Dr. Sergei Cherkasov, and
Academician Dmitri Rundqvist

Raw Materials and Russian Infrastructure

Dr. Sergei Cherkasov of the Vernadsky State Geological Museum, Russian Academy of Sciences, spoke on behalf of himself and the Museum's scientific director, Academician Dmitri Rundqvist. Their presentation, which included slides, was entitled: "Infrastructure Corridors in Russia—Pros and Cons: A Raw Materials Approach." We provide a selection of the graphics here.

EIRNS/Julien Lemaître

Dr. Sergei Cherkasov underlined that while there are formidable problems on the path of constructing the Bering Strait connection to America, there are also major social-political decisions to be made.

Academician Dmitri Rundqvist and I decided to give our talk together, but he was not able to come. He's the president of Russian Minerological Association, and right now he has a conference of this association in Yekaterinburg. But he sends his best regards to all the participants of this forum.

And we decided to show what this Land-Bridge can mean from the standpoint of mineral resources. There will be three parts of this presentation. First of all, I will talk about the current situation in mineral resources. Then, this is a period when Russia is re-evaluating its resources, especially in the Northern parts and in the Far Eastern parts. And from here, we will see what challenges and what solutions we can have, from the standpoint of mineral resources, in relation with land-bridges.

Through the history of humanity, we used more and more different elements. In antiquity, people made use of only 18 of the elements. By the 19th Century, after the Industrial Revolution, 67 elements were in use. Since the harnessing of the atom and the synthesis of new elements in the 20th Century, almost the entire Periodic Table of the Elements has been used by human beings.

And in the same way, we had changes in the Russian territory. We have a series of maps, starting before 16th Century: Using different points to show different deposits that were developed in those times. [Historical map series of the growth of the Russian state and the discovery of mineral resources is omitted here.—ed.] [Kuznechny, shown in photo] is one of

Lebedinsky open pit (Kursk magnetic anomaly)

Granite open pit in Kuznechny, near St. Petersburg

The industrial city of Norilsk above the Arctic Circle, in Winter.

FIGURE 1
Russia's Share of World Resources and Reserves vs. Production and Consumption

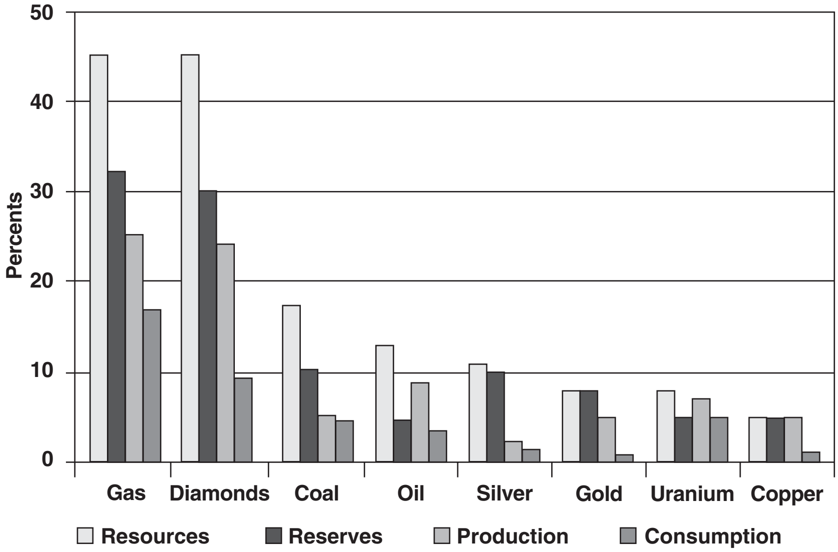
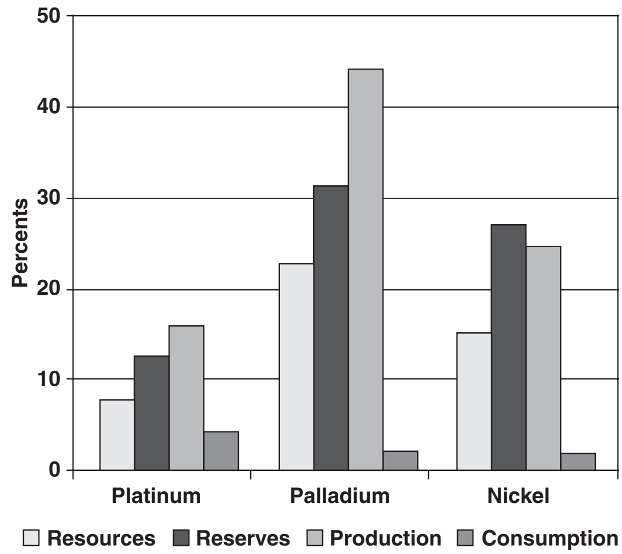


FIGURE 2
Russia's Share of Platinum Group Metals, Resources and Reserves vs. Production and Consumption



the ancient open pits, near St. Petersburg. Then there was an expansion, and the expansion went in different ways. First of all, the government of Russia was interested in developing new territories beyond the Urals. I know people living now in Krasnoyarsk, whose family walked from the European part to the East, and they got land for free; they developed the land, and as much land as they could develop, they could have.

At the same time, exploration techniques developed: The open pits became bigger. Now, in the 20th Century, we already had a number of large deposits, and we had such open pits, such as the Lebedinsky open pit for iron ore [see photo, p. 43]. It looks quite impressive.

Today, Russia, having 20.5% of the world's land area, has 3% of world population; 22% of the forests; 20% of fresh water; 30% of the total area of the shelf; and 16% of the mineral resources.

Our geological knowledge about Russia's territory varies by region. For most of Russia, we have 1:200000 geological maps. It means that observations have been made every 2 kilometers. You can imagine what it means, in terms of mineral deposits. Mineral deposits sometimes are something like just tens of meters in size. Theoretically, and we are confident of that, a lot of mineral deposits in Russia are still undiscovered.

About 30% of Rssian territory is covered by 1:50000 geological maps (observations made every 500 meters). So we have some areas which are better explored, but still not well enough to be sure that nothing is missed. In the State Register we now have about 9,000 mineral deposits.

But what I can add to what Professor Menshikov said about the Russian situation: First of all, here you may see that, in terms of resources and reserves, Russia has a relatively big share in world resource reserves (**Figure 1**). But, it has much less of a share in production, and a very small share in consumption. It looks a bit different, just for the platinum group elements and nickel (**Figure 2**). But the platinum group elements and nickel are being mined mainly in Norilsk, which is far above the Arctic Circle. The photo on p. 43 shows a regular Winter day in Norilsk. The first house was built in Norilsk something like 50 years ago.

But what is important, also, and I agree with Professor Menshikov on that, is that beginning with all these changes in Russia, our economy became export-oriented. **The share of production of different metals and resources, which goes for export,** looked as follows in 1999:

Oil:	57.3%
Gas:	32.0%
Coal:	12.0%
Iron ore:	14.9%
Copper:	85.0%
Nickel:	91.0%
Zinc:	59.0%
Lead:	9.1%
Tungsten:	96.0%

An oil-drilling site in Siberia during a snowstorm.

These data are not from this year; they are the data from a few years ago. But there was a year, 1996, when we exported almost 417% of our production of uranium. One year, we exported 356% of the amount of molybdenum produced in the country. That means that all of our reserves were simply being sold.

Nevertheless, this is the distribution of mineral resources by Federal District (**Figure 3**). And when you see the very big figure of 53% in the center, the Ural Federal District, it is due to very well developed oil and gas provinces, east of the Urals. The relatively low figure in the East shows that the area, in fact, is not very well explored.

Also, the climate, of course, influences all these things. If you compare the total price of subsoil mineral resources in the different districts, with the annual degree-days below zero, you may see that, for example, in the places where the Land-Bridge is being planned, for most of the year, we have temperatures below zero. Of course, that makes for some difficulties, as a picture of oil production in Siberia shows.

But at the same time, mineral resources have become more and more important. In the last 40-45 years, we have utilized the biggest part of the resources in relation with human history: 85% of the oil, 50% of the coal, and 50% of the iron that was produced throughout human history.

And Russia is really rich. Looking at a list of commodities which are very well known in Russia, you may see that Russia's resources, in relation to world resources, is impressive. In the area of energy resources, Russia has 32% of the world's gas, 12-13% of the oil, and 12% of the coal—looking just at the world's explored reserves. Russia has 40% of the world's platinum and 90% of the palladium. If we look at rare Earth elements, Russia has 35% of the niobium, 80% of the tantalum, 50% of the yttrium, 28% of the lithium, 15% of the beryllium, and 12% of the zirconium. Russia's share of other metals used in industry is 36% of the nickel, 27% of the iron ore, 27% of the tin, 20% of the cobalt, 16% of the zinc, and 12% of the lead. Russia also has agrochemical ores, ranking first in the world in deposits of potassium salts, and second for apatite and phosphorite. Russia has the largest diamond resources in the world, and ranks third in gold.

So, why are we re-evaluating our resources at the moment? First of all, the growing demand, and the growing demand not only in relation with earlier known ores and metals, but the spectrum of metals that are being used is changing. And by the way, one of the most successful mining companies in Russia, Norilsk Nickel, is that successful because of the just incredible rise in the price for palladium. At the same time, we discovered new types of ore deposits. For example, in Northern Russia, we know now about oil-titanium deposits. So, it means in some sands there is oil, but the sands are represented by heavy minerals—ilmenite and others.

Then, there are new extraction technologies. They make it possible to develop deposits, which before were just impossible to develop. For example, there is an underground leaching technology. And last year, when I went to Uzbekistan, along the road, for something like 300 km, you may see pipes; from the earth, all the pipes are connected in one system, and they just pump some solution into the pipes; and from the other pipes, they just take it out, already with uranium in it.

FIGURE 3

Distribution of Mineral Resources by Federal District

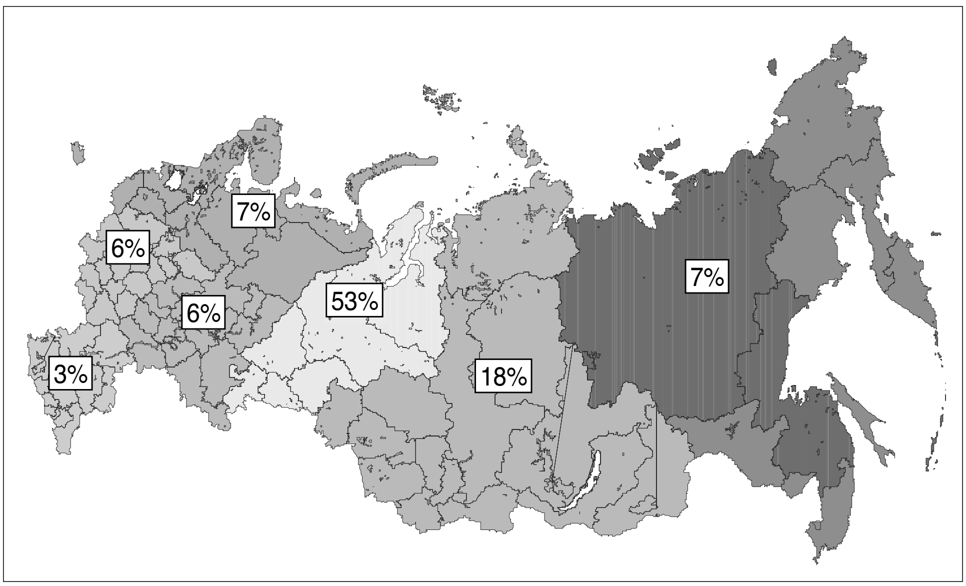
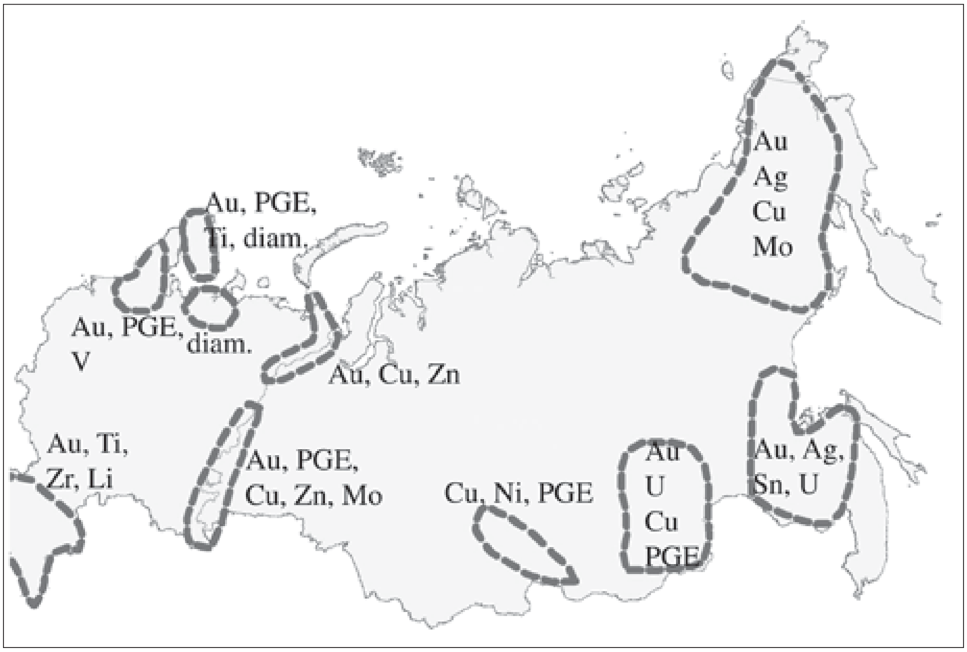


FIGURE 4
General Results of Russian Academy of Sciences Program on Large and Superlarge Mineral Deposits



And it allows us to mine very low-grade deposits.

And from the economic standpoint, one of the most important things is that the methodology for evaluation of mineral deposits is different in the U.S.S.R., in Russia, and in the Western world. I can say that over the last year, I have participated in four expert evaluations, where the task was to re-evaluate already well-known mineral deposits. Two more are planned before the end of this year. Also, we have state programs, and there have been some published results of the state's programs on re-evaluation of Russian mineral resources. The first book has been published by the Karpinsky All-Russia Geolgical Institute, and a second one by the Okeangeologiya National Reseach Institute, also in St. Petersburg. And we ourselves, at the Russian Academy of Sciences, have produced a book titled *Large and Superlarge Mineral Deposits* and, together with the French Geological Survey (BRGM), a CD-ROM called "Largest Mineral Deposists of the World."

This is a result of the re-evaluation made within the framework of the Academy of Sciences program on large and super-large mineral deposits (**Figure 4**). And you may see the regions which we believe to be the most promising in terms of new discoveries of mineral deposits. If you compare this map with a map of existing railroads along the Urals, and the new railroad that is being built northwards from Yekaterinburg [see Figure 2 on p. 38, showing "new freight railroads" north of Yekaterinburg—ed.]; it connects the Industrial Urals and Arctic Urals. Expected investments in the Industrial Urals-Arctic Urals project include $2.4 billion for the 1,000-km railroad, and $3.5 billion for energy infrastructure.

New, projected pipelines in Siberia and the Baltics region are also important, as is the projected land-bridge from Yakutsk to the Bering Strait. We are not professionals in railroads, but still, you may see that the length of Trans-Siberian Railroad is nearly 10,000 km, and it was built in 25 years and completed in 1916.

But also there is another difficulty. You may see that the railway, or infrastructure corridor to the Bering Strait, goes mainly through Yakutia, the Sakha Republic. Let us compare the size of the Yakutia population, with the population of countries you know very well (**Figures 5 and 6**). No com-

ment, except that it is very illustrative.

Look at the photos of Yakutia, below: In the upper left, you see the Verkhoyanye Ridge, and we will have to pass it when we build this railway. The lower left picture shows how we build houses in Yakutsk. They are on stilts, because of the permafrost. And in the right-hand picture, you can see how we mine diamonds in Mirny, in southern Yakutia. Also, I can say that in northern Yakutia, we have the Popigay diamond deposit, which is of an impact nature, from a huge meteorite. And also, the diamonds are not for jewelry; they are industrial diamonds. But the resources are bigger than all other known resources in the world. And it is not being developed, just because there is not *any* infrastructure in this place. Nobody lives in something like a 200 km diameter around this place.

The Russian Geological Survey has charted the contours of ore deposits in the area of this this eastern railroad. They define the so-called Yana-Kolyma Gold-Bearing Province; and the overlapping Silver-Bearing Province. They are comparable in size to Germany.

But, there is a problem. It was calculated that, to develop these provinces means to create something like 300,000 jobs. The problem is that, in this territory, we have maybe 10,000 people living. Because of that, we are sure—and I will talk about it a bit in our conclusion—we are sure that infrastructure corridors, development corridors, are the key to new mineral resources. And we don't have any doubts that we will need these resources, that human beings will need them.

But it is not just a question of construction: It's a question of some social-political decisions. I already talked about how Siberia was populated in the old times. Of course, we know another example: Stalin worked on the same deposits in Kolyma region, quite successfully, sending prisoners there. Also I think that is not the way for this time. Another example: In the Soviet period, the government tried to attract people with higher salaries, with maybe the possibility to buy a car, and people went to build the Baikal-Amur railroad. How should we resolve this issue at this time? Difficult to say.

But from my point of view, all the engineering problems, and economic problems, are nothing in comparison with the problem that we are going—as Professor Menshikov said—to build something through what is not just desert; along the way on this railroad, we have a pole of extreme cold. A temperature of –87°C was registered in this place.

So, I really believe that all these problems can be resolved. But we have to think about them carefully. And here is our conclusion: Of course, it should be done. But we have to keep in mind some difficulties we will face on the way.

Thank you very much.

Helga Zepp-LaRouche: Thank you very much, Dr. Cherkasov. I think you gave us a very illuminating perspective, how the development of these resources can really help to save resources for mankind. And I think it gives you a vision that we have to really reach an age of mankind where wars over raw materials will no longer be fought. That, with this project, we would really approach such an age.

FIGURE 5
Infrastructure Corridors in Russia

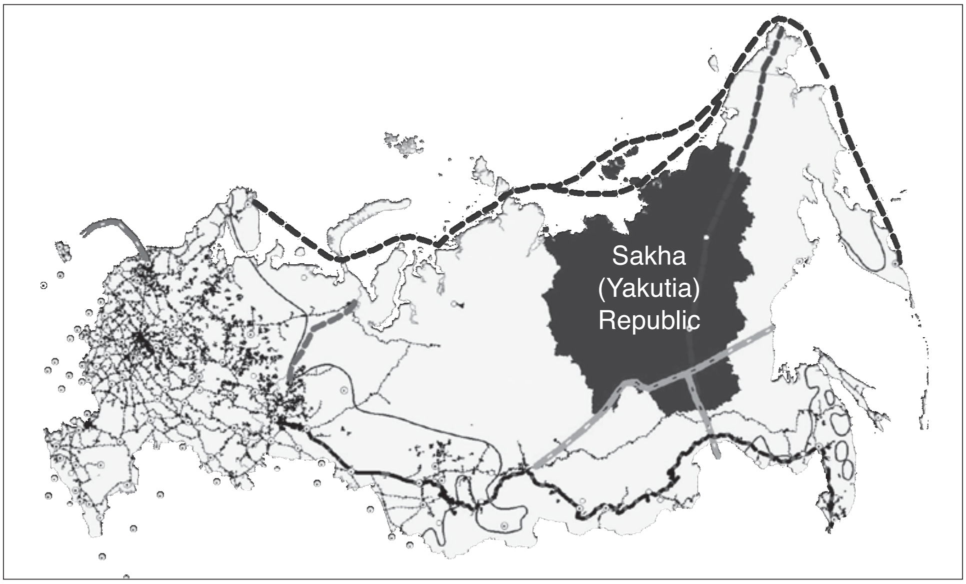


FIGURE 6
Yakutia Compared to France and Germany