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Critical Raw Materials, Local Content Policy and Ukraine's Economic Recovery

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Content

Introduction

Ukraine's critical raw materials (CRM) have become an object of global discussion since the negotiation and signing of an agreement with the United States that gives that country priority access to their development.

The fact that US President Donald Trump continuously referenced Ukraine's critical raw materials is an expression of the geopolitical angst felt on both sides of the Atlantic about China's absolutely dominant role in critical raw material value chains. Beijing's economic success has been achieved in large part by developing an alternative economics, challenging the Washington Consensus through an interventionist policy approach. At the centre of this model is a highly concentrated and state-owned banking system (dominated by the »big four«), numerous other state-owned enterprises (SOEs), an active industrial policy and powerful regional administrations. This development model seeks to make capitalist markets work for the authoritarian regime rather than the other way round.

Western states have long had the goal of tackling Chinese dominance in many critical raw material sectors, but they have been reluctant to mimic the policy instruments China has utilised. Catching up with China would require long-term strategic investment in production, a mix of public and private sector mobilisation, a stable institutional environment and, above all, a radical embrace of the green energy transition. Indeed, the projected high demand for these minerals is often conditional on driving forward the push for net zero. As the International Energy Agency illustrates in their estimates for global demand (Table 1), this is critical in several sectors. Achieving net zero by 2050 entails more than doubling global rare earth demand, of which green technology would take a 39 per cent share by 2050 (up from 18 per cent in 2023). With regard to lithium, the figures are even more stark. A more than tenfold increase is required, 91 per cent of the resulting total demand coming from green technology (up from 56 per cent) in 2050. As regards graphite, demand would need to increase by a factor of 3.5, with 48 per cent coming from green tech (up from 28 per cent) by 2050 (Table 1). In short, the commercial value of these sectors depends in part on climate action by governments as the critical factor in total global demand.

International Energy Agency (2024) estimates for global demand (KT) in different climate scenarios[1]

Table 1

	Stated Policies scenario					
	2023	**2030**	**2035**	**2040**	**2045**	**2050**
Total global demand for magnet rare earth elements	**93**	**127**	**143**	**153**	**165**	**180**
Share of clean technologies in total demand	18%	31%	33%	31%	31%	32%
Total global demand for lithium	**165**	**471**	**736**	**991**	**1115**	**1196**
Share of clean technologies in total demand	56%	81%	85%	88%	88%	87%
Total global demand for graphite	**4632**	**9609**	**12354**	**13100**	**12467**	**12487**
Share of clean technologies in total demand	28%	54%	57%	54%	45%	39%
	Announced Pledges scenario					
	2023	**2030**	**2035**	**2040**	**2045**	**2050**
Total global demand for magnet rare earth elements	**93**	**133**	**153**	**169**	**184**	**200**
Share of clean technologies in total demand	18%	35%	38%	38%	38%	39%
Total global demand for lithium	**165**	**532**	**903**	**1326**	**1511**	**1607**
Share of clean technologies in total demand	56%	83%	88%	91%	91%	90%
Total global demand for graphite	**4632**	**10419**	**14309**	**16023**	**15021**	**14733**
Share of clean technologies in total demand	28%	58%	63%	61%	53%	46%
	Net Zero Emissions by 2050 scenario					
	2023	**2030**	**2035**	**2040**	**2045**	**2050**
Total global demand for magnet rare earth elements	**93**	**148**	**169**	**176**	**185**	**202**
Share of clean technologies in total demand	18%	42%	44%	41%	39%	39%
Total global demand for lithium	**165**	**705**	**1095**	**1431**	**1661**	**1728**
Share of clean technologies in total demand	56%	87%	90%	91%	92%	91%
Total global demand for graphite	**4632**	**13023**	**16956**	**17873**	**17090**	**16352**
Share of clean technologies in total demand	28%	65%	67%	63%	55%	48%

1 IEA (2024): World Energy Outlook 2024, IEA, Paris https://www.iea.org/reports/world-energy-outlook-2024

Ukraine has significant reserves of the critical raw materials important for the green energy transition in the »battery group« (lithium, graphite and manganese) and the »semiconductor group« (gallium, germanium and metallic silicon). It also has strategic building materials, such as titanium, hafnium and vanadium (Table 2). Ukrainian policymakers have been in dialogue with the European Union about these reserves for several years, and Kyiv and Brussels signed a memorandum about their development. Beginning in 2024, however, critical raw materials began to figure in Kyiv's strategic dialogue with the newly-elected Trump administration, and the rhetorical stakes rose. US senator Lindsey Graham referenced the trillions of dollars of critical raw materials in Ukraine,[2] and at the 2025 Davos conference Ukraine promoted itself as a »$12 Trillion Critical Mineral Superpower«.[3] As time went on, this dialogue veered into suggestions from President Trump that the value of these critical raw materials could compensate the US for past and future military aid on a model resembling wartime reparations. The deal that was finally signed makes no mention of previous aid, but nonetheless gives the United States right of first refusal (that is, first and exclusive access to investment proposals for a certain period of time) on critical raw material development projects.

This geopolitical hype has obscured the true economic significance of Ukraine's critical raw materials. If Ukrainian and Western companies begin developing these resources it will not upturn global markets or push Ukraine into the club of rich nations, but it could make a real contribution to reducing reliance on some Chinese critical raw materials and to reviving the country's war-ravaged economy. In this discussion paper we attempt to provide both a sober assessment of the resources and a pathway to maximising their benefits for Ukraine through the policy mechanism of local content.

Critical raw materials: an objective assessment

Some of the largest estimates of the value of Ukraine's critical raw materials rely on Soviet-era data that did not differentiate economically accessible reserves from the total geological mass. By studying more detailed exploration by Soviet and independent Ukrainian authorities, we obtain a more objective picture of Ukraine as a solid »second-tier« supplier, generally holding several percentage points of global supplies of the critical raw materials listed above (Table 2). This does not mean that Ukraine could not play a significant role. It probably has Europe's largest graphite reserves and, by one estimate, could meet EU and US demand for metallic titanium for 25 years.[4]

Given the huge geopolitical stakes around the US–UA critical materials deal, it is worth noting just how small the current levels of extraction and export are in Ukraine. One industry association estimates that exports were just 100 million US dollars (US$) in 2024.[5] At present there is no commercial extraction of lithium in Ukraine, despite the extensive interest shown in this material internationally. In 2024 the only working graphite quarry in Ukraine ceased operations because of low global prices (attributed by some to alleged Chinese dumping) and rising electricity and rail freight costs in Ukraine.[6] Extraction has since resumed, however.

Russia's full-scale invasion in 2022 depressed the extraction and processing of critical raw materials in Ukraine. One of the two mines in the country which extracts high-quality silicon oxide producing metallic silicon used in semiconductors has been idle since the invasion began because its location in the border province of Sumy makes it vulnerable to Russian artillery and rocket strikes. The occupation of the Zaporizhzhia Nuclear Power Station by Russia cut off power availability to that region's titanium-magnesium plant, the only location in Ukraine where germanium can be synthesised for use in fiberoptic and infrared technologies, and also to the Nikopol and Zaporizhzhia Ferroalloy plants that turn Ukraine's rich manganese deposits into semi-processed inputs for the global metallurgy sector. Since the beginning of the invasion the Mykolayiv Alumina Plant has been idle because it was owned by the Russian Rusal corporation and is gradually being prepared for re-privatisation. This was the only location in Ukraine where gallium could be synthesised from alumina waste for the semiconductor industry.

2 https://x.com/LindseyGrahamSC/status/1799832487285465244?lang=en

3 Ukraine: A $12 Trillion Critical Mineral Superpower, Ukraine House Davos 2025.

4 Dutta, Prasanta Kumar, Sam Hart, Jon McClure, Anurag Rao and Mariano Zafra (2025): Ukraine signs mineral deal with the US, Reuters (26.2.2025) (last accessed on 1 May 2025).

5 National Association of Mining Industries of Ukraine (2025): Ukraine and critical minerals: myths, reality and geopolitical challenges (in Ukrainian); available at: https://neiau.com.ua/ukrayina-ta-krytychni-mineraly-mify-realnist-ta-geopolitychni-vyklyky/

6 Bespiatov, Tymofiy (2024): The only producer of graphite in Ukraine has ceased work, delo.ua (in Ukrainian); available at: https://delo.ua/news/jedinii-v-ukrayini-virobnik-grafitu-pripiniv-robotu-439647/

Table 2 Ukraine's critical raw material resources in a global context

Table 2

Critical raw material	Global reserves (A+B+C1) (metric tonnes)	Countries with largest reserves (metric tonnes)	Global extraction in 2023–2024 (metric tonnes/ year)	Volume in Ukraine (A+B+C1) (metric tonnes)	Number of deposits on Ukraine government controlled/ occupied territories
Lithium (100% LiO2)	30 million	Chile (9.3 million), Australia (7 million), Argentina (4 million), China (3 million)	204,000 and 240,000	1.6 million	3/1
Natural graphite (100% C)	290 million	China (81 million), Brazil (74 million), Madagascar (27 million), Mozambique (25 million), Tanzania (18 million)	1.53 and 1.6 million	13.58 million	4/2
Manganese (100% Mn)	1.7 billion	South Africa (560 million), Australia (500 million), China (280 million), Brazil (270 million)	19.6 and 20 million	430 million	3/2
Gallium (100% Ga)	1 million (bi-product of bauxite and zinc ores)	Bauxite: Guinea, Australia, Brazil, Vietnam, Indonesia, Jamaica Zinc ores: Australia, China, Russia, Peru, Mexico	Up to 320 tonnes of Gallium of high purity (Ga=99.9999%)	3000 (in slag heaps of Mykolayiv Alumina Plant)	1/0
Germanium (100% Ge)	Up to 1 million (bi-product of zinc ore and brown coal)	Zinc ores: Australia, China, Russia, Peru, Mexico Brown coal: China, Russia, USA, Ukraine	Around 140 tonnes of Germanium of high purity (Ge=99.999%)	15000 (in commercially accessible brown coal deposits)	20/0
Silicon (100% SiO2)	Over 11 billion tonnes containing SiO2 > 95%	China, Russia	4200 and 4600	150 million	5/0
Titanium (100% TiO2)	510 million (ilmenite) + 540 million (rutile)	Ilmenite: Australia (180 million), China (110 million), Canada (51 million), Norway (37 million) Rutile: Australia (35 million), South Africa (6 million), Sierra Leone (2.9 million), Ukraine (2.5 million)	9.4 million	Ilmenite (5.9 million 100% TiO2), Rutile (2.5 million 100% TiO2) Total 8.4 million (100% TiO2)	25/0
Gafnium+ Circonium (100% ZnO2 + HfO2)	More than 70 million	Australia (55 million), South Africa (5.3 million), Senegal (2,6 million), Madagascar (2.1 million)	1.55 million of concentrate	900000	1/0
Vana-dium (100% V2O5)	18 million	Australia (8.5 million), Russia (5 million), China (4.1 million)	104000 and 100000	600000	12/0

Critical raw material value chains

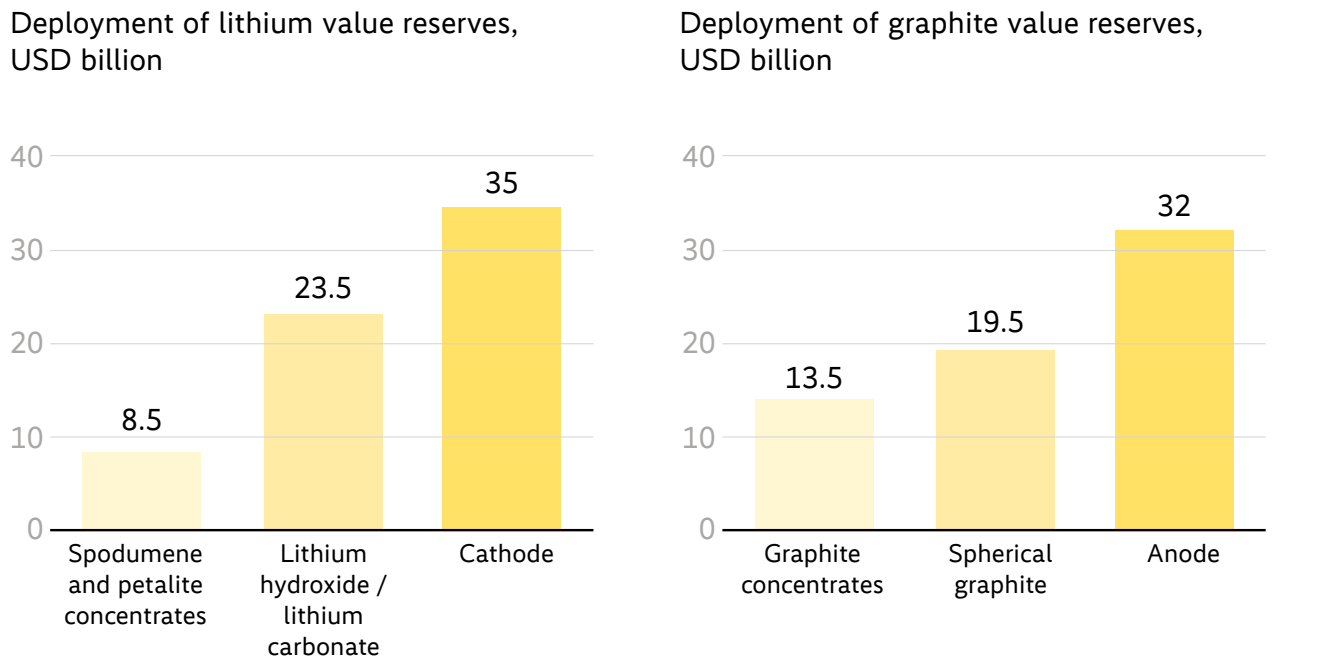
Ukraine's political leadership has identified value-added processing and manufacturing as a priority for economic recovery and development. This is a response to three decades of sustained deindustrialisation, exacerbated by the lack of a national industrial policy.[7] The government is deeply interested in moving beyond the role of »raw material supplier« (or, to use a more pejorative term, a »resource colony«) to become a processor of critical materials and a manufacturer of value-added goods.

If Ukrainian and Western firms begin extracting the country's lithium resources, the most basic saleable form would be spodumene and petalite concentrates (LiO_2=4–6%), the maximum value of which at today's prices would be around US$8.5 billion. If that same resource was processed into lithium hydroxide (LiOH) or lithium carbonate (Li_2CO_3), the value of the resource would grow to US$23.5 billion, and if those semi-processed products were used to make battery cathodes, the total value would grow even further to US$35 billion, more than four times the value of the concentrates (Figure 1a).

In the case of graphite, the value growth from semi-processing 99% graphite concentrate into 99.5% spherical graphite would be almost one third, and if that was processed into anodes and cathodes the full value would be 2.3 times greater than that of the concentrate (US$32 billion vs US$13.5 billion). Shifting from manganese concentrate to metallic manganese would represent a value increase of 3.3 times, and if that was used in battery cathodes the value increase would be six times greater. For titanium the value difference between concentrate and finished product is more than seven times, while for metallic silicon it is more than 11 times (Figure 1b).

Value of lithium and graphite resources in Ukraine based on their level of processing

Figure 1a and b



Source: Analysis of publicly available data by Ukraine Industry Expertise

Figures of such magnitude have tantalised countries across the world for decades. But how can more of the value added be retained by the country in which the raw material is extracted, and how can mineral wealth become a genuine engine of prosperity?

Ukraine's own experience demonstrates the scale of the challenge. In recent decades, the only critical raw material described in this report that Ukraine has processed into a higher value product is manganese. By turning magnesium concentrate into battery-quality metallic manganese (Mn>99%) at the Zaporizhzhia Ferroalloy Factory, Ukrainian industry increased the material's value by 3.3 times and generated important export revenue. But this lucrative processing ceased when the primary customer, China, replaced imports with domestically produced metal-

7 Milakovsky, Brian, and Volodymyr Vlasiuk (2024): Industrial policy for Ukraine's survival. FES (May); available at: https://library.fes.de/pdf-files/bueros/ukraine/21226-20240605.pdf

lic manganese.

This example demonstrates the challenges facing Ukraine in its efforts to move up the value chain from raw ores to semi-finished or finished products. The huge concentration of processing capacity in China gives that country power over Western countries, whether it be by choking off crucial supplies or, conversely, by letting them flow in huge volumes and thus precluding the economic viability of processing elsewhere. The resulting market churn can undermine investments in Western mineral extraction or prospecting even as the long-term prospects for the Green Transition suggest that demand should grow hugely for battery and semiconductor group materials. Further uncertainty is added by the US's dramatic actions with regard to trade and the pro-fossil fuel, anti-renewable policies of the Trump administration. This adds ambiguity about future demand for critical raw materials in the battery group.[8] These geopolitically shaped global market conditions make the very high levels of investment required to move up the value chain inherently risky. Changes in market conditions can leave processing facilities lying idle, with large potential losses. This helps explain why these supply chains tend to become concentrated around a relatively small number of countries and state-supported firms that are cost competitive.

Indeed, the reverberations of this market uncertainty are felt in critical material operations around the world. For example, North America's only graphite mine, in Quebec, is warning that without government intervention it may have to shut down and the leading US lithium company Albermarle is freezing plans to build a lithium refinery in South Carolina.[9] This follows the bankruptcy of Sweden's huge Northvolt plant, which was it was hoped would become a flagship of the EU battery sector.[10]

Investments in these value chains are nevertheless being planned and implemented across the EU and North America. The stakes are simply too high for Western countries to continue acquiescing to Chinese domination of the sectors. But with so much uncertainty, new investments in critical material processing will be feasible only as part of national and supranational industrial policies. The case of Northvolt shows that even with the EU and some of its richest member states behind it, being a subject of industrial policy is no guarantee of success. A key problem that policymakers face is balancing the sectoral subsidies necessary to enable these industries to flourish with the risk of simply creating firms that are uncompetitive and able to survive only because of government support. In an ideal scenario, a sectoral rather than a company focused industrial policy would incentivise a number of firms, to be sure with a role for state-owned enterprises, to make such investments, and the resulting market competition between them would generate innovation and, ultimately, global competitiveness. Such an approach would imitate aspects of Chinese industrial policy. Notably the authoritarian party-state allows individual firms to go bust but within markets shaped by state intervention with long-term, stable financial support. The firms that survive these competitive conditions at the domestic level have often gone on to become highly competitive at the global level.

If the challenges of competition with China in the global marketplace are considerable for wealthy Western states they are, of course, even greater for war-ravaged Ukraine, with its dependence on external funding. How, within these constraints, can Ukraine develop its own industrial policies around critical raw materials and integrate them with those of the US and the EU?

Local content

The concept of local content (LC) may provide a policy framework that allows Ukraine to move towards value capture in critical raw material value chains. At the very least, Kyiv and its partners can learn much from the local content policy experience of such diverse countries as Malaysia, Chile and South Africa, which have tried to escape from the status of raw material supplier.

Local content has been defined as a »set of policy instruments elaborated by national and/or regional governments to ensure that a certain proportion of factors of production (such as labour, supplies of goods and services, technology and technical know-how) required at various stages of the mineral value chain is sourced from the domestic economy«.[11] This concept encompasses both »upstream« and »downstream« value from the extraction of natural resources. Downstream local content policy seeks to increase the proportion of extracted raw materials that is processed domestically to improve economic sophistication, create jobs and increase revenue. Upstream local content policy seeks to maximise the proportion of local goods and services used by the corporations extracting the raw materials.

Global lessons for upstream local content

The concept of upstream local content emerged from the understanding that licensing fees, royalties and taxes for mineral extraction present only a limited part of the potential value that may be generated for developing countries

8 Kaufman, Alexander C. (2025): The Missing Part of Trump's Minerals Math; available at: https://www.theatlantic.com/science/archive/2025/05/trumps-mineral-paradox/682675/

9 Mining Weekly (2025): Albemarle CEO says 'math doesn't work' for US lithium refinery project; available at: https://www.miningweekly.com/article/albemarle-ceo-says-math-doesnt-work-for-us-lithium-refinery-project-2025-05-02

10 New York Times (2025): Swedish Battery Maker Northvolt Collapses, a Blow to Europe; available at: https://www.nytimes.com/2025/03/12/world/europe/northvolt-battery-bankruptcy.html.

11 Ramdoo, Isabelle (2018): Designing Local Content Policies in Mineral-Rich Countries. International Institute for Sustainable Development.

by mining operations.[12] In fact, 40–80 per cent of mining companies' revenues are spent on procurement of goods and services, a figure that dwarfs what they pay directly to governments.[13]

Upstream local content policy covers a spectrum from voluntary commitments by corporations or »best effort« clauses in legislation asking corporations to work with local suppliers to ironclad requirements to purchase a certain percentage of goods and services domestically, hire a certain proportion of locals, and transfer a certain amount of technology to national partners, among other things. After decades of effort, the literature on these policies expresses much caution and points to a rather narrow path to policy success.

The primary weakness of upstream local content policies, at both the voluntary and obligatory ends of the spectrum, is that they do not address the quality delta between the goods and services offered by domestic suppliers and those needed by multinational mining companies. In some countries that delta can be distressingly large; one assessment in Mozambique found that 99 per cent of the goods and services offered domestically did not meet the procurement standards of mining companies working there.[14] If supplier quality is low then semi-voluntary »best effort« clauses in national legislation (that is, requirements that companies make their best effort to source locally) almost always fail, as was found in the Democratic Republic of Congo, Botswana and Zambia.[15] Even Chile, a country considered fairly successful in using mining for economic development, has been criticised for committing too few state resources to developing the capacities of domestic companies trying to secure a place in the value chain.[16]

At the other end of the spectrum, neglect of supplier development can also lead to failures of strict local content mandates. Companies seek to navigate around unrealistic requirements, for example by purchasing large amounts of imported goods from locally registered companies. This occurred in South Africa, provoking its parliament to tighten the law to better define »local« sourcing. Companies in turn have complained that without supplier development programmes compliance with new regulations of that kind will be difficult.[17] In Kazakhstan and Argentina strict local content requirements led to local goods and services being redirected from sectors that were not regulated by local content laws to those that were, with a concomitant increase in imports in the unregulated sectors. Thus, the local content requirements distorted the market without growing the pie for local businesses.[18]

Sober assessment of the present capacity of domestic goods and service providers is crucial before setting mandates.[19] Such mandates should not simply be nested in the current competitive advantage of local suppliers but push that envelope, albeit without setting unrealistic goals. Ghana assessed its domestic suppliers and set local content requirements only for goods and services that could be produced competitively, gradually expanding the list as supplier development programmes helped to raise the quality of local supply.[20]

The basket of goods and services that different countries can provide competitively is very diverse. For example, South Africa is reliant on imported mining equipment but is extremely competitive in certain equipment types that were developed for the country's unique mining conditions.[21]

Supplier development programmes should address knowledge gaps for local companies in international standards, technology and business practices, while raising awareness of sources of financing and fostering direct connections with the major mining companies doing business in the country. These programmes are often partnerships between national and/or provincial governments and corporations. In Nigeria a 1 per cent tax on »backward linkages« in the oil and gas sector (purchases from local suppliers) is used to fund supplier development programming and affordable loan schemes. In South Africa multinational mining corporations set up their own financing mechanisms for local suppliers, perhaps motivated by the country's high local content mandates.[22]

At their best, these programmes oversee a steady increase in the local content of mining supply chains. In Brazil the Vale corporation estimated that more than 90 per cent of

12 Korinek, Jane and Paulo Sa (2023): Local content policies in the mining sector. 10.4324/9781003415794-3.

13 Dobbs, Richard et al. (2013): Reverse the curse: Maximizing the potential of resource-driven economies. McKinsey Global Institute; available at: https://www.mckinsey.com/industries/metals-and-mining/our-insights/reverse-the-curse-maximizing-the-potential-of-resource-driven-economies

14 Korinek, Jane, and Isabelle Ramdoo (2017): Local content policies in mineral-exporting countries. OECD; available at: https://www.oecd.org/en/publications/local-content-policies-in-mineral-exporting-countries_4b9b2617-en.html

15 Ibid.

16 Lebdioui, Amir (2020): Local content in extractive industries: Evidence and lessons from Chile's copper sector and Malaysia's petroleum sector, in: The Extractive Industries and Society 7(2): 341-352.

17 Geipel, Jeff, Kyela de Weerdt and Tatiana Alarcon (2021): Overview of the local content in the mining sector in Southern Africa, in: Southern Africa Resource Watch 24.

18 Stone, Susan, James Messent, and Dorothee Flaig (2015): Emerging policy issues: Localisation barriers to trade. OECD; available at: https://www.oecd.org/content/dam/oecd/en/publications/reports/2015/05/emerging-policy-issues_g17a264f/5js1m6v5qd5j-en.pdf

19 World Bank Group (2015): A Practical Guide to Increasing Mining Local Procurement in West Africa.

20 Korinek and de Sa (2023). See n 12 above.

21 Kaplan, David (2012): South African mining equipment and specialist services: Technological capacity, export performance and policy, in: Resources Policy 37.4: 425–433.

22 Geipel et al. (2021). See n 17 above.

its purchases were from local suppliers and that local content had increased in its main Brazilian operations from 54 per cent in 2012 to 63 per cent in 2014.[23] The World Class Supplier Programme, a state–corporate partnership in Chile's copper sector, helped to start up 250 new domestic suppliers.[24]

The path is not always smooth. International mining corporations and donors fostered a supplier development programme around the Mozal aluminium smelter in Mozambique to address the severe capacity gap for local goods and service suppliers, as already mentioned. The programme helped to bring more local firms into certain mining supply chains, but they struggled to expand horizontally into other chains and sectors, let alone abroad. In some cases this new domestic capacity was left idle between projects in target value chains. The programme's designers identified the strengthening of horizontal links as a key priority for future iterations of the programme.[25] While it unquestionably helped to increase the proportion of local content in Chile's copper sector, some have criticised the World Class Supplier Programme for failing to make a long enough investment. Some new connections fostered by the programme were only short-term and situational, and the new supplier companies were clustered in a few large cities. Few contributed directly to the remote provinces where mining takes place.[26]

If there is a best-case scenario for upstream local content, it is probably Malaysia. Realising that its domestic reserves of oil and gas were insufficient to guarantee long-term prosperity, the Malaysian government developed its extraction service companies (clustered around Petronas, the state fossil fuels company) into internationally competitive service providers. This began as a journey to maximise local content through supplier development, targeted worker training (including financing education abroad) and local content mandates, but in the end, it launched an important export industry for the country as well. Malaysia was even able to launch new manufacturing sectors, such as rig production and shipbuilding.[27]

An important, albeit small detail of the Malaysian case study is that the country was able to make its largest local content gains before exposing its oil and gas sector to the trade requirements of the WTO. Some developing countries have received exemptions from WTO government procurement rules that allow them to practice local content policy, but it is not clear what the organisation's position would be regarding Ukraine, which has signed up to some WTO commitments that would limit local content.

Upstream local content in Ukraine

Ukraine is certainly in a better starting position regarding the availability and quality of inputs to critical raw material value chains than many of the developing countries mentioned above. Although the country has experienced protracted decline in the economic significance of industry, Ukraine still has functioning oil and gas, iron ore and coal mining sectors that could contribute significant knowhow to a growing critical raw materials sector.

Multinational corporations that extract critical raw materials rely on international service companies because of their reliability and maintenance of standards. It is a particularly steep challenge for local firms to displace such international service companies, but many have found success in integrating with them as subcontractors. Most of the engineering services needed to develop critical raw materials are available in Ukraine, and a significant body of expertise could be repurposed from engineering firms that serviced the Russian oil and gas sector before the full-scale invasion. Ukraine's much-lauded IT sector has helped the country's large iron ore mining companies to increase their extraction efficiency. Given the ease with which it is able to work with Western clients it could probably offer similar services to the multinationals that will extract critical raw materials or the international service companies they engage.

In the field of mining equipment Ukraine has certain niche strengths. The country's coal mining equipment manufacturing sector has been severely impacted by Russia's two invasions, which resulted in the occupation of 20 factories across the Donetsk and Luhansk regions in 2014 and the idling of the enormous New Kramatorsk Machine Plant in 2023. Still, two significant factories remain, one in Kharkiv and one dispersed to several locations after being evacuated from the frontline city of Druzhkivka.[28] These firms make a range of equipment that could be utilised in the shaft mining of certain critical raw materials, including graphite, silicon and hafnium. It should be noted that the two remaining mine equipment factories are both in the energy holding of Ukraine's richest man, Rinat Akhmetov, which could cause some political sensitivity if state policy was seen to benefit him specifically.

23 International Labour Organization (2016): Meeting the skills gap: Vale's Inove local content development program; available at: https://www.skillsforemployment.org/knowledge-product-detail/4149

24 Korinek and Ramdoo (2017). See n 14 above.

25 IGF (2018): Mozambique: Horizontal Linkages. Constraints of Building Horizontal Linkages in a Low-Capacity Environment. Intergovernmental Forum on Mining, Minerals and Sustainable Development.

26 Atienza, Miguel, Martín Arias-Loyola, and Marcelo Lufin (2020): Building a case for regional local content policy: The hollowing out of mining regions in Chile, in: The Extractive industries and society 7(2): 292–301.

27 Lebdioui (2020). See n 16 above.

28 The »Svit Shakhtarya« plant in Kharkiv and the Druzhkivka Machine Building Plant of the Corum Group.

Ukrainian manufacturers also have strong capacities in certain products, such as conveyors used in moving ore.

Unfortunately, Ukraine presently has no machinery sector for those minerals extracted with the quarrying method, such as manganese. The last such factory in the eastern city of Kryviy Rih is currently undergoing bankruptcy. Before Russia's invasion of 2014 this plant was slated to host the localisation of mining equipment production by a major international brand, but this was cancelled during the instability that followed the invasion.

The fact that Ukrainian firms can offer some goods and services needed in critical raw material value chains does not necessarily mean they will be competitive and preferred by multinational mining firms that lack experience with Ukrainian suppliers. Nonetheless, there is clearly a local content baseline from which Ukraine could experiment with mandates for its most competitive positions, paired with supplier development programmes for those positions in which it is weaker. For example, Kyiv may want to explore partnerships with Western countries interested in its critical raw material reserves to facilitate the entry of Ukrainian machine parts manufacturers into important manufacturing value chains, such as quarry mining equipment.

Ukraine will enter the local content policy space significantly encumbered by bilateral and multilateral agreements. The country is a signatory of the WTO Agreement on Government Procurement, which in theory virtually precludes the kind of domestic preferences needed to make local content policy work. The Deep and Comprehensive Free Trade Agreement between Ukraine and the EU also limits Kyiv's ability to support its own producers. Finally, the recently signed US-Ukraine Mineral Deal will regulate Ukraine's relations with American minerals companies, and it is unclear whether local content mandates will fit into that framework. Ukrainian diplomats and trade negotiators must explore how much industrial policy space they can secure for the country to support its post-war recovery within the constraints of these various agreements.

Global lessons for downstream local content

As important as capturing upstream local content could be for Ukraine's economy, it is really the downstream local content related to the processing of critical raw materials that has captured the imagination of policymakers in Kyiv. In this respect Ukraine is similar to dozens of developing countries that have dreamed of industrialising on the back of their rich mineral reserves. Without active state policies to encourage the »beneficiation« of critical raw materials domestically, it is distressingly common for supplier countries to see almost no value added after the ore is removed from the ground. For example, in the absence of effective local content policy, almost none of the copper mined in Zambia is available to domestic processors and manufacturers.[29]

Thus, many countries have aimed to impose requirements on multinational mining companies to establish domestic processing facilities as part of the price of resource access. They are working against the fact that efficient maritime shipping makes it possible for industrialised countries to move large volumes of raw materials at modest prices to their own territory and do the processing there, closer to the final consumer.[30] Using mineral reserves as leverage tends to work only when they make up a large proportion of global supply or are of exceptional quality. For example, Botswana has been able to leverage its exceptional diamond resources to convince a few international buyers to move more of the jewellery value chain onto Botswanan territory.[31] Indonesia threatened to impose export restrictions on its strategic supplies of high-grade nickel ore if its Chinese clients did not build refineries there, and make a success of it. The prospect of losing access to Indonesia's strategic supply was too concerning not to make the investment. But when Jakarta attempted similar leveraging with its bauxite resources, which are less globally important, global purchasers simply pivoted to other suppliers and Indonesia lost even the raw material export revenue.[32]

With the rise in global demand for lithium, Chile offered preferential pricing for lithium extraction licenses to firms that would build processing capacity inside the country. Santiago had to carefully negotiate with the EU to avoid a challenge based on the Chile–EU Deep and Comprehensive Free Trade Agreement, but even so market conditions have not yet been conducive to the development of processing facilities.[33]

This is not to say that market forces never lead to value-added processing being established in critical raw material supplier countries. With the right constellation of market conditions they can be competitive, but many of these must be brought about by active policies. A 2018 review identified five such conditions that can make or break domestic processing projects in developing countries (see Figure 3).[34] In the next section we will explore how well Ukraine can meet these conditions.

29 Barron, Karla Cervantes, et al. (2024): Value addition for who? Challenges to local participation in downstream critical mineral ventures in Zambia, in: The Extractive Industries and Society 20: 101554.

30 Östensson, Olle, and Anton Löf (2017): Downstream activities: The possibilities and the realities. WIDER Working Paper No. 2017/113.

31 Korinek and de Sa (2023). See n 12 above.

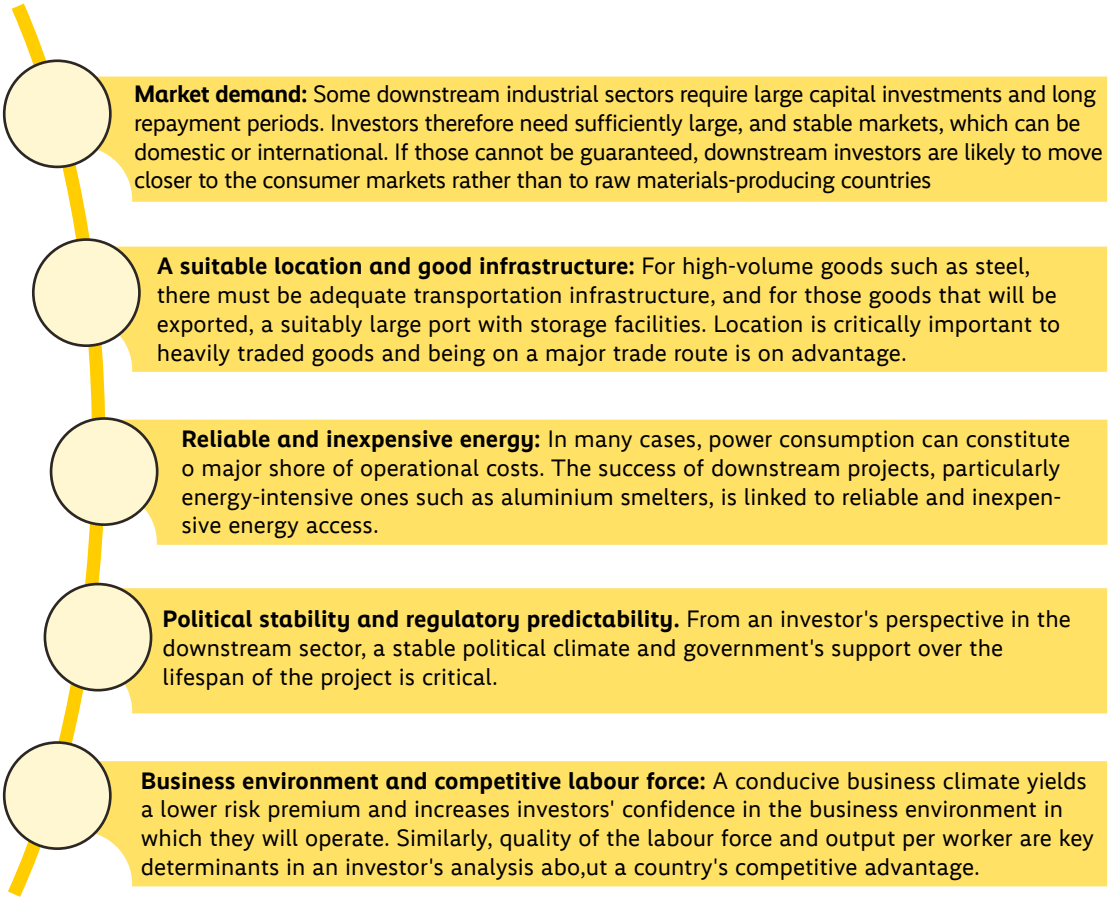
32 Lebdioui, Amir, and Pavel Bilek (2021): Do forward linkages reduce or worsen dependency in the extractive sector. Background Paper.

33 Dünhaupt, Petra, et al. (2025): Industrial policy space in emerging economies: The case of Chile's lithium industry and the energy and raw materials chapter in the EU-Chile free trade agreement. Working Paper No. 251/2025.

34 Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development (IGF) (2018): IGF Guidance for Governments: Local content policies. Winnipeg: IISD.

Figure 3 Conditions for the success of investments in critical raw material processing

Figure 3



Source: IGF 2018.[35]

Downstream local content in Ukraine

Ukraine probably lacks the resource leverage that allowed Botswana or Indonesia to require more domestic processing, given that it holds just a few percentage points of the global supply of any given critical raw material (Table 1). Possible exceptions are manganese, as Ukraine's supplies are some of the highest quality globally, and more obscure materials, such as germanium.

Ukraine will thus have to work harder to convince Western clients that it is an appropriate location for processing facilities, for example, for lithium hydroxide or spherical graphite. To understand the country's competitive position, it is worth assessing the conditions highlighted in Figure 3.

With regard to market demand and "suitable location and good infrastructure", Ukraine is of course in immediate proximity to the huge EU economy, and joint investments are weaving their road, rail and maritime infrastructure even more tightly together. But while this proximity could facilitate EU investments in value-added processing on Ukrainian soil, it seems just as likely it could facilitate the transfer of raw materials to the EU, as has been the case with Ukrainian grain, timber and many other resources. Which of the two scenarios occurs is likely to depend on how well Ukraine can perform on the other conditions, and to what extent the country will be integrated into the EU's industrial and development policies. We must also consider whether the recently signed US-Ukraine mineral deal will form any barrier to the flow of critical raw materials to the nearby European market and result in their export to the more distant American one.

Regarding the third condition, »reliable and inexpensive energy«, Ukraine is currently in an extremely uncompetitive position after three years of Russian attacks on its power grid. But critical raw material mining and processing projects will surely take years to get off the ground. What kind of energy system will Ukraine have by that time? This will surely be a function of how deeply the country is integrated into the European project and what scale of modernisation support it receives.

35 See n 34.

»Political stability and regulatory predictability« are probably strong points for Ukraine relative to many developing countries. Its political system has proven remarkably resilient throughout the conflict. International donors have generally been satisfied with the government's use of aid, and despite all the wartime risks some FDI has flowed to the country's industrial economy, especially defence industries but also building materials and processed foods. Still, there have been hiccups, such as a multi-year dispute over taxation between the government and investors in renewable energy that is only now being resolved. There is room for improvement, but compared with some weaker and less stable states in the developing world Ukraine is a comparably safe investment.

Does the US-Ukraine minerals deal facilitate local content?

The agreement – known in the media as the »US-Ukraine Minerals Deal« – signed by Ukraine's economics minister Yuliya Svyrydenko and US Treasury Secretary Scott Bessent, could profoundly influence how the country develops its critical raw materials. The agreement establishes a joint US-Ukraine investment fund for those resources and related infrastructure projects, to which Ukraine will contribute at least 50 per cent of the funds raised from selling critical raw material licences. The value of arms donated by the United States to Ukraine's defence can count as a US contribution to the Fund, but it is not yet clear whether Ukraine would be obliged to match those sums with its own contributions.

Deputy Minister of Economy Oleksiy Sobolev, who participated in the negotiations leading up to the agreement, described its key features:

- → The auction process for the sale of critical raw material extraction licences will take place as before. Contrary to some interpretations, the agreement does not give preference to US companies in the issue of extraction licences.

- → If a license holder or another company interested in processing critical raw materials extracted by a license holder (hereafter a »project sponsor«) requires external financing to realise their business project, the agreement obliges them to present their investment project to the Fund for consideration. The Fund has three months to consider whether it will invest in the project before it may be offered to other investors. If the Fund declines to invest in the proposed project, the project sponsor may not offer other investors substantially better conditions for the next six months (but may offer them the same conditions that were offered to the Fund).

- → A project sponsor is not obliged to accept investment from the Fund. If the project sponsor has sufficient resources to implement their project without external financing, they may bypass the Fund.

- → The Fund does not have offtake rights for critical raw materials extracted in Ukraine, though the Agreement does stipulate that the parties may limit such offtake rights to those countries that have contributed to Ukraine's defence (excluding the aggressor Russia and potentially neutral China).

- → The United States has asserted its intention not to impose tariffs on critical raw materials extracted in Ukraine by companies affiliated with the Fund.

- → The deal should in no way obstruct Ukraine's accession to the European Union.

The Deputy Minister claims that the agreement guarantees that Ukrainian critical raw material extraction projects will be prioritised over potential investors. The Fund will receive preferential access to these investment opportunities, but only for a matter of months. This significantly rows back on the claim that the agreement commits Ukraine's critical raw materials to the United States. According to the Deputy Minister, the agreement also does not give the United States offtake rights to critical raw materials, in contrast to some earlier interpretations.

It remains to be seen whether the short-term right of refusal will make the United States the dominant player in developing Ukraine's critical raw materials. The real level of interest among US corporations could be tested later this year in the first major new critical raw material auction since the signing of the agreement, for the Dobra lithium deposit in central Ukraine. One expected bidder for this license is TechMet, a US company committed to »securing Western-aligned critical minerals supply«.[36]

The short-term nature of the Fund's right of refusal may allow it to function without triggering a challenge from the EU on the grounds of the its Deep and Comprehensive Free Trade Agreement (DCFTA) with Ukraine. The EU signed a Strategic Partnership on Critical Minerals in 2021, but the war has held up meaningful implementation. Nonetheless, the EU has stated its interest in developing »joint EU-Ukraine CRM value chains«.[37] Other countries have also shown serious interest; a Turkish firm, for example, holds the license for one of the largest graphite deposits in Ukraine.[38]

The current agreement makes no mention of local content and imposes no requirements at all on how US companies

36 Méheut, Constant (2025): Ukraine Takes First Step Toward Carrying Out Minerals Deal With U.S. New York Times (16 June 2025).

37 This was asserted by Gabriel Blanc, Team Leader for the European Commission for the Recovery of Ukraine, at the Ukraine Recovery Conference in Berlin in June 2024.

38 Indiscreto, Nazareno (2025): Ukraine cedes the exploitation of its gold, kaolin, and graphite deposits to a single country. Elcabilda.org.

should operate while developing critical raw materials in Ukraine. (the Strategic Partnership with the EU is similarly silent on the issue). Some of the initial rhetoric around the agreement, including from President Trump, raised fears that it was primarily an instrument for handing over raw materials to US companies to serve a particular American agenda of industrial development. The final text of the agreement seems to have avoided this outcome, but leaves ambiguous the question of whether Ukraine can leverage access to critical raw materials to require greater integration of its companies into critical raw material processing value chains.

Recommendations

As a country that has clearly defined its Euro-Atlantic trajectory and is working diligently towards EU accession, Ukraine is a logical partner for the West in developing its critical raw material security and reducing reliance on Chinese supply. Ukraine's advantages include a well-developed infrastructure in close proximity to its critical raw material deposits, coal and iron ore mining, which provide a workforce and service providers with applicable skills, and a convenient mechanism for organising cooperation between the government and Western companies, namely production sharing agreements (PSA).

Ukraine should initiate auctions for critical raw material deposits and try to engage the maximum range of investors, using the fund created by the US-Ukraine mineral agreement to pursue necessary investments. To ensure that the resulting activity has maximum impact across its domestic economy, Ukraine should adopt a local content policy framework.

Actions on upstream local content

To facilitate the best outcome for capturing value from critical raw material value chains, we recommend that Ukraine establish an interministerial local content policy committee with representation from the Ministry of Economic Development (MED) and the Ministry of Foreign Affairs (MFA).

The first task of this committee should be to conduct a comprehensive review of the procurement needs of corporations involved in mining the critical raw materials found in Ukraine and the present capacity of Ukrainian firms to provide the requisite goods and services. This assessment should identify goods and services that Ukrainian firms offer at a sufficiently competitive level to – potentially – take part in local content mandates, and also those that Ukrainian companies could aspire to with the assistance of supplier development programmes. The present report has highlighted a few links in the value chain that Ukrainian businesses have the real potential to take advantage of to capture more value.

This review should also look at the current local content policies of the leading international and domestic companies most likely to obtain extraction licenses from the Ukrainian government with a view to understanding their openness to and experience with such policies. For example, the leading US lithium firm Albemarle has a Responsible Sourcing Policy that prioritises local supplier development and localisation of the value chain.[39]

Such assessments have been conducted in many developing countries and the expertise is available in Ukrainian and international consulting firms.

Based on this learning process, the Committee should draft proposals to the Ukrainian government on local content policy that could include elements of mandatory local content minimums, voluntary partnerships and incentives for license holders, as well as supplier development programmes. These proposals should be the basis for consultations with Ukraine's key Western partners on subjecting their companies to a local content policy if they launch critical raw material extraction projects in Ukraine. This should be positioned as a necessary step in Ukraine's economic recovery to reduce the country's dependence on international assistance.

In the past the European Union opposed Ukraine's 2021 Localisation Act for certain types of heavy machinery, demanding an exemption for EU firms on the grounds of the EU-Ukraine Deep and Comprehensive Free Trade Agreement. We suggest that overcoming this opposition should be a goal of Ukraine's economic diplomacy, as was the case with Chile during its DCFTA negotiations with Brussels.[40] The MFA and MED should also explore the openness of the Trump administration to local content policies in the US-Ukraine Reconstruction Investment Fund that emerged from the two countries' mineral deal.

Kyiv should also request consultations with the WTO on a possible exemption from government procurement rules that limit local content during the country's period of reconstruction, similar to exemptions that some developing countries have obtained to develop infant industries.

As a broader policy initiative, we recommend that the Ukrainian government apply the concept of local content beyond critical raw materials to other key sectors. There are parts of Ukraine's wartime and reconstruction economy in which local value capture would face fewer challenges. For instance, Ukraine has the production capacity to cover

39 Albermarle (2024): Responsible Sourcing Policy 32-050-150; available at: https://www.albemarle.com/us/en/sustainability/sustainability-reporting-resources/responsible-sourcing-policy

40 Dünhaupt, Petra, et al. (2025). See n 33 above.

more than 80 per cent of the building materials needed for reconstruction.[41] The country has also made stunning progress with localising arms manufacturing during the war, including in new technologies such as drones, thanks in no small part to targeted investment in and technology transfer to that sector by Western partners.

Actions on downstream local content

Ukraine should initiate trilateral consultations with the EU and the United States on the potential for investments in critical raw material processing within the context of both Ukraine's EU accession and its US minerals deal.

Such investments are simply not feasible without contributions from state budgets. Given Ukraine's enormous fiscal challenges brought on by war and reconstruction, it is unlikely that Kyiv alone can provide the necessary state aid. Processing capacity in the West for lithium, graphite and other critical raw materials will, for the foreseeable future, merely duplicate Chinese capacity and thus require significant subsidies. To secure this capacity, Ukraine would need to be integrated into the critical raw material industrial policy of the EU, the United States or both. Brussels should take the lead on resolving the potential contradictions of Ukraine's critical raw materials to the EU and the US.

Kyiv can align its domestic policies as much as possible to be an attractive investment destination, but beyond this it must invest in diplomacy to convince its partners that bringing Ukraine into the later stages of the critical raw material value chain is integral to the country's post-war viability.

41 Vlasiuk, Volodymyr and Milakovsky, Brian (2023): Insourcing the recovery: maximizing engagement of Ukrainian manufacturers in reconstruction efforts, LSE Research Online Documents on Economics 119450, London School of Economics and Political Science, LSE Library.

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Critical Raw Materials, Local Content Policy and Ukraine's Economic Recovery

Ukraine's critical raw materials (CRM) could play an important role in reducing the reliance of the EU, the United States and other Western countries on Chinese supply. The US–Ukraine »minerals deal« lays out one pathway for financing critical raw material mining and processing projects, albeit with some potential contradictions, given Ukraine's earlier commitments to co-develop these reserves with the European Union. But none of these partnerships lay out how Ukraine will capture the economic benefits of critical raw material extraction, whether it be upstream in the domestic supply of goods and services needed in the mining process, or downstream in the domestic value-added processing of the mined material. Local content policy (LCP) offers a framework for achieving this, but global experience shows that it must be carefully designed to reflect the nation's realistic supply potential, and be properly supported by investment in the development of domestic suppliers. In addition, Ukraine will need to negotiate policy space in which to practice local content policy, which is heavily constrained by its Deep and Comprehensive Free Trade Agreement with the EU and signatory status to several World Trade Organization (WTO) agreements. Finally, Ukraine must manage the contradictions of its commitments on critical raw materials to Washington and Brussels to unlock the investment resources needed to make those materials a driver of its economic recovery.

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