ARTICLES

# Silicon Geopolitics: Why Semiconductors Have Become the New Oil

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**EXECUTIVE BRIEF & KEY FINDINGS**

*This article examines how semiconductors have emerged as the new strategic commodity of the twenty-first century, replacing oil as the core driver of economic power, military capability, and geopolitical influence. It highlights the fragility of the global chip supply chain, especially its dependence on Taiwan, ASML, and US-controlled design tools. The article also analyses the limits of American export controls on China and how they may accelerate Beijing's push for technological self-reliance. For India, the semiconductor realignment presents a major strategic opportunity, but success will depend on building depth in design, equipment, materials, and upstream supply chains rather than relying only on fabrication announcements.*

## Introduction: The New Strategic Commodity

For most of the twentieth century, the logic of geopolitics ran on hydrocarbons. Control over oil fields shaped alliances, triggered embargoes, and determined the outcome of wars. The Organisation of the Petroleum Exporting Countries (OPEC) could move markets and topple governments with a single production decision. In the twenty-first century, that strategic centrality has migrated to a different substance: silicon, etched into circuits a few atoms wide.

Semiconductors now sit at the foundation of every domain of modern power, economic, military, and informational. Policymakers in the United States, China, and elsewhere see semiconductors and AI technologies as critical to future economic competitiveness, national security, and global leadership. Unlike oil, which is geographically dispersed across dozens of producing nations, advanced chip manufacturing is concentrated in a handful of facilities controlled by a small number of firms, making the supply chain simultaneously more efficient and more fragile than anything the oil economy ever produced. This is the defining paradox of silicon geopolitics, and it is reshaping the strategic calculus of every major power, India included.

## The New Oil: Analogy and Breakdown

The "new oil" framing captures something essential. Semiconductors are now a precondition for value creation across the entire economy. They are the backbone of energy networks, financial markets, and telecommunications, enabling manufacturing units, hospitals, transport systems, and satellites. Just as oil shortages once paralysed economies, a semiconductor disruption today would cascade through automobiles, healthcare devices, and defence systems simultaneously. Semiconductors sit at the centre of modern industry, and building domestic capability is not a vanity project but a strategic necessity.

But the analogy has structural limits that make silicon arguably more dangerous than oil ever was. Oil is a commodity: a barrel from Saudi Arabia is functionally interchangeable with a barrel from Venezuela. Advanced semiconductors are not interchangeable. By 2023, the Taiwan Semiconductor Manufacturing Company (TSMC) controlled approximately 60 percent of the global foundry market and over 90 percent of the market for chips below 10 nanometres. This is not diversified scarcity; it is near-total dependency on a single company operating on a single island that sits at the centre of the most volatile great-power rivalry of the era.

The fragility runs deeper than fabrication alone. In extreme ultraviolet lithography (the technology required to print the smallest transistor features), the Dutch firm ASML is the world's sole supplier, while American companies collectively command more than 80 percent of the electronic design automation tools market. Oil markets have never had a single point of failure this absolute. A disruption to ASML's lithography exports, a blockade of Taiwanese ports, or a denial of design software would each independently be capable of halting global chip production, something OPEC's most aggressive embargo never came close to achieving.

## The Taiwan Flashpoint

No discussion of silicon geopolitics can avoid Taiwan, because Taiwan is where the abstraction of "supply chain risk" becomes concrete strategic danger. TSMC produces roughly 90 percent of the world's most advanced semiconductors and 99 percent of the chips used to train frontier AI models. This concentration has given rise to the concept of the "silicon shield", which means that any military action against Taiwan would hamper the global semiconductor supply chain because of Taiwan’s irreplaceable position in this market. It eventually deters invasion, as this would result in the attacking country’s own economic and military devastation.

Yet the shield is increasingly recognised as overrated. China could quarantine Taiwan using coast guard vessels and customs inspections without ever touching a single fabrication plant. The chips would still be produced, they simply could not leave the island unless Beijing permitted it. This scenario is more plausible and more strategically useful to Beijing than outright invasion, because it achieves coercive leverage while avoiding the devastating costs of war. A serious, sustained interruption to Taiwan's exports, not necessarily an invasion, would cascade through every sector of the global economy dependent on advanced computing, which by now is nearly every sector.

The numbers involved are sobering. Analysts have warned that a disruption of Taiwan's semiconductor output could cost the global economy as much as $2.5 trillion in annual losses. Washington's own attempts to weaponise this dependency through export controls have run into enforcement limits. Semiconductor chips are produced by the millions and are small and easily concealed, and Chinese enterprises have already proven adept at smuggling proscribed chips through subterfuge, including reportedly using shell companies to have Taiwanese foundries unknowingly manufacture millions of restricted AI processor components.

## Export Controls and Their Limits

The United States has spent the past four years constructing an elaborate architecture of export controls aimed at slowing China's access to advanced chip technology. In January 2025, the Bureau of Industry and Security issued a global AI Diffusion Rule dividing the world into three tiers, with Tier I countries exempted from licensing requirements and most of the rest of the world subject to a data-centre verified end-user program with cumulative computing power allocations. These controls, first imposed in October 2022 and tightened in subsequent rounds through 2023, 2024, and again in March 2025, have significantly disrupted China's semiconductor ecosystem, forcing price spikes and workforce reductions.

But the controls have produced an effect Washington did not fully anticipate. Rather than halting Chinese semiconductor development, they have accelerated an indigenous, state-backed push for self-sufficiency. In March 2025, researchers at Peking University announced a new transistor architecture using two-dimensional materials that, they claimed, could operate forty percent faster than TSMC's three-nanometre devices while consuming ten percent less energy, an attempt to "change lanes" in the semiconductor race by circumventing silicon-based limitations entirely. Whether or not this specific claim survives scrutiny, it illustrates the central tension of export-control strategy: restrictions can slow an adversary's access to existing technology paths, but they may also incentivise breakthrough innovation that bypasses the choke points altogether.

This is the structural lesson of silicon geopolitics that distinguishes it from oil-era embargoes. OPEC could withhold a commodity that nature had already created. Export controls on semiconductors attempt to withhold a technological capability, and capabilities, unlike crude reserves, can be reinvented.

## India's Position and Opportunities

For India, the global semiconductor realignment represents a rare strategic opening. India is emerging as a global semiconductor hub, targeting seventy to seventy-five percent self-sufficiency in domestic chip demand by 2029, and aiming for three-nanometre and two-nanometre manufacturing capabilities by 2035. The implementation of the India Semiconductor Mission, launched in 2021, has already started. By early 2026, the government had approved projects with investment commitments of roughly ?1.6 lakh crore, including a major fabrication facility led by Tata Electronics in partnership with Taiwan's Powerchip Semiconductor Manufacturing Corporation (PSMC) in Dholera, Gujarat, with planned capacity of fifty thousand wafers a month. That facility is targeting first silicon by late 2026, with the union electronics minister stating that four plants will be operational by the end of 2026, and India's first full fabrication unit ready in Dholera by 2028.

The geopolitical logic favouring India is explicit, not incidental. The same export controls restricting Chinese chip makers from accessing TSMC and ASML are pushing American chip designers and fabless companies to build design and packaging capacity outside both China and Taiwan, and India offers English language engineering talent and a non-China geopolitical alignment alongside an actively subsidising government. This is precisely the kind of structural opportunity that mirrors how Gulf states once leveraged oil scarcity into geopolitical weight, except India is positioning itself not as a raw resource exporter but as an alternative node in a contested manufacturing architecture.

Yet candour about the limits of progress so far is essential. India's engineering talent currently lacks ownership of product-level intellectual property and remains concentrated in services, and despite the announcement of fabrication projects, the equipment, speciality chemicals, wafers, gases, and design technologies required continue to be sourced from abroad. ISM 1.0 succeeded in attracting anchor investment into assembly and packaging, yet it did not produce the upstream technological depth that determines whether a country is a genuine semiconductor power or simply a final-assembly hub for components designed and engineered elsewhere. This is why the government's follow-on initiative, ISM 2.0, allocated ?1,000 crore in the 2026-27 budget specifically to promote domestic production of semiconductor equipment, components, and critical inputs, such as speciality chemicals, industrial gases, and wafers, the upstream layer that ISM 1.0 left largely untouched.

The honest comparative assessment, offered without triumphalism, is that the results of India's first mission phase are not comparable with Taiwan, South Korea, or China, but that this is the wrong benchmark for a country that had almost no commercial semiconductor manufacturing base to begin with. Semiconductor ecosystems are not built through one subsidy window or a five-year policy cycle; they require patient capital, technology transfer, trained engineers, and a dense supplier base accumulated over decades.

## Strategic Imperatives

Four considerations should anchor India's semiconductor strategy going forward.

1. **India must resist the temptation to chase prestige nodes at the expense of ecosystem depth:** The flagship Dholera facility is targeting twenty-eight-nanometre and below process nodes, not frontier two-nanometre chips, but the mature-to-advanced range covering automotive chips, industrial micro-controllers, and IoT devices. This is the correct strategic choice. Mature-node chips carry less geopolitical glamour but represent a far larger addressable market and a more achievable technological frontier for a first-generation fabrication ecosystem.
2. **Design capability deserves at least as much policy attention as fabrication:** Semiconductor design accounts for up to fifty percent of value addition and more than thirty percent of global semiconductor revenues. As of January 2026, twenty-four chip design projects had been supported under India's Design Linked Incentive scheme, covering applications from microprocessors to satellite communication and surveillance. This is where India's existing strengths in software and systems engineering can be converted most directly into semiconductor sovereignty, a comparative advantage the country does not need to build from scratch.
3. **India should treat the upstream supply chain, equipment, materials, and gases, as the genuine constraint, not a footnote:** The most consequential recent development may be the smallest in headline terms. On May 16, 2026, Tata Electronics and ASML signed an agreement to establish India's first front-end semiconductor lithography-related collaboration. Equipment partnerships of this kind, not announcements of fabrication capacity alone, will determine whether India's semiconductor mission produces durable capability or simply imported assembly lines.
4. **India must position its semiconductor strategy within its broader strategic alignments without becoming a proxy battleground in the US-China rivalry:** India benefits from the diversification away from Taiwan and China concentration without needing to take an openly antagonistic posture toward Beijing on every related question. The skill lies in extracting the structural benefits of de-risking, capital, technology transfer, talent inflows, while preserving strategic autonomy on the larger geopolitical contest playing out around it.

## Conclusion: The New Foundation

The "new oil" metaphor will likely persist in policy discourse because it captures something true: semiconductors are now indispensable to the functioning of modern states and economies in the way that hydrocarbons once were. But the metaphor obscures an important difference. Oil scarcity was a problem of geology. Silicon scarcity is a problem of engineering, capital, and political alignment, all factors that nations can, with sufficient patience and investment, reshape.

For India, this is the encouraging implication buried inside an otherwise sobering geopolitical picture. Unlike an oil-poor nation condemned by geography to perpetual import dependency, India possesses the engineering talent, market scale, and the institutional commitment to become a genuine node in the reconstructed global semiconductor order. Whether it succeeds will depend not on the announcements of fabrication plants, which have come steadily since 2021, but on the unglamorous accumulation of upstream capability: equipment, materials, design IP, and a dense supplier base that takes a decade or more to mature. The silicon age rewards patience as much as ambition. India's task now is to supply both: patience, as well as ambition.

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