

The Extractive Sector in the Post-COVID World: Implications for Supply Chains

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COVID-Related Immediate Impacts

COVID-19 DISRUPTS \$6.9BN OF MINING OUTPUT

Commodity	% of annual production at risk ▼	Number of mines	At-risk production	Value of at-risk production (\$)
Uranium (lb)	11.78%	21	17,746,289	597.2M
Platinum (oz)	3.30%	12	207,515	161.9M
Silver (oz)	2.36%	100	20,530,777	309.5M
Copper (t)	2.25%	51	466,621	2.4B
Molybdenum (t)	2.16%	14	7,154	140.8M
Palladium (oz)	1.98%	12	140,191	272.7M
Zinc (t)	0.99%	24	136,731	263.9M
Gold (oz)	0.98%	116	1,056,385	1.8B
Nickel (t)	0.97%	16	24,684	299.5M
Cobalt (t)	0.60%	6	1,057	31.2M
Lead (t)	0.55%	23	29,233	47.2M
Iron ore (t)	0.26%	5	6,126,292	517.7M
Lithium (t)	0.24%	2	2,043	14.5M

Source: S&P Global Market Intelligence

Prices: CME Group, LME, Fastmarkets MB, Platts, Benchmark Mineral Intelligence, UxC

Production data as of 23 April 2020. Source: S&P, April 2020



COVID-Related Immediate Impacts



- Planned Investments Delayed or Experiencing Substantially Reduced Budgets
- Annual Exploration Budgets Expected to Fall by 30%
- New Mines Disproportionately Affected
- Demand for Minerals Could Grow Rapidly as World Emerges from Health Crisis



COVID-Related Longer-Term Impacts

Most Speculated Long Term COVID-Related Impacts Reinforce Long Term Trends!

1. Geopolitics and Rise of Protectionism
2. Rise of Investment in Automation Tech
3. Adjustable Resource Nationalism
4. Requests for a New Social Contract
5. Rise of Environmental, Social & Governance (ESG) Requests
6. R&D in alternatives to mining

Rather new trend:

7. Regionalization of Supply Chains



Geopolitics and Rise of Protectionism

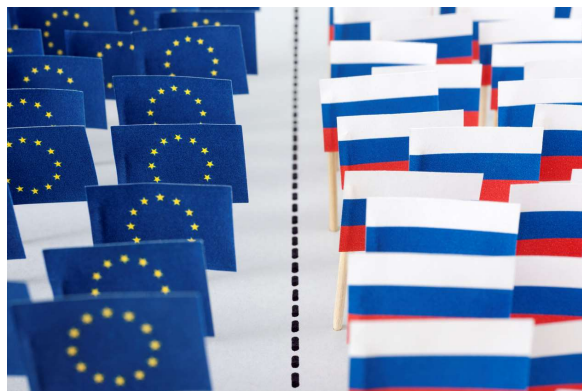


Risk Level Varies Based on:

- Reliance on Foreign Supplies
- Likelihood of Supply Disruptions
- Ability to Substitute or Reach Long-Term Agreements



Geopolitics and Rise of Protectionism



- Crisis Reinforced Protectionist Attitudes Started Prior to Pandemic
- Prior to COVID-19, United States Identified 23 Minerals at Risk of Supply Disruption
- China Largest Producer of 16 Minerals Most At-Risk
 - 15 Minerals Produced Mainly (or Solely) as By-Products
- Trump Administration Encouraging Domestic Mining Development, Risking Damage to National Parks & Environment



Geopolitics and Rise of Protectionism



**Protectionism, Trade Barriers, and Stronger
Domestic Mineral Policies Set to Rise
Resulting in Disruptions to Commodity Markets**



Acceleration of Automation and Digitization

- Lockdown Severely Impacted Production in Mines Where Work Could Not be Done Remotely
- Prior to Pandemic, Automation & Digitization Replacing Low-Skill Workers in Mines with Robots Controlled by Remote Control Rooms
- Expect to See Increased Automation To Save on Future Pandemics' Impact on Workers.



Production Cost Becoming Lumpier with Higher Capex and Lower Opex



Adjustable Resource Nationalism



- Government Interventions Normalized
- New Norms May Reinforce Resource Nationalism Trends, Increasing Production Costs For Existing Mines
- Higher Distribution of Fiscal Incentives May Result in New Investments
- Abusive Fiscal Incentives Might Backlash During Price Discovery



Requests for a New Social Contract



- Proactive, Progressive Companies Deployed Massive Programs to Assist Workers & Communities
- Inadequate Responses are Costly and Lead to:
 - Mine Shutdowns
 - Community Disputes
 - Legal Liability
 - Rise of illicit traders in ASM



Requests for a New Social Contract

Factors Causing Communities & Workers to Demand a New Social Contract:

- Job Losses Due to Automation
- More Water & Energy Intensive Mining
- Climate Change Increasing Water Stress
- Lack of Remediation Plan for Mine Closures
- ASM question remaining unsolved



Continuous Failures To Strike This New Social Contract Will Mean Endless Disruption



Rise of ESG Requests



- Increased Importance Placed on Environmental, Health & Safety and Crisis Preparedness Programs
- Investors Requesting Evidence of Corporate Resilience / Ability to Meet Challenges Arising from External Circumstances: Ex: Climate Change and Pandemics

Adaptation Costs In The Short Term-> Comparative Advantage In The Long Term With Access To Lower Cost Of Capital



Research & Development into Mining Alternatives

- Prior to COVID-19, Multi-Stakeholder Calls to Transition to Less Mining/Extraction
- COVID-19 Caused Realization of Economic Impact of Global Crises
- Significant Increase in Research & Development Efforts for Mining Alternatives



Major Changes in Mineral Procurement To Be Expected Over Next 5 to 10 Years

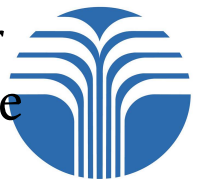


Regionalization / Localization of Supply Chains



- Travel Restrictions Cause All Sectors to Examine Supply Chain Vulnerabilities
- Companies Increasingly Exploring Ways to Build Resilience into Supply Chains through Localization and Regionalization
- Climate Change Calls for Reducing Carbon Intensive Shipping & Packaging Involved in Global Value Chains
- Regional Production makes Government Mandates for Local Content More Viable

Supply Chains Will Be Re-Organized



Summary



Rise of Protectionism



Resource Nationalism



Increased Investment in Automation



Request for New Social Contract



Rise in ESG Requests



Rise in R&D in mining alternatives



Regionalization of Supply Chains

