Rebalancing Europe's Semiconductor Strategy: Building an Inclusive and Sustainable Ecosystem Under the Chips Act 2.0

Introduction

The European Union's semiconductor strategy stands at a critical inflection point. While the *European Chips Act* of 2023 (Regulation (EU) 2023/1781) successfully placed semiconductors at the heart of Europe's industrial policy, the Act remains incomplete in scope and ambition. Europe continues to hold less than 10 percent of global semiconductor manufacturing capacity, far from its 2030 target of 20 percent. More importantly, Europe's position in design, advanced packaging, and AI-accelerator segments remains structurally weak. The result is an ecosystem that depends heavily on non-European supply chains for strategic technologies.

This paper proposes a targeted policy revision — *Chips Act 2.0* — focused on inclusivity, open design infrastructure, and sustainability. The next phase of the Act should democratize access to semiconductor design and manufacturing by expanding open-source design platforms, shared pilot lines, and workforce development programs. It should also establish a unified EU-level "front-door" for state-aid and permitting, enabling small and medium-sized enterprises (SMEs) and research institutions to access support that currently favors large corporations. Strategically, Europe should invest in sectors where it is already indispensable — power electronics, sensors, and lithography — and link these to sustainable, low-carbon production.

By broadening participation and simplifying governance, *Chips Act 2.0* can transform Europe's semiconductor policy from a reactive industrial intervention into a sustainable ecosystem strategy.

II. Legal / Regulatory / Policy Background

The *European Chips Act* (Regulation (EU) 2023/1781) created a three-pillar framework to strengthen Europe's semiconductor ecosystem:

1. **Chips for Europe Initiative:** EU and national funding for pilot lines, design platforms, and competence centers.

2. **Security of Supply and Resilience:** Fast-track permitting and state-aid exemptions for "first-of-a-kind" semiconductor facilities.

3. **Monitoring and Crisis Response Mechanism:** Early-warning systems and joint procurement under the European Semiconductor Board.

While the Act established a solid institutional foundation, implementation challenges remain. First, **fragmentation** persists across national and EU funding programs (*Horizon Europe*, *Digital Europe Programme*, and *IPCEI on Microelectronics*), creating overlapping procedures and inconsistent eligibility rules. Second, **state-aid flexibility** benefits mainly large firms with the capacity to navigate complex legal frameworks. SMEs and academic institutions continue to face barriers to entry. Third, **evaluation mechanisms** focus narrowly on wafer-fabrication capacity rather than ecosystem health (e.g., design output, talent mobility, or sustainability metrics).

In September 2025, all 27 Member States signed the *Semicon Coalition Declaration* calling for an enhanced *Chips Act 2.0*. This declaration emphasizes five pillars: (1) secured EU budget line, (2) simplified state-aid and permitting, (3) expansion into design & packaging, (4) skills development, and (5) sustainability integration. The European Commission's concurrent *Call for Evidence* invites stakeholders to evaluate the 2023 Act's effectiveness.

In short, the existing framework creates a legal platform but lacks the procedural speed and inclusivity necessary to achieve its goals. *Chips Act 2.0* must therefore refine both **governance** (through unified coordination) and **substance** (through broadened eligibility and sustainable objectives).

III. Technical Background

Semiconductor development involves a multistage process — design, fabrication, assembly, testing, and packaging — each with distinct technical and economic constraints. Understanding these realities clarifies why Europe must pursue an ecosystem-oriented approach.

1. **Design Layer.** Modern chips are designed using complex electronic-design-automation (EDA) tools that cost millions annually to license. This excludes universities and startups from innovation unless subsidized or open-sourced.

2. **Fabrication (Fabs).** Advanced fabrication nodes (<10 nm) require >€15 billion per plant and global supply chains for photolithography and materials. Europe's ASML dominates EUV lithography but lacks local customers using it.

3. **Packaging and Testing.** Post-fab assembly and advanced packaging (e.g., 3D stacking for AI chips) have become new bottlenecks in the global chain. Europe's capacity is limited yet vital for AI accelerator markets.

4. **Talent and Infrastructure.** Semiconductor production is energy- and water-intensive, requiring stable grids and skilled technicians. Europe's energy costs and workforce shortages create non-technical barriers to expansion.

5. **Sustainability.** As the European Green Deal becomes a cross-sector mandate, chipmakers must lower carbon emissions and resource consumption. Policies that tie sustainability targets to industrial incentives could differentiate Europe globally.

Technically, these realities show that **scaling only fabrication capacity** will not make Europe competitive. A resilient ecosystem depends on **design access**, **workforce depth**, and **green manufacturing capacity** — the areas where policy intervention can be most effective.

IV. Proposal: The Chips Act 2.0 Framework

The proposed *Chips Act 2.0* builds upon Regulation (EU) 2023/1781 but re-balances priorities from *production volume* toward *ecosystem capacity*. It introduces four interlocking pillars:

A. Open Design and R&D Infrastructure

- Establish an **EU Open Chip Platform** — a federated network of open-source EDA tools, shared IP libraries, and simulation environments hosted by existing competence centers.

- Fund shared *pilot lines* through the *Chips for Europe Initiative* for GaN power electronics, sensors, and AI accelerators.

- Require that all publicly funded pilot facilities reserve at least 30% of capacity for SMEs, startups, and academic partners.

Legal Fit: Implemented under Article 7 (Chips for Europe Initiative) via delegated regulation extending eligibility to SMEs and academic consortia.

B. Unified EU Coordination Portal

- Create a single **"front-door"** under the European Semiconductor Board integrating state-aid approvals, permitting, and grid access.

- Introduce binding **timelines** (e.g., six months) for state-aid decisions on strategic semiconductor projects.

- Publish transparent dashboards of funded projects to enhance accountability.

Legal Fit: Amend Article 8 to authorize the Board to coordinate Member-State procedures and issue binding timelines.

C. Workforce and Mobility Program

- Establish **Semiconductor Talent Mobility Visas** for intra-EU engineers and technicians.

- Fund vocational centers co-located with pilot lines.

● Align university curricula under a unified *Semiconductor Education Framework*.

Legal Fit: New Article 11a linking Chips Act to Erasmus+ and the European Education Area.

D. Sustainable Manufacturing Incentives

● Tie state-aid intensity to *carbon-intensity benchmarks* and *renewable-energy sourcing*.

● Provide *Green Fab Grants* for water recycling, energy storage, and waste-heat reuse.

● Include sustainability metrics in the EU's semiconductor monitoring reports.

Legal Fit: Integrate with Article 14 (Reporting and Evaluation) to include environmental performance indicators.

Collectively, these pillars create an ecosystem where participation is broadened, innovation is accelerated, and sustainability is embedded into industrial strategy. *Chips Act 2.0* thereby shifts focus from **strategic autonomy by volume** to **strategic indispensability through capability.**

How Chips Act 2.0 Resolves the Structural Limitations of Chips Act 1.0

This proposal directly addresses the shortcomings revealed during the implementation of Chips Act 1.0. The original Act created an important foundation, but it did not sufficiently extend design infrastructure or R&D access to smaller innovators. Large firms benefited from pilot lines and design platforms, while SMEs, universities, and startups struggled with high EDA licensing costs and limited access to fabrication resources. By establishing an EU Open Chip Platform—anchored in open-source design tools, shared IP libraries, and accessible pilot lines—Chips Act 2.0 transforms these bottlenecks into enablers. This lowers barriers to entry, expands Europe's innovation pipeline, and ensures that the benefits of public funding reach a broader set of actors than under the initial Act.

Fragmentation and procedural delays also limited Chips Act 1.0's effectiveness. State-aid approvals stretched into months or years, permitting processes varied dramatically across Member States, and there was no single authority ensuring deadline compliance. Investor hesitation and delayed projects, such as the Wolfspeed fab timeline reported by Reuters [14], demonstrate that uncertainty is itself a competitiveness issue. The proposed unified EU coordination portal directly resolves this challenge. Centralizing applications and introducing enforceable decision timelines creates predictability—the single most requested feature from industry during stakeholder consultations. This addresses the core administrative inefficiency that the original Act could not overcome.

Chips Act 1.0 also fell short on workforce development. Despite new R&D programs and planned fabrication facilities, Europe lacks sufficient semiconductor engineers, equipment technicians, materials specialists, and packaging experts. Without talent, capital investment remains inert. The Chips Act 2.0

workforce and mobility program responds by building an EU-wide talent pipeline, aligning educational curricula, and enabling cross-border mobility for semiconductor professionals. This ensures that new pilot lines, design centers, and fabs—funded through public investment—are staffed by the skilled workforce necessary to operate them.

Finally, the first Act paid little attention to sustainability. Semiconductor production is highly energy-intensive, and Europe's high energy costs and environmental constraints shape site-selection decisions as much as subsidies do. By linking state-aid intensity to carbon benchmarks and renewable-energy sourcing, Chips Act 2.0 ensures that public money accelerates Europe's transition to low-carbon manufacturing rather than working against it. These incentives transform a potential liability—Europe's strict environmental standards—into a strategic differentiator for global firms seeking low-carbon supply chains.

Taken together, these four pillars provide targeted solutions to each major limitation identified in Chips Act 1.0: limited access, slow execution, talent shortages, and sustainability blind spots. Chips Act 2.0 evolves the EU's semiconductor strategy from a narrow focus on fabrication volume into a holistic ecosystem approach capable of delivering long-term competitiveness and technological sovereignty.

Anticipated Concerns and Responses:
Some may argue that these reforms risk increasing administrative complexity, weakening Member State autonomy, or imposing sustainability burdens on industry. However, each proposed pillar is designed to streamline existing frameworks, broaden participation without reducing competitiveness, and align industry incentives with long-term strategic goals. Open design infrastructure complements—rather than replaces—proprietary systems. A unified coordination portal strengthens national tools by reducing delays. Sustainability-linked incentives match global corporate trends toward cleaner production. And guaranteed SME access to pilot lines supports innovation without impeding industrial deployment. Far from introducing tradeoffs, this package of measures resolves competing inefficiencies and positions Europe for durable, ecosystem-level semiconductor leadership.

V. Conclusion

Europe's semiconductor ambitions cannot succeed through fabrication subsidies alone. The *Chips Act 2023* was a crucial foundation, but execution gaps in accessibility, speed, and ecosystem breadth threaten its effectiveness.

The proposed *Chips Act 2.0* addresses these issues by opening design access, unifying coordination, investing in workforce development, and embedding sustainability. If adopted, it would produce a semiconductor ecosystem defined by integration, resilience, and innovation — not dependency.

Implementation should proceed via Commission delegated regulations and amendments under Articles 7, 8, and 14 of Regulation 2023/1781, in close partnership with Member States and the Semicon Coalition. With coherent governance and ecosystem-level investment, Europe can transform semiconductor vulnerability into strategic strength.

[1] European Commission, "*The EU Chips Act*," **Digital Strategy**, 2023. [Online]. Available: https://digital-strategy.ec.europa.eu/en/policies/european-chips-act

[2] European Union, *Regulation (EU) 2023/1781: European Chips Act*, **Official Journal of the European Union**, 2023. [Online]. Available: https://eur-lex.europa.eu/eli/reg/2023/1781/oj

[3] European Council on Foreign Relations, "*Chips on the Menu: How the EU Can Get Its Act Together on Semiconductors*," 2024. [Online]. Available: https://ecfr.eu/article/chips-on-the-menu-how-the-eu-can-get-its-act-together-on-semiconductors

[4] Interface Europe, "*Europe's Semiconductor Strategy: From Policy to Execution*," 2024. [Online]. Available: https://www.interface-eu.org/publications/europe-semiconductor-strategy