ENERGY SOVEREIGNTY AND THE NEW POWER ARCHITECTURE

"People say we're running out of energy. That's only true if we stick with these old 19th-century technologies." Ray Kurzweil, Futurist

A Crisis of Energy Sovereignty: Lessons from the Strait of Hormuz

The early March 2026 crisis in the Strait of Hormuz has brought a simple fact into sharp relief: roughly 20 million barrels per day of oil (about 20% of global petroleum liquids) transited that chokepoint in 2025.

Similarly, roughly 30% of global LNG exports flowed through Hormuz, mostly from Qatar[1]. In practice, this means that any disruption there can choke supply quickly. In the current crisis, satellite and AIS data showed tanker traffic through Hormuz collapse to near zero from dozens of vessels per day[3]. Analysts estimate that after a week of de facto closure, around 140 million barrels of crude and products were effectively stranded[4], and charter rates and insurance premiums spiked. Reuters reported war-risk insurance rising tenfold (from ~0.25% to ~3% of ship value) on Hormuz routes[5], and regional benchmarks jumped over 20% in days.

Energy leaders are framing this as a sovereignty issue.

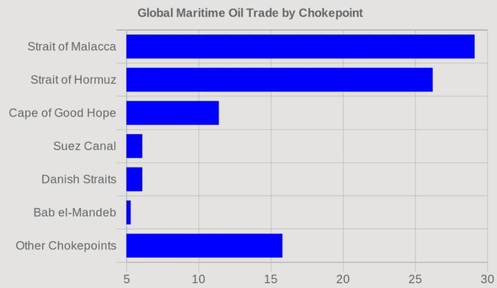
Qatar's energy minister Saad al-Kaabi warned that if attacks continue, "all exporters in the Gulf region will have to call force majeure."[7] European policymakers echoed the theme: EU Energy Commissioner Dan Jørgensen cautioned that Europe must avoid "replacing one dependency with another" as it rushes to diversify away from Russian gas[8].

Obsessing over today's fuel supply blinds us to the larger mission: securing sovereign, clean energy and tackling climate change.

Such statements underline that nations view reliable energy supply as a core security issue, not just a market problem. For many countries, that means being able to generate essential power and heat at home when foreign sources falter and to not depend on any third party country for its supply of fuel, let along power of any source.

Vulnerable Infrastructure and the Case for Decentralization

At the same time, infrastructure vulnerability is coming under scrutiny. The IEA's recent resilience report draws heavily on Ukraine's experience. After Russia launched thousands of drones and missiles at Ukraine's grid, causing massive blackouts in 2024 and 2025, Ukraine rebuilt its network to be more distributed and hardened. The IEA emphasizes that "distributed assets are inherently harder to target and easier to restore"[9]. In concrete terms, this means microgrids and behind-the-meter generation. The U.S. Department of Energy, for example, defines microgrids precisely by their resilience benefit: the ability to "disconnect from the main grid" and keep running locally when the main grid is down[11].



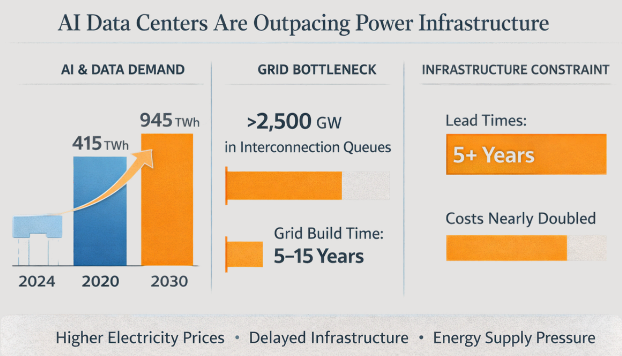
These figures are drawn from U.S. Energy Information Administration data on global oil chokepoints , and highlight how heavily the world's maritime oil trade depends on a few narrow passages.

AI and Data Centers: Surging Demand and Grid Bottlenecks

Meanwhile, a third force is dramatically increasing baseline demand: AI and data centers. The IEA projects global data-center electricity use climbing from roughly 415 TWh in 2024 to about 945 TWh by 2030 (under current policies)[12], a near-doubling in six years.

Accelerated servers (AI hardware) alone drive consumption up ~30% per year. This puts enormous pressure on grids, which are already bottlenecked. The IEA notes that over 2,500 GW of projects (renewables, storage, new loads) were stalled in interconnection queues worldwide, and that building out the grid can take 5–15 years versus just 1–3 years to build a data center[13]. Adding to the crunch, costs of key components (transformers, switchgear, turbines) have nearly doubled in five years.

Equipment vendors now report 5+ year lead times for large gas turbines. The result is a feedback loop: higher capital costs, delayed projects, and higher wholesale prices. In the US, the Energy Information Administration forecast 2026-27 electricity demand growth of ~4% and noted strong upward pressure from big computing centers[14] . Gas prices and power prices in Europe already jumped on March 2026 supply fears.



Global electricity demand from data centers is projected to rise from about 415 TWh in 2024 to roughly 945 TWh by 2030, driven largely by AI computing. At the same time, power infrastructure is struggling to keep pace: more than 2,500 GW of projects are waiting in grid interconnection queues, while building new grid capacity can take 5–15 years and key equipment now has lead times exceeding five years.

Sources: International Energy Agency (IEA), Energy and AI (2025); IEA Electricity 2026; U.S. Energy Information Administration (EIA), 2026 electricity demand outlook.

Putting these threads together, energy sovereignty means having domestic, flexible, decentralized energy options. Staked supply routes look fragile. Targeted grids look fragile. And data centers demand resilient power. The conventional solution, massive new grids and reactors, is slow. Nuclear power infrastructure typically takes ~10-15 years of planning and construction[17, 18].

Renewables and interconnectors also move at grid-pace. In the near term, countries will look to modular, on-site generation to fill gaps. Hot fusion seems promising but is still decades away from being commercially viable, despite claims made by leaders in this sector, who make claims and promises to raise billions in funding from well-known public figures, billionaires and venture capital firms.

Energy sovereignty now also means building power and heat systems that can survive conflict. The recent events reinforce what analysts have long warned: centralized grids and single-supply routes are vulnerable to war. The IEA bluntly notes that "distributed assets are inherently harder to target and easier to restore when damaged." In practice, this means that locally based power and heat sources are essential if a nation is cut off.

Decentralization means scattering many small energy generators across a facility, region or country, rather than relying on a single giant plant. A nuclear reactor, hydro dam or future multi-gigawatt fusion power plant can all be taken out by one well-placed bomb, knocking out an immense amount of capacity at once. In contrast, distributed energy sources are "harder to target" in an attack. An adversary would need to disable dozens or even hundreds of separate units to blackout a decentralized grid. In practice, this means that cutting off energy in a decentralized system would require a vastly larger volume of strikes – making the system much more resilient during war.

Solid-State Fusion and the Quantum Heat Engine (QHe)

One potential solution to address these problems is solid-state fusion, specifically Clean Planet's Quantum Hydrogen Energy (QHe) system. Rather than burning fuel or relying on large reactors, QHe uses metal-hydrogen physics at the quantum level.

In each IKAROS module, hydrogen atoms fusion into nickel/copper plates, triggering low-energy nuclear reactions that produce heat. Each module now delivers 1 kW of targeted energy and the commercial core generators will offer 24 kW of clean thermal energy.
This process is inherently safe: there is no high-temperature plasma, no radiation leak, no need for breakthrough in physics and no high-pressure coolant.
The only inputs are standard hydrogen, which can be produced from water, and a thermal source to start up. Because the reactor core is solid-state, a QHe unit can run continuously into a boiler, emitting only heat, then steam and even or electricity via a generator, with virtually no emissions.

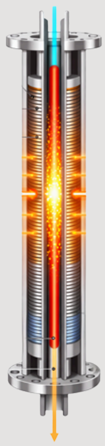
By deploying QHe modules on-site, facilities could be largely self-sufficient for heating and power. For example, a factory could install QHe to provide its process steam without any gas pipeline, or a data center could use QHe-driven generators to back up utility power or eventually to be a 50MW main source of power.

Clean Planet emphasizes that this is a way to "decouple" from foreign fuel and grid vulnerabilities. In essence, each reactor becomes an independent, mini power plant, exactly the kind of decentralization energy strategists say is needed.

Clean Planet's Vision for Decentralized Energy Independence

Clean Planet has been developing this approach for years.
Founded in 2014, the company now counts major industrial partners and investors. In 2021 it announced a partnership with Miura Co., Ltd. (a leading boiler manufacturer) to adapt QHe to industrial boilers. In 2022 it entered a capital and business alliance with Mitsubishi Corporation to accelerate commercialization. Other backers include Mitsubishi Estate and strategic energy funds.
In 2025, the Tokyo Metropolitan Government awarded Clean Planet a ¥1 billion grant to build full-scale prototypes.

The company reports that prototype QHe reactors in its Tokyo labs have already generated measurable excess heat. It is now moving toward commercial units: next-generation IKAROS modules are designed to output 24 kW each, with plans to combine modules into multi-megawatt systems.



Unlike plasma-based fusion, which requires confinement of hydrogen isotopes at over 100 million degrees Celsius, Clean Planet's Quantum Hydrogen Energy (QHe) operates within a solid metal lattice at temperatures below 900 °C. Hydrogen atoms penetrate the nanostructured lattice, where quantum effects within specific defects appear to trigger a form of nuclear-level heat release. The process emits no neutrons, gamma rays, or radioactive by-products, making it safe for direct industrial deployment.

Hideki Yoshino, CEO of Clean Planet, presenting the company's solid-state fusion technology and its potential for decentralized industrial heat and power at ADIPEC, Abu Dhabi, November 2024.

> "The goal is not to build the world's largest reactor. The goal is to build millions of small ones that together transform how energy is produced."

> **Hideki Yoshino, CEO, Clean Planet**

Clean Planet highlights the technology's advantages for security and cost. The reactors contain no radioactive fuels or materials, so they pose no radiation hazard and require less regulatory overhead. They produce high-temperature heat in a fraction of the footprint of a fossil-fueled boiler. Clean Planet executives claim that QHe could eventually undercut the cost of imported gas or diesel for heat, offering "the cheapest available solution" for on-site energy. While full cost data await larger-scale testing, the company argues that solid-state fusion will reach market far sooner than the elusive hot fusion power plants under development, and at lower capital cost than building new nuclear plants, small modulable reactors or LNG terminals.

In the current energy-security climate, Clean Planet's pitch is straightforward: their solid-state fusion reactors could supply independent heat and electricity where it's needed most, ensuring that a war or embargo cannot shut down key services. The proof will be in the field, but the technology is now backed by decades of research and major industry partners. For nations and industries seeking true energy autonomy, such modular reactors represent a new path, one that promises decentralized, self-contained power sources ready for a turbulent world.

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