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China: Scaling Earth's Heat at **Gigawatt** Scale



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→ GLOBAL_GT REGION OF THE MONTH

This Month's Hot Spot

Focus on: China

This December we spotlight China, a nation where geothermal energy is leaping from early promise to strategic priority. From enormous district heating deployments to emerging Enhanced Geothermal Systems potential, China is shaping up as a global powerhouse in direct-use and deep heat innovation. But it doesn't stop there. China is now hosting one of the geothermal sector's most consequential global initiatives - the newly launched International Geothermal Standards Committee (IGSC) - cementing its role not only as a deployer of geothermal solutions, but as a leader in harmonising global practice and accelerating sector growth worldwide.

China's Geothermal Heating Market: From Niche Resource to System-Scale Infrastructure

In just two decades, China has built the world's largest geothermal heating market, transforming a resource long associated with hot springs into a core pillar of urban energy systems. This rapid scale-up reflects not a single policy or technology shift, but a convergence of structural drivers: urbanization, district energy expansion, long-term decarbonization plans, and the need to modernize legacy coal-based heating systems.

China today operates the world's largest district heating network, serving an estimated 22 billion square meters of building space, primarily in northern urban areas. Historically dominated by coal, this system is now undergoing a profound transition. As cities expand and existing building stock is retrofitted, demand for reliable, low-emission baseload heat continues to grow. Geothermal energy – local, stable, and well suited to district systems – has emerged as a practical solution across multiple regions, from colder regions in the north to mixed heating-and-cooling demand in central and southern provinces.



How China Turned Geothermal into City-Scale Heat

While geothermal use in China dates back thousands of years, modern deployment accelerated in the early 2000s with the introduction of geothermal heat pumps and hydrothermal district heating. By 2004, geothermal heating covered only a few million square meters. Policy support through successive Five-Year Plans, combined with resource mapping and integration into urban energy planning, changed that trajectory. From 2010 onward, geothermal heating expanded at annual rates exceeding 20%. By 2021, China had reached approximately 1.3 billion square meters of geothermal-heated building area, spanning both shallow and deep geothermal systems.

The scale-up has been driven not only by environmental targets, but by co-benefits: improved urban air quality, reduced coal dependence, and enhanced energy security. Looking ahead, studies suggest geothermal heating could displace tens of millions of tonnes of coal annually by 2030, with long-term projections indicating potential coverage of over 10 billion square meters of buildings by 2060. The associated emissions reductions would represent an important contribution to China's dual carbon goals.

China's experience highlights an important lesson for the global geothermal community. Heating and cooling, often overlooked relative to power generation, represent one of the largest and most immediate opportunities for geothermal deployment. By treating geothermal as urban infrastructure rather than a niche technology, China has demonstrated how clean heat can scale quickly and seamlessly beneath cities, supporting healthier, more resilient, and more sustainable urban environments. ■



China's Geothermal Momentum: Lessons From Scale and Policy



China's geothermal story is a lesson in scale, policy impact and practical deployment. The latest IEA Future of Geothermal Energy report highlights China's role as a dominant force in global geothermal heat investment and deployment - especially for district heating.

China currently accounts for the largest share of geothermal district heating infrastructure in the world, with extensive systems built across its Eastern and Northern provinces under supportive policy frameworks tied to the 13th and 14th Five-Year Plans.

Beyond Capacity:

The Power of Consistent Policy and Investment

What distinguishes China is not just capacity, but momentum. Investments in geothermal heating and cooling have soared, with China responsible for more than 70 % of global geothermal investment, driven by urban heat demand, strong electrification, and policy targets for expansion of geothermal-heated areas.

China's reliance on coal - both as a backbone of past economic growth and a decarbonisation challenge - also makes geothermal an especially strategic option. As the country pursues its 2060 carbon-neutrality goal, the diversification of dispatchable clean energy sources becomes critical. For instance, according to the IEA report, geothermal could contribute meaningfully to the additional 650 GW of clean dispatchable capacity needed over the next 25 years, nearly half of which could be supplied from geothermal resources.

The report also points to China's potential in Enhanced Geothermal Systems (EGS) - estimated to be second only to the United States globally. Provinces such as Hainan, Guangdong and Fujian have especially favourable geology for EGS development, while major urban centres including Beijing, Xingtai, Shijiazhuang and Tangshan offer strong demand centres for future geothermal heat deployment. heat-hungry economies.

But beyond numbers, what stands out is the scale and speed of implementation - from municipal heat networks to direct-use applications - offering lessons that resonate well beyond China's borders. As one energy leader recently noted, China's experience with district heating deployment has not only transformed thousands of square kilometres of urban heating systems, it provides a practical blueprint for rapid geothermal uptake in other heat-hungry economies.

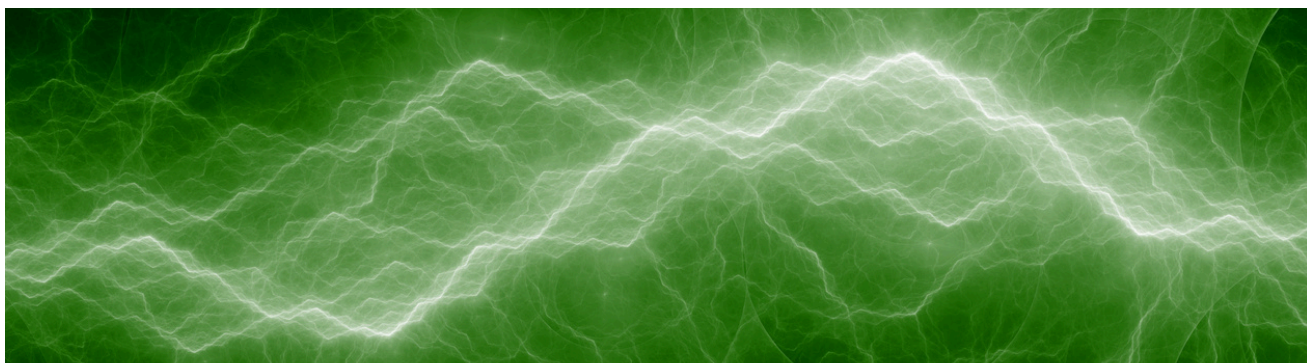


Seequent Segment Director, Energy, Jeremy O'Brien talks to geothermal's potential as part of the energy transition.



<https://www.seequent.com/what-the-ieas-future-of-geothermal-energy-report-revealed-about-china/>

Scaling Geothermal Heating and Cooling in China: The Sinopec Green Energy Model



China's rapid urbanization, ambition to create healthier cities, and long-term decarbonization goals have converged in recent decades to make clean heating and cooling a strategic priority. District energy systems are expanding quickly, driven by the need for reliable baseload heat, reduced dependence on coal, and improved urban livability. With geothermal resources widely distributed and well suited to dense urban environments, geothermal heating and cooling has emerged as a practical, scalable solution, provided it can be delivered with consistency, speed, and long-term performance.

These drivers led to the creation of Sinopec Green Energy (SGE) nearly twenty years ago, a joint venture built to transfer Iceland's proven geothermal energy experience – through Arctic Green Energy – into China, alongside Sinopec's industrial capabilities, construction capacity, and national reach. The partnership was designed from the outset to deliver geothermal heating and cooling as scalable infrastructure.



Today, SGE represents the largest geothermal heating and cooling platform globally. Its systems provide clean heating and cooling to over 120 million square meters of buildings and industrial facilities, serving millions across over 70 cities and municipalities in China. Installed thermal capacity stands at roughly 4.6 GWth, underpinned by more than 1,100 deep geothermal wells drilled to an average depth of 2.2 km.

A Utility-Scale Blueprint for Clean Heat

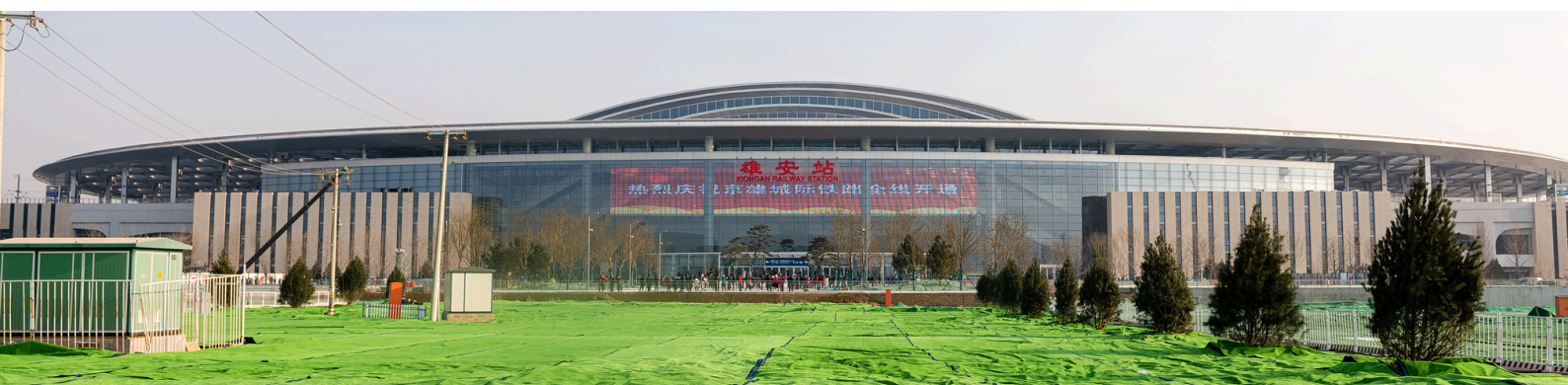
SGE's success lies in a programmatic approach aligned with international best practice. Projects are often developed as standardized systems: clustered wells, modular energy centers, integrated scaling and geosciences management, and long-term operational optimization. This approach reduces technical and financial risk while enabling rapid replication across regions and demand profiles.

Several flagship projects illustrate this model in practice. In Xiong'an New Area, geothermal energy now supplies approximately 96% of the city's heating demand, transforming a former coal-dependent area into a national showcase for clean urban development. At the Xiong'an High-Speed Rail Hub, geothermal systems deliver clean heating across six million square meters, anchoring low-carbon energy supply for critical transport infrastructure. Meanwhile, at Xi'an Xianyang International Airport, geothermal energy provides 48 MW of clean heating across 1.2 million square meters, cutting an estimated 64,600 tonnes of CO₂ annually and demonstrating geothermal's role in large-scale logistics hubs.

The model continues to scale. SGE has secured a development pipeline exceeding 350 million square meters, showcasing that geothermal district energy has moved from demonstration to bankable infrastructure in the Chinese market. Continuous innovation supports this growth, supported by SGE's portfolio of 230+ patents spanning exploration and resource assessment, drilling, cascaded utilization, and re-injection, among other areas.

SGE's geothermal systems avoid over 5 million tons of CO₂ emissions annually, largely by replacing coal-fired heating. Beyond emissions reduction, the model delivers air-quality improvements, energy security, and skilled employment.

For the global geothermal community, the Sinopec Green Energy experience offers a clear lesson: geothermal heat can be scaled when technical expertise is paired with industrial delivery and long-term system thinking. As cities and industries worldwide accelerate the transition away from fossil-based heating and cooling, China's experience shows how geothermal can move rapidly from potential to the backbone of our future infrastructure. ■





→ SETTING THE GEOTHERMAL BAR

China Hosts the Launch of the International Geothermal Standards Committee

One of the most exciting developments in the global geothermal community this year has nothing to do with a well drilling or a power plant — it's about alignment. On 26 November 2025, in Beijing, China, the International Geothermal Standards Committee (IGSC) was officially launched, marking a major milestone for geothermal globally.

This new committee - convened jointly by the International Geothermal Association (IGA) and China Petroleum & Chemical Corporation (Sinopec) - brings together 30 leading experts from 15 countries with a clear mission: to develop harmonised international standards that help the geothermal industry scale with confidence, clarity, and comparability across borders.

Why standards matter may seem obvious to engineers and investors, but when you think about the diversity of geothermal systems, technologies, regulations, and markets around the world, the absence of a shared framework can slow down investment, slow down project delivery, and make international cooperation harder than it needs to be.

Building Trust, Comparability, and Confidence Across Borders

The IGSC aims to change that. In its first plenary meeting, the committee approved its Standard Development Procedures and its 2025–2027 Work Programme, laying out a comprehensive roadmap for standards that span:

- resource exploration and evaluation
- reservoir engineering
- drilling and completion practices
- district heating and cooling
- power generation systems
- shallow geothermal applications



At the launch, leaders from both IGA and Sinopec emphasised the strategic importance of this work. China’s geothermal footprint – including initiatives like the world-recognized “smoke-free city” geothermal heating project in Xiongxin County, Hebei – demonstrates what can be done when national action pairs with global collaboration.



IGA President Bjarni Pálsson said the establishment of the IGSC “transforms a long-standing industry consensus into urgent action” and creates a foundation for geothermal’s next era of growth. Meanwhile, Sinopec’s leadership has stressed that unified, internationally recognised standards will reduce barriers to cooperation, speed technology transfer, and contribute meaningfully to global climate and energy goals.

For a sector that’s moving fast — from emerging markets to gigawatt deployments — having a common language and shared benchmarks is a leap forward. The IGSC, with its global membership and ambitious work plan, will be one of the key platforms shaping how geothermal is developed, measured, and trusted worldwide.

The next milestone for the IGSC will be to present its first recommended practices and engage an even broader community at World Geothermal Congress 2026 in Calgary. Watch this space – standards are becoming strategic infrastructure in their own right. ■



<https://www.worldgeothermal.org/IGSC/>

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