

## Latest developments in renewable energy

Discover the upgrades in renewable energy, driven by both environmental and economic benefits. Key trends include digitization for streamlined operations and energy-efficient integrations to tackle intermittency issues. The industry explores economically viable renewable sources like solar, wind, and hydroelectric power, along with emerging fields such as green hydrogen. Advances including AI-enhanced grid management and next-gen battery storage, complement untapped water energy sources like tidal, wave, and ocean currents and offer green energy solutions for tomorrow.

For this in-depth research on the top renewable energy trends and startups, we analyzed a sample of 5000+ global startups & scaleups. This data-driven research provides innovation intelligence that helps you improve strategic decision-making by giving you an overview of emerging technologies in green energy innovation. In the Renewable Energy Innovation Map below, you get a comprehensive overview of the innovation trends & startups that impact your company.

These insights are derived by working with our Big Data & Artificial Intelligence-powered StartUs Insights Discovery Platform, covering 4.7M+ startups & scaleups globally. As the world's largest resource for data on emerging companies, the SaaS platform enables you to identify relevant technologies and industry trends quickly & exhaustively.

The Tree Map below illustrates the top 10 renewable energy trends that will impact companies in 2025. Advanced photovoltaics (PV) innovations are honing in on high-efficiency technologies. Moreover, big data and AI are enhancing renewable energy, facilitating applications like predictive maintenance and smart management. At the same time, distributed energy storage systems (DESS) add flexibility and stability to renewable energy generation.

Grid integration technologies are reducing transmission losses and stabilizing the grid effectively. These technologies optimize the use of off-grid sources such as biofuels, wind, and hydropower, even when situated far from demand centers. Further, green hydrogen plays a dual role, storing energy from renewables and aiding electrification. Meanwhile, bioenergy holds its ground as a favored choice, thanks to its decentralized nature.

The Global Startup Heat Map below highlights the global distribution of the 5152 exemplary startups & scaleups that we analyzed for this research. Created through the StartUs Insights Discovery Platform, the Heat Map reveals that Western Europe is home to most of these companies while we also observe increased activity in the US and India.

Below, you get to meet 20 out of these 5152 promising startups & scaleups as well as the solutions they develop. These 20 startups were hand-picked based on criteria such as founding year, location, funding raised,

and more. Depending on your specific needs, your top picks might look entirely different.

Solar companies are integrating PV systems with every aspect of our surroundings while minimizing the need for additional land usage. As a result, integrated PV, floatovoltaics, and agrivoltaics are logical shifts in trends. Additionally, startups are developing thin-film cells to make solar panels flexible, cost-effective, lightweight, and environment-friendly.

To improve PV performance, emerging companies are devising technologies to concentrate solar power using mirrors and lenses. Innovations in PV materials, such as the use of perovskite, are increasing energy conversion multifold. These innovations are further coupled with photovoltaic designs that enable maximum efficiency and high productivity.

Together, they promote sustainability through recycling, minimum resource utilization, and the use of alternate materials.

Dutch startup Lusoco develops a luminescent solar concentrator technology. It uses high refractive index materials like glasses and polymers along with fluorescent ink to concentrate light to the edges where thin-film solar cells are placed. Moreover, the fluorescent coating also emits light during the night, enabling self-sustainable signages. The solution harvests energy while maintaining the aesthetics. The luminescent glasses are hence suitable for use in automotive, signages, and interior designing.

Beyond Silicon, a US-based startup, develops perovskite-on-silicon tandem cells that challenge the efficiency limits of traditional silicon solar cells. Its bifacial perovskite and silicon solar modules generate more power than conventional systems. Additionally, Beyond Silicon offers its modules as drop-in replacements for existing silicon PV module manufacturing processes. This enables PV module manufacturers to produce and sell high-efficiency modules, enhancing their profitability while lowering system costs.

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