STRATEGIC WHITE PAPER

THE NEW RESOURCE SECURITY ORDER

Critical Minerals, Energy, Artificial Intelligence, Trade and the Reconfiguration of Global Power, 2026-2040

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CHAPTER 00

Publication Note and Scope

A decision-grade synthesis for governments, boards, investors and resource-sector leaders.

This paper examines the emerging resource-security system linking minerals, energy, electricity grids, artificial intelligence, semiconductors, trade corridors, industrial policy, finance and strategic alliances. The analytical horizon extends from 2026 to 2040, while quantitative evidence uses information available through 11 October 2026.

The paper separates observed data from institutional forecasts and from author scenario analysis. Historical values are described as actual or estimated by the source. Forward values are identified as projections, outlooks or scenarios. Monetary figures are nominal US dollars unless a source states otherwise. Installed power capacity, electricity generation and energy investment are treated as separate measures.

Source priority is given to primary public institutions and official policy instruments. Core evidence comes from the International Energy Agency, World Trade Organization, International Monetary Fund, World Bank, UN Trade and Development, International Renewable Energy Agency, US Geological Survey, NATO and official US-EU policy documents. Fast-moving conflict and market developments are date-stamped to the evidence cut-off.

CORE THESIS

The next phase of global economic competition will turn on the security, cost and speed of access to integrated resource systems. Geology matters. Processing, electricity, technology, infrastructure, capital and alliances determine who converts geology into strategic power.

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Executive map of the paper.

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CHAPTER 00

Executive Summary

Resource security is becoming the operating system of industrial policy, energy policy, technology policy and national security.

The world economy in 2026 is not deglobalizing in a simple or uniform direction. Trade remains large, digital and technology-linked trade is expanding rapidly, and cross-border capital still seeks scale. The structure of interdependence is changing. Governments and corporations are placing a higher premium on resilience, strategic control and trusted supply relationships. WTO evidence describes a multilateral system under its most sustained pressure in eight decades, while UNCTAD describes a selective reorganization of trade around geoeconomic priorities. (WTO, 2026a; UNCTAD, 2026b)

Three forces now reinforce each other. First, the 2026 Middle East energy shock exposed persistent dependence on narrow maritime and energy corridors. Second, the AI investment cycle is translating digital ambition into physical demand for electricity, grids, semiconductors, cooling, storage and minerals. Third, critical-mineral concentration has shifted from a theoretical risk to an operating constraint as export controls, quotas and licensing measures spread. (IEA, 2026a; IEA, 2026b; UNCTAD, 2026a)

The scale is large. IEA estimates global energy investment at US$3.4 trillion in 2026, with US$2.2 trillion directed to renewables, nuclear, grids, storage, low-emissions fuels, efficiency and electrification. Data-centre electricity demand rises from 485 TWh in 2025 to about 950 TWh in 2030 in the IEA central projection. More than 2,500 GW of generation, storage and large-load projects are already waiting in grid-connection queues. (IEA, 2026b; IEA, 2026c; IEA, 2026d)

Critical minerals reveal the deepest asymmetry. UNCTAD reports 74% of cobalt mining in the Democratic Republic of the Congo, 67% of nickel mining in Indonesia and 69% of rare-earth mining in China in 2025. IEA estimates the average share of the top refining country, excluding rare earths, reached 72% in 2025. Full implementation of Chinese rare-earth controls would place about US$6.5 trillion of downstream production outside China at risk each year. The economic value exposed is many orders of magnitude larger than the market value of the minerals themselves. (UNCTAD, 2026a; IEA, 2026a)

Trade and industrial policy are adjusting. The 2026 US-EU critical-minerals action plan places price-support instruments, offtake agreements, stockpiling, standards and coordinated responses inside a shared resilience framework. NATO has moved defence-critical materials into stockpiling and supply-chain planning. Such measures show a shift from passive market dependence toward managed resilience. (USTR and European Commission, 2026; NATO, 2026)

The shift creates a new strategic hierarchy. Resource endowment remains an advantage, yet resource-rich states do not automatically capture value. The winners will pair geology with reliable electricity, processing capacity, logistics, governance, finance, skills, digital capability and international access. Countries and firms positioned only at the extraction stage face greater exposure to price cycles and bargaining pressure. Countries that build midstream and infrastructure capacity gain greater influence over strategic value chains.

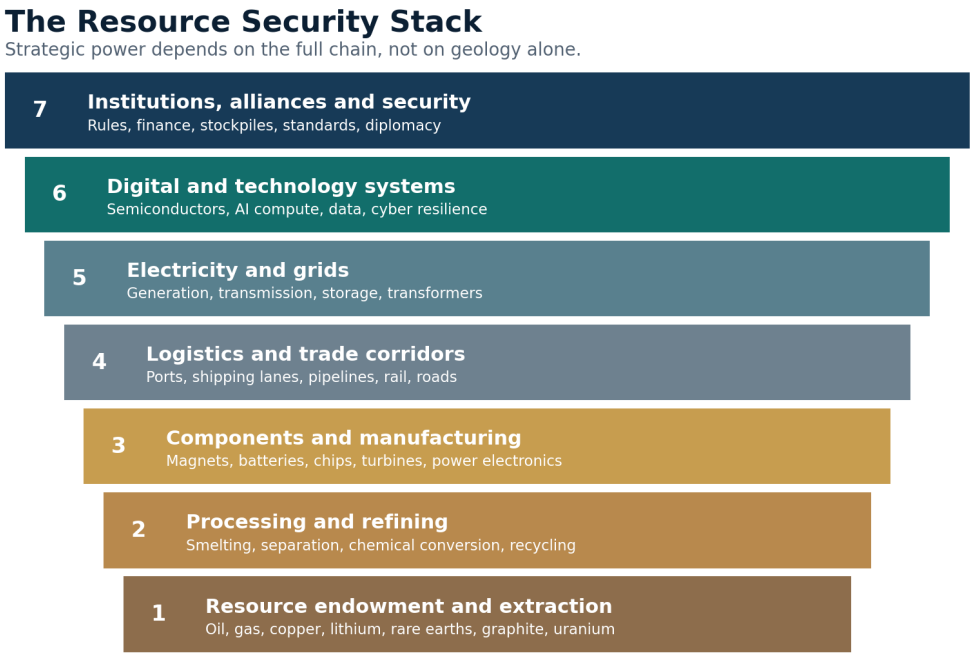


Figure ES-1. The resource-security stack. Source: author framework.

For Guyana, the implications are significant. The IMF reports real GDP growth of 43.8% in 2024 and 19.3% in 2025, with a 22.3% projection for 2026. Crude output is projected at 328.5 million barrels in 2026. The country also holds material gold production, rapidly growing public investment, and rising sovereign buffers. The strategic question is no longer whether Guyana has

resources. The question is how quickly national infrastructure, institutions, human capital and industrial capability convert resource income into durable productive capacity. (IMF, 2026b; World Bank, 2026b)

The core recommendation is to treat resource security as a system, not as a set of isolated commodities. Governments should map dependencies across the full stack, build strategic inventories where economics support them, diversify supply and processing, accelerate power and grid investment, protect open trade where possible, and anchor resource partnerships to local capability. Corporations should move from annual procurement logic to multi-year supply assurance, scenario testing, energy contracting, geographic redundancy and board-level dependency governance.

Twelve numbers defining the new order

Metric	Strategic meaning
US$3.4T	IEA estimate of global energy investment in 2026.
US$2.2T	2026 investment into low-emissions energy, grids, storage, efficiency and electrification.
950 TWh	IEA central projection for data-centre electricity demand in 2030.
2,500+ GW	Projects stalled in global grid-connection queues.
692 GW	Renewable power capacity added in 2025.
72%	Average share of the top refining country for key minerals excluding rare earths in 2025.
US$6.5T	Annual downstream output outside China exposed under full rare-earth controls.
353%	UNCTAD projected increase in lithium demand from 2024 to 2040.
~100	New critical-mineral export measures introduced since 2020.
14.8%	Share of world merchandise trade represented by AI-enabling goods in H1 2026.
25%	Approximate share of global seaborne oil trade moving through Hormuz before the 2026 disruption.
22.3%	IMF projection for Guyana real GDP growth in 2026.

CHAPTER 01

From Efficiency to Resilience

The global system is repricing concentration, lead time and strategic dependence.

For three decades, the dominant operating principle across many global value chains was efficiency. Companies minimized inventories, concentrated production where scale economics were strongest and treated low-cost transport as dependable infrastructure. Governments generally separated commercial supply decisions from national-security strategy except in defence, energy reserves and a narrow set of technologies.

That model is being amended rather than abandoned. WTO data show that most world merchandise trade still flows under multilateral MFN terms. Global trade remains large. The change lies in the treatment of specific sectors whose failure would disable wider economic activity. Semiconductors, critical minerals, electricity equipment, defence inputs, advanced batteries, industrial chemicals and digital infrastructure increasingly sit inside economic-security policy. (WTO, 2026a)

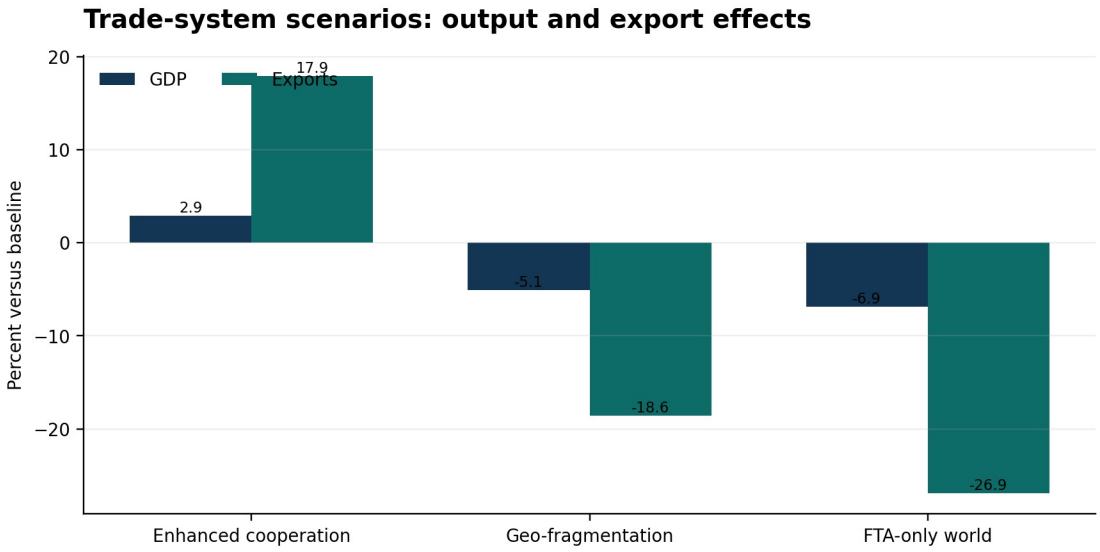
The relevant metric is no longer unit price alone. Decision-makers are adding concentration risk, lead time, geopolitical exposure, regulatory reliability, shipping-route dependence, supplier solvency, electricity availability and substitution potential. A higher nominal procurement price now competes with the expected cost of disruption. The result is a security premium embedded across procurement, inventory, finance and capital investment.

A CHANGE IN OPTIMIZATION

The old question was: Where is the lowest-cost source? The new question is: Which supply architecture protects continuity, scale, affordability and strategic freedom under stress?

This creates tension. Redundancy is expensive. New mines and refineries face long development cycles. Stockpiles tie up capital. Domestic-content rules raise costs in some markets. Duplication risks stranded assets when commodity prices fall. The policy challenge is to identify where resilience delivers system value and where protection merely transfers cost to consumers.

WTO modelling offers a useful boundary. A world of enhanced cooperation produces materially better long-run output and trade than either geo-fragmentation or an FTA-only system. The lesson is not that states should ignore security. The lesson is that resilience works best when targeted at verified vulnerabilities while keeping the wider trading system open. (WTO, 2026a)



Source: WTO, World Trade Report 2026. Modelled scenarios, not forecasts.

Figure 1-1. WTO modelled long-run effects under alternative trade-system scenarios. These are scenarios, not forecasts.

A practical resource-security model therefore needs three filters. First, criticality: how much economic or security value depends on the input? Second, vulnerability: how concentrated is supply, how long is replacement lead time, and how limited are substitutes? Third, intervention efficiency: which tool reduces exposure at the lowest total economic cost? Strategic inventories fit short disruptions. Long-term offtake supports financing. Recycling reduces import dependence. Geographic diversification addresses single-country exposure. Grid investment solves an infrastructure constraint that stockpiles do not.

This distinction is central to the thesis of this paper. Resource security is not synonymous with self-sufficiency. For most economies, full self-sufficiency is unrealistic and costly. Strategic resilience comes from diversified access, trusted partnerships, transparent markets, sufficient inventories, spare capacity where justified and infrastructure able to absorb shocks.

CHAPTER 02

The 2026 Operating Environment

War and technology are pushing the world economy in opposite directions at the same time.

The global economy entered late 2026 under two large and opposing impulses. The Middle East conflict generated an adverse energy and shipping shock. At the same time, the AI investment cycle supported technology-related capital expenditure and trade. The IMF July 2026 update projected global growth of 3.0% in 2026 and 3.4% in 2027, with the negative energy shock partly offset by stronger technology activity. Global headline inflation was projected to rise from 4.1% in 2025 to 4.7% in 2026 before easing to 3.9% in 2027. (IMF, 2026a)

WTO data show the technology impulse clearly. AI-enabling goods accounted for 47% of global merchandise-trade growth in value terms during the first half of 2026. Their share of world merchandise trade reached 14.8%, while year-on-year trade growth reached 67%. Yet trade in these goods is highly concentrated: the top ten traders accounted for about 85% of exports and 80% of imports in 2025. (WTO, 2026b)

Energy is moving in the opposite direction. Shipping disruptions around the Gulf raised fuel, freight and insurance costs and exposed the limits of alternative routes. Countries with limited fiscal space face a harder trade-off between cushioning households and preserving macroeconomic buffers. Higher energy prices also raise the cost of mining, refining, fertilizers, transport and data-centre operation.

The financial backdrop adds pressure. Public debt is elevated across many economies, and financing costs remain higher than during the low-rate decade. Resource-security strategies therefore compete with defence, climate adaptation, social spending and debt service. This changes which resilience investments are viable. Large advanced economies retain more room to subsidize strategic capacity than most developing economies. Without coordinated finance, strategic supply chains risk becoming more concentrated inside states with the deepest fiscal capacity.

The result is a bifurcated global economy. Technology-linked economies, energy exporters outside the main conflict zone and states with strategic minerals gain bargaining power. Energy-import-dependent, indebted and infrastructure-constrained economies face stronger pressure. UNCTAD frames the broader shift as geoeconomics: states increasingly use trade, technology and finance to pursue strategic objectives. (UNCTAD, 2026b)

EXECUTIVE IMPLICATION

The macro cycle and the security cycle now interact. Commodity shocks affect inflation and rates. Rates affect mine, grid and data-centre finance. Technology investment affects electricity demand. Electricity constraints feed back into technology competitiveness.

CHAPTER 03

Critical Minerals Become Strategic Infrastructure

Small-volume inputs now support trillions of dollars of downstream economic activity.

Critical minerals sit at the intersection of clean energy, digital systems, advanced manufacturing, aerospace and defence. Their strategic role comes less from market size than from irreplaceability inside high-value products. A small disruption in gallium, germanium, graphite, magnet rare earths or tungsten carries consequences far beyond the revenue of the upstream market.

The IEA 2026 outlook shows a broad tightening in strategic materials. Base-metal prices including copper rose sharply between January 2025 and April 2026. Lithium prices more than doubled from their prior trough, while cobalt prices rose about 130%, influenced by supply policy in the Democratic Republic of the Congo. Strategic minor minerals rose even faster in several cases as export controls tightened. (IEA, 2026a)

Demand growth remains structural. UNCTAD projects lithium demand 353% higher in 2040 than in 2024 and graphite demand 131% higher. Clean technologies rise from 62% of lithium demand in 2024 to 87% by 2040. This does not imply a straight-line commodity supercycle. Technology substitution, recycling, project execution and demand uncertainty will produce cycles. The strategic point is that more economic systems depend on secure mineral access. (UNCTAD, 2026a)

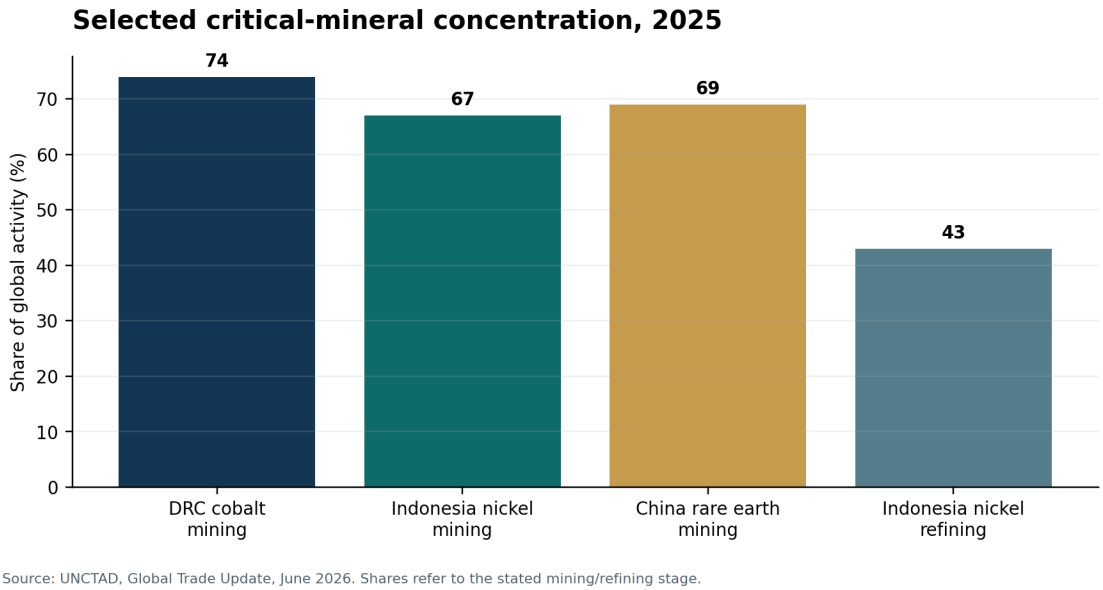


Figure 3-1. Selected upstream and refining concentration in 2025. Source: UNCTAD Global Trade Update, June 2026.

Concentration differs by stage. Mining often reflects geology. Processing reflects industrial policy, energy cost, infrastructure, technical know-how, permitting and decades of investment. This distinction explains why new mining projects alone do not eliminate dependency. The IEA reports that the top refining countries, Indonesia for nickel and China for many other key minerals, represented more than three-quarters of growth in refined supply over the prior two years. Excluding rare earths, the average top-refiner share rose to 72% in 2025. (IEA, 2026a)

Copper deserves special attention because it is both a traditional industrial metal and a strategic electrification input. Grid expansion, data centres, electric transport, renewable generation and conventional industry all compete for supply. The IEA project pipeline still points to an estimated 25% copper supply gap in 2035 relative to projected demand, even after recent project progress. Such forecasts remain sensitive to prices, substitution, recycling and execution, but the direction signals a need for sustained investment. (IEA, 2026a)

Government intervention has accelerated. UNCTAD identifies nearly 100 new export measures on critical energy-transition minerals since 2020. These include licensing requirements, export taxes, bans and quotas. Fifty-eight critical-mineral partnership agreements were signed since 2022 among the 73 agreements reviewed by UNCTAD. The minerals market is therefore no longer governed by private contracts alone. Access increasingly depends on policy, diplomacy and national development objectives. (UNCTAD, 2026a)

Mineral / group	Strategic demand	Primary vulnerability	Decision priority
Copper	Grids, motors, data centres, construction, electrification	Long project cycles and projected medium-term deficit	Mine expansion, recycling, substitution, grid efficiency
Magnet rare earths	Motors, wind, robotics, defence, data centres	Refining and magnet concentration	Diversified refining, magnets, inventories
Graphite	Battery anodes, industrial uses	Processing concentration and export-control exposure	Alternative anode supply, recycling, qualification
Lithium	EV and storage batteries	Rapid demand growth and project cyclicality	Balanced mine, conversion and cell-chain investment
Cobalt	Batteries, superalloys, aerospace	Mine concentration and producer policy	Chemistry shifts, recycling, diversified sourcing

Mineral / group	Strategic demand	Primary vulnerability	Decision priority
Gallium / germanium	Semiconductors, optics, radar, electronics	By-product dependence and concentrated processing	Recovery from smelters, strategic inventories
Tungsten	Defence, tooling, high-temperature uses	Concentrated supply and limited substitutes	Diversification, stockpiles, recycling

CHAPTER 04

Processing Is the Leverage Point

The strategic contest is moving from reserves to refining, separation, smelting and component production.

Resource endowment is only the first layer of strategic power. Processing determines purity, specifications, qualification and access to downstream industries. A country with large reserves but limited refining capacity often exports lower-value material and imports higher-value products. A processing hub without dominant geology still captures industrial margin, technical capability, jobs and influence over customers.

This is especially visible in rare earths. Mining diversification has progressed faster than separation, metal, alloy and permanent-magnet capacity. The IEA estimates roughly US$60 billion of investment over the next decade would support diversified magnet rare-earth supply chains outside the dominant supplier. The figure is modest against the annual downstream production exposed to a full disruption. (IEA, 2026a)

Base-metal smelters also deserve renewed strategic attention. Several critical minor minerals are recovered as by-products of copper, zinc and lead processing. A modern smelter therefore functions as more than a producer of the headline metal. It becomes a recovery platform for strategic elements, a recycling hub and an anchor for downstream manufacturing. When smelter economics deteriorate, the security risk extends into by-product markets.

Policy design needs to account for this chain. Supporting a mine without a processing route might reduce one exposure while retaining another. Supporting a refinery without long-term feedstock or offtake leaves commercial risk unresolved. Supporting a downstream factory without dependable power creates a new vulnerability. Durable diversification aligns resource, processing, energy, logistics and demand contracts.

VALUE-CAPTURE RULE

The more stages a country controls between extraction and the final strategic product, the greater its ability to retain value, build skills and negotiate from strength.

This logic explains the spread of offtake agreements, price floors, investment guarantees and stockpiles. In a perfectly liquid market, price should call forth new supply. In concentrated strategic markets, a new entrant faces price risk from incumbent oversupply, higher financing costs, slower permitting and smaller industrial ecosystems. Public tools are increasingly used to bridge this gap. The 2026 US-EU action plan explicitly explores reference prices, standards-based markets, price-gap subsidies and offtake structures. (USTR and European Commission, 2026)

Such intervention carries risk. Poorly designed price support locks in high-cost capacity. National subsidies compete against each other. Environmental and social standards differ. Overbuilding creates future losses. The preferred approach is therefore targeted support tied to verified security gaps, transparent performance conditions, private co-investment and sunset mechanisms.

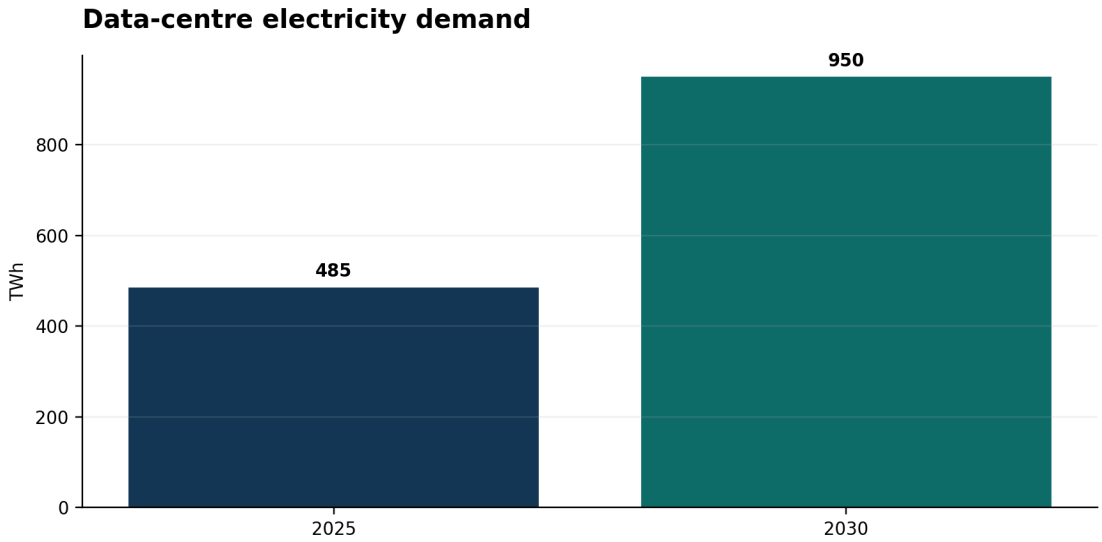
CHAPTER 05

AI Becomes a Physical-Infrastructure Problem

The digital economy now competes directly for power, grids, chips, cooling equipment, storage and capital.

AI is often discussed as software. At scale, AI is an infrastructure industry. Training and inference sit inside data centres filled with high-density computing equipment. These facilities depend on semiconductors, power electronics, transformers, cooling, water, fibre, storage and reliable generation. Physical bottlenecks now shape the pace and location of digital expansion.

The IEA reports data-centre electricity demand of 485 TWh in 2025 and a central projection near 950 TWh in 2030. AI-focused data centres grow faster than the overall category. Electricity demand from all data centres rose 17% in 2025, while AI-focused facilities rose 50%. The largest technology companies spent more than US$400 billion in capital expenditure in 2025, with a further 75% increase estimated for 2026. (IEA, 2026b)



Source: IEA, Key Questions on Energy and AI, 2026. 2030 is the central projection.

Figure 5-1. IEA central projection for data-centre electricity demand.

Power density creates a second constraint. The IEA notes that advanced server racks are moving toward peak demands comparable with dozens of households per rack. AI server power density rose elevenfold between 2020 and 2025 and is expected to rise further by 2027. This places pressure on transformers, switchgear, power electronics and thermal-management systems. (IEA, 2026b)

Storage is becoming part of the data-centre architecture. The IEA estimates 20 to 25 GW of battery storage could sit at data centres by 2030. Such assets support ride-through, power quality and flexible grid interaction. Where properly integrated, a large load shifts from passive consumer toward controllable system resource. (IEA, 2026b)

Location economics therefore change. Land and tax incentives matter, yet power availability, connection speed, grid reliability, fibre connectivity, cooling conditions, regulatory approval and data sovereignty increasingly determine project viability. A jurisdiction with abundant cheap generation but weak transmission still loses. A jurisdiction with a strong grid but no incremental generation faces price pressure. A jurisdiction with power but weak digital and cyber governance faces another constraint.

For resource-rich developing economies, AI infrastructure presents both opportunity and caution. Reliable low-cost electricity and political stability provide a basis for regional compute. Yet large data-centre loads should not crowd out households, industry or mining. Contracts need transparent cost allocation, new-generation commitments and grid investment obligations where appropriate.

STRATEGIC LINK

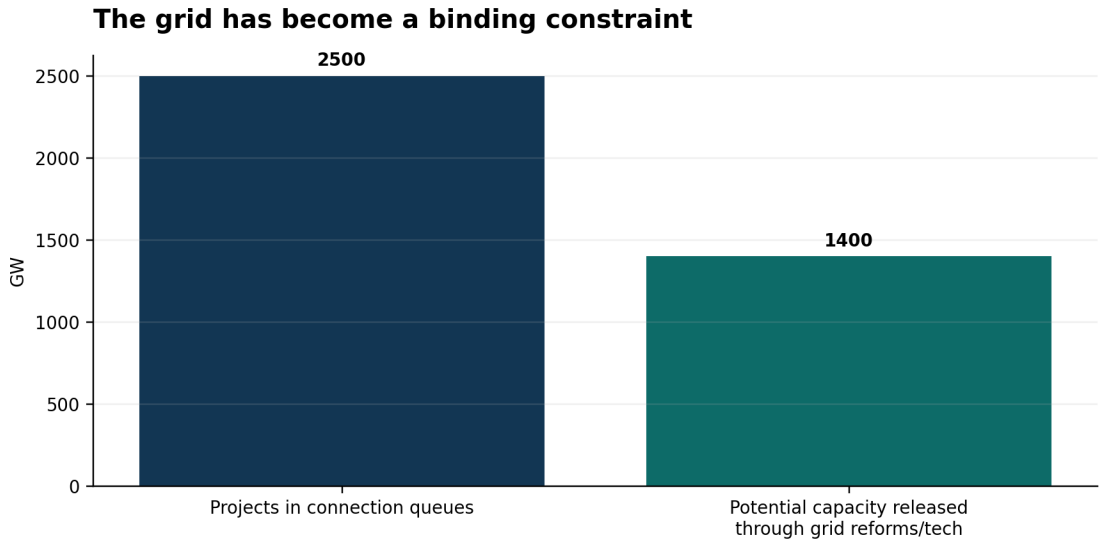
AI leadership is no longer separable from energy strategy. The countries able to deliver dependable electricity, grid access, chips and strategic materials at scale gain an industrial advantage beyond the technology sector.

CHAPTER 06

Grids Are the New Strategic Bottleneck

Generation growth without transmission, transformers and connection reform leaves capital stranded.

The power transition is increasingly constrained by networks rather than generation technology alone. Solar and battery costs have fallen, project pipelines are large, and data-centre loads are expanding. The difficult asset is often the grid connection. IEA reports more than 2,500 GW of generation, storage and large-load projects in connection queues worldwide. (IEA, 2026c)



Source: IEA, Electricity 2026. Release potential shown at midpoint of 1,200-1,600 GW range.

Figure 6-1. Global grid queues and IEA estimate of capacity potentially released by reforms and grid-enhancing technologies.

The IEA estimates annual grid investment needs to rise roughly 50% by 2030 from around US$400 billion today. A large share of the problem is execution: permitting, interconnection studies, transformer and cable lead times, right-of-way, financing and cost allocation. These are institutional and industrial bottlenecks as much as engineering issues. (IEA, 2026c)

The near-term opportunity is not limited to building new lines. The IEA estimates that non-firm connection agreements, dynamic line rating, advanced power-flow controls, reconductoring, voltage upgrades and related reforms could release 1,200 to 1,600 GW of advanced-stage projects now waiting in queues. This is a material reminder that software, regulation and operating practices are part of infrastructure strategy. (IEA, 2026c)

Grid equipment also has a mineral and manufacturing footprint. Transformers depend on electrical steel, copper and specialized components. Power electronics depend on semiconductors. Storage depends on battery materials. New transmission requires conductors, towers and civil works. Resource security therefore feeds back into the ability to build the electricity system needed to reduce fossil-fuel exposure.

For boards and governments, the critical shift is to treat grid access as a strategic asset. Mining expansions, industrial parks, data centres, ports and processing plants should be screened against firm-power and interconnection timelines at the earliest investment stage. A nominal generation surplus does not equal deliverable power.

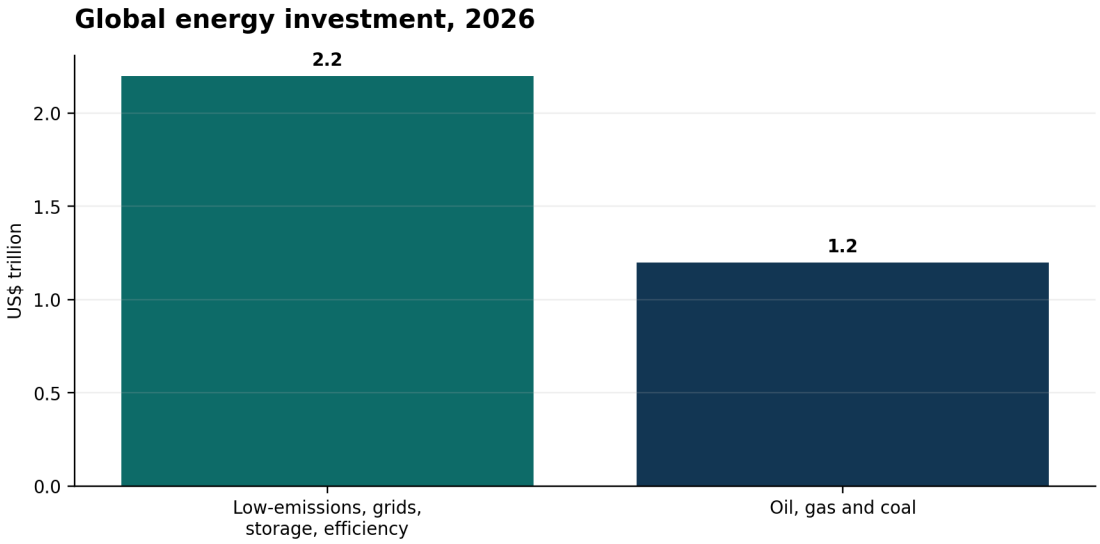
CHAPTER 07

Energy Security Becomes Portfolio Security

The 2026 shock reinforces diversification across fuels, electricity, networks and storage.

The 2026 Middle East conflict delivered a severe reminder that energy security is shaped by geography. Before the disruption, around one-quarter of global seaborne oil trade and roughly one-fifth of global LNG trade moved through the Strait of Hormuz. The shock therefore affected oil, gas, refining, shipping, fertilizer and broader inflation at the same time. (IEA, 2026e; UNCTAD, 2026c)

The investment response is not a simple return to fossil fuels or a straight-line move away from them. IEA expects US$3.4 trillion of global energy investment in 2026. About US$2.2 trillion goes to renewables, nuclear, grids, storage, low-emissions fuels, efficiency and electrification, versus US$1.2 trillion to oil, gas and coal. Natural-gas supply investment is estimated at US$330 billion, the highest in a decade, while oil investment falls below US$500 billion for a third consecutive annual decline. (IEA, 2026d)

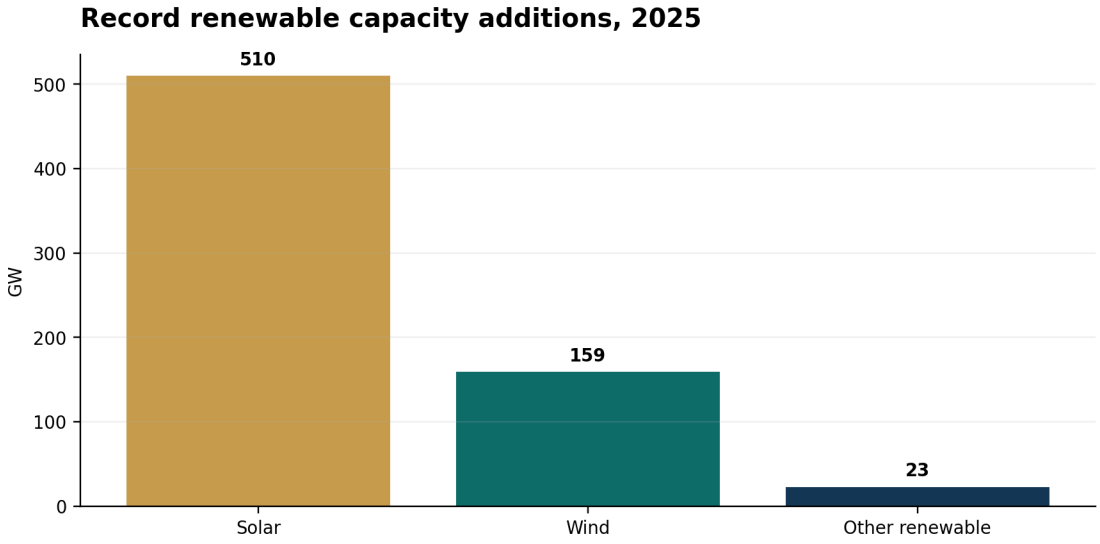


Source: IEA, World Energy Investment 2026. Values are IEA estimates for 2026.

Figure 7-1. Global energy investment allocation in 2026. Source: IEA.

The central strategic lesson is diversification. Domestic renewable resources reduce exposure to imported fuels. Gas provides dispatchable power in many systems but carries trade-route and price risk for importers. Nuclear offers firm low-carbon generation but depends on long project cycles, specialized technology and fuel-cycle supply. Storage provides short-duration flexibility but relies on mineral-intensive manufacturing. Efficiency lowers the amount of energy exposed to every supply shock.

Renewables continue to scale. IRENA records 692 GW of renewable capacity additions in 2025, including 510 GW solar and 159 GW wind. Renewables represented 85.6% of global capacity additions and 49% of installed global power capacity at year-end. Deployment remains uneven: China, the United States and European Union together accounted for nearly four-fifths of additions. (IRENA, 2026)



Source: IRENA, Renewable Capacity Statistics 2026. Total renewable additions: 692 GW.

Figure 7-2. Renewable capacity additions in 2025. Source: IRENA.

Nuclear is also returning to strategic planning. IEA reports 78 GW under construction across 15 countries and annual investment above US$80 billion. More than 40 countries have policies supporting nuclear deployment. The supply side is concentrated, with Chinese and Russian reactor designs representing a large share of projects that began construction over the prior decade. (IEA, 2026d)

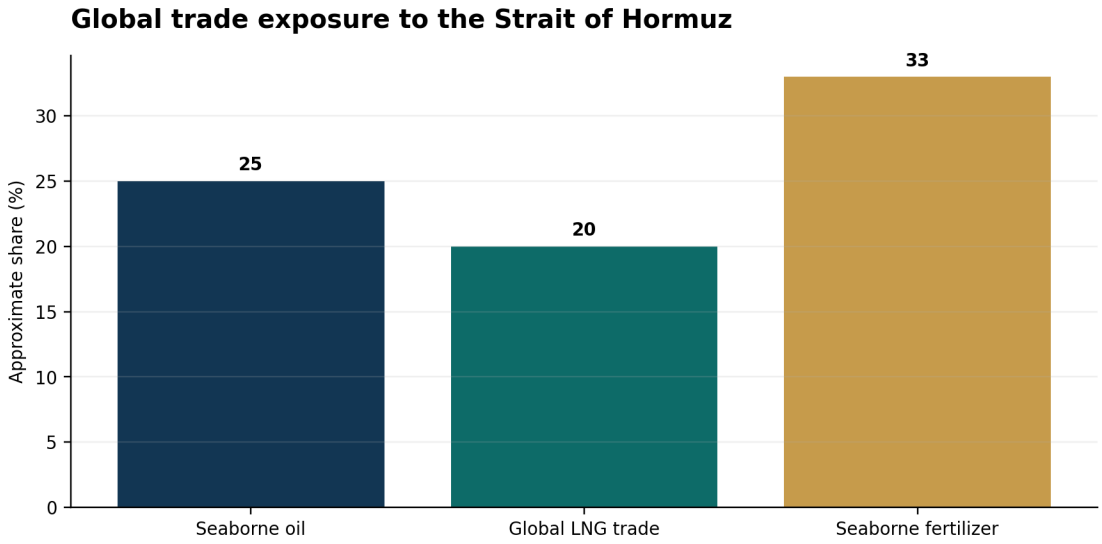
Portfolio security therefore requires a technology-neutral risk lens. The relevant question is which combination of domestic resources, imports, storage, networks and demand flexibility delivers acceptable reliability and price exposure under multiple stress cases.

CHAPTER 08

Chokepoints and Trade Corridors

Shipping lanes, ports and pipelines are strategic infrastructure for energy, minerals and food systems.

Modern value chains depend on narrow physical corridors. The Strait of Hormuz is the clearest 2026 example. UNCTAD estimates about one-third of global seaborne fertilizer trade uses the route, alongside large shares of oil and LNG. When transit falls, the shock travels through freight, insurance, fuel, agriculture and consumer prices. (UNCTAD, 2026c)



Sources: IEA, Middle East and Global Energy Markets, 2026; UNCTAD, Strait of Hormuz Disruptions, 2026. Rounded shares.

Figure 8-1. Approximate global trade exposure to the Strait of Hormuz before the 2026 disruption.

The strategic response is not to eliminate maritime trade. Shipping remains the most efficient route for large volumes of commodities. The objective is to reduce single-corridor dependence where practical. Bypass pipelines, alternative ports, distributed storage, spare terminal capacity and diversified suppliers all carry option value during crisis.

The same logic applies to minerals. A diversified mine base still depends on ports, rail, concentrate handling and refining routes. A smelter depends on imported feedstock, reagents, power and spare parts. A battery plant depends on chemical precursors, cells or components. Mapping chokepoints therefore needs to extend beyond country-of-origin statistics into physical logistics and industrial dependencies.

Climate risk adds another layer. Drought can affect canal capacity and hydropower. Floods can halt mines and railways. Extreme heat raises power loads and affects labour productivity. Physical resilience and geopolitical resilience increasingly overlap.

BOARD-LEVEL TEST
For each critical input, leaders should know the mine or source, processor, transport corridor, port, inventory buffer, substitute, contract counterparty and recovery time. Country-of-origin alone is insufficient.

CHAPTER 09

Trade Policy Becomes Security Policy

The world is moving toward selective protection around strategic sectors while most trade stays open.

The multilateral trading system remains economically important. WTO reports 166 members and estimates roughly 72% of global merchandise trade still takes place on core MFN tariff terms. Yet the institution describes the current period as its most serious and sustained disruption since the multilateral system was created. (WTO, 2026a)

The source of stress is structural. Strategic competition has expanded the use of subsidies, export controls, investment screening, local-content rules and national-security exceptions. Digital and green trade grew faster than the rulebook. Production concentration created dependence that some governments now regard as a security problem rather than a normal market outcome.

The 2026 US-EU critical-minerals action plan shows how trade policy is being redesigned. The agenda includes reference-price mechanisms, price-gap support, offtake agreements, standards, investment cooperation, screening, coordinated emergency response, research and stockpiling. Such tools sit between traditional free trade and autarky. They seek to create resilient markets among trusted partners. (USTR and European Commission, 2026)

At the same time, the WTO scenario analysis cautions against broad fragmentation. Its geo-fragmentation scenario produces a 5.1% long-run global GDP loss and an 18.6% decline in global exports versus baseline. An FTA-only world performs worse. Enhanced cooperation produces positive output and trade effects. (WTO, 2026a)

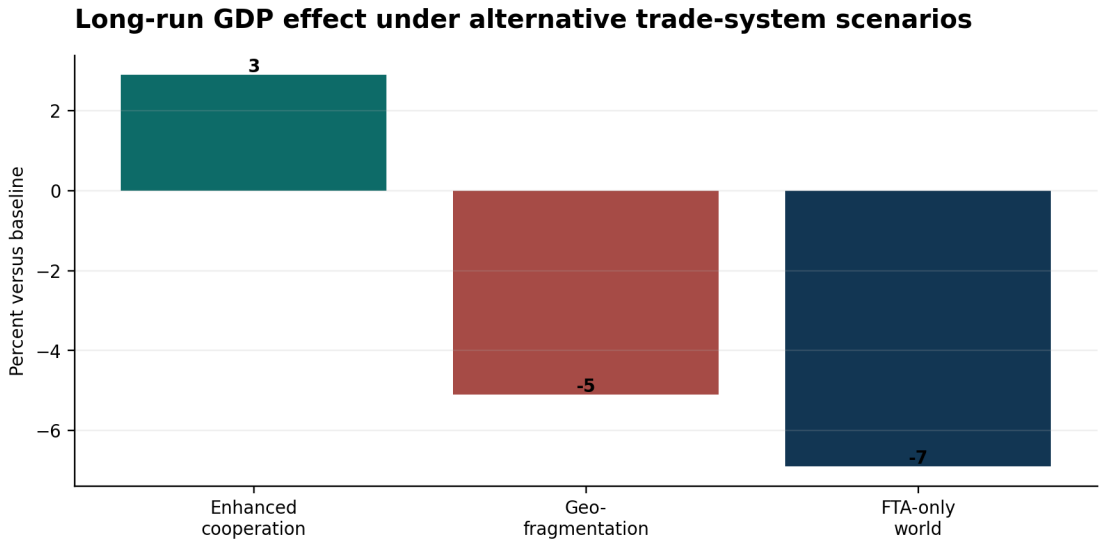


Figure 9-1. WTO modelled GDP effects under alternative trading-system scenarios.

The optimal policy is therefore selective. Protecting every sector under a security label would raise costs, weaken competition and invite retaliation. Strategic intervention should focus on inputs with high criticality, concentrated supply, low substitutability and long recovery time. Transparency around the rationale and duration of support reduces the risk of permanent protection becoming an end in itself.

For developing economies, the new policy environment creates negotiating space. Resource partnerships increasingly cover exploration, extraction, processing, recycling and finance. Yet UNCTAD finds agreements involving developing states still tend to emphasize upstream extraction. The policy objective should shift toward infrastructure, skills, processing, technology transfer and market access alongside resource supply. (UNCTAD, 2026a)

CHAPTER 10

Defence and Strategic Stockpiles

Material security has moved from procurement into deterrence and national readiness.

Defence systems are material-intensive, specification-intensive and difficult to substitute once platforms enter service. Gallium, germanium, titanium, tungsten, graphite, cobalt, lithium and rare earths support radar, sensors, optics, aerospace alloys, batteries, motors and electronics. Supply disruption therefore affects readiness even when defence budgets rise.

NATO has formalized this concern. Its defence-critical supply-chain roadmap identifies twelve critical raw-material categories and includes strategic stockpiling, recycling, substitution and shared supply-chain assessments. In July 2026, twelve Allies launched a multinational project focused on acquisition, storage, transport and management of defence-critical materials and related components. (NATO, 2026)

Stockpiles are one of the few tools able to respond immediately to a disruption. They do not solve structural concentration. They buy time. The IEA estimates the net annual cost of stockpiling eleven high-risk materials outside the dominant supplier at less than US$900 million, small relative to the downstream value exposed. (IEA, 2026a)

Stockpile design requires discipline. Inventory should focus on materials with high criticality, long replacement lead time, storability and limited substitution. Rotation rules should reduce degradation. Release rules should prevent political allocation during crisis. Inventories should complement, not replace, new supply, recycling and processing diversification.

SECURITY PRINCIPLE

Inventory buys time. Capacity restores supply. Diversification reduces recurring risk. A mature strategy uses all three in the right proportions.

CHAPTER 11

Capital Follows Strategic Infrastructure

Investment is being redirected toward power, grids, storage, processing and technology supply chains.

Capital allocation is becoming a strategic signal. IEA expects US$3.4 trillion of energy investment in 2026. Electricity supply and infrastructure alone account for roughly US$1.6 trillion, rising to about US$2 trillion when end-use electrification is included. Network investment is estimated near US$550 billion, up almost 20% year on year, while power-sector battery investment exceeds US$100 billion. (IEA, 2026d)

The composition matters. Grid spending is rising after years when generation investment expanded faster. Data-centre buildout is also drawing energy capital. The IEA estimates more than US$100 billion was invested in energy infrastructure serving data centres in 2025, including generation, power equipment, grid upgrades and onsite assets. (IEA, 2026d)

Critical-mineral finance is more difficult. The IEA reports investment in critical-mineral development fell in 2025 even as strategic concern rose. Battery-metal spending declined more sharply than copper. This mismatch reflects weak commodity prices in prior periods, cost inflation, permitting, financing conditions and uncertainty about future demand and policy. Strategic need does not automatically produce bankable projects.

Governments are responding with guarantees, state equity, offtake, price support, concessional finance and export-credit tools. Such instruments are most effective when they solve a defined financing gap rather than substitute public money for commercially viable private capital.

Developing economies face an additional hurdle: cost of capital. A processing plant or grid project that is economic at a 6% financing rate may fail at 12%. Resource partnerships therefore need a finance architecture, not only an exploration agreement. Development banks, sovereign funds, export-credit agencies and strategic buyers all have roles in reducing risk around infrastructure that supports several projects at once.

Capital problem	Why private finance hesitates	Useful de-risking tool
New mine	Price volatility, permitting, construction risk	Long-term offtake, political-risk cover, staged financing
Refinery / separator	Feedstock and price risk, technical qualification	Floor-price mechanism, anchor buyers, guarantees
Grid / transmission	Long payback, regulatory cost recovery	Regulated revenue, development finance, blended capital
Strategic inventory	No direct operating return	Public procurement, industry consortia, rotation fees
Data-centre power	Connection uncertainty, load ramp risk	Phased capacity, dedicated generation, firm interconnection terms
Recycling	Feedstock availability and scale	Collection mandates, recycled-content demand, contracts

CHAPTER 12

The Global South Value-Capture Test

Resource-rich developing states face a narrow window to move from extraction toward capability.

The new resource order creates opportunity for mineral-rich and energy-rich developing economies. Demand for copper, lithium, graphite, rare earths and other strategic inputs expands the bargaining value of resource endowment. Higher geopolitical competition also increases the number of potential partners. Yet historical experience shows resource wealth alone does not guarantee broad industrial development.

UNCTAD highlights a central asymmetry: developing economies hold major critical-mineral resources, while higher-value strategic-sector investment remains concentrated in advanced economies. Partnerships with developing states still focus heavily on extraction. Without power, transport, skills, predictable regulation and finance, raw material continues to leave the country before the high-value stages begin. (UNCTAD, 2026a; UNCTAD, 2026b)

The policy objective should not be blanket beneficiation at any cost. Some processing stages require scale, chemistry, energy or market proximity that make domestic production uneconomic. A more rigorous approach identifies the stages where local comparative advantage exists. Cheap clean electricity supports refining and data infrastructure. Port access supports bulk trade. Existing mining clusters support service industries. Strong institutions and investment treaties support regional headquarters and finance.

Regional integration also matters. A single small market rarely supports every stage of a battery, semiconductor or mineral chain. Cross-border power pools, shared ports, regional laboratories, common standards and coordinated industrial zones expand scale. Multi-country value chains provide an alternative to simple raw-material export without requiring each state to reproduce the full chain.

DEVELOPMENT TEST

A resource partnership should be judged by five outcomes: domestic infrastructure, skills, local enterprise capability, fiscal value and access to higher-value stages. Extraction volume alone is an incomplete measure.

CHAPTER 13

Latin America in the New Order

The region combines mineral depth, renewable resources and proximity to major markets, but processing remains thin.

Latin America and the Caribbean enter the resource-security cycle with strategic advantages. The region is a major producer of copper and lithium, holds substantial renewable resources and sits close to the North American market. Several countries also maintain long histories of mining governance and international investment. These features position the region for a larger role in diversified supply chains.

The central weakness is value capture. IEA analysis finds the region processes only a fraction of its mined output for several key energy minerals. Greater local processing, where commercially supported, raises the value retained from mining and strengthens regional industrial capability. The IEA estimates deeper processing could lift the associated economic value toward roughly US$220 billion by 2035. (IEA, 2026a)

Power quality is a decisive differentiator. Mineral processing, copper smelting, green metals, data centres and advanced manufacturing need large volumes of reliable electricity. Latin America has strong hydro, solar and wind potential, but grid constraints and permitting limit the value of theoretical resource abundance in several markets.

Regional growth remains weak outside resource outliers. The World Bank October 2026 update projects Latin America and the Caribbean at 2.2% growth in 2026, while Guyana stands far above the regional average. This divergence creates a policy opportunity for fast-growing resource economies to finance infrastructure during a period when many regional peers face tighter fiscal conditions. (World Bank, 2026a)

The region should avoid a binary choice between China and Western partners. Sector-specific multi-alignment, transparent investment standards and diversified buyers preserve bargaining space. The key is to prevent strategic partnerships from becoming exclusive dependencies at a different point in the chain.

Regional advantage	Current constraint	Strategic move
Copper and lithium endowment	Processing concentration abroad	Anchor conversion/refining where power and scale support it
High renewable potential	Grid bottlenecks	Transmission, storage and interconnection reform
Atlantic and Pacific access	Port and corridor gaps	Strategic logistics and multimodal upgrades
Large urban markets	Productivity and skills gaps	Technical training, digital capability, applied R&D
Proximity to North America	Policy volatility in parts of region	Stable investment frameworks and regional standards

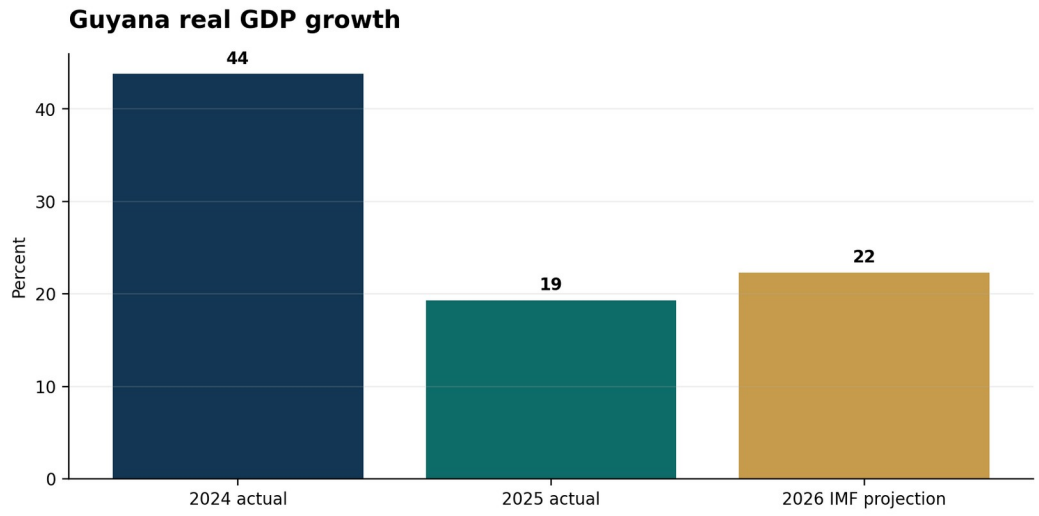
CHAPTER 14

Guyana as a Strategic-Resource State

The national challenge is to convert exceptional resource income into infrastructure, institutions and productive capability.

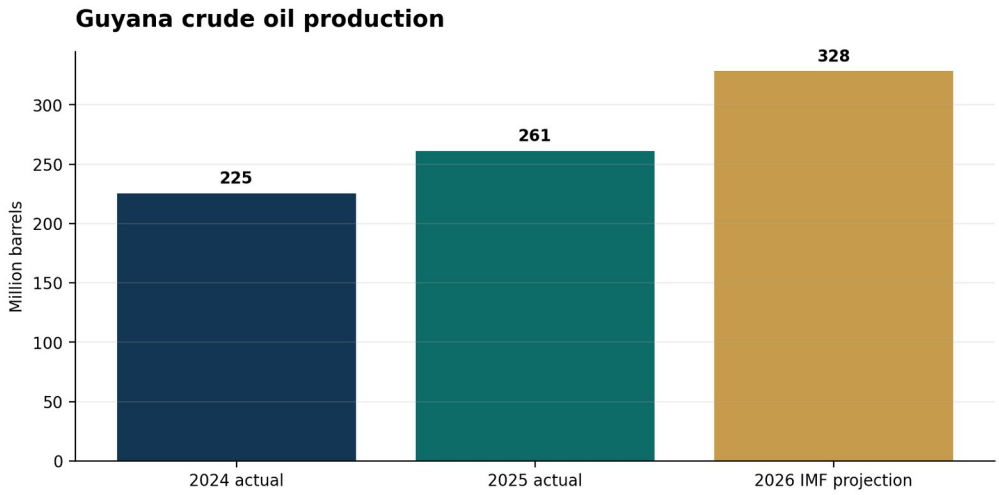
Guyana occupies an unusual position in the 2026 global system. It is a small state with rapidly expanding offshore oil production, established gold mining, large forest assets, Atlantic access and a public balance sheet being reshaped by petroleum revenues. The scale of economic expansion gives the country more fiscal room than most peers, while its small population and execution constraints create equally large absorptive-capacity challenges.

The IMF Executive Board concluded Guyana's 2026 Article IV consultation on 8 October 2026. It reported real GDP growth of 43.8% in 2024 and 19.3% in 2025, with a 22.3% projection for 2026. Non-oil growth is projected at 10.2% in 2026. The IMF reports oil production exceeded 900,000 barrels per day by end-2025 and projects 328.5 million barrels for 2026. (IMF, 2026b)



Source: IMF Executive Board 2026 Article IV Consultation with Guyana, 8 October 2026.

Figure 14-1. Guyana real GDP growth. IMF actuals and 2026 projection.



Source: IMF Executive Board 2026 Article IV Consultation with Guyana, 8 October 2026.

Figure 14-2. Guyana crude oil production. IMF actuals and 2026 projection.

The sovereign buffer is also growing. The IMF records the Natural Resource Fund at about US$3.3 billion at end-2025. The World Bank reports around US$4.3 billion at end-June 2026. The values refer to different dates and are therefore not conflicting measures. They illustrate the speed at which resource revenues are changing the state's financial position. (IMF, 2026b; World Bank, 2026b)

This creates a strategic choice. Guyana could remain principally a high-income hydrocarbon exporter with imported industrial capability, or use the resource window to build low-cost power, logistics, technical skills, digital systems, competitive non-oil sectors and stronger institutions. The second path is harder. It offers more resilience beyond the oil cycle.

Energy is the first lever. The gas-to-energy program is intended to reduce reliance on imported liquid fuels in electricity generation and lower power costs. If delivered with transmission upgrades, storage and renewable integration, lower-cost electricity would support mining, manufacturing, cold-chain logistics, data services and household welfare. The strategic metric is not project completion alone, but delivered reliability and system cost. (IMF, 2026b)

Mining is the second lever. Gold provides an existing ecosystem of geology, equipment, logistics, government regulation and international markets. The next step is not to force every downstream activity locally. The priority is to deepen technical services, responsible sourcing, digital traceability, environmental performance, exploration capability and local procurement around competitive operations.

Logistics is the third lever. Guyana sits on the Atlantic edge of South America with links to the Caribbean and proximity to northern Brazil. Ports, bridges, roads, aviation, warehousing and border infrastructure shape the economic radius of domestic industry. Logistics also determines whether Guyana serves only its own market or functions as a regional service platform.

Human capital is the fourth lever. Rapid public and private construction, oil, mining and services growth places pressure on engineers, technicians, operators, project managers, regulators and skilled trades. Training capacity should be tied to specific demand forecasts rather than broad enrollment targets. International mobility should transfer skills rather than permanently substitute for domestic capability.

Institutional throughput is the fifth lever. The IMF and World Bank both emphasize spending quality, governance, public-investment management and diversification. In a high-growth economy, the constraint shifts from financing to execution. Procurement quality, project preparation, regulatory coordination, audit capacity, data systems and maintenance become macroeconomic infrastructure.

GUYANA 2035 PROPOSITION

Guyana has an opportunity to become a resilient Atlantic resource and energy platform. Success requires converting oil income into dependable electricity, logistics, skills, institutional capacity and competitive non-oil exports before the resource window narrows.

Strategic pillar	2026 position	2035 objective
Energy	Rapidly rising demand, gas-to-energy buildout, renewable potential	Reliable lower-cost power with diversified generation and strong transmission
Oil and gas	World-scale offshore growth	Fiscal buffers, local capability and disciplined reinvestment
Mining	Gold and other mineral activity	Higher technical capability, traceability and responsible services
Logistics	Atlantic access with infrastructure expansion	Regional port, aviation and Brazil-Caribbean corridor capability
Digital / AI	Early-stage national opportunity	Secure digital infrastructure and applied AI in government, mining, energy and logistics
Institutions	Rapid workload growth	Faster, transparent and data-driven project and regulatory execution
Human capital	Skill shortages in fast-growing sectors	Technical workforce aligned with infrastructure and industry demand

CHAPTER 15

Corporate Strategy for 2026-2040

Resource security should sit inside enterprise risk, capital allocation and commercial strategy.

Most companies still manage strategic inputs through procurement, sustainability or operations teams. The emerging risk profile requires board-level integration. A mineral or power interruption can halt revenue across multiple business units, while a low-value component can disable a high-value asset. Traditional spend-based supplier rankings therefore miss criticality.

The first step is a dependency map. For each business line, identify inputs whose failure would stop production, degrade safety or breach customer commitments. Trace each input beyond the direct supplier into processors, origin countries, logistics corridors, power dependencies and technology licenses. Measure recovery time, not only inventory days.

The second step is a portfolio response. Inputs with short recovery times may need ordinary dual sourcing. Inputs with long qualification cycles may need multi-year offtake. Items with no substitutes may justify strategic inventory. Electricity-intensive operations may need long-term power contracts, onsite generation, storage or location diversification.

The third step is capital discipline. Resilience spending should compete against expected disruption losses. Management should model revenue at risk, restart cost, reputational exposure, customer penalties and working-capital effects. This creates a common financial language for comparing inventory, supplier diversification and capital projects.

The fourth step is policy engagement. Export controls, sanctions, tariffs, local-content requirements and national-security rules increasingly shape supply availability. Government relations, legal, procurement and strategy functions should share a single dependency view rather than operate in parallel.

The fifth step is disclosure discipline. Resource-security claims, local-content commitments, climate targets and supply-chain standards should be supported by auditable data. The market is moving toward more scrutiny of traceability, responsible sourcing and physical transition plans.

Board question	Minimum decision-grade answer
Where are our single points of failure?	Critical inputs mapped through origin, processing, logistics and power.
How long before operations stop?	Inventory plus qualification and replacement lead-time analysis.
What is revenue at risk?	Scenario-based financial exposure by 30, 90, 180 and 365 days.
Which mitigations are funded?	Dual sourcing, offtake, inventory, substitution, recycling, power solutions.
Which policies change our access?	Current export controls, tariffs, investment screening and sanctions map.
Who owns the risk?	Named executive, board committee and cross-functional operating cadence.

CHAPTER 16

Government Strategy for 2026-2040

Economic security works best when policy is selective, measurable and tied to real bottlenecks.

Governments face a difficult balance. Too little intervention leaves strategic sectors exposed to concentrated supply. Too much intervention raises costs, distorts investment and fragments trade. The policy goal is not maximum domestic production. It is minimum unacceptable dependence at an affordable system cost.

A national resource-security strategy should start with a dependency inventory. Rank materials, energy sources, technologies and infrastructure by criticality, concentration, substitutability, inventory duration, recovery time and downstream value. The list should be reviewed annually because technology and trade policy change quickly.

The second pillar is infrastructure. Grids, ports, pipelines, storage, laboratories and industrial zones often provide more resilience per public dollar than commodity subsidies. Shared infrastructure lowers the cost of multiple projects and improves private investment economics.

The third pillar is market design. Strategic projects often fail because buyers will not commit before financing and lenders will not finance before buyers commit. Long-term public procurement, anchor offtake, price floors or contracts-for-difference-style mechanisms can bridge this coordination gap when applied to verified vulnerabilities.

The fourth pillar is alliances. Full self-sufficiency is unrealistic for most states. Resource security requires trusted cross-border flows. Agreements should combine access with investment, standards, emergency coordination, skills and technology cooperation. Open architecture reduces the risk of trading one dependency for another.

The fifth pillar is strategic inventory. National stockpiles are best targeted at materials with long replacement times and small market volumes. Large bulk commodities may require different tools such as commercial storage mandates or emergency sharing arrangements.

The sixth pillar is circularity. Recycling lowers primary demand, recovers strategic by-products and creates domestic supply. Policy should focus on collection, product design, standards and economics rather than treating recycling as a universal substitute for mining.

The seventh pillar is social legitimacy. New mines, lines, ports and processing facilities need land, permits and community acceptance. Faster execution does not mean weaker standards. Predictable timelines, transparent benefit sharing and early consultation reduce both project risk and political opposition.

Policy instrument	Best use	Main failure risk
Strategic stockpile	Short-duration disruption in storable high-criticality inputs	Poor rotation, political release, obsolete inventory
Long-term offtake	Finance new mines/refineries with demand certainty	Overpaying if price assumptions are wrong
Price floor / gap support	Protect diversification against predatory or cyclical price collapse	Permanent subsidy to uncompetitive capacity
Public equity / loan guarantee	Bridge capital gap in strategic infrastructure	Political project selection and weak discipline
Tariff / local-content rule	Temporary support where domestic capacity is credible	Higher consumer costs and retaliation
R&D / substitution	Reduce dependence where alternatives are technically plausible	Long time to commercialization
Regional agreement	Pool scale, infrastructure and trusted supply	Weak implementation and uneven benefits

CHAPTER 17

Four Global Scenarios, 2026-2040

The purpose of scenarios is not prediction. It is to test strategy against different combinations of cooperation and supply stress.



Source: author scenario framework informed by IEA, WTO, UNCTAD and IMF evidence through 11 October 2026.

Figure 17-1. Four resource-security scenarios for 2026-2040. Source: author framework.

Scenario A, Fortress Economy. Strategic rivalry intensifies while supply remains tight. Export controls expand, stockpiles grow and governments duplicate capacity. Security premiums rise across minerals, chips and electricity equipment. Resource-rich states gain bargaining power, yet project costs and trade friction reduce global growth. Corporate winners hold diversified physical supply and strong balance sheets. Losers depend on single-source inputs and long logistics chains.

Scenario B, Strategic Compact. Supply remains constrained, but major economies coordinate diversification. Trusted blocs share finance, standards, stockpiles and offtake. New processing capacity develops across allied countries and selected emerging markets. Costs remain above the prior globalization baseline, yet disruption risk falls. This scenario delivers the strongest balance between security and economic efficiency among stress cases.

Scenario C, Commodity Reversal. New mines, recycling, technology substitution and weaker demand create oversupply while geopolitical rivalry continues. Commodity prices fall, threatening the economics of diversification projects. Governments face pressure to keep strategic capacity alive through price support. The security risk shifts from scarcity to financial failure of alternative suppliers.

Scenario D, Managed Abundance. Supply expands, recycling scales, grids improve and trade cooperation strengthens. Security premiums decline. Competition shifts toward technology, productivity and low-cost power. Strategic stockpiles remain but are smaller relative to market depth. This is the lowest-cost system, though it requires sustained cooperation and investment.

No single portfolio should depend on one scenario. Governments and firms should select actions with value across several states of the world. Grid modernization, recycling, supplier transparency, workforce development, faster permitting and digital dependency mapping perform well in almost every scenario. Broad protectionism does not.

Signal	Fortress Economy	Strategic Compact	Commodity Reversal	Managed Abundance
Export controls	Rising fast	Targeted	Persistent but less binding	Declining
Critical-mineral prices	High / volatile	High but supported	Low / stressed producers	Moderate
Government support	Large and national	Large and coordinated	Defensive price support	Targeted R&D / infrastructure
Trade blocs	Hardening	Trusted network architecture	Hard but commodity-rich	More open
Corporate priority	Inventory and redundancy	Long-term partnerships	Cost discipline and supplier solvency	Productivity and innovation

CHAPTER 18

Strategic Agenda and Early-Warning Dashboard

Leaders need a repeatable operating cadence, not a one-time report.

Resource security changes too quickly for annual strategy cycles alone. Export controls, conflicts, grid bottlenecks and technology demand can move within months. Leadership teams should maintain a compact dashboard that links physical supply with market, policy and infrastructure signals.

Indicator	Why it matters	Escalation trigger
Top-three supplier share by critical input	Measures concentration	Material rise or single-country share above internal threshold
Inventory days and recovery time	Measures disruption tolerance	Inventory below recovery time
Export-control / sanctions changes	Signals policy restriction	New licensing, quota, ban or extraterritorial rule
Grid-connection lead time	Signals infrastructure constraint	Lead time exceeds project schedule buffer
Transformer / turbine / cable lead times	Signals equipment bottleneck	Lead time rises faster than capex schedule
Critical mineral capex and FID pipeline	Signals future supply response	Sustained investment below projected demand growth
Freight and war-risk premiums	Signals corridor stress	Rapid spike on critical route
Power price and reserve margin	Signals operating risk	Sustained price shock or declining adequacy
Supplier credit stress	Signals financial fragility	Downgrade, covenant breach, delayed expansion
Government stockpile and alliance policy	Signals structural response	Major public buying or new strategic partnerships

For governments, the first 24 months should focus on dependency mapping, grid and logistics acceleration, strategic-stockpile design, project pipeline triage and partner alignment. For corporations, the first 12 months should focus on critical-input mapping, financial exposure, supplier solvency, long-term energy strategy and board ownership.

For resource-rich developing states, the highest-value action is to connect resource policy with infrastructure and capability policy. A mine licence, power project, port investment, technical institute and offtake agreement should be viewed as parts of one industrial system where they serve the same strategic value chain.

For Guyana, the early agenda is clear: preserve macroeconomic buffers, raise execution quality, reduce power costs and reliability risk, build logistics capacity, deepen technical skills, strengthen mining and oil governance, and use international partnerships to expand non-oil capability. The timing matters because rapid revenue growth creates both financing capacity and pressure on domestic absorptive capacity.

FINAL PROPOSITION

The defining advantage of the next resource cycle will belong to states and firms that convert access into resilience, resilience into productive capacity, and productive capacity into strategic freedom.

CHAPTER 19

Closing Perspective

The resource-security era rewards integration.

The 2026 evidence points toward a durable change in the organization of economic power. Energy shocks, mineral export controls, AI infrastructure demand, trade-policy intervention and defence planning are converging around the same concern: secure access to physical systems that advanced economies require to operate.

The transition will not eliminate globalization. It will change which forms of interdependence are considered acceptable. Open markets will remain essential for scale, innovation and growth. Strategic sectors will operate with more inventories, more public finance, more long-term contracting, more geographic diversification and more political oversight.

The central analytical error would be to treat each issue separately. Critical minerals depend on processing. Processing depends on electricity. Electricity depends on grids, equipment and minerals. AI depends on electricity, chips and cooling. Defence

depends on many of the same mineral and semiconductor chains. Trade corridors connect them all. Finance determines how quickly alternatives reach commercial scale.

Resource security is therefore a systems problem. The strongest strategies will target real chokepoints rather than pursue broad self-sufficiency. They will preserve cooperation where possible, build alternatives where necessary and keep public support tied to measurable resilience outcomes.

For Guyana and other resource-rich emerging economies, the opportunity is larger than export revenue. The new order places a premium on reliable energy, strategic geography, minerals, governance and investment access. The long-term prize is not resource extraction. It is the construction of productive capability able to endure beyond the resource cycle.

CHAPTER 20

Appendix A. Strategic Mineral Risk Matrix

A qualitative screening tool for executive and policy use.

Material	Critical sectors	Structural risk	Substitution	Recommended resilience focus
Copper	Grid, construction, motors, data centres	Large absolute demand, long mine lead time	Moderate in selected applications	New supply, recycling, efficiency, conductor innovation
Lithium	Batteries, storage	Rapid demand and price cycles	Chemistry alternatives exist	Diversified conversion, recycling, technology monitoring
Graphite	Battery anodes, industrial	Processing concentration	Alternative anodes emerging	Diversified processing and qualification
Rare earth magnets	EVs, wind, robotics, defence	High refining and magnet concentration	Limited for highest-performance uses	Refining, magnets, inventories, recycling
Gallium	Power semiconductors, RF, radar	By-product and processing concentration	Limited in some high-performance uses	Recovery, stockpile, alternative suppliers
Germanium	Fibre optics, infrared, semiconductors	By-product concentration	Application-specific	Recovery, recycling, inventories
Tungsten	Tooling, defence, aerospace	Concentrated supply	Limited in performance uses	Stockpile, recycling, diversification
Cobalt	Batteries, superalloys	Mine concentration and policy risk	Battery chemistry substitution rising	Diversified supply, recycling, strategic allocation
Nickel	Stainless steel, batteries	Mine and refining concentration increasing	Battery chemistry substitution partial	Diversified class-1 supply and recycling
Uranium / nuclear fuel services	Nuclear generation	Long contracting and conversion/enrichment concentration	Low for existing reactors	Long-term contracting, inventories, supplier diversification

Note: Risk classification is qualitative author analysis. It should be recalibrated for each organization using specific purity, geography, qualification and inventory requirements.

CHAPTER 21

Appendix B. Data Definitions and Interpretation

Key distinctions used throughout the paper.

Term	Treatment in this paper
Actual	Observed historical value reported by the cited institution.
Estimate	Source institution estimate for a period with incomplete final data.
Projection / forecast	Forward-looking source value based on stated assumptions.
Scenario	Conditional model result, not a forecast.
Installed capacity	Maximum nameplate or net generating capacity, not electricity output.
Generation	Electricity produced over a period, usually TWh.
Market concentration	Share of mining, refining, processing or trade held by leading suppliers. Stage always matters.
Resource security	Ability to maintain affordable, reliable access to strategic physical inputs and infrastructure under stress.
Evidence cut-off	11 October 2026. Later events and releases are outside scope.

CHAPTER 22

Appendix C. Selected Global Indicators

A concise reference table for decision-makers.

Indicator	Value	Period / status	Source
Global energy investment	US$3.4T	2026 estimate	IEA 2026d
Low-emissions, grids, storage, efficiency and electrification investment	US$2.2T	2026 estimate	IEA 2026d
Data-centre electricity demand	485 TWh	2025 actual/estimate	IEA 2026b
Data-centre electricity demand	950 TWh	2030 central projection	IEA 2026b
Global grid queues	2,500+ GW	2026 report status	IEA 2026c
Renewable capacity additions	692 GW	2025	IRENA 2026
Solar additions	510 GW	2025	IRENA 2026
Top refiner average share, excluding rare earths	72%	2025	IEA 2026a
Rare-earth downstream production at risk	US$6.5T/year	Full-control stress case	IEA 2026a
Lithium demand change	+353%	2024-2040 projection	UNCTAD 2026a
AI-enabling goods share of merchandise trade	14.8%	H1 2026	WTO 2026b
AI-enabling goods contribution to merchandise trade growth	47%	H1 2026	WTO 2026b
Hormuz share of seaborne oil trade	~25%	2025 baseline	IEA 2026e
Guyana real GDP growth	22.3%	2026 IMF projection	IMF 2026b
Guyana crude production	328.5M barrels	2026 IMF projection	IMF 2026b

CHAPTER 23

Appendix D. Guyana Indicator Crosswalk

Different institutions publish different projections. Values remain source-specific.

Indicator	IMF latest used here	World Bank latest used here	Interpretation
2026 real GDP growth	22.3%	23.7%	Different forecast vintages and models. Both imply exceptional growth.
2025 NRF balance	~US$3.3B at end-year	n/a	IMF year-end reference.
2026 NRF balance	n/a	~US$4.3B at end-June	World Bank mid-year reference. Not directly comparable with year-end 2025.
Oil output	328.5M barrels in 2026	~0.92 mb/d average in 2026	Broadly consistent scale expressed with different units and modelling conventions.
Medium-term non-oil growth	~7% average over next five years	Declining from double-digit near term	Both stress diversification and execution quality.

CHAPTER 24

Appendix E. Source Register

Primary sources used for quantitative and policy claims.

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CHAPTER 25

Appendix F. Research Method

Scope, source hierarchy and analytical discipline.

The paper uses a source hierarchy designed to minimize factual drift. Primary intergovernmental and official sources receive first priority. Quantitative claims are tied to the exact stage, year and status described by the source. Where sources use different definitions or forecast vintages, values remain separate rather than averaged.

Fast-moving geopolitical and market events are treated with an evidence cut-off of 11 October 2026. The full IMF October 2026 World Economic Outlook was scheduled for release after this cut-off, so the paper relies on the July 2026 WEO Update and the latest available IMF statements through 11 October for global macro context.

Scenarios in Chapter 17 are author analysis. They use institutional evidence as inputs but do not represent forecasts from the IEA, IMF, WTO, World Bank or UNCTAD. Recommendations are strategic judgments derived from the dependency patterns documented in the paper.

This publication is intended for strategic discussion and does not constitute investment, legal, engineering or public-policy advice. Project-level decisions require current technical, legal, financial and jurisdiction-specific diligence.

CHAPTER 26

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RESEARCH CUT-OFF
11 October 2026. The report should be refreshed when major policy, conflict, market or institutional forecast changes materially alter the evidence base.