

# 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:

<b>SDG 7</b> Affordable & Clean Energy	<b>SDG 9</b> Industry & Infrastructure	<b>SDG 13</b> Climate Action
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### 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

<b>53</b> Chapters	<b>9</b> Report Parts	<b>7</b> Regions Covered	<b>40+</b> Country Markets
<b>2025–32</b> Forecast Horizon	<b>4</b> Forward Scenarios	<b>25+</b> Companies Profiled	<b>3</b> 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
<ul style="list-style-type: none"> <li>• Private fusion build-out and ITER programme</li> <li>• High-temperature superconductor breakthroughs</li> <li>• Plasma-facing materials and divertor advances</li> <li>• Vacuum-vessel and tritium-compatible structures</li> <li>• Component qualification and supply scale-up</li> </ul>	<ul style="list-style-type: none"> <li>• Pre-commercial fusion TRL and demand timing</li> <li>• HTS tape supply and cost constraints</li> <li>• Plasma-facing material and neutron-damage limits</li> <li>• Extreme manufacturing tolerances and cost</li> <li>• Narrow, concentrated customer base</li> </ul>

## SEGMENTATION SNAPSHOT

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

### Part I — Report Foundation, Discovery and Strategic Intelligence

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- › Chapter 3. Executive Intelligence and Decision Dashboard
- › Chapter 4. Strategic Findings, Materiality and Investment Verdict Preview

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- › Chapter 6. Market Dynamics
- › Chapter 7. Global Market Size and Forecast, 2020–2032
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- › Chapter 53. Reference Annexes

## 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](http://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](http://www.anewmarketdynamics.com). The full detailed table of contents will be sent directly to your registered company email address.