Electricity Matters

Paul A. DeCotis

Energy's Role in National Security

The relationship between energy security and national security is indisputable. We are seeing growth in energy use worldwide and for electricity, like we have not seen in decades. The *global energy review* found that global energy demand grew by 2.2 percent last year, which was faster than the average annual increase of 1.3 percent over the previous 10 years.[1] Electricity demand saw the most significant growth at 4.3 percent, well above the 3.2 percent growth in global gross domestic product (GDP). Electricity demand growth is being driven by global record temperatures, electrification of buildings, transportation, and industries, and digitalization of business operations and use of machine learning and acritical intelligence (AI) to support business operations. The growth in new energy supplies is also growing to meet this demand. Renewable energy sources, for example, accounted for the largest share of the growth in global energy supply (38 percent), followed by natural gas (28 percent), coal (15 percent), oil (11 percent) and nuclear (8 percent).

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The challenges faced globally for all countries is to continue making significant investment in energy infrastructure to support economic growth, social well-being, and national security. Support for energy infrastructure investment across the globe, including for traditional fuels and technological innovations in power generation, are supporting a wide variety of new and innovative energy supply options.

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energy storage is important for national security in the US.

The US has been energy independent for decades and with the proliferation of renewable energy and long duration storage, it can remain so for decades to come. Enhanced national security comes with domestically sourced energy—the US can continue to be free from geopolitical influences disrupting energy supplies for decades to come. Developing domestic manufacturing of components and equipment to serve the energy sector would further insulate the US from global supply chain disruptions.

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WORLD'S OIL AND NATURAL GAS RESOURCES[2]

The US has the world's largest recoverable oil reserve base in the world, greater than that of Saudi Arabia or Russia. This is due in large part to innovations in exploration and drilling. "Ranking nations by the most likely estimate for existing fields, discoveries and as-of-yet undiscovered fields (proved, probable, possible and undiscovered), the US is at the top of the list with 264 billion barrels of recoverable oil reserves, followed by Russia with 256 billion, Saudi Arabia with 212 billion, Canada with 167 billion, Iran with 143 billion, and Brazil with 120 billion."[3]

Iran accounts for approximately 16 percent of the world's share of natural gas resources, with 32 tcm (1,131 trillion cubic feet). Qatar has proven natural gas reserves of 24.7 tcm (872 trillion cubic feet), accounting for more than 12 percent of the world's total. Qatar is also the top producer of liquefied natural gas (LNG), and along with Australia the largest exporter of LNG. Turkmenistan in Central Asia has the fourth-largest natural gas reserves in the world, totaling 19.5 tcm (688 trillion cubic feet), which is equivalent to a 9.8 percent share of the world's total. The US holds a 6.5 percent share of global natural gas reserves, with proven resources of 12.9 tcm (455 trillion cubic feet). Production skyrocketed over the past 15 years due to the shale fracking revolution that has also helped the US increase oil production, becoming the world's largest oil-producing nation.[4]

NATIONAL SECURITY

Over the next five years, the US anticipates a 5 to 10 percent increase in electricity demand, driven by industrial and manufacturing expansion in the US and greater use of electricity fueling the economy. Meeting this demand is an immediate need. To support economic and job growth, the US needs to increase power generation and double or even triple our investment in grid infrastructure to connect loads and move power seamlessly between regions with excess generating capacity and those in need.

The US ranks fifth globally for natural gas reserves, behind Russia which has the world's largest natural gas reserves, with a total proved resource of 38 trillion cubic meters (tcm) or 1,341 trillion cubic feet. That is equivalent to approximately 19 percent of the world's total reserves.

Government support remains necessary, yet as such, policymakers should avoid the tendency to pick winning technologies, and rather support research, development, demonstration, and commercialization of technologies that show the greatest market

promise—something the US Department of Energy, National Laboratories, and states have done for years. A broad portfolio of power generation options and robust delivery infrastructures to serve loads will provide sufficient capacity and necessary redundancy to meet these needs and protect and enhance our national security.

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The broad portfolio mix of resources eliminates dependency on any single resource or delivery route and strengthens reliability and resiliency of our energy systems. And, to the extent power generation resources use domestic indigenous fuels, be they fossil or renewable, the US would be largely shielded from economic shocks due to geopolitical risks that can disrupt energy supplies and delivery thereby strengthening national security.

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In 2023, the US witnessed a record-breaking 31 gigawatts of installed solar energy capacity in the US, signaling the immense potential of renewable energy. Even as political winds shift, the imperative for investment in renewables remains—and when coupled with energy storage technologies, renewables represent a locally sited domestic energy source able to meet loads and provide grid stability. Viewed from a defense and national security perspective, the US would remain energy self-sufficient for decades to come. Our national security hinges on a robust and resilient energy ecosystem that relies on domestic and indigenous resources like renewable energy to complement fossil fuels that can withstand future and geopolitical uncertainties.

As noted earlier, the US has been energy independent for over two decades and is a net exporter of oil, natural gas, and coal. With the current federal policy focus redirected toward mining, drilling, and refining fossil fuels, such increases if they occur will be exported to other parts of the world. Considering the relatively low market prices today for fossil fuels in the US, and the large investment needed to expand fossil fuel production in the US, it is unlikely that we will see significant new supplies hit the market any time soon. Capital markets are leery of investing in risky assets particularly with the threat of tariffs significantly disrupting trade.

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New investments in fossil fuel production do not pencil out easily in the current market environment for domestic use. While the export market remains robust, particularly for LNG, any significant increase in exports will simply risk the US depleting its fossil fuel supplies more quickly than would otherwise be the case, thereby putting the US national security at future risk.

Renewable energy is a critical component of our energy future, just like nuclear power, natural gas, and potentially hydrogen, in ensuring a diversified and resilient energy mix. Nuclear power, particularly through small modular

reactors (SMRs), offers a promising solution for providing consistent, low-carbon energy operating around the clock. SMRs and renewable energy sources can be deployed in various configurations, such as repurposing existing fossil fuel sites or providing dedicated power to industrial customers. Yet, while we wait for SMRs and green hydrogen to be economic, conventional renewable energy resources coupled with fossil fuel resources will guarantee our energy security thereby strengthening our national security.

Natural gas, with advancements in carbon capture technology, continues to serve as an important fuel, supporting grid reliability. Hydrogen, especially green hydrogen, presents a long-term opportunity for sustainable indigenous energy supplies to support economic growth. Its potential applications in transportation, and buildings combined with fuel cells, and manufacturing, and energy storage make it a versatile and emission-free component of our future energy landscape. Integrating these diverse energy sources will create and sustain a robust energy strategy that supports both economic growth and national security.

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ENERGY AND NATIONAL SECURITY

Thomas Wackman (April 2023)[5] explains the relationship between energy and national security well. Nations go to enormous lengths to guarantee energy supplies, and for good reason. Lack of reliable and affordable energy can produce severe social unrest and inflame conflict between and among nations.

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As Wackman notes, the US was thrown into economic turmoil and social unrest when the supply of oil was interrupted in the late 20th century. By the 1970s, US domestic oil production was rapidly declining with existing reserves running low. At the time, hydraulic fracturing technology which in the early 2000s unlocked oil and natural gas within shale formations was still three decades away. Domestic production peaked in 1970, and foreign oil imports rose to make up over 50 percent of all US consumption less than a decade later. This coincided with the postwar automobile boom, which saw the number of automobiles in the US more than double between 1950 and 1970. "To put it simply, the United States was consuming more and more foreign oil at a faster and faster rate. Still more significant was the source of much of this oil: the Middle East."[6]

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well as security controls—both physical and cyber—that protect these critical services for civilians and defense interests alike. The stakes have never been higher. Cyber adversaries are becoming more sophisticated, and the potential impact of an attack on our critical infrastructure could be catastrophic.

And with more devices connected to the grid our critical infrastructure has more points of access for bad actors to try and compromise our energy systems. It is essential that the US adopt a proactive stance, leveraging advanced technologies and fostering collaboration among all stakeholders to enhance the resilience of our infrastructure. Our energy system is not solely about technology; it's about building a secure and integrated system that aligns with our economic and national security goals.

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By fostering collaboration between government, industry, and communities, we can ensure a future that supports our economic prosperity and national security.

CONCLUDING THOUGHTS

The US, like other countries across the globe, are facing an existential crises. More frequent and severe weather events are causing havoc. The National Centers for Environmental Information reports that in 2021 alone, there were 20 billion-dollar weather disaster events across the US costing about $145.0 billion in damages. 2021 was the third most costly year on record. The total cost for the last five years is estimated at $764.9 billion which is more than one-third of the disaster cost total of the last 42-years, which exceeds $2.2 trillion (inflation-adjusted to 2021 dollars). This reflects a 5-year cost average of nearly $152.9 billion per year. 2021 also followed the year 2020 that set the new annual record of 22 events. 2021 is the seventh consecutive year (2015–2021) in which ten, or more billion-dollar weather and climate disaster events have impacted the United States.

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As reported by National Centers for Environmental Information, the average cost per event by disaster types are the following:

1. Tropical cyclones have the highest average cost per event of $20.3 billion.
2. Drought/heat waves have an average cost of $10.0 billion per event.
3. Wildfires have an average cost of $6.2 billion per event.
4. Flooding events have an average cost of $4.7 billion per event.
5. Winter storms have an average cost of $4.1 billion per event.
6. Deep freezes have an average cost of $3.7 billion per event.
7. Severe storms have an average cost of $2.3 billion per event but are the most frequent disaster type.[7]

The linkage between national security and energy security is indisputable. The linkage between economic security and social well-being, and energy use is now an existential threat. As climate disasters threaten our economic and social well-being, they too are linked to energy use and our energy and national security.

National security in the US hinges on a robust and resilient energy ecosystem that relies on domestic and indigenous resources

like renewable energy to complement fossil fuels that can withstand future and geopolitical uncertainties. And a diverse mix of non-polluting energy resources coupled with innovations in fossil energy production contributing to a more climate friendly ecosystem, enhances our economic, social, and national security interests.

NOTES

[1] International Energy Agency. (2025). *Global energy review 2025: Key findings. Paris: International Energy Agency.* https://bit.ly/4lhxA2t.

[2] The term "resource" used this Column refers to the amount of a geologic commodity that exists in both discovered and as of yet undiscovered deposits—representing a best guess, while "reserves" refer to the resource that has been discovered with a known size, and which can be extracted at a profit.

[3] Nysveen, P. M.. (April 2, 2025). U.S. holds most recoverable oil reserves. *The American Oil & Gas Reporter.* https://bit.ly/3FV5JVq.

[4] Fawthrop, A. (2021, March 15). Profiling the top five countries with the biggest natural gas reserves. *NS Energy.* https://bit.ly/3EfnYV7.

[5] Wackman, T. (2023, April). *Energy security is national security. Prepared for Institute for Energy Research, Washington, DC.* https://bit.ly/3GdA5m4.

[6] Ibid.

[7] National Centers for Environmental Information. (2022, April 21). *Calculating the cost of weather and climate: Seven things to know about NCEI's U.S. billion-dollar disasters data.* https://bit.ly/4hZ9SF7.