KTH Response to the European Commission Call for Evidence for the Revision of the EU Chips Act (Chips Act 2)

Position dated November 2025.

Since its founding in 1827, KTH Royal Institute of Technology has grown into a leading international technical university. As Sweden's largest institution for technical education and research, KTH brings together students, researchers, and educators from around the world. Rooted in a strong tradition of advancing science and innovation, our work is dedicated to fostering sustainable societal development.

KTH strongly supports the European Commission's strategic initiative to strengthen Europe's semiconductor ecosystem. Semiconductors power technologies that define future competitiveness, innovation, and resilience, including applications in AI, automotive, defence, quantum technologies, HPC, and energy. We welcome the Commission's recognition of the strategic importance of semiconductors for Europe's global competitiveness and digital sovereignty, and we support bold and forward-looking initiatives such as the EU Chips Act and the proposed Chips Act 2.0.

Strategic Context

Europe currently produces a relatively small share of global semiconductor output and lacks high-volume manufacturing capacity for sub-10 nm nodes. This dependency on non-EU actors constitutes a strategic vulnerability, particularly in sectors critical for defence, security, automotive, quantum technologies, and HPC.

However, this challenge is not solely one of technical capability. Europe lacks a single customer or sector with sufficient, stable demand to justify the construction of full-scale leading-edge fabs. Demand is fragmented across industries, and volumes fluctuate over time. To overcome this, industrial coordination is required — for instance, pooling semiconductor demand across the automotive industry or other medium-volume strategic sectors. Without this coordinated demand, even advanced European fabs may struggle to achieve sustainable operation.

Capacity Building and Frontier Research

Addressing Europe's strategic dependencies requires a long-term approach that combines pilot production, innovation, and research. Flexible, modular manufacturing facilities, including pilot lines and first-of-a-kind fabs, are essential to serve as technology testbeds for emerging applications.

Sustained investment in low-TRL (Technology Readiness Level) research is critical to ensure Europe remains globally competitive. This includes research in foundational areas such as chip design, materials science, and photonics, as well as applied domains including heterogeneous integration, advanced packaging, and power electronics. As KTH has previously highlighted as an input to the MFF-

consultation, together with the University Alliance Stockholm Trio (Karolinska Institutet, KTH and Stockholm University, and as other academic and research organizations have emphasized, Horizon Europe should support low-TRL Research Actions in strategic areas— for example, through targeted funding calls, collaborative research networks, and pilot projects — to drive long-term innovation across strategic sectors. Such initiatives are essential to advance emerging technologies in AI, HPC, quantum technologies, and other areas critical to Europe's technological sovereignty.

Overcoming disciplinary silos between physics, electronics, and materials science is key to unlocking semiconductor innovations critical for strategic sectors such as quantum technologies, high-performance computing, and space systems, ensuring Europe maintains a leading role in frontier research. Semiconductors are foundational to multiple domains — from quantum computing and communication to energy, automotive, and defence applications. Developing advanced semiconductor materials, for example silicon carbide and other emerging materials in which Sweden has strong expertise. Funding and research structures should encourage cross-sectoral collaboration, enabling breakthroughs that span multiple technologies and applications critical to Europe's chip ecosystem.

Strengthening Europe's Position in Essential Semiconductor Technologies

While leading-edge nodes attract global attention, Europe also holds competitive strengths in essential semiconductors such as power electronics, sensors, photonics, and microcontrollers. Preserving and enhancing this leadership requires long-term, stable funding for research and innovation, including multi-year programs that allow ambitious projects to reach maturity. Equally important is the establishment of dedicated research infrastructures—that support the translation of research from lab to industry.

Robust academic-industry collaboration is critical to maximize the impact of investments, ensure hands-on training for students and researchers, and accelerate technology transfer. The Framework Programme, Horizon Europe, is in this respect a very important instrument supporting pre-competitive collaboration between academia and industry. This should be complemented by joint programming and strategic roadmapping at the European level to coordinate priorities, avoid duplication, and leverage resources efficiently. Cross-border collaboration, open-access facilities, and shared innovation ecosystems will strengthen Europe's position in essential technologies and prepare for future semiconductor challenges, including emerging materials, system integration, AI-optimized chips, and quantum-enabled devices.

Workforce Development and Skills

Europe faces a substantial workforce gap in semiconductor technologies, with estimates indicating the need for approximately 75,000 skilled professionals across academia, industry, and public institutions by 2030 (European Chips Skills Academy, 2024). Recent ECSA reports highlight a structural shortage: around 30% of current skilled staff are expected to retire by 2030, while graduate inflow grows at less than 1% per year, potentially creating an annual shortfall of ~10,800 professionals across design, manufacturing, testing, and emerging roles such as AI-hardware design and cybersecurity (European Chips Skills Academy, 2025).

Addressing this gap requires a coordinated approach to education, training, and lifelong learning. KTH advocates expanding undergraduate, graduate, and continuing education programs in semiconductor technologies, alongside initiatives such as the European Chips Academy, coordinated PhD schools, and programs leveraging MSCA, Erasmus+, and Lifelong Learning frameworks. Partnerships with industry are essential to provide hands-on experience, internships, and applied research opportunities.

Programs aimed at attracting and retaining top researchers and engineers within Europe will ensure that Europe remains competitive in both research and industrial production.

Cross-Cutting Considerations

Europe's semiconductor strategy must also address broader considerations beyond capacity and demand. Long-term funding stability is crucial, protecting frontier research from market or political fluctuations. Sustainability should be embedded in production and materials innovation, promoting energy-efficient, circular approaches to manufacturing.

KTH's ongoing involvement in EU Chips JU and the Swedish Chips Competence Centre (SCCC) illustrates how semiconductor investments can contribute to wider ecosystem resilience. Through SCCC's coordinated national framework for skills, infrastructure access, and SME support, KTH demonstrates how academic actors can strengthen regional innovation capacity, enable participation by SMEs and deep-tech startups, and link research infrastructures to industrial needs. Such initiatives show that cross-cutting semiconductor policy must incorporate not only leading-edge research, but also ecosystem-wide accessibility—ensuring that startups, scale-ups, and smaller companies can utilize advanced infrastructure, pilot lines, and training resources.

Security and dual-use considerations must be balanced with academic freedom and international collaboration. Universities should be able to engage globally while adhering to clear guidance on security, foreign interference, and dual-use compliance. International partnerships with like-minded actors can accelerate innovation while safeguarding European technological sovereignty.

Conclusion

KTH strongly supports the European Commission's bold vision for the EU semiconductor ecosystem. Achieving technological sovereignty requires more than building capacity; it requires coordinated industrial demand, long-term investment in frontier research, robust research infrastructure, and the development of a highly skilled workforce. By integrating these elements, Europe can reduce dependency on non-EU actors, foster innovation across critical sectors, and secure a leading position in the global semiconductor landscape.

Building on this commitment, KTH contributes to the EU's semiconductor strategy through practical, operational actions: offering access to cutting-edge research facilities, participating in pilot-line development, expanding semiconductor education and skills programmes, and collaborating closely with industry and SMEs. These efforts help ensure that Europe's semiconductor ambitions translate into real technological capability, competitiveness, and long-term resilience.