SCOTTIE VENTURES

Energy Generation Industry Report

Associates

Anya Bansal
Naman Chordia

Analysts

Sohan Chakravorty
Viviana Chen
Arihanth Nuka
Rithanya Senthilvel
Zack Zhou
Gadin Aggarwal

Industry Overview

Within the energy industry, two major trends are driving large shifts: climate goals and nation-specific energy independence. In 2015, more than 175 countries including the United States and the EU signed the Paris Agreement, setting targets to limit warming to below two degrees Celsius, with an aim of 1.5 degrees. This pushed governments to cut emissions and invest heavily in renewable power and related technologies, accelerating sector growth. At the same time, the oil price crash from 2014 to 2016 exposed fragility in the global energy system. A combination of OPEC supply decisions and the U.S. shale boom created a supply glut, driving prices sharply lower and forcing countries to reconsider their reliance on oil from a national security perspective.

The U.S. Clean Power Plan in 2015 added further pressure by limiting CO_2 emissions from coal plants, and even after its repeal in 2019, many coal units continued to shut down in favor of cheaper renewable alternatives. Between 2017 and 2019, costs across solar, wind, and battery technologies declined rapidly as manufacturers scaled production. Solar leaders such as JinkoSolar, Trina Solar, and LONGi expanded output, wind turbine manufacturers including Vestas, GE Renewable Energy, and Siemens Gamesa improved turbine efficiency, and battery producers such as Tesla, CATL, LG Chem, and Panasonic significantly reduced battery costs.

These advances made clean power increasingly competitive and helped catalyze electric vehicle adoption in the 2020s.

The COVID-19 pandemic in 2020 pushed oil demand to historic lows, with futures briefly turning negative, further accelerating interest in renewable and resilient energy systems. In 2022, the Inflation Reduction Act added $369 billion in tax credits for solar, wind, storage, and nuclear, reinforcing long-term investment certainty. The Russia-Ukraine war then exposed Europe's dependence on imported natural gas, driving rapid renewable deployment under REPowerEU. In the United States, approval of NuScale's SMR design in 2023 and rising power demand from data centers renewed interest in firm, low-carbon power. By 2025, tariffs on solar components and updated tax credit rules reflected a stronger focus on domestic supply chains and energy security, while the phase-down of certain clean energy credits increased emphasis on nuclear power.

Together, these developments point to a central theme of this report: rising, location-based energy demand from AI data centers, remote industry, and geopolitically exposed regions is converging with climate targets in a way that increases the need for modular, secure, low-carbon power solutions.

SMRs Overview

Small modular reactors (SMRs) and microreactors are emerging as one of the most viable solutions to meet the explosive growth in electricity demand from AI data centers, industrial electrification, and off-grid infrastructure. Data-center power demand alone is projected to rise five-fold by 2035 to roughly 176 gigawatts, far exceeding what existing grids can reliably supply. Unlike traditional nuclear plants that are large, expensive, and slow to build, SMRs are factory-manufactured, modular, and deployable in 50–300 MW blocks that can be scaled as demand grows. Their smaller footprint, passive safety systems, and lower capital risk make them well-suited for constrained sites such as decommissioned coal plants and for energy-intensive customers that require continuous, zero-carbon power. These features allow companies to meet climate targets while securing the round-the-clock electricity needed for advanced computing and industrial operations.

A growing ecosystem of companies is now commercializing these technologies, supported by major technology firms seeking to power AI infrastructure. Many are deploying reactor designs that use advanced fuels such as TRISO to improve safety, reduce waste, and shrink plant size, while enabling faster construction and flexible output. Google, Microsoft, Amazon, and Meta are actively partnering with or investing in these firms to secure long-term nuclear power for data centers.

Although the sector faces challenges including lengthy licensing, fuel supply constraints, workforce shortages, and lingering public concerns about nuclear safety, policy support and rising demand for reliable clean energy are accelerating deployment. As electricity becomes a strategic input for the digital economy, SMRs are positioned to become a foundational part of the future low-carbon energy system.

Market & CAGR (SMRs)

The SMR and microreactor sector has demonstrated strong growth momentum as demand for firm, low-carbon power increases across energy-intensive industries. Analysis of historical exits and major funding events suggests a weighted average compound annual growth rate of approximately 16.5%. Early-stage valuations in the sector typically range from $100 to $150 million post-money, reflecting both the capital intensity of nuclear development and the strategic value of regulatory progress. Continued hyperscaler interest, government support, and grid congestion are expected to sustain growth as projects transition from licensing into deployment.

16.5%

CAGR

$100-150M

range of post-money early-stage valuations

Company	Seed Funding Amount ($M)	Valuation ($M)	Funding Year	Description
Thorizon	20M	120M	2025	Dutch molten-salt reactor
Stellaria	23M	138M	2025	French molten-salt fast-reactor
Steady Energy	22M	170M	2025	Finnish industrial heat SMR

AGS Overview

Advanced Geothermal Systems (AGS) address the limitations of intermittent renewables by providing 24/7 baseload power for data centers, industrial facilities, and modern grids. As grids approach 60-80% renewable penetration, firm power becomes essential to offset variability. Industries such as steel, chemicals, cement, and hydrogen production require continuous electricity that solar and wind alone cannot supply.

AGS operates by drilling 3-10 kilometers underground to create closed-loop systems in which water or supercritical CO_2 circulates through hot rock formations reaching 150-400°C. Unlike conventional geothermal, AGS is not restricted to volcanic regions, leveraging the Earth's average geothermal gradient to enable widespread deployment.

Fervo Energy leads near-term deployment, supplying 3.5 MW to Google in Nevada and targeting 400+ MW by 2028.

Quaise Energy is developing millimeter-wave drilling technology to reach deeper, higher-temperature resources. Eavor Technologies operates an 8.5 MW demonstration project in Germany.

Advances in drilling technology including horizontal drilling, real-time logging, automation, and high-temperature materials have significantly improved performance and reduced costs. Policy momentum increased in 2023 with the DOE's Enhanced Geothermal Shot and IRA incentives supporting geothermal deployment.

Drilling remains the primary cost challenge. At depths of 10 km, extreme pressure and temperature require thicker casing, specialized materials, and expensive drilling fluids. Regulatory complexity, induced seismicity concerns, and long permitting timelines continue to limit deployment speed.

Market & CAGR (AGS)

AGS represents one of the largest long-term opportunities in firm, low-carbon power. Global technical potential exceeds 10 TW. Deploying 200-500 GW by 2050 would generate $120 to 300B in annual electricity revenue and $1-2.5T in cumulative infrastructure investment. Near-term addressable markets including AI data centers, remote industry, grid-constrained regions, and hydrogen production represent a $15-25B opportunity over the next decade. Modular deployment beginning at 5-10 MW enables phased capital investment and venture-scale entry. While AGS lacks a long exit history, improving drilling economics and policy incentives suggest a high-teens effective growth trajectory through the late 2020s and early 2030s.

7.5%

CAGR

$90-115M

range of post-money early-stage valuations

Company	Series A Funding ($M)	Valuation ($M)	Funding Year	Description
Quaise Energy	40M	~120M	2022	Ultra deep mm-wave drilling
Sage Geosystems	45M	~100M	2024	Geothermal pressure wells
XGS Energy	20M	~80M	2024	Advanced Closed Loop System

Cross-Cutting Market Dynamics

Structural Headwinds

Across SMRs and AGS, several structural tailwinds are reinforcing demand. Decarbonization mandates and corporate net-zero commitments are pushing energy buyers toward firm, low-carbon power rather than intermittent renewables alone. At the same time, rapidly rising AI and data center loads are creating customers that prioritize reliability and uptime over marginal power costs, increasing willingness to contract power in the $80-120/MWh range. Policy support further strengthens these dynamics. The IRA provides long-duration certainty through production and investment tax credits, global nuclear restarts are reframing nuclear energy as a climate solution, and government-backed hydrogen pilots are accelerating early demand and infrastructure development. Together, these forces create a durable demand pull for modular, location-flexible energy systems.

Structural Tailwinds

Balancing these tailwinds are significant shared challenges. SMRs and AGS are capital-intensive and slow to deploy relative to solar and wind, with long timelines driven by licensing, drilling, and infrastructure build-out. Supply constraints add further friction: SMRs depend on HALEU fuel with limited near-term domestic supply, AGS projects compete for specialized drilling rigs and high-temperature materials, and hydrogen deployment is constrained by electrolyzer manufacturing capacity and transport infrastructure. Siting and permitting risks remain a universal hurdle, particularly for AGS projects facing fragmented subsurface rights and seismicity concerns, and for nuclear projects navigating complex regulatory frameworks. These factors increase cost of capital and extend commercialization timelines, especially in less supportive jurisdictions.

Maturity Curve

SMRs and AGS complementary positions along the maturity curve. SMRs are the most visible and politically supported, with strong hyperscaler interest, but remain highly constrained by regulation and fuel supply. AGS is emerging as the fastest-rising firm power option, with earlier commercialization potential driven by drilling technology spillovers and fewer long-term fuel constraints.