U.S. Municipal Bond Market

# AI is Racing Ahead and Energy Infrastructure Needs to Catch Up

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- The biggest bottleneck for Artificial Intelligence (AI) isn't algorithms or chips—it's electricity. U.S. energy capacity is running close to the edge, and that's potentially not just an economic problem.
- By 2028, AI could demand 50 gigawatts of additional power. By 2030, that number could hit 90 to 100 gigawatts, about eight percent of today's total capacity. An ambitious goal? Yes. Impossible? No. But it will take careful infrastructure planning and policy choices that don't blink.
- Growth must be smart. **Taxpayers should carry minimal to no risk.** The private sector, especially the tech giants driving this surge, **must shoulder the financial burden**. If they don't, progress will slow, and the political appetite could fade.
- Financing matters. Proven tools like tax-exempt municipal bonds can deliver cost-effective funding when they fit. But outdated IRS rules are slowing progress. **Modernizing those rules and protecting the municipal bond tax-exemption is not optional. It's critical.**

## Energy Infrastructure is the Bottleneck

Artificial intelligence is scaling faster than our energy system can support. The path to artificial general intelligence (AGI) is not limited by chips, algorithms, or compute—it's limited by electricity. Energy. That's the part many people miss. If the United States falls behind, the consequences could extend across the country's economic and national security interests. Global competitiveness could erode, innovation could slow, and critical infrastructure could become increasingly vulnerable to strategic and financial risks.

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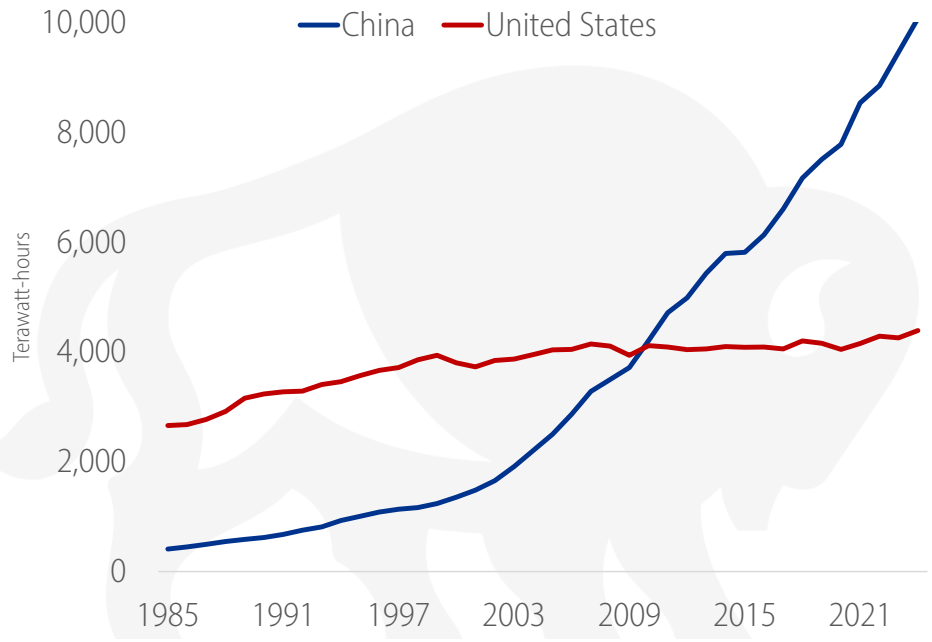
### Electricity Generation




Source: Our World in Data and HilltopSecurities.

*Please see disclosure starting on page 8*

Here's the kicker: the United States' energy infrastructure entered 2025 with a "D+" grade from the American Society of Civil Engineers, below the overall "C" grade assigned to all of America's infrastructure in the ASCE's 2025 Infrastructure Report Card. This below-average grade for U.S. energy infrastructure is not an optimal foundation for a resilient, future-ready energy system. But it's not a dead end. It's a starting line. The future of U.S. energy can catch up to AI's pace, but only if investment and policy move with clarity and urgency. That is the challenge now, not a question of possibility but of timing, execution, and cooperation.

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AI data centers, a demand that barely registered before 2023, are now arriving with the force of wide-body jets landing on rural airstrips. Meanwhile, much of the U.S. power grid still resembles a narrow, aging two-lane road—built for yesterday's traffic, not the surge now accelerating toward it. This isn't a critique of past planning, but a recognition that **the landscape has very quickly changed**, and the response must change with it. Compute, training, and deployment are scaling exponentially. Energy capacity is already the top constraint for near-term and future AI development. Public and private players are scrambling and afraid of losing ground.

The need isn't just about powering servers. It's about the broader electrification of vehicles, robots, industry, and homes of tomorrow, which are all competing for the same supply. Data center growth must be matched with serious electrification planning, or the U.S. energy capability risks bottlenecks that stall both AI progress and the transition to a modern electrified economy.

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This is the new era of AI, infrastructure, and growth. On the ground, it means massive power demands arriving at industrial sites on timelines measured in months, not years. These projects require electricity at the scale of entire cities, and they're coming faster than traditional utility planning and policy can handle. Public and private sector players that act early can attract investment, secure revenues, and drive long-term growth by aligning zoning, permitting, and financing strategies with grid reliability, while those that delay risk gridlock, stranded costs, and missed opportunities in a landscape where collaboration between the private sector, developers and governments is essential to meet AI-driven power demand.

## The Grand AI Bargain

Ben Buchanan, formerly a White House Special Adviser for Artificial Intelligence and Tatum Collins, formerly Director for Technology and National Security on the National Security Council wrote in The Grand AI Bargain:

> "Protecting American AI leadership is not just a matter of pride. It is essential to U.S. national security and economic competitiveness."

They argue that private-sector innovation alone is not enough. A new model must be built on a partnership between the private technology sector and government at different levels. The tech sector can help governments deploy AI. Governments can help the tech sector grow in ways that benefit the country's economic and national security interests.

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## Protecting the Public: Ensuring Innovation Doesn't Come at Taxpayers' Expense

Such a partnership model is ideal, but any approach must confront the hard financial realities, political risk, and the very real challenges on the ground. The scale and speed of these projects create real risks for current ratepayers and taxpayers, and **those risks should not fall disproportionately on the public**. Private companies—particularly large technology firms—and their investors, who stand to benefit most from the AI-driven surge in electricity demand, should shoulder a significant share of the financial responsibility for the necessary infrastructure upgrades. Government should play an enabling role by providing clear policy frameworks, streamlined approvals, and targeted support. At the same time, direct financial risk to governments and especially to current ratepayers and taxpayers should remain extremely limited. Maintaining this balance ensures growth is pursued responsibly, protecting communities and lawmakers' desires while unlocking the transformative potential of AI-driven infrastructure and paving the way toward artificial general intelligence.

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Between now and the early 2030s, credible estimates suggest that AI-driven data centers will require tens—possibly hundreds—of gigawatts of new electric load. Meeting this demand will take coordinated action from public and private entities that include but are not limited to investor-owned utilities, public power providers, and electric co-ops, supported by a strong and strategic partnership between the public and private sectors. What lies ahead is a surge in energy demand, a race to mobilize capital, and inevitable policy challenges. To keep pace, we need practical solutions that align infrastructure investment with the speed and scale of AI development.

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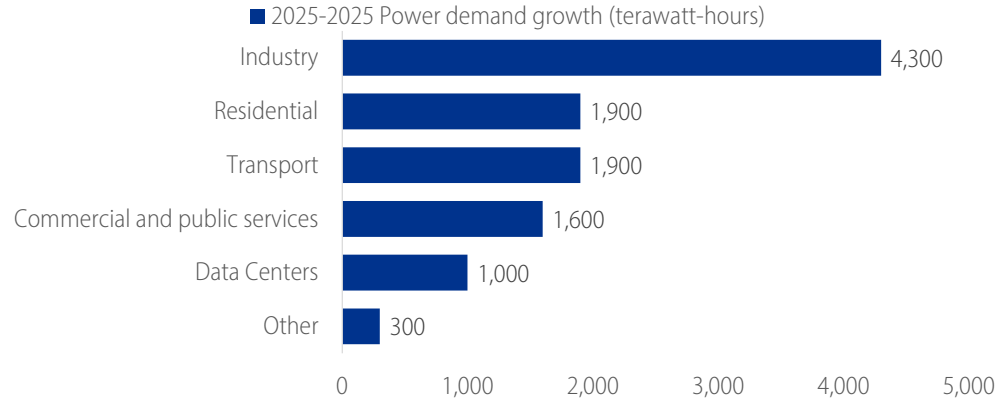
The next challenge is understanding the size and urgency of the **demand gap**—and what it will take to close it.

## Rising Energy Needs

Global electricity demand is projected to climb by about 30% over the next decade as electric vehicles, heating and cooling systems, and industrial sectors like iron and steel drive consumption, according to Rystad Energy. While these legacy sectors remain dominant, a notable new force is emerging: AI-driven data centers. Their share of global demand may still be modest at 3.5% by 2035, but the pace and concentration of their growth make them strategically significant. This global trend underscores an even more urgent challenge at home—the widening U.S. energy demand gap fueled by AI's unprecedented power appetite.

## Global Power Demand is Set to Rise 30% in Next Decade

Data center use to grow to 3.5% of total from 1.5%




Source: Rystad Energy, Bloomberg and HilltopSecurities.

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## The U.S. Demand Gap: AI's Power Appetite, by the Numbers

Let's review some numbers. In testimony before Congress this past spring, **Dr. Eric Schmidt**, CEO of Relativity Space and former Google CEO, didn't mince words. Schmidt warned D.C. lawmakers that AI-driven data centers are now demanding "1 to 5, even up to 10 gigawatts of power" each (page 1). For perspective, one gigawatt is equivalent to about one large nuclear reactor. Dr. Schmidt says 90 gigawatts could be needed by 2030.

*Anthropic argues the U.S. needs at least 50 gigawatts of electric capacity by 2028 to maintain global AI leadership.*

Schmidt isn't an outlier. Across the strategy landscape, thought-leaders, private industry and think-tanks are converging on the same storyline for the rest of this decade:

- **Anthropic** argues the U.S. needs at least 50 gigawatts of electric capacity by 2028 to maintain global AI leadership.
- **Bain & Company** writes: "AI's computational needs are growing more than twice as fast as Moore's law, pushing toward 100 gigawatts of new demand in the U.S. by 2030" (page 31).
- **Deloitte's** 2025 Infrastructure Survey projects that "power demand from AI data centers … could grow more than thirtyfold, reaching 123 gigawatts by 2035" (page 1).
- **RAND** estimates global power demand will surge by roughly 68 gigawatts by 2027 and 327 gigawatts by 2030 (page 2).
- The 29 members of the **Large Public Power Council** are projected to invest at least $140 billion over the next decade to build approximately 60 gigawatts of new generation and transmission capacity. (3:22)

Even with conservative adjustments to the above forecasts, the trend is clear. AI is creating sustained, high-density, often geographically concentrated demand. This strains interconnections, transmission systems, and local distribution networks.

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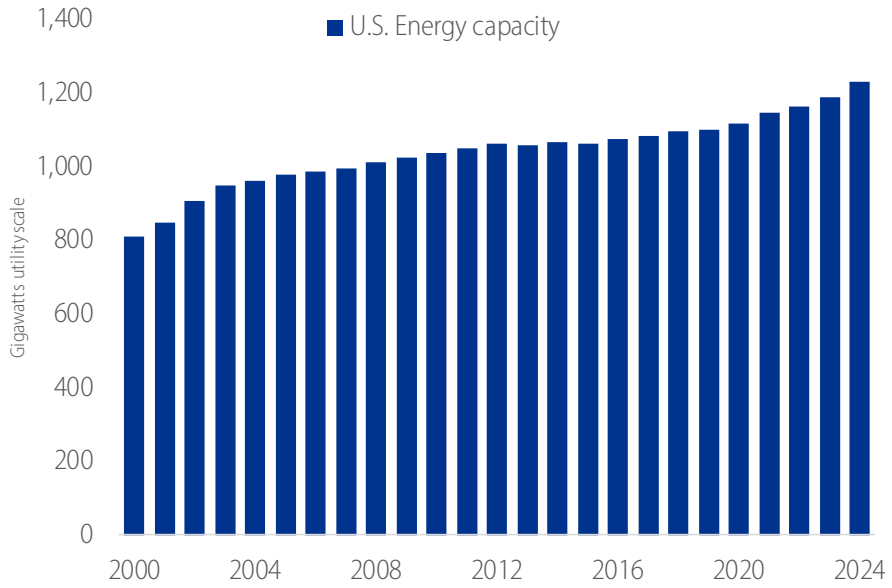
*Artificial intelligence is advancing rapidly, but the infrastructure needed to support it is lagging.*

### The U.S. Has About 1,200 Gigawatts of Energy Capacity




Source: U.S. Energy Administration and HilltopSecurities.

## How to Meet the Moment

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The status of United States infrastructure stands at a pivotal moment. Remember, we noted in our introduction that the United States' energy infrastructure entered 2025 with a "D+" grade from the American Society of Civil Engineers, not an optimal starting point. Artificial intelligence is advancing rapidly, but the infrastructure needed to support it is lagging. This is not just a technology challenge. It is a **national public infrastructure challenge** with implications for economic growth, strategic competitiveness, and global leadership.

The scale of what lies ahead rivals some of the most transformative infrastructure efforts in American history. The interstate highway system linked the nation, reshaped commerce, and provided an national security connection. Rural electrification brought power to underserved communities and unlocked new economic potential. The Space Race accelerated innovation and potentially most importantly defined a generation of leadership. The U.S. energy buildout belongs in this category. It will reshape industries, redefine productivity, and determine which nations lead in the next era of global competition. Like these examples and especially the Manhattan Project, the U.S. energy buildout demands urgency, coordination, and focused investment.

To meet this moment, policy must move with urgency. Processes need to be streamlined to accelerate infrastructure deployment. Federal and state incentives should support grid modernization and the development of high-density load zones essential for artificial intelligence.

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Public-private partnerships can play a critical role in aligning resources and timelines. Collaboration among utilities, technology firms, state and local governments, and other public entities is vital. Working together, rather than in silos or competition, will ensure more efficient and effective outcomes.

Financing tools must also evolve or at least continue to exist. Tax-exempt municipal bonds, where permitted by the tax code, can provide cost-effective funding for grid upgrades. Green and transition bonds offer a way to attract ESG-focused investors to projects that advance both AI and electrification goals. These mechanisms are proven and can be scaled quickly with the right focus and policy support.

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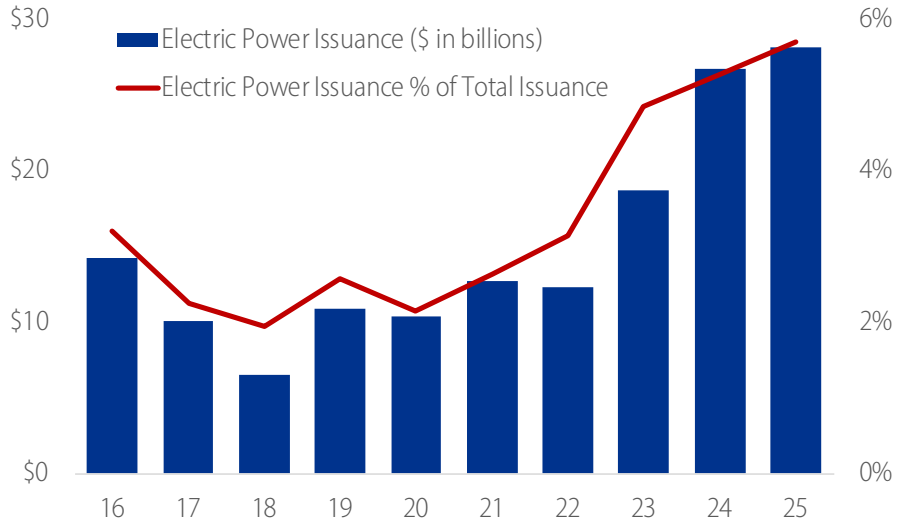
## Electric Power Municipal Issuance is Rising




**Source: Arizent, Refinitiv and HilltopSecurities.**

Government and private-sector leaders have made meaningful progress, but the challenge ahead calls for greater attention, reinforcement, and advocacy. Closing the demand gap will require additional action. The following are key starting points. This is not an exhaustive list, and other measures will likely be needed, but these examples reflect steps already taken or proposed that point toward the path forward:

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- **Executive Action:** In January 2025, President Trump issued an executive order declaring a national energy emergency and directing the U.S. to strengthen the reliability and security of the electric grid. The policy calls for using all available power generation resources, prioritizing secure fuel supplies to meet rising electricity demand.

  A second order in May 2025 accelerated deployment of advanced nuclear reactors to power military bases and AI data centers, now designated as critical to national security. It reduces regulatory and funding barriers to help private companies build, fuel, and export these reactors on an aggressive timeline.

- **Department of Energy Memo:** In late October, the Department of Energy (DOE) directed the Federal Energy Regulatory Commission to expand its authority over connecting large energy loads (above 20 MW) to the grid, accelerating integration. This move responds to surging electricity demand from AI and manufacturing, which DOE says will require unprecedented power levels. FERC was asked to finalize action by April 30, 2026.

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- **IRS Rules:** Outdated IRS "private use" rules prevent public power utilities from signing long-term contracts needed for major infrastructure investments. The Large Public Power Council (LPPC) and the American Public Power Association (APPA) are urging Treasury and IRS to update these rules, which could potentially unlock billions over time in grid upgrades.

- **Municipal Bond Advocacy:** The LPPC and the APPA have continually emphasized the critical role of the municipal bond tax-exemption plays as a cornerstone of infrastructure financing. In addition, the LPPC and APPA have also both advocated for the reinstatement tax-exempt advance refunding bonds and for an increase to the small-issuer exception limit from $10 million to $30 million.

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## Protect the Tax-Exemption

It may seem redundant to call for protecting the municipal bond tax-exemption, but given federal uncertainty, continued education and advocacy are essential. The Big Beautiful Bill (BBB) of 2025 did not use tax-exemption as a pay-for, yet it added $4–$5 trillion to the federal deficit which makes the threat to the tax-exemption even greater—though the threat is not imminent, as no current legislation targets it.

Still, low-grade attacks persist. In August, a new think tank floated eliminating the tax-exemption as a potential tax-policy offset. In late October, another analysis proposed alternatives to this vital financing tool. Protecting the municipal bond tax-exemption remains critical as federal deficit pressures and tax-policy debates resurface. While the Big Beautiful Bill of 2025 left the tax-exemption intact, persistent proposals from think tanks and policy analysts signal ongoing risk. Continued education and advocacy are essential to safeguard this financing tool and potentially advance measures to potentially restore advance refundings and to expand the small-issuer flexibility.

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## Lead or Lag: A Choice That Defines the Future

The race toward AI-driven innovation must prioritize closing the power gap and recognizing the role of energy infrastructure in economic strength and national security. Leadership from both public and private sectors will be decisive, and choices made today will determine whether the United States leads or falls behind. Progress has started, but momentum depends on focused action: streamline processes, modernize financing rules, protect the municipal bond tax-exemption, and align resources. Delay is not neutral; it raises costs and erodes competitiveness, shaping not just the next decade but America's infrastructure and innovation for generations.

## Recent HilltopSecurities Municipal Commentary

- Municipal Issuance Moves Toward Stability with $555 Billion Expected in 2026, November 3, 2025
- No Major Scares for Municipal Investors in October as Momentum Holds, October 27, 2025
- Preserve Wealth, Capture Yield with Municipal Bonds as Concern Mounts, October 20, 2025
- October's Municipal "Moment" Continues to Unfold Amid Market Uncertainty, October 15, 2025
- The Municipal Bond "Moment" Persists—But Cracks Are Forming, October 6, 2025

Readers may view all of the HilltopSecurities Municipal Commentary here.