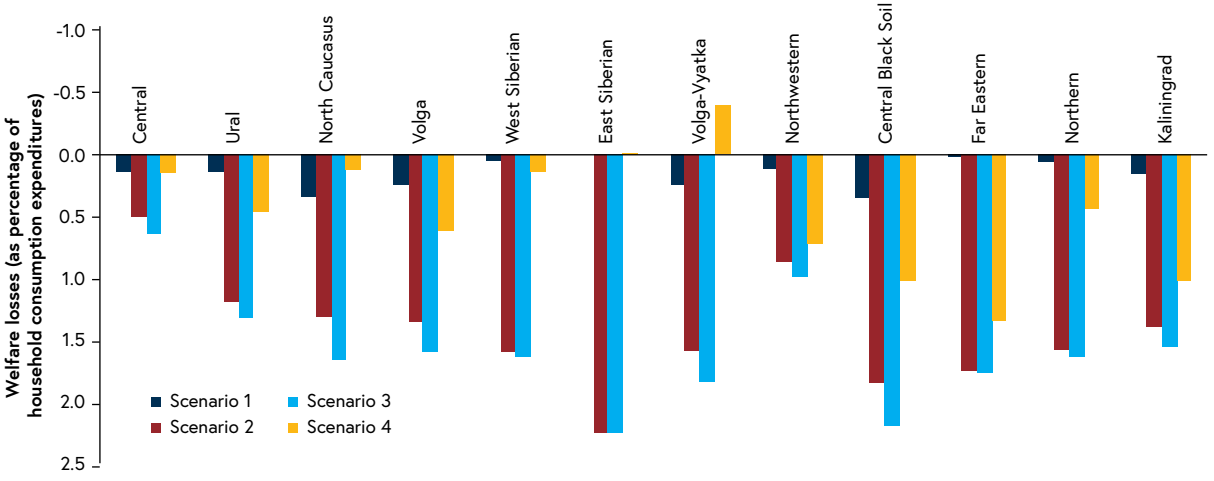
> Energy poverty, a measure of deprivation that seeks to capture affordability problems as they relate to energy, is an indicator mostly used in Europe and Central Asia, where energy bills can represent very high shares of total household income due to heating expenses.[20]

Figure 3.8. Distributional impact of subsidy removal by geographic group

Absolute incidence of household subsidy removal by geographic regions



Relative incidence of household subsidy removal by geographic regions



Source: Authors calculations using Russian Household Budget Survey, 2019

Note: Under Scenario 1, pipeline gas household price without subsidy, while electricity price remains unchanged. Scenario 2 refers to the unchanged pipeline gas price, while electricity household price is without subsidy. Scenario 3—both gas and electricity household prices have no subsidy. Scenario 4 includes, in addition to changes in gas and electricity prices (measured by consumer surplus), an adjustment in general prices due to the general equilibrium estimates of general consumer price changes.

In this study, the conventional threshold of 10 percent of household consumption expenditures defines whether or not a family lives in "energy" poverty. This threshold originated in the United Kingdom to measure "fuel poverty," as twice the median consumption of low-income households. Alternative, more country-specific measures have been proposed, such as the share of "energy" expenditures within the budget of households in the bottom 20 percent of the national distribution for the country being studied. In the Russian Household Budget Survey, the shares of household expenditures into pipeline gas, electricity, and central heating are 9.8 percent for the bottom decile and

8.5 percent for the second decile of the disposable income distribution. Therefore, the conventional 10 percent mark seems appropriate for this study.[21]

As expected, energy poverty is much higher among those at the bottom of the disposable income distribution. However, it does not seem to vary much by region or demographic group. The share of energy-poor goes from 48.5 percent of the population in the first decile of the disposable income distribution to only 1.1 percent of those in the top decile. The variation is much narrower across regions. It goes from a lower bound of 9.2 percent in the Northwestern Region to an upper limit of 25.6 percent in the Central Black Soil Region. "Energy" Poverty across regions seems to have more to do with income levels and region-specific tariffs rather than weather conditions. Interestingly, the gap in "energy" poverty rates is wider among family types than across regions. Pensioners living alone have an almost double incidence of energy poverty (45 percent) than the rest of the groups, ranging between 10 and 26 percent (Table 3.4).

Pipeline gas subsidies have a rather subdued impact on energy poverty. Removal of this subsidy would increase energy poverty by between 2 and 4 percentage points in the bottom third of the distribution. But electricity subsidies would have a more serious impact. They would increase energy poverty rates by more than 10 percent for the bottom three deciles and nearly ten percentage points for the middle four deciles. Even the middle classes would see a significant increase in energy poverty rates. Scenario 4, which includes the impact of general price declines, sees no improvement in energy poverty rates because the percentage increases in pipeline and electricity prices are larger than the general price decline. Assuming no changes in consumption, this leads to a rise in the share of energy expenditures.

The results of these simulations warn of the significant social impact that the removal of pipeline and electricity tariffs may have upon households' well-being. Almost all households will experience welfare losses if subsidies are removed. This impact is certainly noticeable in the short term, although it may lessen—but not be reversed—in the medium term if consumers adopt significant substitution effects. Consequently, a compensatory social policy is clearly necessary. This compensatory policy can be financed from the additional public revenues that the government would collect from higher pipeline gas and electricity prices.

Compensatory policy

The removal of subsidies allows for the collection of additional revenues for utility companies. Some of these may also engross fiscal resources with which compensatory policies could be funded. As was indicated in the introduction and previous literature on this topic in Russia, the removal of gas and electricity subsidies has been promoted as a mechanism to increase national energy efficiency through cost-conscious consumption and additional investments in industrial equipment, housing refurbishment, and environmental protection. Our results, and the previous literature, also underline the negative impact on welfare, particularly among the most vulnerable, and the need for compensatory measures. As indicated in the previous section, a larger share of the total budget of implicit subsidies goes to the richer segments of society. In our simulations, out of the total potential additional revenues due to higher prices (that is, the sum of total implicit subsidies due to the difference between household prices with- and without-subsidies), 35 percent is collected by the top 30 percent of the population (a five-percentage point difference). No family group or geographic region has such a large share of total implicit subsidies. However, some groups reveal a larger difference between their share of subsidies and their share of the population (Table 3.5). For instance, pensioners represent 13.5 percent of the population but collect 21.4 percent of total implicit subsidies (an eight-percentage point difference).

Conversely, the Central Region represents 21.7 percent of the population but takes only 14.9 percent of subsidies (an almost seven-percentage point difference). These differences are due to various factors. Standards of living and consumption level difference in the case of deciles, a higher share of energy consumption for pensioners, and smaller implicit subsidies in the Central Region.

This underlines the different dimensions of inequality in energy consumption and subsidies to compensate for it. Since part of the revenues collected should go to investments, the remainder could compensate welfare losses and target those facing the largest potential losses due

Table 3.4. Households' pipeline gas/electricity subsidies and energy poverty

	Baseline	Changes in energy poverty			
		Scenario 1	Scenario 2	Scenario 3	Scenario 4
Total population	18.0	1.5	8.6	10.1	10.4
Decile of disposable income (%)					
1	48.5	4.0	17.8	20.5	21.1
2	31.4	3.0	16.1	19.3	19.9
3	25.6	2.7	12.7	15.7	16.1
4	22.1	1.1	8.4	10.5	10.9
5	17.2	1.4	8.5	9.8	10.2
6	12.2	1.4	8.3	9.4	9.7
7	10.1	0.2	5.2	6.0	6.3
8	8.0	0.3	3.0	3.5	3.7
9	4.3	0.4	4.3	4.6	4.8
10	1.1	0.0	1.4	1.7	1.8
Type of household (%)					
Two adults (or more) and 1 child	10.8	1.4	7.8	9.0	9.3
Two adults (or more) and 2 children	9.5	1.5	7.4	9.3	9.7
Two adults (or more) and 3+ children	10.5	1.6	9.8	11.6	11.9
One adult and child(ren)	26.6	1.9	11.9	13.4	13.8
Only working age adults	14.9	1.2	7.9	9.2	9.5
Only pensioners	45.4	1.4	9.9	11.4	11.8
Mixed adults, no children	20.1	1.7	9.2	11.1	11.5
Area (%)					
Urban	15.7	1.1	6.4	7.6	7.9
Rural	24.9	2.6	14.9	17.5	18.1
Macroeconomic regions (%)					
Central	15.6	1.6	3.9	5.6	5.7
Central Black Soil	25.6	2.3	11.0	13.4	13.6
East Siberian	16.2	0.0	17.0	17.0	17.4
Far Eastern	24.3	0.0	10.9	11.0	11.0
Kaliningrad	12.7	1.2	7.6	9.5	9.6
North Caucasus	15.4	3.0	8.5	11.5	12.3
Northern	24.2	0.5	9.6	10.0	10.3
Northwestern	9.2	0.5	5.3	5.8	5.8
Ural	19.0	1.1	8.0	9.1	9.3
Volga	19.6	2.1	9.7	11.9	12.4
Volga-Vyatka	24.5	1.7	10.6	13.2	14.0
West Siberian	19.5	0.3	12.1	12.4	12.7

Source: Authors' calculations using Russian Household Budget Survey, 2019.

Note: Energy poverty refers to the percentage of the population whose expenditures in pipeline gas, electricity, and central heating represent 10 percent or more of household consumption expenditures. Baseline refers to original data as per the Russian Household Budget Survey 2019. Scenario 1 refers to pipeline gas household price to cost recovery estimates, while the electricity price stays unchanged. Scenario 2 refers to pipeline gas price unchanged, while electricity household price changes to cost-recovery estimates. Scenario 3—both gas and electricity household prices change to cost recovery. Scenario 4 includes, in addition to changes in gas and electricity to cost recovery estimates, an adjustment in general prices due to general equilibrium estimates. Changes in energy poverty (four columns to the right) are in percentage points.

Table 3.5. Distribution of total implicit subsidies by population group

		Implicit subsidies (in billions)			Difference beetween share of subsidies and share of population (percentage points)		
	Population	Pipeline gas subsidies	Electricity subsidies	Total	Pipeline gas subsidies	Electricity subsidies	Total
National	146,002,705	56.2	401.3	457.5			
Deciles							
1	10.0	8.8	7.6	7.7	-1.2	-2.4	-2.3
2	10.0	10.9	8.3	8.6	0.9	-1.7	-1.4
3	10.0	11.7	8.9	9.3	1.7	-1.1	-0.7
4	10.0	10.4	9.0	9.2	0.4	-1.0	-0.8
5	10.0	10.5	9.3	9.5	0.5	-0.7	-0.5
6	10.0	9.8	10.1	10.1	-0.2	0.1	0.1
7	10.0	9.0	10.6	10.4	-1.0	0.6	0.4
8	10.0	9.2	10.9	10.7	-0.8	0.9	0.7
9	10.0	9.2	12.8	12.4	-0.8	2.8	2.4
10	10.0	10.5	12.4	12.1	0.5	2.4	2.1
Type of household:							
Couple 1 child	22.5	19.7	18.6	18.7	-2.8	-3.9	-3.8
Couple 2 children	18.8	13.9	12.9	13.0	-4.9	-5.9	-5.8
Couple 3+ children	5.8	3.5	3.5	3.5	-2.3	-2.2	-2.2
Lone parents	5.8	4.4	5.5	5.4	-1.3	-0.2	-0.4
Only adults	21.3	22.0	26.6	26.0	0.7	5.3	4.7
Only pensioners	13.2	22.3	21.3	21.4	9.1	8.1	8.2
Mixed	12.7	14.3	11.7	12.0	1.5	-1.1	-0.7
Area							
Urban	74.6	64.8	65.8	65.7	-9.8	-8.8	-8.9
Rural	25.4	35.2	34.2	34.3	9.8	8.8	8.9
Macroeconomic regions							
Central	21.7	26.5	13.3	14.9	4.8	-8.4	-6.8
Central Black Soil	4.9	8.9	6.5	6.8	4.0	1.6	1.9
East Siberian	5.6	0.0	9.7	8.5	-5.6	4.1	2.9
Far Eastern	4.2	0.6	7.5	6.6	-3.7	3.2	2.4
Kaliningrad	0.7	0.5	0.6	0.6	-0.2	-0.1	-0.1
North Caucasus	15.4	25.4	13.7	15.1	10.0	-1.7	-0.3
Northern	3.1	1.2	4.4	4.0	-1.9	1.3	0.9
Northwestern	5.8	5.1	5.2	5.2	-0.7	-0.6	-0.6
Ural	12.9	9.7	11.8	11.5	-3.1	-1.1	-1.3
Volga	10.9	14.1	10.7	11.1	3.3	-0.2	0.2
Volga-Vyatka	4.9	5.7	5.2	5.2	0.7	0.3	0.3
West Siberian	10.0	2.4	11.5	10.4	-7.6	1.5	0.4

Source: Authors' calculations using Russian Household Budget Survey, 2019

Note: Total implicit subsidies are computed as the summation of welfare losses (per the Laspeyres Index) across the population. These correspond to scenarios 1, 2, and 3.

to this policy change. A redistribution of new revenues towards the poorest segments of the population seems a natural first step. However, additional adjustments towards specific groups, at least in the short term, may also be necessary. As a raw approximation, a compensation policy that distributes a share of the total additional expenditures in pipeline gas and electricity to a specific population group is hypothesized. Approximately two-thirds of pipeline gas is produced and distributed by Gazprom. And assuming that half of the additional revenues are allocated to new investments or foreign investors who are co-owners of the firm, the other half (30 percent of the total collection from pipeline gas subsidies) can be allocated to a compensatory distribution program for those affected by subsidy removal. In the case of electricity, production and distribution are primarily in the hands of private companies, whereby it is assumed—as a simplification—that a third of the collection of new revenues also ends up in public hands through taxation and can eventually be distributed in lump-sum transfers. These allocations into compensatory policies and new investments are arbitrary and only illustrative of potential uses of the extra revenue collection. The simulation assumes that this money will be distributed as a flat transfer, per household member, for all households with expenditures in pipeline gas and/or electricity and who are in the bottom four deciles of the distribution. In other words, one-third of additional revenues collected from higher pipeline gas and household electricity prices is assumed to be ably collected by public authorities and distributed in equal per-capita amounts to all households with a disposable income below the 40th percentile. This is essentially a means-tested cash transfer, conditional on beneficiaries being a member of the "bottom 40" and a consumer of gas or electricity. The amount of the transfer does not depend on the actual consumption of these services. It is more an anti-poverty transfer than compensation for welfare losses.

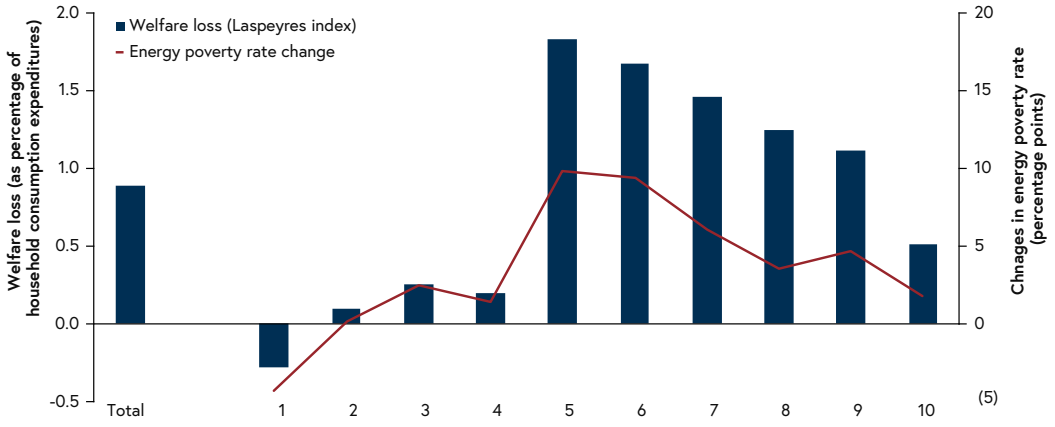
This exploratory exercise shows that it is possible to compensate the more vulnerable members for the rise in pipeline gas and electricity prices. The lump-sum transfers lead to welfare losses of less than 0.25 percent of household consumption expenditures among households in the bottom 40 percent of the distribution, with those in the poorest decile experiencing a small welfare gain of 0.3 percent. (Figure 3.9).[22] This focus on the vulnerable population translates into welfare gains for some demographic and geographic groups. Couples with two or more children see the smallest welfare losses (between 0.1 and 0.4 percent). In contrast, pensioners still see the largest welfare losses, but lower than in the previous scenario (that is 1.8 percent with lump-sum transfers rather than 2.2 percent without them). The regions with the highest household consumption per capita, Central and Northwestern, see the smallest welfare losses of 0.4 and 0.8 percent, respectively. But these two, and all others, have welfare losses of between 0.2 (Central) and 0.7 (North Caucasus) percentage points lower than without the transfer. The poorerst the region, the larger the reduction in welfare losses.

Energy poverty rates also decline for the most vulnerable population. Our simulation indicates that after the lump-sum transfers described above, energy poverty rates would decline for people in the first and second decile and increase by less than 2 percentage points for those in the third and fourth.[23] However, the middle class still sees important welfare impacts: energy poverty rates will increase by around 10 percentage points for those in the fifth and sixth decile of the distribution. This abrupt discontinuity results from the construction of our hypothetical exercise that targeted only those at the bottom 40 percent (Figure 3.9, top panel). In terms of family groups, families with children will see declines or small increases in energy poverty rates. Pensioners will still experience a sizeable increase of nearly 10 percentage points in energy poverty rates. Similarly, energy poverty rates will increase by less than 3 percentage points in all regions except for the Far Eastern, East Siberia, Central Black Soil, and Northern ones, where they remain between 3 and 9 percentage points higher, even after the flat lump-sum transfers.[24]

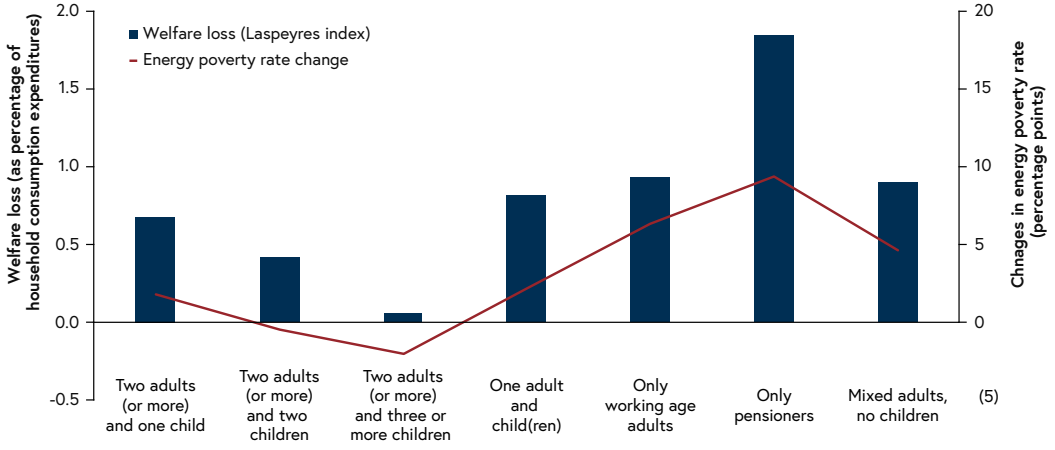
This exercise highlights that middle-class groups, and certain demographic and geographic groups, may still see a degree of welfare loss. These losses range from 1.2 to 0.5 percent of household consumption expenditures between the fifth and tenth deciles of the income distribution. Energy poverty rates will increase by between 5 and 10 percentage points for these groups. These welfare losses can be reduced through a larger allocation of additional collected revenues into lump-sum transfers. Alternatively, the per-capita lump-sum transfers could be reduced and spread to a larger population group. The peculiarities of some groups may require special attention: pensioners and certain regions (for example, Far Eastern,

Figure 3.9. Welfare and energy poverty effect of a compensatory policy

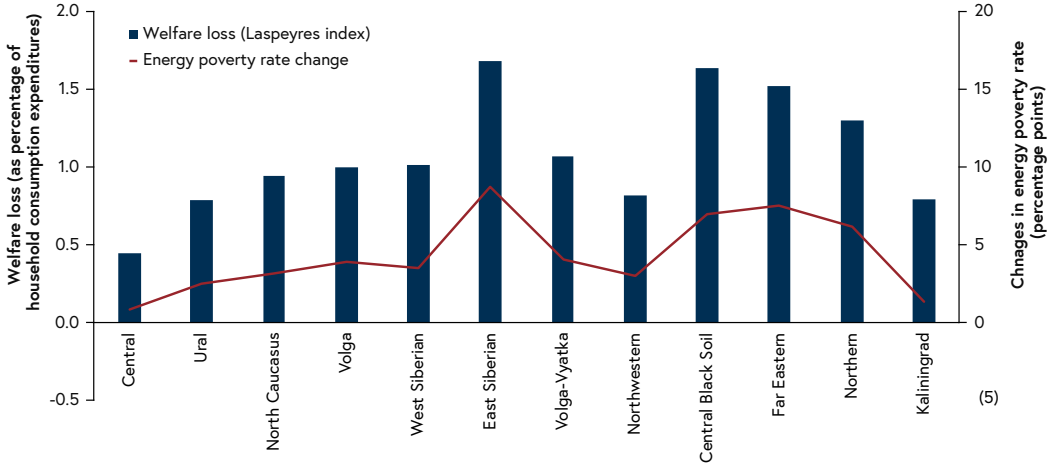
Short-term welfare impacts of subsidy removal after a compensatory policy for the bottom 40 percent



Short-term welfare impacts of subsidy removal after a compensatory policy for the bottom 40, by demographic group



Short-term welfare impacts of subsidy removal after a compensatory policy for the bottom 40, by geographic group



Source: Authors calculations using Russian Household Budget Survey, 2019.

East Siberia) tend to have a higher proportion of energy expenditures and may require special attention in terms of social policy or special investments to reverse their infrastructure conditions.

Alternatively, an additional hypothetical scenario concentrates on compensating specific welfare losses due to subsidy removal. This scenario contrasts with the simple redistribution of additional resources towards the poor. In this experiment, we allocate a subsidy in three forms: 25 Rub/person/month if the household spent on pipeline gas; Rub 125 per person per month if the household spent on electricity; and an additional Rub 25 per person per month if the household is of "pensioners" only type. This is similar to a subsidy that guarantees minimum consumption of pipeline gas and electricity to every family (the Rub 25 and Rub 125 per capita to everyone with connections). The additional Rub 25 to pensioners is a recognition of the special vulnerability of this type of household. This type of subsidy is easier to implement (simply count the number of family members, no household means-test needed). It incentivizes energy-saving behavior by charging higher prices to consumption above a minimum. However, it is not progressive because the average transfer is similar across deciles due to similar average household size and composition across socio-economic groups. Because of this, the welfare losses after the compensation still remain larger in relative terms for poorer than wealthier households, although the loss is smaller for all groups with this compensation than without none. Furthermore, this type of transfer would require a larger share of the budget collected from higher prices (about 55 percent).

There are multiple alternative options of compensatory policies that can be designed to address the different outcomes of removing the subsidies for gas and electricity. These policies will vary by objective (for example, reduce poverty, compensate welfare losses, induce energy savings, increase energy efficiency) and difficulty of implementation. Instruments other than transfers (for example, reduced indirect or direct taxes) can also be considered, and the literature has treated these.[25] The precise objectives, instruments, and implementation design are not to be discussed here. But the message of our exercises, and others in the literature, is an embedded trade-off between price incentives towards energy savings, investments for efficiency gains in refurbishment and new equipment, and redistribution towards equity, particularly in the short term. Further efficiency gains in the economy and more intense energy conservation by households could moderate this trade-off, particularly in the medium to long term, when technological and behavioral change reap their full benefits.

Conclusion

The population at the bottom 40 percent of the income distribution can be shielded from welfare losses due to higher utility prices in the short term. We may observe this in a simple simulation exercise wherein one-third of the additional revenues collected from higher pipeline and electricity prices is redistributed to households through lump-sum transfers. It indicates that people most vulnerable to subsidy removal can be protected from the impact of price changes in the short term, even if a large share of additional revenues caused by price hikes is directed towards investment. Alternative compensatory policies can be designed with different equity, efficiency, and environmental goals in mind, but this basic figure indicates that a transition is feasible and affordable. The magnitude of the price correction is considerable because average subsidies represent about 40 and 90 percent of the household price in pipeline gas and electricity, respectively—and an even larger proportion in some specific regions or demographic groups. Closing the price gap in the short term would involve sizeable welfare losses for some groups and is therefore inadvisable. The way to proceed with reform entails a correction spread out over time, such that efficiency and behavioral changes occur.

The main source of inequality in the distribution of subsidies is across socioeconomic groups and less so across most demographic or geographic divisions. Consequently, compensatory measures should consider household consumption levels and select beneficiaries among those more vulnerable to relatively large welfare losses. This type of targeting will enhance equity among socioeconomic categories and across demographic and geographic groups. However, a few notable exceptions to this generalization can be given to certain specific groups (for example, pensioners and Siberian and Far Eastern regions).

The findings exhibited in this chapter can be extended and elaborated along several lines. First, potential changes in incomes, through efficiency gains, can be explored in more detail. An initial glimpse of these gains

at the national and regional level is provided in Chapter 2 of this report. Second, the simulation in this chapter includes only one compensation policy in terms of lump-sum transfers, and others are both possible and desirable. Detailed fine-tuning of targeting and transfer size can be made to implement a smooth reform transition.

Moreover, there is no discussion about the types of investments adopted by public and private sector recipients of additional revenues. These can invest in energy-saving technologies, building refurbishment to conserve energy, meters to help in measuring and billing household consumption, and a gamut of alternatives and combinations. These investments have not been included in our simulations, which concentrate instead on the short term but could also have a favorable impact in the long term.

The simulations presented in this chapter show the fundamentals of the social impact of eliminating gas and electricity subsidies to households. Despite the regressive nature of removing subsidies, in relative terms, the most vulnerable can be shielded from significant and regressive welfare losses in the short term. In the long term, the welfare losses among certain groups can be subdued and even reversed through income gains if appropriate investments of the additional revenues lead to technological and behavioral changes towards the more efficient use of energy resources in Russia.

Notes

[1] International Financial Corporation, World Bank (2014).

[2] Orlov (2017, 599).

[3] Heyndrickx, Alexeeva-Talebi, and Tourdyeva (2012), 19–20.

[4] Cooke, Antonyuk, and Murray (2012), 14)

[5] Proskuryakova, Starodubtseva, and Bianco (2020), 2.

[6] For a summary of these four types of analysis of welfare impacts of changes in subsidies, see Olivier and Ruggeri Landerchi (n.d.); for a general assessment of energy subsidies, see the overview in Flochel and Gooptu (2017).

[7] For a summary of these computational approaches see Araar and Verme (2019).

[8] For a formal description of the formulas used to estimate these welfare effects see Annex 3A: Formulas for welfare changes.

[9] Although not included in the tables, differences across family types in any of these variables never surpasses 20 percentage points.

[10] As a reminder, survey data on actual expenditures in pipeline gas, electricity, and central heating refers only to households living in multi-apartment buildings.

[11] Monthly retail prices of pipeline gas by regional entity are reported as the Consumer price and tariffs registration form for goods and services, produced by the Office of Price and Finance Statistics at ROSSTAT. In principle, this may lead to some measurement error, particularly in regions that use increasing block pricing schedules. For the regions on a fixed metered tariff the average price should be close to the true price. And for regions with a fixed lump sum tariff the average price would measure the volume-weighted average of the marginal prices paid by consumers.

[12] For references and methods see Chapter 1 of this report.

[13] These changes in the CPI by region are collected through a CGE exercise specially commissioned for this report. General prices are estimated to fall in all regions because of the fall in demand in some sectors, mainly utilities, and the release of resources to non-energy sectors that reduce prices. Consumer prices fall 0.68 percent on average and range from −1.86 percent in the Volga-Vyatka region to −0.02 percent in the Far Eastern region, according to this CGE exercise. For references and methods see Chapter 2 of this report.[14] These "cost recovery prices" as well as the region-specific "with-subsidy" retail prices are collected through a study commissioned for this report. For references, see Chapter 1 of this report.

[15] The analysis does not include the welfare impact of removing subsidies from district heating. This is because the price-gap approach adopted for pipeline gas or electricity, which uses netback export prices, cannot be applied to the case of district heating. In the absence of industry's estimates of production and distribution costs, there is no undisputed alternative method to define implicit subsidies in this service. It must be underlined that the relative expenditure share of this item among Russian households is much larger than pipeline gas and electricity together (see Table 34) whereby subsidy removal in this service can potentially render even larger welfare impacts. This is an area where future analysis—particularly regarding the appropriate pricing of the service—is needed. A recent study on the problems of subsidies to for district heating, using estimates of costs from heating companies, is by Zhang and Hankinson (2018).

[16] These medium-term impacts of removing subsidies are driven by assumptions about the price-elasticity of pipeline gas and electricity. In Annex 3A: Formulas for welfare changes, relatively large (in absolute terms) price-elasticities are adopted based on secondary sources. Smaller elasticities would render welfare losses closer to the short-term estimates using Laspayres indexes.

[17] In absolute terms, the size of subsidies to pipeline gas prices is approximately the same across all deciles.

[18] When the poorest households have lower (in absolute terms) price elasticities to utilities, their welfare impact can be approximated by the Laspeyres Index. For a study with differences in elasticity by household socio-economic status see Zhang (2011).

[19] This is due to Volga-Vyatka and some other regions having superior positive GDP impacts (mainly stemming from the huge subsidies involved), implying greater economic activity that leads to a higher supply of many goods. This, in turn, pulls down prices in these regions. Conversely, the Central Region has the lowest GDP impact implying a lower supply shortage and hence a lower price impact. See Chapter 2 of this report.

[20] Olivier and Ruggeri Landerchi (2017, 40).

[21] If including other "fuel expenditures" such as gasoline and and/or transportation, the measure would need to be adjusted. Moreovoer, in the case of Russia, the welfare aggregate for computing poverty is based on household incomes rather than consumption expenditures. Consequently, as explained in the Appendix of this chapter, we do not assess the welfare impact through measures of monetary poverty because we have focused our analysis on direct welfare impacts through consumption, and have not explored the indirect impacts on incomes from labor or capital.

[22] This is a short term exercise where a third of total extra revenues due to subsidy removal is distributed among the 40 percent poorest households, and these households have not yet reacted to price changes with changes in consumption patterns, or enjoyed the medium-long term benefits of lower prices due to productivity gains. In formal terms, we are adding the lump sum transfers to the situation described in Scenario 3 of previous figures and tables (a short term scenario with removal of subsidies both to pipeline gas and electricity household consumption). In the medium to long term, assuming households change consumption patterns and enjoy lower prices (scenario 4), the compensation policy would lead to qualitatively similar results because, although welfare losses are smaller, the budget of lump-sum transfers would change as well for the same reason, which would make transfers smaller.

[23] A compensatory mechanism to combat energy poverty is already in place in Russia. The Federal "Household Code" stipulates that any household whose expenditures on "communal services"—including gas, electricity, heating—exceeds 22 percent of its income is entitled to compensation of the difference (calculated between household's actual income and notional normative regional expenditures on communal services). The exercise simulated in this chapter resembles the official mechanism, although compensating households based on income level—not energy poverty—and using a lower energy poverty threshold to assess the impact. The purpose of this exercise is to gauge the fiscal price tag and the redistributive consequences of a mechanism for compensating subsidy removal, rather than proposing a different mechanism.

[24] The lump-sum transfer, in the strictest sense, represents an increase in disposable income, but since the welfare impact is measured in terms of household consumption expenditures, it would seem that the compensatory policy had no impact on energy poverty as both the energy bill and household consumption remain unaltered. Instead, for ease of interpretation, the lump-sum transfer is subtracted to the gas and electricity bill of the household, leaving total consumption unchanged, and hence leading to a reduction in energy poverty.

[25] For instance, Heyndrickx, Alexeeva-Talebi, & Tourdyeva (2012) compare lump-sum transfers, reduced labor taxes and general government expenditures.

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4 Reforming Russia's Energy Subsidies for Consumers: Political Economy Analysis

This chapter seeks to understand the key factors that have shaped the government's approach to energy subsidies. It consists of six parts. The first provides an overview of the economic and political context of energy subsidy reform in Russia. It also identifies the decision-making context and the key stakeholders involved in domestic energy prices and subsidy reform policies. The following three parts are devoted to consumer subsidies and subsidy reform in the oil, gas, electricity markets. Each part describes the process of subsidization in the respective market and documents the successive attempts by Russian authorities for reform. Drawing lessons from over two decades of energy policy reform, the chapter highlights the principal factors that can facilitate or impede further energy subsidy reform. The fifth part reviews the findings of several focus group discussions conducted in Russia to gauge public perceptions on subsidy reform. The final part underlines the fundamental choices the Russian government will face in further subsidy reform and offers a set of recommendations.

Economic and political context of energy subsidies and subsidy reform

The economic and political context of a country can shape the evolution of energy subsidies. Rather than describing Russia's context in general terms, the purpose here is to highlight key elements of this context that have affected and continue to affect how the Russian government approaches the question of reforming energy subsidies. The analysis is in three parts. First, the focus is on the economic context. Next, key elements of the political context are examined in terms of their significance for energy subsidy reform. Finally, attention turns to the decision-making process concerning oil, gas, and electricity subsidies.

Economic context

Several features of Russia's economic context have shaped the government's approach to energy subsidies over the past two decades:

- **Russia is abundant in energy resources**, and its economy has remained notably dependent on export revenues from oil and gas. The Russian Federation remains the largest economy in G20 that depends heavily on hydrocarbon revenues. Depending on the price of oil, oil and gas revenues have constituted up to half of the federal government's revenues in the past decade.[1] Meanwhile, oil and gas exports have accounted for up to two-thirds of the country's total export revenues.[2] This energy abundance and the heavy role of hydrocarbons in the Russian economy have affected the government's position on energy subsidies in many ways. There has been a broad tendency among Russian policymakers to adhere to a notably guarded approach to energy subsidy reform. This has been primarily due to the wider potential implications of subsidy reform for the oil and gas industries and the government's continued ability to generate substantial oil and gas revenues. In the meantime, Russian authorities have prioritized the long-term diversification of the economy to reduce dependency on hydrocarbon revenues. While progress has remained slow, access to "cheap energy" remains a common condition within Russia's discourse on enhancing the international competitiveness of non-hydrocarbon sectors.
- **Access to cheap energy appears to be a widely shared goal among the public.** Focus group studies have confirmed the presence of an overwhelming

public expectation to pay relatively low prices for energy due to Russia's abundance of energy resources.[3] In this respect, one could view the presence of extensive energy subsidies in Russia as part of a common phenomenon in energy-exporting states, whereby policymakers engage in distributing energy rents to meet public expectations.[4]

- **The federal budget has generally not been a major source of funding energy subsidies.** In the case of gas and electricity, one group of consumers has benefited from subsidies at the expense of remaining consumers through the process of cross-subsidization. In the case of oil, one can refer to foregone revenues to the federal budget (due to lower tax receipts) instead of expenditures designated to support subsidies (at least until 2018). Regional and municipal budgets have occasionally incurred expenses to help consumers with their energy expenses. However, Russia's case remains unique. It does not fit the profile of a typical oil or gas-rich state whereby the government commits substantial funds to maintain low energy prices. The lack of a significant direct burden on the federal budget has partly alleviated the urgency for the Russian government to take action on energy subsidies. Thus, unlike in countries where the government provides energy subsidies, Russia's energy subsidies have not been part of the budget-making process at the federal government level, narrowing the scope of the political discourse. Where energy subsidies are handled through the budget, subsidy reform typically prompts political battles on reallocating economized expenses. This has not applied to Russia's case. Likewise, it has been common for energy-exporting states to launch subsidy reform following a cyclical collapse in oil prices to balance their budgets.[5] In Russia's case, boom and bust cycles in oil prices have not significantly affected decision-makers' approach to energy subsidies due to the lack of a significant direct burden. The oil sector appears as a partial exception, whereby foregone revenues have prompted the political leadership to remain in continuous pursuit of reform that would secure more revenues for the budget while also ensuring relatively low prices for petroleum products.
- **Russia's economic performance has remained highly uneven over the past three decades.** After a deep economic crisis that lasted throughout the 1990s, ending in a financial crash in August 1998, Russia witnessed a decade of high economic growth: it recorded an average growth rate of 6.9 percent a year between 1999 and 2008.[6] After the Great Recession (2008–09), Russia was unable to repeat the noteworthy economic performance of the 2000s. Notably, rising oil prices and a booming oil sector had contributed to about half of total growth during the 2000s.[7] However, record-high oil prices during 2010 and 2014 were no longer sufficient to sustain high growth rates, indicating deeper structural problems in the Russian economy. Russia's GDP rose on average by a mere 0.9 percent between 2013 and 2019.[8] The country's economic performance has been a significant factor in the government's approach to subsidy reform. Concerns over economic growth have featured widely in Russia's political discourse on reforming energy subsidies, prompting a strategy that has favored a slower increase in regulated energy prices. The economic boom of the 2000s was accompanied by bold reform measures to reorganize the electricity and gas markets. Significant steps to raise domestic gas prices were also taken during this period. By contrast, the weak economic performance since 2013 has coincided with a very cautious approach to further changes in the gas and electricity markets.
- **Economic performance has impacted domestic energy demand, indirectly affecting the government agenda for subsidy reform.** Energy-exporting countries commonly prioritize energy subsidy reform when rising domestic demand starts raising concerns over future energy export revenues. For instance, Iran launched a major effort to reduce oil subsidies in hopes of curbing domestic growth in demand.[9] In Russia's case, the notably strong performance during the 2000s was accompanied by significant growth in domestic energy demand—gas and electricity consumption rose by 19.6 percent and 22.9 percent, respectively, between 1999 and 2008.[10] This exacerbated the government's

concern to meet domestic and foreign gas commitments, contributing to a reform agenda incorporating a gradual upward adjustment in domestic gas prices. By contrast, stagnant energy demand has tracked the relatively weak economic performance beyond 2008. One may argue that this has weakened the incentive for the government to take decisive action on energy subsidies.

- **The fiscal approach of the Russian government constitutes another element of the economic context with implications for energy subsidy reform.** Russia's fiscal management has oscillated between a highly expansionary approach and a strictly conservative one over the past three decades, reflecting political battles and the changing economic priorities of Russia's government.[11] The sharp decline in oil prices in 2014 and the onset of international sanctions targeting sectors of the Russian economy provided a conducive setting to bring back fiscally conservative economic policies. This approach has been largely maintained, evidenced by the government's choice to adhere to a fiscal rule that significantly restricts spending and its ability to balance its budget at relatively low oil prices. In this context, controlling inflation has remained a high priority for the Russian leadership, dampening the pace of growth in regulated energy prices. In the meantime, a fiscally conservative approach has weakened the possibility to shift the financial burden of energy subsidies to the state budget.
- **Russia faces substantial volatility in its exchange rate, complicating efforts to set international (for oil) and European (for gas) prices as a viable benchmark.** Volatility is a product of structural problems in the economy, such as high dependence on mineral export revenues and geopolitical risks that affect its capital flows. For instance, a sharp depreciation of the ruble in the aftermath of the Great Recession rendered European gas prices an ineffective benchmark, prompting the government to postpone, and eventually abandon, an objective to align domestic prices with this benchmark. Another sharp depreciation in 2014 further highlighted that the gap between domestic and international energy prices could grow sharply, even if temporarily, irrespective of the government's approach to energy subsidies. This has notably been the case for gas, where residential consumers have benefited from regulated prices.
- **Mitigating climate change through dedicated policies to reduce energy-related emissions has not traditionally been a high priority for the Russian government.** This has further weakened the urgency to take action through subsidy reform. However, there has been a discernable shift in the approach of the Russian government in the recent months, demonstrating its openness for a more vigorous climate policy both at home and abroad. On October 29, 2021 the government issued a new low carbon development strategy, with the objective of Russia becoming carbon neutral by 2060. The European Union's recent proposal to establish a Carbon Border Adjustment Mechanism has also contributed to a high-level discussion about potential economic implications for Russia and a possible new approach to climate policy. This new context is likely to put energy subsidy reform in Russia in the spotlight.
- **Finally, Russia remains an upper-middle-income country where a rise in energy prices constitutes a considerable challenge in terms of affordability.** With a per capita income of $11,584 in 2019, about a third of the average level for the European Union,[12] closing the gap with international or European energy prices will necessitate the government to take significant political risks. Additionally, the question of affordability has been closely intertwined with a tendency among residential consumers to avoid paying for energy bills.[13] Meetings with focus groups have confirmed that respondents tend to view the current tariffs as high and unfair. Focus group respondents perceive that energy in Russia is not underpriced or subsidized, driven by comparing their incomes with those in Europe. Russian policymakers therefore recognize affordability as a major constraint that has contributed to their cautious approach to subsidy reform.

Political context

Several factors have defined Russia's political context for enacting and implementing energy subsidy reform:

- **The 1993 Constitution[14] and a process of concentration of power after the end of the 1990s have yielded a comparatively powerful executive branch.**[15] This setting has enhanced the ability of the executive branch to take decisive action and enact new legislation and policies, including in areas relating to Russia's energy subsidies.
- **A broad consensus among key stakeholders is needed to implement the energy subsidy reform.** Building such consensus is not a simple task given the varied and sometimes conflicting policy priorities across the branches of the Russian executive.[16] Members of Russia's government have continued to discuss various aspects of subsidy reform. Issues include estimating the size of subsidies, establishing benchmarks for domestic prices, and the pace and methods for reform. In areas where key stakeholders within of the executive have coalesced around a similar policy objective, proposals for subsidy reform have gained more traction. For instance, government officials have committed to maintaining a high tax burden on the Russian oil sector, which has prompted an active pursuit of new measures to meet this objective while reforming oil subsidies.

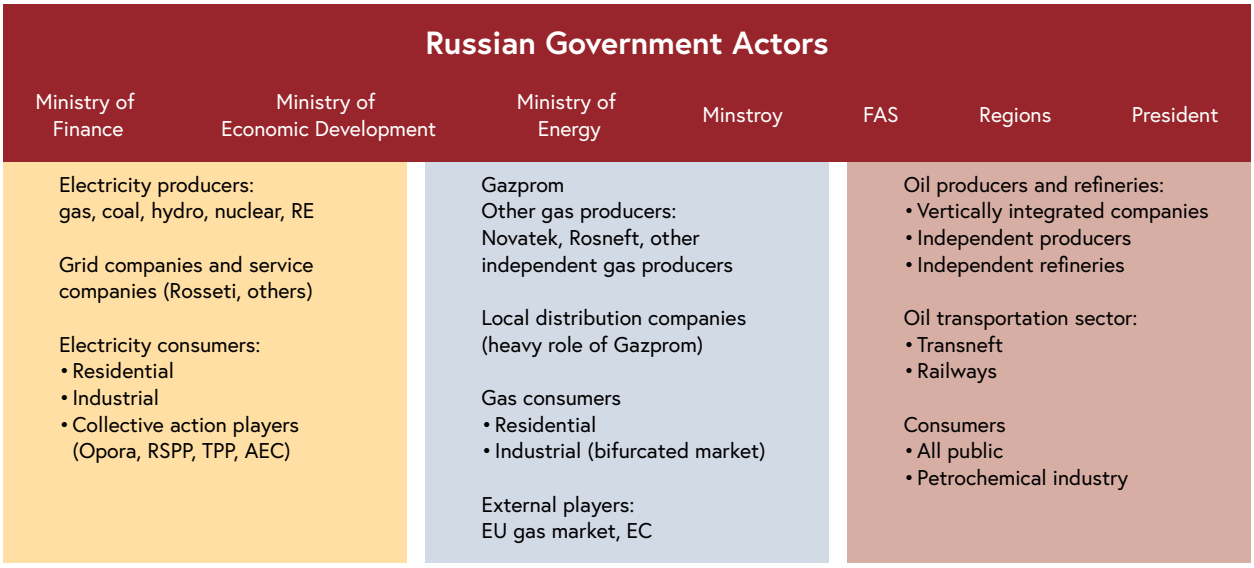
  Policy reform with major distributional implications can generally prompt political leaders to adopt a more cautious approach. In Russia's case, concerns about public perceptions and social stability have often shaped approaches to reform.[17] For instance, the Russian government attempted to abolish in-kind benefits in 2004–05, but public reaction prompted it to soften its ambitions for reform. Likewise, similar concerns in 2018 prompted the government to eventually set a less ambitious pace for pension reform.[18] Based on these previous reform experiences, the executive may remain cautious regarding energy subsidy reforms if the public perceives them as a new financial burden.
- **Finally, the extent to which the Russian leadership prioritizes a specific policy reform can be generally gauged from its periodic programmatic proposals.** There has been a tendency for the government to incorporate key priorities in widely publicized strategic and economic programs. Some analysts have argued that adhering to strategic plans has been a significant part of the style of governance in Russia in the past two decades.[19] The Russian government has most recently announced a Unified Plan for Achieving Russia's Nation al Development Goals, which encompasses the fourteen national projects and 42 socio-economic development initiatives for implementation over the period up to 2024.[20] Reforming direct energy subsidies has not been prioritized in this or other major strategic plans. The Russian Energy Strategy to 2035 approved by the government in June 2020[21] calls for a gradual phase out of cross-subsidies in electricity and natural gas—a welcome positive development.

The decision-making context and key stakeholders

Russia's stakeholders can be distinguished between state institutions, whose decisions may affect subsidy reform, and players from the power, gas, and oil industries (Figure 4.1). The review here focuses on the state institutions, namely on the key motives that have defined their position concerning energy subsidies and subsidy reform. Acknowledging that stakeholders' position has fluctuated over time depending on the policy in question, this report provides further details on all stakeholders when examining the specific reforms that have been under consideration in Russia. Proposals for reforms relating to energy prices in Russia have come from various agencies, with the Ministry of Energy, the Ministry of Economic Development, and the Federal Anti-Monopoly Service often taking the leading role. The Ministry of Finance has also played a significant role in Russia's political discourse on subsidy reform. The president and his administration have also been at the forefront of this discourse, presenting key objectives on energy pricing. Many of the policy proposals coming from other key players have been developed in response to these objectives.

The Ministry of Energy has notably comprehensive responsibilities for implementing government policy and regulation in the energy sector. Its responsibilities comprise drafting and implementing policies on the distinct segments of the value chain of Russia's energy industries. Among state institutions, the Ministry of Energy is

Figure 4.1. Russia's stakeholders can be distinguished by state institution, whose decisions may affect subsidy reform, and players from the power, gas, and oil industries



Source: World Bank.

the one that appears closest to representing the interests of key players in the energy sector. As the interests of different players in the energy value chain can be at odds, this ministry has tended to adopt a cautious stance on issues such as subsidy reform. Yet, as noted below, it has also led to many proposals for reform that directly target energy subsidies or have the potential to affect domestic energy prices.

The Ministry of Finance's approach to the energy sector overall, and to energy subsidies, in particular, is defined by its central role in the preparation and implementation of Russia's federal budget. While the approach of the Russian government to the economy and budgetary spending has fluctuated significantly over the past two decades, this ministry has been relatively consistent in favoring a countercyclical approach to public spending. Mainly when international oil prices are low, it has preferred policies that would rein in public expenditure, advocating adherence to stricter fiscal rules. Concerning energy subsidies, the Ministry of Finance has actively strived to minimize the burden on the federal budget or expand budgetary revenues further. Namely, in the current setting where the burden of electricity and gas subsidies falls primarily on industrial/commercial users rather than the state, the Ministry of Finance has opposed reform proposals that further burden the federal budget.[22] Its approach can be defined primarily as reactive: rather than developing an action plan on gas and power sector subsidies, it has responded to other agencies' proposals. By contrast, the ministry has been notably proactive, holding a central role in the discourse on oil subsidies. Such subsidies have been associated with substantial foregone revenues for the budget. The discourse itself has been part of a wider debate on taxation of the oil industry—an area where the ministry has had a determining role.

The Ministry of Economic Development has an extensive portfolio of responsibilities that have shaped its approach to energy subsidies. Among its many tasks, this ministry has drafted and implemented Russia's socioeconomic development programs and charted federal targeted programs.[23] It has pioneered multiple proposals to reform energy subsidies. Driven by a large set of economic considerations the ministry's recommendations on subsidy reform have typically prioritized maintaining and raising the economic competitiveness of Russian industries and fighting inflation. The ministry has generally viewed low energy prices as a factor that could facilitate such objectives. This has contributed to its predominantly risk-averse approach. Some of the proposals by the Ministry of Economic Development have entailed redistributing part of the subsidy burden on the state budget.[24]

The Federal Anti-Monopoly (FAS) service has been another key player in Russia's policy-making on energy subsidies. As a federal agency in charge of competition policy, it has played a central role in overseeing natural monopolies in the energy industries. As the discourse on energy subsidies has often encompassed questions about a more comprehensive sector reform, particularly in gas and electricity, FAS has contributed to this discourse with its proposals, including ones specifically targeting tariff reform. It has actively strived to incorporate improved efficiency and cost-cutting by natural monopolies as a key element in tariff reform.[25] FAS has also been advocating greater transparency about the extent of cross-subsidization across Russia's regions.[26] Importantly, in 2015, the Russian government decided to merge the federal agency in charge of tariffs, the Federal Tariff Service (FTS), with FAS, expanding the latter's portfolio to include tariff regulation in the energy sector. Through its 84 regional branches, FAS has maintained an extensive network to oversee prices in Russia's regions.[27] FAS regulates wholesale gas prices for households, Gazprom's tariffs for industrial consumers, and distribution tariffs. FAS sets federal grid tariffs and determines rules for regional authorities regulating their grid tariffs in electricity.

The Ministry of Construction, Housing, and Utilities (Minstroy) has also been an active government player in Russia's discourse on subsidies. One of the principal duties of the ministry is contributing to legislation on housing and communal services. It is involved in preparing regulations on tariffs for such services, among which district heating occupies a crucial role. In general, Minstroy has strived to ensure that the discourse on energy tariffs considers distributional implications, namely on utility-providing companies and households.[28] Furthermore, Minstroy is in charge of developing and executing government programs on energy efficiency, which involves it in discussions on energy tariffs.[29]

Russia's regional authorities are also significant players concerning energy subsidies. They are involved in regulating retail gas and electricity tariffs. Regional entities involved in tariff regulations vary from one region to another. In some cases, they are housed within the government in special departments on tariff regulation, while in others, the regulation is conducted through relatively more autonomous energy committees or agencies. They are all bound by federal laws and are overseen by FAS.[30] Additionally, regional authorities are involved in the provision of subsidies/allowances for low-income households. This assigns them a significant role in policy discussions on the introduction of a targeted approach to subsidies.

Gas subsidies and reform

The Russian gas market and the process of subsidization

At the core of Russia's gas subsidies stands a gas market model that has continued to evolve over the past three decades. The market's dominant player, Gazprom, sells gas at prices regulated by FAS. Its tariffs for residential consumers are set below "industrial" consumers, which entails significant cross-subsidization. Independent gas producers can minimize their role in cross-subsidization by selling gas to industrial consumers at unregulated prices. The relation between Gazprom's industrial tariffs and unregulated tariffs has gone through a curious cycle. Throughout the 1990s and most of the 2000s, independent gas producers (including oil companies) typically charged industrial users prices above Gazprom's regulated tariffs. In that context, industrial consumers vied for access to Gazprom's gas. However, over time, independent gas producers could sell gas at prices below Gazprom's regulated tariffs, allowing them to expand their market share progressively.[31] In essence, Gazprom's "regulated" prices turned into a policy tool that helps to maintain high gas tariffs for industrial consumers and ensures cross-subsidies for residential consumers.

The existing regulatory setup has created peculiar incentives among Russian gas producers concerning tariff reform. Gazprom has been actively advocating for tariff reform, though its efforts have been primarily focused on gas sales to industrial users. Lifting restrictions set by FAS would allow Gazprom to lower its industrial prices, enhancing its competitiveness in the industrial market. Clearly, this has resulted in some hesitancy among independent gas producers concerning tariff reform. In principle, they have not been opposed to reforming Russia's gas tariff policy. Instead, they have actively advocated linking the agenda on tariff reform to a broader set of gas market reforms that would help maintain a competitive domestic gas market. As gas tariff reform and gas market reform have emerged largely intertwined, this has encumbered the task of reforming cross-subsidies in Russia's gas sector. The arguments presented by independent gas producers

and Gazprom have been difficult to reconcile. According to independent gas producers, gas tariff reform needs to be accompanied by gas market reform in several areas.

The first issue relates to Gazprom's privileged access to export markets, which independent gas producers would like to see removed. Gazprom has traditionally maintained a monopoly in gas exports, selling gas abroad at substantially higher revenues than at home. This advantage allows Gazprom to maintain a competitive position in the domestic market. Despite a breakthrough in 2013 that allowed other gas producers to export LNG,[32] Gazprom maintains its monopoly on export pipelines—still the dominant means to ship gas abroad.

Second, many independent gas producers would like to see Gazprom's monopoly over the transportation network broken or reformed. This can be accomplished through better application of third-party access and potentially through the unbundling of Gazprom. Third, Gazprom controls storage faculties and can set its tariffs. Independent gas producers have perceived this as an area that constrains the development of a competitive gas market. Additionally, independent gas producers note that Gazprom is not entirely constrained from selling gas below regulated prices. It can opt to lower its prices below those allowed by the regulator. This applies to gas it has purchased from independent gas producers for resale, gas produced by its subsidiary Gazprom Neft, and gas transactions at the St Petersburg International Mercantile Exchange.[33] Ultimately, from the perspective of policymakers, the arguments brought by independent gas producers boil down to one fundamental question: is the status quo, whereby deregulated gas prices for industrial consumers remain below Gazprom's regulated tariffs, sustainable? If one assumes that further liberalizing the gas market, namely by deregulating Gazprom's industrial prices, would reduce gas prices, this would substantially facilitate government efforts to implement tariff and gas sector reform. However, the long-term equilibrium gas price in the domestic gas market remains highly uncertain, prompting the government to adopt a cautious approach. The two key stakeholders from the gas industry have continued to disagree on this question. Independent gas producers prefer to point out their comparative success in managing production costs, suggesting that deregulation may not necessarily result in higher gas prices. However, Gazprom deems the current status quo as an "illusion" underpinned by several factors, some of which would lose their effect should Russia move forward with full-scale gas market reform.[34]

Several factors could drive domestic gas prices up following gas market reform, according to Gazprom. This could complicate the launching of a comprehensive reform that includes tariff reform. In other words, Gazprom insists that deregulated prices cannot stay below-regulated prices for long following gas market reform. Gazprom enjoys some fundamental privileges mentioned above; it also bears additional costs that independent gas producers are not subject to in the same way. From Gazprom's perspective, it has been able to sustain these additional costs primarily thanks to its privileged access to export markets—its main source of profits. In addition, one can also argue that its Soviet legacy fields provide a further advantage due to their relatively low marginal costs.

- **First, Gazprom pays a higher mineral resource extraction tax (MRET) than independent gas producers.** This is due to a 2012 change in tax policy that differentiated the tax rate depending on several factors, including whether gas is sold in domestic or foreign markets. Independent gas producers have benefitted from this fiscal approach by paying significantly lower MRET rates than Gazprom. Thus, the NDPI rate per cubic meter of gas rose by a factor of 3.5 for independent gas producers and a factor of 7.6 for Gazprom between 2010 and 2017.[35]
- **Second, Gazprom bears high "social costs."**[36] Namely, it is tasked with supplying gas to households and entities that provide social and communal services such as district heating. As prices for residential users are the lowest, Gazprom incurs costs that other companies have to worry about less. By contrast, serving residential consumers represents an insignificant fraction of gas sales by independent gas producers. Furthermore, residential consumers constitute the one segment of the gas market where payment discipline remains the lowest. In particular, the North Caucasian Federal District has accounted for the bulk of Gazprom's residential non-payments.[37] Also, Russia's district heating companies have been notably associated with non-payment or delayed payments. Local and

regional governments have regularly stepped in and subsidized district heating companies; however, this has not prevented non-payments. Moreover, Gazprom is responsible for ensuring further progress in the gasification of Russian regions—an objective defined by the government. The Russian gas giant provides gas in 69 regions through 53 subsidiaries and continues to invest in new gasification projects. The company reports investing Rub 395 billion between 2005 and 2019 in new gas grids, raising the gas penetration rate in Russia to 70.1 percent (73 percent in urban areas and 61.8 percent in rural areas).[38] Reportedly, only 10 to 12 of the regions Gazprom serves have been deemed profitable for gasification.[39] Stagnant gas demand, the absence of significant industrial consumers in some regions, and limited financial assistance from regional authorities have accounted for the poor economic feasibility of Gazprom's new gasification projects.

- **Third, independent gas producers have predominantly concentrated their business activities in regions of the highest profitability.** This is because of substantial regional differences in profitability. These regions have mainly had large industrial consumers and are close to gas production sites. According to 2017 data, Gazprom sold 43 percent of its gas in regions ranked as "low-profit regions," compared to 14 percent and 3 percent for Rosneft and Novatek, respectively.[40]
- **Finally, Gazprom has the additional responsibility of addressing seasonal changes in demand.** Thus, while the production of independent gas producers does not tend to fluctuate significantly throughout a calendar year, Gazprom's output amount goes through notable changes. Its share of the domestic market can hover above 70 percent in the winter but falls below 40 percent during the summer.[41] Meeting such swings in demand is possible by maintaining a substantial surplus production capacity. This cost is primarily borne by Gazprom.

The supply and demand balance in the Russian gas market has also contributed to the current status quo of relatively low deregulated prices. Throughout the 2000s, booming domestic gas demand and increasing exports prompted concerns over the gas deficit.[42] In that context, independent gas producers could charge industrial consumers above Gazprom's regulated prices. By contrast, stagnant domestic demand since 2008, and relatively weak gas demand in Europe (particularly in the first half of the 2010s), generated surplus production capacity in Russia's gas market.[43] In this reversed context, unregulated prices went below Gazprom's regulated tariffs beyond 2011. This prompted Gazprom to perform as a "swing" producer, often cutting its output to well below its production capacity to balance the market. While weak demand has been partly responsible for this "gas surplus" in Russia, it is also a product of multiple supply-side factors that happened to be present in concert. This includes Gazprom's ability to maintain the legacy of Soviet gas fields operating at low marginal costs, opening a vast new production center at Bovanenkovo on the Yamal peninsula, and the booming production of relatively cheap associated gas by Russian oil majors. As it remains unclear how long this "gas surplus" in Russia will last, this raises further questions about the equilibrium gas price in the long-term should Russia move forward with further liberalization of the gas market.

Initiatives for reforming gas tariffs and subsidies

While the origin of today's two-tier gas market dates back to the 1990s, the prevalence of gas subsidies is a phenomenon that represents a legacy from the Soviet period. Gas prices in the Soviet Union were set substantially below international prices for all types of consumers. Low-priced gas did not reflect long-term marginal costs, as the gas sector effectively subsidized the rest of the economy. Inadvertently, this helped turn gas into the single most important component of the Soviet energy balance—a legacy that remains in place to this day. As Russia started transitioning to a market economy in the 1990s, the government attempted to use its regulatory power to maintain low gas prices while setting the foundation for cross-subsidization in the gas market. All consumers enjoyed low prices, though prices for residential consumers were set substantially lower than those for industrial users. The Russian leadership saw multiple reasons to justify gas subsidies. And as Gazprom emerged as the national gas champion, it inherited the assets of the Soviet Gas Ministry at no cost. This included the entire transportation network, which qualified as a natural monopoly, and gas fields explored and developed during the Soviet era.

Gazprom was given the exclusive rights to export Russian gas, which would provide a stream of revenues that could help keep domestic prices low. There was a deliberate attempt to use the legacy of Soviet gas fields, where marginal costs remained low, as a means to support the economy. Low industrial gas prices would help shield Russia's energy-inefficient economy. Keeping residential gas prices even lower would both ensure public access to Russia's gas rents and help the government contain inflationary pressure.[44] The policy of sharing gas rents with the public also reflected the institutional limitations of the time. As the government still lacked the means to implement an effective social policy, indiscriminate access to cheap gas for all Russian citizens seemed a reasonable solution. In that setting, distributional questions outweighed concerns over the economy.[45]

Transition to a market economy raised certain fundamental questions about the gas market, some of which remain at the center of Russia's policy discourse today. One key question concerned the regulation of gas prices. Unlike oil, where prices were eventually liberalized, the government opted to continue its direct role in determining natural gas prices. This limitation applied to Gazprom, while the emerging new, independent, and relatively small producers could sell their gas at unregulated prices. The Russian government experimented with new ways to regulate the price of gas. Initially, the authority to regulate belonged to the Ministry of Energy. Over time the government opted to transfer this power to regulatory agencies, first to the Federal Energy Commission in 1997 and subsequently to the FTS in 2000.[46] This regulatory power was transferred to FAS in 2015.

Another central question concerned adjusting gas prices periodically, a question of particular concern in an inflationary environment. In the early 1990s, the Russian leadership experimented with indexing industrial gas prices to inflation. However, amid hyperinflation, this policy soon proved unsustainable. Industrial gas prices gradually rose through 1995, approaching European export netback prices. This contributed to an increasingly intractable problem of non-payment among industrial consumers. The problem peaked in 1997 when Gazprom was paid for only 29 percent of its domestic sales.[47] Furthermore, many industrial users could only offset their debts through in-kind payments instead of cash, leading some analysts to describe this phenomenon as the rise of a "virtual economy."[48] This problem prompted the Russian government to adopt a more cautious approach and periodically freeze industrial gas prices. In December 2000, it adopted a new resolution (No. 1021) that authorized the FTS to regulate gas prices without the requirement to index them to inflation.

The political debate on Russia's gas prices gained new potency at the beginning of the 2000s. This culminated in a concrete plan to align domestic industrial prices with an international benchmark in 2006. There were two main drivers of this shift. On the demand side, gas consumption in Russia started rising beyond 2000, prompted by the end of a nearly decade-long economic downturn. As gas had remained cheap, its share in the Russian energy balance continued to grow, raising concerns about ensuring a healthy state of inter-fuel competition, especially in the power sector.[49] Traditionally, the share of gas in Russia's energy balance and power generation has been exceptionally high compared to higher income countries. In the meantime, gas exports to Europe were also on the rise.

Furthermore, Russia faced an increasingly complicated picture on the supply side. Gazprom was gradually running out of the cheap gas produced from Soviet-legacy supergiant fields, leading to an apparent urgency to invest in new fields. Overall, the supply and demand balance increasingly led to concerns over Gazprom's ability to meet its growing commitments. In this context, there was a strong incentive to raise domestic gas prices. Higher prices would encourage improvements in energy efficiency and moderate demand growth. They could also secure more revenues for Gazprom from domestic gas sales, which on average, were still priced below the company's recovery costs. This could allow Gazprom to allocate more funds for investment in new fields and aging infrastructure, allowing the company to meet expected demand growth in the future.

The main breakthrough came in 2006 when the Russian government decided to set export netback parity with gas export prices to Europe as a key target. This occurred after several steps to raise industrial gas prices above inflation in the early 2000s. Hence, the objective was to raise Russia's domestic industrial prices to this benchmark by 2011. Cautionary warnings from key government players, such as the Ministry of Economic Development, indicated that the Russian government might have perceived export parity primarily as a means to raise

prices in a guided manner rather than as a target to be met.[50] The broader assumption of the export parity target was that Gazprom's industrial gas prices would no longer be regulated once the target was approached, amounting to further liberalization of the Russian gas market.

While an important step in aligning Russian gas prices with the European market, there were a few caveats that limited the scope of price liberalization:

- **First, export netback parity, by definition, is a function of both transportation costs and export duties imposed on gas sold by Gazprom abroad.** Both components are a product of a government policy that ensures the Russian domestic gas market clears at prices below the European market. While transportation costs are inevitable, they are shaped by tariffs set by the regulator and Gazprom's approach to investment and cost management in its transportation network. Export duties are a product of the government's fiscal design to collect taxes from the gas sector. Both components can result in price distortions that can implicitly yield lower domestic prices when export netback parity is set as a benchmark. Thus, targeting export parity could align Russian gas prices with Europe's but not necessarily equalize them.
- **Second, Russia's objective to reach export parity pertained to industrial rather than residential gas prices.** The bill intentionally excluded the residential sector. In effect, the government's policy simply did not address the problem of cross-subsidization between industrial and residential consumers. Instead, the main policy debate on regulating residential prices centered on whether periodic tariff increases would stay above or below inflation. To an extent, this "omission" reflected a broader tendency that one can discern in Russian politics beyond 2005. Following the first large-scale social unrest in the winter of 2004–2005, the Russian government appeared more inclined to favor policies with redistributive benefits for the public. Rising concerns over presidential succession also drove such policies during the then-upcoming 2008 elections.[51] A fast-paced increase in residential gas prices met significant resistance from the policy establishment, including from within the presidential administration.[52]
- **Third, the export netback parity target applied only to Gazprom's regulated prices for industrial consumers.** Other producers could continue to charge industrial consumers prices determined by the market. However, Gazprom's regulated prices constituted a significant benchmark, given the company's heavy weight in the Russian gas industry. The export parity target and the ensuing upward trend in domestic industrial gas prices were well aligned with the interests of both Gazprom and the independent gas producers. As a result of a consistent rise in regulated industrial prices, Gazprom was for the first time able to turn a profit from sales in the domestic market in 2009.[53] For the remaining gas producers, who typically sold gas at a premium compared to Gazprom's prices, the rise in the regulated industrial price made their gas more competitive and fostered a boom in production. As their sales volumes grew in size, they were progressively able to lower their prices to compete more effectively with Gazprom. By 2012, independent gas producers were able to not only match Gazprom's industrial gas prices but also sell below them, further solidifying their position in Russia's domestic gas market. By 2018, their share in the Russian market reached about 45 percent.[54]

The government's policy of setting export netback parity as a benchmark proved to lack resilience. Export parity is inevitably exposed to significant risks over which the Russian government has little or no control. The government never made clear how one could adjust to such risks. Namely, the policy lacked clarity about the impact of potential significant shifts in international oil prices, which would inadvertently impact netback parity prices. The underlying oil price assumption had been set at around $50–55 per barrel.[55] As Gazprom's export prices to Europe have fluctuated along with oil prices, this brought the risk of substantial instability to Russia's domestic gas prices. Fluctuations in the exchange rate posed another major risk. As the ruble depreciated sharply in the context of the Great Recession, it opened a significant gap between Russia's domestic gas prices and Gazprom's

European export prices. A large drop in the value of the Russian currency in 2014 further exposed the pitfalls of the Russian policy targeting export parity.

Additionally, Europe's own gas liberalization process further compromised the practicality of export parity as a benchmark. As the significance of oil-indexed gas prices waned in favor of spot prices, Gazprom adapted to this process by selling an increasingly more significant proportion of its gas at spot prices. As spot prices tend to fluctuate more often, aligning Russia's prices on the basis of export parity would necessitate a continuous price intervention as long as prices remain regulated.

After the Great Recession, the quick rebound of oil prices shackled the government's goal of achieving export parity for gas by 2011. There was a broad consensus among key government players to delay the target until 2015 to avoid a heavy toll on the economy. Subsequently, the target year was moved once again to 2017.[56] Shortly thereafter, export parity faded altogether as a near-term government priority. Instead, the focus of Russia's discourse on gas prices shifted back to adjusting them periodically to the inflation rate. This brought FAS and key government entities, such as the Energy Ministry and the Ministry of Economic Development, into regular policy discussions on the appropriate size of the increase in industrial and residential gas prices. The government was particularly cautious in the aftermath of the economic downturn of 2014, striving to keep the pace of growth in gas prices below inflation. Apart from the complexity involved in using export parity as a benchmark, one might conclude that the new context in the Russian gas market contributed to the eventual de-prioritization of this benchmark. Concerns over Gazprom's inability to meet its growing commitments never materialized. Instead of a gas shortage, Russia ended up with a major gas "surplus." According to Gazprom's estimates, it achieved a spare production capacity of about 150 billion cubic meters in 2016 due to weak demand.[57] Thus, reaching export parity was no longer deemed a necessary incentive to raise capital and boost investments in the Russian gas sector. In the meantime, stagnating demand from Russian gas consumers also lifted the urgency to promote energy efficiency through higher gas prices.

The St. Petersburg International Mercantile Exchange (SPIMEX) has emerged as Russia's largest commodity exchange for oil and natural gas. This is an additional area where the Russian government has taken the initiative to move towards a more liberalized gas market. Established in May 2008 under the direction of President Putin, SPIMEX provides a platform for a wide range of Russian gas consumers and producers to trade.[58] Initially, the clearing prices at the exchange generally exceeded Gazprom's regulated prices, which limited the trading volume.[59] Since 2018, the average price of gas traded via the exchange has exceeded the price set by FAS.[60] For Gazprom, the exchange has provided occasional opportunities to expand its gas sales, as it legally allows the company to make transactions at below the regulated prices. However, SPIMEX has not yet turned into the primary outlet for gas sales in Russia.[61] Gas trading through the exchange peaked in 2017 at 20.3 billion cubic meters—a small fraction of the domestic market. After a drop in trading by 2019, trading volumes increased in 2020, reaching 16 billion cubic meters.[62] A key constraint for SPIMEX's further growth has been the heavy role of Gazprom, regulatory limits to its further involvement, and the limited availability of uncontracted gas among independent gas producers.[63] FAS and the Ministry of Energy have proposed a requirement for Gazprom and independent gas producers to sell a certain proportion of their gas at the exchange. Independent producers have actively lobbied against such a requirement.[64]

Factors facilitating/constraining reforms for gas tariffs and subsidies

Russia is in a better position now than before to undertake tariff reform that could yield a more liberalized market along with a gradual elimination of cross-subsidies. Based on Russia's experience with regulating and reforming gas tariffs, it is possible to draw several conclusions about key factors that can facilitate subsidy reform.

- **Government players broadly recognize the need for tariff reform.** While key government agencies have disagreed on the pace and scope of reform, there has been a broad understanding of the need to move towards a more liberalized gas market. Russia's official energy strategy for 2035, approved in 2020, calls for a steady increase in regulated benchmark prices, a transition towards

deregulated industrial prices, and gradual elimination of cross-subsidies both among consumer types and across regions.[65] Key underlying drivers for the Russian government include excessive gas consumption, heavy reliance on gas in the power sector, and the slow adoption of more energy-efficient technologies in key Russian industries.[66] It is evident that the government's notion of price liberalization relates primarily to industrial consumers. However, there is an overall appreciation that the gap between industrial and residential prices, which are likely to remain regulated, should be reduced over time.

- **Support for tariff reform among gas industry players.** Gazprom, Russia's main gas producer, has actively advocated for tariff reform that would let it sell gas to industrial consumers at unregulated prices. Deregulating industrial prices would allow the company to sell its gas to industrial users at rates below current regulated prices. Some of Gazprom's arguments have echoed well-established government priorities. Other gas producers have not been opposed to tariff reform; however, their support has remained conditional. Unless broader gas sector reforms accompany tariff reform, the current status quo allows them to compete better with Gazprom in the industrial market. Both Gazprom and independent gas producers have common interests in phasing out cross-subsidies. As the chief supplier to residential users, Gazprom could see this segment turn into a profit-generating business. Higher residential prices can open new business opportunities for independent gas producers, who have typically shied away from this segment.
- **Multiple industrial interests overlap in support of phasing out cross-subsidies.** As Russia's industrial consumers bear the burden of cross-subsidies, key gas-intensive sectors (such as power plants, chemicals, and fertilizers) have a strong incentive to see the phase-out of these subsidies. Many of these players have managed to minimize this burden by switching to independent gas producers who can offer them gas at unregulated prices. However, only a third of Russian gas was sold at unregulated prices in 2018, indicating the limited opportunities to avoid direct involvement in cross-subsidization.[67] Industrial users have claimed that higher regulated prices affect their international competitiveness—an argument that resonates well with the Russian government.
- **Reforming tariffs in an already partly liberalized gas market.** Russia has already made substantial progress in liberalizing its gas market. While Gazprom remains the dominant player, independent gas producers (including oil majors involved in gas production) have been thriving, increasingly expanding their foothold in the domestic gas market. Selling gas to industrial consumers at unregulated prices has helped move the Russian gas industry towards a liberalized market. Furthermore, after years of lobbying, independent producers gained the right to export LNG in 2013, effectively breaking Gazprom's monopoly. And meanwhile, the emergence of SPIMEX as a trading platform has proven to be another promising dimension of Russia's liberalizing market. Each of these steps contributes to a more conducive environment in which to gradually deregulate industrial prices. However, this still leaves the residential sector lagging in terms of price reform.
- **Russia's "gas surplus" as a factor in tariff reform and gas sector reform.** Unlike during the 2000s when the overarching concern was about an impending gas supply deficit, this appears no longer to be the case in the near term. On the contrary, Gazprom maintains a substantial surplus in production capacity. This condition in the market has helped drive deregulated prices below those set by FAS. Thus, the near-term impact of further price deregulation is less likely to result in higher prices for all consumers—typically a key constraint for price reform. The longer-term impact of deregulation, however, bears many uncertainties. Meanwhile, the ability of independent gas producers to thrive in the current context at Gazprom's expense is indicative of the latter's weakening position in the overall policy discourse on gas market reform. Should further tariff reform be contingent on a

broader set of gas sector reforms, one could expect greater progress in addressing key issues that have been intractable so far.

- **External factors driving tariff reform.** One of the reasons for Russia to raise its domestic gas prices in the early 2000s was an agreement with the European Union on accession to the World Trade Organization (WTO).[68] Meeting WTO accession requirements was also a factor in the government's drive to establish netback parity as a target for domestic prices in the late 2000s.[69] More recently, in line with Russia's objective of steadily integrating its energy markets with those of the members of the Eurasian Economic Union, the government has committed to taking further steps in gas market liberalization.[70] Notably, the EU's recent proposal to establish a carbon border adjustment mechanism (CBAM) has brought the attention of the Russian leadership to the potential costs of this policy. According to some estimates, the costs could be as high as $60 billion for the 2022–30 period.[71] The EU's CBAM proposal has also invigorated discussions among Russian officials about possible remedies such as improved energy efficiency and greater reliance on renewable energy. Higher gas tariffs, in theory, can help in both areas.

Nonetheless, it is also possible to identify a range of factors that have limited the government's scope for maneuvering concerning tariff and subsidy reform in the gas sector. Many of these factors are likely to present limitations for further reform:

- **Tariff reform intertwined with broader gas sector reforms, leading to a stalemate.** Russia's experience with tariff reform has proven to be directly intertwined with broader changes in the gas market. Gazprom and independent gas producers have found themselves at odds with deregulating industrial gas prices. While Gazprom has advocated tariff reform, independent gas producers have supported such reform only under the condition of broader gas market reforms that would create a level playing field. Reforming the gas market has raised difficult questions about curbing some of Gazprom's privileges while simultaneously allocating some of its "social" costs and key responsivities to other producers.
- **Lack of consensus within the government on the scope and pace of reform.** For the Russian government, striking a balance between the interest of independent gas producers and Gazprom has been a difficult task, prompting caution in its approach to reform. The complexity of intertwining price reform with a broader gas sector reform has remained a significant source of disagreement. There has been a general lack of consensus among government officials about the scope and pace of gas market reforms. Reportedly, such disagreements have contributed to many years of delay in approving Russia's new energy strategy, leaving key questions unaddressed.[72] This has prevented a significant departure from the government's current approach to regulated industrial tariffs and cross-subsidies. A further complicating factor is the relatively small number of players. While independent players have risen in significance, they are over-represented by a handful of companies, many of which are Russia's oil majors. This raises uncertainty about the actual extent of competition should Russia take the major step of further liberalizing the gas market.
- **Weak fiscal incentive for the government for cross-subsidy reform.** As the cross-subsidies in the gas sector are borne primarily by industrial consumers, there has been no significant burden on the federal budget. This has alleviated the urgency to take action on tariff reform. The government can still raise more fiscal revenues from gas consumption by adjusting its tax policy. However, the fiscal benefits of cross-subsidy reform remain uncertain as the outcome would depend on how the reform impacts demand and relative prices for industrial and residential consumers. In the meantime, the gas sector has remained the second most significant source of revenues for the federal budget—this has prompted the government to tread with caution regarding sector reforms.

- **Gas market conditions leading to lower priority on tariff and subsidy reform.** During the 2000s, widespread concern about the ability of the Russian gas sector to meet growing demand commitments prompted key steps towards gas sector reform, particularly through a relatively aggressive approach to raising gas tariffs. The current context appears very different: investments, production, and exports have been steadily rising (until the impact of COVID-19). Gazprom still maintains ample "surplus" production capacity. Also, gas demand has remained stagnant: its cumulative growth was merely 2 percent between 2011 and 2019 (compared to 15 percent between 2000 and 2008.[73] Russia's official energy strategy estimates the cumulative growth for gas demand to be as low as 2 to 5 percent between 2018 and 2035.[74] This context has weakened the urgency to adopt a more proactive approach to tariff and subsidy reform. For many, the fact that independent gas producers have been able to sell their gas at a discount to Gazprom's regulated industrial tariffs proves that the sector can continue attracting investments and thrive.[75] Gazprom officials have warned about the possibility of rising difficulties to meet all commitments in the future unless Russia undertakes a long-term approach to tariff reform.[76]
- **Weak emphasis on climate policy, gas abundance, and geography.** Russia has not set ambitious targets to lower its CO_2 emissions. Its emissions have remained notably below the level of 1990 largely owing to the economic transformations of the 1990s. Tariff reform has never emerged as a central element in Russia's climate mitigation efforts. Furthermore, based on interviews with stakeholders and members of focus groups, it is possible to discern a broadly shared perception, both among the public and policymakers, that Russia's abundant energy supplies should justify lower prices for the population and the economy as a whole.[77] Russia's relatively cold climate has been a powerful reason for government officials to carefully consider the potentially catastrophic impact of reforms should they inadvertently lead to supply disruptions.[78] Also, Russia's peculiar climate has magnified the problem with the seasonality of gas consumption.[79] Another geographic factor is the sheer size of the country and the high concertation of gas production in the Yamalo-Nenets Autonomous District, which accounts for over 80 percent of Russia's gas output.[80] Distances from this region vary significantly, causing considerable variations in transportation costs. In this context, the government has operated on the presumption that consumers in some regions would have to pay substantially more if cross-regional subsidies embedded in transportation tariffs were abandoned. This could potentially hamper economic activity. Eliminating cross-subsidies may clash with the government's goals of promoting regional development.[81]
- **Low public acceptance of tariff reform.** The Russian public currently appears to be a major beneficiary of cross-subsidies in the gas sector. Government officials commonly refer to the weak affordability of energy costs as a cause for broad-based public resistance to tariff reform. Indeed, comparisons with gas prices in Europe typically yield the argument that Russia's per capita income remains relatively low, which should justify low gas prices. However, if one adopts the share of household income spent on natural gas as a key indicator, Russia could possibly have the scope to raise residential gas prices.[82] According to a survey conducted by Russia Public Opinion Research Center (VCIOM) in 2020, 76 percent of respondents opposed the idea of paying more for gas and oil products, even if they were given assurances that higher prices would be used for investment in energy efficiency and renewable energy.[83] Respondents in focus group meetings have questioned the evidence of gas subsidies going to residential consumers. They strongly opposed tariff increases and expressed a general lack of trust in potential government efforts to reform gas tariffs. Weak public support for tariff reform may also be due to the low recognition of the impact of climate change. VCIOM's survey reveals that only 18 percent of Russians believe climate change might significantly affect their lives.[84]

Summary: Gas subsidies and tariff reform

Consumer subsidies in the gas sector transpire primarily through a mechanism whereby residential consumers get gas at discounted, regulated prices at the expense of industrial consumers, who pay higher prices. Thus, subsidized gas for residential consumers constitutes a Soviet legacy that successive Russian governments have tried to address with a high degree of caution. Reforming cross-subsidies in Russia's gas sector inevitably touches on broader and highly delicate sectoral issues. Comprehensive reform would necessitate balancing multiple issues of critical importance. Deregulating Gazprom's industrial prices can complicate the broader, long-term objective of building a competitive domestic gas market. Reforming Gazprom raises questions about how effectively Gazprom's various "social" costs could spread across the entire gas industry. Uncertainties about the future of Russia's supply and demand balance further complicate the task of Russian decision-makers in formulating a path. Market players have had contrasting views about gas tariffs following full-scale gas market liberalization, further complicating the process of subsidy reform. Additional factors that impede effective gas subsidy reform include a general lack of consensus within the government on the scope and pace of reform, a weak fiscal incentive from a budgetary perspective, gas market conditions that create no urgency to curb gas consumption to meet other commitments, the government's comparatively weak commitments to mitigate climate change and low public support for tariff reform.

There is some scope for the Russian government to launch tariff reform measures that would ultimately phase out cross-subsidies. Overall, the need for gradually removing cross-subsidies is widely recognized by government players, including in the official energy strategy through 2035. Gazprom, the main player in the gas sector, has been actively advocating for reform. Industrial consumers have also been arguing about phasing out cross-subsidies to cut costs and improve their international competitiveness. The government has already taken significant steps towards liberalizing the gas market, though further steps necessitate carefully balancing the interests of key players in the gas sector. Finally, growing recognition of the potential implications of the decarbonization agenda in Europe, namely regarding the recently proposed carbon border adjustment mechanism, is likely to reinvigorate interest in gas subsidy reform.

Oil subsidies and reform

The Russian oil market and the process of subsidization

The Russian oil market has evolved very differently from the gas sector. The distinction is partly due to the organizational setup of the sector, which has generated a different set of players. The dissimilarity also concerns the approach and policy tools employed by the government to maintain a degree of control over domestic prices. The oil industry was privatized mainly during the 1990s when several privately-owned vertically integrated companies (VICs) emerged as the dominant players. Only a few relatively small players, including Rosneft, remained state-owned by the end of the 1990s. However, following several waves of transformations in the organizational setup of the oil industry over the past two decades, the majority state-owned Rosneft emerged as the biggest player among several VICs that maintain their heavy role in the industry. Overall, Russia's oil sector today can be characterized by the coexistence of state-owned and private VICs that own assets within an extensive oil value chain. There are also many small and independent oil producers, along with a handful of independent refineries. Notably, the state never relinquished control over pipeline transportation. Transneft, which is majority state-owned, has remained in charge of the extensive network of crude oil pipelines and oil product pipelines. Thus, unlike in the gas industry, the complex issue of unbundling transportation and production assets has not been part of the policy discourse on reforms in the oil sector.

The distinct organizational setup of the oil sector matters on several grounds. The vertically integrated companies in the oil sector are less likely to clash—in contrast to the gas sector, where Gazprom's interests have collided with those of independent gas producers. This has enhanced their ability for collective action regarding reforms in areas of mutual interest, such as the government's policy tools guiding domestic prices. Yet, collective action among oil majors has been compromised due to various factors such as differences in geological assets and investment priorities. In the meantime, independent smaller producers and independent refineries have had limited

opportunities to effectively provide input in key policy discussions. Since the mid-1990s, when prices in the Russian oil market were liberalized, successive governments have experimented with a different set of tools to guide domestic petroleum prices. During the 1990s, the primary tools were administrative restrictions in export quotas and compulsory delivery requirements for oil companies.[85] Apart from a temporary drop in oil prices, these measures helped ensure sufficient fuel stocks for the winter and secure fuel supplies for harvesters.[86] This tool, however, was a recurring source of protracted bargaining between oil companies and the Russian government, prompting the latter to opt-out in favor of a more lasting solution.

Export duties have been a primary policy tool impacting Russia's domestic oil prices. They were first introduced in the early 1990s as a minor fiscal measure. Still, their significance grew particularly after the 1990s, eventually turning into the single most important source of oil revenues for the budget. Companies have had to pay these duties both for exporting crude oil and petroleum products. As oil prices rose during the 2000s, the government calibrated the export duties to collect more revenues from the then-booming oil sector. The size of export duties has fluctuated along with international oil prices. For example, amid the historic high oil prices of August 2008, exporters of diesel and gasoline had to pay $46.30 and $40.90, respectively, for every barrel shipped abroad.[87] Export duties, and to a lesser extent, transportation tariffs, have constituted policy tools affecting domestic petroleum prices. Both tools have added to the cost of exporting oil and petroleum products, ensuring the domestic market clears at lower prices than international prices. In effect, both tools have driven a wedge between Russia's domestic prices and international prices. Domestic prices have generally tracked international prices, though deviations have occurred, often temporarily.[88] During the 2000s, the government set different export duty rates for crude oil and petroleum products, resulting in further price distortions. Since 2011, Russian officials have adopted a series of measures to remove this source of distortion gradually.

Russian refineries have been a primary beneficiary of the distortions created by export duties. While this study focuses on consumer subsidies, it considers refineries as significant players, namely as a sub-sector whose interests have affected the government's policy on domestic oil prices. The size of the implicit "subsidy" received by the refining sector has varied, depending on various factors such as a refinery's fuel mix, the exchange rate, and the size of the export duty.[89] The government's policy of differentiated export duties contributed to a major boom in Russia's refining sector during the 2000s. The export-duty-triggered boom was particularly evident in the case of heavy refined products, such as fuel oil. The government had set the lowest export duty on fuel oil, prompting many refineries to ramp up their "primary" processing capacity. Investments in such capacity often came at the expense of "secondary" processing capacity, which is needed to turn crude oil into higher-yield lighter products such as gasoline, kerosene, and diesel. Russian consumers overall have also benefited from relatively lower petroleum product prices ensured by the government's policy on export duties. Additionally, several members of the (formerly) Eurasian Economic Community (EEC) and the Eurasian Economic Union (EEU) have also reaped benefits. For many years, refineries in Belarus, in particular, could get relatively cheap crude oil from Russia and export refined products without facing export duties.

The price distortions triggered by export duties have been widely discounted as a subsidy by international observers. However, the policy discourse in Russia has clearly referred to them as a form of subsidy. The Ministry of Finance has consistently presented them as a form of subsidy that has amounted to substantial foregone revenues for the Russian budget.[90] Indeed, the size of the subsidy has been substantial: it has been estimated at Rub 19 trillion between 2005 and 2015, of which nearly half went to refineries, and the rest was acquired mainly by domestic consumers, while EEU member states gained an additional minor portion.[91]

Since 2011, the Russian government has been taking numerous steps to minimize the distortions generated by export duties. In 2018, it set a schedule to gradually phase export duties out by 2024. As the size of the duty has been reduced, the amount of the implicit subsidy has also declined. However, the phasing out of export duties has become fairly complex, raising new challenges. The Russian government has responded with policies that amount to a more interventionist approach in the domestic petroleum market. It has adopted three new policy tools that aim to help both Russian consumers and refineries. The

government introduced negative excise taxes and a damping mechanism to support refineries affected by the scheduled phase-out of export duties. These measures, unlike export duties, have constituted a direct government budgetary subsidy to the refining sector. The process of phasing out export duties has put upward pressure on domestic petroleum prices, raising concerns about their impact on consumers. The Russian government has addressed these concerns partly through the damping mechanism for refineries. Also, it has directly engaged in negotiations with the leading oil companies on establishing a price cap for their petroleum products.[92] The concentration of ownership in the oil sector around several large vertically integrated entities has facilitated the government's approach to negotiating a price cap. Thus, for instance, amidst a sharp spike in gasoline and diesel prices in 2018, the government struck a deal with oil majors to cap their prices for six months and effectively subsidize consumers.[93] In effect, the attempts to gradually eliminate export duties have yielded new forms of intervention that have perpetuated oil sector subsidies. Subsidization has not been abandoned; instead, the process has changed form.

Managing price formation and distortions in the domestic oil market

Three main objectives have guided the approach of the Russian government to domestic oil prices and the oil market.

- **First, there has been a general reluctance to let domestic prices for consumers reach the prices prevalent in Europe.** Export duties, and more recently, agreements with oil companies to cap their prices have partially served this goal. In addition, the Russian government has maintained distinctly lower consumption taxes for gasoline and diesel. This policy is comparable with the one in the United States and many oil-exporting countries.
- **Second, the government has adhered to industrial policy aimed at propping Russia's refining sector.** The sector has been the main beneficiary of price distortions created by export duties. Subsidizing refineries has been driven by three Soviet legacies. Russia inherited an oversized refining sector.[94] Many of Russia's refineries have been geographically "misplaced" in the sense that they could not survive financially without state support.[95] And yet, during the 2000s, even some of the least technologically modernized refineries could generate profit margins comparable to those enjoyed by highly sophisticated refineries in Europe.[96] Also, Russia inherited a technologically backward refining industry, producing a relatively small share of lighter petroleum products. Price distortions created by export duties and the more recent policies aimed at supporting refineries have helped sustain Russia's refining sector. Thus, Russia produced 5.8 million barrels a day of petroleum products in 2019, nearly the same amount produced in 1990. This represented a major turnaround since 1998, when the struggling refining sector processed only 3.3 million barrels. In terms of processing capacity, Russia ranked third in the world in 2019. Compared to Saudi Arabia, which produced a similar amount of crude oil and maintained a logistical advantage for petroleum product exports, Russia's refining throughput was more than twice as large.[97]
- **Third, there has been a strong fiscal objective in the government's evolving policies affecting oil prices in the domestic market.** The oil sector remains Russia's single most important source of revenue. As a result, export duties have been a critical component of Russia's oil tax regime. They were first introduced in 1992 as a means to collect more tax revenues. However, they were initially set very low and were suspended in 1996.[98] Reintroduced in the aftermath of the August 1998 crisis, export duties gradually turned into the most significant source of oil revenues for the government by 2004.[99] Unsurprisingly, Russia's policy discourse on price distortions caused by export duties has been closely connected with the government's fiscal plan.

While export duties have effectively helped the Russian government with all three objectives, they have come at a high cost. This has triggered a series of attempts to reform them. From a fiscal perspective, the distortions they created represented substantial foregone revenues for the government. Also, reliance on export duties as a tax tool delayed Russia's transition to a modern profit-

based tax regime in the oil sector. Export duties helped sustain an oversized refining sector; however, they also had some unintended effects. Export duties contributed to major value destruction: many Russian VICs simply opted to export fuel oil rather than crude oil, as the former faced lower duties. They often sold fuel oil abroad at prices below those for crude oil. According to data from the Central Bank of the Russian Federation, the value of petroleum products, measured per ton, stayed below the value of crude oil exports for 9 out of 14 years in the 2000 to 2013 period.[100] It was evident that many of Russia's refineries were not using the export duty-generated subsidy to invest in modernization.

The Russian government undertook several initiatives to reform export duties between 2011 and 2018. Known as "tax maneuvers," these new initiatives indicated that the government had started considering a more comprehensive approach to reforming export duties and overcoming the distortions associated with them.[101] It set the broader objective of recalibrating the oil tax regime by gradually reducing the significance of export duties in favor of a proportionate increase in the Mineral Resources Extraction Tax (MRET). The underlying assumption was that this recalibration would shift the tax burden from the refining sector to oil producers while also helping minimize the distortions created by export duties. Despite some setbacks,[102] the Russian government, under strong guidance from the Ministry of Finance, maintained its priority of gradually eliminating the distortions created by export duties. In 2018, the Russian legislature approved a bill known as the "Completion of the Tax Maneuver," which set a clear objective for a gradual but complete phase-out of export duties by 2024, along with a commensurate increase in the MRET.[103] The plan also envisaged increased emphasis on recalibrating the tax regime to target oil sector profits rather than their gross revenues.

The gradual phase-out of export duties can be regarded as a major step towards overcoming price distortions in the Russian oil market. However, this policy shift has not eliminated key challenges for the Russian leadership. As export duties have been progressively lowered, this has curbed the size of the subsidy received by Russian refineries, leading to mounting pleas for finding alternative ways to support them. As expected, lowering export duties has amounted to higher export netback parity prices in the domestic market, raising concerns over the impact on Russian consumers. The policy to phase out export duties has prompted the Russian leadership to pursue alternative mechanisms to help refineries stay competitive and protect consumers from unwelcome increases in petroleum product prices. Its chosen policy response has contained many elements that contradict the idea of having a liberalized oil market. The introduction of negative excise duties has constituted a direct government intervention. The state has agreed to compensate refineries directly from the budget for their gradual loss of subsidies associated with export duties. This new form of subsidy has not applied to smaller refineries (less than 600 thousand tons a year), indicating a greater emphasis on targeting players of long-term market potential.[104]

To ensure that the state maintains some ability to guide domestic petroleum product prices, the Russian government has introduced a damping mechanism. Accordingly, during periods of higher international oil prices, the government has committed to providing additional financial compensation for refineries to keep gasoline and diesel prices below the export netback parity level. Under lower international oil prices, the refineries have been required to pay the state back through this mechanism. These mechanisms, along with the government's newfound emphasis on negotiating price caps with the oil industry's leading players, have helped the state maintain some control over domestic petroleum product prices.

Factors facilitating/constraining reforms for oil sector subsidies

There are no significant cross-subsidies among Russian oil consumers. The sector has been liberalized for over two decades. The recently adopted policy for progressively phasing out export duties promises to eliminate price distortions gradually. However, the newly adopted policy instruments have ensured that some form of subsidization has remained in the oil sector. There are a few reasons to think that Russia has further scope for reforming these subsidies:

- **The government has a strong fiscal incentive to reduce/eliminate subsidies in the oil sector.** Distortions created by export duties have amounted to substantial foregone revenues for the state budget. This has prompted a highly proactive approach within the Russian government, led mainly by the

Ministry of Finance, to pursue new methods to minimize losses for the budget. This has resulted in continuous efforts to calibrate the government's approach to oil subsidies. The introduction of new mechanisms that have led to new forms of subsidies since 2018 resulted from this pursuit. As reforming oil sector subsidies has been directly intertwined with reforms of Russia's oil tax regime, the question about their gradual removal is unlikely to disappear from the political agenda. However, the government is likely to maintain a highly risk-averse approach in taking further steps due to the critical role of the oil sector in the Russian economy.

- **Geological constraints limit Russia's fiscal space as a further incentive to prioritize reform.** As Russia's mature fields have declined, it has been possible to maintain a modest growth in output thanks to investment in new fields and further optimization of mature ones. This has come at the cost of the proliferation of various tax exemptions for oil producers. Russia's official energy strategy projects a stagnant output under its best-case scenario through 2035.[105] Achieving such a scenario is also preconditioned on the provision of numerous tax incentives, which will constitute further foregone revenues for the budget. In this context, one can expect that finding a policy that balances the interests of domestic consumers while minimizing subsidies for refineries remains a higher priority. Importantly, as the government's fiscal space appears increasingly limited concerning oil producers, it can find it more appealing to collect oil taxes from consumers. The government's newfound interest in a tax model that targets oil industry profits rather than their gross revenues may also provide an opening for a more comprehensive approach to oil industry taxation, which could address concerns across the oil value chain.
- **Progress in technological modernization of the refining sector can help limit the state's active involvement.** Since 2011, the multiple efforts to incentivize investment in the modernization of Russia's refining sector have been yielding results. The average complexity of Russian refineries has been consistently improving, and the share of fuel oil in Russian petroleum product exports has been declining. Importantly, since 2014, Russian petroleum product exports, on average, have no longer amounted to value destruction. Moreover, the new subsidization mechanisms introduced since 2018 have involved conditionalities about investment in technological upgrades.[106] These developments represent significant progress for the refining sector to become internationally competitive in the long run without resorting to state subsidies. This provides an opening for the government to move away from its active involvement in guiding price formation for crude oil and petroleum products in the domestic market.

While one can expect further progress in phasing out subsidies for Russian refineries and the population as a whole, multiple factors may potentially limit the scope for further reform and may continue to exert a similar impact.

- **The government continues to guide domestic oil prices and help the refining sector.** For nearly two decades, price distortions resulting from export duties helped the government keep domestic petroleum product prices relatively low while sustaining a large refining industry. The recent plan to gradually phase out export duties as a tax instrument has demonstrated that the Russian leadership remains committed to these two goals. Furthermore, the two goals are intertwined. Subsidizing the refining sector also helps to keep domestic prices lower. The damping mechanism, for instance, is a product of this approach.
- **Russian refineries remain dependent on subsidies.** Refineries have been major winners of the policy tools resulting in oil-related subsidies. They have been instrumental in perpetuating policies that favor some form of government intervention in the Russian petroleum market. An overall lack of international competitiveness, inherited as a Soviet legacy, remains a key problem. Even though the Russian government has actively strived to incentivize the refining sector to modernize and become more competitive internationally, it has abstained from addressing two additional problems that Russia inherited as Soviet legacy. The refining sector remains oversized, and many refineries continue

to operate from locations that hamper their competitiveness due to the high costs of shipping their products to markets. There has been a strong financial argument from Russia's expert community in favor of downsizing the refining sector and focusing on crude oil exports at the expense of petroleum products. Such moves could increase Russia's total export revenues.[107] There are also strong indications that in the case of many logistically disadvantaged refineries, upgrading their technology may not suffice to avoid value destruction.[108] Such refineries can be sustained only through continuous subsidies. The government's more recent subsidy mechanisms have further helped perpetuate the problem by promising additional support (such as larger negative excise taxes) for refineries that suffer from a logistical disadvantage.[109]

- **Regional development policies support subsidies.** Refineries' pleas for subsidies have often been aligned with the government's policy objectives of fostering the development of Russia's regions. Thus, the lack of a long-term policy to gradually shut down logistically disadvantaged refineries can in part be explained by the presence of an overarching priority to promote regional development. Also, shutting refineries down remains a politically sensitive issue due to unemployment, particularly in localities with few other significant employers.
- **There are concerns over inflation and public reaction.** As consumption taxes on petroleum products remain comparatively low in Russia, consumers appear less shielded against major fluctuations in international oil prices. Low taxes on the consumption of oil products have also limited the government's room for fiscal maneuvering in response to price fluctuations. Price spikes in global oil prices can contribute to inflationary pressure in Russia more easily than in OECD countries with high tax rates on consumption. Meanwhile, the Russian leadership remains cognizant of inflationary pressure and potential public reaction. The introduction of a damping mechanism and negotiation of a price cap with oil majors constitute policy interventions driven primarily by such concerns.

Summary: Oil subsidies for consumers

The Russian government has experimented with various tools to guide the prices for petroleum products in the domestic market. This followed the liberalization of oil prices in mid-1992. Export duties in crude oil and petroleum products have been the primary tool impacting domestic oil prices over the past two decades. They have created price distortions that have allowed consumers to pay less for petroleum products while also financially helping Russian refineries. Unlike the gas and electricity sectors, subsidies resulting from price distortions for oil have constituted substantial foregone revenues for the Russian government. This has prompted the Russian leadership to undertake a series of efforts to phase out export duties gradually. Currently, export duties are set to be phased out by 2024. Yet, the planned phase-out has not meant abandoning the state's interventionist approach. Instead, the government has introduced new policies that have aimed to simultaneously keep domestic petroleum product prices relatively lower and sustain a large refining industry. The government's recent approach has included direct budgetary transfers and negotiations with oil companies to cap their prices to meet these objectives.

There are several constraints to achieving a full liberalization of domestic petroleum product prices in Russia. The government has remained committed to sustaining relatively lower petroleum product prices while also helping Russia's vast refining industry. The refining sector, the main winner of state intervention in the market, has been actively perpetuating the government's approach. Concerns over inflation and public reaction have also contributed to the government's policy interventions in the petroleum market. Still, the scope for a change in the government's approach is significant, primarily because of the high financial costs associated with its interventions. Furthermore, new policy instruments, rather than constituting a bid to recoup foregone revenues, have resulted in direct budgetary outlays, which have raised the urgency of finding new solutions. The government has demonstrated its willingness to recalibrate its policy and limit the costs for the federal budget. Limited fiscal space associated with a rising geological challenge in Russian oil fields has further raised the significance of developing a new approach.

Electricity subsidies and reform

The Russian electricity market and the process of subsidization

Subsidies for electricity consumers transpire in a market setting that has largely been liberalized. The liberalization of Russia's power sector was launched at the end of the 1990s and was essentially completed by the late 2000s. RAO-UES (Unified Energy System of Russia), the conglomerate that controlled about 70 percent of power generation assets and provided most grid services, was unbundled. Many of its assets were privatized, and in 2008, it ceased to exist.[110] Today, with few exceptions (such as in the case of residential consumers and for some localities in the Far East and Northern Europe supplied by off-grid systems),[111] electricity in Russia is overwhelmingly traded at unregulated market prices. In this context, cross-subsidies for consumers have remained as a remnant of the earlier market model.

The emphasis of this study is on cross-subsidies between different types of electricity consumers. Namely, a set of consumers pay a price above the marginal cost so that "residential consumers" can pay lower tariffs.[112] In Russia, these types of cross-subsidies are commonly referred to as "social subsidies." Such subsidies are less common in a liberalized market. Residential users typically pay higher prices than other consumers (such as industries) due to the higher cost of delivering electricity to their door. Over the past decade, Russia has witnessed the proliferation of an additional type of cross-subsidies, whereby the primary function has been for electricity consumers to help fund investments in the modernization of power generation and support the power sector in special regions (such as Kaliningrad). According to some estimates, such cross-subsidies, also known as "investment cross-subsidies" or surcharges, have grown progressively, in 2020 exceeding the size of social subsidies.[113] Investment cross-subsidies are common in liberalized markets such as those in Europe and the United States. They represent administratively generated price distortions that serve various objectives such as decarbonization. Russia's case has been made somewhat different by the broader set of objectives associated with these surcharges and the general lack of transparency surrounding the actual cost they bring within the power sector value chain. While not part of this study, investment-related cross-subsidies are significant to consider as they often appear an integral part of Russia's discourse on power sector cross-subsidies and power sector reform.

The process through which social cross-subsidies transpire is a highly complex one. The complexity has generated a lack of consensus about how to define these cross-subsidies. As a result, various agencies (such as the Ministry of Energy and FAS) estimate their size differently, sometimes significantly. Methodological differences and problems have also been recognized by Russian officials.[114] There are two primary mechanisms for social cross-subsidies. The main one is through the regulation of network tariffs, where residential consumers obtain electricity at a reduced tariff set for the distribution network. A large, special group of residential consumers benefits from a further discount ("super-discounted tariffs")—typically, residential consumers who have no access to gas or reside in houses/dachas in suburban areas. The other mechanism for social cross-subsidies is through "regulated contracts" for residential consumers. Accordingly, the tariff set for wholesale electricity and capacity is regulated to remain below unregulated prices.[115] Furthermore, unlike other consumers, households do not pay for any additional surcharges embedded in the wholesale electricity prices. There is an additional mechanism for cross-subsidization, though for relatively less significant volumes of electricity. Namely, consumers in certain specially designated regions such as North Caucasian Federal District enjoy discounts on the transmission tariff along with discounted wholesale prices in their regulated contracts.

The entire process of subsidization is made possible through the involvement of regulatory authorities. FAS for instance, sets tariffs for cross-regional (high-voltage) transmission grids. Other grid tariffs, along with tariffs in regulated wholesale contracts for households, are set by regional executive authorities who need to comply with federal legislation and are overseen by FAS.[116] As in the case of gas tariffs, the institutional setup for these executive authorities can vary across regions. They could be ministries, departments within them, or special tariff committees.[117] The cost of social cross-subsidies is dispersed among the remaining consumers. These include

industrial consumers, commercial entities, and small and medium enterprises (SMEs). A common tendency among large industrial consumers has been to buy electricity from the federal grid company (FGC) instead of regional grid companies, which allows them to bear a lower burden for social cross-subsidies. In some cases, large industrial users generating their own power, further minimizing the cost of subsidy payments.[118] This tendency has further shifted the burden of social cross-subsidies to commercial entities and SMEs. Consequently, SMEs pay the highest prices for electricity, followed by commercial entities.

The financial costs of social cross-subsidies for the state have been modest. A key component of their contribution to these subsidies is foregone revenue through reduced value-added tax (VAT) payments by residential consumers. Regional authorities also provide allowances to the population to help pay utility bills. This mechanism, however, is not specifically designed to help households with energy expenses. Instead, it covers a wide set of communal services. Overall, it is possible to suggest that the Russian (federal) government has had a limited fiscal incentive to eliminate social cross-subsidies.

Initiatives for reforming social cross-subsidies in the power sector

Cross-subsidies for residential electricity consumers were first introduced during the early 1990s. These emerged as a temporary element of the government's social policy to help the public cope with the profound changes that followed the collapse of the Soviet Union.[119] This policy constituted a break with the Soviet tradition of charging residential consumers significantly more than industrial consumers. In 1997, the Presidential Decree titled "On the General Direction of the Reforms of Natural Monopolies" kicked off the comprehensive reform of the power industry. Also, in 1997, the Russian government announced a plan to bring residential tariffs up to marginal cost levels by 2000. However, the plan lacked specifics about how to accomplish this objective and did not materialize.[120] Reforming cross-subsidies did not emerge as a priority area during the 2000s. In 2003, legislation specific to the power industry was approved, and key reform objectives were defined. Power sector reform gained further urgency as electricity demand had started to recover. The sector was in dire need of investment in new generation capacity and modernization of existing infrastructure. Until the reform was deemed largely completed following the liquidation of RAO-UES in 2008, the priority was other key elements of restructuring the power industry, such as the unbundling, privatization, and reorganization of key players. Delaying cross-subsidy reform reflected a cautious approach by the government: the reform would have necessitated a significant rise in residential tariffs, potentially weakening public support for power sector reforms.[121] Apart from cross-subsidies, the reform process in the power industry also left additional issues to be addressed in the future, such as the high concentration of ownership in power generation, the high degree of state ownership in generation companies, and the presence of regional monopolies among electricity supplier (retail) companies.[122]

In the aftermath of the Great Recession, there was a clear shift in the government's approach to cross-subsidies. The issue was widely recognized, prompting various proposals by different agencies to find a path to reform. In 2013, the government adopted a longer-term strategy for developing the power industry, outlining the objective for a gradual phase-out of residential cross-subsidies.[123] Following a meeting with President Putin, the Ministry of Energy announced a plan to reduce the total size of such cross-subsidies from Rub 220 billion (about $7.1 billion) in 2012 to less than Rub 50 billion by 2022.[124] However, the government soon recognized that the target could not be reached as it found the required annual tariff increase (about 11.7 percent) excessive.[125] Hence, no significant progress was made in phasing out social cross-subsidies in subsequent years. Instead, such subsidies continued to grow.

Cross-subsidies have remained a significant policy issue on Russia's political agenda. The government and associated agencies have continued to present new proposals for addressing the problem. The official energy strategy to 2035 also recognizes the goal to "gradually liquidate" cross-subsidies, though it does not set a clear target.[126] Rather than listing the numerous proposals, it is worth focusing on some of the main aspects of the stakeholders' approaches. Several proposals have suggested redistributing the burden of the social cross-subsidies instead of eliminating them. There have been two distinct methods proposed to accomplish this:

- **First, the Ministry of Energy and Rosseti, the operator of Russia's electricity grids, have proposed differentiating transmission tariffs for different categories of users.** The proposed measure would increase transmission tariffs for industrial users who have access to electricity directly through the high-voltage transmission grid, along with a reduction in tariffs for distribution grids. Large industrial consumers, after heavy lobbying, gained the right to sign contracts with the transmission operator FGC in 2014 directly.[127] Many of them have also been increasingly investing in their own off-the-grid power generation facilities: the total capacity of their generation facilities reached about 15 gigawatts out of the total of 243 gigawatts in 2018.[128] These steps have allowed many industrial consumers to bear a lower burden in the cost of social cross-subsidies. The Ministry of Energy claims that this has put a further burden on other consumers, SMEs, and commercial users in particular. Opora, the non-governmental organization representing the interests of small and medium-sized businesses, supported the proposal, claiming that, if not implemented, many SMEs could also opt to generate their own electricity.[129] The proposal met strong resistance from large industrial users. It was put on hold in 2019, following a letter to Prime Minister Dmitry Medvedev from the head of the Russian Union of Industrialists and Entrepreneurs, an organization representing large industrial players.[130] FAS, Minstroy, and the Ministry of Economic Development also opposed the proposed plan.[131]
- **Second, in another proposal, the Ministry of Economic Development suggested moving the entire burden to the federal budget.** Accordingly, the state would cover the cost of the social cross-subsidies through budgetary transfers. Based on the ministry's estimates, the budgetary cost would be about Rub 400 billion in 2019.[132] While a step towards market pricing for residential consumers, this proposal would not eliminate subsidies. The ministry's plan was welcomed by the Association of Energy Consumers, a non-governmental organization representing electricity consumers in the industrial sector.[133] However, it met firm resistance from the Ministry of Finance. The latter has been opposed to transferring the burden of cross-subsidies on the state, emphasizing that the proposed measure would be in violation of existing fiscal rules that constrain government spending. As a result, the proposal was removed from the policy agenda.[134]

Another type of proposal aims to make social cross-subsidies more targeted. Since 2012, there have been various attempts to introduce a "social consumption norm" whereby residential consumers pay a discounted rate for electricity only up to a certain volume of consumption. The underlying assumption is that this would foster energy conservation. The proposed measure was actively debated in 2018 when the Ministry of Economic Development and the Ministry of Energy urged its implementation. Based on the draft plan, households would pay the fully discounted rate for consumption under 300 kilowatt-hours per month and market prices for consumption above 500 kilowatt-hours. It also envisaged ending the "extra" discounts provided to a special category of consumers (rural, suburban, and without access to gas).[135] According to estimates by the Ministry of Economic Development, about 60 percent of residential users would be able to get electricity at a discounted rate if the plan for "social norm" was implemented.[136] However, the plan was met with resistance within the government due to potential public reaction in the aftermath of several unpopular reforms undertaken in the preceding months (such as an increase in the VAT rate and a rise in retirement age).[137] Minstroy was particularly against the proposed plan, as its implementation could necessitate further compensation from regional budgets.[138] Also, setting the precise parameters for the "social norm" turned out to be a difficult undertaking because the amount of residential consumption varies depending on a range of factors such as location, climate, and available energy infrastructure. In January 2019, Deputy Prime Minister Dmitry Kozak announced that further considerations on this proposal were suspended.[139]

Promoting cost-cutting by companies providing grid services and retail services constituted another set of proposed measures. Such measures have been common in liberalized markets as a means to limiting the size of cross-subsidies. Additionally, there have been proposals

to benchmark grid companies' expenditures to industry leaders.[140] Many key players such as the Ministry of Energy, FAS, and President Putin have emphasized the significant potential for optimizing cost among transmission and distribution companies.[141] The Ministry of Energy, for example, introduced a draft strategy for the development of Russia's grid complex through 2035, proposing a consolidation of all companies providing grid services. It suggests reducing their number from about 1,200 (in 2020) to less than 700 to cut costs and improve the efficiency of grids.[142] As a further measure, FAS urged improved transparency regarding cross-subsidies. It proposed that Russia's regions should determine the precise extent of the cross-subsidy (in rubles per kilowatt-hour) and publish this amount regularly.[143] The underlying assumption is that transparency would help to establish a better baseline for addressing the problem and measuring future progress. Measures for transparency can also help raise awareness about the extent of cross-subsidization.

Finally, the Russian government's recent approach favors establishing a clear long-term schedule for a gradual but steady increase in residential tariffs. FAS, for instance, has proposed establishing a nationwide schedule for adjusting tariffs in a way that would amount to an annual 1 percent reduction of cross-subsidization for ten years until 2030.[144] The Association of Energy Consumers, representing large industrial consumers, has criticized FAS's proposal for the slow pace of liquidating cross-subsidies.[145] The Ministry of Energy has proposed establishing a binding, long-term schedule for tariff increases along similar lines. It has suggested raising grid tariffs by a rate equivalent to the inflation rate minus 0.1 percent for ten years in a row.[146] Federal legislation (FZ No 300 "On Amendments in the Federal Law on Electricity," August 2, 2019) has already been approved, authorizing such an approach.[147] The Russian government has taken on the task of preparing additional legislation to enable its implementation.

Factors facilitating/constraining reforms for social cross-subsidies in the electricity sector

Since the early 2010s, cross-subsidies in the power industry have been a significant element of Russia's policy discourse on the energy sector. Several factors can facilitate further reform targeting the gradual phase-out of these subsidies:

- **Support for cross-subsidy reform among government stakeholders and key consumer groups.** Key ministries and regulatory authorities have acknowledged the need to phase out social cross-subsidies gradually. An argument resonating broadly within the government relates to the impact of the current setup on the business climate in the country. Namely, commercial consumers and SMEs have been bearing a significant part of the cost of social cross-subsidies. Industrial consumers, particularly in energy-intensive sectors such as aluminum, have been actively advocating for the phasing out of cross-subsidies.[148] Additional arguments have focused on the negative impact of these subsidies on industrial growth, keeping low inflation (due to upward pressure on energy-intensive sector goods), regional government budgets,[149] and developing a more competitive retail market.[150] Also, the Russian government recognizes the untargeted nature of social subsidies as a problem, particularly in the special category of consumers receiving further discounts. Many of these consumers appear among those with the highest income.[151] A gradual phase-out of cross-subsidies in the power sector has been incorporated as a significant objective in the official energy strategy through 2035.
- **Reforming electricity cross-subsidies in a liberalized market.** The power sector has already undergone a comprehensive market reform during the 2000s. While there are remaining challenges to be addressed, the sector has in principle been liberalized. Unlike in the gas industry, where the incompatible interests of key players have contributed to a stalemate in tariff reform, disagreements within the power industry present a significant obstacle to social cross-subsidy reform. While subsidy reform may benefit from additional sets of reforms in the power industry, there is a wide scope for successfully concentrating the government's efforts on cross-subsidies reform.
- **Surplus generation capacity as a potential factor in tariff reform.** Due to overly optimistic forecasts on electricity demand during the 2000s and a series of "capacity delivery agreements" signed with investors, Russia ended up with surplus capacity in power generation.[152] This has put downward

pressure on unregulated wholesale electricity prices and can be considered a positive development. It helps reduce the gap between these prices and subsidized residential prices. Russia's Energy Strategy 2035 predicts that electricity demand will continue to grow: compared to 2018, it will be 10.9 to 21.3 percent higher in 2035, indicating that if the current surplus provides any opportunities, they could be temporary.[153]

- **Cross-subsidy reform as an incentive to streamline costs in the grid companies.** Current tariff regulation on grids has provided limited incentives for grid companies to cut costs. Meanwhile, a number of analysts have pointed out the notably strong financial results of the main operator of the country's electricity grids, Rosseti, indicating potential savings for consumers through an adjustment in tariffs.[154] New principles to regulate grid tariffs, such as establishing benchmark reference costs that correspond to best practice, could help incentivize cost reduction.[155] The government's objective in reforming cross-subsidies can incentivize additional measures to reduce costs in the transmission and distribution sector.

There is a set of factors that have remained as a constraint for reforming social cross-subsidies in the power industry:

- **The government's guarded approach amid a lack of consensus on the scope of subsidy reform.** Even though government officials have widely recognized the need to phase out social cross-subsidies, they have maintained a guarded approach towards raising residential tariffs. President Putin has long considered cross-subsidies in the power industry as a problem to be addressed, prompting government officials to come up with alternative reform plans. However, the president has emphasized that the reform should not lead to an "excessive" increase in tariffs for the population.[156] Series of government proposals to reform the problem of social cross-subsidies indicate a clear lack of a consensus on the scope of reform. Regarding the pace of reform, there is a general preference for adopting a relatively slow approach, though government officials have continued to disagree on the timeline. Recognizing the complex political and economic dynamics on cross-subsidies reform, FAS has projected it could take up to 20 years to liquidate subsidies.[157]
- **Inadequate design of subsidy reform as a constraint.** The Russian government launched a pilot project in six regions to implement a "social consumption norm" between 2012 and 2015. The project established a "social norm" concerning electricity consumption for households, whereby households consuming above a predetermined limit were required to pay more. However, the pilot project failed to meet its objective and was eventually suspended. The underlying problem was the inadequate design of the reform itself. The pilot project did not consider numerous factors that could affect household consumption. It did not include measures (such as assistance for improving energy efficiency) that could have helped affected households cope with increased electricity prices.[158] While this trial did not yield the expected result, it has been a significant lesson for the Russian leadership about the limitations of simple solutions to subsidy reform.
- **Limited fiscal incentive for the government to remove social cross-subsidies.** The government does not bear high costs due to cross-subsidization in the power industry. The costs are borne mainly by industrial and commercial consumers and SMEs. The government's main costs appear in the form of foregone VAT revenues associated with pricing electricity for residential consumers below market prices. Thus, there is some scope for raising more revenues for the budget, albeit to a limited degree. The limited burden on the state budget has contributed to the government's guarded approach to electricity tariff reform.
- **Weak public support for reforming electricity tariffs.** Russian households have been the main beneficiaries of the cross-subsidies. Focus group respondents have indicated a considerable lack of awareness of the presence and extent of electricity subsidies, and an almost complete lack of knowledge on who bears the subsidy costs. It is possible to suggest that this is partly due to the complexity

and the lack of transparency of the mechanism for cross-subsidies. Furthermore, respondents have expressed a lack of support for raising electricity tariffs, a result supported by a survey by VCIOM conducted in 2020. According to the survey, 69 percent of respondents were opposed to paying higher electricity prices. In comparison, 11 percent and 9 percent were willing to pay up to 5 percent and up to 15 percent more, respectively.[159]

- **Constraints related to households.** Weak affordability to pay higher rates for electricity among low-income groups poses a major constraint. While the problem could be overcome through targeted subsidies, focus group discussions indicate that support for formally liquidating cross-subsidies is limited due to weak public trust. There are also technological constraints that might be shaping public attitudes to subsidy reform. These are the slow progress in improving residential energy efficiency and the limited penetration of smart meters among Russian households.

Summary: Electricity subsidies and tariff reform

Consumer subsidies for electricity remain as the legacy of a government approach to support the Russian public amidst rising poverty and economic turbulence during the 1990s. Despite notable progress in liberalizing the power industry, subsidies for residential consumers have remained. These subsidies transpire in the form of regulated contracts and network tariffs for residential consumers, which ensure they pay comparatively low prices. The cost is born primarily by industrial and commercial consumers and SMEs paying the highest electricity prices.

The Russian government has undertaken numerous efforts to reform cross-subsidies in the power industry. Several proposals from government agencies, some of them never approved, have centered on redistributing the burden of these subsidies rather than phasing them out. Also, there have been efforts to make these subsidies better targeted for households. Failed progress with such efforts has revealed the need to develop a thorough methodology for successful implementation, highlighting the significance of a proper reform design. Russian officials have come up with additional proposals to improve transparency regarding cross-subsidies while also encouraging cost-cutting among electricity grid companies and retail service providers. While proceeding with caution, the Russian government has prioritized establishing a longer-term schedule for a gradual but steady increase in residential tariffs. Key constraints for electricity tariff reform include the government's preference for raising residential tariffs very slowly, a general lack of consensus on the scope of reform, relatively weak financial incentives for the government to phase out electricity subsidies for residential consumers, and the general lack of public support for tariff reform.

There is significant scope to launch reforms that would ultimately eliminate untargeted cross-subsidies for consumers. There is a broad understanding with the government about the need for reform. Key consumer groups that have borne the cost of subsidies (see Chapter 3) have also been active in advocating reform. Furthermore, it is a significant advantage that Russia's power sector has essentially been liberalized. Unlike in gas, where market players have contributed to a stalemate in tariff reform, this does not appear to be the case in the power industry.

Focus group analysis of consumers' approach to energy tariffs, subsidies, and subsidy reform

This analysis in this chapter has benefited from four focus group discussions to better understand public perceptions as a potential factor in energy subsidy reform. The group discussions were conducted live online in April 2021 through a reputable Russian public opinion agency. The focus groups were established to examine perceptions on energy, namely electricity and gas. Respondents were also asked questions about additional services such as heat, waste management, and municipal services. The groups were formed in three selected regions: Moscow, Ivanovo, and Neberezhnye Chelny (Tatarstan). In Neberezhnye Chelny, two separate group discussions were distinguished by income level. All groups incorporated significant variety in terms of gender, type of dwelling, household size, level of education, quantity, type of energy use, and eligibility to social assistance. Apart from offering valuable insights about public perceptions, the focus group analysis has provided promising results to conduct a nationwide public survey to further explore key barriers and solutions for effective subsidy reforms.

The focus group discussions on energy tariffs and subsidy reform offered insightful results in several areas:

- **Perceptions on quality of service.** The discussions revealed a considerable lack of public discontent regarding the quality of gas and electricity services. Any significant complaints were related primarily to other services such as waste management or maintenance of apartment buildings. The absence of alternative energy service providers due to a lack of competition was mentioned among key areas for improvement. Incidentally, respondents with the lowest income demonstrated the highest level of satisfaction with energy services. The overall high degree of public satisfaction with gas and electricity services significantly contrasts with certain other developing countries where the World Bank has engaged in subsidy reform.[160] Existing studies have revealed that public perceptions of subsidy reform can be improved if the reform is accompanied by a significant improvement in the quality of services.[161] This incentive appears to be lacking in Russia's case.
- **Public perceptions of gas and electricity tariffs.** While all respondents appeared well-informed about the amount they paid for electricity and gas, the prevalent tendency was to view current prices as excessive and unfair. This perception appears to be driven by: expectations about low-priced energy due to Russia's abundant energy resources; beliefs that energy tariffs have risen faster than salaries; and memories of relatively underpriced energy in the past. The primary discontent regarding energy prices, however, appeared to be related to the provision of heat services rather than gas and electricity. Heat consistently ranked as the one utility for which households paid the most. By contrast, many respondents recorded the smallest energy-related expenses on gas. Additionally, it is possible to refer to widely-shared expectations that utility prices would continue to rise in the near future.
- **Public awareness of subsidies.** The group discussions have revealed a near-complete lack of awareness of a subsidy component in the final price of electricity and gas. Many respondents questioned the definition of a subsidy, suggesting that lower-priced energy services could not be defined as a subsidy in the context of an energy resources-rich country. Provided with several options (government, energy companies, industrial/commercial consumers) and asked to identify who bears the actual cost of the subsidy for residential consumers at present, the government was selected as a common choice. High-income group respondents were only relatively better able to identify industrial/commercial consumers as the chief player paying for the cost of subsidies. When told that subsidies are borne mainly by industrial/commercial consumers and asked whether/how this could change, respondents were divided. Some of them favored the status quo, while others thought the government should step in and pay for the subsidies instead of industrial/commercial consumers, as the latter had the option to reflect the cost of the subsidy in the price of their products.
- **Options for subsidy reform.** Faced with multiple options for reform versus maintaining the status quo, focus group respondents overwhelmingly supported the latter. When the status quo was no longer an option, they were provided four reform alternatives in exchange for removing subsidies: (a) expanding government services for the public, (b) compensating low-income households, (c) receiving government support in improving residential energy efficiency, and (d) arranging tariffs based on the amount of consumption so that households consuming low volumes get a further price discount, while high-volume-consuming households face tariff increases. Responses were notably lukewarm to the possibility of having the government commit to providing more services and helping with energy efficiency improvements. To endorse these options, respondents needed more specific government commitments (such as the amount of energy subsidy support or eligible appliances). The option which appeared to receive the most support was adjusting tariffs based on the amount of consumption. Lower-income respondents were clearly more supportive than their high-income peers in the same region. However, some of them

expressed unease over the definition of eligibility. Others noted that low-income families already get allowances from the state for communal services. Thus, they needed more clarity about the eligibility of households should the government opt to develop a new mechanism that specifically targets energy expenses.

- **Response to an increase in tariffs following subsidy reform.** The potential reaction of focus group members to tariff increases appeared to present a wide spectrum with no single option as the preferred choice. Potential reactions included cutting energy consumption, cutting other expenses, stopping paying bills, joining protests against subsidy reform, and supporting political candidates who oppose tariff increases.
- **Trust in government to successfully implement subsidy reform.** Responses from focus group members indicate a significant lack of trust in government to implement subsidy reform. For example, many thought that an approach that targets households based on their income level might not be implemented successfully because of questions about eligibility and an alleged track record of the government not committing to its promises.
- **Perceptions of what drives subsidy reform.** Focus group respondents demonstrated a high degree of skepticism about potential motives for the Russian government to launch subsidy reform. Skepticism related to assertions that the government aimed to help businesses, help improve public welfare, and address climate change concerns. A few respondents thought that further raising the profits of service-providing companies might constitute the actual motive behind potential subsidy reform. Finally, many respondents considered the government's real motive to be about raising further tax revenues through higher prices for energy and communal services.

Pathways to energy subsidy reform

There are multiple pathways to reforming subsidies for oil, gas, and electricity. Each pathway differs in terms of its scope and complexity. Each alternative path also faces a different level of political economy constraints and varies in its broader potential implications. Thus, there is a trade-off between choosing an approach that favors modest reform and setting objectives for a more comprehensive set of reforms. Reforms that are modest in scope may face fewer constraints, albeit not necessarily always being effective. Comprehensive reforms can be more effective; however, they affect the interests of a broader set of stakeholders, which can impede progress.

Essentially, there are four fundamental choices the Russian governments will need to consider in pursuing energy subsidy reform. The choices begin with a modest approach to reform and progressively touch on a broader spectrum of policy areas. The combination of these choices delivers multiple pathways for reform:

- **Phasing out subsidies or redistributing the burden.** The first choice is between policies that eliminate subsidies and merely redistribute their burden. So far, multiple proposals by the Russian government have been geared towards redistributing the burden of subsidization among key players rather than phasing it out. While the approach does not help end subsidization, it has also proven to face considerable limitations due to resistance by potentially affected players.
- **Simple tariff reform or comprehensive tariff reform.** Another fundamental choice centers on the scope of reforming tariff formation. The simpler approach is to enact policies that gradually raise subsidized energy prices. The alternative is to accompany an increase in energy prices with additional reforms directly related to establishing compensation mechanisms, as discussed in Chapters 2 and 3 of this Report. One could also refer to "institutional" reforms, such as enhancing the autonomy of regulatory agencies and building administrative capacity for delivering well-targeted targeted support to the public. Such reforms could be supported further by "informational" reforms that aim to enhance transparency about the prevalent subsidy mechanisms and raise public awareness about the presence and extent of these subsidies.
- **Subsidy reform in isolation or comprehensive gas/oil/power market reform.** A simple approach to subsidy reform focuses only on bringing subsidized prices to the market level. Many proposals in Russia have centered on the extent of indexation of

regulated energy prices to inflation. The objective has been to ensure a gradual reduction in the gap between subsidized prices and market prices. The more complex approach is to consider a series of reforms in the respective energy market that aim to address broader problems affecting the functioning of the market. Such reforms aim to enhance competition where possible, create a level playing field, and reduce costs in the longer run. A simpler option subsidy reform in isolation may not always be feasible if key market players bring conditionalities for further reform, as has been the case in the Russian gas sector.

- **Energy sector/subsidy reform or a broader package of reforms.** The scope of reform can also vary in targeting the energy sector alone or as part of a broader set of policy area reforms. As shown in Chapters 2 and 3 of this report, reforming subsidies can benefit from additional policy measures, such as compensating vulnerable consumers, poor regions, or energy-intensive industries. A comprehensive policy would target a rather extensive field by addressing immediate and longer-term concerns about social inequality, improvement in energy efficiency, sustainable growth and climate mitigation, and enhancing the economic competitiveness of key sectors of the economy.

Conclusion

Russia's experience with subsidy reform over the past two decades highlights some key areas for consideration:

- **Focus on proposals that gradually eliminate cross-subsidies instead of redistributing the burden.** Redistributing the burden of a subsidy can often appear to be an appealing policy option. However, this approach only helps to delay actual reforms. It generates new sets of challenges for affected stakeholders. New redistribution patterns can become entrenched and hard to reverse.
- **Comprehensive tariff reform is more likely to be effective than simple tariff increases.** Supplementing policy initiatives to raise regulated prices for residential consumers with additional institutional and informational reforms can ensure a stable and effective tariff policy. For example, consumers can be provided with utility (gas, electricity) bills that include a breakdown of the charges and indicate the extent of the subsidy in the final price. Improving awareness about who bears the actual burden of the subsidy can help address misconceptions and potentially enhance public support for reform.
- **Subsidy reform is more likely to succeed if accompanied by additional power/gas market reforms.** There is a wide set of sectoral reforms that can accompany subsidy reform. Progress in each of them can facilitate finding a lasting solution for energy subsidies. As outlined below, further reforms in both the power and gas sector can help accomplish effective subsidy reform.
- **Promote additional reforms in the power sector.** While the power market has been largely liberalized, many remaining issues constrain the scope for tariff reform. Promoting wider competition, encouraging more private companies to participate in power generation, fostering greater competition in the retail sector, and making it easier to choose suppliers could constitute significant steps. Other areas for reform include measures aimed at improving the transparency of grid tariffs and establishing benchmarks for grid companies' expenditures to encourage lower costs.
- **Promote additional reforms in the gas market.** The two-tier market that has evolved in Russia's gas industry has given rise to largely incompatible interests between Gazprom and independent gas producers. There is no easy way to break the stalemate that has emerged between these players. Yet, moving forward with tariff reform necessitates the government to strike a new balance among its interests. Additional reforms that will accompany gas tariff reform can help address the multiple concerns of key market players. They can also facilitate the establishment of a level playing field in the gas market, and ultimately, assist with the removal of price distortions. Initial steps could include improved transparency regarding Gazprom's gas transportation tariffs in exchange for deregulating its industrial prices. Unbundling of transportation services could be considered as a subsequent measure. Comprehensive reform of the gas sector will necessitate incremental steps that consider

affordability for consumers, the sector's investment needs to meet potential growth in export demand, seasonal peak demand at home, and the government's targets for further gasification of the country. Expanding the effectiveness of SPIMEX as a platform for trading gas can also help build a better functioning gas market.

- **Promote policies that help gas/electricity consumers.** Past pilot projects for establishing a "social consumption norm" for electricity have revealed the need to develop a thorough methodology, one that is based on a larger number of parameters that help better identify consumers who need support. Expanding peak-load electricity pricing and smart meters can also assist cost-conscious consumers in lowering their bills. Consumers can be provided with assistance for installing smart meters. While establishing a targeted approach to subsidies, the government can also put more effort into advancing the administrative capacity of regional authorities in the provision of targeted allowances. Introducing seasonality in gas pricing for residential consumers can also help strike a better balance between the interests of these consumers and the gas industry.
- **Promote additional reforms affecting the pricing of petroleum products.** The Russian government has taken steps to gradually transition towards an oil tax regime that targets profits rather than gross revenues. While it is important to remain on the chosen path, the government may need to focus on improving its administrative capacity to enforce profit-based taxation. Unlike in Russia, where the Ministry of Finance retains an overwhelming role in enforcing the oil tax regime, a common practice in countries with a profit-based tax regime has been for finance ministries to share certain tax responsibilities with other ministries (such as the Ministry of Energy) that maintain expertise in areas such as geology and engineering.[162] Additionally, the Russian government can find it helpful to review its approach to supporting an oversized refining sector that includes many geographically mislocated refineries. Establishing clarity about the optimal amount of refinery throughput that Russia can provide as a whole would be helpful. The government's more recent mechanisms, such as negative excises taxes and damping, would benefit from greater predictability to allow refineries to establish longer-term development plans. In addition, the government can establish a clear schedule for entirely phasing out such subsidies, setting a credible target for the refining industry to adapt. Finally, low taxes on the consumption of petroleum products provide significant scope to collect more revenues for the budget while helping to build a mechanism that provides more room for maneuvering in response to fluctuations in international oil prices.
- **A comprehensive approach to economic reforms could be a factor facilitating subsidy reform.** The Russian government has multiple tools at its disposal to facilitate progress in subsidy reform. Some of these tools, such as assistance with energy efficiency and a targeted approach to providing social assistance, can help stakeholders negatively affected by tariff increases. Other tools can help align subsidy reform with broader and longer-term policy objectives of the government. While each of these tools exists and has been experimented with in Russia, incorporating them in a broader strategy can help secure a more successful approach to subsidy reform. For instance, the policy agenda on energy efficiency can be integrated into the policy discourse on energy subsidies, identifying clear targets for each area.
- **Identify the place for subsidy reform in building a modern economy.** Persistent energy subsidies constitute one of Russia's multiple structural challenges. Overcoming these challenges is critical to building a modern economy and achieving a higher growth rate. A reform strategy targeting subsidies would benefit from establishing a better understanding of its place in building a modern economy, one that is more likely to respond effectively to global competition and global challenges such as climate change.
- **Develop an effective communication strategy to gain public trust and support for tariff reform.** In broadest terms, it is possible to suggest that the Russian public remains reluctant to support tariff reform that increases energy prices. This reaction

is driven mainly by widespread perceptions that Russia's energy prices remain relatively high. Also, unlike in many counties where energy subsidies for consumers remain widespread, Russian consumers do not perceive significant problems with respect to the quality of energy services they receive. Furthermore, there is a considerable lack of trust in the government's ability to develop mechanisms that could adequately compensate significantly affected households. More attention can be given to extensive public surveys that reveal key factors shaping public perception on what constitutes a fair energy tariff in Russia's context. Such surveys should also aim to improve the understanding of the key aspects of subsidy reform that might appeal to the public and identify policies and means that can help build trust in government. These steps could form the basis of an effective communication strategy that would help the government gain public trust in its ability to accomplish tariff reform, both fairly and effectively.

- **Develop a "change management" strategy to facilitate tariff reform.** Implementing effective energy subsidy reform in Russia can benefit from developing a robust "change management" strategy. Such a strategy would entail multiple elements such as: establishing clarity on the intended process of change by defining the problems to solve, potential sequencing and levers of change; maintaining effective intra-governmental communications to bring key ministries and agencies on board, and identifying tools and techniques to help build support for the proposed reforms.
- **Establish an agreed methodology for estimating the size of subsidies.** Key government stakeholders in Russia have come up with distinct accounts about the extent of energy subsidies. Developing a common methodology can facilitate building a collective understanding of the precise burden of the subsidy and potentially assist in finding acceptable solutions. In addition, efforts to build such a methodology could benefit from further transparency regarding gas and electricity company costs through improved accounting and reporting requirements, among other measures.
- **Incorporate subsidy reform as a national priority.** For over two decades, there has been a tendency to incorporate key economic and social priorities in strategic and economic programs. Most recently, the Russian government has outlined a wide range of policy priorities in 13 national projects announced for the 2018–24 period. Incorporating energy subsidy reform in a strategic document can spur Russian institutions to enact and implement key measures that could assist subsidy reform.

Notes

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[7] Kudrin and Gurvich (2015).
[8] See https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=RU.
[9] Dudlak (2018).
[10] See Statistical Review of World Energy 2021, British Petroleum. https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/statistical-review/bp-stats-review-2021-full-report.pdf
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[21] See http://government.ru/en/docs/39847./
[22] RBC Daily (2019b).
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[40] National Energy Security Fund. 2019, 35.
[41] Ibid, 39.
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[43] Yermakov (2018).
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[60] SPIMEX (2021).
[61] Talipova, Parsegov, and Tukpetov (2019).
[62] SPIMEX (2020).
[63] Feygin and Belogorev (2018).
[64] National Energy Security Fund (2019), 43.
[65] See RF Government Decree No 1523 at http://static.government.ru/media/files/w4sigFOiDjGVDYT4IgsApssm6mZRb7wx.pdf.
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[69] Henderson and Mitrova (2017), 15.
[70] Belogorev (2018).
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[109] Ezhov and Tyrtov (2018).
[110] Letova et al. (2018).
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