Flow Battery Installations

ANMD-MRS17-167 · Energy Storage & Grid Flexibility 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

Flow battery installations deliver long-duration storage through liquid electrolytes — the vanadium redox, iron, zinc-bromine and novel-organic flow systems whose decoupled power and energy enable cost-effective storage for 4-to-12-plus hours. With long cycle life and non-flammable chemistry, flow batteries target the long-duration niche where lithium-ion economics weaken. This report is a comprehensive, decision-grade study of that flow-battery market across chemistry, duration class, application, end user and business model, spanning history 2020–2024, a 2025 base year, a 2025–2032 forecast and long-term outlooks to 2035, 2040 and 2050. This decision-grade study sizes the global market three ways — value, capacity (MWh) and installed power (MW) — 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. Flow batteries enable long-duration renewable shifting with very long life, recyclable electrolytes and non-flammable safety. The analysis applies double materiality, maps outcomes to GRI, SASB, ISSB, TCFD, TNFD, CSRD and the EU Taxonomy, and Vanadium and material sourcing, electrolyte lifecycle and reuse, and manufacturing footprint are treated as material risks — with greenwashing and SDG-washing screens applied throughout.

Mapped Sustainable Development Goals:

SDG 7	SDG 9	SDG 11	SDG 12	SDG 13
Affordable & Clean Energy	Industry & Infrastructure	Sustainable Cities	Responsible Consumption	Climate Action

Measurable sustainability outcomes assessed:

- Long-duration renewable shifting (4–12+ hours)
- Very long cycle life and recyclable electrolytes
- Non-flammable, safe grid-scale storage
- Electrolyte sourcing and energy density 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	**5** 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 and Asia Pacific lead long-duration deployment; Europe drives vanadium-flow and policy support; other regions assessed on their own merits.

MARKET OVERVIEW

From niche pilots to bankable long-duration flow installations.

Flow batteries are scaling into the long-duration niche. Demand is driven by 4–12+ hour storage needs, long cycle life and non-flammable safety, and renewable-shifting requirements — with electrolyte cost and energy density central to value. The market is read three ways — value, capacity (MWh) and installed power (MW) — and forecast under four scenarios (conservative, base, accelerated and disruption), each region reported separately.

- **North America and the UK lead non-vanadium flow** — anchored by ESS Inc. (iron) and Invinity (vanadium) targeting long-duration deployment.
- **Asia drives vanadium flow scale** — with Sumitomo Electric, Rongke Power and VRB Energy building large vanadium installations.
- **Specialists broaden chemistries** — with CellCube, Redflow (zinc-bromine), Largo and Quino across vanadium and novel flow.
- **Decoupled power and energy is the differentiator** — sizing energy independently of power makes flow economical at long durations where lithium falters.

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 & UK	Non-vanadium leader	United States, UK — ESS Inc., Invinity long-duration flow
Asia Pacific	Vanadium-flow scale	Japan, China — Sumitomo, Rongke, VRB Energy
Europe	Chemistry depth	Austria — CellCube, specialty flow
Latin America	Frontier	Chile — long-duration pilots
Africa	Frontier	South Africa — long-duration interest
Middle East	Emerging	UAE, Saudi Arabia — long-duration storage interest

KEY MARKET DRIVERS & RESTRAINTS

Drivers	Restraints
• Long-duration (4–12+ h) storage needs	• Low energy density & footprint
• Long cycle life & deep cycling	• High upfront & electrolyte cost
• Non-flammable safety	• Vanadium price & supply volatility
• Decoupled power/energy economics	• Lower round-trip efficiency
• Renewable-shifting & resilience	• Early commercial scale

SEGMENTATION SNAPSHOT

By Chemistry	Vanadium redox · iron flow · zinc-bromine · organic / novel · hybrid flow
By Duration Class	4–8 h · 8–12 h · >12 h
By Application	Front-of-meter · commercial & industrial · residential
By End User	Utilities · IPPs · developers · C&I; · residential
By Business Model	Equipment sales · integration · storage-as-a-service
By Electrolyte	Vanadium · iron · zinc-bromine · organic

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

- Chapter 1. Scope, Methodology and Report Architecture
- Chapter 2. Industry Discovery Summary — Flow Battery Installations
- Chapter 3. Executive Intelligence and Decision Dashboard
- Chapter 4. Strategic Findings, Materiality and Investment Verdict Preview

Part II — Market Intelligence, Sizing, Forecasting and Segmentation

- Chapter 5. Industry Overview and Market Evolution
- Chapter 6. Market Dynamics
- Chapter 7. Global Market Size and Forecast, 2020–2032
- Chapter 8. Market Segmentation Analysis
- Chapter 9. End-User and Demand-Side Intelligence
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Part IV — Technology, Innovation and Category-Specific Intelligence

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- Chapter 21. Category-Specific Intelligence Module
- Chapter 22. Research, Innovation and Funding Landscape

Part V — Company, Competition, Patent and Project Intelligence

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- Chapter 25. Mergers, Acquisitions, Partnerships and Ecosystem Intelligence
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- Chapter 45. Bottom-Line Verdict and Strategic Recommendations
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- Chapter 51. Forecast Annex
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- Chapter 53. Reference Annexes

COMPETITIVE & INVESTMENT SNAPSHOT

The competitive field spans vanadium-flow leaders and lower-cost-chemistry challengers.

Representative players profiled in the full report:

Invinity Energy Systems plc · ESS Tech, Inc. · Sumitomo Electric Industries, Ltd. · Dalian Rongke Power Co., Ltd. · CellCube Energy Storage Systems Inc. · and 20+ further profiled players across vanadium-flow leaders and lower-cost-chemistry challengers.

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 flow battery installations market, and how fast will it grow to 2032?
? Which regions, countries and segments offer the strongest risk-adjusted opportunity?
? How do decoupled power and energy change long-duration value versus lithium-ion?
? 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, capacity (MWh) and installed power (MW)) 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 infrastructure / PE funds, utilities and storage developers, flow-battery makers and integrators, procurement and sustainability leaders, policymakers and lenders, and corporate strategy and ESG teams.

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.