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CONFERENCE REPORT

CR 2009-16 September 2009

Russia: The Impact of Climate Change to 2030
Geopolitical Implications

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Russia: The Impact of Climate Change to 2030: Geopolitical Implications

Prepared jointly by

CENTRA Technology, Inc., and Scitor Corporation

The National Intelligence Council sponsors workshops and research with nongovernmental experts to gain knowledge and insight and to sharpen debate on critical issues. The views expressed in this report do not reflect official US Government positions.

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Scope Note

Following the publication in 2008 of the National Intelligence Assessment on the National Security Implications of Global Climate Change to 2030, the National Intelligence Council (NIC) embarked on a research effort to explore in greater detail the national security implications of climate change in six countries/regions of the world: India, China, Russia, North Africa, Mexico and the Caribbean, and Southeast Asia and the Pacific Island States. For each country/region we have adopted a three-phase approach.

- In the first phase, contracted research explores the latest scientific findings on the impact of climate change in the specific region/country. For Russia, the Phase I effort was published as a NIC Special Report: ***Russia: Impact of Climate Change to 2030, A Commissioned Research Report*** (NIC 2009-04, April 2009).
- In the second phase, a workshop or conference composed of experts from outside the Intelligence Community (IC) determines if anticipated changes from the effects of climate change will force inter- and intra-state migrations, cause economic hardship, or result in increased social tensions or state instability within the country/region. This report is the result of the Phase II effort for Russia.
- In the final phase, the NIC Long-Range Analysis Unit (LRAU) will lead an IC effort to identify and summarize for the policy community the anticipate impact on US national security.

In April of 2009, a group of regional experts convened to explore the sociopolitical challenges, civil and key interest group responses, government responses, and regional and geopolitical implications of climate change on Russia through 2030. The group of outside experts consisted of social scientists, economists, and political scientists. While the targeted time frame of the analysis was out to 2030, the perceptions of decisionmakers in 2030 will be colored by expectations about the relative severity of climate changes projected later in the century. The participants accordingly considered climate impacts beyond 2030 where appropriate.

This work is being delivered under the Global Climate Change Research Program contract with the CIA's Office of the Chief Scientists.

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Executive Summary

The National Intelligence Council-sponsored workshop entitled *The Implications of Global Climate Change in Russia*, held on May 18, 2009, brought together a panel of Russia experts to consider the probable effects of climate change on Russia from a social, political, and economic perspective. **The panelists concluded that Russia is reaching a point where serious deterioration of its physical and human capital is a major obstacle to sustainable economic growth and Russia's capacity to adapt and protect its people will be tested out to 2030. Climate change will add additional stress to energy and transportation infrastructure burdens.** However, given Russia's high overall state capacity and the mixed or comparatively tolerable nature of most anticipated climate change impacts over the next twenty years, climate change is unlikely to lead to a general failure of the Russian state.

Energy is the most important determinant of Russia's economic future and state capacity and climate change will have significant direct and indirect impacts on the energy sector.

- Russia's economy is vulnerable to the uncertain effects of climate change and international climate change mitigation policies that may reduce world oil and gas prices.
- Russia will need to make massive investments in its oil and gas infrastructure, including upgrades to existing infrastructure and development of new resources. Climate change will add to the cost and technical difficulty of these projects.
- Climate change-induced effects such as permafrost melting will pose a serious threat to Russia's pipelines and other aging energy and transportation infrastructure, which is already in need of replacement.

Russia has attributes that provide it with a greater capacity to respond to the negative effects of climate change than some industrialized countries and most underdeveloped ones. The state has robust capacities in areas such as analysis and forecasting, and emergency response. Russia retains, even if aging, significant Soviet-era industrial infrastructure. The population is accustomed to privation and has developed informal networks to address shortfalls in government-provided services and resources. Demand for oil and gas in Asia will keep Russia's energy revenues, and therefore state resources, at high levels through 2030.

Russia nevertheless faces limitations that may inhibit an effective response to climate change.

- Centralization of power has diminished the capacities of local and regional governments, the normal first responders to climate change-induced challenges.
- The state prioritizes development and security with little regard for environmental issues, and a significant proportion of the leadership voices the view that a warming climate is a net benefit for Russia. Energy infrastructure demands will divert resources away from climate change adaptation and mitigation.

- Civil society—the ability for citizens to mobilize through NGOs and interest groups—is underdeveloped and civil responses to climate change, such as ecological movements, face state repression.

The considerable variation in the negative effects of climate change across the vast Russian territory also will challenge the central government’s ability to respond.

While climate modeling cannot reliably identify the specific effects of climate change at a local level, existing data provides insights into climatic challenges that may become most prominent in Russia’s different regions.

- Melting of the Arctic permafrost threatens to undermine urban, industrial, and transportation infrastructure across northern Russia and its primary agricultural regions may face severe stress from water shortages, temperature increases, and shifts in crop zones.
- Russia will face major internal and cross-border migration, mainly into its cities, which may increase ethnic tensions. Conversely, the expected decline in the working-age population may reduce competition for employment and resources.

Russia will also face climate change-induced challenges originating outside its borders as climate change will increase competition for resources and population pressures along Russia’s periphery, particularly in Central and East Asia and the Caucasus. Climatic pressures may drive migration into Russia, and the influx of migrants could stimulate xenophobia and ethnic violence.

Despite the many challenges, climate change will generate a number of benefits in some parts of Russia.

- Russia will have more water overall, which benefits hydroelectric potential, irrigation, and urban water supply.
- Warming will reduce energy demand for heating, and allow agriculture and settlement in currently inhospitable northern areas of Russia.
- Melting of the Arctic ice pack will open shipping routes along Russia’s northern coast and allow access to previously inaccessible Arctic energy resources.

At Copenhagen, Moscow’s probable overarching strategy will be to leave the contentious negotiations to the United States, China, India, and the European Union. Moscow will look to take full advantage of the United States’ interest in brokering deals with India and China, and will take every opportunity to extract favorable concessions. Moscow may try to position itself as an important swing player and broker between the West and the developing world.

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Background and Introduction¹

The Russian Federation is already experiencing the impacts of climate change in the form of milder winters, melting permafrost, changing precipitation patterns, the spread of disease, and increased incidence of drought, flooding, and other extreme weather events. Many of these observed climate impacts are having concrete, negative effects on Russians' quality of life. By 2030, Russia will start to feel the impacts of climate change in relation to both water and food supply. Nonetheless, a significant proportion of the country's senior leaders continue to voice the view that a warming climate is a net benefit for Russia. Although Russia has a number of attributes that provide a greater capacity for resilience² in response to the negative effects of climate change than some other industrialized countries and most developing countries, as the impacts of the change continue and intensify over the coming years, Russia's capacity to adapt and protect its people will be severely tested.

The most important impacts of climate change in Russia will likely include the following:

- **Energy.** A warming climate holds the possibility of milder and shorter heating seasons, which in turn may lead to reduced energy demand. Increased water availability—particularly along those Siberian rivers that are used for hydroelectric power—should result in increased power production in certain parts of the country. On the other hand, existing and future energy infrastructure for the all-important petroleum industry will experience more pronounced challenges, including structural subsidence; risks associated with river crossings; and construction difficulties as permafrost thaws earlier and deeper, impeding the construction of vital new production areas. These challenges have the potential for a material, negative impact on the single greatest source of revenue to the Russian state—the oil and gas industry.
- **Water.** Many parts of Russia's immense territory will experience increases in the availability of water, including much of Siberia, the Far North, and northwestern Russia. This change will bring certain positive impacts, including for hydroelectricity generation. Nevertheless, managing the increased flows will pose other problems, especially when these increases coincide with extreme weather events such as downpours or springtime, ice-clogged floods. In addition, increasing water shortages are predicted for southern parts of European Russia, areas that already experience significant socioeconomic and sociopolitical stress. Moreover, a number of densely populated Russian regions that are already subject to water shortages are expected to face even more pronounced difficulties in decades to come.
- **Agriculture.** As growing seasons become longer and precipitation patterns change, it will become possible to cultivate northern lands that previously were too cold for agricultural purposes. It may also become possible to raise new crops and new crop

¹ This section is extracted from the Executive Summary of the Phase I report (see Scope Note): ***Russia: Impact of Climate Change to 2030, A Commissioned Research Report*** (NIC 2009-04, April 2009). Some of the judgments in this report (Phase II) may differ from the Phase I report.

² See the Phase I report, p. 35 for a discussion of adaptation and resilience capacity.

varieties. A changing climate may nevertheless prove inhospitable to expanded agriculture, as whether longer growing seasons and warmer agricultural lands will result in increased yields of new or existing crops remains to be seen. Moreover, agriculture will become more reliant on irrigation (especially in the southern parts of European Russia), pesticides and herbicides, and more vulnerable to droughts and other extreme weather.

- **Migration.** Russia, which is already the top choice for immigrants after the United States, is likely to experience greater migration pressure from Central Asia, the Caucasus countries, Mongolia, and northeastern China.³ The latter areas are expected to experience increased water shortages and resulting economic stress. In addition, internal migration pressures may occur as residents of Russia's many northern cities face increasing economic and climate-related challenges.
- **Accentuation of existing socioeconomic and sociopolitical stresses.** Russia is better equipped to deal with the impacts of climate change than many of its neighbors. Nonetheless, by 2030, climate change appears likely to accentuate some of the stresses that currently plague Russia. Some of the most affected regions already feature attenuated and unsettled socioeconomic and sociopolitical situations and most of the impacts of climate change will manifest themselves in smaller cities and in the Russian countryside. For example, the long-turbulent North Caucasus region will be drier, hotter, and less prosperous than it is today. Primorskiy Kray and the Russian Far East, which have long struggled to develop peacefully next to China, appear likely to experience even greater migration pressures, which could exacerbate longstanding cross-border tensions.

³ Data as of 2005; see Migration Policy Institute:
<http://www.migrationinformation.org/DataHub/charts/6.1.shtml>; viewed 23 Sep 2009

Social, Political, and Economic Challenges

Regional Challenges

Predicting the economic, social, and political impacts of climate change across the vast territory of Russia is difficult because of the lack of micro-level climate change modeling. Affects that may appear moderate when averaged out over such a large area may in fact produce extremely intense problems at the local level that may exert disproportionate destabilizing influence. Existing data nonetheless can at least be used to identify those climatic challenges that may potentially become most prominent in Russia's different regions.

Northern European Russia. The principal climate change-induced challenges facing Russia's northwest appear to be permafrost melting, which threatens to undermine urban, industrial, and transportation infrastructure, and flooding, both along the coast because of sea-level rise and along rivers due to increased river flows. Major urban centers and ports such as St. Petersburg and Murmansk will face significant risks of flooding from extreme weather events.

Southern European Russia. Russia's traditional "breadbasket" region will face serious agricultural challenges as a result of drying and warming. Crop zones may shift and rural communities will face increased stress because of water shortages and possibly increased ethnic tensions. Considerable internal migration and migration from Russia's more severely affected southern neighbors may occur. Sea-level rise will be a long-term problem along the Black Sea coast.

The North Caucasus. One of the poorest and most ethnically diverse areas of Russia, the North Caucasus is expected to become even hotter and drier. Already high unemployment rates will most likely grow, increasing the region's volatility and further pressuring internal economic migration to elsewhere in the Russian Federation.

Siberia. The most disruptive climate change impact in Siberia may be the large-scale melting of the permafrost, with attendant disruption to infrastructure. River basins will face a greater risk of flooding and the region will probably see significant migration from Central Asia.

The Russian Far East. Eastern Siberia and the Far East will become wetter, with risks of coastal and river flooding, particularly along the Lena River. The region may be the target of major Russian energy infrastructure expansion, which will be complicated by permafrost melting. Migration from Northeastern China will also probably continue, creating the possibility of a demographic sea change.

Overall Economic Challenges

The classic factors of economic growth for any country are the quantity and mainly the quality of its physical and human capital and the rate of technological change. So far in its transition from central planning to the market, post-Soviet Russia has been able to exploit its inheritance of physical and human capital. But this Soviet-era legacy is now reaching a point where serious deterioration of Russia's physical and human capital is a major obstacle to sustainable economic growth. It is almost certain that Russia will not

be able to solve these economic challenges by 2030 and although it can survive and even prosper in the short to medium term without seriously addressing these challenges, by 2030 the costs of managing the annual impact of the physical and human capital deficiencies will be a major burden on Russia's economy.

In addition, Russia already faces a geographic challenge to its economic cohesiveness. If looked at in terms of "effective national territory"—defined as those parts of a state that contribute to the national economy at a level greater than that relative to its population—Russia resembles an archipelago of urban, economically dynamic islands amidst an ocean of vast, relatively undeveloped geographical space. Its effective national territory forms an "economic spine" that supports the rest of the country economically and strategically.

Moreover, the wealth that is largely generated by extractive industries across Russia's vast territory is concentrated in large state-sponsored monopolies in Moscow. Local populations and regional governments receive very little of their industries' profits and have very little say in corporate decisionmaking. This geographic disconnect encourages Russian industries to treat the resource areas they exploit and their inhabitants as disposable. It also removes industrialists from the proximate effects and impacts of climate change and gives them little incentive to be responsive in terms of adopting mitigation measures, leaving it instead to the under-resourced local governments.

Energy Challenges

Climate change has the potential for a material, negative impact on the single-greatest source of revenue to the Russian state—the oil and gas industry. In some respects, however, the effects of change may prove positive, such as in reduced energy consumption for heating, a major source of energy demand in Russia. Increased river flows may boost hydroelectric potential, and arctic melting may allow exploitation of previously inaccessible subsea hydrocarbon deposits.

The energy sector, particularly the revenue derived from hydrocarbon exports, is the most important factor that will affect Russia's near, mid-, and long-term future.⁴ The market value of Russia's oil and gas resources—its resource rent—is primarily a function of how much Russia is able to produce and world market prices. Oil and gas rents are and will remain a far more important driver of Russian politics, economics, and foreign policy than climate change.

Although climate change will directly affect the production and transportation arenas of Russia's energy sector, the effect this will have in turn on resource rents is unclear. It does not follow that production levels or rents will fall because the total volume of Russia's oil and gas rents depends much more on price than on quantity. Between 1996 and 2007, the volume of oil produced increased by 63 percent. Nevertheless, price increases accounted for around 84 percent of total oil rent growth, while volume increase accounted for only 16 percent.

While production levels of oil and gas may slip in the years ahead as a result of climate change-induced impacts on energy infrastructure, the key question is how climate change may affect oil and gas prices, which have historically been more volatile than production

⁴ Andrew C. Kuchins, *Alternative Futures of Russia to 2017* (Washington DC: Center for Strategic and International Studies, December 2007).

levels. Presumably global supply of and demand for oil and gas—the fundamental determinants of price—will be affected by climate change, although the magnitude and direction of these effects could be quite uncertain. In addition, the global response to climate change will have a huge but still-indeterminate impact on demand for energy, particularly in light of decisions of the major economic powers regarding a move away from fossil fuels.

Oil and Gas Infrastructure and Development Challenges. The bulk of Russia’s energy extraction infrastructure dates back to the Soviet period and therefore Russia was able to unleash tremendous excess capacity—and realize windfall revenues over the past decade—by applying more up-to-date techniques to the inefficient and wasteful legacy infrastructure. The gains in efficiency from this so-called “brownfield miracle” have now largely run their course, production levels—for example in Western Siberian oil and gas fields—are waning, and Russia will need to turn principally to “greenfield” development of new energy sources to keep production up. Many of the potential greenfield sources are in remote and exceptionally harsh locations in Russia’s far northern and eastern regions. Vast new transportation infrastructure will be needed even to reach these areas, let alone transport the extracted energy to customers. Oil and gas extraction present roughly equivalent technical challenges and costs, and deposits are located in equally difficult geographic regions of Russia. Climatic challenges will further complicate this development, as permafrost melting and more volatile weather will impede access to and construction of vital new production areas.

In addition, Russia will face huge replacement costs for its Soviet infrastructure on top of the costs associated with new energy development. Climate change-induced effects, particularly permafrost melting, again are likely to add even more to these expenses because the Soviet-era infrastructure was built on the permafrost and designed accordingly—as the permafrost thaws earlier and deeper it will cause structural subsidence and force the replacement of a considerable amount of infrastructure that might otherwise simply have been repaired and updated. In contrast, the greenfield infrastructure can be designed from the outset to compensate for the altered conditions. Climate change may therefore render greenfield development, even in remote areas, more competitive with brownfield replacement than would otherwise be the case.

Regardless, Russia’s development of the technically and climatically challenging new energy projects and replacement of its existing infrastructure will be the largest capital expenditure projects in the history of the planet. Russian sources estimate that developing oil and gas deposits in the Arctic regions will cost \$500 billion, about the size of Russia’s entire hard currency reserves at their peak in mid-2008. Not surprisingly, the current economic downturn has significantly reduced Russia’s enthusiasm for launching these projects in the near term. While they have subsequently rebounded, oil and gas prices declined nearly threefold since the summer of 2008, dropping well below the \$70 per barrel that the Russian Government considered necessary to make Arctic development feasible.

Challenges to Transportation Infrastructure

Climate change is anticipated to cause potentially serious periodic disruptions to Russian transportation and increase the strain on transportation infrastructure. As opposed to

creeping environmental change in which effects occur slowly over time some climate-induced changes, such as flooding in major river basins including St. Petersburg, more snow in non-European Russia, and more frequent mudflows and landslides, will present immediate challenges to transportation and may separate Moscow, the economic center, from the regions and industries that fuel of the national economy. Such disruptions to commerce and economic activity may be sporadic and difficult to predict or to prepare for and will necessitate large-scale investments in infrastructure.

Permafrost melting is a major concern for the maintenance and viability for commodity flows of transportation systems, including those that serve the oil and gas pipelines in central and eastern Siberia. Because a significant proportion of road and railway networks are constructed on permafrost, increased melting could swallow the transportation networks of large expanses of Russia's territory into a swampy morass for a significant part of the year. Russia has a comparatively under-developed road and highway network and is far more dependent on railroads for long-distance transportation than most industrialized countries. Beyond the effects of permafrost melting on the rail system, increased river flows may threaten the structural integrity of railway bridges.

Waterborne transport faces mixed impacts from climate change. New ports and shipping routes in the Arctic may be offset by increased threats of flooding of existing ports and higher incidence of severe storms. Increased river flows may facilitate the use of rivers as transportation arteries, particularly in Siberia, but also brings increased risks of catastrophic flooding and ice jams. Additionally, the structures located at thousands of river crossings are unlikely to accommodate increased water levels associated with climate change.

Agricultural Challenges

The future impact of climate change on Russian agriculture is uncertain. Warming will lead to longer growing seasons, less frequent bitter winters, and more northerly areas open to cultivation. Expected resulting increases in yields will be at least partially mitigated by other climate change-induced effects such as greater weather variability, more frequent severe weather events, and the spread of plant diseases and pests into new areas.

The expected northward migration of planting zones will be a complex process with mixed impacts. The climatic conditions suitable for warm-climate crops such as cotton, grapes, tea, citrus, and other fruits and vegetables will move northward from Central Asia and the Trans-Caucasus into the North Caucasus and Volga regions. Depending on the specific crops, the northward shift may involve a broadening of the zone of potential cultivation. Alternatively, it may entail a shift in both northern and southern margins of the planting zone such that current cultivation areas will no longer be able to support historic crops. The latter scenario may have catastrophic effects on single-crop dependent agriculture such as in Central Asia. The outlook is further complicated by the fact that although climatic bands may shift, soil bands such as the Chernozem (Black Earth) will not. If climatic movement pushes crops into areas with unsuitable soil, yields may drop significantly and it may no longer be possible to cultivate certain crops at all.

Although new agricultural areas will open up, the areas on which Russia has historically depended and around which its agricultural infrastructure is organized will suffer

increased stress. Many of the fertile Chernozem agricultural regions of southern European Russia—such as Belgorod, Voronezh, Kursk, Lipetsk, Orel, and Tambov Oblasts—are expected to experience water shortages and sustaining agriculture here will require increased irrigation and reliance on chemical additives. In the longer term, Russia faces a need to refocus its agricultural enterprises northward, which may entail uprooting an entire region’s socioeconomic system.

Urban Challenges

As migration to urban areas increases, climate-induced hardships, such as the water shortages anticipated for the Moscow Oblast, will affect increasing numbers of people. Energy blackouts and brownouts resulting from unreliable or insufficient energy supplies can cause local economies and productivity to grind to a halt. Heat waves are likely to lead to increased levels of secondary pollution and public health stress. Water treatment in cities could be impaired and waterborne illnesses could rapidly affect an entire city. Infrastructure in many Russian cities is already decrepit and inefficient, and could be further damaged by climate change-induced effects.

Although overall climate change effects do not appear likely to create chronic or insurmountable disruptions for Russia’s urban population, an increase in extreme weather events—including heat waves, storms, flooding, water shortages or contamination, and outbreaks of disease—could threaten cities with sudden local disasters.

Demographic Challenges

Unrelated to climate change but a factor certain to compound the impact of that change are demographic challenges that threaten Russia’s human capital—that combination of the number and age of its citizens, their health, their education, and their location. A health crisis threatens productivity; a mismatch exists between the types of skills being produced by the educational system and economic needs; and mobility problems prevent reallocation of human resources in an effective manner.

A declining population is another aspect of this demographic challenge. The Russian Federation today is a great deal more homogeneous than was the Soviet Union but Russia’s population has been in decline since the end of the Soviet Union. The Slavic population had been falling even before that time, although this drop was offset by high birth rates in the non-Slavic population. As a result, the Soviet Union was less than 50 percent Russian by 1989. Today the population is about 80 percent Russian, boosted by migration of ethnic Russians from the Former Soviet Republics since 1991.⁵

The population decline, although it has slowed in recent years, is primarily the result of a substantially higher mortality rate, particularly among working-age males, than other countries in Europe. Estimates of life expectancy by Russia’s State Statistics Agency (Rosstat) suggest that after 2008 Russia will see the beginning of a decade-long precipitous decline in working-age population. By 2015, that group is projected to decline by 8 million and by 2025 by 18-19 million. This decline is more serious when one factors in the high numbers of the population who are incapacitated due to chronic health problems.

⁵ Although Russia hosts nearly 160 ethnic groups, the only minorities with over a 1 percent representation in the population are Tatars, Ukrainians, and Chuvash.

Given the downward demographic dynamics in Russia's Slavic population, increased immigration was already poised to play a greater role in filling Russian labor needs in the first half of the twentieth century, leading to a more diverse nation with higher percentages of Asians and Muslims. Increased immigration because of climate change-induced stress in Central Asia and China can be expected to accelerate these trends. The prospects for further ethnic diversification as a result of immigration and disparities in birth rates have revived late Soviet-era fears that ethnic Russians may become a minority in Russia, although such fears do not appear to be borne out by the demographic facts. Popular conceptions of an internal Muslim demographic time bomb also seem exaggerated. There are less than 11 million Muslims in Russia, and their birth rates are dropping. Traditional Muslim birth rates among the larger Muslim ethnic groups such as Bashkirs and Tatars are not much higher than those among Slavs, and birth rates have even declined in the Caucasus.

Ecological Challenges

The effects of climate change will not be limited to human systems. Effects such as changes in growing seasons, permafrost melting, more frequent forest fires and floods, and the spread of disease will have broad-based impacts on Russian ecosystems. Entire ecosystems may shift into new geographic areas, such as the sub-Arctic taiga forest encroaching on more northerly areas previously dominated by tundra. In some parts of the North, warmer climatic conditions may lead to increased biodiversity. On the other hand, the stress associated with flora and fauna moving into new areas and competing with native plant and animal life may result in extinctions threaten and more species. The impact of climate change on Russia's vast wilderness ecology is particularly significant in part because many indigenous peoples depend on these ecosystems. Natural ecological change will in some cases be worsened by the secondary impact from human actions that are driven by increasing economic and climatic stress.

Climate change effects such as increasing sea-surface temperatures, changes in ocean circulation patterns, sea-level rise, changes in water levels in lakes and streams, and river and coastal silting caused by increased river flows, could create problems for fish populations. In the Caspian Sea, for example, an anticipated decrease in water levels is expected to reduce the number of sturgeon, an important industry in the region. It is not clear how climate change will ultimately affect fishing, but preliminary evidence suggests that in some cases fish schools are beginning to move to new waters, and in other cases fish stocks are decreasing.

In addition, climate change is likely to exacerbate the threat of disease caused by insects and vermin. Milder winters allow pests to thrive in more northerly areas, and Russia is already beginning to see an increased incidence of diseases more familiar in warmer regions.

Political Challenges

The sheer size of its territory and wide dispersion of its population have posed a perennial governance challenge for the Russian state. The country's extreme regional social, economic, and ethnic disparities are difficult to reconcile with the strong tendencies toward centralization of power and authority in Moscow. The oil center of Khanty-

Mansiysk in western Siberia, for example, enjoys a per capita GDP comparable to that in the United States, while Vladikavkaz in the Caucasian republic of North Ossetia has a per capita income 30 times smaller. Moscow faces a huge political challenge in providing effective governance to cities and regions on both ends of this spectrum and every point in between.

During the Yeltsin years, state authority was diffused among the constituent regional and local levels of government, particularly to the ethnically defined republics within the Federation. Under Vladimir Putin, Moscow reversed this trend and undertook a sweeping recentralization of authority. The federal subjects—oblasts, republics, and krais—were grouped within seven large federal districts with centrally appointed governors. Local executives are heavily influenced by Moscow but locally elected. Although local parliamentary bodies are technically still elected, in practice higher authorities suggest candidates, whose election campaigns are state-funded. Power trickles down from the Federation level, curtailing the influence of budding, local-level civil society. Further erosions of federal subject authority may occur, such as the political restructuring of critical resource areas away from the control of the more sovereign federal subjects, such as the ethnic republics. This could be undertaken officially through boundary changes, or more insidiously by de facto economic relationships. The recentralization of authority already has aroused resentment among local actors who have sought to renegotiate their political rights and regain some of sovereignty from Moscow.

Such federal-local tension may be exacerbated if local authorities find themselves under increased stress because of climate change. Given Russia's geographic extent, regional climate change impacts will vary widely and may be best addressed at local and regional levels of government; but the state's tendency toward centralization of authority in Moscow may adversely affect the country's ability to respond to local climate change-induced challenges, worsening these problems and even causing them to spill over and affect the country more broadly.

Civil and Key Interest Group Responses

Civil Society

The legacy of Soviet-era control over political and social activity continues to undercut civil society in Russia and the other former Soviet countries, both through lingering social inhibitions and continued state repression. Political and social activism has tended to be scrutinized, if not outright discouraged, by the government. As a result, few individuals will admit to involvement in a non-government organizations (NGOs), social organization, opposition political party, or civic group and most are cynical about what can be achieved through such channels.

Informal Networks. Absent overt civil society mechanisms, many Russians have developed alternative, informal social networks to deal with day-to-day issues such as commodity shortages, which are likely to play a major role in how the public responds to the effects of climate change. The black market thrives and Russia is host to a large number of unofficial networks based on clan allegiance, ethnic identity, and any number of other criteria. These networks command a great deal of social power outside of the

government, but are tolerated as long as they do not infringe upon the state's domain. Indeed, it is arguable that these networks actually strengthen the state: aided by the networks, the Russian people may feel they do not need to mobilize politically.

Ecological and Environmental Movements. Some civil organization nonetheless has occurred related to the environment and the environmental effects of climate change. The development of ecological movements, particularly in Siberia, has been increasing, bolstered by the interaction between these movements and indigenous cultural and ethnic preservation movements. Such collaboration is likely to increase as Russia feels greater effects from climate change.

In the Siberian North, where initial effects of climate change are being felt, indigenous activists are conducting their own environmental measurements because they distrust reports from the regional and central government. They have merged “folk knowledge” about climate change with broader scientific reporting and accelerated indigenous people's concerns. As a result, a high level of public awareness about climate change effects, such as methane outgassing from melted permafrost, now exists in this region. Public awareness in other parts of Russia is also likely to increase along with global awareness, particularly with the advent of more precise and reliable climate change measurements.

Local mobilization around environmental issues already has managed to convince Moscow to change course in some instances, as happened in the case of a pipeline proposed for the Lake Baikal area. More commonly, even when local and indigenous responses exceed what Moscow had expected, as in the case of a local referendum against a planned hydroelectric dam on the Lower Tunguska in Krasnoyarsk Kray, broader economic considerations remain the deciding factor. Even if local mobilization against mega-infrastructure projects such as dams and pipelines intensifies, it is not likely to rise to a level that seriously challenges state security or deters decisionmakers from pursuing national-level plans they perceive to be in Russia's overall interest.

Rural Responses

In general Russia's rural areas will bear the worst strains from climate change, including the immediate effects on agricultural productivity, interrupted connectivity to cities and sources of non-local commodities and energy, as well as health impacts of increased bogs, floods, disease vectors, altered temperature patterns, and food quality and supply. The ability of rural populations to cope will depend on several factors including the health of the local economy, the ongoing, toxic Soviet environmental legacy, and the degree of new climate change related stresses. However, rural residents may be more likely than urban residents to have back up food supplies, traditional ways of dealing with sickness, and strong social networks.

The West and South. In considering how the Russian countryside will respond to climate change, it is important to distinguish between agricultural and non-agricultural rural populations. Russian agriculture—and its rural population—is concentrated in southern and central European Russia, from the Black Earth of the Ukraine to the southern Urals. Conditions in these areas vary: in southern Russia, the rural areas are more vibrant, with agricultural towns of 10,000-100,000 inhabitants who benefit from a

favorable climate. The more northerly agricultural areas, in contrast, feature small, 19th-century-style farms with low productivity and elderly populations.

These two markedly different rural agricultural models are likely to have quite different responses to climate change. Elderly rural dwellers are unlikely to move or generate conflict in the face of climatic stress, nor are state resources likely to be directed toward maintaining marginally productive agricultural areas. This way of life is already dying out, and climate change may simply accelerate the process. The response in the more intensive agricultural areas of the south is likely to be far more dynamic. Migration to the cities is likely to increase, as are demands for aid from the state, particularly in the area of expanding irrigation infrastructure, and conflict over water and other resources may become commonplace.

The East and North. The majority of Russia's territory, particularly in Siberia and the Far East, is a demographic and agricultural desert and will have a very different experience of climate change than the west and south. Russia's northern lands are a zone of poverty, soaring unemployment, industrial over-extension, and instability. The small and widely separated population is overwhelmingly urban and the tiny rural population—primarily indigenous peoples—is engaged in herding, hunting, fishing, and resource extraction, not agriculture.

The rural inhabitants of Siberia and northern European Russia have already begun to experience climate change-induced pressures, resulting in a loss of traditional means of subsistence and forcing many to move to increasingly larger towns and villages; however, any mass migration appears unlikely given the mixed impact climate change may have in these areas. Moreover, although shifts in traditional practices and ways of life will be traumatic, such shifts are already under way as a result of resource development and northern populations, already resilient to climatic challenges, are already responding to the leading edge of climate change.

Prospects for Rural Unrest. Historically, stress on rural areas was a major source of destabilizing political unrest in Russia but severe challenges to the state from the countryside are no longer plausible in post-Soviet, urbanized, industrial Russia. Rather, as noted previously, it is the lack of federal interest in or attention to their plight may be the most challenging aspect of rural society's response to climate change.

Urban Responses

Nearly three-quarters of Russia's population is urban. In some cities, the overall effect of climate change may be only a moderation of the harsh weather perhaps a welcome change for Russian urbanites. Given gradual climatic shifts, Russia is likely to have the resources to adapt its urban infrastructures to new conditions. Nonetheless, urban dwellers may face disruptions to transportation, food and water distribution, electricity, heating and air conditioning, waste removal and treatment, and public health. Such effects, perhaps severe in isolated cases, may be felt primarily by the very young, the very old, those with compromised immune systems, and those residing in hospitals or other institutions. Russians have low expectations regarding their government but climate change-induced challenges may shed more light on existing deficiencies and lead urbanites to demand more from their local and central government

Prospects for Urban Unrest. Russia's more recent historical experience suggests that the greatest danger from political unrest comes from the major cities, such as Moscow and St. Petersburg where the concentration of population and economic and political power means that a serious climatic event there could have major repercussions for the stability of Russia as a whole. The most serious threat may be a major flooding event in St. Petersburg. A truly catastrophic event of this magnitude in which federal and regional officials and agencies demonstrate tragic incompetence would be a massive blow for the state to absorb. Moscow is less threatened than St. Petersburg and other major cities. Owing to its privileged status, authorities will ensure the capital receives the resources it needs to cope.

Ethnic Minority Groups

Climate change may have a particularly significant impact on Russia's diverse ethnic minorities, depending on where they reside. Climatic shifts may disrupt traditional ways of life among groups—who are already under economic pressure—and in some cases force them to migrate and be subsumed within the larger Russian population and subjected to cultural dislocation, discrimination, and even violence. Climate change may spark increased resource competition among co-located ethnic groups. Groups living in isolated areas may suffer disproportionately from disruptions to the transportation network.

Moreover, climatic stress can be a key element inter-ethnic tensions devolving into violent conflict. For example, in northeastern Kenya in early 2009, drought and resulting crop failures sparked increased tribal clashes over water and pasture lands, high food prices, and the decimation of goats and sheep by a viral disease. Many minority groups in Russia live at a subsistence level in marginal areas where fairly minor climatic shifts could generate considerable local stress and resource conflicts that might play themselves out along ethnic lines.

The North Caucasus. The North Caucasus region—the most ethnically heterogeneous region in the world and the site of numerous recent inter-ethnic or ethno-nationalist conflicts—often is cited as having the most potential for ethnic conflict as the result of climate change. As noted previously, while the region is projected to bear the brunt of climate change-induced drying and warming trends, it is one of Russia's poorest and least-prepared areas to cope.

However, when the North Caucasus is considered in aggregate, the region is extensive and expected climatic impacts in particular areas do not appear to correlate with existing ethnic fault-lines. Indeed, the regions expected to bear the brunt of water shortages and agricultural disruptions—the steppe and the Black Earth—do not have heterogeneous populations or unstable political situations; while areas characterized by social and political tensions—from Kabardino-Balkaria to Dagestan—appear more likely to experience agriculturally friendly trends such as increased water availability, more mild winters, and warmer weather. The North Caucasus will certainly remain an ethnically charged region, but climate-induced conflict does not appear likely.

Siberian Indigenous Peoples. Indigenous peoples have shown a prescient grasp of the profound impacts climate change may have on their native regions. Siberians never needed scientists to tell them that their food chains were more fragile than other areas

farther south. The lasting effects of marks from all-terrain vehicles and the easy destruction of, lichen, the main food source for reindeer, that rejuvenates in multi-year cycles or not at all, alerted them early after Russian mining and energy developers entered their territories. They have already seen and felt the loss of their hunting, fishing, cattle, horse and reindeer breeding territories in numerous places, at increasingly alarming rates. With projected climate changes they fear increased forest fires, oil pipeline fractures, and the return of long submerged illnesses—anthrax for animals, small pox for humans. Indigenous peoples, who believe in the delicate interrelationship of humans to nature, are already voicing their concerns over environmental degradation and climate change and tend to conceptualize climate change as nature taking revenge for human transgressions. These beliefs have manifested themselves in increasing interest in environmental issues and interaction with ecological groups.

To the extent that indigenous groups mobilize politically, they may become useful political levers for other interest groups. In the 1990s, ethnic Russian interest groups used indigenous mobilization as a way to leverage support for their own interests. In such situations, minority groups could become levers that challenge state authority even if their intrinsic political clout is minimal.

Internal Migration

The Russian Government's recently published climate change doctrine highlighted internal migration as a key concern arising from climate change. Russia already faces a great deal of economically driven internal migration, with movement from the East into the West, and from rural to urban areas.

Climate change will also “pull” migration into more northerly areas: the likely opening of new oil and gas fields in the north and east and the massive accompanying infrastructure projects will draw labor into previously sparsely-populated areas of Russia, as will the potential opening of Arctic shipping routes. Although large-scale shifts in population will no doubt cause social and economic strains, voluntary migration in response to labor demand is likely to be considerably less destabilizing than involuntary movement of refugees out of stricken areas.

However, large-scale, sudden or protracted internal migration because of climate change could create local distortions in the labor market, increasing competition, frustration, and racial violence. The urban metropolises of Moscow and St. Petersburg are already experiencing tensions and violence directed against Caucasian migrants and immigrants of Central Asian descent. Indeed, anti-immigrant hostility and xenophobia are deeply rooted and widespread on the streets of Russia and a growing number of violent neo-Nazi and others groups already blame minorities and immigrants for a host of economic and social problems.

The most destabilizing type of internal migration could be the displacement of agricultural populations into previously homogeneous rural areas and towns where they will compete for resources with established groups.

State Responses

While the Russian state will need to expend considerable effort to address climate change-induced challenges, historically it has successfully tackled large-scale challenges under harsh conditions. Given Russia's high overall state capacity and the mixed or comparatively tolerable nature of most anticipated climate change impacts over the next twenty years, climate change is unlikely to lead to a general failure of the Russian state.

The Russian political elite has historically viewed climate change as a net positive for Russia, anticipating that warming will alleviate some of the challenges associated with the country's cold climate. This attitude is now changing: some Russian leaders now realize the possibility that climate change may have a number of deleterious social, economic, and political effects on Russia, an awareness that is likely to lead to measures to alleviate some of the most dramatic impacts.

Climate change is likely to generate complications and challenges for the state in two principal areas. First, the differential impact of climate change across the Federation will complicate centralized governance and policymaking in Moscow. Russian authorities already face considerable challenges in managing a vast federal state with extreme regional socioeconomic disparities and considerable ethnic diversity. The addition of differing, and in some cases opposing, climatic shifts and consequent movement of people and economic activity will only make the Federation more difficult to govern.

Second, as previously noted, climate change will affect how the Russian state and its (largely state-sponsored) energy industries implement the massive infrastructure projects and investments needed for the continued development and solvency of the critical Russian oil and gas sector. These projects will have to be undertaken regardless of climate change, but climatic impacts may render the process more expensive and technically challenging.

Climate Change Mitigation Policies

In May 2009, in preparation for the Copenhagen Climate Conference later this year, Russia's Ministry of Natural Resources and Ecology unveiled a climate doctrine that outlines the country's response to climate change. The doctrine, prepared without public scrutiny, came as a surprise, particularly because of the change in tone among Russian officials that it reflects: rather than emphasizing the benefits of milder winters, the opening of the Arctic coast, and longer growing seasons, the doctrine warns of serious climate-induced challenges and outlines adaptive measures.

According to the Minister for Natural Resources and Ecology, Yuri Trutnev, Russia will need to take a strategic, long-term approach to adapt to climate change, looking at least to 2030 and as far as 2050 in some sectors. The climate doctrine is intended to provide guidelines for planning and instituting that policy approach, and calls for a range of initiatives:

- Increased research in order to acquire more precise and reliable data on climate change. Russia should establish a climate change oversight body and potentially a national center for climate studies.
- Expanded and updated state environmental regulation and legislation to bring Russia into line with international norms on climate change; more stringent regulation of

industrial carbon and emissions; measures to stimulate responsible resource use and efficiency; and better natural resource management.

- Structural change in Russia's economy aimed at increasing the resilience of key economic sectors such as agriculture, transport, and energy, to include a redistribution of resources and economic activity to meet shifts caused by climate change.
- Development of alternative energy sources to help meet domestic energy needs, as well as increased energy efficiency, an initiative in which Russia had not previously shown much interest.
- Participation in international climate change initiatives.

Although the doctrine reflects some new sensitivity on the part of the Russian Government to potential adverse consequences of climate change, it is not clear if the policies articulated in the doctrine go beyond rhetoric in part because the Moscow's support for the initiatives has to date been vague. In addition, critics have charged that the doctrine does not go far enough in addressing the root causes of climate change and rather focuses on alleviating the effects.

State Priorities

Except in wartime, few states have historically prioritized state security in as stark terms as Russia. The Russian Federation and its Soviet precursor have been willing to sacrifice progress in virtually every social, economic, and technological area in order to focus on security and the military. Even today, with an emphasis on energy export-led economics, state security remains the ultimate priority of Russia's decisionmaking elite.

Russia's approach to state security is characterized by caution and paranoia. Having weathered a huge economic and political crisis in the 1990s, Russian leaders are very conservative and place a premium on precautionary measures. Moscow feels a sense of vulnerability because of its relative demographic and geopolitical decline vis-à-vis both its longstanding rivals and new, rising powers. As a result, Russian planners and decisionmakers typically focus on worst case scenarios and remain largely unwilling to depend on other countries for food, energy, or physical security.

A state whose primary goal is security will respond quite differently to climate change effects than one oriented toward economic efficiency. The goal of efficiency dictates policies such as competition, pluralism, entrepreneurial independence, and participation in the global division of labor. An emphasis on security, in contrast, leads to excessive control, a high degree of redundancy, lack of specialization, resistance to interdependence and openness, and a focus on building up reserves of various kinds. Climate change-related tradeoffs will be framed in terms of their net effect on state resilience more so than their economic impact. Climate change-induced challenges are likely to necessitate a broad range of state interventions including mega-infrastructure projects and local-level responses to discrete incidents.

To insure that these challenges do not rise to levels that threaten security, the state must bolster its overall capacity to respond and adapt. Therefore, if expenditures are seen as preserving state power and stability, the Russian state may be willing to spend more on climate change mitigation than a growth-oriented state. Although Russia favors

efficiency and global cooperation in responding to climate change, Russian leaders, preferring autarkic solutions, will most likely not allow the country to be placed in a dependent position.

Policy Decisionmaking. The current Russian leadership has tended strongly toward a pragmatic approach to policymaking aimed at keeping Moscow's options open until the outcome is fairly certain. The Russian Federation is much less bureaucratic than the Soviet Union; decisionmaking is more personal and less institutionalized; planning is less complex and deliberative; and the policymaking process is opaque and in many cases a formal process may not exist. Another critical feature of decisionmaking in Russia is the conflation of Kremlin officialdom and the corporate elite, to the point that the distinction between state policy and corporate policy is often arbitrary.

Overall, the Russian state leadership expends much less effort to monopolize decisionmaking than was the case in Soviet era, primarily stepping in if an issue is deemed a national security threat and/or requires a major state initiative to address it. In such cases, both the Soviet and post-Soviet regimes have shown a capacity to rapidly come to decisions and act on them, which may facilitate the rapid adoption and implementation of major initiatives to deal with climate change related incidents. But such actions will tend to be reactionary and done with an abbreviated policy formulation process that has in the past led to deeply ill-considered policies with disastrous long-term side effects.

State Capacity

Russia faces a very complex planning, prioritization, and implementation challenge regarding its responses to climate change. Nevertheless, heavily industrialized and well-educated, with an outsized national security establishment, the Russian state already has a robust capacity to respond to climate change, which could be boosted even more with investments over the coming years.

Analysis & Forecasting. Russia has a strong scientific establishment and its research institutes and universities provide ample expertise and infrastructure with which to gather data on climate change, analyze it, and produce forecasts. The lead agency involved in such efforts is the Federal Service for Hydrometeorology and Environmental Monitoring (Roshydromet), the Russian equivalent of the US National Oceanographic and Atmospheric Administration (NOAA).

Emergency Response. Russian capabilities in emergency response and disaster consequence management are relatively robust. The lead agency for emergency response is the Ministry for Affairs of Civil Defense, Emergency Situations and Disaster Relief—better known as the Ministry of Emergency Situations or the Emergency Control Ministry (EMERCOM)—the Russian equivalent of the US Federal Emergency Management Agency (FEMA). EMERCOM has a reputation as a dynamic and effective agency, and has capabilities to respond to a wide variety of climatic incidents throughout the Federation, including forest fires, floods, and storms. Acting through the Prime Minister's office, EMERCOM can draw on assistance from the Ministry of Defense and Ministry of the Interior, as well as assistance from foreign and international disaster response agencies.

Environmental Protection. In contrast to emergency response, environmental planning and prevention are weak. Environmental oversight within the Russian state bureaucracy is housed in the Ministries of Regional Development and of Natural Resources and Ecology, both of which are primarily charged with facilitating economic development and resource extraction. These ministries collaborate with the increasingly compliant, non-elected republic and regional governments. This creates a conflict of interest situation in which development goals supersede environmental concerns and ecological oversight is pro forma or corrupted. Problems include data collection, secrecy, and, especially, a lack of systematic efforts to curtail or repair environmental harm with sustainable development.

State Resources. As mentioned earlier, Russia's oil and gas wealth is by far the most essential element of its "adaptive capacity." A historical correlation exists between the value of oil and gas rents, on the one hand, and Russian and Soviet economic performance and political behavior, on the other (Figure 1). When resource rents are high, the Russian political system tends to be assertive, centralized, and less prone to reform. When the rents grew in the 1970s and early 1980s, the Soviet Union entered an expansive phase both economically and politically. The subsequent collapse of oil rents was followed in short order by the collapse of the Soviet Union. The sharp growth of oil and gas rents in the late 1990s-2000s correlates with the resurgence of authority and stability for which Vladimir Putin is often given credit.

The future price of oil (and gas, which follows the oil price closely) is one of the most uncertain of all economic parameters. Taking a high-price scenario of oil prices averaging \$120 a barrel through 2030 and a low-price scenario of \$40 a barrel, forecasts of Russian oil and gas output can be used to give a plausible range for Russia's future resource rents. In either case, rents would provide Russia with a great deal of wealth to meet significant climate and aging infrastructure challenges if they can be efficiently and effectively applied to that end. In the high-price scenario, Russia would enjoy a staggering amount of wealth over the next 20 years, on average 30 percent higher than in the historically boom year of 2008. Even under the low-price scenario, the average annual rents would be 80 percent higher than in the preceding 21-year period, 1987-2008. Only the unlikely combination of an extended period of very low oil prices and poor policy in managing rents will produce a Russia as poor and weak as it was in the 1990s.

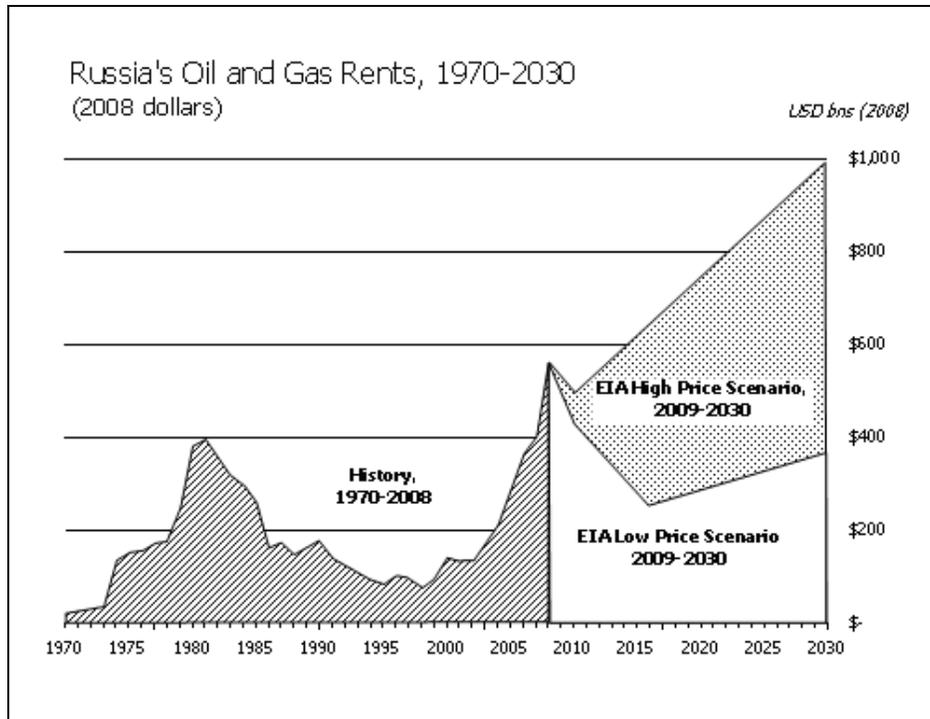


Figure 1. Russia's Oil and Gas Rents, 1970-2030. Source: Clifford G. Gaddy, data from US Energy Information Administration (EIA), "International Energy Outlook 2008."

State Repression. When considering whether instability generated by climate change might pose a threat to state security, it must be taken into account that the Russian Federation has an extensive and capable repressive internal security apparatus at its disposal. The Federal Security Service (FSB) is a pervasive presence that has largely reclaimed the virtually unchecked powers it had in its previous incarnation as the Committee for State Security (KGB). The Ministry of the Interior (MVD) disposes of some 200,000 fully equipped internal security troops with which to put down armed insurrections. Special Purpose Police Squad (OMON) riot control units are stationed in every Russian oblast and major city.

Civil groups and non-governmental organizations are allowed, but are continually scrutinized, discouraged, and hindered in their activities in many indirect ways. Such coercive measures may be directed at ecological movements that might otherwise assist the state and society in responding to climate change-induced challenges. State coercion already has included publicly discrediting leading ecological figures and permitting or directing attacks on ecological groups by nationalist extremists.

“Level” of the Response

The governments of the constituent republics, oblasts, and krays in many respects will be better positioned to observe and respond to the considerable variety of climate change-induced challenges across Russia. Horizontal mobilization across republics, oblasts, and krays is possible—perhaps organized around shared climate change impacts. State centralization, however, has robbed the federal subject governments of authority and

resources, which may dramatically reduce their effectiveness as first responders to the effects of climate change.

Ineffective policy responses from Moscow, lack of consideration of local or regional interests, and lack of attention to local or regional problems arising from climate change may lend increased impetus to demands for decentralization from the constituent levels of the Federation government. Climate change may thus become a rationale that regional and local governments can use in negotiations with Moscow for greater authority and resources.

Territorial Integrity. Russia is set to undergo a geographic shift in economic activity and population unrelated to climate change in which regions distant from Moscow may experience significant gains in population, development, and economic power. If coupled with a perception that Moscow is unresponsive to local concerns—such as local effects of climate change—this increased clout may cause governments in the peripheral federal subjects to question their allegiance to the Federation. For example, if Sakhalin Oblast, in the Russian Far East, north of Japan, becomes a key energy producer, its leaders might question how it serves their interests to continue to be integrated with Russia rather than pursuing closer ties to their proximate customers in Northeast Asia.

That being said, the central government is highly unlikely to allow threats to the Federation's territorial cohesion to fester, as the precedent of Chechnya illustrates. The reassertion of Federal power under Vladimir Putin has for the time being reined in the federal subject governments, and if they try to reassert themselves over the next two decades they will have a steep hill to climb. In addition, Moscow has shown interest in creating more cohesive national infrastructure as a means of strengthening ties with distant regions, and is incorporating that strategic intent into its development projects. The Eastern Gas Program, for example, envisions investment in gas-dependent industries (such as fertilizer production) in the Russian Far East and the connection of the Far Eastern gas fields with fields as far west as Lake Baikal. These efforts may be driven by a desire to reinforce cohesion more than economic considerations: if Moscow is able to maintain political influence over its distant territories in the Russian Far East, resource development in the region could serve as a catalyst to hasten the integration of Russia with the economies of the Pacific Rim.

Urban Planning. Climate change-related problems in cities have the potential to rapidly become severely destabilizing. To the extent that municipal governments remain under-resourced and subject to cumbersome, overly centralized state control, they have the potential to become weak links in Russia's state response capacity.

Environmental Protection. The federal subject governments are much closer to the ecological issues facing their regions than the central government and are more responsive to local ecological activism. The federal subjects of the Siberian North, strongly influenced by the beliefs and traditions of their indigenous inhabitants, have been particularly active in autonomous environmental preservation measures. The Sakha Republic, for example, features an excellent network of ecological protection zones: two major federation level preserves, five national parks, 78 reserves, and numerous other protected areas of local interest. The Sakha Republic Ministry for the Protection of Nature publishes yearly reports available on the Internet documenting at least some

efforts at monitoring ecological devastation and planning for more Sakha preserves in the face of huge pressures for further development of the republic. Nevertheless, local authorities are sometimes loath to admit their failure to protect the health of their communities by publishing data on environmental degradation and pollution. In addition, local authorities have in many cases allowed mineral and energy exploitation to become priorities, overriding local interests even while giving lip service to the importance of ecology and “lands of traditional means of subsistence.”

State Economic Policies

The former Soviet regime managed its resources and economy poorly and fell so deeply in debt to Western governments that it sacrificed its financial, and in effect its political, sovereignty. From this experience, Vladimir Putin and his associates concluded that financial and fiscal health were essential. Consequently, as oil prices rose, the Putin regime prioritized the use of the windfall to pay off the country’s foreign debt and build reserves. Russia’s foreign exchange reserves, now the third largest in the world, play a critical role primarily in protecting Russia’s financial sovereignty and secondarily ensuring the welfare of its citizens. Looming increases in expenditures and greater economic uncertainty as a result of climate change are apt to reinforce these tendencies.

Marginally but not dramatically lower levels of revenue derived from hydrocarbon exports may also spur more rapid, but still limited diversification of the Russian economy. Public rhetoric in favor of “diversification away from oil” notwithstanding, Moscow is not likely to diversify away from oil and gas despite its vulnerability to the vicissitudes of commodity prices.

Energy Policies

Russia enjoys a major comparative advantage in hydrocarbon-based energy production that will persist regardless of increased production costs associated with climate change. Indeed, for the foreseeable future, Russia will remain reliant on fossil fuel commodities and its energy planning envisions only modest diversification away from hydrocarbons, mainly as an excuse to subsidize particular alternative energy industries. To the extent that diversification to supplement oil and gas does occur, hydroelectricity, nuclear power, and liquefied natural gas are the most likely choices.

The Russian Government nevertheless is showing interest in energy efficiency for the first time. A recent World Bank study concludes that Russia can save up to 45 percent (equivalent to nearly six million barrels of oil per day) of its total primary energy consumption by adopting measures that could pay for themselves within four years,⁶ putting Russia in an excellent position to address any increase in demand or decline in production as a result of climate change. In addition, Russia has announced the intention to bring domestic energy prices up to international export parity by 2011. To the extent that Russia’s domestic energy demand is elastic, this measure should reduce energy consumption, which is inflated by artificially low domestic energy prices.

⁶ World Bank and International Finance Corporation, *Energy Efficiency in Russia: Untapped Reserves* (Washington, 2008)

A focus on increasing efficiency may delay implementation of the necessary energy-infrastructure improvement programs, but it cannot substitute for them. Indeed, as noted previously the major focus of Russia's domestic energy policy will be the vast capital expenditures associated with replacing the aging Soviet-era infrastructure that forms the core of Russia's energy production enterprises. Russia and its investment partners will need high prices in order to lay out the initial investments and will also need to be able to count on sustained high prices over the considerable period it will take to bring greenfield energy infrastructure online. Developing oil fields in eastern Siberia will require \$70 a barrel oil prices to be a profitable venture.

Russia's simultaneous need to replace its aging infrastructure and to modify its infrastructure to take climate change into account is in some respects fortuitous. For example, an important preventive measure to reduce the chance of spills if climate change renders the permafrost-based pipeline systems unstable would be to elevate pipeline infrastructure and deepen its physical foundation to minimize risks of subsidence. As long as Russian infrastructure planning incorporates those changes necessary to cope with such climate change effects as permafrost melting, or exploit opportunities, such as the opening of new ports in the Arctic, Russia will only have to invest once to address both issues. Greenfield development in the Barents Sea and Far East will require a great deal of new construction projects. Historical infrastructure, much of which will need replacement, will be less important in supporting most of the greenfield projects, although some will still rely on existing networks. Development areas such as the Yamal Peninsula, for example, will require incremental new construction but will be connected to existing infrastructures.

Russia will face an increasing incentive to accept foreign involvement in these expensive and risky energy development projects, at least on the financing end of the project. Extending the existing pipeline infrastructure to reach the proposed Yamal field will cost \$10 billion, even before considering costs of field development. The economic incentives pressing Russia in this to involve foreign investors nevertheless be filtered through a security lens by Kremlin decisionmakers and much of the critical supporting infrastructure—roads, railroads, bridges, ports, new settlements—will be paid for by the Russian state.

Lastly, these large-scale infrastructure projects undoubtedly will be accompanied by waste, corruption, environmental degradation, and outright construction errors. Assuming errors are even fixed, repairs and replacements will require all the more capital outlays. For example, a new oil pipeline being built near the Lena River in the Sakha Republic is being built as a trench, rather than a tunnel, with increasing possibilities of oil spills in conditions of melting permafrost, even though the necessity of surrounding pipelines with tunnels or building them aboveground is obvious to locals in the area.

Hydroelectricity. Increased river flows are expected to substantially boost Russia's existing hydroelectric capacity and hydropower potential but, as with the rest of the energy sector, the hydroelectric infrastructure will require substantial investment. Whereas in many countries, notably China and India, hydropower development is an international flashpoint, this is unlikely to be the case in Russia. Although most of its major rivers run almost entirely within Russia's borders, eliminating the common international issue of diversion by downstream countries, Russia may be less likely to

pursue hydropower because oil and gas development will absorb most of the infrastructure investment.

Nuclear Power. The nuclear power industry currently supplies 16 percent of Russia's electricity needs, and Russia plans to produce at least a quarter of its domestic electricity through nuclear power by 2030. The industry is managed by Atomenergoprom, a civilian nuclear power monopoly subordinate to the Russian State Corporation for Atomic Energy (Rosatom). Atomenergoprom includes Energoatom, which operates Russia's civilian reactors; the nuclear fuel producer and supplier TVEL; nuclear goods and services exporter Tenex; and nuclear facilities builder Atomstroyexport. Although Atomenergoprom has ambitious plans to expand its export activity, international concerns about proliferation make nuclear exports to some countries even more politicized than gas pipelines. The nuclear industry, like oil and gas, needs to replace aging Soviet-era infrastructure; however, in the event of a prolonged global financial and domestic budgetary crisis, the nuclear industry will have to compete with the far more profitable hydrocarbon industries for state funding and political cover, which may constrain nuclear power expansion. In order to fund domestic infrastructure needs, Russia may turn to increased exports to such customers as Iran in order to fund domestic infrastructure needs, with corresponding implications for global security.

Liquefied Natural Gas. As Russia moves to develop new natural gas fields, it has the option of diversifying from pipeline-based gas delivery into liquefied natural gas (LNG). Pipelines create a hardwired relationship between Russia and its customers, primarily in Europe, and increasingly in China. Pipelines require consistent demand to be profitable, and cannot easily be redirected to new customers. Pipeline-delivered natural gas is therefore less commoditized than oil, which is bought and sold on the world market rather than being directly delivered to specific customers. In contrast, tanker-shipped LNG allows more flexibility; the LNG can be shipped to different customers as demand shifts. This flexibility may become more appealing to Russian leaders and to the gas monopoly Gazprom if they assess that some customers, particularly in Europe, may try to move away from a fossil fuel-based economy. On the other hand, a less hardwired natural gas sector is likely to increase natural gas price volatility, making Russia's economy more vulnerable to external shocks.

Gazprom is likely to add LNG to its repertoire while retaining pipelines as its principal focus. Historically Gazprom has avoided LNG in order to protect its pipeline monopoly, but it has entered the LNG business with its participation in the Sakhalin-2 natural gas development project in the Russian Far East. The firm also has drawn on foreign contractor expertise in LNG and deep-water gas drilling, as in the case of the Shtokman field in the Barents Sea. Nevertheless, incremental updating and expansion of the existing pipeline-based natural gas export system remains cheaper than development of a greenfield liquefaction capability.

Water Policies

As discussed previously, Russia faces major technical and engineering challenges to manage the impact of hydrologic changes and soil subsidence from melting ice, but the country has long battled harsh climatic and geological conditions with considerable perseverance and ingenuity. Russia's water supply is expected to increase overall, but

much of the increase will occur in sparsely populated areas such as Siberia. Indeed, the differential climate change impact on water availability across Russia raises the question of whether the state will turn to large-scale water redistribution. Water will be relatively overabundant in the north, while the south, where Russia's key agricultural areas and most turbulent regions are located, will face shortages. Dating back to the Soviet period, Russian leaders have considered reversing the Siberian rivers to flow south, rather than unused into the Arctic Ocean. Such grandiose civil engineering projects may be fanciful, but more reasonable projects to transfer water from swollen northern rivers to the drying southern cities and fields are plausible. The expected major increase in flow from the Volga River, for example, could supply irrigation to the adjacent steppe regions expected to face water shortages.

Russia will most likely need to build new reservoirs, dams, and water pipelines to adapt to a new hydrological environment. Such projects would have to compete for resources with the equally massive infrastructure investments required in the energy sector.

Transportation Infrastructure

At the same time, the Russian state faces a large-scale requirement to upgrade the country's transportation network to adapt to changing climatic conditions. Many of Russia's roads, railways, and bridges are constructed on permafrost and its melting is likely to necessitate laborious improvement of thousands of miles of roads and railways in northern Russia, arteries needed for the expansion of infrastructure in the North. Potential competing focuses for investment include a more substantial snow removal system, ways to prevent ice-jamming of major rivers, flood control systems, and fortified bridges and river crossings. Much of these infrastructure improvements will have to be undertaken before substantial progress can be made on the all-important energy infrastructure issue. Accordingly, portions of the transportation network associated with the energy sector will no doubt receive priority, potentially leaving other parts of the country and their inhabitants with damaged or inadequate access to transportation for an extended period.

Regional Implications

Russia not only enjoys a better climatic outlook than many of its neighbors, but it has comparatively greater ability to cope with climate change. As a result, the most daunting climate change-induced challenges Russia will face out to 2030 may originate from outside its borders.

Regional Energy Issues

Climate change is likely to affect Russia's relations with its regional energy clients in two principal respects. Firstly, climatic stress on Russia's pipeline infrastructure will likely lead to increased maintenance costs and increased development costs for new oil and gas fields. Russia probably will pass these costs on to its customers in Europe and East Asia. Secondly, Europe is likely to forge ahead with efforts to transition away from fossil fuels and to alternative sources of energy in the interest of reducing emissions and mitigating longer-term climate change. This would jeopardize demand from Russia's primary energy customer.

Dynamics between Russia and its European energy customers are troubled. Russia shut down its gas supplies to Ukrainian transit routes in January 2009, and the situation escalated into a gas blockade affecting much of Europe. Gas supplies were shut off for eighteen days until Russia and Ukraine finally signed a memorandum of agreement. Russia's leaders may have been hoping to demonstrate Russia's critical role in European energy security and to persuade European countries to fund new pipelines that would increase European access to Russia's gas supplies. But Russia could face a shortfall in its gas production once European demand recovers if Russia does not invest in new gas field development. President Medvedev underscored the importance of constructing the proposed Nord Stream pipeline on the Baltic Sea bed to provide direct gas links to Germany and the South Stream pipeline that would bypass Ukraine, carrying Russian gas exports over the Black Sea bed to the Balkans and Central Europe. In addition, Prime Minister Putin promoted Yamal Two, the proposed pipeline westward through Belarus and Poland, and the expansion of Blue Stream, by way of the Black Sea from Russia to Turkey, as well as a proposed gas pipeline eastward to China that would parallel a planned oil pipeline. Some question whether or not Russia has the gas resources to fill these pipelines, however.

The European Union has not responded to the gas crisis in an integrated manner by investing in diversified pipeline projects with Russia, although some individual European states have made such investments. Rather, the EU has launched a serious effort to find non-Russian sources of natural gas, such as the proposed Nabucco pipeline which would allow access to Caspian gas via Turkey, bypassing Russia. Because pipelines represent a major investment and a long-term relationship, the reliability of the supplier is a critical consideration and Nabucco does not have sufficient non-Russian supply to be convincingly viable. Russia's provocative use of its gas pipelines as economic "weapons" may have branded it an unreliable supplier with serious long-term consequences for the country's natural gas industry and have put European investment across Russia's energy sector in some jeopardy. Without European investment, the proposed improvements to Russia's export capacity would take longer to bring on line.

In addition to oil and gas, Russia exports electricity to Scandinavia, Ukraine, and the Baltic States, and imports it from the Trans-Caucasus. Expected gains in Russia's hydroelectric potential as a result of climate change raise the possibility that electricity exports could be expanded. At the same time, greater risks to transmission lines from soil subsidence and stronger winds are likely to complicate long-distance electricity transmission schemes.

The Arctic Ocean

In contrast to their conservative attitude toward other aspects of climate change, Russian scientists and officials have paid keen attention to the dramatic developments associated with rising Arctic temperatures and melting ice caps that have accelerated in the last several years. Having by far the longest contiguous Arctic coastline and a preponderance of ice-capable naval capabilities, Russia is ideally positioned to exploit the opening of the Arctic Ocean as an arena for trade and resource exploitation.

A key Russian Federation Security Council policy document entitled "On Defense of the Russian Federation's National Interests in the Arctic," frames Russia's goals in the

Arctic, stating ⁷ that “the Arctic must become Russia’s main resource base,” and lists “active development of natural resources” as the first priority of the Russian Federation in the region. It calls for “international recognition of the outer boundaries of Russia’s continental shelf in the Arctic,” an oblique reference to Russia’s claims of the Lomonosov and Mendeleev Ridges that would give Russia jurisdiction over half of the Arctic Ocean. Russia claims that these subsea ridges extending far out into the Arctic Ocean are linked to the continental shelf and thus part of Russia’s legitimate maritime territory. Russia claims nearly a half million square miles of seabed beyond its recognized 200-nautical mile exclusive economic zone.

Direct conflict over Arctic resources may be unlikely, since the majority of the energy reserves in the Arctic are in uncontested areas. The incentives for cooperation—both in resource extraction and support to Arctic economic activities—may be greater than has been conventional wisdom. In the limited areas that are contested, states that anticipate exploiting resources have already begun to maneuver in support of their claims. Denmark, which chairs the Arctic Council for the next two years, has made clear that it considers securing Arctic resources a priority. Negotiations are complicated and Russia is sensitive to the fact that all the parties in disputes over Arctic territory except Russia are NATO members (the United States, Canada, Denmark, and Norway).

Beyond the Arctic’s potential energy resources, the melting of the polar ice cap has major international implications, specifically for maritime transit. Formerly impassible sea lanes, such as Canada’s fabled Northwest Passage, are already beginning to open to shipping as the pack ice in the Arctic Ocean recedes. The opening of the so-called Northern Sea Route (NSR) along Russia’s Arctic coast promises to cut thousands of miles off the shipping routes between Europe, East Asia, and the North American Pacific coast. These shipping routes will create new strategic interests on Russia’s northern periphery for Russia, NATO, and non-contiguous countries anticipating heavy reliance on the NSR, particularly China and the EU.

The sea lanes of the Arctic Ocean will remain perilous: rising water temperatures will increase the power and severity of Arctic storms, which along with icebergs will potentially hamper shipping and the exploitation of offshore energy deposits. Russia is likely to play a major role in search-and-rescue (SAR) and weather monitoring for Arctic shipping in the rough northern seas, which may facilitate a more cooperative approach among the Arctic states. For example, the US Coast Guard already works well with the Russians in the Arctic.

The receding ice also opens up potential ports along the Russian northern coast, which could allow Russia to more easily export onshore energy from northern Siberia. Historically, Russia’s main strategic challenge was to secure access to warm water ports for both military and economic purposes. In effect, climate change will bring the ice-free ports to Russia, removing one of the most durable strategic rationales for Russian expansionism. Russia is already building a new class of winterized, ice-capable tankers to transport oil in rough Arctic waters.

⁷ Заседание Совета Безопасности Российской Федерации, (Russian Federation Security Council Meeting) «О защите национальных интересов Российской Федерации в Арктике» (On the defense of Russian Federation’s national interests in the Arctic), 17 September 2008; NIC 2009-04, p. 34.

New ports on Russia's Arctic coast may provide vital shelter to ships during violent storms along the NSR, along with SAR and emergency infrastructure, and refueling stations. Although Russia's fleet of Arctic-capable icebreakers may be less required given the receding ice, the ships may assume a SAR role as shipping traffic increases. Lastly, revitalization of Arctic ports may be a means to extend state administrative control into previously isolated areas of Russia's North. To date, Russia's commitment to developing its Siberian ports has been mainly rhetorical, but this is likely to change as the NSR opens to shipping traffic.

Russian enthusiasm about the Arctic surged at the time of rapid economic growth and high oil prices, peaking in 2007 with the planting of a Russian flag on the seabed beneath the North Pole. The current global economic downturn significantly reduces the incentives for Arctic development, both onshore and offshore. Observations of Russian media indicate that the "Arctic buzz" has waned since the onset of the economic crisis in the fall of 2008. Nevertheless, Russia's sense of entitlement to the Arctic's resources and the likely continued opening of the ocean because of melting ice ensure that the "buzz" will be heard again.

Fishing Conflicts

Climate change may generate increased disputes over fishing rights in the Arctic and Russia's peripheral seas. Changes in the movement of fish schools could bring Russian and other fishermen into conflict over new fishing grounds and exacerbate competition in existing grounds, particularly in the Arctic Ocean and the Baltic Sea. While unlikely to drive international conflict at the strategic level, particularly when compared to the sub-sea resource issue, fishing conflicts have great potential to generate local incidents that raise the overall level of tension in the seas along Russia's periphery.

Disputes over fishing rights and the relocation of fishing grounds could become a larger factor in relations between the Arctic states, particularly Russia and Norway, which have had disputed control of waters—in terms of sub-sea resources and fishing rights—in the western Barents Sea for decades.

Cross-Border Migration

Immigration into Russia currently follows a "pull" scenario: migrants enter Russia pulled by better employment opportunities. In European Russia and Siberia, the majority of migrants come from Central Asia and the Trans-Caucasus (Armenia, Azerbaijan, and Georgia), while temporary Chinese laborers are a major presence in the Far East. Climate change-induced migration would instead follow a "push" scenario, in which adverse climatic effects in neighboring countries would drive migration of environmental or economic refugees into Russia. Water shortages and more frequent droughts, particularly in Central Asia, Mongolia, and Northeast China, could push large numbers of people into Russia and become a source of instability, especially in hard economic times. As with internal migration, however, it is not clear that populations under climate-induced stress will respond by migrating rather than taking measures to adapt.

Moreover, any climate change-induced migration into Russia may in fact be less destabilizing than previously considered, as an increase in "push" migration may coincide with a decline in "pull" migration. Much of the immigration into Russia has been

essentially a redistribution of population after the collapse of the empire. A large proportion of migrants have been ethnic Russians residing in the former Soviet Republics, but that source of migration is now almost depleted. The attractive influence of social networks and economic incentives may also be reaching a saturation point. In the medium term, as “push” migration becomes a larger factor, Russia will begin experiencing the previously mentioned expected steep decline in working-age population, and the demand for labor will increase. Russia might consider a guest worker program similar to those in Europe.

Migration from Central Asia & Mongolia. Climate change may have an especially severe effect on conditions in arid Central Asia, particularly in terms of water shortages and disruption of agricultural patterns; but a number of factors, including historical precedent, suggest that a rapid and destabilizing exodus from Central Asia into Russia is unlikely. Environmental conditions in Central Asia—such as air contamination of large swaths of Kazakhstan and Uzbekistan resulting from the drying out of the Aral Sea—degraded significantly in the late 1980s and continued to deteriorate rapidly in the 1990s. Although these adverse conditions affected all ethnic populations in the region, the overwhelming majority of migrants to Russia were ethnic Russians, as by and large, non-Russian groups remained in their home countries. Moreover, most large population centers in Central Asia lie far from Russia’s borders in the southern parts of the region, such as the Fergana Valley. Iran, South Asia, and even western China are closer potential destinations for migration than Russia. Passenger transit is limited and costly, and the Russian Border Guard Service—now part of the FSB—mans border checkpoints at the main road and rail entry points from Kazakhstan into Russia.

Although it may face similar climate change-induced pressures to the Central Asian states, Mongolia has too small a population to pose a migration challenge to Russia. If migration from Mongolia increased, the ethnic Mongolian populations on the Russian side of the border would probably help absorb the newcomers. Moreover, “push” migration out of Mongolia is more likely to be directed toward China.

Migration from the Trans-Caucasus. Migration from Azerbaijan, Georgia, and Armenia may prove particularly troublesome given the existing ethnic tensions. Bitter memories persist of the Russian apartment bombings in 1999 that were blamed on people from the Caucasus and contributed to the intensification of Russia’s military engagement in Chechnya. To date, migrants from the Trans-Caucasus have preferred to settle in the large cities of European Russia where they can find work rather than in the North Caucasus where conditions are similar what they seek to escape.

Chinese Migration. The numbers of Chinese economic migrants crossing the border into the Russian Far East are already considerable and increased migration could create tension between the two countries, eroding recent improvements in bilateral relations. Unlike the Central Asian states, however, China ranks high in terms of resilience to climate change, so “push” migration may be less of a factor and the Chinese state, with its increasing adaptive capacity, is likely to be able to act to cushion adverse climate change impacts. Nevertheless, sustained climatic pressure from desertification in China’s Northeast could still increase Chinese migration into the Amur River valley and Russia’s Maritime Province (Primorskiy Krai), areas where the ethnic Russian population is in decline.

Moreover, labor shortages in the Russian Far East will continue to drive “pull” migration from China, although climate change may somewhat alter the pattern of this migration. The southern areas of permafrost, now near China’s border, are likely to move northward 90-120 miles, which may negatively affect agriculture in the Amur River region because of soil deterioration and more pests and make the area less attractive to Chinese agricultural migrants. At the same time, Arctic warming could shift the northern borders of the forests and steppes north by up to 600 miles and tundra areas become more hospitable. In the longer term this shift could open more of the interior to the timber industry, which already employs many Chinese migrants in Primorskiy Kray and other parts of the Russian Far East. These shifts could gradually induce more Chinese migrants to penetrate further into the Russian interior rather than clustering near the border.

A real potential exists for the Russian Far East to become demographically Chinese, although driven more by an outflow of Russians than an influx of Chinese. Although the Far Eastern Federal District comprises over a third of Russia’s territory, less than six million people live there, concentrated in the cities on the Chinese border. The region has suffered a very sharp decline in population since 1991 as Russians are moving west in search of greater economic opportunities and better living conditions, and the population is projected to drop to 4.5 million by 2015.

Water Disputes

Fairly few areas in Russia are likely to be the center of major disputes over control of fresh water resources between Russia and its neighbors. Disputes between regions within Russia are far more likely to cause trouble. The major shared water resource in Russia is the Amur River, which runs along the Sino-Russian border. The flow of the Amur is projected to increase significantly because of climate change, so conflict seems unlikely. Projected sustained water shortages in northern China could lead to interest in Lake Baikal, which holds one fifth of the world’s unfrozen fresh water, more than all the North American Great Lakes combined.

Peripheral Instability

Resource and ethnic conflicts and humanitarian disasters within countries neighboring Russia are likely given their limited adaptive capacities compared to Russia. Russian humanitarian intervention appears very likely given Russia’s traditionally paternalistic attitude toward its “Near Abroad.” Some interventions in hard-hit regions such as Central Asia could require considerable resources.

Foreign Policy Implications

Russia's Global Engagement

Because international engagement is not Russia's preferred option for addressing its critical interests, Russia will most likely seek autarkic solutions to problems related to climate change where it can and accept international cooperation where it must. Given the regional variation in projected climate change effects and Russia's probable expanding state capacity, Moscow will address most problems by transferring resources from one part of its territory or economy to another. Disruptions to agriculture may render the country more dependent on international markets for food and put pressure on Russia to address the ports and transportation infrastructure.

Russia is already seeking large-scale international investments in its energy sector, but as projected costs rise, Moscow will be less able to set the terms for such agreements and will have to take greater care not to alienate prospective investors. This may inhibit Russia from adventurism and "pipeline warfare" and encourage a more cooperative stance with lender countries. Russia may also have a greater need for foreign expertise in its energy industries, for example in the area of deep-water oil drilling, which could lead to more openness to foreign investment and partnerships in production.

The regional implications of climate change along Russia's periphery could easily translate into broader foreign policy concerns. Climate-induced stress and resource competition could deepen NATO and United States involvement in the Caucasus, Central Asia, and the Arctic, all areas of vital interest to Russia. Russia is unlikely to tolerate such encroachment, even if it is framed in cooperative or humanitarian terms.

Russia's Global Energy Policy

Russia's long-term financial solvency rests on its ability to ensure that it has reliable customers for its oil and natural gas exports in order to continue as a principal world energy supplier. In doing so, Russia will have to change its energy policies in reaction to the inevitable shifts in the structure of the global energy markets. Russian expectations of the future of oil prices will determine the range of climate change policy options it feels able to consider.

With the exception of natural gas through pipelines, Russia will face difficulties preserving itself as a monopolistic provider of energy because its customers will naturally seek diversification and security of supply. Russia's most important international relationships will be with its primary longer-term energy customers, particularly China.

Russia's position as a fossil fuel-based energy supplier will not be threatened if the United States and/or Europe move aggressively away from fossil fuels or away from dependence on foreign sources. Projections suggest that demand and therefore prices of Russian supply will stay high because of increases in energy demand in developing markets such as China and India. A Western move away from fossil fuels would nevertheless be troublesome and costly to Russia, forcing Moscow to reorient its exports and the attendant distribution infrastructure. Russia already faces a major medium-term shift toward Asia as its principal energy export market, but Western alternative energy

policies could accelerate that shift, making more difficult the reorientation and recapitalization of Russia's energy infrastructure.

Despite projected Asian demand, Russia needs to prepare for a contingency involving a reduction in overall world demand for oil by diversifying its portfolio as an energy supplier to include more focus on natural gas and nuclear energy. In keeping with its conservative tendencies, Russia is likely to pursue both options.

Nuclear energy is a lucrative business area for Russia's energy export sector. Russia has the production capabilities and technical expertise to be a key world supplier of civilian nuclear technology and its ability to provide nuclear technology at relatively low prices makes it attractive to some customers. If Russia couples provision of nuclear reactors with reprocessing or disposal of spent fuel rods, the proliferation fears associated with customers acquiring weapons-grade nuclear materials might be assuaged. This is essentially the agreement Russia made with Iran concerning provision of nuclear fuel for the Bushehr nuclear plant.

Russia's Foreign Policy Perspectives on Climate Change

Russia does not yet consider the climate change issue a top-tier priority. Although this is likely to change over the next decade as more hard evidence of its disruptive impact surfaces, Russia still probably will feel less motivation to address climate change than the United States and others. Moscow also does have a legitimate rationale to regard climate change as not wholly negative, given that, while mainly disruptive, it is likely to generate beneficial effects in some areas. Nevertheless, as previously noted, evidence such as its recent climate change doctrine does suggest that Russia's views may be coming more into line with the international community.

Even if Russia is realizing that climate change is a serious issue, Russia's position on climate change has been, and is likely to remain, divergent from that of many other countries, including the United States. Much of the international debate on climate change mitigation, including the prospective debate at Copenhagen, has focused on measures to address the factors generating climate change, such as greenhouse gas emissions. As a primary fossil fuel supplier, Russia has little incentive to constructively engage in a debate that ultimately aims to extinguish the country's primary source of revenue. Even if it successfully manages the domestic energy challenges brought about by climate change, Russia's continued reliance on fossil fuel production will exacerbate rather than mitigate global climate change. Russia has therefore tended to treat climate change as a *fait accompli* and preferred to focus on adapting to and treating its effects rather than attacking the causes. Russia nonetheless is willing to accept international restrictions on emissions and initiatives toward alternative energy as long as it can be confident that demand for its oil and gas will continue to grow in Asia and the developing world.

US Engagement with Russia on Climate Change

Constructive engagement on climate change will be hampered by Russia's distrust of the United States. Beyond the legacy of decades of strategic confrontation, Russia has more proximate and concrete concerns that Western policy decisions pose direct threats to its security. Russia feels threatened by recent expansion of NATO into Eastern Europe, and

particularly plans to admit more former Soviet Republic such as Ukraine or Georgia. Expanded US involvement in Central Asia, NATO operations in the Balkans, and moves toward establishing a US missile defense shield in Europe contribute to a siege mentality in the Kremlin. Russia's proactive stance in the Arctic may be an attempt to turn the tables and keep the United States and NATO at arm's length.

The Cold War experience, however, illustrates that Russia and the United States can cooperate in some areas even in an atmosphere of distrust and strategic competition. Therefore, the two may be able to cooperate and engage constructively on climate change mitigation. Moreover, Russia's assessment of the US approach to energy and climate change—in particular, how Moscow assesses US energy policy will affect oil and gas prices—will play a significant role in its internal approach to climate change. If Russia sees the United States making clear steps towards alleviating climate change, Russia will begin to adjust its own policies in response, such as by ensuring that international oil and gas prices stay high or becoming a key supplier of alternative energy technologies such as nuclear power. That said, ultimately Russia will care more about the policies adopted by Europe or China, its primary customers.

Russia is more likely to respond constructively to approaches framed in terms of energy policy rather than climate change policy. Specifically, Russia has much to gain from energy efficiency and an emphasis on technical cooperation regarding efficiency highlights action that can benefit Russia and help mitigate climate change. US companies also have expertise in areas such as deep-water drilling that might open doors to a more cooperative approach to Arctic energy exploration. In terms of alternative energy, nuclear energy may be a fruitful area for US-Russian cooperation on climate change-related issues and proliferation-resistant nuclear technology to meet the needs of international nuclear energy markets. The United States has pursued a framework for providing nuclear fuel reprocessing—a service Russia also offers—multilaterally through the Global Nuclear Energy Partnership (GNEP). Russia has expressed openness to cooperation with the United States or other countries on such approaches.

Technical and scientific cooperation on climate represents another potentially fruitful area of engagement. For example, the United States might pursue Russia's expressed interest in developing better data and models with which to assess the future effects of climate change. The United States also might involve Russia in joint efforts to model future climate scenarios. Joint modeling may not result in unified analytic results, but would at least foster a common understanding of the parameters of the issues involved. Alternatively, such an initiative might be undertaken at the non-governmental level, partnering with Russian think tanks and research institutes.

The Copenhagen Negotiations

Russia's approach to the climate change negotiations is likely to be pragmatic and opportunistic and focused on ensuring that the terms of any deal are to its benefit or at least cost Moscow nothing. Russia believes it has less at stake in the climate change debate and more freedom to extract concessions from the participants. The practical effect global climate change agreement is a secondary concern for Russia, although it would likely welcome a deal that mitigates some of the sources of climate change without constraining its oil and gas exports.

Russia's overarching strategy at Copenhagen probably will be to leave the contentious negotiations to the United States, China, India, and the European Union. Russia will look to take full advantage of the United States' interest in brokering deals with India and China, and will take every opportunity to extract favorable concessions. Moscow may position itself as an important swing player and broker between the West and the developing world.

Russia expects that the results of Copenhagen will not differ radically from the 1997 Kyoto Protocol. They presume that such a Kyoto-like system would be based on substantial individual pledges to reduce emissions according to the signatories' particular developmental situation. The terms of Kyoto were highly beneficial for Russia because emissions pledges were based on percentage changes from 1990 baseline levels: the economic collapse of the former Soviet countries after 1991 caused a major reduction in emissions, and it was easy for Russia to keep its emissions below the limitation set based on the 1990 baselines. One of Russia's objectives at Copenhagen will be to retain the favorable 1990 baseline, over European objections.

Russia's recent rhetorical recognition of the challenges posed by climate change may be a strategic move intended to better position itself to secure favorable concessions at Copenhagen. By appearing more in line with prevailing views of climate change, Russia may hope to find other participants more favorable towards its positions and to lay the groundwork to request exemption from certain climate change mitigation measures.

Russia's primary focus may be to secure favorable terms for its major capital projects and insure that any agreement reached at Copenhagen includes less restrictive terms for foreign investments. Because of its high projected investment needs, Russia will seek to secure joint international investment and credits for their energy infrastructure projects on the grounds that they will increase efficiency and thereby help mitigate climate change. Gazprom, for example, argues that investment to help them upgrade their gas pipeline system and credits for reducing gas flaring by a significant amount would be beneficial in combating climate change. Gazprom and other elements of the Russian energy industry have identified climate-related international investment as a major potential source of funding.

Although Russia may exhibit a flexible position on climate change, it has very little room to maneuver in terms of concessions that would negatively affect its oil and gas sector. It is also very unlikely to accept conditions that it regards as threatening its sovereignty. Russian willingness to accept the terms of an international climate deal could evaporate if these core interests are challenged or its paranoia over an international anti-Russian conspiracy is triggered.

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CONFERENCE REPORT

**RUSSIA: THE IMPACT OF CLIMATE CHANGE TO 2030:
GEOPOLITICAL CHANGE**

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