Tokamak and Stellarator Core Components

ANMD-MRS23-227 · Nuclear & Fusion Technologies

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

Tokamak and stellarator core components are the precision-engineered building blocks of magnetic-confinement fusion — superconducting magnets, vacuum vessels and divertor/first-wall systems that must contain a plasma hotter than the sun. High-temperature superconductors, ultra-high-vacuum structures and plasma-facing materials turn fusion physics into machines. The pay-off is foundational: these components set the performance ceiling, cost and timeline of every fusion device. This decision-grade study sizes the global market three ways — value, units and component volume — across segmentation, seven regions and four scenarios to 2032, with outlooks to 2050.

SUSTAINABILITY & SDG IMPACT — THE ANMD LENS

The sustainability case is the report's backbone. Beyond enabling clean fusion, core components deliver measurable performance gains, material efficiency and clean-energy enablement, while durable plasma-facing design strengthens the resource-efficiency story. The analysis applies double materiality, maps outcomes to GRI, SASB, ISSB, TCFD, TNFD, CSRD and the EU Taxonomy, and Rare-material supply (REBCO, tungsten), activation, embodied carbon and end-of-life recycling are treated as material risks — with greenwashing and SDG-washing screens applied throughout.

Mapped Sustainable Development Goals:

SDG 7	SDG 9	SDG 13
Affordable & Clean Energy	Industry & Infrastructure	Climate Action

Measurable sustainability outcomes assessed:

- Enabling carbon-free fusion baseload power
- Manufacturable, high-field magnet and core components
- Industrial supply chain for fusion energy
- Materials availability and qualification 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 private-fusion investment and tokamak components; Europe drives ITER and stellarator programmes; Asia Pacific scales magnet and component supply; other regions on their own merits.

MARKET OVERVIEW

From experimental devices to manufacturable fusion core components.

The component market is being pulled forward by the global build-out of tokamaks and stellarators and the high-temperature superconductor revolution. Demand is driven by the convergence of private fusion capital with public mega-projects like ITER, supported by magnet and vessel supply investment across North America, Europe and Asia Pacific. The market is read three ways — value, units and component volume — and forecast under four scenarios (conservative, base, accelerated and disruption), each region reported separately.

- **North America leads HTS magnets** — anchored by the United States, where high-temperature superconductor magnet technology and private tokamak programmes set the pace.
- **Europe is the supply anchor** — with Germany, France and the UK driving ITER, stellarator (W7-X) and a deep magnet, vessel and component supply base.
- **Asia Pacific is scaling** — supported by Japan, China and South Korea, where superconducting tokamak programmes and component manufacturing capacity expand rapidly.
- **Component type and confinement application segment the value** — across superconducting magnets, vacuum vessels and divertor/first-wall systems, serving tokamak, stellarator and spherical-tokamak machines 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
North America	HTS-magnet leader	United States, Canada — high-field magnets, private tokamaks
Europe	Supply anchor	Germany, France, UK — ITER, W7-X, magnet and vessel base
Asia Pacific	Scaling	Japan, China, South Korea — superconducting tokamaks, fabrication
Latin America	Emerging	Brazil — research linkage, component participation
Africa	Frontier	South Africa — research and materials collaboration
Middle East	Frontier	UAE, Saudi Arabia — sovereign research investment

KEY MARKET DRIVERS & RESTRAINTS

Drivers	Restraints
• Private fusion build-out and ITER programme • High-temperature superconductor breakthroughs • Plasma-facing materials and divertor advances • Vacuum-vessel and tritium-compatible structures • Component qualification and supply scale-up	• Pre-commercial fusion TRL and demand timing • HTS tape supply and cost constraints • Plasma-facing material and neutron-damage limits • Extreme manufacturing tolerances and cost • Narrow, concentrated customer base

SEGMENTATION SNAPSHOT

By Component Type	Superconducting magnets · vacuum vessel · divertor / first-wall · internals
By Technology Platform	HTS / LTS magnets · vessel structures · plasma-facing materials
By Application	Tokamak · stellarator · spherical tokamak confinement
By End User	Fusion developers · research programmes · governments · EPCs
By Business Model	Component sale · fabrication service · co-development · managed supply
By Scale	Prototype · experimental device · pilot plant

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.

COMPETITIVE & INVESTMENT SNAPSHOT

The competitive field spans fusion-device developers, magnet and superconductor specialists and precision fabricators.

Representative players profiled in the full report:

Commonwealth Fusion Systems, Inc. · Tokamak Energy Ltd · General Atomics · Type One Energy Group, Inc. · Thales S.A. · and 20+ further profiled players across fusion developers, magnet makers and component manufacturers.

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 tokamak and stellarator core components market, and how fast will it grow to 2032?
? Which regions, countries and segments offer the strongest risk-adjusted opportunity?
? How do HTS magnets and precision components change fusion feasibility versus legacy approaches?
? 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, units and component volume) 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, fusion developers and OEMs, magnet and component manufacturers, national labs and utilities, 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.