



THE SEMICONDUCTOR BOTTLENECK

Build targeted capability before long cycles close options

A 6C strategic-choice analysis of Europe's effort to reduce critical semiconductor supply-chain vulnerabilities by 2035.

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STRATEGIC THESIS

Europe's semiconductor autonomy cannot come from copying the whole global chain at home. The strategic shift is to use time, targeted learning and protection to reduce the few dependencies that can most disrupt European industry—before long investment cycles lock in the wrong capabilities.

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How to read this brief

This public report turns the Workbench analysis into a shorter strategic brief. It keeps the evidence and methodological limits of the case, but removes internal codes, historical strategy names and repeated technical detail.

6C describes the reference context through six dimensions: Defensive Strength, Offensive Strength, Relational Capacity, Potential Energy, Time Availability and Context Adherence. These assessments are compared with 60 strategic mechanisms: 36 derived from classical stratagems and 24 developed by IGS. IGS does not claim ownership of the classical tradition. Its contribution is the 6C formalisation, the calibrated profiles used for comparison and the robustness method. Related mechanisms are grouped only when that helps explain the strategic direction clearly.

The ranking shows which mechanisms fit the recorded situation more closely. It is not a probability of success and it does not make the decision for the reader. Evidence, model results and the final human synthesis remain separate. Robustness testing checks whether the overall direction still holds when important assessments are changed within or beyond the range supported by the evidence.

The report focuses on the stated strategic objective. Other outcomes are included only when the available evidence shows that they materially affect it.

EXECUTIVE SUMMARY

THE CHOICE IN ONE READING

Europe has industrial strengths and a policy framework, but those do not yet remove dependence on advanced production and design elsewhere. The decision is whether to use its strengths to reduce the most consequential vulnerabilities without trying to reproduce an interdependent global chain.

The comparison favors using time, learning through small tests, renewing capabilities before they become outdated, and protecting what Europe has already built. That is more demanding than simply expanding domestic production: each gain must reduce an important exposure without closing off useful international links. The sharpest tension is between active use of time and passive waiting; the comparison favors the first, not delay for its own sake.

A second finding is that more production can conceal a persistent bottleneck if it grows in the wrong segment or cannot reach sustainable production. A third is that access to the chain runs through many connected firms and stages, not one centre. Robustness tests show that the leading mix can change, and that changes in coordination or in what the objective requires can produce a different overall direction.

The human choice is to use staged learning and early renewal to identify where a European capability or dependable partner can reduce a consequential dependency. Protect those gains as larger investments mature, and change course if evidence shows that Europe cannot coordinate the effort or that the objective requires a closer fit with the chain's real needs.

01 / STRATEGIC SITUATION

Semiconductor production depends on specialized stages spread across countries, so Europe cannot quickly replace every external link. The European Union has strengths in equipment, industrial chips, power electronics and research, but remains dependent on non-European suppliers for advanced production and parts of chip design. China is a consequential counterpart because it has strong positions in selected materials and supply-chain activities, and can regulate some exports; this does not mean it controls the whole chain or opposes every European objective. The exposure is therefore selective: it depends on which chips and inputs matter, how easily they can be replaced, and how long recovery would take. ^{[1], [4], [2]}

The European Union has established strengths in equipment, industrial chips, power electronics and research, and has built shared research and pilot-line capabilities. These provide a foundation for learning and selected expansion, but they do not by themselves show that new technologies have become sustainable, large-scale production. The Commission's proposal also describes design and pilot-line links intended to help move work toward industrial use. ^[2]

The central weak link is the passage from policy and research support to durable industrial output. The European Court of Auditors found that the earlier market-share ambition was unlikely to be met under the implementation it examined; the Commission's follow-on proposal also identifies scale-up finance, fragmented demand and limited supply-chain intelligence as continuing problems. Taken together, this suggests that additional capacity alone may not remove the dependencies that matter most. ^[3]

Shared pilot lines, design facilities and proposed supply-chain intelligence could help connect experimentation, industrial needs and early warning. These are potential buffers, not proof that Europe can already replace critical suppliers. The key timing pressure is that large facilities take years to develop while technology and demand can shift sooner, so learning and adaptation must continue as investment proceeds. ^[2]

Which dependencies must Europe reduce first to protect critical industries, and how can it build that capability without locking itself into the wrong technologies or losing useful access to international partners?

02 / WHAT EMERGES FROM THE 6C SIMULATION

The comparison puts timing, incremental gains, learning through pilots, early renewal and preventive protection among the leading directions. Together they favor changing Europe's position before disruption forces a response, while building capability in stages. The visible contrast is with approaches that rely mainly on direct pressure or on a single, sweeping expansion of domestic production.

Leading strategic directions

Public strategy label	Meaning in this case
Use time as leverage	Use timing and duration to preserve choices while long semiconductor investments take shape.
Accumulate small gains	Build useful European capability through small gains instead of assuming every chain stage can be replaced.
Pilot, learn, scale	Test whether a capability meets a real industrial need before expanding it.
Renew before disruption	Renew European capabilities as technology and demand change, before existing choices become difficult to reverse.
Build preventive barriers	Protect important capabilities and supply continuity before disruption exposes their value.

The strategy labels are plain-language names for the underlying strategic mechanisms. Internal identifiers are omitted here; the technical Annex keeps the detailed traceability.

Why these directions lead

The leading directions share a preference for acting early and preserving room to adjust. That matters because chip technology and demand can change faster than large facilities can be built, while small advances at a critical stage may matter more than broad growth in production.

What fits less well in this situation

Approaches built around direct confrontation, forced dependence or deceptive pressure fit less well than patient, adaptive change in the current comparison. This does not make them inherently unsuitable; it means the present evidence favors protecting and redirecting Europe's own position rather than assuming it can control the wider chain.

What the overall pattern tells us

The comparison favors a staged response: use time to learn and adapt, secure useful gains, and protect the capabilities already within reach. Large-scale expansion remains relevant, but only when it addresses a consequential dependency and can be sustained.

03 / THREE STRATEGIC INSIGHTS

Insight 1

Use time well, but do not confuse waiting with progress

The leading directions use time actively: Europe can learn, adapt, and secure useful gains while longer investments develop. Yet the full comparison places passive waiting among the directions that fit least well. This is not a contradiction: the comparison distinguishes managing the pace of change from simply postponing action. Europe's semiconductor facilities require long investment and construction cycles, while technology and demand can change sooner. Taken together, this suggests that time helps only when it is used to preserve choices: test where European strengths can meet real needs, make changes before a capability becomes outdated, and protect what would be difficult to replace. Waiting without learning or adaptation leaves the same external dependencies in place. The less expected move is therefore not to rush every project, but to use small, visible advances to keep options open while the larger commitments mature.

Insight 2

A larger production share can hide the wrong dependency

Europe has genuine strengths in manufacturing equipment, industrial chips, power electronics, and research, alongside dependence in advanced logic manufacturing, foundry capacity, and parts of chip design. The comparison favors small gains, pilots, and selective protection, not production growth as an end in itself. The distinction matters because more output in a segment that does not supply a critical need may leave the most disruptive exposure untouched. A facility announcement is also not the same as qualified, sustainable production: the chain still needs skilled people, reliable utilities, specialist suppliers, and customers. The strategic question is whether each gain changes the availability of a chip or input that matters to European industry, and whether it can keep doing so as technology and demand change. The comparison makes this selectivity important to the decision; it does not prove that any particular project will succeed. Europe should judge progress by whether a critical dependency becomes easier to replace or withstand, not by aggregate production alone.

Insight 3

Reach the chain through its links, not a single centre

The semiconductor chain is not controlled through one production site or one decision-maker. Design tools, intellectual property, materials, equipment, fabrication, packaging and customer demand connect firms and countries across multiple stages. China's role in selected materials and its ability to license some exports make access one real transmission channel; they do not establish control over the entire chain. The

comparison favors using time and targeted learning, while signals from the relationship analysis show that the same strategic approach must protect Europe's position and account for its dependence on others. Taken together, this suggests that useful leverage comes from identifying which link matters to a particular European need, then building alternatives or trusted access around that link. A broad effort to replace every supplier would ignore how specialized and interdependent production is. The choice is to reduce exposure where a disruption would matter most, while keeping cooperation possible in stages where shared access remains valuable.

04 / THE INTEGRATED STRATEGIC CHOICE

This is a human-led strategic synthesis informed by the comparison, relationship analysis, recorded evidence and robustness tests, not an automatic prescription from the model.

Use time as leverage: make long investment cycles serve learning and adjustment, rather than treating delay as a strategy. This sets the pace for the other leading mechanisms and keeps choices open as technology and demand shift.

Secure gains in small steps: address useful bottlenecks as they become clear. These gains give the larger effort a practical basis without assuming that every part of the chain must move at once.

Learn before scaling: the pilot-learn-scale approach makes experimentation an enabling step: test whether a European capability serves a real need before committing to broad expansion. It complements incremental gains, but does not replace the need for viable demand and supporting skills.

Change before options close: Renew before disruption means adapting European capabilities as technology and supply conditions change. It belongs alongside—not instead of—long-term investment, since renewal without durable production would leave dependencies intact.

Protect what matters: build preventive barriers by safeguarding critical capabilities and supply continuity before a disruption exposes their importance. This protects the gains made through pilots and renewal; it should not become a claim that Europe can or should reproduce the entire global chain.

What this choice should avoid

A preliminary consideration is to avoid treating a higher European production share as proof that critical dependencies have fallen. Capacity should not be built across every stage before demand, skills and supporting inputs can sustain it. Urgent short-term supply measures should not lock Europe into technologies or investments that no longer fit the chain's changing needs.

05 / HOW ROBUST IS THE CHOICE?

Bottom line:

The analysis repeated 111 tests, each changing one recorded assessment while holding the others fixed.

Same basic direction remained recognisable:

26; mix changed but overlap remained: 69; genuinely different overall approach: 16; declared total: 111. These are model test outcomes, not probabilities.

What changes and what does not:

Across most tests, the broad approach remains recognisable even when the leading mix changes. But a different overall approach does appear within the recorded plausible range: changes to the European Union's ability to coordinate, or to how closely its current capabilities fit the situation, can shift the comparison toward relationship-shaping and dependency-balancing approaches. Those changes are not merely a change in order.

Where sensitivity is concentrated or spread:

Sensitivity is spread across many assessments, though the full switches have a clearer focus. If European coordination is judged materially weaker, relationship-shaping and dependency-balancing approaches become the leading alternative. If the objective is judged to require more coordination, or a closer match between European capabilities and semiconductor needs, relationship-shaping approaches become a plausible alternative. Other changes in European and Chinese capabilities, available resources, timing and the objective's requirements mostly change which closely related approaches lead or how they are mixed.

What this means for the decision-maker:

Treat the current direction as a working reference, not a fixed formula. Changes in order or mix alone do not replace it, but evidence that European coordination has weakened, or that the objective requires more coordination or a closer fit with real supply-chain needs, justifies reopening the choice.

Additional tests beyond the supported range:

Tests beyond the recorded plausible range also showed different overall approaches when the objective was judged to require less coordination or less close fit. These results are not evidence about current conditions and are not included in the declared test count; they do not make the declared in-range findings more sensitive.

06 / WHAT WOULD CHANGE THE STRATEGIC CHOICE?

If evidence showed that European coordination across institutions, member states and industry had weakened enough to make shared action unreliable, the choice should be reopened. The comparison then shifts toward shaping relationships and balancing dependencies, because the current approach relies on coordination to turn European assets into durable capability. If evidence showed that Europe's existing strengths and policy choices fit semiconductor needs, industrial economics and supply-chain constraints less well than assumed, a different overall approach would deserve consideration. That would reflect a change in the European Union's ability to match its actions to the context, not merely a change in the external context itself. If the objective came to require substantially more coordination among European institutions, industry and trusted partners for success, the strategic choice should place greater weight on building and maintaining those relationships. That would be a change in what European Semiconductor Strategic Autonomy by 2035 requires, not evidence that coordination has already improved. If credible attainment came to require a closer match between European capabilities and the actual needs and economics of semiconductor production, the choice should shift toward reshaping those relationships and dependencies. Evidence would need to show that this closer fit is required for the objective, not merely that Europe's current fit has improved.

07 / WHY THIS READING IS COHERENT

The evidence describes a European Union with real assets in equipment, industrial chips, power electronics and research, but with continued reliance on external suppliers in advanced production and parts of chip design. It also describes a chain in which skills, demand, finance, infrastructure and specialized suppliers affect whether investment becomes lasting production. These facts point to a selective challenge: build where a European capability can reduce a consequential exposure, rather than treating domestic output as the goal by itself. The comparison adds a clear preference for managing time, learning in stages, renewing capabilities and protecting gains. The robustness tests qualify that reading: related approaches often change order or mix, and some tested changes to coordination and fit lead to a different overall direction. The human choice is therefore a working judgment, informed by the comparison but open to evidence that changes what Europe can coordinate or what the autonomy objective requires. ^{[2], [3]}

08 / METHODOLOGICAL BOUNDARY AND SOURCES

Methodological boundary

The 6C method compares structured assessments of a situation with a repertoire of 60 strategic mechanisms. These assessments describe actors, objectives and context through six conditions; they are evidence-grounded judgments, not direct measurements of the outside world. Their recorded coordinates can be checked against the stated subject and meaning, rationale, plausible range, confidence and evidence behind them. Decimal values make the assessment reproducible; they do not claim accuracy to a hundredth. A plausible range shows which assessments remain defensible, not automatically a statistical confidence interval. Confidence describes how well the evidence supports the assessment, not strategic strength or the chance of success. The comparison that matches the recorded situation to the 60 mechanisms is a protected part of the method. Its vectors, weights and formulas need not be disclosed for its decision-support role to be examined. That role can be judged through consistent recorded inputs, the complete comparison, reproducibility and declared tests of how the result changes under plausible reassessment. The repertoire combines 36 mechanisms derived from classical stratagems with 24 additional mechanisms developed by IGS; this does not imply ownership of the classical tradition. IGS's methodological contribution includes the 6C formalisation, calibrated condition profiles across the repertoire, comparative matching and robustness method. Comparative fit is not a prediction of success, causal proof or an instruction to choose. The final choice is human judgment. Robustness describes how the comparison behaved under declared changes to its recorded assessments; it does not estimate the likelihood of future events. This brief addresses strategic fit for European semiconductor autonomy by 2035, not a project plan or forecast.

Main sources

1. Council of the European Union. The EU chips industry. Retrieved 2026-10-25
2. European Commission. Proposal for the Chips Act 2.0. Retrieved 2026-10-25
3. European Court of Auditors. Special report 12/2025: The EU's strategy for microchips. Retrieved 2026-10-25
4. Ministry of Commerce of the People's Republic of China. Announcement No. 18 of 2025 on export controls for certain medium and heavy rare-earth-related items. Retrieved 2026-10-25

Final formulation

Europe does not need to reproduce the whole semiconductor chain. It needs to learn, renew and protect its way toward reducing the dependencies that matter most.