QUANTUM IN THE CHIPS ACT 2.0

QUIC SUBMISSION TO THE CALL FOR EVIDENCE ON COM(2026) 504

SEPTEMBER 2026

TABLE OF CONTENTS

EXECUTIVE SUMMARY

QuIC welcomes the Chips Act 2.0 proposal and the continued place of quantum within it. The proposal defines the quantum chip, retains a dedicated operational objective, names the six quantum pilot lines and their coordinators, and provides in Article 5(c)(i) for pilot lines, clean rooms and foundries for prototyping and producing quantum chips. The evaluation of the first Chips Act found the quantum pilot activities effective and fit for purpose, and we share that assessment. [1]

QuIC responded to the first call for evidence in December 2025, drawing on a four-week sprint series with open calls for input across our membership. A number of those recommendations are not yet reflected in the adopted text. One, the Integrated Production Facility instrument, has been discontinued. The proposal still provides no accessible route for small-scale and in-house facilities that cannot meet the first-of-a-kind requirement, and it leaves open whether a facility producing quantum chips qualifies at all in every modality. We set the full comparison out in the first chapter, in the hope that it is useful to the co-legislators. [2]

The central issue is that the proposal provides the language of industrialisation for quantum without an instrument capable of delivering it. Article 19 shows what a foundry commitment looks like in this Regulation when it is fully formed: a dedicated provision, highest priority strategic-project status, its own Annex II priority area and EUR 20 to 40bn indicated. That is for advanced semiconductors. For quantum, Article 5(c)(i) provides the term and Annex II provides no route. [3]

We are not asking Europe to build a quantum foundry this year. Our own members are clear that many processes are not yet fab-ready and that volumes remain low. We are asking that the Regulation not foreclose one, and that it fund the infrastructure that industrialisation needs today: multi-project wafer access, cryogenic qualification and characterisation, packaging and heterogeneous integration, metrology, design enablement, and photonics at the wavelengths quantum actually needs.

The urgency is not a forecast. Three transactions in two months have changed who controls quantum fabrication, and the pattern is the same each time.

A pure-play foundry manufactures chips to order for other companies and sells no competing product of its own, which is what makes it usable by an entire industry. On 2 June, one day before this proposal was adopted, IBM committed more than USD 10bn to quantum over five years and announced Anderon, described as the world's first pure-play quantum wafer foundry, backed by USD 1bn of IBM cash and the support of the US Department of Commerce. On 23 July it agreed to acquire HRL Laboratories, which holds the state of the art in silicon spin qubits, one of the six modalities for which Europe operates a pilot line and which sources neither from European foundries nor from European suppliers. On 31 July IonQ completed its acquisition of SkyWater Technology, the largest exclusively United States based semiconductor foundry and an accredited Trusted Foundry for American defence programmes, in order, on its own account, to secure a fully scalable supply chain domestically. Chapter 4 sets out each transaction in full, together with IonQ's undertakings to SkyWater's existing customers, which QuIC takes at face value. [4]

Few European quantum companies own fabrication plants of their own. Most buy capacity from specialised process foundries that serve all customers, and Europe has relatively few of these: they do not offer every process the sector needs, and not at the industrial maturity standard semiconductor foundries have reached. That capacity is now being consolidated into companies that sell quantum computers, under commitments that are voluntary, revocable and framed around another jurisdiction's security of supply. None of these transactions waited for a demand forecast or a business case.

IMPORTANT NOTES

1 Proposal for a Regulation of the European Parliament and of the Council on a framework of measures for strengthening Europe's semiconductor ecosystem, repealing Regulation (EU) 2023/1781 (Chips Act 2.0), COM(2026) 504 final, 3 June 2026. Submitted as feedback through the Have Your Say portal, initiative 14842.
2 QuIC Position Paper on the EU Chips Act (Chips Act 2) Review, December 2025, at euroquic.org. On Integrated Production Facilities see section 3.2 of that paper.
3 Annexes to COM(2026) 504 final, ANNEXES 1 to 7, Annex II area 1, page 8, which states that it expands on a potential implementation of Article 19.
4 IBM, press releases of 2 June 2026 and 23 July 2026, newsroom.ibm.com; IonQ, 'IonQ Completes Acquisition of SkyWater Technology', Business Wire, 31 July 2026.

1. QUIC'S 2025 RECOMMENDATIONS AND THE ADOPTED TEXT

QuIC published its position paper on the Chips Act review in December 2025, drawing on a four-week sprint series in November 2025 with open calls for input across our membership. The table below sets each of those recommendations against the adopted text, so that the co-legislators can see at a glance which points remain open. We recognise that a proposal of this scope cannot accommodate every sectoral request, and we have limited the recommendations later in this response to those we consider structural.

QuIC recommendation, December 2025	Corresponding provision in COM(2026) 504	Reflected in the proposal
Strengthen Europe's quantum and semiconductor supply chains while enabling disruptive innovation	Article 5; Annex II point 6	**Partly reflected**
Establish quantum chips as a strategic pillar of the future Chips Act, backed by funding	Annex II; Article 19	**Not reflected**
Harmonise access, IP management and exploitation policies across pilot lines	Article 5(c); Annex I point 3	**Not reflected**
Expand support for enabling technologies critical to quantum industrial scale-up	Annex I point 3; Annex II point 6	**Partly reflected**
Deepen incentives for quantum chip design and fabrication, including a quantum-specific extension of EUROPRACTICE and affordable access to packaging, integration and cryogenic-electronics services	Annex I points 1 and 3	**Not reflected**
Strengthen cross-sector integration between semiconductor, quantum, photonics, on-chip lasers and HPC industries	Annex IV; Annex I point 7	**Partly reflected**
Embed sustainability and human-centric principles in all quantum-related Chips Act actions	Recitals; Annex I	**Not reflected**
Require each stability pilot line at SGA2 to deliver an exploitation, sustainability and standardisation roadmap, with funding for its implementation	Annex I point 3	**Not reflected**

QuIC recommendation, December 2025	Corresponding provision in COM(2026) 504	Reflected in the proposal
Strengthen technology-transfer frameworks and IP licensing conditions for publicly funded results	Article 14; Annex I point 3	**Not reflected**
Maintain the Integrated Production Facilities instrument for small-scale in-house prototyping by companies that cannot qualify as first-of-a-kind	Articles 13 and 14 of Regulation 2023/1781; recital 47; Article 59	**Discontinued**
Develop dedicated visible and UV photonic pilot-line capacity, with specialised PDKs, testing and packaging	Annex I point 5	**Not reflected**
Support heterogeneous and hybrid integration approaches beyond standard CMOS constraints	Annex I points 2 and 5	**Partly reflected**
Adopt a differentiated, risk-based framework for global partnerships with trusted allied nations	Provisions on international cooperation	**Not reflected**
Align the Chips Act with EU action on critical raw materials for quantum supply chains	Annex II point 6	**Not reflected**

• **Discontinued**. Integrated Production Facilities. Our 2025 paper asked the Commission to preserve and strengthen the instrument, noting that IPFs are crucial for SMEs that may not qualify as first-of-a-kind projects. Recital 47 and Article 59 replace both the IPF and Open EU Foundry statuses with a single status, and we understand the case for simplification. The first-of-a-kind requirement applied to each of the earlier statuses and applies to the merged one, so the route we asked for, open to companies below that threshold, still does not exist.

• **Not yet reflected.** Exploitation and sustainability roadmaps at SGA2. Harmonised access, IP management and exploitation rules across pilot lines. Visible and ultraviolet photonic capacity and dedicated PDKs. A quantum-specific extension of EUROPRACTICE and affordable multi-project wafer access. Shared cryogenic testing and high-volume characterisation. A risk-based framework for international partnerships. Critical raw materials specific to quantum hardware. Quantum-specific sustainability principles.

• **Partly reflected.** Quantum chips retained as operational objective 3, though without a funding figure or indicators. Enabling technologies named in Annex I point 3. Cross-sector coordination reflected in the synergies with the Cloud and AI Development Act.

2. WHAT QUANTUM CHIP INDUSTRIALISATION REQUIRES

2.1 Production-grade fabrication rather than research access

External or customer runs on qualified or pre-qualified process flows, with defined acceptance criteria, delivery commitments and repeatability requirements. Research contracts are not production demand.

2.2 Shared foundry and foundry-style access

There is no quantum foundry in Europe as such, but there are specialised process foundries the community already uses. Requirements differ by modality, so the objective is fit-for-purpose manufacturing routes for each mature platform, using existing semiconductor and photonic capacity where process baselines can be adapted and dedicated infrastructure where they cannot. Not one facility for all six modalities.

2.3 Multi-project wafer access

MPW runs are a crucial short-term enabler for European quantum companies, because volumes are low and will remain so while quantum computing sits in the HPC accelerator domain. Affordable, quantum-compatible MPW access is the single most immediate need.

2.4 Cryogenic packaging, interconnect, qualification and test

Cryogenic signal routing, interconnect density, thermal budget and packaging repeatability remain unresolved at scale. High-volume cryogenic characterisation is neither standardised nor widely available.

2.5 Design enablement on stable process baselines

QPDKs, assembly design kits and cryogenic design libraries, plus qualification of existing PDKs to operate across the temperature ranges the platforms actually use, from the millikelvin regime of superconducting and spin qubits to 4 K, 35 K and 70 K. Design environments disconnected from manufacturable devices do not produce products.

2.6 Photonics at quantum wavelengths

Ion-trap and neutral-atom platforms rely on photonic components in the visible, 400 to 800 nm, and the near ultraviolet, 295 to 325 nm. These fall outside the processes and PDKs available in commercial foundries and require material platforms incompatible with standard CMOS.[5]

2.7 A secured enabling-hardware ecosystem

Cryogenic refrigeration, cryo-CMOS control and readout electronics, superconducting electronics and low-noise amplifiers, quantum ASICs, single-photon sources and detectors, integrated photonics across silicon nitride, lithium niobate, aluminium nitride, silicon carbide and III-V, microwave-to-optical conversion, quantum memories, precision lasers, advanced packaging and heterogeneous integration, and strategic quantum materials. These are cross-platform dependencies shared by computing, communication, sensing and metrology. [6]

2.8 An IP and licensing route from pilot line to production

Pilot lines generate processes and intellectual property. Industrialisation requires a counterparty able to take a licence and a framework governing the transfer. Inconsistent licensing practices between research organisations and companies have already caused delays under Qu-Pilot and Qu-Test. [7]

2.9 Structured demand

Private demand will not sustain manufacturing scale-up before 2030. Anchor users, trusted-supplier requirements, certification milestones and procurement tied to chip-level specifications are part of the fabrication case rather than separate from it. [8]

IMPORTANT NOTES

5 QuIC Position Paper, December 2025, section 4. The PIXEurope pilot line launched under the Chips Act focuses primarily on the near infrared, reflecting telecom-driven applications rather than quantum modalities.
6 Drawn from consultation with the Quantum Technologies group at Tyndall National Institute, a QuIC Associate Member.
7 QuIC Position Paper, December 2025, section 3.1 and note 7. Licensing practices among European research and technology organisations vary significantly, with royalty rates in the chip industry often around 4 per cent, though some institutions have pursued considerably higher equity-based claims.
8 Quantum Flagship, Quantum Chips Industrialisation Roadmap, update 2026, in preparation.

3. ANALYSIS OF THE PROPOSAL

3.1 What the proposal delivers

Quantum is well established in the proposal. Article 2(3) defines the quantum chip across computing, communication, sensing and metrology, which is a broader and more useful definition than the sector has had in EU law before. Article 5(c) retains a dedicated operational objective covering design libraries, pilot lines, clean rooms and foundries for prototyping and producing quantum chips, and facilities for testing and validating them. Quantum appears 28 times across the text.

Annex I point 3 is more detailed than its 2023 predecessor. It names all six quantum pilot lines with their coordinators, covering superconducting, spin, photonic, diamond, neutral-atom and trapped-ion platforms, and it extends beyond the processors themselves to the enabling technologies that prepare, protect, control, interconnect and read out quantum devices, including cryogenics, packaging and interfacing. It also refers, for the first time, to support for first industrialisation efforts of the most mature developments, and to the emergence of a pan-European quantum design community. QuIC welcomes all of this.[9]

The pilot lines themselves are working. They were chartered to establish stable pilot-scale fabrication processes, integrate testing and experimentation facilities and develop early industrialisation roadmaps, and the Commission's own evaluation found those activities effective and fit for purpose. Nothing in this response should be read as a criticism of them.

Beyond the dedicated objective, quantum IP and design libraries are to be integrated into the cloud-based design platform under Annex I point 1, the Chips Fund under Annex I point 6 covers access to capital for a semiconductor and quantum innovation ecosystem, and Annex IV retains quantum within the synergies between the Initiative and the Digital Europe Programme and Horizon Europe. The architecture for supporting quantum research and prototyping is therefore in place and, in several respects, improved.

3.2 Where it falls short

Measured against the requirements set out above, the proposal leaves ten gaps. Each is identified below by the provision in which it should have been addressed.

3.2.1 No route to industrial scale

Quantum is absent from Annex II, the priority areas for strategic projects, appearing once only as a customer of advanced chips at page 8. Annex II is the sole gateway to strategic-project status. Recital 56 names memory and design as complements to the open foundry; quantum is not among them.

3.2.2 The Article 19 asymmetry

Article 19 gives an open foundry for advanced semiconductor manufacturing a dedicated provision, highest priority treatment, its own Annex II priority area and indicative investment of EUR 20 to 40bn. Article 5(c)(i) provides only for support to the development of new or existing pilot lines, clean rooms and foundries for prototyping and producing quantum chips for the integration of quantum circuits and control electronics: the word foundries inside a research objective, and nothing else.

3.2.3 No route for small-scale and in-house capacity

The proposal does not carry forward the Integrated Production Facility (IPF) and Open EU Foundry (OEF) categories, replacing both with the single status of European semiconductor technology initiative. Recital 47 explains the reason: experience under Regulation (EU) 2023/1781 had created uncertainty as to whether the status depended on receiving public support, and the merged status resolves that by making clear, in Article 14(5), that it does not. That is a genuine improvement. However, as under the previous IPF and OEF regimes, Article 14(3) and (4) require applicants to qualify as first-of-a-kind initiatives.

IMPORTANT NOTES

9 Annexes to COM(2026) 504 final, Annex I point 3, pages 3 and 4. The six pilot lines are SUPREME (superconducting, VTT), SPINS (spin, imec), P4Q (photonic, University of Twente), DIREQT (diamond, CNR), Q-PLANET (neutral atoms, PASQAL) and CHAMP-ION (trapped ion, SAL).

This leaves no accessible route for small-scale and in-house facilities that cannot meet this threshold. Article 59 preserves existing designations, so the issue applies to facilities not yet established.[10] More fundamentally, small-scale and fast-turnaround fabrication can serve a distinct industrial function by accelerating design iteration and shortening the development cycle, irrespective of the production format ultimately adopted at scale.

3.2.4 Uncertainty over the eligibility of quantum chip modalities under Article 14

A separate question is whether a facility producing quantum chips qualifies at all. Article 14(6)(c) requires the initiative to invest in continued innovation with a view to achieving concrete advances in semiconductor technology, or preparing next-generation semiconductor technologies. A spin-qubit or silicon-photonic facility plainly satisfies this. A trapped-ion, neutral-atom or superconducting facility arguably does not, notwithstanding that Article 2(3) defines the quantum chip for the purposes of the same Regulation.[11]

3.2.5 No monitoring indicators

Annex III contains no quantum indicator. The workforce indicator moved from semiconductor and quantum in the 2023 Regulation to semiconductor and photonics at page 13. An operational objective with nothing to measure it cannot be evaluated under Article 57, which requires the Commission to report on the evaluation and review of the Regulation four years after entry into force and every four years thereafter, and what cannot be evaluated is not defended at the next budget review. Annex IV, by contrast, still describes the Initiative as exclusively focusing on semiconductor and quantum technologies at page 16 and does not mention photonics, which suggests drafting drift rather than a policy decision. [12]

3.2.6 Photonics promoted, but at the wrong wavelengths

Photonics gained a new Annex I component titled advanced design, prototyping and industrial deployment capacities, and a pilot line alongside sub-2nm logic and FD-SOI. That capacity is built on silicon, silicon nitride and indium phosphide, all telecom and datacom platforms. Ultraviolet appears nowhere in the proposal or its annexes. Visible appears once, for augmented and virtual reality light engines.

3.2.7 No IP or licensing route, and no exploitation obligation

The Regulation is attentive to intellectual property where it grants status. Article 15(2)(e) requires the Commission, when deciding on an application for European semiconductor technology initiative status, to consider the existence of appropriate policies and appropriate licensing agreements, including technical protection measures, to protect undisclosed information and IP rights. Article 14(8) goes further, requiring functional separation of design and manufacturing processes wherever such an initiative offers capacity to unrelated undertakings. [13]

Nothing comparable governs the transfer of pilot-line processes and intellectual property into production. No pilot line is required to deliver an exploitation roadmap, and no framework establishes on what terms a process developed with public money becomes available to a European manufacturer. The instruments therefore exist for facilities that already have a route to production, and are absent precisely at the point where quantum needs them.

3.2.8 No MPW access and no metrology infrastructure

Multi-project wafer appears nowhere in the proposal. Metrology appears once, inside the definition of a quantum chip.

IMPORTANT NOTES

10 COM(2026) 504 final, recital 47 and Articles 14(3), 14(4), 14(5) and 59, read against Articles 13 and 14 of Regulation (EU) 2023/1781.
11 COM(2026) 504 final, Article 14(6)(c) and Article 2(3).
12 Annexes to COM(2026) 504 final, Annex III, page 13, compared with Annex III to Regulation (EU) 2023/1781.
13 COM(2026) 504 final, Article 15(2)(e) and Article 14(8).

3.2.9 Enabling hardware not recognised as a value-chain segment

Annex II point 6 allows strategic projects to strengthen key value-chain segments, using the logic of the Nexperia disruption, but the segments contemplated are mainstream chips, back-end processes, printed circuit board assembly, materials and equipment. Quantum enabling technologies are not mentioned. [14]

3.2.10 No criteria for differentiation between platforms

Annex I point 3 states that a differentiation in support shall be made for different technology platforms, without publishing how that will be decided or providing for consultation before reallocation.

IMPORTANT NOTES

14 Annexes to COM(2026) 504 final, Annex II point 6, pages 11 and 12, which refers to the Nexperia case and to the accompanying Staff Working Document.

4. THE INTERNATIONAL CONTEXT

4.1 Where Europe stands

The global quantum landscape is organised around three poles. The United States leads on scale, speed and platform access, resting on deep federal investment, a dense start-up ecosystem and strong venture capital, and its actors have moved rapidly towards vertically integrated hardware, software and cloud offerings. That vertical integration — Rigetti, IBM and Google Quantum AI all manufacture their own QPUs — gives them significant control over the pace of industrialisation, over user access, over benchmarking narratives and over system-level integration. China benefits from state-driven coordination, long-term public investment and a dominant position in upstream inputs. Europe remains a scientific powerhouse with genuine industrial strength in cryogenics, photonics, control electronics, metrology and specialised laser sources, and it covers every major hardware modality. [15]

Europe's difficulty is conversion rather than capability. The Commission's own Quantum Europe Strategy records that the Union hosts approximately one third of the world's quantum companies and supplies nearly half of global quantum hardware and software components, while attracting only around five per cent of global private quantum funding. The European challenge is therefore the transition from research strength to industrial capacity, and the weaknesses are visible precisely where this response concentrates: system integration, high-volume manufacturing, late-stage capital, structured public demand, and the passage from research cleanrooms to production-grade fabrication environments. [16]

4.2 Neutral fabrication capacity is being acquired

There is no quantum foundry in Europe in the ordinary sense of the term. What exists is a set of foundries specialised in particular processes, silicon photonics, III-V compounds, superconducting materials and others, which the quantum community uses on a shared basis, typically through multi-project wafer runs where several customers share the cost and the risk of a single production batch. This arrangement works because those foundries are neutral: they manufacture for whoever asks and do not compete with their own customers. That neutrality is now eroding. [17]

On 2 June 2026, one day before this proposal was adopted, IBM committed more than USD 10bn to quantum computing over five years, spanning research and development, capital expenditure, manufacturing scaling, ecosystem partnerships and acquisitions. Within that commitment it announced Anderon, described as the world's first pure-play quantum wafer foundry, with the support of the United States Department of Commerce and USD 1bn of IBM cash alongside intellectual property, assets and a skilled workforce. [18]

On 23 July 2026 IBM agreed to acquire HRL Laboratories, the United States research laboratory holding the state of the art in silicon spin qubits. Spin is one of the six modalities for which Europe operates a quantum pilot line, and HRL sources neither from European foundries nor from European suppliers. [19]

On 31 July 2026 IonQ, a United States manufacturer of trapped-ion quantum computers, completed its acquisition of SkyWater Technology, the largest exclusively United States based semiconductor foundry and a DMEA-accredited Category 1A Trusted Foundry serving American defence programmes. SkyWater shareholders received USD 15.00 in cash and 0.4883 IonQ shares for each share held. IonQ describes the result as the only vertically integrated full-stack quantum platform company, and states that the acquisition allows it to secure a fully scalable supply chain domestically. [20]

IonQ has undertaken that SkyWater will continue to serve all of its foundry customers, among them D-Wave and PsiQuantum, that it will operate as a subsidiary under its own name and management, and that it will act as a merchant supplier to the wider quantum industry. QuIC takes that commitment at face value.

IMPORTANT NOTES

15 Quantum Flagship, Quantum Chips Industrialisation Roadmap, update 2026, in preparation, section 1.1.
16 Quantum Europe Strategy, European Commission, adopted 2 July 2025. Public commitments by the EU and Member States over the preceding five years exceeded EUR 11,000 million.
17 Quantum Flagship, Quantum Chips Industrialisation Roadmap, update 2026, section 6.3, which identifies limited access to fabrication capacity as a structural constraint and notes that existing pilot lines are not scaled for industrial demand.
18 IBM, press release, Armonk, New York, 2 June 2026, newsroom.ibm.com. The company states that the investment is intended to advance quantum leadership anchored in the United States.
19 IBM, press release, 23 July 2026, newsroom.ibm.com.
20 IonQ, 'IonQ Completes Acquisition of SkyWater Technology', Business Wire, 31 July 2026. SkyWater shareholders received USD 15.00 in cash and 0.4883 shares of IonQ common stock for each SkyWater share. SkyWater operates as a subsidiary under its own name.

It is nonetheless a voluntary commitment rather than a regulatory guarantee, given by a company that competes with the customers concerned, and the stated strategic purpose is the security of supply of another jurisdiction. A European quantum manufacturer whose process depends on that line has no means of enforcing the undertaking and no European alternative to move to.

This is a continuation rather than a departure. Over the preceding eighteen months IonQ alone acquired Oxford Ionics in the United Kingdom for approximately USD 1,075 million, of which some USD 1,065 million was paid in its own common stock rather than cash, took a controlling stake in ID Quantique, and completed the acquisitions of Qubitekk, Lightsynq and Capella. European quantum assets are being bought with United States equity, and now the fabrication capacity that European companies rely upon is being bought as well. [21]

Three transactions in two months have moved fabrication and platform capacity from neutral or European ownership to companies that sell quantum computers, in each case with an explicit objective of national supply-chain security. For European firms that depend on shared access to specialised processes, this is a question of security of supply rather than of competitiveness in the abstract. The capacity they use today remains available on terms set elsewhere and revocable elsewhere, and there is no European alternative to turn to. It is the same logic the proposal applies in response to the Nexperia disruption, and the logic Annex II point 6 exists to address. [22[

4.3 European demand exists and is met from outside Europe

IBM reports more than USD 1.1bn in client contracts since 2017 and operates over ninety quantum systems worldwide, more, on its own account, than the rest of the industry combined.Those deployments include quantum centres in Germany and a system at BasQ in Spain, alongside installations in the United States, Canada, Japan, South Korea and India. European institutions are therefore already procuring quantum computing at scale, from a supplier that owns its fabrication route and has now committed a further USD 1bn to a dedicated foundry. The question before the Union is not whether European demand exists, but who supplies it and on whose terms. [23]

4.4 Capital, not appetite, is the constraint

IBM can commit to its roadmap because it owns its fabrication route, and it has announced a dedicated foundry on top of that. While a number of European quantum companies operate their own fabrication lines, none holds a comparable position at scale and none can reach it alone: European firms attract a small fraction of global private quantum investment and cannot pay for acquisitions in stock as their United States competitors do. If the implicit expectation is that each European company replicates that vertical integration, the capital required across the sector exceeds anything Europe will supply, and no European champion emerges from any of them. Shared fabrication infrastructure is therefore the affordable route rather than the generous one, and it is the only route consistent with the structure of the European industry. [24]

4.5 What European companies need now

European quantum companies fabricate in Europe today, with multi-project wafer runs acting as a crucial short-term enabler where volume is low and dedicated foundry capacity is still missing. Cryogenic packaging is likewise carried out in Europe. The companies’ exposure lies in the maturity of the process design kits available to them: a process design kit is the set of models, design rules and verified components a foundry supplies so that a customer can design a chip that will work on that particular line, and cryogenic versions of these remain immature everywhere. Should non-European foundries qualify cryogenic design kits before European ones do, European companies will have to move production in order to remain competitive. The binding constraint is design enablement, packaging and qualification rather than the absence of a large fabrication plant. [25]

IMPORTANT NOTES

21 IonQ press releases and filings with the United States Securities and Exchange Commission, 2024 to 2025: the Oxford Ionics acquisition was announced on 9 June 2025 and completed in September 2025; the controlling stake in ID Quantique completed in 2025; Qubitekk announced in December 2024; Lightsynq and Capella completed in 2025. IonQ Form 8-K, second quarter 2025 results.
22 Annexes to COM(2026) 504 final, Annex II point 6, pages 11 and 12.
23 IBM, press release, 2 June 2026, newsroom.ibm.com. The company reports a network of more than 340 organisations running workloads on its systems.
24 Quantum Europe Strategy, European Commission, 2 July 2025, on the share of global private quantum funding attracted by European companies.
25 Input from QuIC members engaged in quantum processor and control-chip manufacture, August 2026.

This is also why the request in this response is sequenced rather than immediate. Many quantum fabrication processes are not yet ready for a production line, and the industry itself says so. What must exist now is the legal route and the surrounding infrastructure, so that the capability can be supported when the processes mature, rather than a legislative reopening at the point when the decision can no longer wait. [26]

4.6 Supply-chain dependencies

Quantum chip industrialisation depends on specialised inputs with fragile supply chains. Europe is strong in dilution refrigeration, but compressors for the 2 to 10 K range are largely Japanese and American. Isotopically enriched silicon, thin-film lithium niobate, ultra-low-loss silicon nitride, diamond substrates, silicon carbide, superconducting materials, precision lasers, detectors and cryogenic electronics are each concentrated in a small number of suppliers, several outside the Union. The precursors used in European photonics manufacture are themselves sourced from Germany, China and Japan.[27]

These dependencies matter for this Regulation because they are cross-platform: the same cryogenic, photonic and control technologies underpin quantum computing, communication, sensing and metrology alike. China's position in critical raw materials, including gallium, germanium, rare earths and specialised optical crystals, gives it leverage over inputs that quantum manufacture cannot substitute quickly. Recognising these technologies as a value-chain segment is therefore a resilience measure and not a sectoral preference. [28]

IMPORTANT NOTES

26 Quantum Flagship, Quantum Chips Industrialisation Roadmap, update 2026, section 5.1, which places foundry-level operations for mature modalities in the 2030 to 2035 period behind a gate at 2030.
27 Quantum Flagship, Quantum Chips Industrialisation Roadmap, update 2026, sections 3.1 and 6.3, and input from QuIC members and the Quantum Technologies group at Tyndall National Institute.
28 Quantum Flagship, Quantum Chips Industrialisation Roadmap, update 2026, section 1.1.

5. RECOMMENDATIONS

- Extend the Article 19 treatment to quantum. Add quantum chip manufacturing as a priority area in Annex II, or commit in a recital to using the power in Article 17(1) to amend Annex II by delegated act in accordance with Article 55, so that a quantum foundry can be designated a strategic project when processes mature.
- Establish a route for small-scale and in-house production capacity. Provide an appropriate route for small-scale and in-house quantum prototyping and production facilities that cannot meet the first-of-a-kind requirement.
- Ensure that all quantum chip modalities are eligible under Article 14. Confirm that facilities producing quantum chips can qualify as European semiconductor technology initiatives irrespective of the technological modality.
- Require exploitation and licensing roadmaps. Each quantum pilot line should deliver an exploitation, sustainability and licensing roadmap at SGA2, and publicly supported fabrication capacity should be open to unrelated undertakings on transparent, non-discriminatory terms. Each pilot line should also publish an up-to-date overview of its available process modules, packaging and testing capabilities, external access terms and lead times. This is not a new standard: recital 56 already provides that the advanced semiconductor open foundry should operate on the basis of open access for different users, Article 14(6)(a) refers to offering capacity to undertakings not related to the facility where there is sufficient demand, and Article 14(8) requires functional separation of design and manufacturing where it does. We ask that the same standard apply to publicly supported quantum capacity.
- Restore quantum in Annex III. Reinstate semiconductor, photonics and quantum in the workforce indicator and add quantum-specific indicators, including the share of qualified line capacity allocated to, and actually used for, production-grade external runs. Annex A to this response sets out a drafted indicator set, in the form Annex III already uses, which can be adopted directly or refined with us.
- Extend the photonics component to quantum wavelengths. Annex I point 5 should cover visible, deep-blue and ultraviolet integration and the materials they require, not only telecom and datacom platforms.
- Fund the infrastructure around fabrication. A European quantum multi-project wafer and shuttle programme, with reserved capacity, subsidised access for SMEs and academic groups and a published run calendar, together with cryogenic characterisation and qualification, packaging and heterogeneous integration, metrology, and a quantum-specific extension of EUROPRACTICE.
- Recognise quantum enabling hardware as a key value-chain segment. Under Annex II point 6, and align with the Critical Raw Materials Act on inputs specific to quantum hardware.
- Publish criteria before differentiating support between platforms. With structured consultation of European quantum industry before any reallocation.
- Extend demand-side instruments to quantum chips and components. Including anchor-user and trusted-supplier mechanisms, and adopt a risk-based framework for partnerships with trusted non-EU European countries.

6. GOVERNANCE: MAKING QUIC AND CHIPS JU LINK WORK

QuIC holds an observer role on paper but is not systematically brought in when quantum topics are discussed. Where Chips JU activities concern quantum calls, quantum-relevant pilot lines, design enablement, packaging, testing, cryogenic electronics, photonics or supply-chain dependencies, QuIC should be systematically involved. This requires clear triggers for invitation, prior access to the relevant agenda points, the ability to submit written input, and regular structured exchanges on quantum-related work programme priorities.

7. COHERENCE WITH THE FORTHCOMING QUANTUM ACT

The explanatory memorandum to the proposal states that coordination will be needed between the Chips Act, the proposed European Competitiveness Fund and the upcoming Quantum Act, and that consistency with the Quantum Act will provide an opportunity to establish a comprehensive European quantum policy framework. QuIC agrees, and would add that consistency has a failure mode. If this Regulation treats the industrialisation of quantum chips as a matter for the Quantum Act, while the Quantum Act treats fabrication as a matter for the Chips Act, the subject belongs to neither instrument and no one is accountable for it. [29]

We therefore set out below where we believe the boundary should fall. We do so in the knowledge that the scope of the Quantum Act is not yet published and will in all likelihood appear after this consultation closes. That is precisely why we state a position now rather than later: a demarcation proposed before either instrument is settled is a contribution to the design of both, whereas one proposed afterwards is a request to reopen a decision already taken. We offer it as a principle for scoping rather than as a fixed allocation, and we would welcome the chance to discuss it as the Quantum Act takes shape.

- The Chips Act should keep what is already built into it and what depends on semiconductor infrastructure: fabrication and pilot lines, chip design tooling and process design kits, packaging and heterogeneous integration, enabling-component supply chains, and the industrialisation of quantum chip manufacturing. The six quantum pilot lines and the design platform already sit here, and separating fabrication from them would recreate the discontinuity this Regulation exists to close.

- The Quantum Act is the natural home for what sits above the chip: systems and applications, procurement and demand-side measures, standards and certification, skills at system level, and the modalities and use cases that are not chip-based. Demand-side instruments will need to operate across both, and should be designed jointly rather than duplicated.

IMPORTANT NOTES

29 COM(2026) 504 final, explanatory memorandum, section 1, on the Technological Sovereignty Package and coordination with the European Competitiveness Fund and the upcoming Quantum Act.

8. HOW QUIC CAN HELP

QuIC is a non-profit industry association and has no commercial interest in the outcome of this file. We would be glad to make the following available to the Commission, the Parliament and the Council during the legislative process, at no cost. The indicator set exists in draft. The remainder we would assemble with the member companies concerned, aggregated and anonymised where the underlying information is commercially sensitive, and we would agree a timescale rather than assume one.

- An indicator set for Annex III. A drafted set of measurable indicators for quantum, built on work already carried out within the Quantum Flagship industrialisation roadmap and usable directly.
- Wavelength and materials requirements. A technical specification of the visible, deep-blue and ultraviolet photonic capability required by ion-trap, neutral-atom and colour-centre platforms, and the material systems involved.
- Supply-chain mapping. A structured assessment of dependencies in cryogenics, control and readout electronics, lasers, detectors, substrates and quantum-grade materials, aggregated across our membership.
- Skills mapping. A structured assessment of the skills needed to support the timely development of the quantum industry in Europe. Skills at system level belong primarily to the Quantum Act; we raise the point here because the chip-level skills base sits within the scope of this Regulation and of the Chips Joint Undertaking's own work.
- Demand-side evidence. Structured input from the companies that would use European fabrication capacity, on qualification requirements and the conditions under which they would source in Europe. Volumes are commercially sensitive and would be reported as aggregate ranges rather than company by company.
- An interlocutor on quantum manufacturing. A single point of contact able to convene the relevant European companies quickly for DG CNECT, the Chips Joint Undertaking or the co-legislators as the file progresses.

We would welcome the opportunity to discuss any part of this response.

9. ANNEX A. A PROPOSED INDICATOR SET FOR ANNEX III

The recommendation on Annex III asks that quantum be restored to the monitoring indicators. To make that as straightforward as possible, QuIC sets out below a drafted indicator set which could be inserted into Annex III. It follows the form Annex III already uses, specifying what is to be measured rather than the values to be attained, and it draws on indicator work under way within the Quantum Flagship industrialisation roadmap. QuIC would be glad to refine it with the Commission. [30]

9.1 Amendment to the general monitoring indicators

The second general indicator currently reads: skilled workforce in semiconductor and photonics, including workforce trained or reskilled through the national chips competence centres' initiatives. QuIC proposes: skilled workforce in semiconductor, photonics and quantum technologies, including workforce trained or reskilled through the national chips competence centres' initiatives. This restores the wording used in Annex III to Regulation (EU) 2023/1781

9.2 Proposed quantum indicators

To be added under the first specific monitoring indicator, on capacity, security of supply and competitiveness across the value chain.

Indicator	What it measures, and why
Union share of the global value of quantum chips and quantum-enabling components fabricated in Union production facilities	The headline measure of whether industrialisation is happening in Europe. Mirrors the existing value-chain share indicator for semiconductors.
Share of critical fabrication inputs for quantum chips for which at least one qualified Union or trusted-partner alternative exists	Security of supply. Critical inputs are the materials, tools, process capabilities, design assets, components, test infrastructure and expertise without which a quantum chip line cannot reliably produce, qualify or scale devices.
Share of qualified pilot line capacity allocated to, and actually used for, production-grade manufacturing	Whether the pilot lines are serving customers. Production-grade means external or customer runs on qualified or pre-qualified process flows, with defined acceptance criteria and delivery commitments. Research and development work is tracked separately. Reserved capacity may go unused, so reporting allocation and utilisation together gives a truer indication of industrial demand.
Number of external customers, and of repeat external customers, served by Union quantum fabrication, packaging and test facilities	Whether the capacity is usable in practice. Repeat custom is the clearest single signal that a facility has become a supplier rather than a project.

IMPORTANT NOTES

30 Annexes to COM(2026) 504 final, Annex III, pages 13 and 14. The existing indicators are expressed as measurement categories rather than as targets, and the set below follows the same form.

Indicator	What it measures, and why
Median lead time from order to delivery for a standard process on an existing process design kit	Whether the capacity is usable in practice. Repeat custom is the clearest single signal that a facility has become a supplier rather than a project.
Share of commercial fabrication runs executed using validated PDK or QPDK flows	Design enablement maturity. Without validated kits, design environments stay disconnected from manufacturable devices.
Number of non-Union users completing tape-outs using European PDK or QPDK flows	The international attractiveness of European capacity, and a proxy for whether Europe sets standards or follows them.
Installed and qualified capacity for cryogenic characterisation and qualification within the Union	A bottleneck common to every platform, and one currently invisible to the monitoring framework.
Operational availability of full quantum fabrication lines	Whether a line can be relied upon by an industrial customer, as distinct from whether it exists.
Yield and process capability of qualified quantum fabrication flows, reported by modality and by integration level (die, chip, module)	Process reproducibility and readiness for industrial production.

10. About QuIC & Contributors

About QuIC

The European Quantum Industry Consortium (QuIC) is a non-profit industry association, founded in 2021, dedicated to the growth of the commercial quantum technology sector. QuIC operates as a collaborative hub throughout Europe, bringing together hundreds of SMEs, large corporations, investors, research and technology organisations and academic institutions. Members address topics of common interest such as standardisation, intellectual property, trade and workforce development.

QuIC speaks for the companies that need access to fabrication, packaging and test capacity in order to bring quantum products to market. QuIC holds no seat on the Chips Joint Undertaking Governing Board.

More information: www.euroquic.org

Contributors

Dr Emanuele Pelucchi, Tyndall National Institute, Ireland

Prof Giorgos Fagas, Tyndall National Institute, Ireland

Dr Louise Burgoyne, Tyndall National Institute, Ireland

Dr Michael Bauer, Bull, Germany

Martin Farnan, Equal1 Labs, Ireland

Dr Cécile M. Perrault, PhD, Executive Director, European Quantum Industry Consortium (QuIC)

Dr Thomas Luschmann, Peak Quantum GmbH, Germany

Dr Eva Martín Fierro, Qilimanjaro Quantum Tech, Spain

"We acknowledge the support of the European Union's Horizon Europe research and innovation programme under Grant Agreement N° 101296593 (QOMPASS)"