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Location Decisions in the Russian Aluminium Industry

Location decisions – where production enterprises are located – are crucial for corporate and national economic development.[1] Those decisions determine not just whether an enterprise is a commercial success or failure, but can also have significant political and social ramifications. Analysis of location decisions taken by privately owned firms operating within a market economy usually begins with the assumption that they are based on profit-driven commercial considerations: access to cost-effective inputs (raw materials, power, finance, an appropriately qualified workforce) and to markets. The relative importance of these factors is influenced by a range of 'natural' variables, including climate, remoteness, and the physical characteristics of inputs, outputs and the production process. The significance of these variables varies considerably according to the sector of the economy in which the firm is operating.

While these might be the factors driving the decisions of firms when left to their own devices, it is rare that location decisions are unaffected by political and social considerations. Governments seek to influence location decisions, often to promote the development of one particular region, in order to bring about improvements in employment and living standards.

Location decisions are particularly complex and sensitive in Russia. It is a large country with a wide range of geographic and climatic conditions. It has extensive natural resources often located in the most challenging regions, raising questions of what arrangements to make for their recovery, processing and delivery to market. It also has greatly varying levels of development across its regions, which has led to debates over whether industrial location should be a policy instrument for regional development. Location decisions can also be driven by strategic considerations, such as whether to locate strategic assets well away from border zones or to attract population to regions that might be contested by outsiders. A difficult relationship with foreigners is further reflected in a constant national debate on the desirability of economic self-sufficiency versus

[1] The literature on location decisions is enormous. Miroslav N. Jovanovic, *Economic Integration and Spacial Location of Firms and Industries* (Cheltenham: Elgar, 2007) is a three-volume set of reprinted papers dealing with location issues.

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engagement with the outside world. This raises the question of whether economic activities should be situated outside Russia, or whether encouragement should be given to their location within the country.

In this article location decisions in the Russian aluminium industry, in particular a greenfield project in the Komi republic, are analysed. Four possible approaches to understanding location decisions are offered: the commercial, the regional development, the climate, and the global firm approaches. The boundaries between the approaches are porous. Nevertheless, despite overlap, each has its own implications for the Russian economy.

The commercial approach

As suggested above, this model holds that a privately owned firm in a market economy locates its enterprises according to commercial considerations, essentially which mix of access to various inputs and to markets maximises profits. That mix will vary considerably from industry to industry. Aluminium does not occur naturally. It is smelted from alumina, which in turn is usually produced from bauxite, most efficiently through the Bayer process. The high-grade ore needed for the Bayer process is typically found in tropical locations. It is possible to make alumina from low-grade, non-tropical bauxite, and even from non-bauxite substitutes such as nephelite. However there are technical inefficiencies in doing so.

Roughly speaking, the production of one tonne of aluminium requires two tonnes of alumina, which in turn requires five tonnes of bauxite. A cubic metre of bauxite weighs 1281 kg; the same volume of alumina weighs only 961 kg, mainly because it has had the water roasted out of it.[2] The difference in weight suggests that it makes sense to mine bauxite and process it into alumina in close proximity. Alumina is also easier to transport because of the sticky, muddy consistency of bauxite.[3] However the processing of bauxite into alumina is quite energy-intensive, since it involves a roasting (calcining) process at 1100°C. So while there are good reasons to locate an alumina plant close to the source of the bauxite which feeds it, the availability of reliable, well-priced power cannot be ignored.

[2] <http://www.simetric.co.uk/si_materials.htm>.

[3] 'Aluminum and bauxite', Mineral Information Institute, <http://www.mii.org/Minerals/photoal.html>.

The power demands of alumina production are nothing, however, compared to those involved in aluminium smelting. Indeed energy considerations make it essential that aluminium smelters be close to cheap power, even if that is some distance from the bauxite and alumina. Power costs are also likely to outweigh the cost of transporting the finished product to markets.

For geological reasons the overwhelming majority of high-grade bauxite is situated in tropical regions. Russia therefore is not blessed with large amounts of it. It is considerably better off as far as power is concerned. Nevertheless arriving at the right locational combination of availability of raw materials and power, particularly when various non-commercial complications are added to the mix, has not been easy.

The regional development approach

Particularly among those wary of state interference in the operations of the market, the regional development goals of national and local governments are seen as the greatest threat to commercially based location decisions. Governments use financial incentives (subsidies and tax arrangements) or regulation (zoning and capital controls) to meet political and social goals, above all regional equalisation and national security.

In Soviet times, an ideology of regional equalisation was based on the 'Engels dictum' – that large-scale industry should be equally distributed across a socialist country. It was arguably primarily a cover for strategic imperatives, including the need to place strategically important economic assets far from vulnerable borders, to exploit strategically important natural resources no matter how remotely located, and to maintain a population in regions susceptible to foreign incursions.[4]

The Soviet state was in a strong position to impose its regional development goals, with what many would claim to be baleful results. Has the approach survived the collapse of central planning and the end of the Cold War? There are those who claim that it indeed lives on, in a primeval fear of the Chinese occupation of empty space in the east, the continued existence of the ideology of regional equalisation, and the lobbying power of self-interested regional elites,

[4] Fiona Hill and Clifford Gaddy, *The Siberian Curse: How Communist Planners Left Russia Out in the Cold* (Washington DC: Brookings Institution Press, 2003), 88–89.

often in alliance with subsidy-seeking business firms.[5] It is an issue that has become mixed up with the complexities of the politics of post-Soviet centre–periphery relations.

The circumstances under which Yeltsin came to power meant that he had to give the regions considerable control over their own economic resources in order to buy the political support of regional leaders. Although other factors, including the possible threat to national unity of ethnic issues, were relevant, the major beneficiaries of Yeltsin-era fiscal arrangements were those regions that had some economic resources to control.[6] This was reflected in the high percentage of resource tax revenues retained by resource-rich regions. The consequences for non-resource regions were low revenues of their own and a lack of federal revenue to which they could gain access. The results were severe economic distress and strong support for the communists in the non-resource 'rust belt' regions.

Putin did not have the same political debts to regional leaders as Yeltsin, and he was not prepared to tolerate the political threat represented by the 'Red Belt'. His attacks on regional political rights, including the removal of governors from the upper house of parliament and the abolition of gubernatorial elections, applied to all regions. The resource-rich regions were specifically affected by changes to tax arrangements, with their percentage of resource-tax revenues being drastically reduced.[7] The centre's seizure of resource revenues was used for revenue redistribution purposes, with the proceeds being used to pay off wage and pension arrears in poorer regions.

There have been efforts by the resource-rich regions to fight back. Proposals, supported by Putin, that resource tax arrangements be re-adjusted in favour of the regions, have been put forward.[8] Efforts have been made to formalise the abandonment of the regional equalisation approach. Aleksandr Khloponin, the governor of Krasnoyarsk region, an important centre of the aluminium and other resource industries, has been particularly persistent. He complains that resource-rich regions, which, being remote, high-cost and socially underdeveloped, usually

[5] Hill and Gaddy, Chapters 7–10.

[6] Michael Bradshaw and Jessica Prendergrast, 'The Russian Heartland Revisited: An Assessment of Russia's Transformation', *Eurasian Geography and Economics*, 46 (2005), 100–101.

[7] Aleksei Shapovalov et al, 'MERT nameren vernut′ NDPI regionam', *Kommersant*, 29 May 2006, <http://www.kommersant.ru/doc.html?docId=677250>.

[8] Shapovalov.

have their own special needs, but do not have enough revenue left for their own needs.

Initially Khloponin worked closely with the newly created Ministry of Regional Development to present to the government a new policy concept based on the principle that only regions with good economic prospects receive federal development funding.[9] The government accepted the new approach in principle in mid-2005, although further reworking was requested. During the reworking Khloponin fell out with minister Yakovlev, seemingly over Khloponin's suspicion that the minister was having second thoughts about giving up regional distribution policies that were at the core of his ministry's *raison d'etre*. Khloponin continued to lobby within the government and presidential administration to get Putin's support for his views.[10]

In September 2007 Yakovlev was replaced by Putin's close associate Dmitrii Kozak, under whom the ministry appears to be continuing its drift back towards regional equalisation. The ministry has called for the use of 'negative transfers' to the centre from regions that benefit excessively from the proposed new tax arrangements.[11] In doing so it takes on a number of lobbies: the anti-inflation lobby of the Minister of Finance Kudrin, which does not want government spending on development anywhere; Khloponin's resource lobby, which does not want resource-rich regions to be taxed in order to finance non-resource regions; the industry lobby, which wants development spending to be sectorally, not regionally based. It does however have the general support of the powerful *siloviki*, since they support the strategic goals that have always lain behind the ideology of regional equalisation. In February 2008, Putin seemed to support that approach in a speech he made to a meeting of the State Council, even if his words suggest that implementation may not be immediate:

> In the coming years we must move to a new stage of regional policy, directed towards the achievement of not formal but real equal rights of the subjects of the Federation – an equality of rights allowing each region to possess the

[9] Kazuhiro Kumo, 'Interregional population migration in Russia: using an origin-to-destination matrix', Discussion Paper Series A No. 483 (Tokyo: Institute of Economic Research, Hitotsubashi University), 21.

[10] Tat′iana Stanovaia, 'Aleksandr Khloponin provozglasil regional′nuiu revoliutsiiu', *Politcom.ru*, 24 July 2006, <http://www.politcom.ru/article.php?id=3114>.

[11] Nadezhda Ivanitskaia, Kira Latukhina, 'V pol′zu bednykh', *Vedomosti*, 17 April 2008, <http://www.vedomosti.ru/newspaper/article.shtml?2008/04/17/146309>.

> required and adequate resources to provide decent living standards for its citizens and the comprehensive development and diversification of regional economies.[12]

This situation is far from clear. The case of the Komi aluminium project will allow us to shed further light on the matter.

The climate approach

The 'cost of the cold' has become a topical issue. Parshev's 2002 book *Pochemu Rossiia ne Amerika* (*Why Russia is not America*) caused a sensation.[13] His argument was developed by Lynch.[14] In 2003 Hill and Gaddy adopted a different approach to the same issue in their book *The Siberian Curse*.[15] Parshev argues that Russia's climatically determined costs of construction, resource exploitation and transport mean that the country will never be competitive in the global economy. He claims that Russia's post-Soviet resource exports are profitable only because of the cheap energy to which resource firms have access.[16] The lesson is that Russia should withdraw from the global economy.

Lynch suggests that the reason for the lack of investment in the Russian economy is not the usually identified poor 'investment climate' (poor legislation, corruption, crime, etc), but rather the unattractiveness, based on geography, of potential investment projects. Because of its location-related lack of competitiveness, Russia's resource wealth, as extensive as it might be, cannot bring a reasonable return to a private investor. The only private 'investors' likely to be attracted to such assets are oligarchic asset strippers. State intervention is clearly required.

Neither Parshev nor Lynch is discriminating in his identification of those parts of Russia that are cold – each sees the entire country in those terms. The implication is that adjustments to location policy within the country will make

[12] V. V. Putin, 'O strategii razvitiia Rossii do 2020 goda', Vystuplenie na rasshirennom zasedanii Gosudarstvennogo soveta, 8 February 2008, <http://www.kremlin.ru/text/appears/2008/02/159528>.

[13] A. P. Parshev, *Pochemu Rossiia ne Amerika* (Moscow: Krymskii most-9d, Forum, 2002).

[14] Allen C. Lynch, 'Roots of Russia's economic dilemmas: liberal economics and illiberal geography', *Europe-Asia Studies*, 54 (2002), 31–50; *How Russia is Not Ruled: Reflections on Russian political development* (Cambridge: Cambridge UP, 2005).

[15] Hill and Gaddy.

[16] Parshev, 77–78.

no difference. Hill and Gaddy adopt a different approach, concentrating on the coldest parts of the country, specifically Siberia. Further, unlike Parshev and Lynch, who are relatively undiscriminating in their sectoral approach, Hill and Gaddy are primarily interested in the location of industrial capacity. Indeed, they recognise that the exploitation of natural resources is a special case, in which high intrinsic value could offset the costs of the cold.[17]

While for Parshev and Lynch there is something deterministic about Russia's geography and climate, for Hill and Gaddy the location of much of Russia's industrial capacity in the very cold regions of Siberia is the result of choice, by Stalin and other leaders driven by strategic considerations. Determined policy and market forces should over time bring about a shift of assets from Siberia to the milder climate of European Russia. Although Parshev and Lynch, on the one hand, and Hill and Gaddy on the other, differ considerably in their approach to the cost of the cold, they all concentrate on the extra costs of construction, transport and heating in cold climates. We will also look at those costs, as borne by the aluminium industry, and compare them to such costs in the tropics.

The global firm approach

In very recent times outward foreign direct investment (OFDI) by Russian firms – their decisions to locate their operations outside Russia – has attracted considerable attention, as part of the phenomenon usually known as emerging-market OFDI.[18] The phenomenon is of academic and policy significance. The major academic question is whether, in terms of the motivations and capacity of firms to engage in it, emerging-market OFDI is significantly different from more traditional Western-sourced FDI, on which most analysis of FDI has been based.

[17] Hill and Gaddy, 48, 205.

[18] Russian OFDI receives attention in W. Andreff, 'The newly emerging TNCs from economies in transition: a comparison with Third World outward FDI', *Transnational Corporations*, 12 (2003), 73–118; A. S. Bulatov, 'Russian direct investment abroad: main motivations in the post-Soviet period', *Transnational Corporations*, 7 (1998), 69–82; 'Case study on outward foreign direct investment by Russian enterprises', UNCTAD, 8 November 2005; V. Kaartemo (ed.), *New Role of Russian Enterprises in International Business*, Pan-European Institute electronic publication, Turku School of Economics, 18 (2007), <http://www.tukkk.fi/pei/e/>; Alexei Kuznetsov, 'Russian companies expand foreign investments', *Russian Analytical Digest*, 34 (5 February 2008); 'Russian multinationals bullish on foreign markets', SKOLKOVO (Moscow School of Management) and Columbia Program on International Investment, Press release, Moscow and New York, 11 December 2007.

The policy issue is whether FDI from such countries as China, India and Russia should be welcomed by host states or seen as a threat to national security.[19]

For our purposes these issues are not of primary concern. The OFDI literature is useful here because it tells us that for Russian firms today a location decision can be a decision to locate outside Russia. Different motivations are suggested: to obtain raw material inputs that are unavailable or more expensive at home, to obtain new technology and managerial know-how, to become too big and internationally engaged for a rapacious Russian state easily to seize the firm, or conversely to have it serve as the instrument abroad of an aggressive and hostile Russian state. The Russian aluminium industry is very involved abroad, and one or more of these motivations could well be present.

Which of the four approaches just outlined might best be used to explain Russian location decisions is the question behind our examination of the Russian aluminium industry, in particular a project in the Komi republic. With a chequered history dating back to Soviet times, as proposed the project includes a bauxite mine, alumina plant and aluminium smelter, all in close proximity to each other in Russia's north. To understand its history and what has been driving location decisions in the Russian aluminium industry requires a historical survey of the industry.

The Russian aluminium industry[20]

The birthplace of the Soviet aluminium industry was in the northwest of Russia, using local bauxite from Boksitogorsk. As smelting expanded, increasing use was made of nephelite ores from the Kola Peninsula. The other traditional centre was the Urals, with two smelters, the Urals and Bogoslovo Aluminium Plants, producing their own alumina from local bauxite.

From the early 1960s aluminium production shifted east to take advantage of Siberian hydropower. With the exception of the Krasnoyarsk Aluminium Plant, which used local nephelite ore processed into alumina at the neighbouring

[19] These issues are discussed by the author in a conference paper, 'Outward FDI by Russian minerals firms', Conference of Research Committee 38, Business and Politics, International Political Science Association, University of Tasmania, Hobart, 31 March 2008.

[20] This section is based largely on Theodore Shabad, 'The Soviet aluminum industry: recent developments', *Soviet Geography*, 24 (1983), 89–99; Matthew J. Sagers, 'The aluminum industry in the former USSR in 1992', *Post-Soviet Geography*, 33 (1992), 591–601; Stephen Fortescue, 'The Russian aluminum industry in transition', *Eurasian Geography and Economics*, 47 (2007), 76–94.

Achinsk Alumina Plant, the Siberian smelters used alumina from the Urals, from a new alumina plant in Kazakhstan, and increasingly imports. In the 1970s the Soviet Union made major investments in a bauxite source at Kindia in Guinea, with most of its output going to a new alumina plant at Nikolaevsk in Ukraine, opened in 1983. Its alumina was destined for East Siberia, the Sayansk Aluminium Plant in particular.

There is no need here to go into the complex and often brutal detail of the reallocation of ownership through the 1990s. Suffice to say that by 2000 the industry was dominated by two companies, Oleg Deripaska's Rusal, with up to 80 per cent of primary aluminium output, and Viktor Vekselberg's SUAL. Rusal was strongest in Siberia, where the biggest smelters are situated; SUAL was concentrated in the Urals and north-west Russia. In autumn 2006 they announced their intention of merging, with the major international trader Glencore adding its aluminium assets to the new firm. The merger was completed in 2007, with the new firm being called Rusal.[21]

Rusal

Rusal's Siberian smelters rely heavily on imports, from the 'far abroad' and union republics that gained their independence with the collapse of the Soviet Union. Early this decade securing inputs became Rusal's primary strategic goal.[22] Its firm focus was on obtaining supplies from abroad, with a bewildering series of announcements of plans to develop bauxite and/or alumina capacity in many places. None bore much fruit, although the company did spend $461 million on Kaiser's 20 per cent share in Queensland Alumina, which runs a plant of 3.6 Mt/year capacity at Gladstone.[23]

Rusal's most serious involvement was in Nikolaevsk and Guinea. Nikolaevsk was the company's only 'in-house' source of Bayer-based alumina, the required input for most of its plants. The plant has brought the company serious political difficulties. To get the agreement of the Ukrainian government to its takeover Deripaska had to make a commitment not only to expand output at Nikolaevsk,

[21] Iuliia Fedorinova, 'Starshii brat', *Vedomosti*, 28 March 2007, <http://www.vedomosti.ru/newspaper/article.shtml?2007/03/28/123107>.

[22] Kirill Petrovskii, 'Kompaniia vybrala svoi put'', *Metally Evrazii*, 3 (2001), 51.

[23] 'RUSAL vyigral auktsion po prodazhe 20 per cent aktsii avstraliiskogo zavoda Queensland', *Vedomosti*, 29 October 2004, <http://www.vedomosti.ru/newsline/print.shtml?2004/10/29/85362>.

but also build an aluminium smelter nearby. Although the expansion requirement is being met,[24] there is no sign of the smelter and the Ukrainian government occasionally expresses its displeasure.[25] Rusal took over the Soviet government's operations in Guinea, including a commitment to expand output at Kindia.[26] In 2002 it gained access to more Guinean alumina when it took over the Friguia alumina plant.[27] Rusal also has a 25-year concession to develop the giant DianDian deposit. It is undeveloped and would require considerable investment, including a railway and port facilities.[28] Rusal's foreign excursions did not bring it the input security that it craved, leading it eventually to turn to domestic sources. Most interesting for us is Rusal's 2005 decision to join SUAL in the latter's Komi project, paying $100 million to buy in.[29]

SUAL

At first glance SUAL appeared to have inherited a more generous legacy from the Soviet period than Rusal. Its core smelters, the Uralsk and Bogoslovo plants, were built with their own alumina capacity processed from local bauxite. However the legacy had its difficulties. The South Urals Bauxite Mine, always a relatively small producer, was essentially exhausted as SUAL obtained it, and was quickly closed.[30] The situation at the North Urals mine has also been difficult. Its bauxite is only barely suitable for the Bayer process.[31] From the 1970s high sulphur

[24] Iurii Svirko and Mariia Molina, ' "Rusal" otol′et aliuminii', *Kommersant*, 4 March 2005, <http://www.kommersant.ru/doc.html?docId=552168>.

[25] Iuliia Fedorinova, Elena Mazneva, Anna Nikolaeva, 'Deripaska dolzhen postroit′ zavod', *Vedomosti*, 14 June 2005, <http://www.vedomosti.ru/newspaper/print.shtml?2005/06/14/93333>.

[26] Petrovskii, 51.

[27] Marina Zateichuk, 'Boksity Gvinei podorozhali', *Vedomosti*, 11 April 2008, <http://www.vedomosti.ru/newspaper/article.shtml?2008/04/11/145798>.

[28] 'Rousski Alumini fete cinq ans d'existence en Guinee', *Boubah.com*, 30 April 2005, <http://www.boubah.com/article/article.asp?num=653&cat=3>.

[29] Iuliia Fedorinova, 'Vkhodnoi bilet za $100 mln', *Vedomosti*, 26 April 2005, <http://www.vedomosti.ru/newspaper/print.shtml?2005/04/26/91301>.

[30] Vitalii Potylitsyn, 'Boksity Timana – put′ k stabil′nosti kompanii', *Metally Evrazii*, 5 (2001), 48; Pavel Arabov, 'SUAL zakroet boksitovyi rudnik', *Kommersant*, 24 April 2004, 17.

[31] Rudol′f Shkol′nikov, 'Ural′skii aliuminievyi: iubilei na poroge XXI stoletiia', *Metally Evrazii*, 3 (1999), 42.

content caused particular problems.[32] It is said that it takes seven tonnes of North Urals bauxite to produce a tonne of aluminium, rather than the typical figure of five. Geological conditions are also difficult and particularly since going underground the mine has suffered serious flooding problems.[33] Through the first half of the 1990s there were major declines in output, with it expected at the time that the decline would continue.[34]

When SUAL moved in it it decided to make the investments needed to reverse the decline. The decision was taken to make the required investments, including opening a new shaft at Novo-Kalinskaia.[35] But this would still leave the group's alumina plants short by approximately 1 Mt/year.[36] The shortfall forced the company to look elsewhere. Seemingly pushed by a production crisis at the North Urals mine,[37] SUAL decided to develop a greenfield deposit at Timan in the Komi Republic.

Timan

Reserves of 250–280 Mt are claimed, with 90 per cent suitable for open cut mining.[38] SUAL first obtained pilot quantities of ore, used to test suitability for use in the Urals alumina plants, in 1994.[39] Construction of the mine began in 1998. A 165-kilometre railroad connecting the mine to the railhead was completed in 2002. Until the railroad was completed ore could be delivered only in winter, the road being impassable in the summer.[40] In 1998 58,000 tonnes of Timan ore were processed.[41] In 2003 over a million tonnes were shipped for the first

[32] B. G. Bekhtev, 'Istoriia glinozemnogo tsekha UAZa', *Tsvetnye metally*, 8 (1999), 16–17 of insert; A. V. Kuznetsov, 'Syr′evaia baza glinozemnogo proizvodstva na Ural′skom aliuminievom zavode', *Tsvetnye metally*, 8 (1999), 23–24 of insert.

[33] Aleksandr Iulin, 'Strasti po krasnoi rude', Izvestiia, 28 October 1995, 4.

[34] 'Do Srednego Timana – rukoi podat'', *Metally Evrazii*, 1 (1997), 70–71.

[35] Viktor Rad′ko, 'Boksity Urala v situatsii vybora', *Metally Evrazii*, 5 (1999), 56–57; Potylitsyn, 50.

[36] Vladimir Skorniakov, 'Real′nost′ i perspektivy sy′revoi bazy', *Metally Evrazii*, 3 (1999), 48.

[37] Aleksandr Okatov, 'Vremia Timana', *Metally Evrazii*, 5 (1998), 16.

[38] Okatov, 16; Potylitsyn, 49.

[39] Kuznetsov, 24–25.

[40] Okatov, 18.

[41] Nikolai Makitrov, 'Komp′iuter na smenu rukavitsami', *Ural'skii rynok metallov*, 6 (2001), <http://www.urm.ru/newsOne.php?docid=51914>.

time.[42] Initially the plan was to use Timan ore purely to supply the company's Urals plants. However it was quickly decided to push capacity beyond the needs of the Urals plants. The figure usually cited is 6.5 Mt/year. The planning focus shifted to an alumina plant and even aluminium smelter.[43]

The smelter, to be situated in the north of the republic at Pechora, was always a doubtful starter. But until recently the commitment to the alumina plant, to be situated at the village Kerki on the outskirts of Ukhta (its location is also often given as Sosnogorsk), appeared to be firm. Detailed planning was completed, as were environmental evaluations and public consultations. Land was acquired, site preparation begun, and infrastructure installed.[44] Completion was scheduled for 2008 or 2009.[45] As late as July 2007 Rusal signed an agreement with the Norwegian company Storvik to build a plant nearby to produce the special equipment needed for the project.[46]

However from the beginning there had been questions about the power supply. In 2003 SUAL, the Komi government and EES, the power supplier, signed an agreement that power would come from the Pechora gas-fired power station, which at the time was operating below capacity. However an expansion of the station's capacity would be required to meet the project's needs.[47] That expansion required a commitment from Gazprom that extra natural gas would be made available. Despite several years of negotiation no agreement could be reached. Not even an instruction in 2006 from Putin that the government investigate the matter resolved the problem.[48]

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[42] *Proekt rasshireniia Sredne-Timanskogo boksitovogo rudnika do moshchnosti 6 mln. t/god. Ekologicheskaia i sotsial'naia otsenka. Kratkaia versiia*, Gruppa SUAL, Programma "Komi Aliuminii", March 2004, 7, <http://www.rusal.ru/business/komi_aluminium/ecology/>.

[43] Iuliia Fedorinova, ' "SUAL" zaimet $600 mln', *Vedomosti*, 4 February 2005, <http://www.vedomosti.ru/newspaper/print.shtml?2005/02/04/86530>.

[44] 'Komi Aliuminii zhdet gaz', *Rosinvest.com*, 27 March 2008, <http://www.rosinvest.com/printnews/398746/>.

[45] 'Proektu "Komi Aliuminii" dan zelenyi svet', website of Shaneko Consulting, 31 October 2006, <http://www.shaneco.ru/news/?id=2455>.

[46] Dmitrii Smirnov, 'OK "Rusal" sdelaet metallokonstruktsii dlia sebia', *Kommersant*, 17 July 2007, <http://www.kommersant.ru/doc.aspx?DocsID=78300>.

[47] 'Obshchaia stoimost′ realizatsii proekta "Komi aliuminii" prevyshaet $2 mlrd', *Delovoi Peterburg*, no date, <http://www.avias.com/news/2003/06/16/53904.html>.

[48] Vladimir Torlopov, 'Damoklovy nozhnitsy mezhbiudzheta', *Ekspert Online*, 28 August 2006, <http://www.expert.ru/printissues/expert/2006/31/interview_pravitelstvo_komi_nauchilos_zhit_po_sredstvam/>.

The focus of most commentators' concern was the price at which power would be made available to the Pechora smelter, smelters being far bigger users of electricity than alumina plants.[49] However in 2005 Alcoa had declined to participate in the alumina plant stage of the project because of uncertainties over access to power supplies for it as well as the smelter.[50] Despite that clue that the alumina plant was vulnerable to the power issue, it was still a surprise when suddenly, in March 2008, Rusal announced that it was postponing construction for two years, citing the lack of agreement on gas supplies. There are differing views as to the true meaning of Rusal's announcement. Some believe that, given the size and importance of the project, agreement will undoubtedly be reached and the project proceed;[51] others are less sure, believing that Rusal itself has lost interest.[52] We will consider the possibilities in terms of the different approaches to understanding location decisions outlined at the beginning of the paper.

The climate approach

We will begin with consideration of the climate approach. Is it possible that Rusal has re-done its sums and decided that such a development in the far north would not be globally competitive? That is, has a private company operating in the global market place decided not to bear the costs of the cold? The climatic costs of the Komi project are now examined, and some comparisons made to costs in other parts of the world, including Guinea, in order to determine whether locating an aluminium project in northern Russia makes commercial sense.

The Timan deposits are in the western part of the Komi republic, at approximately 64° 20′ N, 51° 05′ E.[53] The average temperature is below zero 190–192

[49] 'Proekt vsei zhizni Vladislava Bronevogo', 30 November 2004, <http://www.renova.ru/press/publications/593/print/>; Vladimir Demin, ' "Programma opredelena nashimi aktsionerami" ', website of Pechora GRES, no date, <http://www.pechgres.elektra.ru/news/articles/20050418dir.htm>.

[50] Fedorinova.

[51] Aleksandra Trushina, 'RUSAL otodvinul Komi Aliuminii', *RBC-daily*, 3 March 2008, <http://www.infogeo.ru/metalls/press/?act=show&rev=3701>.

[52] Viktor Tsuker, 'Na vremia ili navsegda?', *Ekspert Severo-Zapad*, 10 March 2008, <http://www.expert.ru/printissues/northwest/2008/10/alyuminiy>. In April 2008 Vladimir Kremer, the executive who was in charge of the Komi project, was appointed deputy chair of the management board of Renova (the parent company of SUAL). 'Otstavki i naznacheniia', *Vedomosti*, 17 April 2008, <http://www.vedomosti.ru/newspaper/article.shtml?2008/04/17/146282>.

[53] The coordinates identified by Sagers are incorrect. The Vezhayu at the coordinates he provides, 62° 34′ N, 54° 50′ E, is south east of Ukhta, whereas the Timan deposits are to the north-west. Sagers, 598; *Respublika Komi*, Obshchegeograficheskie karty Rossiiskoi Federatsii (Moscow: Federal′naia

days per year, and the soil is frozen to a depth of up to 1.5 metres from the end of October to the end of March. There is solid snow cover 204 days a year.[54] Ukhta, the site of the alumina plant, is at 63° 32′ N, 53° 43′ E; Pechora, the projected site of the aluminium smelter, is further north, at 65° 07′ N, 57° 05′ E. These places are not at the radical extreme of Russia's cold. The average January temperature in Ukhta is -17°C and in Pechora -18°C.[55] In Burkhanov's classification they are on the boundary between the northern and subarctic zones.[56]

Rusal's undeveloped bauxite deposit at DianDian in Guinea is at 11° 01′ N, 13° 47′ W, on the edge of the coastal lowlands in north-west Guinea.[57] Like Timan, it is not at the climatic extreme of the country, the highlands being hotter than places closer to the coast. Nevertheless the average temperature is 30°C, with something like 100 inches of rain per year.[58] DianDian is certainly as hot as Timan is cold. What might the 'costs of the cold' be in Timan, and how might they compare to the 'costs of the heat'? The 'cost of the cold' literature focuses on two cost categories: construction and operation of plant, and living and working in cold conditions.

Plant costs in the cold

Hill and Gaddy talk of 'what happens when the thermometer drops below certain critical cold thresholds that trigger massive and disastrous materials failures'. They note, on the basis of Russian sources, that -15°C is the first critical threshold for standard equipment. At that temperature high-carbon steels break and car batteries must be heated. At -20°C, standard compressors with internal combustion engines cease to operate and metal structural components fracture.[59] The Timan project clearly has to cope with such temperatures and at times considerably colder. Because of such stresses on equipment, equipment turnover is very high

sluzhba geodezii i kartografii Rossii, 1995), 1:1,000,000 map; *USSR*, Gazetteer No 90, Official standard names approved by the US Board on Geographic Names (Washington, DC: Department of Interior, April 1965), microform.

[54] *Proekt*, 21.

[55] <http://meteo.infospace.ru/climate/html/city_e.sht?num=23606&id=15611940>.

[56] V. F. Burkhanov, 'Criteria for determining an engineering-geographic boundary of the north of the USSR', *Soviet Geography*, 11 (1970), 30.

[57] *Guinea*. Gazetteer No 90.

[58] Thomas O'Toole, *Historical Dictionary of Guinea* (Metuchen NJ: Scarecrow, 1978), xvii.

[59] Hill and Gaddy, 48–49.

– in the Soviet period the extreme cold regions took a strongly disproportionate percentage of construction machinery.[60] According to Burkhanov's classification, sub-arctic sites require specially designed equipment which adds 45 per cent to their cost over standard designs. Northern sites can get by with modified standard equipment at a 25 per cent increase in cost.[61] The construction manager for the Timan project noted in 2001 that they had imported expensive machinery, since adequate domestic equipment was not available. This might be related to Burkhanov's complaints about the use in Soviet times of standard Soviet-made equipment in entirely inappropriate climatic conditions.[62]

The start up costs for the mine itself were said to be $77.4 million. This is considerably more than the projected costs in 1993 for the Mulanje Mountain mine in Malawi of $25.5 million. However the Malawi mine was projected to produce 580,000 tonnes per annum compared to eventually something like 6 million from Timan.[63] On a pro rata basis, therefore, the Mulanje bauxite is more expensive. A Saudi Arabian mine, a large one at 2.5 Mt per year, was projected to cost $100 million in 1992, making the Timan mine look even cheaper.[64]

When in 1998, as deputy head of the Komi government, Aleksandr Okatov was trying to sell the project, he was relaxed about construction costs. He did admit that the transport link added significantly to the cost.[65] There is considerable variation in the claimed cost of the line, ranging from a high of $243 million projected in 1997 (of a total cost for the mine of $520 million), to $72.6 million (of a total $150 million) in 2001.[66] The lower and later figure, representing $440,000 per kilometre, seems most likely.[67] The projected cost in 1992 for a

[60] Hill and Gaddy, 50.

[61] Burkhanov, 29.

[62] Potylitsyn, 49.

[63] 'Mulanje Mountain bauxite project', <http://sdnp.org.mw/geosoc-mw/mulanje-bauxite.htm>.

[64] 'Mining opportunities in Saudi Arabia', US–Saudi Arabian Business Council, <http://www.us-saudi-business.org/Joint%20Ventures/jvmining.htm#Bauxite>.

[65] Okatov, 17.

[66] 'Do Srednego Timana', 70–71; Okatov, 18; Potylitsyn, 49.

[67] When the EBRD was considering funding the second stage of the project, it stated that $112 million had already been spent, including the completed rail line. Middle-Timan Bauxite Mining & Processing Project, Project summary document, European Bank for Reconstruction & Development, <http://www.ebrd.com/projects/psd/psd2004/20318.htm>.

615 km railway for a Saudi Arabian bauxite mine was $452 million, or $730,000 per kilometre.[68]

Construction of the alumina smelter was estimated at $1 billion, for a capacity of 1.4 Mt/year ($714 per tonne). The projected plant in Malawi was more expensive at $1027 per tonne ($205.4 million for 200,000 tonnes per annum). The replacement cost of the Gladstone alumina plant in Queensland is about the same as the Malawi price at $1081 per tonne ($4 billion for 3.7 Mt/year).[69] A proposed Indian alumina plant, in Gujarat State, was closer to but still above the Ukhta cost at $805 per tonne ($322 million for 400,000 tonnes per annum).[70] There is no suggestion here of construction costs in cold climates being higher than those in warmer climes.

Human costs of the cold

Human costs can be discerned in two areas: reductions in work effort because of climatic conditions, and the effects of climate on health. Hill and Gaddy summarise US military research on the effects of the cold on the ability to carry out manual tasks.[71] While Timan is some way from the extremes of -40°C at which work outside becomes impossible, its average January temperature suggests efficiency levels roughly half those achieved in temperate conditions. Another source suggests that 33 per cent of working time in the Russian Far North is lost to the cold.[72]

For Parshev, and Hill and Gaddy, one of the most important lessons of the cost of the cold argument is that it corrects the fallacious view that Russian labour is cheap. Parshev concentrates on the extra costs involved in feeding, clothing, and keeping warm the workforce. In response to that argument, one would expect Russian companies to keep their labour force to the lowest levels possible. Hill

[68] 'Mining opportunities'.

[69] 'QAL fact sheet', <http://www.qal.com.au/>.

[70] 'Alumina project', 19th World Mining Expo 2003, New Delhi, <http://www.gmdcl.com/worldexpo/min17.htm>.

[71] Hill and Gaddy, 42.

[72] Victor L. Mote, 'Environmental constraints to the economic development of Siberia', in Robert G. Jensen, Theodore Shabad, Arthur W. Wright (eds), *Soviet Natural Resources in the World Economy* (Chicago and London: University of Chicago Press, 1983), 21.

and Gaddy suggest, though, that because of lower labour productivity employment levels have to be higher in the cold.

Do employment levels at Timan provide support for the views of either Parshev or Hill and Gaddy? The planning documents suggest that at full capacity employment levels would be about 900, of which about 200 would be managerial. The mine would be worked around the clock seven days a week in two 12-hour shifts, the shift brigades working two weeks at a time. Accommodation is required for 760 people, suggesting 380 working at any one time.[73] These are reasonable numbers. Rusal's Kindia mine in Guinea employs 1436 for an output of 2 Mt per year, and the Weipa mine in northern Queensland employs 688 to produce over 12 Mt per year.[74] The Timan mine is somewhere between Guinea and Australia, which is what one would expect given the relative wage levels in the three countries. While the sample is small and imprecise, climate does not appear to be a factor.

Another claimed cost of the cold is the increased level of illness of those working in the far north. While Russian health data show distressingly high mortality rates, there is no evidence that Komi is particularly unhealthy, by Russian or Guinean standards. Life expectancy at birth in Guinea is 51.0 for males (53.0 for females), and healthy life expectancy at birth is 43.9 years (45.6 for women). The equivalent Russian figures are 58.0 and 52.8 (and 72.0 and 64.3 for women). Russian adult male mortality is actually higher than for Guinean adult males, at 480 per 1,000 as against 403.[75] For the cohort most likely to be working in Timan and Ukhta, Russia appears to be a more unhealthy place than Guinea!

When we compare health data in Komi to the Russian average, the northern location is reasonably healthy. In 1998 the death rate in Komi was 10.0/1000, compared to 13.6 for the whole country. The figure for the Kniazhpogostskii district in which Timan is situated was closer to the national average at 12.7, a reflection of the higher figures for the rural parts of the republic.[76] There is little illness recorded that could be described as specifically cold-climate related, unless

[73] *Proekt*, 14–15.

[74] 'From the general manager', <http://www.comalco.com/freedom.aspx?pid=211>.

[75] All data from the World Health Organization website, <http://www.who.int/countries/rus/en/> and <http://www.who.int/countries/gin/en/>.

[76] *Osnovnoi sbornik za 1999 god*, Respublikanskoe Biuro Meditsinskoi Statistiki Respubliki Komi, Tables 3 and 4, <http://minzdrav.kominet.ru:8101/sbornik/basic99/005demo.html> and <006demo.html>.

the very high percentage of influenza and upper-respiratory infections can be attributed to the cold. Dysentery rates are quite high.[77] It is clear from the planning documents that water quality is an issue at the Timan mine, a consequence of the boggy nature of the northern regions in the summer time.[78] But most of the health problems of Komi are standard health problems of Russia, which one suspects are more culturally determined than climatically.

In summary, given the location in the Urals of the smelters it serves the Komi project, leaving out the Pechora smelter, is well-placed. On top of that, with due deference to the scratchiness of the data, there is no overwhelming evidence that the costs of the Timan project are extraordinarily high because of its climatic circumstances. It should also be noted that Rusal is quite prepared to invest large amounts to modernise and build new plants in even colder Siberia.

The commercial approach

If cold-related construction and human costs are not comparatively excessive, should we therefore take the company at its word that power is the issue? Might indeed the postponement be no more than a bargaining ploy in a negotiation over power supplies? The aluminium industry is believed by its critics to be so riddled with subsidised power that no producer could compete without having access to such subsidies.[79] It is generally considered that the availability of reliable and cheap power – Siberian hydropower and the relatively low domestic prices of all forms of energy – is one of the strong competitive advantages of the Russian industry. It is surely the reason that Rusal continues to invest major resources in the expansion of its Siberian smelting capacity.

The difficulty in Komi appears not to be price, but the unwillingness of Gazprom to commit new gas to the project at any price that Rusal could conceivably pay. Gazprom, a state-controlled and monopoly supplier, has effectively limitless markets for its gas abroad, and already chafes under the politically imposed requirement that it sell a considerable proportion of its output

[77] *Mediko-gigienicheskaia otsenka sostoianiia zdorov'ia naseleniia Respubliki Komi i rezul'taty Gossanepidnadzora za faktorami okruzhaiushchei sredy*, <http://www.komi.com/CentreSanitary/monit1.html>.

[78] Middle-Timan Bauxite Mining & Processing Project.

[79] C. J. Riedy, *Energy and Transport Subsidies in Australia: 2007 Update* (Sydney: Institute for Sustainable Futures, University of Technology Sydney, 2007).

to domestic customers at a price below the export price. It is also struggling to maintain output, adding to its reluctance to commit gas to a new domestic customer.[80] We know too little of the negotiations between Rusal and Gazprom to know whether there is a basis for commercial negotiation. It is surprising that Rusal would have committed itself to the alumina plant without having at least a basis for negotiation. The somewhat rueful tone of one Rusal executive – 'We'll think before we sign up for new projects, so that we won't have another "Komi" ' – suggests that they might indeed have done so.[81]

Regional development approach

Some commentators remain confident that the project will proceed regardless of the lack of a commercial reason for Gazprom to provide the gas, because they believe – with good reason – that Gazprom's operations are not purely commercially driven. Gazprom will provide the gas because it will be politically pressured to do so.

Where would that pressure come from? The most obvious source is the Komi government. It has always been a keen supporter of the project, but there must be doubts about its capacity to put pressure on Gazprom and even its total commitment to doing so. While welcoming the bauxite mine and alumina plant, the government was particularly keen to have the Pechora smelter included in the project, because of the contribution it would have made to the Pechora local economy, devastated by the closure of most of its coal mines. It is clearly suspicious of Rusal's commitment to the smelter, and might feel that there is little point investing a lot of lobbying effort just for the sake of the alumina plant.[82]

That assumes that the Komi government would be an effective lobbyist even if it approached the task wholeheartedly. Komi is not one of the heavy-hitting regions. There has not been a stable regional political elite able to present a strong face to the central government,[83] and it does not have the population to enable a

[80] Tsuker.

[81] Trushina.

[82] See the tension in the responses of Vladimir Torlopov, the governor of the Komi republic, to the probing questions of a journalist regarding Rusal's apparent commitment to a new Siberian smelter in preference to Pechora. Torlopov.

[83] Yury Shabaev, 'Business and state in Komi: managing common and conflicting interests', *Russian Analytical Digest*, 8 (2006), 12–14.

strong governor to buy central government support with the promise to deliver votes.

The other possible supporter for a lobbying effort against Gazprom is the Ministry of Regional Development, with apparently a new commitment to the regional equalisation ideology under its powerful new minister, Dmitrii Kozak. However, in practice, the regional equalisation ideology depends for its persuasiveness on strategic arguments, not least to gain the support of the influential *siloviki*. Its northerly location makes Komi far less strategically sensitive than the east. While Khloponin can use the Chinese threat to support his bid for further Siberian development, it is difficult for those pushing Komi's interests to do so. There is no indication that the Ministry of Regional Development has been or would be able to enforce a priority for northern development. (Kozak's personal experiences have been in the more sensitive south.)

Might Rusal be able to lobby on its own? While the oft-claimed closeness of Deripaska to Putin is probably exaggerated, the latter has certainly represented the firm's interests abroad. But those representations are no more than standard diplomatic representation of the national interest, and they have not been limited to Rusal.[84] Rusal would have to invest enormous lobbying efforts in order to persuade the central state to pressure Gazprom.

The global firm approach

One cannot help feeling that Rusal itself does not think it worth the trouble, because it recognises the commercial and political realities of the gas issue. That recognition could be strengthened by a growing commitment to its foreign operations. Always with a hankering for things foreign, is Rusal now so committed to a global strategy that it is less committed to any domestic projects other than its core operations in Siberia?

Other small signs are a recent strike at the North Urals Bauxite mine, with workers demanding a commitment to the future of the mine,[85] and a 2008 decision to sell the Pikalevo Alumina Plant in the Russian north west for conversion to

[84] 'Putin seeks business deals in South Africa', *RFE/RL Newsline*, 10, 164, Part 1 (6 September 2006); Svetlana Ivanova, 'Pora pokupat'', *Vedomosti*, 1 February 2008, <http://www.vedomosti.ru/newspaper/article.shtml?2008/02/01/140826>.

[85] Gleb Stoliarov and Iuliia Fedorinova, 'Rusal sporit s gorniakami', *Vedomosti*, 28 March 2008, <http://www.vedomosti.ru/newspaper/article.shtml?2008/03/28/144488>.

cement production.[86] This is while there is a continuing expansion programme abroad. As usual with Rusal it is difficult to separate out the propagandistic plans and proposals from true commitments. But in recent times, among many announcements, the company has bought a smelter in Nigeria in order to have a fully integrated bauxite-to-aluminium capacity in West Africa.[87] It has also announced an agreement with the Chinese power company CPI to build a smelter in China, with CPI also invited to participate in a bauxite-alumina project at DianDian in Guinea.[88] While that project is a long way from realisation, it would indeed be symbolic if an alumina plant were built at DianDian and not at Ukhta.

Various motivations can be attributed to the global strategy: the basic desire of an aggressive entrepreneur to get bigger; a recognition that the 1970s Soviet planners were right and that Russia's natural endowment of bauxite is so poor that peripheral aluminium production in Russia is not worth the trouble; or that the company wants to give itself some protection from the Russian state by making itself too important abroad to be subjected to Yukos-style expropriation. The latter is a motivation often attributed to Russian firms investing abroad.[89] When Renova, the parent company of SUAL, and so a significant shareholder in Rusal as well as an important investment company in its own right, announced its intention of holding at least 20 per cent of its assets abroad, the Russian newspaper *Vedomosti* took it as evidence of a desire to reduce Russian 'country risk'.[90] When asked whether this was so, former SUAL head and now Rusal board chair Viktor Vekselberg vigorously denied it.[91] While one would not expect Vekselberg to say otherwise, there is other evidence to dispute the 'country risk' motivation, not least that the Russian state has supported the investments abroad of Rusal and

[86] Anatolii Temkin and Nadezhda Zaitseva, 'Tsement vmesto glinozema', *Vedomosti-Sankt-Peterburg*, 13 March 2008, <http://www.vedomosti.ru/newspaper/article.shtml?2008/03/13/143455>.

[87] 'Investment shows integration into world economy', *Oxford Analytica*, 4 April 2007.

[88] Iuliia Fedorinova, 'UC Rusal prishla v Kitai', 5 February 2008, <http://www.vedomosti.ru/newspaper/article.shtml?2008/02/05/140996>.

[89] Kuznetsov, 4; Andreff, 99; Bulatov, 78–81; 'Investment shows integration'.

[90] Iuliia Fedorinova, 'Zarubezhnyi pokhod Veksel′berga', *Vedomosti*, 16 January 2008, <http://www.vedomosti.ru/newspaper/article.shtml?2008/01/16/139752>.

[91] Iuliia Fedorinova and Irina Reznik, '«K pervomu mestu ne nado stremit′sia», - Viktor Veksel′berg, vladelets Renova Holding', *Vedomosti*, 24 January 2008, <http://www.vedomosti.ru/newspaper/article.shtml?2008/01/24/140240>.

other Russian firms.[92] The commitment to a global strategy appears to be firm, and can probably be explained by normal corporate expansionary motivations rather than to avoid Russian 'country risk'. Is that enough to explain the freezing of the Komi project?

Conclusion

The climate approach does not seem to be an adequate explanation. The costs of the cold do not appear to be particularly high compared to the alternatives, and the company is prepared to bear them in even colder Siberia. There are, nevertheless, signs of a reduced commitment to domestic operations outside the Siberian core. That leads one to suspect that power availability, as real an issue as it might be, is something of an excuse for the freezing of the project. Vigorous lobbying might lead to power being made available at a cost that would allow Rusal to reconsider. However the required lobbying forces appear to be inadequate. The Russian state in fact appears more interested in global champions than developing the north. That fits well with the strategic goals of Rusal and other large Russian companies. The fate of the Komi project might still be finely balanced, but the global ambitions of Rusal and the state's acceptance of those ambitions have probably counted against it.

If Rusal has indeed abandoned the Ukhta alumina plant, it is not because Russian firms and the state have realised the folly of taking on the costs of the cold. In the right circumstances those costs are in fact bearable, but it could well indicate that regional development arguments are not enough to compensate for other problems faced by greenfield Russian projects, in this case the lack of commercial incentive for Gazprom to provide power. This applies particularly in places, such as the far north, that cannot claim strategic sensitivity. The attractiveness of global champions to the Russian state and of global operations to Russian firms, even in places that involve significant 'costs of the heat', has added to the failure of the regional development argument in this case. That willingness to look abroad could well have implications for investment in other regions of Russia.

[92] Putin's diplomatic support has already been mentioned. In a speech just before his election as president, Dmitrii Medvedev called on Russian companies to take on more foreign investments, not least because the Chinese were doing it. Tat′iana Stanovaia, 'Liberal v shkure gosudarstvennika', *Politcom.ru*, 1 February 2008, <http://www.politcom.ru/print.php?id=5665>; Ivanova.