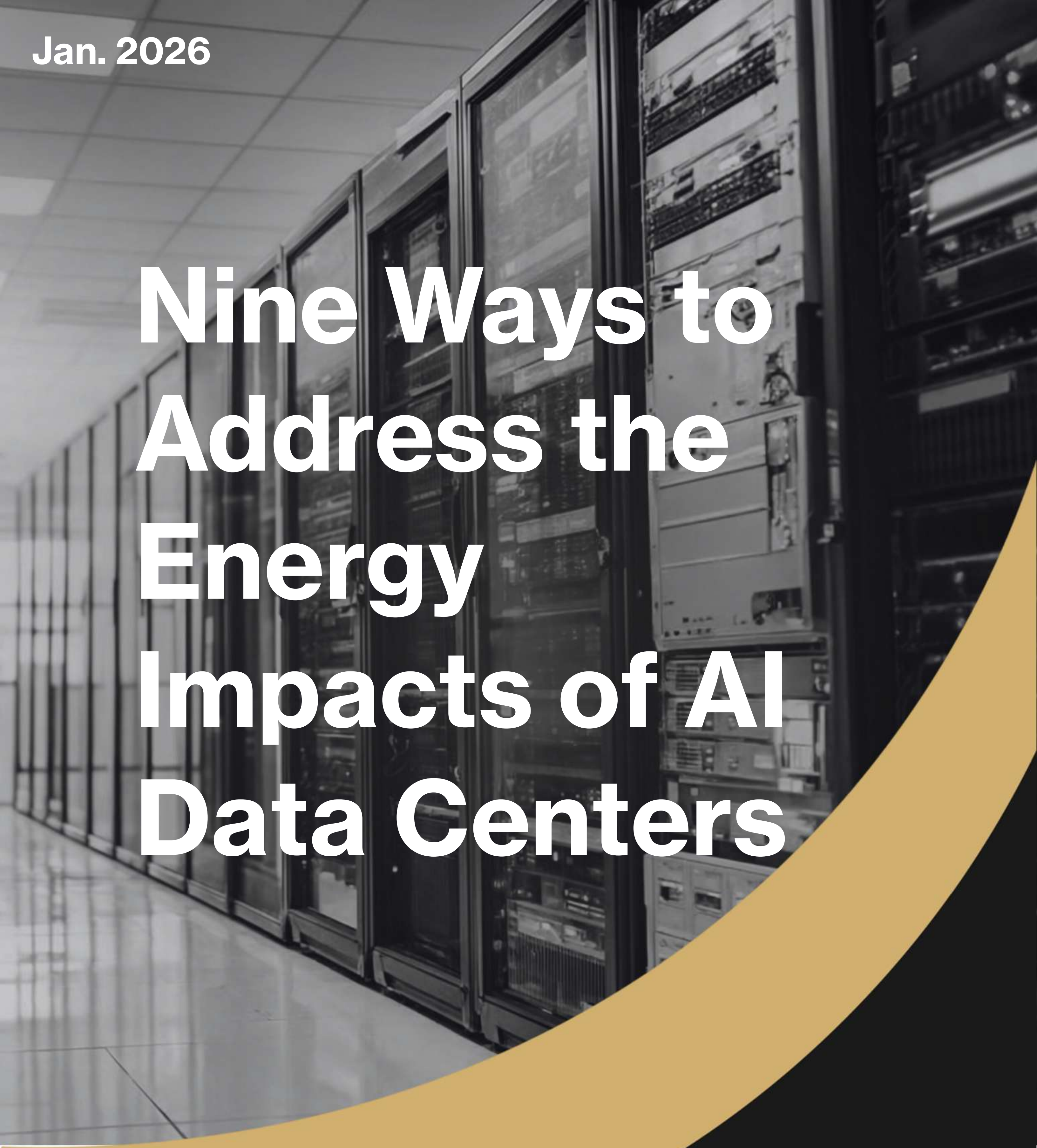
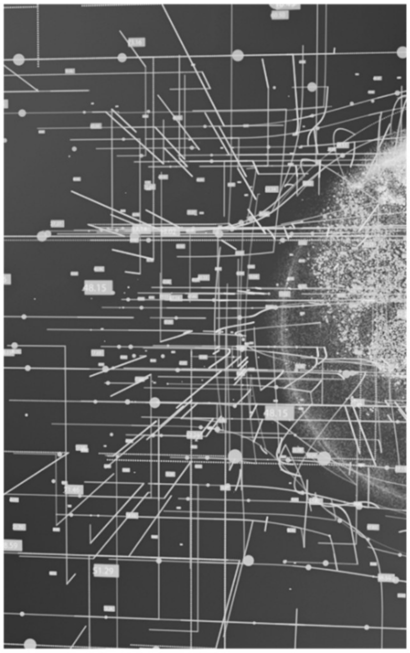
Jan. 2026



Nine Ways to Address the Energy Impacts of AI Data Centers

Vanderbilt Policy Accelerator

VANDERBILT UNIVERSITY



ABOUT THE VANDERBILT POLICY ACCELERATOR

The Vanderbilt Policy Accelerator focuses on cutting-edge topics in political economy and regulation to swiftly bring research, education, and policy proposals from infancy to maturity.

ABOUT THE AUTHORS

Matthew McHale provides policy recommendations, research, and analysis to the electric utility industry as an independent consultant.

Hannah Wiseman is a professor at Penn State Dickinson Law and in the Penn State Department of Energy and Mineral Engineering, and she co-directs the Center for Energy Law and Policy.

Acknowledgements: Many thanks to Eliza Martin and Ari Peskoe for comments on an earlier, longer draft of this paper. All errors and views expressed here are our own.

Table of Contents

Introduction

The development and use of artificial intelligence (AI) has led to a massive build-out of data centers.[1] Data centers are projected to increase their electricity use from 4.4% of total US electricity use in 2023 to between 6.7 and 12% in 2028, with some utilities projecting their peak demand will increase 50% by the end of the decade.[2]

The sheer number of new data centers and the individually large "load" (demand) of each data center contribute to this phenomenon: a single hyperscale data center can use more electricity than 80,000 households.[3] The electricity and infrastructure required to serve data centers is adding to the cost of replacing, modernizing, and hardening our aging electricity grid. And prices are projected to rise because of data centers. For example, in Virginia, experts project that residential consumer electricity rates could increase by as much as $14 to $37 monthly in real dollars by 2040 (independent of inflation) due to the increase in electricity demand.[4] Even more worrying is that households are already losing electrical service because they can't

---

[1] For AI demand growth, *see, e.g.*, ARMAN SHEHABI ET AL., LAWRENCE BERKELEY NATL. LAB., 2024 UNITED STATES DATA CENTER ENERGY USAGE REPORT at 5-6 (2024). For peak demand increases in PJM, see Paul Gerke, *Virginia calls for technical conference to address electric utilities and load growth*, FACTOR THIS (Oct. 4, 2024), https://www.renewableenergyworld.com/news/virginia-calls-for-technical-conference-to-address-electric-utilities-and-load-growth/. Other, lesser factors contributing to growing electricity demand in some US regions include consumer adoption of electric vehicles and the electrification of heating and other functions in homes and businesses. NORTH AM. ELECTR. RELIABILITY CORP., 2024 LONG-TERM RELIABILITY ASSESSMENT at 31 (2024), https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_Long%20Term%20Reliability%20Assessment_2024.pdf (noting rising demand due to electric vehicles and the electrification of heating).

[2] Shehabi et al., *supra* note 1, at 5-6.

[3] Based on average household consumption of 10,566 kWh/yr U.S. Energy Info. Admin., *Table CE2.1 Annual Household Site Fuel Consumption in the U.S.—Totals and Averages, 2020, in Residential Energy Consumption Survey (RECS) 2020* (2023), https://www.eia.gov/consumption/residential/data/2020/index.php; and a 200MW hyperscale data center operating at a 50% load factor or an 125MW AI training data center operating at an 80% load factor (load factors from Shabi et al, *supra* note 1, at 27.); Phillip Marangella, *The Gigawatt Era: From Hyperscale to Exascale*, FORBES (Feb. 29, 2024), https://www.forbes.com/councils/forbestechcouncil/2024/02/29/the-gigawatt-era-from-hyperscale-to-exascale/ (noting emerging "exascale" data centers "potentially housing 100 MW to 500 MW in stand-alone facilities").

[4] JOINT LEGISLATIVE AUDIT & REV. COMM'N, DATA CENTERS IN VIRGINIA, REP. NO. 598 at v (2024).

afford to pay bills that are rising for many reasons, such as utilities' investments in grid protections for extreme weather.[5]

Policymakers around the country need a playbook to address this problem. In this paper, we offer nine ways for policymakers to address extraordinary energy use of data centers stemming from AI.[6] These are broken down into two categories: (I) protecting households, consumers, and communities, and (II) facilitating reliable and resilient energy supply. Data centers and AI raise a host of other critical societal issues, including, for example, water use, land use, air pollution (from on-site back-up generation, co-located generation, or off-site generation), stalled progress toward low-carbon electricity, AI-driven job losses, the U.S. position within the global economy, and national security questions.[7] This paper focuses solely on the growing electricity use of data centers and implications for electricity prices and reliability.

I. Protecting Households, Consumers, and Communities fom Rate Increases

The Goal: New and proposed data centers should not drive up rates for residential, commercial, and smaller industrial customers.

The retail rate for residential, commercial, and industrial customers is driven by the wholesale cost incurred by utilities to generate and purchase electricity, transport this electricity long-distance over transmission lines, and distribute it to customers.

---

[5] This is already happening. CLIMATE ONE, *Dead Heat: The Danger Of Home Power Shutoffs* (June 20, 2025), https://www.climateone.org/audio/dead-heat-danger-home-power-shutoffs (quoting Jean Su, who reported that "[r]ight now the United States is facing an epidemic of shutoffs with over 665,000 households who were shut off in 2024"); SANYA CARLEY, DAVID KONISKY, & EMILY NASH, ENERGY JUSTICE LAB., ELECTRIC UTILITY DISCONNECTIONS: LEGAL PROTECTIONS & POLICY RECOMMENDATIONS 2 (2023) ("In 2022, utility providers across the country reported disconnecting nearly 3 million households from service, though this is a drastic underestimate of the actual number of disconnections due to limited national reporting requirements.").

[6] This policy toolkit could also apply to any large consumer of energy.

[7] Noman Bashir et al., *The Climate and Sustainability Implications of Generative AI*, MIT EXPLORATION OF GENERATIVE AI (2024),https://mit-genai.pubpub.org/pub/8ulgrckc/release/2; NATL. LEAGUE OF CITIES, EPI CENTER FOR SCIENTIFIC EVIDENCE IN PUBLIC ISSUES & AAAS, DATA CENTERS AND ENVIRONMENTAL CONSIDERATIONS (2025), https://www.aaas.org/sites/default/files/2025-09/Data%20Centers%20Fact%20Sheet%202%20-%20Data%20Centers%20and%20Environmental%20Considerations.pdf; WORLD ECON. FORUM, THE FUTURE OF JOBS REPORT 2025 at 18, 20 (2025) (providing job displacement figures).

Different classes of customers pay different rates based on the costs that the utility must incur to serve those classes. The federal government regulates long-distance transmission expenses and wholesale sales of electricity. States regulate generation and localized transmission and distribution.

The trouble with retail electricity rates, which are substantially influenced by federal and state policies, is that data centers use so much energy that they, by themselves, can lead to increases in costs for everyone else—including ordinary households.[8] When data centers significantly increase costs for utilities, utilities need to raise users' rates. At the high level, the answer to this problem is simple: Policymakers should require AI data centers (and other extremely large load customers) to shoulder their fair share of costs through higher rates. This will avoid shifting costs to other classes of customers.

Recommendation 1: State and federal policymakers and regulators should avoid overbuilds through better models to predict new infrastructure needs.

A key measure to limit electricity price increases is to avoid building more generation, transmission, and distribution infrastructure than needed.

[8] State public utility commissions and experts in ratemaking policy tend to assume that new customers are good, because the costs of providing electricity are spread out among a larger ratepayer base. But in many cases, the energy demands of data centers are so large that the data centers are using the bulk of the electricity from the utilities. In other words, they are posing so much demand for new energy that their demand is not universally complementary or beneficial to other customers. Approximately 80 percent of Georgia Power's new capacity will serve large load. Jeff Dantre, *Georgia Power projects demand to increase by 8,200 megawatts by 2031*, WUGA (June 24, 2025), https://www.wuga.org/local-news/2025-06-24/georgia-power-projects-demand-to-increase-by-8-200-megawatts-by-2031; For a source addressing data centers' contribution to rising wholesale capacity (generation) costs, which are passed on to retail consumers, see MONITORING ANALYTICS, ANALYSIS OF THE 2026/2027 RPM BASE RESIDUAL AUCTION PART A 1-2 (2025) (observing that "[h]olding aside all the other issues associated with the 2026/2027 BRA [base residual auction—the generation capacity auction], existing and forecast data center load by itself resulted in an increase in the 2026/2027 BRA revenue" and that data centers are contributing to higher prices in PJM's capacity auction). For sources on retail consumers covering data center costs, see MIKE JACOBS, *Connection Costs*, UNION OF CONCERNED SCIENTISTS (2025), https://www.ucs.org/sites/default/files/2025-09/PJM%20Data%20Center%20Issue%20Brief%20-%20Sep%202025.pdf; ELIZA MARTIN AND ARI PESKOE, HARV. L. SCH. ENVTL. & ENERGY L. PROG., EXTRACTING PROFITS FROM THE PUBLIC: HOW UTILITY RATEPAYERS ARE PAYING FOR BIG TECH'S POWER 2, 15 (2025), https://eelp.law.harvard.edu/wp-content/uploads/2025/03/Harvard-ELI-Extracting-Profits-from-the-Public.pdf.

For the large-scale grid, federally-regulated entities tasked with controlling the regional grid—independent system operators or regional transmission organizations (all called RTOs for short) or utilities—predict the amount of new load, generation needed for that load, and new transmission needs. The Federal Energy Regulatory Commission (FERC) then approves fees that support the construction of new transmission. At the state level, state regulators approve utilities' individual proposals for expanding generation and local transmission and distribution (T&D) to support new loads.

The construction of more generation, transmission, and distribution infrastructure causes rates to increase, so it is imperative to properly model how much infrastructure will actually be needed. Utility commissions and regional transmission operators[9] should share and adopt best practices for forecasting load increases from data centers, and require that forecasts in utility proceedings follow these practices. Under their mandate to keep rates "just and reasonable"[10] they have the power to do this without new legislative mandates. For example, regional transmission operators and state utility commissions should:

a. Standardize criteria for incorporating proposed data center projects into load forecasts based on project maturity, financial commitments, and interconnection process stage.[11]
b. Avoid double counting individual data center facilities that have not yet selected their final location from several proposed sites.[12] To accomplish

---

[9] We use the term "regional transmission operators" to refer to all entities that control the flow of power through regionally interconnected transmission lines. These entities include regional transmission organizations (RTOs) and independent system operators (ISOs), both of which control transmission lines on behalf of utilities that own the lines. In areas without RTOs or ISOs, utilities that own the transmissions lines also operate the lines.
[10] Federal Power Act, 16 U.S.C. § 824 (a); Richard L. Revesz & Burcin Unel, *Managing the Future of the Electricity Grid: Modernizing Rate Design*, 44 HARV. ENVTL. L. REV. 43, 105 (2020) ("Most state legislatures historically have required retail electricity rates to be 'just and reasonable' and nondiscriminatory or to be set under a similar general standard . . . .").
[11] *See, e.g.*, L. Craig Dowdy, *Microsoft Comments on Georgia Power's 2024 Integrated Resource Plan Update, Docket No. 55378* (Ga. Pub. Serv. Comm'n Apr. 1, 2024), https://services.psc.ga.gov/api/v1/External/Public/Get/Document/DownloadFile/218199/99204 (in a Georgia proceeding in which Public Service Commission approved more planned utility infrastructure build-out to serve data centers, arguing for these types of methods to better project rising demand).
[12] FED. ENERGY REG. COMMN., TECHNICAL CONFERENCE REGARDING LARGE LOADS CO-LOCATED AT GENERATING FACILITIES 30 (2024), https://www.ferc.gov/media/transcript-technical-conference-regarding-large-loads-co-located-generating-facilities (noting the double counting issue at the RTO level).

this, FERC should maintain and regularly update a national database of proposed data centers. For this database, FERC should limit data as needed to maintain confidentiality for companies engaged in the competitive process of selecting sites and interconnecting with a utility. But the database should provide enough detail for one company's data center—including a single center being considered in multiple locations—to have a unique identification number and therefore not appear as a different data center at each of the locations where it is being considered.

c. When possible, prorate contribution of early-stage projects to long-term load growth based on data center project cancellation (dropout) rates.
d. Properly measure the capacity of generation planned to service new data center loads. This is important for renewable energy, such as wind and solar energy, which is intermittent (unless paired with storage) but inadequately credited in some models.[13]

Recommendation 2: Policymakers and regulators should require utilities to allocate the costs of grid expansion induced by large loads to large load customers.

Large load customers such as data centers are demanding so much more electricity that the US transmission grid—already aging and in need of expansion prior to AI growth—cannot accommodate this demand.[14] Utilities and independent "merchant" builders of transmission will need to expand the "backbone" transmission infrastructure that enables the transport of electricity over large regions.[15]

Utilities that purchase and transport electricity pay for the cost of backbone transmission expansion through higher transmission charges. Utilities pass these costs on to residential, commercial, and industrial customers through a transmission charge on these customers' bills.

---

[13] Dowdy, *supra* note 11; *Direct Testimony of John L. Kaduk On Behalf of the Georgia Public Service Commission Public Interest Advocacy Staff In the Matter of Georgia Power Company's 2023 Integrated Resource Plan Update Docket No. 55378*, at 5 (Ga. Pub. Serv. Comm'n Feb. 15, 2024) (debating approaches to measure the contribution of renewable energy to future load growth).
[14] Shehabi et al., *supra* note 1, at 69 ("Acceleration of data center deployments is likely to require substantial investment in new or expanded power infrastructure.").
[15] New England Sts. Comm. on Elec., Data Centers and the Power System: A Primer 3 (2024), https://nescoe.com/wp-content/uploads/2024/06/Data-Centers-Primer-Spring-2024.pdf ("This magnitude of required power presents a host of challenges related to grid capacity and transmission infrastructure.").

The costs of expanding the transmission infrastructure backbone to serve new large load customers should be allocated to large loads through the transmission portion of large load rates. Residential customers' share of transmission costs, in turn, should reflect their share of overall load growth, and the costs of maintenance and infrastructure replacement, not large buildouts of new transmission driven by data center demand.

Recommendation 3: Large load customers of utilities should pay for localized infrastructure costs induced by large loads.

Beyond straining the transmission backbone, large load customers cause utilities to build more generation and localized T&D infrastructure to serve large loads.[16] Consumers shoulder these costs through retail electricity rates. Policymakers need to follow several steps to keep retail rate increases in check.

Establish a "large load" customer class: To ensure that large load customers such as AI data centers pay their fair share of generation and T&D costs, policymakers should establish a separate rate class of large load customers.[17] This class should be defined by factors such as the average amount of peak (maximum) electricity used by a customer in a year or the total megawatts of generating capacity it requires.[18] Establishing a separate class allows utilities to clearly set out different rates, terms, and

---

[16] *See, e.g.*, Press Release, Georgia Power, Georgia Power highlights first contracts under new rules & regulations, continued economic growth and updated forecasts in latest filings with Georgia PSC, (Sept. 30, 2025), https://www.georgiapower.com/news-hub/press-releases/georgia-power-highlights-new-customer-contracts-continued-economic-growth-updated-forecasts-in-latest-filings-with-georgia-psc.html (noting that "new contracts — driven largely by projected data center growth and other large-load customers — reinforce the need for additional generation resources to meet projected future demand").

[17] Utilities have long had different electricity rates for different classes of customers based on how much it costs to serve the class of customers. Rates are supposed to reflect the "cost of service," and different classes of customers cause utilities to incur different costs depending on when these classes tend to need electricity, for what duration, and in what quantity, for example. For different rate classes, *see, e.g.*, PA. PUBLIC UTIL. COMM'N, RATE COMPARISON REPORT 11-12 (2024), https://www.puc.pa.gov/media/2909/24_rate-comparison-report_final.pdf (showing utilities in Pennsylvania that had classes of "small commercial" "medium commercial," and "large commercial" customers, with a different rate charged for each of these types of classes).

[18] *See, e.g.*, Indiana Michigan Power Company, Order No. 46097 (Ind. Util. Regul. Comm'n. Feb. 19, 2025) at 30 (applying new rates, terms, and conditions to the "Large Load Customer," as defined by "contract capacity greater than or equal to 70 MW at an individual plant or 150MW on an aggregated basis").

conditions for large load customers, which reflect the additional costs that they cause for the utility and the electricity system as a whole.[19]

Some AI data center companies have pushed back against efforts to treat large loads as a separate class with a different rate and terms of service from other industrial or commercial customers.[20] They essentially argue that by supporting the construction of new electricity infrastructure, they are contributing to an electricity renaissance that will benefit all customers.[21] But large loads are so large—and are demanding so much electricity—that the extent to which build-out will more broadly benefit all customers is not yet clear, and is not a certain result.[22] Indeed, it might be that there are no spillover benefits to households and smaller businesses—and that there are significant costs. Furthermore, although both wholesale and retail ratemaking legal principles prohibit "discriminatory" rates that unjustly single out some types of customers over others, discrimination is justified when different classes of customers cause different costs for

[19] The assumption of many state public utility commissions has historically been an assumption that more customers—particularly industrial ones—are better because they allow the costs of providing electricity be shared among more customers, thus lowering costs for all. But large loads such as AI data centers and cryptocurrency do not necessarily match this assumption. Although these loads are starting to become more flexible (able to decrease power usage when other customer demand rises), many of them need electricity all of the time, and they need relatively unprecedented quantities of electricity. And a disruption in service can be catastrophic to their business model. Historically, industrial sources added to utilities were more complementary to utilities' existing customer base, were more diverse in their power needs, and did not individually demand the quantity of electricity demanded by AI data centers. For an analysis of why adding large load customers is now not always a win for utility customers, see Hannah Wiseman & Matthew McHale, *Governing the Energy Bottleneck*, __Harv. Envtl. L. Rev. __ (forthcoming 2026).

[20] Matthew Zeitlin, *The Country's Biggest Grid Has a Plan to Manage Data Center Energy Use. Everyone Hates It*, HEATMAP (Sept. 4, 2025), https://heatmap.news/energy/data-centers-pjm ("Several commenters, including data center developers, focused on singling out particular large loads for special treatment, which they argued ran afoul of what regional transmission organizations like PJM are allowed to do in structuring electricity markets").

[21] *PJM Critical Issue Fast Path – Large Load Additions Stakeholder Comments* (2025), https://www.pjm.com/-/media/DotCom/committees-groups/cifp-lla/postings/20250828-stakeholder-comments-cifp-lla.pdf (Talen Energy comments at p. 1, arguing that PJM's proposal creates "discriminatory conditions on how large industrial loads can connect to the grid and when they can draw power" and that "PJM should focus on improving load forecasting and a market-based solution that encourages more generation supply to be built so that the 'golden age for American manufacturing and technological dominance' can be achieved").

[22] *See, e.g.*, Martin & Peskoe, *supra* note 8, at 2 ("Based on our review of nearly 50 regulatory proceedings about data centers' rates, and the long history of utilities exploiting their monopolies, we are skeptical of utility claims that data center energy costs are isolated from other consumers' bills.").

the system.[23] That is one reason driving the creation of separate classes of retail, commercial, and industrial classes of customers in the first place.[24]

Challenges of energy usage apply not just to AI data centers, but many large load users. Different large loads do have important differences, however, even within the data center/AI sphere. For example, AI facilities used for training (model creation and modification) have "rapid fluctuations" in energy use, whereas data centers for AI inference—"using a pre-trained AI model"—do not have such "rapid ramps up and down."[25] Facilities used for cryptocurrency mining similarly have constant, more stable, large demand.[26]

State policymakers guiding utility formation of new large load tariffs and state commissions' approval of those tariffs should apply the rules to all large load users with similar use profiles—meaning loads that impose similar costs on the grid. To comply with state nondiscrimination requirements, tariffs should define large load using industry-agnostic characteristics including the size, timing, and flexibility of peak demand, as well as their ability to leverage their own backup generation.

Set data center T&D rates: When terms are established in separate large load tariffs, data centers operating under these tariffs should pay rates that reflect the cost and risk of financing substations and T&D lines built to serve them. These rates should include both the T&D component of the rate and any additional equipment required specifically for the interconnection of that particular large-load customer, such as protection and sensing gear required by grid operators.[27] This rate treatment should

---

[23] *See, e.g.*, Ari Peskoe, *Unjust, Unreasonable, and Unduly Discriminatory: Electric Utility Rates and the Campaign Against Rooftop Solar*, 11 TEX. J. OIL & GAS. L. 211, 228 (2016) (explaining that under the utility ratemaking model for just and non-discriminatory ratemaking, "[a]s long as . . . each consumer paid through its rates for the costs it imposed on the utility to provide service, the utility . . . would not be unduly discriminating against particular ratepayers").

[24] JIM LAZAR ET AL.,REGULATORY ASSISTANCE PROJECT, ELECTRIC COST ALLOCATION FOR A NEW ERA: A MANUAL 62 (2020), https://www.raponline.org/wp-content/uploads/2023/09/rap-lazar-chernick-marcus-lebel-electric-cost-allocation-new-era-2020-january.pdf ("Most utilities distinguish among residential customers, small commercial customers, large commercial customers, industrial customers and street lighting customers.").

[25] NORTH AM. ELECTR. RELIABILITY CORP., CHARACTERISTICS AND RISKS OF EMERGING LARGE LOADS: LARGE LOADS TASK FORCE WHITE PAPER 5-7 (2025).

[26] *Id*. at 7.

[27] *See, e.g.*, Utah S.B. 132 (2025), enacted (providing that large load contracts must ensure that "the large load customer bears all just and reasonable incremental costs attributable to receiving the requested electric service").

be triggered when loads exceed a certain threshold, such as 100 megawatts of peak load.[28] Several states have already enacted large load tariffs, and many others are in the process of developing them.[29]

Require self-builds or data center-specific utilities: Another way to ensure that customers aren't bearing the costs of new data center load is to require that data centers build their own generation, T&D, and associated infrastructure, or contract for it. For example, Duke Energy Indiana requires an AI subsidiary to use a "dedicated power purchase agreement" that is not contained within the utility's broader, state-approved plans for building new capacity to serve its customers. This means that any costs incurred to serve the subsidiary are directly covered by the power purchase agreement and not other customers.[30] States should also consider requiring utilities to create separate businesses to serve large load, thus clearly separating out new costs caused by large load customers. For example, an electric cooperative in Northern Virginia proposed creating an affiliate utility to serve large data center loads.[31]

Ensure data center responsibility for stranded costs: There is a concern that data centers will cause utilities to invest in generation, T&D, and associated infrastructure and then exit the utility's service area, leaving unrecovered costs (called "stranded costs").

---

[28] *See, e.g.*, Georgia Power, RE: Request for Approval of Revisions to Georgia Power Company's Rules and Regulations, Docket No. 44280 at 1.41 (Ga Pub. Serv. Comm'n. Dec. 11, 2024), https://psc.ga.gov/search/facts-document/?documentId=220667 (customers with expected demand of 100 MW or more may be required to pay "any costs the Company [utility] incurred in serving or preparing to serve the customer, including, but not limited to, distribution, transmission, and generation costs . . . ."); Georgia Power, Order Approving Revisions to Georgia Power Company's Rules and Regulations, (Ga Pub. Serv. Comm'n. Jan. 28, 2025).

[29] Evergy Kansas Inc., Order Approving Unanimous Settlement Agreement (Kan. Corp. Comm'n Aug. 18, 2025), https://estar.kcc.ks.gov/estar/ViewFile.aspx/25-315_Settlement_Agreement.pdf?Id=f65c8223-c3d3-47a7-b83b-877f318cf355; Consumers Energy Company, No. U-21859 (Mich. Pub. Serv. Comm'n Nov. 6, 2025), https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/068cs00001Nipc9AAB; *Interconnection and Tariffs for Large Load Customers*, Docket No. M-2025-3054271 (Pa. Pub. Util. Comm'n Nov. 6, 2025) (Tentative Order), https://www.puc.pa.gov/pcdocs/1901687.pdf (proposing a model rule for utilities to potentially follow when setting large load rates); S.B. 6, 89th Leg., R.S. (Tex. 2025).; S.B. 132, 66th Leg., 2025 Gen. Sess. (Utah 2025), https://le.utah.gov/~2025/bills/static/SB0132.html; *Large Loads Database,* Smart Electric Power Alliance, https://sepapower.org/thank-you-large-load-tariffs-database.

[30] ANDREW SATCHWELL ET AL., LAWRENCE BERKELEY NATL. LAB., ELECTRICITY RATE DESIGNS FOR LARGE LOADS: EVOLVING PRACTICES AND OPPORTUNITIES 10 (2025), https://eta-publications.lbl.gov/sites/default/files/2025-01/electricity_rate_designs_for_large_loads_evolving_practices_and_opportunities_final.pdf.

[31] Maeve Allsup, *To Get Data Centers Online, One Virginia Co-Op Is Proposing a New Business Model,* LATITUDE MEDIA (Dec. 20, 2024), https://www.latitudemedia.com/news/to-meet-massive-data-center-load-one-virginia-electric-co-op-is-proposing-an-entirely-new-business-model/.

Many data centers may not be very mobile, as the permitting and construction costs of data centers represent a large commitment.[32] But given the rapidly-changing nature of the AI economy, data centers could go out of business or at least change design and move to another location.[33] Depending on how much conditions change during or after construction, solvent data centers might also move to greener pastures with lower electricity rates or more favorable taxation packages.

In short, whether due to bankruptcy of other conditions, there is a risk that developers will cancel projects or leave the utility's territory before all infrastructure costs are recovered. With this abandonment, non-data center customers should not have to shoulder these stranded costs. Rates can include the following types of provisions to avoid shifting stranded costs to non-data center customers:

a. Exit fees that decline over time to cover the cost of unrecovered depreciation costs on equipment; these can be backed with financial security such as deposits or letters of credit.[34]
b. Accelerated cost recovery for the equipment required for the data center customer, through higher initial monthly charges that can be reduced over time.

Capture energy expenses within large load rates: Beyond ensuring that large loads such as AI data centers cover their fair share of infrastructure, the rates that they pay for actual energy must be fair. Providing energy to many data centers requires utilities to offer a

---

[32] Fed. Energy Reg. Comm'n., *Order Rejecting Proposed Rate Schedules, Dockets ER 24-1610-000, ER 24-1610-001* at 42 (Aug. 20, 2024), https://elibrary.ferc.gov/eLibrary/filelist?accession_number=20240820-3044&optimized=false (noting "significant" infrastructure investment by large loads, which may make these loads less speculative and less likely to exit).
[33] *Data centers: Managing risk and market boom*, MOODY'S (May 15, 2025), https://www.moodys.com/web/en/us/creditview/blog/data-centers-managing-risk-amid-a-market-boom.html (noting "long-term credit risks to developers, landlords and investors" due to uncertain computing needs and rapid change in the AI industry).
[34] *See, e.g.*, Indiana Michigan Power Co., *supra* note 18, at 150; *In re* Ohio Power Company, Case No. 24-508-EL-ATA at Exhibit MSM-1, Exhibit MSM-1 page 5 of 7 (Pub. Util. Comm'n of Ohio Oct. 23, 2024); Georgia Power, *RE: Request for Approval of Revisions to Georgia Power Company's Rules and Regulations,* Docket No. 44280 at 1.41 (Ga. Pub. Serv. Comm'n Dec. 11, 2024), https://psc.ga.gov/search/facts-document/?documentId=220667); *Order Approving Revisions to Georgia Power Company's Rules and Regulations*, WL 388303, (Ga. Pub. Serv. Comm'n Jan. 28, 2025) (allowing utility discretion in setting "performance and credit provisions it [the utility] deems appropriate to protect the Company and ensure the recovery of costs incurred").

large quantity of electricity around the clock. And in some cases, utilities must rapidly change their operations when a data center unexpectedly drops offline, threatening a blackout.[35] Large load customers' rates paid for energy must reflect these costs (and updated standards for electricity reliability must also address these reliability threats, as we explore in Part II below). On the flip side, when large loads offer back-up generation and other technologies to avoid sudden changes in electricity use, or when they commit to decrease their electricity demand during periods of peak systemwide demand, their rates should accurately reflect these benefits.[36]

Recommendation 4: Publicly available tariffs should govern all rates and terms of service provided by utilities to large electrical loads.

To ensure that large loads pay their fair share of costs that they impose on the system, policymakers and groups that represent ratepayers in utility and RTO proceedings need to know those costs. The impacts of large loads on residential, commercial, and other industrial consumers' electricity rates will be hidden if large load rates and terms of service are contained in secret contracts with utilities, as many of them now are.[37] As Eliza Martin and Ari Peskoe of Harvard Law School's Environmental and Energy Law Program observe, "[a] special contract shifts costs to other ratepayers when the customer pays the utility a price lower than the utility's costs to serve that customer," and the utility makes up the difference in other rates.[38]

---

[35] *See, e.g.*, Tim McLaughlin, Big *Tech's data center boom poses new risk to US grid operators*, REUTERS (Mar. 19, 2025), https://www.reuters.com/technology/big-techs-data-center-boom-poses-new-risk-us-grid-operators-2025-03-19/ (noting that when 60 data centers near Washington, DC, all suddenly dropped offline, this caused the regional grip operator PJM and the local utility to have to "scale back output from power plants to protect grid infrastructure and avoid a worst-case scenario of cascading power outages across the region").

[36] TYLER NORRIS, TIMOTHY PROFETA, DALIA PATINO-ECHEVERRI, & ADAM COWIE-HASKELL, NICHOLAS INST. FOR ENERGY, ENV'T & SUSTAINABILITY, DUKE UNIV., RETHINKING LOAD GROWTH: ASSESSING THE POTENTIAL FOR INTEGRATION OF LARGE FLEXIBLE LOADS IN US POWER SYSTEMS (2025), https://dukespace.lib.duke.edu/items/bb350296-d7a1-4d8f-acb0-2fba9b1f03de.

[37] Martin & Peskoe, *supra* note 8, at 11 (noting that state public utility commissions often "reflexively" grant utility requests for the confidentiality of special contracts); *Electric Rates Large Power Contract Service*, Black Hills Energy, Wyo. PSC Tariff No. 14 (2024) ("If the parties agree through negotiations to electric service through this tariff, a Confidential Large Power Service Agreement (Agreement) will be executed.").

[38] Martin & Peskoe, *supra* note 8, at 12.

State public utility commissions should prohibit secret utility-large load contracts. Instead, commissions should approve publicly available tariffs that govern the rates and terms of electricity service for all large load customers.[39]

Recommendation 5: States' and local governments' offers of tax breaks and other benefits for large load in the land acquisition, siting, and construction process should be transparent, and if used, backed up by proof that data centers provide net economic benefits.

Many local governments and states are offering benefits to large loads such as AI data center companies to incentivize them to build within their jurisdictions. These benefits often take the form of tax abatements and exemptions.[40] Data center companies seeking sites for new construction also frequently enter into non-disclosure agreements (NDAs) with local officials, thus hiding any concessions that local governments may be providing in negotiation.[41] As local governments and states compete to attract what they view as an economic boon, there is a risk of a race to the bottom. Within this race, new large load construction could proceed without adequate review of environmental impacts, such as water use, and without an assurance that construction will actually produce net economic benefits.

The public should have an opportunity to weigh the costs and benefits of state and local incentives through legislative proceedings and other open processes. We recommend the following practices to avoid governments' secret negotiation of streamlined permitting or regulation, land deals, or other benefits for large load developers.

---

[39] Martin & Peskoe, *supra* note 8, at 23 ("Guided by their consumer-protection mandate, regulators should stop approving any special contracts and instead require utilities to serve data centers through tariffs that offer standard terms and conditions for all future data-center customers.").

[40] *Tax Incentives for Data Centers 50 State Survey*, Husch Blackwell, https://hbfiles.blob.core.windows.net/webfiles/TaxIncentivesforDataCenters50StateSurvey.pdf.

[41] Eric Bonds & Viktot Newby, *Data centers, non-disclosure agreements and democracy*, VA. MERCURY (Apr. 30, 2025), https://virginiamercury.com/2025/04/30/data-centers-non-disclosure-agreements-and-democracy/ (professor and student in a guest column noting that they submitted Freedom of Information Act requests to every Virginia locality we could identify with an existing, approved, or proposed data center," "found that the vast majority – 25 out of a total of 31 localities – have NDAs," and "think that this could be an underestimate because some local governments may use definitions or maneuvers to avoid disclosing this information").

a. Limit the use of secret contracts and other confidentiality agreements for building large loads and incentives offered for such builds. The public has a right to know and participate in governments' negotiation of the terms.
b. Require detailed, well-documented studies—completed by neutral third parties—of the economic impacts of large loads at the local and state level. These studies should analyze factors such as jobs created and maintained by large load, job losses induced by AI, net loss or gain of tax revenues, indirect spending induced by the large load (for example, food and hotel expenditures during construction, and longer-term job growth from in-state suppliers of equipment).[42]
c. Based on more accurate studies of the net economic impacts of large load construction, if these studies show a race to the bottom—in which the impacts of incentives are net negative—policymakers should consider constraining these tax abatements, tax exemptions, and similar incentives.

Recommendation 6: Utilities should track utility disconnections as a metric to monitor household affordability.

Both the Trump and Biden administrations have emphasized the need to keep consumer electricity affordable, but you can't improve what you don't measure.[43] Many state utility commissions do not maintain public dashboards on residential utility disconnections.[44] Commissions should require all utilities to measure utility

[42] Joint Legislative Audit & Rev. Comm'n *supra* note 4, at 13 (noting data center reports that "a typical 250,000-square-foot data center may have approximately 50 workers," half of which are data center employees); *Id.* at 11 (noting direct and indirect employment effects, using in-state supplier job inducement as an example of indirect employment); Joseph Briggs & Devesh Kodnani, *The Potentially Large Effects of Artificial Intelligence on Economic Growth*, GOLDMAN SACHS (Mar. 25, 2023) https://www.key4biz.it/wp-content/uploads/2023/03/Global-Economics-Analyst_-The-Potentially-Large-Effects-of-Artificial-Intelligence-on-Economic-Growth-Briggs_Kodnani.pdf. (estimating that "roughly two-thirds of current jobs are exposed to some degree of AI automation, and that generative AI could substitute up to one-fourth of current work").
[43] Exec. Order No. 14156, 90 Fed. Reg 8433 ("An affordable and reliable domestic supply of energy is a fundamental requirement for the national and economic security of any nation."); Exec. Order No. 14141, 90 Fed. Reg. 5469 (noting the need for "plans to help ensure that the construction and operation of AI infrastructure does not increase electricity costs to other ratepayers"). EIA's new EIA-112 survey will begin collecting standardized national data on utility disconnections (See Agency Information Collection Proposed New Survey, 89 Fed. Red. 82598 (Oct. 11, 2024)).
[44] The standards for utility commission reporting should align with the existing Energy Information Administration Form 112. Only approximately 10% of utilities are even required to report disconnection

disconnections and update their public dashboards quarterly to provide regulators and the public with a critical metric to gauge the affordability of electricity in their jurisdictions.

II. Ensuring a Reliable, Resilient Grid

The Goal: Households and other electricity users must be protected from power shortages and blackouts potentially caused by data center electricity use.

In addition to contributing to likely electricity rate increases, large loads threaten the reliability of the grid if not designed and operated with adequate technical and operational precautions.[45] This is a challenge because grid reliability is already in peril due to the rise of extreme natural events such as powerful winds, wildfires, and flooding and underinvestment in grid infrastructure.[46] Yet a reliable energy supply is

---

numbers, although this covered "47% of the total U.S. population as of 2022." Sanya Carley, David Konisky, & Alison Knasin, KLEINMAN CTR. FOR ENERGY POL'Y, *Tracking the Pernicious Challenge of Utility Disconnections* (Jan. 15, 2025), https://kleinmanenergy.upenn.edu/commentary/blog/tracking-the-pernicious-challenge-of-utility-disconnections/. *See also* Trevor Memmott, David M. Konisky, & Sanya Carley, *Assessing demographic vulnerability and weather impacts on utility disconnections in California*, 15 NAT. COMMC'NS1, 2 (2024). (noting that utility disconnection reporting and tracking "[p]olicies that exist at the state level vary widely, from mandatory reporting requirements to voluntary to none" and that although many states required disclosure of disconnections during the COVID-19 pandemic, "these requirements have expired in the vast majority of places").

[45] NORTH AM. ELECTR. RELIABILITY CORP., 2024 LONG-TERM RELIABILITY ASSESSMENT 38 (2024), https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_Long%20Term%20Reliability%20Assessment_2024.pdf; ERCOT, Large Loads – Impact on Grid Reliability and Overview of Revision Request Package 8, 12 (Aug. 16, 2023), https://www.ercot.com/files/docs/2023/11/08/PUBLIC-Overview-of-Large-Load-Revision-Requests-for-8-16-23-Workshop.pptx ("ERCOT has experienced multiple events in the last year where a significant amount of Large Load unexpectedly disconnected from the grid."); Matthew Gooding, *Virginia narrowly avoided power cuts when 60 data centers dropped off the grid at once*, DATA CENTER DYNAMICS (Mar. 20, 2025), https://www.datacenterdynamics.com/en/news/virginia-narrowly-avoided-power-cuts-when-60-data-centers-dropped-off-the-grid-at-once/; *See also* sources *infra* note 50.

[46] Diana DiGangi, *Americans Lost More Power Last Year than Any Year in Previous Decade: EIA*, UTILITY DIVE (Dec. 2, 2025), https://www.utilitydive.com/news/hurricane-power-outage-electricity-climate-change-helene-milton/806771/; Glen Andersen, Megan Cleveland, & Daniel Shea, *Modernizing the Electric Grid: State Role and Policy Options*, NAT'L CONF. OF STATE LEGISLATURES (Sep. 22, 2021), https://www.ncsl.org/energy/modernizing-the-electric-grid ("Sixty percent of U.S. distribution lines have surpassed their 50-year life expectancy, according to Black and Veatch, while the Brattle Group estimates that $1.5 trillion to $2 trillion will be spent by 2030 to modernize the grid just to maintain

increasingly imperative so that people can remain healthy during growing weather extremes.[47]

Large loads such as AI data centers contribute to reliability concerns for several reasons. First, they are demanding so much electricity that there is not enough capacity to meet their needs.[48] Too much demand coupled with inadequate capacity can lead to blackouts, and current interconnection times are too slow.[49]

Second, large loads are not only demanding, overall, more electricity than the grid can offer. For those that do obtain a grid interconnection, they are, in some cases, also presenting short-term grid reliability risks. The electric grid is a unique form of infrastructure. To maintain the proper voltage in the grid (essentially the "pressure" of electricity flowing through the grid) and frequency (the "waves" of alternating current electricity), grid operators must precisely balance electricity generation and load. This matching must occur moment-to-moment, and continuously. If more generators suddenly dispatch more electricity into the grid than is demanded, voltage and frequency can increase so much that equipment is damaged, causing an outage. To avoid such damage, equipment connected to the grid will automatically disconnect, which can also lead to outages. Similarly, if loads suddenly decrease demand, yet the same amount of generation is dispatched, an outage can also occur.

---

reliability"); Larry Dale et al., *Assessing the Impact of Wildfires on the California Electricity Grid*, CAL. ENERGY COMM'N (2018), https://www.energy.ca.gov/sites/default/files/2019-11/Energy_CCCA4-CEC-2018-002_ADA.pdf.

[47] For attention to the importance of reliability during weather extremes, *See, e.g.,* Press Release, North Am. Electr. Reliability Corp., NERC Advances Extreme Weather Protection, Energy Assurance, and Approves 2025 Work Plan Priorities, (Dec. 10, 2024), https://www.nerc.com/newsroom/nerc-advances-extreme-weather-protection-energy-assurance-and-approves-2025-work-plan-priorities.

[48] *See supra* notes 14-15; Ethan Howland, *PJM capacity prices hit record high as grid operator falls short of reliability target*, UTILITY DIVE (Dec. 18, 2025), https://www.utilitydive.com/news/pjm-interconnection-capacity-auction-data-center/808264/ (showing that in PJM, the grid operator is 6.6 gigawatts short of its target for projected necessary generation capacity—a demand forecast "almost entirely driven by data centers").

[49] *See, e.g.*, TYLER NORRIS, NICHOLAS INST. FOR ENERGY, ENV'T & SUSTAINABILITY, DUKE UNIV., BEYOND FERC ORDER NO. 2023, CONSIDERATIONS ON DEEP INTERCONNECTION REFORM 2 (2023), https://nicholasinstitute.duke.edu/sites/default/files/publications/beyond-ferc-order-2023-considerations-deep-interconnection-reform.pdf (noting the long queue for interconnection on the PJM regional grid, where data centers are concentrated); Aftab Khan, PJM Generation Interconnection Reforms Continue to Produce Results, PJM INSIDE LINES (June 4, 2025), https://insidelines.pjm.com/pjm-generation-interconnection-reforms-continue-to-produce-results/ (showing some improvement in the queue but also ongoing constraints).

Large loads are so large that if one of them trips offline when it senses a small change in voltage in the grid (similar to a circuit breaker tripping in a house), this substantially upsets the delicate supply-demand balance on the grid and can cause cascading outages throughout the grid. And it is not entirely uncommon for these types of unexpected load reductions—caused by tripping or other events at large load facilities—to happen.[50] When large loads connect to the grid, there should be robust interconnection standards in place to ensure that they will not cause outages if they temporarily go offline.

A third challenge of large load also contributes to short-term reliability challenges. Large loads such as AI data centers can cause instability because they need such a large quantity of electricity, and most of them want it to be available all of the time.[51] During periods of peak demand, when all customers on the grid need electricity for cooling or heating during weather extremes, for example, this high demand can strain the grid. Data centers need to be more flexible so that they can reduce demand during peak periods.

These challenges, while formidable, are fixable. Policymakers can take the following actions to address the reliability issues caused by data centers.

---

[50] Agee Springer, ERCOT, Power Point Presentation at ESIG Large Load Workshop, Large Load Interconnection Process 12 (Mar. 19, 2025), https://www.esig.energy/wp-content/uploads/2025/03/ESIG_LL_Workshop_Springer.pdf (describing large load losses, which can lead to reliability challenges, when data centers shut down due to minor grid voltage changes); Dan Woodfin, ERCOT, Item 7.2.1: Inverter-Based Resource and Large Load Ride Through Events: Background and Mitigation 4, 5 7, https://www.ercot.com/files/docs/2023/06/12/7-2-1-inverter-based-resource-and-large-load-ride-through-events-background-and-mitigation.pdf. (noting events in Texas since October 22 "where large loads in west Texas (data centers and oil/gas) failed to ride through faults" and faults leading to 1,600 MW of load loss in the Odessa area, and noting that large loads need to "ride-through voltage dips to "stay in sync with the grid frequency"); See *supra* note 45.

[51] The flexibility of data center load is highly contested within the industry and by policymakers, but LBNL estimated that data centers operate at 40% utilization for AI inference loads, 45-50% for hyperscale loads, and 80% for training AI models. ARMAN SHEHABI ET AL., LAWRENCE BERKELEY NATL. LAB., 2016 UNITED STATES DATA CENTER ENERGY USAGE REPORT (2016); (Some data centers need a continuous supply of electricity, while others can complete work in batches).

Recommendation 7: Federal policymakers, regional grid operators, utilities, and states should improve processes for interconnecting new generating sources with the grid.

As large loads demand more electricity on a grid with inadequate generation and T&D infrastructure, it is necessary to get more power online quickly. The short-term response—keeping old coal plants from retiring—will not only be inadequate to the task but also has significant and well-known environmental and social consequences.[52] Federal regulators and regional and utility grid operators need to speed up the process for connecting new energy generators to the grid—particularly the many solar generators and battery storage facilities in the queue that could displace the need for dirtier, costlier power that emits pollutants harmful to human health.[53] The Department of Energy issued an Advanced Notice of Proposed Rulemaking on October 23rd, which argued FERC must take a central role in standardizing the terms for large load interconnections and proposed several specific steps, some of which overlap with the proposals below.[54]

To speed up interconnection queues, FERC should allow "connect and manage" agreements proposed by grid experts such as Tyler Norris. This approach, piloted by the Electric Reliability Council of Texas (ERCOT), lets energy generators connect to a transmission line with fewer detailed studies addressing potential congestion or reliability concerns in the grid (although extensive study is still required). If concerns do arise, they are addressed on the back-end by prohibiting generators from sending energy into the grid (called "curtailment") if it would cause reliability concerns. Generators bear the risk of curtailment in exchange for faster interconnection, and

---

[52] Cy McGeady, Joseph Majkut, Barath Harithas, and Karl Smith, The *Electricity Supply Bottleneck on U.S. AI Dominance*, CTR. FOR STRATEGIC & INT'L STUD. (Mar. 3, 2025), https://www.csis.org/analysis/electricity-supply-bottleneck-us-ai-dominance; Lucas Henneman et al., *Mortality risk from United States coal electricity generation*, 382 SCIENCE 941 (2023).

[53] For health impacts, *see* Henneman et al., *supra* note 52.

[54] *Secretary of Energy's Direction that the Federal Energy Regulatory Commission Initiate Rulemaking Procedures and Proposal Regarding the Interconnection of Large Loads Pursuant to the Secretary's Authority Under Section 403 of the Department of Energy Organization Act*, U.S. DEP'T OF ENERGY (Oct. 23, 2025), https://www.energy.gov/sites/default/files/2025-10/403%20Large%20Loads%20Letter.pdf [hereinafter "Secretary of Energy's Direction"] (directing FERC to initiate a rulemaking to initiate federal authority over large loads' interconnection to transmission lines).

transmission owner/operators reduce the risk of stranded assets from overbuilt infrastructure.[55]

FERC should also allow or require RTOs and utility grid operators to permit faster interconnection for large loads that provide their own interconnection infrastructure and/or grid-connected energy generation, not just behind-the-meter backup, as proposed by the RTO PJM Interconnection.[56]

At the state level, for utilities accommodating new generator interconnection requests on local wires, states should adopt advanced interconnection modeling. This would: 1) speed interconnection studies for localized generation, and 2) fully realize benefits of the cluster-based interconnection study process mandated by FERC for regional transmission organizations.[57] Through cluster-based interconnection, rather than studying the interconnection of one new generator at a time, grid operators study generators in cohorts. This gives them a better idea of the collective impacts of new generators on the grid system and, if done well, shortens approval times.

Recommendation 8: Federal and state policymakers should update large load interconnection requirements to prevent cascading outages.

Due to the need for constant and exact supply-demand balance in the grid, unmanaged, near-instantaneous increases or decreases in electricity demand from data centers can cause outages even when no other stresses are present on the grid.[58]

Regional transmission organizations or utilities that control long-distance transmission lines use complex technologies and practices to do this instantaneous matching of generation and load. Utilities do this same matching on the distribution network—the wires that carry electricity to consumers. If demand suddenly spikes when consumers

---

[55] Tyler Norris, an expert on generator interconnection, notes the speed of ERCOT's interconnection process as compared to, for example, PJMs. *See* Norris, *supra* note 49.

[56] Answer of PJM Interconnection, L.L.C., Docket Nos. EL25-49-000, et al. (F.E.R.C. Mar. 24, 2025), https://www.pjm.com/-/media/DotCom/documents/ferc/filings/2025/20250324-el25-49-000.pdf.

[57] FERC does not regulate local transmission and distribution wires, but we recommend that states should follow the FERC approach to localized interconnection. For the FERC requirement, *see* Fed. Energy Reg. Comm'n Order No. 2023, 184 FERC ¶ 61,054, https://www.ferc.gov/media/e-1-order-2023-rm22-14-000.

[58] *See* McLaughlin, *supra* note 35 for a close call in Washington, DC, when 60 data centers simultaneously and rapidly dropped offline. *See also supra* note 50 (describing large load loss risks and experiences with large load losses in ERCOT—the Texas regional grid).

turn on their air-conditioning, for example, the utility must dispatch enough generation to instantly match that demand. And if demand suddenly dips, the utility must rapidly decrease generation and/or employ specialized equipment to maintain the correct voltage and frequency to prevent a widespread outage.

The North American Electric Reliability Corporation (NERC) establishes and enforces reliability standards for the bulk power system—the wholesale generators that serve utilities, and the transmission grid that transports this wholesale electricity, among other system components. FERC reviews NERC's standards and enforcement. State public utility commissions, in turn, regulate the reliability of localized generation and distribution to retail customers.

NERC and state PUCs need to update reliability standards to ensure that large loads do not cause widespread outages when they suddenly "trip" offline, causing a large dip in power usage.[59] They also need to prevent outages from sudden spikes in demand from large load. For example, if a large load typically relies on on-site generation, but its on-site generator fails, the load might suddenly draw a large amount of power from the grid if it is grid-connected. The following measures will help to prevent unexpected, large, and rapid changes in electricity use at data centers:

a. FERC should give NERC the authority to register large loads during the interconnection process (when loads request to interconnect to utility wires and receive electricity from the utility). With this registration, NERC would be able to assess whether large loads had the equipment and procedures necessary to reduce the risk of outages caused by rapid load variations. This could also serve a dual purpose of tracking proposed very large loads nationally to avoid double-counting.
b. PUCs and NERC should require utilities and data centers to incorporate monitoring and protection equipment into data center interconnections to reduce the risks of outages. This equipment should include, for example,

[59] NERC's Large Load Task Force is currently considering which standards might require modification to address this and other challenges related to large data centers: NORTH AM. ELECTR. RELIABILITY CORP., CHARACTERISTICS AND RISKS OF EMERGING LARGE LOADS: LARGE LOADS TASK FORCE WHITE PAPER at vii (2025), https://www.nerc.com/globalassets/who-we-are/standing-committees/rstc/whitepaper-characteristics-and-risks-of-emerging-large-loads.pdf.

equipment that allows data centers to safely continue operating ("ride through") modest changes in voltage.[60]

c. PUCs and NERC should track, record, and regularly report incidents of large loads dropping offline or otherwise contributing to reliability risks. This should be similar to NERC's Generating Availability Data System, which tracks power plant outages.[61] PUCs and NERC should document the causes of these outages and suggest needed reforms to avoid future similar incidents.

Recommendation 9: Data center companies should improve the flexibility of data centers so that they can reduce demand rapidly.

In addition to posing short-term threats to reliability by unexpectedly dropping offline, data centers threaten grid reliability by demanding too much electricity during peak demand periods when utilities lack adequate generation to cover all demand. Data centers should be required to build in and maintain the capacity to reduce their energy usage at anticipated peak electricity demand times and in response to emergency requests from grid operators. This practice is called demand response. Researchers have quantified significant benefits to making data center loads flexible, major AI developers have already announced plans to test and deploy flexible data center power management, and industry consortiums are developing best practices to expand adoption.[62] But some large load companies appear dissatisfied with grid operators' proposals for required flexibility.[63] The following practices would force more innovation in large load flexibility and better ensure a reliable grid as demand rises:

---

[60] *Large Loads Frequently Asked Questions,* NORTH AM. ELECTR. RELIABILITY CORP. (May 2025), https://www.nerc.com/comm/RSTC/LLTF/Large%20Loads%20FAQs.pdf (observing that "data centers . . . frequently house a multitude of sensitive electronics that require ideal electrical conditions," and in low voltage situations, without enhanced technologies that allow for voltage ride-through, "large loads can disconnect from the grid to protect their equipment from damage").

[61] *Generating Availability Data System (GADS)*, North Am. Electr. Reliability Corp. (last visited Dec. 22, 2025), https://www.nerc.com/pa/RAPA/gads/Pages/GeneratingAvailabilityDataSystem-(GADS).aspx.

[62] Norris et al., *supra* note 36 (documenting the opportunities for large load demand flexibility); Bianca Giacobone, *Google Expands Demand Response to Target Machine Learning Workloads*, LATITUDE MEDIA (Aug. 4, 2025), https://www.latitudemedia.com/news/google-expands-demand-response-to-target-machine-learning-workloads/; Maeve Allsup, *Nvidia and Oracle Tapped This Startup to Flex a Phoenix Data Center*, LATITUDE MEDIA (July 1, 2025), https://www.latitudemedia.com/news/nvidia-and-oracle-tapped-this-startup-to-flex-a-phoenix-data-center/.

[63] Zeitlin, *supra* note 20 (quoting Microsoft's public critique of PJM's plan for large load curtailment).

a. Large loads should be required to submit emergency load reduction plans when requesting interconnection approval and demonstrate that they can implement these plans.[64]
b. Demand response capability should be incorporated into large load electricity tariffs rather than as an optional add-on program.
c. At large load facilities, states should mandate or incentivize enhanced backup power systems with emissions compliance (zero-emissions or emissions-control equipment in place), which are not subject to annual usage limits due to air quality concerns.[65]
d. Utilities and regional grid operators should consider offering and specifically quantifying direct incentives for large loads to offer more flexibility than required in their tariffs, including incentives based on how quickly they can respond to requests for load reduction and how much load reduction they can offer.[66]

Conclusion

AI and associated data centers represent both massive challenges and opportunities for the United States. Spending on AI in the United States contributed more to U.S. economic growth than consumer spending in 2025, making AI the dominant part of the economy.[67] There is the opportunity for the United States to continue to lead the development and expansion of AI. Yet there are threats, from boom-and-bust economics to the displacement of human labor, higher electricity prices for consumers, and increased instability in the electric grid.

---

[64] *See, e.g.*, Indiana Michigan Power Co., *supra* note 18, at 6 (noting a meeting and discussion to address "the Company's emergency response procedures, including required system actions that would be necessary to respond to an emergency load shedding event" and the potential need to modify these procedures due to large load).
[65] *See, e.g.*, @TylerNorris, X, (Sept. 3, 2025, 3:29 PM), https://x.com/tylerhnorris/status/1963338486548742567 (commenting on PJM's large load flexibility proposal and arguing that regional transmission organizations such as PJM should provide more detail on backup generation emission constraints in its policies for large load flexibility and curtailment).
[66] *Id*.
[67] Nick Lichtenberg, *Spending on AI data centers is so massive that it's taken a bigger chunk of GDP growth than shopping—and it could crash the American economy*, FORTUNE (Aug. 6, 2025), https://fortune.com/2025/08/06/data-center-artificial-intelligence-bubble-consumer-spending-economy/.

Our focus in this paper has been on how policymakers can address the energy challenge raised by AI: maintaining reasonable electricity prices and reliable energy for all consumers in the wake of relatively unprecedented growth in demand. Policymakers should ensure that large loads pay for this growth, support the infrastructure needed for this growth, offer flexibility when there is not enough electricity to go around, and operate under transparent electricity tariffs and agreements with governments. With these tools, the public can better monitor the impact of AI data centers and other large loads, and can meaningfully participate in the ongoing policy project to harness the opportunity of AI while minimizing its dangers to society.

Appendix: Summary of Policy Recommendations

Policy Recommendation	Agency Action (Who, What, When)				
	Congress	FERC	Regional Transmission Organizations	State Legislatures	State PUCs
State and federal policymakers and regulators should avoid overbuilds through better models to predict new infrastructure needs.	Although FERC likely already has this authority, give FERC the explicit authority to track unique large load interconnections nationally to avoid double-counting.	Track proposed / interconnected data centers connected to bulk power system; facilitate sharing of best forecasting practices through informational proceedings.	In regional transmission planning, require utilities to prorate forecasts based on likelihood of load appearing, not unlikely worst-case scenarios.		In utilities' integrated resource plans (IRPs—plans for new generation and T&D needed to meet future demand) and rate case proceedings, require utilities to prorate forecasts based on likelihood of load appearing, not unlikely worst-case scenarios.
Large load customers of utilities should pay for localized infrastructure costs and grid expansion induced by large loads.		Define large load; approve large-load tariffs for wholesale generators.	Create large-load tariffs that fairly allocate new transmission costs.	Create enabling legislation to define large loads consistent with established non-discrimination principles, including provisions to protect utilities from stranded cost risks.	Order utilities in rate case proceedings to create large-load tariffs in accordance with new state law.

Policy Recommendation	Agency Action (Who, What, When)				
	Congress	FERC	Regional Transmission Organizations	State Legislatures	State PUCs
Publicly available tariffs should govern all rates and terms of service provided by utilities to large electrical loads.				Create legislation that limits secret one-off rate agreements and requires large load rates to be determined by publicly available tariffs.	
States' and local governments' offers of tax breaks and other benefits for large load in the land acquisition, siting, and construction process should be transparent, and if used, backed up by proof that data centers provide net economic benefits.				Create legislation that places reasonable limits on NDA usage regarding terms offered by state/local governments to attract large loads. Require and fund publicly available studies of the state and local economic costs and benefits realized from data center construction and operation.	

Policy Recommendation	Agency Action (Who, What, When)				
	Congress	FERC	Regional Transmission Organizations	State Legislatures	State PUCs
Utilities should measure utility disconnections as a metric to monitor household affordability.				Create legislation requiring quarterly reporting of utility disconnections.	Host publicly accessible dashboards to report quarterly utility disconnections.
Federal policymakers, regional grid operators, utilities, and states should improve processes for interconnecting new generating sources with the grid.		Allow "connect and manage" agreements for large loads, faster interconnection for loads bringing generation.		Create legislation promoting the use of advanced interconnection modeling in IRP and rate case proceedings, including funding technical support for PUCs to acquire modeling capability.	Identify best practices from successful peer commissions; develop in-house or contract expertise in modeling shared with utilities for IRP and rate case planning.
Federal and state policymakers and regulators should update large load interconnection requirements to prevent cascading outages.		Require NERC registration of large loads connected to bulk power system. Require installation of equipment to prevent sudden load loss from impacting the grid, such as equipment that allows large			Require utilities managing loads connected to bulk power system to follow NERC registration requirements including equipment and procedures needed to monitor and control loads.

Policy Recommendation	Agency Action (Who, What, When)				
	Congress	FERC	Regional Transmission Organizations	State Legislatures	State PUCs
		loads to ride through voltage fluctuations.			
Data center companies should improve the flexibility of data centers so that they can reduce demand rapidly.		Approve large load tariffs that incorporate demand response and adequately measure and compensate for demand response services provided by large load.	Create large load tariffs that incorporate demand response and adequately measure and compensate for demand response services provided by large load.		Require utilities managing large loads to develop and submit for approval large load tariffs that incorporate demand response and adequately measure and compensate for demand response services provided by large load.