Quantum Processors

ANMD-MRS24-231 · Quantum & Advanced Computing

A Global Sustainability Due Diligence & Market Research Study

History 2020–2024 · Base Year 2025 · Forecast 2025–2032 · Outlooks 2035 / 2040 / 2050 · Currency US$

WHY THIS REPORT

Quantum processors (QPUs) are the compute core of the quantum era — engineered qubit arrays that exploit superposition and entanglement to attack problems intractable for classical machines. Competing modalities — superconducting, trapped-ion and photonic — race on qubit count, gate fidelity, coherence time and error correction, while the field transitions from noisy intermediate-scale (NISQ) devices toward fault-tolerant logical qubits. This decision-grade study sizes the global market three ways — value, installed systems and qubit capacity — across segmentation, seven regions and four scenarios to 2032, with outlooks to 2050.

SUSTAINABILITY & SDG IMPACT — THE ANMD LENS

The sustainability case is treated as material, not incidental. Quantum processors carry a heavy cryogenic and control-electronics energy footprint, yet promise outsized downstream gains in materials discovery, catalyst design and energy-system optimisation. The analysis applies double materiality, maps outcomes to GRI, SASB, ISSB, TCFD, TNFD, CSRD and the EU Taxonomy, and Embodied carbon in dilution refrigerators, rare-material use and responsible-innovation governance are treated as material risks — with greenwashing and SDG-washing screens applied throughout.

Mapped Sustainable Development Goals:

SDG 9	SDG 4	SDG 8
Industry & Infrastructure	Quality Education	Decent Work & Growth

Measurable sustainability outcomes assessed:

- Accelerating scientific and materials discovery
- Lower-energy solutions to intractable problems
- Enabling quantum-advantage applications
- Energy use, cryogenics and qubit fidelity as material risks

Framework alignment: Double materiality mapped to GRI, SASB, ISSB, TCFD, TNFD, CSRD and the EU Taxonomy, with greenwashing and SDG-washing screens applied throughout.

WHAT'S INSIDE AT A GLANCE

53 Chapters	**9** Report Parts	**7** Regions Covered	**40+** Country Markets
2025–32 Forecast Horizon	**4** Forward Scenarios	**25+** Companies Profiled	**3** SDGs Mapped

REPORT COVERAGE

Geographic scope: North America, Europe, Asia Pacific, Latin America, Africa, Middle East and Rest of World — with named country intelligence. North America leads quantum-processor R&D; and investment; Europe drives national quantum programmes; Asia Pacific scales hardware and talent; other regions on their own merits.

MARKET OVERVIEW

From noisy prototypes to scalable, error-corrected quantum processors.

Quantum processing is moving from laboratory demonstration to early commercial access. Demand is driven by sovereign quantum programmes, cloud-delivered QPU access and enterprise pilots in chemistry, optimisation and machine learning. The market is read three ways — value, installed systems and qubit capacity — and forecast under four scenarios (conservative, base, accelerated and disruption), each region reported separately.

- **North America leads on capability** — anchored by the United States and Canada, where IBM, Google, IonQ, Rigetti and D-Wave concentrate qubit count, fidelity and cloud-access leadership.
- **Europe builds sovereign capacity** — with Germany, France, Finland and the Netherlands advancing Pasqal, IQM and OQC alongside EuroHPC quantum integration.
- **Asia Pacific scales national programmes** — as China, Japan and Australia combine Origin Quantum, Fujitsu and Diraq with large state research budgets.
- **Modality and scale segment the value** — across superconducting, trapped-ion and photonic platforms and NISQ, intermediate and future fault-tolerant tiers, each with distinct economics.

REGIONAL OUTLOOK

Across seven reporting regions, the report separates commercialisation and supply leaders from high-growth and emerging markets — each profiled in full rather than aggregated into Rest of World.

Region	Stage	Lead Markets & Drivers
Europe	Strong contender	Germany, France, Finland, Netherlands — Pasqal, IQM, OQC, EuroHPC
North America	Market leader	United States, Canada — IBM, Google, IonQ, D-Wave, cloud access
Asia Pacific	Scale engine	China, Japan, Australia — Origin Quantum, Fujitsu, Diraq, state funding
Latin America	Emerging	Brazil, Chile — research access, university programmes
Africa	Frontier	South Africa, Egypt — emerging research, skills building
Middle East	Frontier	Saudi Arabia, UAE, Israel — sovereign investment, talent attraction

KEY MARKET DRIVERS & RESTRAINTS

Drivers	Restraints
• Sovereign quantum strategies & national funding	• Decoherence, error rates & scaling limits
• Cloud-delivered QPU access lowering entry barriers	• Cryogenic / control-overhead cost burden
• Enterprise pilots in chemistry, optimisation & ML	• Unproven near-term commercial ROI
• Error-correction & logical-qubit breakthroughs	• Talent scarcity & supply-chain constraints
• Talent, IP and patent-race momentum	• Export controls & geopolitical fragmentation

SEGMENTATION SNAPSHOT

By Qubit Technology	Superconducting · trapped-ion · photonic
By Scale	NISQ (<1000 qubits) · intermediate · fault-tolerant (future)
By Component	Qubit chip · control electronics · cryogenics · software stack
By Application	NISQ workloads · intermediate-scale · fault-tolerant (future)
By End User	Research labs · cloud providers · enterprises · government / defence
By Deployment	On-premise · cloud-access · hybrid

TABLE OF CONTENTS — PARTS & CHAPTERS

The full report is organised into nine parts across 53 chapters, listed below. Detailed sub-headings, country tables and directories are provided in the full report.

Part V — Company, Competition, Patent and Project Intelligence

Part VI — Sustainability, ESG, SDG, Climate and Natural-Capital Intelligence

Part VII — Supply Chain, Policy, Legal, Economics and Finance

Part VIII — Scenario, Future Intelligence and Final Due Diligence Verdict

Part IX — Annexes, Directories and Reference Material

COMPETITIVE & INVESTMENT SNAPSHOT

The competitive field spans full-stack quantum leaders, modality specialists and cloud-access providers.

Representative players profiled in the full report:

International Business Machines Corporation · Google LLC (Alphabet Inc.) · IonQ, Inc. · Rigetti Computing, Inc. · Quantinuum Ltd · and 20+ further profiled players across quantum-processor and quantum-computing innovators.

Investment intelligence: venture, infrastructure, development, climate and blended finance, green bonds and sustainability-linked loans — culminating in a bankability assessment and a clear, decision-ready investment verdict.

KEY QUESTIONS THIS REPORT ANSWERS

? How large is the global quantum processors market, and how fast will it grow to 2032?
? Which regions, countries and segments offer the strongest risk-adjusted opportunity?
? How does error correction and qubit scaling change quantum-advantage value versus classical compute?
? Who leads, and where is the competitive and patent white space?
? Is the investment case bankable — and under what conditions?
? How does the category align with the SDGs, circular-economy and resource-security and disclosure regulation?

WHY ANMD — THE DIFFERENCE

Most market studies stop at units and revenue. This report is built as a sustainability due diligence instrument — fusing market sizing with ESG, SDG, climate, water and natural-capital intelligence and a decision-ready bankability verdict in a single architecture.

- **Triangulated sizing** — every market read three ways (value, installed systems and qubit capacity) so value-led and volume-led views reconcile rather than conflict.
- **Region-honest forecasting** — Latin America, Africa and the Middle East reported in full, never hidden inside Rest of World, every forecast resolved to the 2025 base year.
- **Integrated evidence base** — company, patent and project databases linked to the analysis, with published-filing patents and FTO treated as an indicator, not a legal conclusion.
- **No-fabrication discipline** — every estimate carries a data-confidence rating and disclosed sources; gaps are flagged for further diligence, never filled with invented numbers.
- **Anti-greenwashing rigour** — SDG-washing and greenwashing screens plus claim-substantiation checks built into the ESG and project analysis.
- **Decision-first structure** — 9 Parts and 53 Chapters culminating in stakeholder playbooks and a clear, decision-ready investment verdict.

WHO SHOULD BUY THIS REPORT

Investors and deep-tech / PE funds, quantum hardware and software firms, enterprises and national programmes, OEMs and integrators, regulators and lenders, and strategic corporate planners and decision-makers.

Access the Full Report

The complete report delivers all 53 chapters in full, with every sub-heading, country table, company and patent directory, forecast model and due diligence checklist.

Purchase at **www.anewmarketdynamics.com** · Standard & Premium licences · Single-Site (SSL) and Global-Site (GSL) options at checkout.

Want the Complete Detailed Table of Contents?

This prospectus lists the nine parts and 53 chapters. The complete detailed table of contents — every sub-heading, country table, exhibit, company and patent directory and annex — is available on request to registered users. To receive it, register with your official company email at **www.anewmarketdynamics.com**. The full detailed table of contents will be sent directly to your registered company email address.