AN ECONOMIC IMPACT ASSESSMENT OF THE IRON ORE SECTOR IN MONGOLIA

March 2014

Mongolia’s iron ore sector is high cost, small size, and low quality that impedes the competitiveness and is unattractive to investors

Iron ore sector overview and outlook

Current situation

- Nine small scale magnetite iron ore projects exist in Mongolia with an estimated total resource of 1,250 Mt (Fe content between 25% - 52%)
- Six of these projects are currently operational and exporting low grade ore (3.74 Mtpa) and concentrate (3 Mtpa) to China
- Additional production in the future is limited due to lack of investment funding
- Domestic demand is small although Mongolian authorities seek to develop downstream processing

Future outlook

- No exploration activity is targeting new deposits
- Existing projects will supply ~227.3 Mt of iron ore and ~53.8 Mt of concentrate during 2014-2030
- Commodity prices are expected to decline in the midterm due to excess global supply
- Required CAPEX (mine development, enabling infrastructure and a concentrator) for current projects is ~US$0.9 billion, while total OPEX is estimated to be ~US$17.9 billion across 2014-2030

Source: Publically available documents
Nine small scale magnetite iron ore projects exist in Mongolia with estimated total resources of 1,250 Mt (Fe content of 25% - 52%).

Iron ore production in Mongolia

- TOTAL RESOURCES ~1,250Mt
- PROVEN RESERVE ~674Mt
- 45% CHINESE INTEREST
- SIX OPERATING MINES

Iron ore is the 3rd biggest contributor to Mongolian exports and budget after coal and copper.

Two iron ore operations (Oyut Ovoo and Tumurtei) have been temporarily halted due to low realized iron ore prices once adjusted for iron content.

Note: Selenge project is the only project expected to commission production in the short-term.

Contribution of the Iron ore sector to the Mongolian economy

Iron ore’s contribution to exports and increased contribution to budget revenue is attracting government interest resulting in the sector declared as strategically important.
Although the government sees the sector as strategic and have plans to further develop, market sentiment contradict its convictions

**Market Sentiment and Government convictions**

<table>
<thead>
<tr>
<th>Key themes</th>
<th>Key findings</th>
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<tbody>
<tr>
<td><strong>Strategic commodity</strong></td>
<td>▪ Subject to Mongolian ownership of no-less than 34%. However, ownership restrictions are not exercised in practice</td>
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<td><strong>Pursuing downstream processing</strong></td>
<td>▪ Construction of a MNT 400 million DRI plant with iron ore beneficiation in the Darkhan Region and a DRI plant with capacity of 2.5 Mtpa is also planned under Sainshand Industrial Park (SIP)* to create value add in Mongolia</td>
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<td><strong>Environmental issues</strong></td>
<td>▪ Strong public opposition towards iron ore producers due to environmental, social and community issues. Public protests have occurred seeking to halt the operations of the largest producer (Eruu Gol)</td>
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<table>
<thead>
<tr>
<th><strong>Given short iron ore mine life in Mongolia, significant investment obstacles are likely</strong></th>
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<tbody>
<tr>
<td><em>SIP includes nine d processing plants (copper smelter, iron pelletizing, coke plant) requiring investment of US$ 9.5 billion (6 times higher than the Chinggis bond)</em></td>
</tr>
</tbody>
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**High cost, small size, and low quality impede the competitiveness of Mongolia’s iron ore sector, demotivating investors**

**Outlook of iron ore border price and unit production cost**

Room for cost optimisation is limited due to infrastructure constraints, vulnerable macro economic conditions and an unfavourable investment environment in the mining sector

*Over 60 iron ore projects are planned to be started in 2013-2015 with a total capacity of 625 Mt (340 Mt from BHP Billiton, Rio Tinto, Vale and FMG)*
Current Mongolian iron ore producers are projected to generate ~227 Mt of iron ore and ~54 Mt of concentrate in 2014-2030

Outlook of iron ore production and demand (2007-2030)

Rapid resource depletion is likely despite the governments policy to limit exports, however this is subject to investment availability for aggressive expansion plans

Iron ore producers need an additional US$18.8 billion of capital investment to develop and continue its operations in 2014-2030

Investment assumptions

Mine development, enabling infrastructure and a concentrator requires ~US$0.9 billion in capital investment, while total OPEX is estimated to be US$17.9 billion across 2014-2030
Excluding import purchase, 53% of the total investment\(^{\dagger}\) in the sector is estimated to remain in Mongolia with a multiplier effect.

### Investment assumptions (2014-2030)

<table>
<thead>
<tr>
<th>Domestic suppliers</th>
<th>Taxes and fees</th>
<th>Salary</th>
<th>Import</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

\(^{\dagger}\)CAPEX and OPEX

One of the main purposes of this analysis is to estimate the additional indirect impact (multiplier effect) of iron ore projects on the Mongolia economy.

In order to estimate the economic impact of the iron ore sector in Mongolia, this analysis considered two different scenarios:

#### Assumptions used in these two scenarios

**Base Case:**
- No Iron Ore
- hypnotical

**Policy Case:**
- With Iron Ore

- This modelling assumes all major mining projects will operate according to their mine plans\(^{\ddagger}\) except iron ore (no iron ore in the economy)
- Commodity prices are based on consensus prices discounted to Mongolian border price
- Additional FDI into the mining sector development is estimated to be US$13 billion excluding iron ore sector in 2014-2030, out of which: Thermal coal - US$1.4 billion, Metallurgical coal - US$1.2 billion, Copper - US$8.7 billion

- In addition to base case mining production, 227.3 Mt of iron ore and 53.8 Mt of concentrate will be produced by current iron ore producers between 2014-2030
- Iron ore price is based on consensus price discounted to Mongolian border price and is expected to decline in the midterm
- An additional US$0.9 billion of CAPEX will to be injected into the Mongolian economy through FDI and domestic investment in 2014-2015 for the Iron Ore industry and US$17.9 billion of OPEX will be spent by the industry across 2014-2030

All indicators are in 2013 price. USD/MNT annual exchange rate is 1523

\(^{\ddagger}\)Assumes OT underground starts in 2015
The total economic impact is ~MNT 31.3 trillion (US$20.8 billion) from 2014-2030, notably in the mining, transport & service sectors.

Direct and indirect impact of the Iron Ore sector on Real GDP (RGDP)

Indirect impact through domestic value add in the transport and service sectors increases over time as a key input for Iron Ore.

Base case represents a scenario without Iron Ore, while policy case represents a scenario with Iron Ore. *Benefit is the difference between the two scenarios.

The sector has a higher impact on export and investment inflows than on imports that will cause moderate MNT appreciation.

Impact on foreign trade and exchange rate

Iron ore exports will contribute ~6% of total exports on average between 2014-2030.
Investment in the sector is not labour intensive however as labour demand increases by 4,300 employees wages will adjust accordingly

Impact on total wage payment

Household income will increase by ~MNT 9.4 trillion (US$6.2 billion) in 2014-2030, of which the majority or 70% is from the sector’s spill over impact for demand in the labour market

*Direct: taxes and wages paid by projects, Indirect: taxes and suppliers, employees and foreign trade revenue based on wages paid by their suppliers and services

By 2030, the direct contribution to budget revenue will decrease to 0.4%, however, total impact on budget will be more than 2%

Impact on total state budget (direct and indirect impact)

Government budget revenue will increase by MNT 13.8 trillion (US$9.1 billion) in 2014-2030, and at its peak in 2021, the total impact will increase state budget revenue by 7%

*Direct: taxes and wages paid by projects, Indirect: taxes and suppliers, employees and foreign trade revenue based on wages paid by their suppliers and services
The development of the iron ore sector has a 4% contribution to total value add US$1.2 billion on average annually in 2014-2030

**Impact of the iron ore sector on the economy**

<table>
<thead>
<tr>
<th></th>
<th>MNT trillion (2013 terms)</th>
<th>Now: 2013</th>
<th>By 2030</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Best Case</td>
<td>No Iron</td>
</tr>
<tr>
<td>Real GDP</td>
<td></td>
<td>17.5</td>
<td>70.8</td>
</tr>
<tr>
<td>Private Consumption</td>
<td></td>
<td>8.0</td>
<td>28.3</td>
</tr>
<tr>
<td>Government consumption</td>
<td></td>
<td>2.9</td>
<td>18.4</td>
</tr>
<tr>
<td>Investment</td>
<td></td>
<td>8.7</td>
<td>20.5</td>
</tr>
<tr>
<td>Export</td>
<td></td>
<td>4.3</td>
<td>16.0</td>
</tr>
<tr>
<td>Import</td>
<td></td>
<td>6.4</td>
<td>12.4</td>
</tr>
<tr>
<td>Total wage payment</td>
<td></td>
<td>8.2</td>
<td>30.8</td>
</tr>
<tr>
<td>Budget Revenue</td>
<td></td>
<td>5.9</td>
<td>25.8</td>
</tr>
</tbody>
</table>

*Domestic suppliers, employees and government’s import purchase based on revenue from Iron ore projects

**Comparative analysis**

The size of the iron ore sector is estimated to be marginal compared to other mineral potential in Mongolia

**Size of the key mineral sectors in Mongolia**

Required CAPEX for all of the iron ore projects is equal to one fifth of OT’s Phase 2 investment

*Bubble size represents the estimated production value in MNT 2012 trillion
The impact of the iron ore sector on total exports is likely to diminish over time and will become negligible by 2030.

**Contribution to mineral exports**

<table>
<thead>
<tr>
<th>Year</th>
<th>Copper</th>
<th>Gold</th>
<th>Iron ore</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>1</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>2020</td>
<td>9</td>
<td>18</td>
<td>10</td>
</tr>
<tr>
<td>2030</td>
<td>13</td>
<td>9</td>
<td>4</td>
</tr>
</tbody>
</table>

**Mining exports (MNT 2013 trillion)**

- **2010**: 2nd biggest
- **2020**: 4th biggest
- **2030**: Insignificant

Short mine life of the mining operations such as Eruu Gol (16.5% of the sector) that is estimated to stop in 2023 will cause the economic impact of the iron ore industry to diminish over the long term.

*No double counting: Although OT has gold reserves its considered as a copper mine only.

The iron ore sector's contribution to the Mongolian economy will be ~5% at its peak, ~5 times less than the OT's contribution alone.

**Impact on the economy and state budget revenue (2013 MNT trillion)**

**Direct Tax Payments**

- **2010**: 99 MNT trillion
- **2020**: 535 MNT trillion
- **2030**: 340 MNT trillion

**Total Contribution to GDP** (%)

- **2010**: 12 tln
- **2020**: 44 tln
- **2030**: 72 tln

*Direct and indirect impact, †Indirect impact on tax revenue is not considered*
The economic impact of the iron ore industry on the Mongolian economy is estimated to be marginal in the long term

Summary Findings

This study seeks to estimate the direct and indirect impact of the Iron Ore industry on the Mongolian economy until 2030

- Iron ore is the 3rd biggest contributor to Mongolian exports and state budget after coal and copper: 15% of total export revenue, 10% of total mining tax revenue or 2% of total budget revenue
- Impact on labor market is low: Employing only 4300 people, total wage paid by the iron ore sector is only 0.4% total national wage payment
- Direct value add from iron ore sector is 2% of GDP, and including its indirect impact through its supply chain and job creation, total impact of the sector on GDP reaches 3.5%

APPENDIX

Despite aggressive industry expansion, short mine life may lead to SIP having a shortage of feedstock (in the future)

Mongolian Iron ore industry in 2020 (Mtpa)

*Sainshand Industrial Park (SIP) – Iron Pelletizing Plant