

Arm response to the European Commission's call for evidence on Chip Act 2

1. Introduction

Arm welcomes the European Commission's consultation on strengthening Europe's semiconductor competitiveness and resilience. The first Chips Act has successfully mobilised investment and strengthened Europe's research advantage in particular through the pilot lines, but the gap between laboratory and large-scale manufacturing remains particularly visible in advanced compute and leading-edge technology nodes.

While Europe has world-class R&D capabilities, most of the semiconductor industry's value creation, including advanced manufacturing and high-performance chip design, still occurs outside the region. Bridging this gap requires a renewed focus on design capability, system-level IP integration, and deployment of production-grade technologies that can translate research leadership into commercial and strategic impact.

2. Europe's Semiconductor Opportunity

Compute demand is growing exponentially, up to four orders of magnitude in just five years, driven by AI, autonomous systems, and data-intensive applications. Meeting this demand sustainably requires innovation not only in process nodes but in how systems are architected, packaged, and integrated.

Europe's research strengths in chiplets, photonics, and power systems provide a foundation for leadership in next-generation chip architectures. Modular chiplet-based systems, combining CPUs, AI accelerators, photonic interposers, and voltage-regulator chiplets, demonstrate the potential of collaborative European R&D.

However, to remain competitive, Europe must ensure that these innovations translate into commercially viable and energy-efficient products, a challenge that requires linking design, IP, and manufacturing capabilities across the value chain.

3. From Lab to Fab to Market: Europe's Competitive Edge

Europe has demonstrated that collaborative R&D works, from photonics to packaging and interconnect technologies. The Chips Joint Undertaking and Horizon Europe have been instrumental in achieving this. The next step is to ensure industrial deployment, integrating design platforms, IP ecosystems, and fabrication pathways into a continuous innovation chain.

Arm's Foundation Chiplet System Architecture shows how open, interoperable standards can accelerate this transition, simplifying the integration of chiplets and enabling modular innovation across European automotive, industrial, and AI sectors.

4. Leveraging Production-Grade IP and Compute Subsystems

To accelerate time-to-market and reduce duplication, Europe should leverage production-grade solutions from trusted, like-minded countries, ensuring that design and manufacturing sovereignty are compatible with open global collaboration.

In particular, the use of Arm Compute Subsystems (CSS) provides a fast, secure path from

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concept to tape-out. CSS offers validated, production-ready compute platforms that integrate CPUs, interconnect, and system IP optimized for AI, automotive, and edge applications.

Adopting such proven system-level IP within European would enable SMEs to focus on differentiating technologies, AI accelerators, chiplets, photonics, and software, while relying on a secure, efficient, and export-compliant compute foundation.

5. Upgrading the European Chips Design Platform (EuroCDP)

Arm strongly supports the Commission's vision for a European Chips Design Platform (EuroCDP). To fully deliver on its goals, EuroCDP should evolve from a component-level design environment into a system-level innovation platform that includes:

- System IP integration: Incorporate production-grade compute subsystems like Arm CSS to allow teams to design, simulate, and tape-out complex systems-on-chip.
 - Digital twin EDA capabilities: Provide system-level simulation, verification, and co-design environments for hardware-software integration.
 - Open interoperability standards: Ensure compatibility with chiplet and IP ecosystems under initiatives like Arm's Foundation Chiplet System Architecture.
- SME access and scalability: Allow startups and research institutions to access proven IP and secure cloud-based design environments, accelerating innovation across Europe.

This evolution would transform EuroCDP into a true “from lab to fab to market” accelerator, reducing the design cycle and lowering the barriers to semiconductor innovation for European companies.

6. Energy-Efficient AI as a Strategic Priority

AI represents both Europe's greatest opportunity and its largest energy challenge. Inference already accounts for more than 70% of AI compute demand globally. Arm research shows that deploying AI processing closer to the data source, through edge and distributed computing, can cut energy use by up to 60% for equivalent workloads.

Europe can lead in energy-efficient AI by linking the Chips Act and the Green Deal Industrial Plan to support efficient-by-design architectures, distributed compute, and secure edge systems that optimise both performance and energy use.

Arm's experience and customer cases show that custom silicon consistently outperforms off-the-shelf silicon in energy efficiency and workload suitability. By optimising compute, memory, and interconnect at system level, custom designs typically deliver 30 to 50% efficiency gains, and up to 4 \times improvements for large-scale AI inference workloads. These gains come from removing general-purpose overheads and aligning architectures directly with European industrial and AI requirements.

7. Policy and Investment Recommendations

To strengthen Europe's semiconductor ecosystem and competitiveness, Arm recommends that the European Commission:

1. Expand the Chips Act's design dimension, including support for chiplet system architecture, photonics, interconnects, and efficient compute IP.
2. Leverage production-grade IP from trusted global partners, such as Arm Compute Subsystems, to ensure high-quality, export-compliant foundations for European innovation.

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3. Upgrade the EuroCDP to include system-level IP, digital twin EDA tools, and open standards, transforming it into a full innovation and deployment platform.
4. Integrate semiconductor and AI policies, linking the Chips Act with the AI Act, Cyber Resilience Act, and Digital Energy Roadmap, to align compute efficiency, trust, and sustainability goals.
5. Reinforce public-private funding mechanisms to transition R&D results into pilot production, particularly in 2.5D/3D integration, advanced packaging, and chiplet manufacturing.

8. Conclusion

Europe stands at a turning point in semiconductor innovation. To compete globally, the EU must combine research excellence with industrial-scale deployment, ensuring that design innovation, energy efficiency, and trusted collaboration become the cornerstones of its Chips Act strategy.

By investing in system-level design, production-grade compute platforms, and open interoperability, the EU can strengthen its sovereignty while remaining connected to global innovation networks.

Arm remains committed to working with European partners to achieve this vision, helping ensure that Europe not only designs the chips of the future but also leads in making them efficient, secure, and sustainable.