

# Perovskite Solar Cells

## ANMD-MRS8-079 · Advanced Energy 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

Perovskite solar cells are the most disruptive frontier in photovoltaics — a low-cost, high-efficiency thin-film technology that, stacked atop silicon in tandem form, is breaking conversion-efficiency records and promising a step-change beyond the silicon ceiling. This decision-grade study sizes the global market three ways — value, capacity and cell area — across cell architecture, junction type and application, across seven regions and four scenarios to 2032, with outlooks to 2050.

## SUSTAINABILITY & SDG IMPACT — THE ANMD LENS

Sustainability is this report's backbone, not an afterthought. Perovskite solar cells promise measurable higher efficiency, lower cost and new flexible and BIPV applications, while a path beyond the silicon ceiling strengthens the energy-transition story — pending durability and scale-up.

### Mapped Sustainable Development Goals:

<b>SDG 7</b> Affordable Clean Energy	<b>SDG 9</b> Industry & Innovation	<b>SDG 11</b> Sustainable Cities	<b>SDG 12</b> Responsible Consumption	<b>SDG 13</b> Climate Action
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### Measurable sustainability outcomes assessed:

- Higher conversion efficiency beyond the silicon ceiling
- Lower cost and new flexible / BIPV applications
- Tandem road-map yield gains
- Lead-content and toxicity, device durability and end-of-life 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>5</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. Asia Pacific is the scale engine (China, India, Japan) on manufacturing and deployment; Europe leads on technology and demand (Germany, Spain, Netherlands); North America is the value leader (United States, Canada) on IRA support; other regions assessed on their own merits.

## MARKET OVERVIEW

### From lab record to early commercialisation — where PV goes tandem, flexible and beyond silicon.

Perovskite solar is moving from lab record to early commercialisation. Demand is driven by the efficiency ceiling of silicon, tandem road-maps and IP races across China, Europe and North America, even as stability and manufacturing scale-up remain the gating challenges. The market is read three ways — value, capacity and cell area — and forecast under four scenarios, each region reported separately.

- **Asia Pacific is the scale engine** — China, on pilot-line build-out and tandem scale-up
- **Europe is the technology leader** — United Kingdom and Germany, on tandem pioneering and IP
- **North America is the value leader** — United States, on tandem R&D and commercialisation
- **Efficiency is the differentiator** — perovskite-silicon tandems plus record conversion gains

## REGIONAL OUTLOOK

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

Region	Stage	Lead Markets & Drivers
Asia Pacific	Scale engine	China, India, Japan — manufacturing, deployment
Europe	Technology / demand leader	Germany, Spain, Netherlands — deployment, policy
North America	Value leader	United States, Canada — IRA support, premium pricing
Middle East	High-growth	Saudi Arabia, UAE — utility-scale solar investment
Latin America	Emerging	Brazil, Chile — renewable-energy expansion
Africa	Emerging	South Africa, Egypt — clean-energy access, build-out

## KEY MARKET DRIVERS & RESTRAINTS

Drivers	Restraints
<ul style="list-style-type: none"> <li>• Silicon-ceiling + tandem-roadmap convergence</li> <li>• Efficiency-gain &amp; cost-reduction value</li> <li>• Policy &amp; funding support (clean-energy R&amp;D, targets)</li> <li>• Flexible and BIPV new-application momentum</li> <li>• Tandem, flexible &amp; BIPV technology gains</li> </ul>	<ul style="list-style-type: none"> <li>• Device stability &amp; durability uncertainty</li> <li>• Manufacturing scale-up &amp; yield challenges</li> <li>• Lead-content, toxicity &amp; end-of-life scrutiny</li> <li>• First-of-a-kind financing &amp; bankability risk</li> <li>• IP, standards &amp; qualification gaps</li> </ul>

## SEGMENTATION SNAPSHOT

<b>By Cell Architecture</b>	Single-junction · perovskite-silicon tandem · all-perovskite tandem · flexible · BIPV
<b>By Junction Type</b>	Single-junction · 2-terminal tandem · 4-terminal tandem
<b>By Application</b>	Utility tandem · BIPV · flexible / portable & niche
<b>By End User</b>	Module OEMs · IPPs · BIPV integrators · electronics
<b>By Business Model</b>	Cell / module sales · IP licensing · tandem supply
<b>By Scale</b>	Lab / pilot · pre-commercial · commercial

## 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 — Perovskite Solar Cells
- › 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
- › Chapter 10. Pricing, Cost and Commercial Model Intelligence

### Part III — Regional and Country Intelligence

- › Chapter 11. Global Regional Intelligence Framework
- › Chapter 12. North America Market Intelligence
- › Chapter 13. Europe Market Intelligence
- › Chapter 14. Asia Pacific Market Intelligence
- › Chapter 15. Latin America Market Intelligence
- › Chapter 16. Africa Market Intelligence
- › Chapter 17. Middle East Market Intelligence
- › Chapter 18. Rest of World Market Intelligence

### Part IV — Technology, Innovation and Category-Specific Intelligence

- › Chapter 19. Technology Landscape and Architecture
- › Chapter 20. Emerging and Next-Generation Technology Intelligence
- › Chapter 21. Category-Specific Intelligence Module
- › Chapter 22. Research, Innovation and Funding Landscape

## Part V — Company, Competition, Patent and Project Intelligence

- › Chapter 23. Competitive Landscape
- › Chapter 24. Company Profiles
- › Chapter 25. Mergers, Acquisitions, Partnerships and Ecosystem Intelligence
- › Chapter 26. Patent Landscape and Intellectual Property Intelligence
- › Chapter 27. Project, Deployment and Case-Study Intelligence

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

- › Chapter 28. Sustainability Intelligence Suite
- › Chapter 29. ESG Intelligence and Double Materiality
- › Chapter 30. ESG and Sustainability Framework Alignment
- › Chapter 31. SDG Intelligence
- › Chapter 32. Carbon, Net-Zero and Climate-Mitigation Intelligence
- › Chapter 33. Water, Biodiversity and Natural-Capital Intelligence
- › Chapter 34. Circular Economy and Resource-Security Intelligence
- › Chapter 35. Social Impact, Human Capital and Community Intelligence
- › Chapter 36. Climate Risk, Adaptation and Resilience Intelligence

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

- › Chapter 37. Value Chain, Supply Chain and Geopolitical Intelligence
- › Chapter 38. Policy, Regulation and Incentive Intelligence
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- › Chapter 41. Investment, Sustainable Finance and Bankability Intelligence

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

- › Chapter 42. Scenario Analysis and Future Intelligence
- › Chapter 43. Sustainability Due Diligence Framework and Data-Room Index
- › Chapter 44. Risk Register, RAG Rating and Anti-Greenwashing Screen
- › Chapter 45. Bottom-Line Verdict and Strategic Recommendations
- › Chapter 46. Implementation Roadmap and Stakeholder Playbooks

## Part IX — Annexes, Directories and Reference Material

- › Chapter 47. Methodology Annex
- › Chapter 48. Corporate Directory and Company Intelligence Annex
- › Chapter 49. Patent Directory and Patent Intelligence Annex
- › Chapter 50. Project Intelligence Annex
- › Chapter 51. Forecast Annex
- › Chapter 52. Sustainability KPI Annex
- › Chapter 53. Reference Annexes

## COMPETITIVE & INVESTMENT SNAPSHOT

The competitive field spans global clean-energy majors, specialist perovskite solar cells makers, and emerging innovators. Deal activity — M&A, technology acquisition and platform expansion — signals a market consolidating around scalable, scale, efficiency and bankability.

### Representative players profiled in the full report:

Oxford PV Ltd. · GCL Perovskite (GCL Technology Holdings Limited) · Wuxi UtmoLight Technology Co., Ltd. · Microquanta Semiconductor Co., Ltd. · Hanwha Qcells (Hanwha Solutions Corporation) · and 20+ further profiled players across manufacturers, developers and emerging innovators.

**Investment intelligence:** venture, infrastructure, development, climate and blended finance, green bonds and sustainability-linked loans — culminating in a bankability assessment and a Go / No-Go / Conditional-Go investment verdict.

## KEY QUESTIONS THIS REPORT ANSWERS

- ? How large is the global perovskite solar cells market, and how fast will it grow to 2032?
- ? Which regions, countries and segments offer the strongest risk-adjusted opportunity?
- ? How do efficiency, yield and bankability change project economics versus incumbent technology?
- ? 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, energy-access and just-transition 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 so value, volume and capacity 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 Go / No-Go / Conditional-Go investment verdict.

## WHO SHOULD BUY THIS REPORT

Investors and infrastructure / PE funds, IPPs, utilities and EPC contractors, manufacturers and OEMs, project developers and asset owners, off-takers and corporate buyers, regulators, 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](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.