

Xinjiang's Leap into New Energy: From 'China's Coal Warehouse' to a Green Power Hub

JINHUA, CHINA, July 3, 2025 /EINPresswire.com/ -- Across the vast expanse of northwestern China, Xinjiang is quietly rewriting its energy narrative. Once known as the “coal warehouse” of China, with coal-fired generation accounting for more than 80% of its electricity, Xinjiang is now emerging as a pivotal node in China’s — and the world’s — map of renewable energy. In 2024, the region’s installed renewable energy capacity surpassed 100 gigawatts for the first time, accounting for more than 55% of total power capacity, while renewable electricity generation reached 116.16 billion kWh, a year-on-year increase of 30.7%. Beneath these numbers lies a story of profound structural change, not only for China’s energy mix but also as part of the global wave of green transformation.

Resource Endowment and Policy Drive: The Ingredients for Transformation

Xinjiang’s rise as a renewable energy powerhouse begins with a rare endowment of wind and solar resources. Official data show that Xinjiang’s technically exploitable wind resources account for around 15.4% of China’s total, while its theoretical solar potential represents 40% of the national figure. This level of resource density is striking even by global standards — Xinjiang’s annual sunlight hours rival those of the American Southwest’s solar valleys, while its wind potential is comparable to the North Sea’s offshore wind corridor.

Yet abundant resources do not automatically translate into industrial advantage. The real driver of Xinjiang’s energy leap has been policy and institutional innovation. In recent years, the region has made renewables a pillar of economic upgrading and energy security. A key reform — decentralizing project approval to the city and county level — has streamlined bureaucracy and unleashed a flood of private and corporate investment.

In 2024, Xinjiang added 35.57 GW of new renewable capacity — more than the entire installed capacity of countries like Belgium or Finland, and close to Portugal’s national total. Not only does this rank first in China, it also eclipses the annual renewable additions of most European countries. Crucially, this surge is not isolated: large-scale bases in Hami, Zhunge’er, and the Tarim Basin have come online, with over a dozen more million-kilowatt projects commissioned ahead of schedule. By the end of 2024, every prefecture in Xinjiang had surpassed 1 GW in renewable capacity, creating a comprehensive, clustered green energy ecosystem. This regional, clustered approach goes far beyond earlier “pilot projects” and positions Xinjiang as a national — even international — green power center.

Xinjiang's experience demonstrates that even world-class resources require agile policy and institutional reform to become real economic strengths. In a global context shaped by the imperatives of climate change, energy security, and industrial upgrading, Xinjiang's pathway offers a valuable reference for other resource-rich regions.

Infrastructure and Market Mechanisms: From Power Exporter to Green Energy Hub

Xinjiang's green energy leap has been built on aggressive infrastructure investment and ever-evolving market mechanisms. Cutting across deserts and plateaus, a web of ultra-high voltage (UHV) transmission lines is reshaping China's energy landscape. By 2024, Xinjiang had constructed 31 UHV substations, enabling not only reliable supply to local industry and households, but also the mass export of electricity to China's heavily populated and industrialized eastern and central provinces.

The backbone of this system is cutting-edge UHV transmission technology. Take the Hami-Chongqing ± 800 kV UHVDC line, commissioned in 2024: this "electricity superhighway" stretches 2,260 kilometers (about the distance from Paris to Istanbul) and can deliver power from Xinjiang to Chongqing in just 0.007 seconds — a hundredth of a heartbeat. Such rapid, efficient transmission breaks down the barriers of geography and time zone, instantly lighting up millions of homes in southwest China with wind, solar, and thermal power from the northwest. Of the 14.2 GW of generating capacity linked to this line, more than 70% is wind, solar, or solar-thermal. Each year, it delivers over 36 billion kWh to Chongqing, about half of which is renewables, saving the equivalent of 6 million tons of coal annually.

Xinjiang's current outbound transmission capacity stands at 25 GW, with 2024 electricity exports exceeding 850 billion kWh — more than the total annual electricity consumption of France. Today, Xinjiang's "green electrons" light up 22 provinces across China, making it a textbook case of national energy integration. What makes this possible is not just an abundance of electricity, but an infrastructure network capable of gathering green energy from the desert and steppe, then transmitting it over mountains and plains to the nation's economic heartlands.

Meanwhile, market innovation has played a crucial role in supporting the integration of renewables. Since 2015, Xinjiang has piloted a range of electricity market mechanisms, from long-term contracts and spot markets to "green power" and cross-province trading. In 2024, the region's annual market-based renewable power transactions reached 51.7 billion kWh — double the figure just five years ago. Green power trading volume alone grew by 265% year-on-year, enabling higher levels of renewables integration and cross-regional balancing.

UHV transmission is not just a technical feat; it's a lever for structural change, carbon reduction, and regional balancing. For Xinjiang, with its sparse population and limited local demand, it's the only way to fully unlock its vast wind and solar resources, while easing supply and decarbonization pressures in the populous east. As clean power flows seamlessly across China,

Xinjiang offers a glimpse of the future for large-scale, cross-regional green energy networks.

Industrial Upgrading and Technological Innovation: The Rise of New Productive Forces

Xinjiang's new energy leap is about more than just massive power output — it's about a fundamental reshaping of the industrial landscape. In 2024, the localization rate of wind power equipment manufacturing in Xinjiang surpassed 70%, making it the sixth largest — and the most complete — wind equipment base in western China. From blades and towers to gearboxes and generators, almost every major component can now be produced and assembled locally, mirroring the industrial “closed loop” seen in America's Midwest wind corridor.

Beyond wind, Xinjiang is rapidly emerging as a hub for photovoltaics, battery manufacturing, energy storage, and new energy vehicles. In 2024, renewable projects drove a 32.6% year-on-year surge in fixed asset investment — an acceleration that far outpaces most major economies and green energy regions. For context, this is more than twice the annual manufacturing investment growth rate of Spain, highlighting the sector's powerful economic pull.

Technological innovation is now the engine of Xinjiang's energy revolution. Grid-connected new energy storage capacity hit 8.175 GW in 2024, the highest in China and comparable to the total pumped hydro capacity of the Netherlands. The region is also home to China's largest green hydrogen demonstration project, capable of producing 20,000 tons per year using renewable electricity — opening the door to integration between renewables, hydrogen, and downstream transport and industry.

A new frontier is emerging in “green computing,” as Xinjiang's abundant renewable power attracts a wave of data centers and “smart computing” (AI) hubs, especially in cities like Karamay and Hami. Karamay alone boasts 17,000 PetaFLOPS of computing power — on par with world-class supercomputing centers — providing the backbone for AI, big data, and industrial cloud applications powered by clean energy. This not only ensures the local absorption of green electricity, but also lays a low-carbon foundation for the digital economy.

In energy storage, Xinjiang is pushing multiple technologies in parallel — from advanced batteries to compressed air and hydrogen/ammonia storage — to ensure grid stability as renewables scale up. Storage system utilization hours now stand at 1,569, four times higher than last year and approaching the efficiency levels seen in Germany and the US.

Through industrial upgrading, technological innovation, and the integration of green computing, Xinjiang is transforming from a traditional energy exporter into a source of cutting-edge technology and green industry. This leap “from wind and sun to computing power” may offer a template for resource-rich regions worldwide seeking a sustainable path forward.

Challenges and Prospects: From Power Exporter to Collaborative Ecosystem

Xinjiang's green transition, for all its impressive gains, is not without obstacles. As a traditional energy heavyweight, the region still has a high share of heavy industry and coal, making for a difficult structural shift. Even as renewables scale up, gaps remain in high-end manufacturing, digital talent, and innovation capacity — leaving room for improvement before Xinjiang can truly claim the mantle of a global green energy hub.

Integrating vast amounts of intermittent wind and solar poses new challenges for grid balancing and reliable supply. Maintaining system stability amid these fluctuations requires ever more flexible market mechanisms, advanced storage, and intelligent dispatch. Meanwhile, the rise of green computing and high-performance data centers brings demands for digital skills, data security, and smart manufacturing — challenging Xinjiang to move beyond the traditional “power exporter” mindset and embrace a “green power + computing power” ecosystem of the future.

Yet just as Xinjiang's endless deserts give rise to boundless wind and sunlight, the region's potential solutions are equally vast. The interplay of resources, policy, market, and technology gives Xinjiang a unique edge. UHV transmission enables green power to flow at lightning speed from west to east, while the burgeoning ecosystem of data infrastructure and green industry is drawing more and more innovative firms and skilled workers to the region. The convergence of clean energy and the digital economy is steadily transforming Xinjiang from a single-minded energy exporter into a crucial node for both China and the world's green energy and computing networks.

Xinjiang now finds itself on China's new economic frontier — and its green transformation is likely just beginning. For other resource-rich regions globally, seeking to move beyond legacy energy models, Xinjiang's journey is not a simple blueprint to copy. But it does provoke a timely question: how do we turn wind and sunlight into the engines of future prosperity? In the years ahead, the green story unfolding across Xinjiang's vast landscapes may well become a chapter worth watching in the world's energy transformation.

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