

Infrastructure, Environment, and Regional Development in South-Eastern Mongolia

Issues Note

The South Gobi region is poised for a major boom in economic activity, with a foundation based on planned development of mines of world class significance. The Parliament is considering a proposed Investment Agreement with Ivanhoe Mines for the development of a copper and gold mine at Oyu Tolgoi, and a shareholder agreement that relates to proposed development of a coal mine at Tavan Tolgoi. Other proposed mines in the relatively near future include copper and molybdenum at Tsagaan Suvraga (TS) and export coal at Nariin Sukhait. It is likely that infrastructure development in the region will spur the development of additional mines and associated industries.

The following discussion sets out the major infrastructure, environment, and regional development issues identified by a World Bank team in October 2007.

Water Resources

The availability of water in South Gobi may constrain the region's development potential. Despite several studies undertaken since the 1980s the extent of water resources in the area is not well-known.

Ivanhoe has studied an area of roughly 100 km radius centered on Oyu Tolgoi, and has identified three deep aquifers with sufficient volumes of water to meet the mine's needs. Ivanhoe's investment plans suggest a demand for water ranging from 37 million liters per day up to 60 million liters per day, as the mine's production volume increases. It is planned to extract water from the Gunii Hooloi aquifer, over a period of 25-30 years, and then to extract water from the Galbyn Gobi aquifer, once Gunii Hooloi is exhausted. In discussions with the company, Ivanhoe indicated that the water in these aquifers is unsuitable for drinking purposes, and that so far as is known the aquifers are isolated so that there are no wider consequences on other aquifers or on surface water availability. An environmental impact assessment on the proposed water extraction has been approved by the Ministry of Environment and Nature. On this evidence, it seems there are adequate water resources to permit the development of Oyu Tolgoi.

In addition to Oyu Tolgoi, further sources of regional demand for water could include:

- Coal washing – Tavan Tolgoi may produce 50 million tons or more of coal per year (of which about 25 million tons of coking coal for export and 25 million tons of steaming coal for local use), which could require in the order of 65 million liters of water per day.
- Power plants – a 400 MW power plant re-circulating water uses around 30 million liters per day. A larger power plant will be required in the region if it is decided to supply power to the north or to China. Alternative technologies are available which use no water, but the power plants are more expensive to build and operate.
- Towns – 10,000 households might consume 2.5-4 million liters per day, based on typical consumption in Mongolia.
- Other industries would create additional water demand.

It is not clear that there is sufficient water in the south Gobi region to sustain all of the potential sources of demand. While depletion of deep aquifers may (subject to environmental analysis) be an acceptable means of supplying water for mines, industries beyond mining would desirably be supplied from renewable water sources which would endure beyond the life of the mines. Possible sustainable alternative sources of supply could involve piping water 400-600 km from

rivers to the north. The cost (perhaps as much as \$1 billion), environmental and social consequences of this option are not known.

Each additional development will require studies to identify water resources, and to examine the environmental consequences of water extraction. As a minimal indication of the likely cost, it appears that the aquifer currently serving Hambogt soum, the town closest to Oyu Tolgoi, is inadequate to meet the needs of a population which is expected to grow from 1600 to 4000-9000 by the third year of Oyu Tolgoi's operation. Ivanhoe suggests that boring to identify a new water source for Hambogt could cost \$3 million and take nine months.

On the evidence available so far, it seems likely that one or two major mining projects, with their implied population growth, can be sustained. But in order to set the background for the overall limits on regional development it would be useful to conduct a regional study of water resources. This analysis should attempt to better understand where the principal sources of water are, and the environmentally sustainable limits on water extraction.

Electricity

The provision of electricity has been one of the major obstacles to conclusion of the Oyu Tolgoi investment agreement. Ivanhoe will need a supply capacity of 130 MW in the initial years of operation.

The Government intends to build a transmission line to supply Oyu Tolgoi from the Central Electricity System (CES), and the Ministry of Finance is providing for its construction in this year's budget. It should be noted that the CES is operating on a low reserve margin of around 10%, with demand growth of 7-10% per year. Existing older generation plants are scheduled to be retired. Excess peak demand can be met by wheeling power from Russia, but there is clearly a need for additional new capacity in the CES. The replacement of old technology power plants and construction of new capacity with modern technology may provide the opportunity to improve air quality in Ulaanbaatar, notwithstanding the planned increase in electricity production.

A decision to build the transmission line seems to have been made. An alternative, cheaper option may be the importation of power from China using a much shorter transmission line. Economic analysis could also address the price at which power is sold from the CES - the recent Infrastructure Strategy indicates that the prices of power are less than the cost of production. As the feasibility study for the proposed transmission line is conducted, consideration should be given to its capacity, taking account of the potential within a few years for power to be supplied from the south Gobi to Ulaanbaatar.

In the medium-term, a coal-fired power plant may be built at Tavan Tolgoi, or elsewhere in the South Gobi. As plans for Tavan Tolgoi are developed, the Government will consider whether the investment agreement for Tavan Tolgoi should include provision for the construction of the power plant by the mine developer, by an independent operator, or by the Government. While Mongolia has recently concluded its first private power purchase agreement with a small wind farm, there will be substantial need for technical assistance in understanding the options for private investment in generating capacity, in preparing the legal environment for private investment, and in negotiating the terms for construction and operation of the power plant.

Depending on the size of the power plant to be developed at Tavan Tolgoi, it may be possible to export power to China. In order to satisfy Chinese requirements for power importation, transmission lines of 550 kV would need to be constructed, implying a high capacity power plant. Technical assistance could be provided in relation to plans for power exports.

Transport

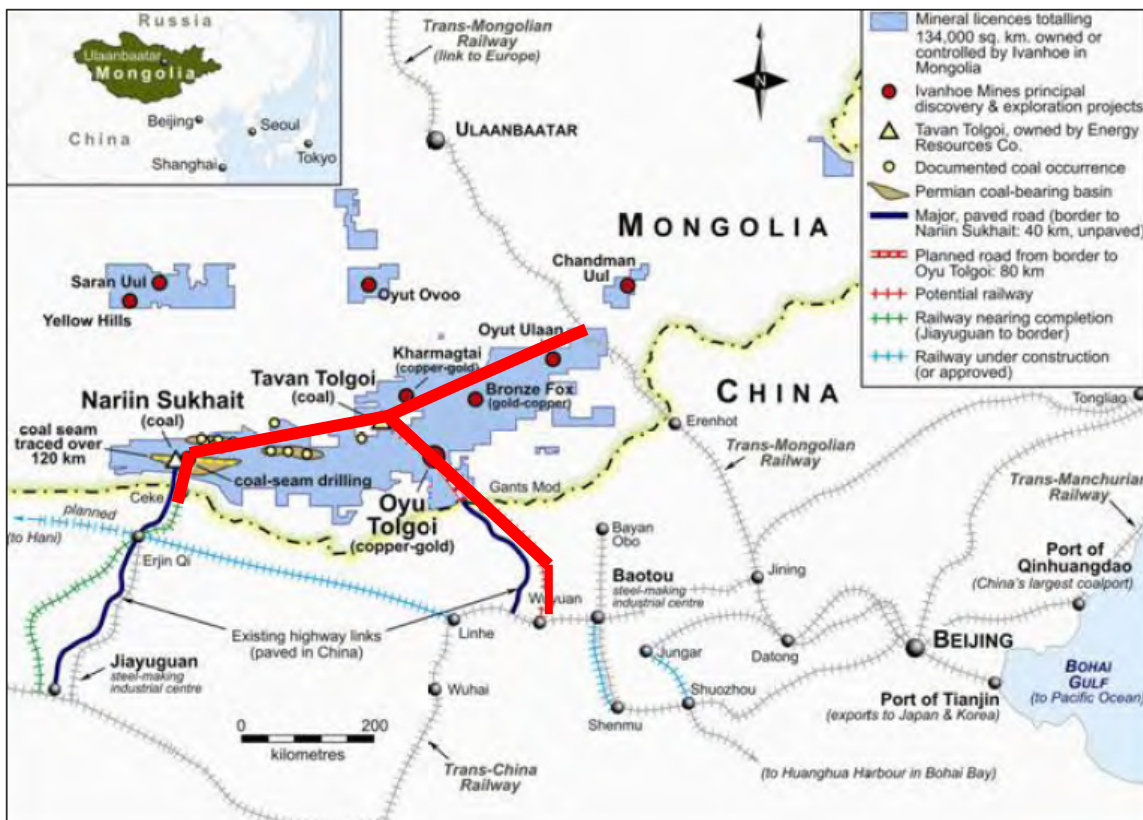
The Ministry of Transport has plans for a 520 km asphalt road from Ulaanbaatar to Dalanzadgad, the main city of the South Gobi. A feasibility study has commenced.

Work has started on a BOT road connecting an existing coal mine near Nariin Sukhait to the Chinese border. Construction is by a Chinese company. The Ministry of Transport estimates road construction to cost in the order of \$200,000-250,000 per kilometer.

Oyu Tolgoi's transport needs can be satisfied with a planned 105 km BOT road to China. It is intended that the road will be financed and constructed by Ivanhoe, and then transferred to, maintained and operated by the Ministry of Transport as a toll-road (Ivanhoe will be exempt from tolls). Ivanhoe has already tendered for the road construction, obtained approval for the EIA from the Ministry of Nature and Environment, and is ready to begin construction once the Investment Agreement is signed.

When Tavan Tolgoi is developed, a railway will need to be constructed – rail is the only practical option for shipping the expected volumes of coal. The Ministry of Transport has plans for the physical rail network, which appear to be along the lines indicated in Figure 1. Oyu Tolgoi to the Chinese border is a distance of 80 km, and Tavan Tolgoi to the trans-Mongolian railway is around 400 km. The Ministry has submitted the proposed routes to the National Security Council, and intends that once the routes are approved feasibility studies will be commenced.

Figure 1: Possible rail network in the south Gobi region



Map Source: Ivanhoe website (2007).

Economic analysis should be applied in sequencing the development of this extension to the rail network. Erdenes, the state holding company for the Government's interests in mines, is

investigating the costs of different rail options, including the cost of delivering minerals to various ports in China and Russia. But this analysis is at an early stage and does not appear to inform the Ministry of Transport's plans. It would be possible to sequence the development of different segments of the rail network to maximize the economic rate of return on the investments.

Economic assessments of different sequencing options should take account of the likely stimulus that development of the rail network will give to additional mining in the region, and other industries. Ivanhoe has calculated that trucking ore to Chinese smelters could cost around \$38 per wet metric ton, while using rail could cost around \$20 per wet metric ton, so Ivanhoe is a likely customer for any rail development at Tavan Tolgoi. Once the main rail network is in place additional mine developers may find it profitable to construct rail links to the network.

The issue of rail gauge is being considered by the State Security Council. China, the principal market for the South Gobi's mineral production, uses standard gauge rail. Mongolia uses the slightly broader Russian gauge. Change of gauge raises transport costs and causes delays. It would be possible to have Chinese gauge railways leading into China, while using Russian gauge railways to connect from Tavan Tolgoi to the trans-Mongolian Railway. Decision on the choice of gauge for the likely railway line from Tavan Tolgoi to the Chinese border should be informed by an assessment of the additional cost involved in changing gauge at the border.

There are many public/private options for the construction and operation of the new rail developments. Rail in the area may cost in the order of \$1 million per kilometer to construct. Mongolia Railways is a joint venture with Russia, and the Russian shareholder is not keen to invest to expand the network beyond the trans-Mongolian railway. The Ministry of Transport would like to encourage private investment in the rail system, and has received several informal expressions of interest to construct railways. The new Law on Railway Transport mandates that 51% of rail infrastructure should be state-owned.

As plans for Tavan Tolgoi are developed, the Government will consider whether the investment agreement for Tavan Tolgoi should include provision for the construction of particular railway lines by the mine developer, by an independent operator, or by the Government.

Internationally, extremely high rail productivity has been possible where mine operators have operated railway lines which are dedicated solely to mine output. A concern where an individual mine developer operates a railway is whether other companies will be able to use the railway. The rail operator may be able to exclude competitors, or charge very high rates to extract the profits of mine development. These difficulties are not new, and different countries have adopted different methods for solving them. The World Bank intends to provide technical assistance to the Government to understand better the different options for private operation and construction of railways in the South Gobi.

Environment

Mongolia's Gobi region is enormous, sparsely populated, richly endowed with mineral wealth, served by few transport links, home to many wide-ranging threatened species, and suffering from a decrease in rainfall and water availability. This region also supports a growing human population, including a large number of livestock herders, who maintain a tenuous grip on survival after enduring the political and economic upheaval wrought by the collapse of the socialist command economy. With Mongolia's transition to a privatized market economy, more people and exploitative economic activities, notably mining and associated infrastructure needs, could further impact environmental security and habitat needs in the region.

International experience indicates that reputable strategic investors can bring significant experience, international best practice, technologies, financing, and efficient management

practices to large investment operations in developing countries. In the mining sector in particular, reputable international companies have developed and adhere to standards and practices that take environmental and social concerns relating to their operations into account, and adopt rules about transparent information sharing, often beyond the requirements of host countries. Mongolia can benefit from encouraging international companies in following such practices as strategic investors.

In order to maximize the benefits of mining development in an environmentally and socially friendly manner:

- Environmental and social issues need to be addressed at the project level according to Mongolian requirements and international good practice (environmental impact assessments and environmental management plans to be approved by the Ministry of Nature and Environment);
- Environmental performance of mining companies should be regularly monitored by Mongolian authorities, who may wish to take advantage of an independent advisory panel and ensure transparent information sharing;; and
- Environmental issues should be assessed at the regional level to identify and address cumulative and regional impacts on key environmental resources related to a range of mining and other development plans.

To date, across the Ministry of Nature and Environment (MNE), Ministry of Food and Agriculture, and the Land Management Authority there is not comprehensive body of work that looks at the likely effects of proposed mining and infrastructure activities in the region. Rigorous studies on land management in Mongolia that draw on field observations are few, and do not have the Gobi region as its main focus. The existing limited availability, reliability, and accessibility of environmental and NRM monitoring data and information for the Gobi region represents a significant constraint to the Government to ensure the environmental sustainability of current and future activities planned in the Southern Gobi region. There are no plans in MNE and/or other sectoral ministries to fill this knowledge gap in the short and/or medium term.

Ivanhoe has conducted the three required EIAs for water resources, the 100 km road from Oyu Tolgoi to the border with China, and for the area where the core mining operations are to be developed. The first two EIAs have been approved by the Ministry of Nature and Environment, but the third has not, and has been with the Ministry for more than two years. The Ministry has limited in-house capacity to review EIAs related to the development of large-scale mining operation and has requested whether or not, the Bank could provide assistance in supporting an independent advisor working on behalf of MNE to help with such review. The Bank advised that under a current non-lending technical assistance program funded by the Netherlands-Mongolia Trust Fund for Environmental Reform, there may be opportunities to provide such assistance.

In case MNE is not ready to approve the EIA before the investment agreement with Oyu Tolgoi is concluded, a clause in the investment agreement could be included to refer to the required approval to be obtained within a reasonable time period.

After Oyu Tolgoi development is approved there will be a need for ongoing monitoring and evaluation of the EMPs established as a result of the EIAs. The Ministry of Nature and Environment has asked for technical support to assist identifying priorities to be addressed during the implementation of the EMPs. In addition, plans for development beyond Oyu Tolgoi should be informed by a regional environmental assessment. The World Bank plans to agree on technical assistance to meet these needs.

Regional Development

The immediate development needs for the region consist of providing towns for the expected population increase. The Ministry of Construction has recently prepared land management plans for urban developments located near Oyu Tolgoi and Tavan Tolgoi. The Ministry expects that the population in the vicinity of Oyu Tolgoi will grow from the current 5000 to around 24000 in the next few years.

It seems broadly agreed by both the Government and Ivanhoe/Rio Tinto that township development should be managed by local governments, and that enclave mining camps should be avoided. It seems, however that the Ministry of Construction expects mining companies to provide much of the financing for the towns' infrastructure. It would be desirable to examine international experience on this subject, and to establish principles that could guide future mining developments.

Mongolia has a national development strategy which divides the country into four regions plus Ulaanbaatar. The Ministry of Trade and Industry wishes to encourage clusters of industrial development. For the South Gobi those plans include copper, coal, camel-wool and cashmere, construction materials, and tourism. It is not apparent how the Ministry intends to encourage these industries to develop.

International experience suggests there are generally weak upstream and downstream links between mining developments and developments of other industries, so that mining of itself is unlikely to stimulate the Government's plans for broadly based regional development. Nevertheless, there is an untapped potential to develop small and medium enterprises in the region. The World Bank supports a regional development strategy focused on reforms that improve the overall investment climate and public investments such as infrastructure and human capital development (such as education in rural areas). Policies which try to directly influence firm location have little chance of success, as market access and agglomeration economies are dominant factors influencing firm location.

Financing

Financing issues include the provision of both public and private finance.

The Ministry of Finance is implementing a Medium Term Expenditure Framework (MTEF). The top-down part of this analysis has been performed, with identification of the overall public resource envelope available. But the bottom-up part of an MTEF is more difficult to implement, requiring identification of a broad list of expenditure options (investment and maintenance) and a system of prioritization (ideally economic rates of return) in order to fit the expenditure plans within the available budget. Under the GAP module of the MTBF project, the World Bank is providing technical assistance to the Ministry of Finance in developing the Public Investment Plan component of the MTEF. This component addresses the Government's infrastructure investments. The aim is to shift from the current system of long line Ministry investment wish lists to more focused and prioritized investment options, in line with the Government's overall development strategies.

The development of trunk infrastructure facilities may spur the development of new mines. Developers of these mines may be relatively small Mongolian companies, but it may be profitable for them to construct infrastructure spurs, to connect to the main networks. A conducive environment for such private infrastructure investment will require the development of domestic sources of long-term capital. The Government could possibly play a role in the development of an infrastructure fund, to provide such finance.

Social Issues

The aimags of Omnogovi, Dornogovi, and Dundgovi have a combined population of around 150,000 in an area of 350,000 square kilometers (0.43 people/km²). About 44,000 people live

in the three provincial capitals Dalanzadgad, Sainshand, and Mandelgovi. Herders comprise about a third of the current population.

Social issues which may arise with the development of the mines and associated infrastructure include:

- competition between the existing rural population and new mining and infrastructure developments concerning access to water resources and pastureland;
- the presence of immigrant workers, many of whom will come from China, and the reaction of local communities;
- possibility of migration from ger areas to the mining communities;
- social unrest in mining towns;
- provision of social services in mining towns;
- HIV/AIDS associated with construction and mining communities;
- community participation in regional development planning.