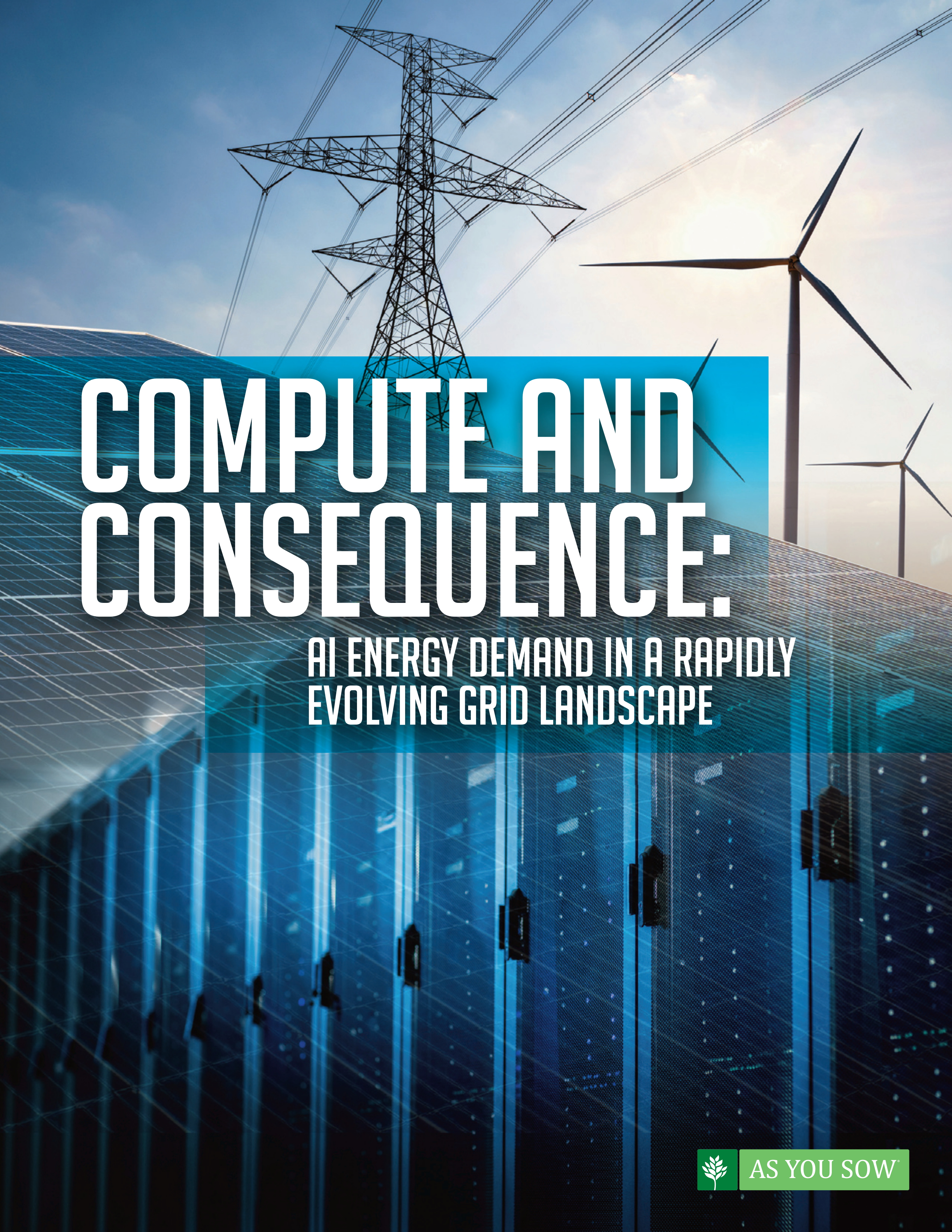

COMPUTE AND CONSEQUENCE:

AI ENERGY DEMAND IN A RAPIDLY EVOLVING GRID LANDSCAPE

AS YOU SOW

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About *As You Sow*

As You Sow is a nonprofit organization dedicated to increasing environmental and social corporate responsibility while increasing company value. Founded in 1992, *As You Sow* envisions a safe, just, and sustainable world in which environmental health and human rights are central to corporate decision making. Its Energy, Environmental Health, Waste, and Human Rights programs create positive, industry-wide change through corporate dialogue, shareholder advocacy, coalition building, and innovative legal strategies. For more information, visit www.asyousow.org.

Note to the Reader

This data on which this report is based solely on publicly available documents but may not be exhaustive. Please contact individual companies with questions regarding the corporate data presented in this report. If you are a company representative and believe there has been an error in the data collected, or if you would like to submit updated information, please contact EnergyandClimate@asyousow.org.

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1. INTRODUCTION

Technology companies have been leaders in corporate clean energy procurement, helping accelerate the deployment of wind and solar across the world. However, technology companies' rush to lead in the development of Artificial Intelligence (AI) is now driving investment in new fossil-based gas plants and even extending coal power generation to meet projected energy demands of new and proposed data centers.[1]

Between January 2023 and January 2025, new gas-fired power plants actively proposed by utilities and independent developers jumped by 70% to nearly 200 gigawatts (GW).[2] Many of the proposed gas projects are directly associated with data center demand. If these plans are fully realized, today's gas fleet would be increased by nearly one-third.

While many technology companies are claiming 100% renewable or clean energy goals, those goals are often achieved through matching consumption of energy with renewable energy certificates (RECs). However, many RECs do not incentivize new renewable capacity or, due to time of use and location discrepancies, fail to sufficiently cancel the emissions from data centers reliant on gas or coal-fired electricity. This disconnect between greenhouse gas (GHG) emissions from operating and planned data centers and the emissions reductions actually achieved through RECs can undermine the climate goals of both technology companies and power utilities.

"If surging electricity demand is overestimated and is met primarily by expanding gas-fired generation and maintaining coal power, the U.S. risks locking in tremendous GHG emissions for decades to come."

Amplifying this issue is significant uncertainty and speculation around the number of new data centers actually needed to serve growth in AI. Similar to prior technology booms, as the market for new technology solidifies beyond its frothy stage, actual demand will likely be much less than the public hype suggests. Not only are demand projections currently overestimated due to companies seeking bids from multiple providers, but competition will likely winnow the number of AI competitors with successful market offerings. Further, the projected hourly energy needs of data centers are likely to be reduced substantially through demand flexibility and operational efficiencies still to come.

Investors have a great deal at stake in understanding these dynamics. If surging electricity demand is overestimated and is met primarily by expanding gas-fired generation and maintaining coal power, the U.S. risks locking in tremendous GHG emissions for decades to come. This potentially dramatic expansion of fossil power comes at a time when rapid decarbonization is necessary to prevent climate-related catastrophes from becoming worse and permanently locking in market value destruction.

This paper provides perspective on the AI boom and its energy and risk implications and offers a practical framework through which investors, technology companies, and utilities can work together to evolve best practices and drive clean energy solutions aligned with grid decarbonization.

While this report focuses on the electricity demand and climate implications of rapid data center growth, water use is a growing area of concern as it is tightly intertwined with energy use. Many data centers rely on large volumes of water for cooling, which can strain local water supplies, particularly in regions already experiencing water stress. Addressing energy and water impacts together will be critical for ensuring that data center expansion aligns with broader environmental and community sustainability goals.

Energy Demand Growth

Calls for energy growth are coming from a number of players in the AI arena. The most prominent are the hyperscalers (Amazon, Google, Meta, and Microsoft, who build and operate their own facilities), colocation companies (which lease space and power to clients), and data center developers (real estate companies building and selling data centers). The hyperscalers are in the spotlight, but the combined calls for energy are exerting significant pressure on grid infrastructure and energy markets and warrant closer attention from investors.

Technology companies are accelerating their development of new data centers to maintain a competitive edge in the AI arms race. Their search for reliable power supply is occurring at a scale and urgency that is placing considerable strain on utilities and regional transmission operators (RTOs). Some of the data center campuses currently under construction are of record-breaking size, capable of using up to one GW of electricity at any time (more than the generation capacity of a large utility-scale power plant). Estimates of growth vary significantly, but data center electricity demand is now projected to potentially triple, with estimates that the sector may consume from 7% to 12% of total U.S. electricity consumption by 2028.[3]

2. THE IMPACT OF DATA CENTER GROWTH ON THE U.S. ELECTRICITY SECTOR

For the first time in decades, power utilities are facing demand growth. This growing energy demand, coupled with new and challenging load consumption patterns from AI models, can cause issues for grid balancing and power quality, with the potential for the U.S. grid to become increasingly congested, unstable, and ultimately more expensive for all customers.[4] Added to these concerns, the climate impact of the currently projected gas generation buildout will also be consequential for utilities, technology companies, and their investors.

Investors play a critical role in advocating for urgent but thoughtful action from both power utility and technology companies to address the growing risks from the AI boom and its impact on the energy grid. Investors can support the opportunity presented by a low-carbon economy and, more specifically, the robust benefits offered by renewables and battery technology, which are increasingly seen as the main drivers of decarbonization and long-term value creation. Solutions are available that not only reduce demand for new gas but also present ways in which data centers can be assets to the grid and even accelerate the clean energy transition.

2.1 Data Center Speculation

Equally important, while many utilities are enthusiastically embracing the economic opportunity of new large-load customers, experts warn that growth projections are exaggerated. Indeed, a survey of investor and regulator-facing materials conducted by the Sierra Club shows that utilities cite an “economic development pipeline” for data centers exceeding 700 GW – enough energy to exceed all U.S. electricity produced in 2024.[5]

Numerous electric utilities seem to believe that their underlying economic development pipeline is robust enough to support significant capital expenditures, often without acknowledging or accounting for the industry’s uncertainty. If utilities overextend expensive infrastructure on behalf of clients that fail to materialize, or without sufficient demonstration of viability, they may end up with stranded assets – i.e., power plants and infrastructure that burden ratepayers and/or utility company investors.

Some utilities are starting to publicly note that there is likely a wide gap between the expressions of interest they are receiving from technology companies and the demand that will transpire. As the President and CEO of the Electric Power Supply Association stated, "The magnitude of the energy needed [for data centers] is still much more in question than many seem to think."[6] Other experts have echoed this sentiment, cautioning that "[utilities are] seeing five to ten times more interconnection requests than data centers actually being built."[7]

Three main factors fuel this speculation:

1. **There is uncertainty around data center utilization rates.** Because technology companies provide limited transparency pertaining to their electricity use, power utilities are likely overestimating how often new data centers will operate at full capacity.[8]
2. **Speculators are flooding the market.** New entrants are increasingly looking to build and flip data centers. Many of these actors are requesting power access before securing capital or customers, simply to claim a spot in the long queue for power and transmission connection.[9]
3. **Many entities proposing new data centers are approaching multiple utilities.** There is increasing evidence that many hyperscalers, colocation facilities, and real estate companies are approaching multiple utilities with the same data center proposals to test the market.[10] This "shopping around" is resulting in double-counting of demand.

Estimating demand as accurately as possible is critical, not only because of the potential to lock in unnecessary high-carbon infrastructure for decades, but also because rate payers – not the owners and operators of data centers – will likely shoulder much of the financial burden for new infrastructure through rate increases on already high electricity bills. As former Federal Energy Regulatory Commission (FERC) Chair Neil Chatterjee notes, governors pushing data center growth are now "realizing it can come at a cost of increased consumer bills."[11] Harvard Energy Law Initiative's Ari Peskoe and Eliza Martin more bluntly state that, without change, "consumers will be paying billions of dollars for regional infrastructure that is designed to address the needs of just a few of the world's wealthiest corporations."[12].

WE'VE SEEN THIS BEFORE

In the late 1990s, analysts foresaw booming electricity demand driven by digital technologies, but demand forecasts were routinely overstated. For example, analysts at California's Independent System Operator anticipated double-digit growth rates that never materialized. Merrill Lynch correctly forecast that thousands of megawatts of nearly completed plants would never run because demand growth would fall short of expectations, which turned out to be the case.[13]

The oversupply of generation capacity quickly drove major utilities into financial distress. In May 2003, Xcel Energy's unregulated subsidiary NRG (spun off only three years earlier) filed Chapter 11. NRG attempted to unload 12,000 MW of merchant power generation to shore up its finances but struggled because of the power supply glut in the market.[14] Similarly, Mirant (spun off from Southern Company in 2001) slid into bankruptcy in December 2003.[15] Calpine, the nation's largest independent power producer, also provides a dramatic example. Calpine, which built dozens of gas plants in the boom years but carried a massive debt load, attempted to shed 20 power plants that were operating or under construction. In late 2005, it filed for bankruptcy with over $22.5 billion in liabilities on $26.6 billion of assets.[16]

2.2 The Drivers Behind Overbuilding

The growth of data centers, and even the potential for growth, is driving utilities to invest in and build an extraordinary amount of infrastructure. Investor-owned utilities have historically embraced opportunities for growth because new demand yields new revenue.

Numerous elements of electric utility regulation and ratemaking are geared to promote load growth speculation:

- Traditional utility rate recovery favors capital expenditures, which earns a guaranteed rate of return, encouraging utilities to seek growth.
- Utilities are generally obligated to serve customer demand and will lean towards higher growth projections to ensure they do not under-build generation capacity.
- Regulators may see new load as financial security that may serve to improve credit ratings, reduce the cost of capital, and protect other customers from credit shortfalls.
- New utility customers may be favored when they provide a broader base for existing fixed costs.

These biases are likely to pose risks for utilities. Pursuing load or building new capital infrastructure in anticipation of potential new demand can create financial risk if demand fails to transpire or if costs are shifted to existing customers and, to the extent clean energy sources are not pursued, create substantial climate risk by driving up emissions.

2.3 Utilities Defaulting to Gas and Coal

One of the most prominent features of the data center growth boom is the impetus it provides to develop new gas plants and keep existing coal infrastructure online. According to a Sierra Club analysis, between January 2023 and January 2025, new gas-fired power plants actively proposed by utilities and independent developers increased by 70% to nearly 200 GW.[17] This is especially remarkable given that in 2024, due to the low price of renewables, over 90% of new electricity generation brought online was renewable,[18] a trend that is continuing into 2025.

There are various reasons for this renewed focus on fossil energy. Existing fossil-fuel plants can serve demand quickly while providing dispatchable energy 24/7, a feature technology companies claim they need for AI-related needs (but is being increasingly challenged).[19] To meet 24/7 energy needs, coal plant life can be extended and new gas plants require relatively little property and can be built by the utility, offering an attractive return for investor-owned utilities.

2.3.1 Pathways to Gas

There are three ways in which data centers are directly driving the expansion of gas capacity:

1. **Adding capacity to existing gas plants.** Adding capacity at existing or recently retired power plants is one of the fastest ways to bring gas power onto the grid. Examples include Georgia Power's (Southern Company) plan to add an additional 268 MW of gas capacity at Plant McIntosh,[20] PPL's Kentucky utilities' plan to add 1.3 GW of new gas capacity at existing plants,[21] or Duke Indiana's 470 MW proposal for the Cayuga coal plant site.[22]

2. **Locate data centers with utilities willing to build new gas plants.** Siting new data center locations with utilities willing to skip planning processes to build new gas power plants can be a shortcut for technology companies. One prominent example that has raised concern is Meta's enormous 2.2 GW proposed data center in Louisiana. Meta and Entergy have agreed that three large methane gas-powered, combined-cycle plants would be built by the utility to meet Meta's increased power demand.[23] If fired entirely on gas, Meta's project would result in an incremental 8 million tons of CO_2 per year.[24] While Meta has proposed funding up to 1,500 MW of additional solar power,[25] the project would still result in a new 6.5 million tons of CO_2/yr,[26] or nearly 100 million tons over the minimum 15-year contract.
3. **Colocate data centers with new merchant gas plants.** Several large proposals are moving forward to power data centers with colocated gas. Examples include a partnership between Chevron and Engine No. 1 to build 4 GW of gas for colocated data centers[27] and a partnership between gas company Energy Transfer and Cloudburst, an AI startup, to build 1,200 MW of gas power in Texas.[28]

In addition to data centers directly driving gas expansion, merchant electricity providers looking to harness data center growth are positioning themselves with additional gas capacity. In March 2025, NRG acquired 738 MW worth of gas capacity in Texas to help meet demand growth from data centers,[29] and in May 2025, Vistra acquired 2,600 MW of gas capacity in four states across the Northeast as well as California.[30]

A closer look reveals deeper structural incentives for why utilities are turning to gas. Because many regulated utilities earn a guaranteed return on the infrastructure they own – and gas plants are typically utility-owned – gas projects often look more attractive in utility financial models than renewables, which tend to be bought through third-party contracts. As a result, analysts and advocates have found that many utilities embed assumptions in their models that systematically undervalue cleaner alternatives and overstate the need for gas – driven by the near-term financial advantages of capital recovery rather than long-term system needs or consumer price concerns.

Modeling biases can make gas plants look cheaper and more reliable than they truly are, biasing resource choices. Typical modeling biases include the following:

- **Use of preselected projects or retirement dates** so that scenario analyses do not explore least cost, renewable-forward portfolios. For instance, in its 2023 Integrated Resource Plan (IRP), Ameren largely preselected the extension of coal retirements and new gas plants, obviating the use of economic optimization. This preselection practice "fails to meet the IRP's fundamental goal of minimizing long run costs."[31]
- **Self-imposed caps on the amount or type of renewables** included in modeling scenarios such that even if certain renewables would be faster to build or more economic, it would not show in the outcome of a modeling scenario. For example, Duke Energy imposed an artificial cap on solar additions in its North Carolina 2024 IRP, assuming only small-scale projects.[32] Under a more realistic assumption of larger-scale solar projects, the cost of accelerating coal retirements and adding more solar/storage would beat Duke's preferred fossil-fuel heavy pathway.
- **Assumptions of overly high capital or operating costs for wind, solar, and batteries** while using unrealistically low fuel prices or financing costs for new gas plants. For instance, Xcel assumed capital costs lower than industry benchmarks for new high-efficiency gas turbines,[33] biasing its model toward building gas plants. Including appropriate inflation-based estimates and projected higher gas costs would shift the optimal portfolio toward more renewables and storage.

These modeling biases, among the other factors driving utility investments in gas, warrant investor attention as gas plants commit a utility to 30 to 40 years of significantly higher GHG emissions, higher operational expenses, and the potential for stranded assets, putting both utility shareholders and ratepayers at risk. Of further concern is that power utilities do not have viable climate transition plans for their gas plants. While some power utilities have pointed to hydrogen blending in their sustainability reports as a potential pathway to decarbonize gas plants in the future, producing the clean, green hydrogen required at scale remains prohibitively expensive,[34] and no companies have disclosed concrete plans to build the extensive supply chain needed to replace methane gas.

Despite utilities' bias toward gas, what is most perplexing about the new investments in gas is the mismatch between urgent energy needs and the long lead times required to secure additional gas turbines. As demand has surged for large combined-cycle gas turbines, a manufacturing backlog has emerged of five to seven years.[35] This, coupled with the rising cost of gas plants, suggests that gas plants may not be the most cost-effective or timely response to growing energy demand. Several recently built gas plants have come in at well over $2,200 per kilowatt (kW). For example, Duke Indiana's estimated procurement cost for the Cayuga combined-cycle plant is $2,340 per kW, which is 36% above the figure provided in the utility's prior year resource plan.[36] This is two times the cost cited by EIA's 2025 Annual Energy Outlook benchmark that assesses a combined-cycle gas plant capital cost at $1,117 per kilowatt.[37] Reflecting this price trend, the CEO of NextEra stated that "the cost of gas-fired generation has gone up three-fold" since 2022.[38]

2.3.2 A Renewed Reliance on Coal

Between 2012 and 2023, the U.S. power sector replaced more than 11 GW of coal annually, an amount of coal that, at its peak, emitted nearly 900 million tons of CO_2 each year.[39] However, the pace of retirement has slowed, and coal plants are increasingly announcing retirement delays or canceling retirements entirely with both a coal-supportive administration and as utilities reassess demand. According to an analysis by The New York Times, utilities have extended the life of nearly a third of coal units with planned retirement dates.[40] These delays leave residents exposed to continuing health risks.[41]

For example, Southern Company, one of the largest utility companies in the U.S., has delayed the retirements of Plant Scherer (GA) and Plant Bowen (GA) beyond 2028[42] and has extended the life of Plant Daniel (MS) expressly to power data centers.[43] The utility has not been shy about the connection between data center load growth and its coal fleet, stating that "as we look at responding to demand growth, looking at coal operating longer is a consideration."[44]

In Nebraska, energy demands from data centers have delayed the retirement of a coal plant,[45] and in Virginia, Dominion Energy elected to retain the Clover coal plant to meet rising data center demands.[46] Dominion South Carolina has recently proposed maintaining the Wateree and Williams coal plants "considering recent increases in demand on the system."[47]

3. THE DISCONNECT BETWEEN STATEMENTS AND ACTION

Technology companies have become some of the most prominent voices in the global conversation on climate action, often positioning themselves as leaders in the transition to a low-carbon future. Through bold commitments to 100% clean energy (see Table 1) and public-facing sustainability goals, technology companies shape investor expectations, influence policy, and set industry norms.

While technology companies are purchasing record-breaking amounts of renewable electricity, data centers today remain heavily reliant on fossil-based, high-carbon electricity from the grid.

To meet their 100% clean energy claims, many technology companies are matching RECs to their fossil fuel power use, which represent 1 megawatt-hour (MWh) of renewable electricity generated. However, RECs vary widely in quality and their likelihood of contributing to grid decarbonization. Complicating matters, the rise of different emissions accounting methodologies, combined with limited company disclosure, makes it difficult to assess the true emissions impact of voluntary renewable energy purchases. As a result, real-world climate outcomes are at risk.

TABLE 1: CLEAN ENERGY TARGETS OF SELECT COMPANIES

COMPANY	ENERGY TARGET RELATED TO DATA CENTERS
Amazon	"Match 100% of the electricity consumed by our global operations with renewable energy by 2025"[48]
Google	"Run on 24/7 carbon-free energy on every grid where we operate by 2030"[49]
Meta	"Continue to match 100% of our electricity use with renewable energy to support our operations"[50]
Microsoft	"By 2030, 100% of electricity consumption will be matched by zero carbon electricity purchases 100% of the time"[51]
Digital Realty	"Long-term goal of making 100% renewable energy available to customers"[52]
Equinix	"100% clean and renewable energy coverage across our global portfolio by 2030"[53]
Apple	"Maintaining 100 percent renewable electricity for Apple facilities"[54]
IBM	"Procure 75% of the electricity IBM consumes globally from renewable sources by 2025, and 90% by 2030"[55]
Oracle	"100% energy usage with renewable sources for Oracle Cloud Infrastructure [by 2025]"[56]

Higher quality RECs are tied to procured electricity generated through specific renewable energy installations. The most common form is linked to energy generation through a Power Purchase Agreement (PPA), which is typically a long-term contract between an electricity provider and a company for a new renewable energy installation. However, RECs can also be tied to PPAs for existing installations where they are less likely to result in additional renewable electricity capacity.

While there is no single definition of utility green tariffs, high-quality RECs from utility green tariffs operate under similar conditions to PPAs in that a long-term contract bundles renewable electricity from a specific renewable energy installation with a utility tariff rate. The benefit to many companies is that the utility manages the development of new projects without paying program costs or shouldering project risks.

Standalone RECs are not directly associated with a particular renewable electricity installation and often do not contribute to additional renewable energy supply. This lack of "additionality" (i.e., whether the purchase actually adds new clean energy to the grid) is especially concerning for unbundled RECs in which the certificate is sold independently from any purchase of electricity. Because these unbundled RECs are often associated with existing renewable energy capacity, and in many cases are not connected to the same grid as the purchaser, they are widely viewed as ineffectual on grid decarbonization.[57] Importantly, these unbundled RECs are cheaper than their higher quality counterparts,[58] incentivizing low-cost, low-impact decarbonization claims and can decrease the uptake of meaningful grid decarbonization measures.

> "The gap between energy targets and the outcomes they affect has led to overstated impressions of corporate electricity emissions performance."

In practice, most companies rely on a mix of RECs of varying quality. When companies purchase RECs from existing projects, or those that would have gone forward regardless of the REC purchase, there is often a disconnect between emissions claims and real grid decarbonization. A similar outcome occurs when purchased RECs are not time- or location-specific and, therefore, fail to materially alter the time- and location-bound electricity mix of the relevant grid. Only a few companies, including Microsoft and Google, have adopted clean energy goals that require hourly and regional matching.

The gap between energy targets and the outcomes they affect has led to overstated impressions of corporate electricity emissions performance. Targets and reporting practices often create the perception among investors that technology companies operate entirely on clean energy while, in reality, many still rely on high-carbon grid power. Companies are reporting emissions using the "market-based" method, which calculates electricity-related emissions based on the specific contractual instruments they purchase, such as RECs, rather than the average emissions intensity of the local grid, which is referred to as "location-based" emissions.[59]

For example, in its *2024 Sustainability Report*, Meta highlights a relatively low total for its Scope 2 market-based GHG emissions from purchased electricity: 1,658 metric tons of CO_2e; however, its actual, location-based emissions are orders of magnitude higher: 5,141,350 metric tons of CO_2e.[60] By prominently showcasing the adjusted figure and using it in the company's aggregated GHG emissions footprint, Meta gives a distorted and unfairly favorable view of the company's carbon-intensive activities.

Without a clear framework that distinguishes high-impact procurement from greenwashing, companies that invest significantly in transformative solutions are often treated the same as those taking more limited steps. The result is a loss of credibility, confusion for investors and regulators, and a weakened collective ability to drive grid decarbonization.

4. THE VERY REAL RISKS FROM DATA CENTER GROWTH

For investors, the rapid expansion of data centers brings growth potential and a growing suite of potential risks. Understanding how these risks are evolving – and how well-positioned companies are to manage them – is critical for informed investment decision-making in the AI and data center-driven economy.

4.1 Utility Risks

Investors have been working with utilities for decades to proactively manage climate-related risks. The AI boom and the concurrent electricity demand growth is testing the integrity of these efforts. Companies that have done the work to embed comprehensive and robust climate risk assessment into their investment decisions are reacting differently to the current demand growth than those that have not.

Utilities that lack this foresight are prioritizing the short-term economic appeal of high-carbon infrastructure, while overlooking risks ranging from stranded assets to the systemic threat of global economic disruption from climate change. As temperatures rise and the opportunities of the clean energy transition become more apparent, the gap between utilities that are prepared and those that are not will only widen.

4.1.1 Stranded Asset Risk

One of the most substantial risks for utilities investing in the data center boom is the risk of holding stranded assets – i.e., power plants and infrastructure that are not supported by ratepayers. Utilities may overextend expensive infrastructure on behalf of clients that fail to materialize or who go out of business when technologies, efficiencies, or regulations change. The risk of obsolescence is not unique to the technology boom we see today; rather, the unique aspect is that utilities, a quasi-public set of services, are asked to shoulder much of the risk.

The risk associated with speculative load was described by Basin Electric Cooperative in a filing to FERC during the crypto boom:

> ". . . Basin Electric could be placed in the untenable position of having to construct new generation resources to serve Crypto Load that ultimately relocates or to serve Large Load projected to be constructed but that never materializes. In this case, Basin Electric would have constructed or procured resources that have been rendered obsolete, resulting in stranded assets."[61]

4.1.2 Fuel Cost Exposure

One of the most substantial costs facing utilities over the last several years has been exposure to fuel volatility, which can put both utility shareholders and ratepayers at risk. In mid-2024, Rocky Mountain Power (PacifiCorp or RMP) sought a staggering 30% rate increase from its Utah customers, triggering a regulatory backlash and a substantial trimming of the utility's request to just a 4.7% increase.[62] The utility explained that the higher costs were a function of higher fuel costs[63] and wildfire liability costs, noting that failure to fully recover its costs could lead to net losses and negative ramifications for its shareholders. The utility also stated that bringing renewable energy online could help mitigate its exposure to higher fuel costs.[64]

Across the country, energy costs rose dramatically in the last two years.[65] The higher costs of energy have already been identified as a credit risk for utilities,[66] and greater exposure to fuel cost volatility only exacerbates that risk.

4.1.3 Affordability & Regulator Resistance

There is a growing and credible concern that electric utility customers may unfairly shoulder the costs of the growth in energy demand from data centers. These concerns have emerged in public utility commission hearings, community meetings, policy debates, and utility credit assessments.[67]

Even Virginia, which has relatively enthusiastically embraced data centers, is starting to look skeptically at the potential impact on customers. A recent study from the Joint Legislative Audit & Review Commission, a state research agency, found that "increased energy demand will likely increase system costs for all customers, including non-data center customers."[68] Researchers found that data center load growth in Virginia (as of mid-2024) would increase electricity costs for all PJM customers by more than 10% due to higher energy and capacity costs.[69]

These increased costs for non-data center customers are likely to have a direct impact on how regulators assess utility requests for rate increases, returns, and capital expenditures incurred without sufficient due diligence in this data center boom.[70]

4.1.4 Competitive Risk

To fast-track time to power, some technology companies are partnering directly with independent power generation companies to develop on-site power generation to avoid the confinements of regulated utilities. For example, Meta is partnering with Sage Geosystems and Constellation Energy for 150 MW of geothermal energy and 1.1GW of nuclear power, respectively.[71] Google has also signed an agreement with Kairos Power to build multiple small modular reactors.[72] Technology companies are also looking to off-grid power solutions, even if powered by fossil fuels, to bring data centers online rapidly. Siemens Energy and Eaton have developed an on-site 500 MW modular gas plant for data centers.[73]

These alternative power sourcing strategies pose a competitive risk to regulated power utilities, which may lose prospective large-load customers because they either cannot overcome the regional circumstances preventing new grid connections or because they are not prioritizing renewable energy investments. This also poses a competitive risk to technology companies that are not pursuing energy providers outside of power utilities as they may have fewer resource options and longer timelines.

4.2 Technology Company Risks

While electric utilities are shouldering much of the risk from rising electricity demand driven by AI, technology companies face mounting risks tied to the scale and energy intensity of their data centers.

4.2.1 Fuel Cost Exposure & Increasing Costs

On the flip side of utility exposure to higher fuel costs and increasing costs of energy are the potential cost implications to large-load customers if, or when, tables turn, and regulators seek to assign costs to data center customers. Today, regulators and utilities have relatively limited transparency into the price sensitivity of technology companies to electricity costs. Indeed, technology companies themselves may have a relatively limited understanding of their price elasticity[74] – i.e., how much data centers and the customers they serve are sensitive to energy costs.

As discussed below, utilities, regulators, and policymakers are increasingly using policies and practices that would assign an increasing fraction of cost and risk to large-load customers or data centers specifically. If realized, data center customers could carry substantially more risk associated with fuel cost volatility, supply chain disruptions, weather-related risks (e.g., heat waves and floods), and wildfire risks that are impacting the electric sector today and likely to grow as climate impacts grow.

4.2.2 License to Operate & Regulatory Risk

In response to the mounting strain that data centers are placing on the power grid, including rising costs for everyday consumers, regulators at the city, state, and regional levels are beginning to introduce limits on new data center developments and their energy procurement practices. These emerging regulations reflect a shift from purely growth-focused incentives[75] to a more balanced approach. These new rules vary in form and intent: Some establish renewable energy requirements, others introduce financial accountability measures, and some are designed to safeguard grid reliability.

Three policies demonstrate the breadth of regulations:

- In Oregon, the Power Act bill requires data center companies to sign a 10-year power contract, ensuring that ratepayers are not saddled with the costs of building new power sources if the data center demand does not come to fruition.[76]
- New Jersey lawmakers are considering a bill requiring all electricity for AI data centers to come from newly built clean energy sources.[77]
- In Texas, a bill allows the grid operator Electric Reliability Council of Texas (ERCOT) to cut data center power and use it during an emergency.[78]

These types of regulatory policies, while critical for protecting communities, pose significant market and competitive risks for technology companies. In an industry currently amidst a race to market dominance, these policies lengthen time to power and narrow technology companies' options for locating new data centers (to the extent they are unable to meet the policies' requirements), potentially barring access to key markets. These policies are global and already affecting data center expansion plans. For example, Google's proposal to build an additional data center in Ireland was denied due to its plan to draw too much power from the local grid.[79] Similarly, Amazon's proposed 600 MW "Project Blue" data center campus was rejected by the City of Tucson, Arizona over concerns of water use and community impacts.[80] There is also a growing movement from local communities that are concerned about the environmental impacts of new data centers; $64 billion of data center projects have been blocked or delayed amid local opposition.[81]

This serves as a critical warning, highlighting the growing scrutiny over how data centers source energy and the increasing pressure to demonstrate a direct contribution to grid sustainability in addition to protecting the energy costs for local consumers.

4.2.3 Reputational Risk

As the impacts of data center energy procurement become more visible, technology companies risk being seen not as climate leaders but as major contributors to high-carbon expansion. This association has already led to reputational harm. One headline reads, "A utility promised to stop burning coal. Then Google and Meta came to town."[82] Another says, "AI could keep us dependent on natural gas for decades to come."[83] Stakeholders are noticing the contrast between company renewable energy claims and how new data centers are actually driving high-carbon development. One article states, "Even the large hyperscalers are willing to turn a blind eye to their renewable goals for some period of time in order to get access [to power]."[84]

This reputational harm may have consequences. Technology companies that do not align their operations with meaningful climate solutions may risk removal from environmental, social, and governance (ESG) indices, reduced access to sustainable finance, and shareholder pushback.

Additional features of the AI boom are driving reputational risk. Today, ratepayers are footing the bill for new fossil infrastructure being built to support data centers. If companies are perceived as profiting at the public's expense, trust will erode – along with political goodwill.

Moreover, if the projected wave of new data centers does not fully materialize – whether due to economic pressures, permitting delays, or market consolidation – the utilities building capacity on their behalf may be left with stranded assets and unrecoverable costs. This scenario could damage relationships with utilities and regulators, making it harder for technology companies to secure future energy access, infrastructure support, or favorable contract terms.

In sum, companies that fail to ensure their data center expansions are aligned with the grid's decarbonization jeopardize their brand, stakeholder relationships, and long-term license to grow.

4.3 Systemic Climate Risk

Meeting rising data center demand with new, fossil gas capacity has the potential to derail the clean energy transition at the exact moment when accelerating it is most critical.

Peer-reviewed science indicates that, if left unchecked, the cumulative impact of investment in high-carbon infrastructure will reach a tipping point in both climate effects and economic viability.

The consequences are no longer theoretical or relegated to the future: Climate change has already cost the global economy at least an estimated $148 billion annually since 2000.[85] In the U.S. alone, 2024 brought 27 extreme weather disasters, each exceeding $1 billion in damages, totaling nearly $183 billion.[86] To date, 2025 has brought fires, the estimated costs of which have ranged from $30 to $250 billion.[87] Losses associated with climate change extend far beyond the damage from extreme weather events. They are embedded in disrupted supply chains, reduced productivity, resource constraints, and strained infrastructure, but are not yet routinely accounted for as costs of climate change.

Systemically, the exponential increase in climate-related catastrophes is alarming and underscores the impact of adding even more greenhouse gas emissions to the atmosphere, especially from assets with 30 to 40-year lifespans. Without substantive action to reduce GHG emissions, over 40% of global equity value is at risk, with losses potentially exceeding 50%.[88]

Investor action is critical to redirecting capital in ways that reduce, not increase, systemic global warming risk.

5. ALIGNING DATA CENTER GROWTH WITH DECARBONIZATION

Game-changing strides have been made in the availability of low-cost, renewable energy and battery storage.[89] In 2025, a projected 93% of new capacity will be renewables and storage, demonstrating that clean energy is deployable at scale.[90] And while new tariffs inject additional uncertainty and are slowing clean energy investment in the near term, continued cost declines in renewables and battery storage technology, coupled with rising costs for fossil-fuel infrastructure also affected by the tariffs, suggest the long-term trajectory still favors clean energy. Additionally, wind and solar projects that begin construction by mid-2026 or come online by the end of 2027 could still benefit from Inflation Reduction Act (IRA) incentives, providing developers with a critical window to lock in tax credits.

While the AI-related data boom is ringing alarm bells across the U.S., responding with a deliberate and informed response that takes long-term impacts into account is critical. Renewable energy systems with storage can serve the vast majority of new data center demand for electricity, particularly when paired with flexible load management. Despite the noise within this system, a large range of responsible management strategies are emerging to temper the risk of overbuilding fossil generation capacity based on speculative demand.

5.1 Increase Demand Certainty Through Transparency and Commitments

Responsible energy procurement requires greater demand certainty to reduce speculative pressures and increase transparency around data center development. At a minimum, utilities can require large-load customers to provide decision-critical information in applications, including the

- number of utility providers approached to procure power for a given data center;
- status of project site and operational certainty (e.g., land purchase agreements in place, substantial construction outlays made or approved, reservations or down payments made on a certain percentage of long-lead equipment); and/or
- projected operational profiles for energy demand and flexibility potential.

To date, technology companies are not providing this transparency. When utilities have confidence about load growth from large-load customers, the pressure and likelihood of overbuilding gas or prolonging the operation of coal plants are reduced. This information is also critical for the transmission and distribution utilities responsible for building supporting infrastructure for increased energy loads.

To address challenges associated with competitiveness and proprietary information concerns, which has led many companies to withhold ownership or project status information, a balance can potentially be struck by anonymizing projects while providing transparency around critical data.[91]

Utilities can also reduce speculation by tightening contract requirements to ensure only credible, viable projects proceed. This can include imposing higher financial commitments on users and collateral requirements, such as

- increased non-refundable fees and deposits (often tied to MW capacity);
- milestone-based payment schedules;
- pre-payment for network upgrades;
- long-term service contracts;
- higher minimum demand charges;
- and ratcheting penalties for project withdrawal.[92]

Large-load tariffs with these types of requirements have begun to emerge as a tool for bringing new load onto the grid while minimizing risk to utilities and ratepayers of either overbuilding systems and ending up with stranded assets or underbuilding and facing reliability challenges.[93] Emerging best practice is highlighted in studies by the Lawrence Berkeley National Laboratory.[94]

5.2 Increase Flexibility

Data center flexibility – the ability to adjust the time of their electricity use – can be highly valuable to the electricity grid during infrequent periods of system stress, such as severe weather events or fuel supply disruptions, and, more broadly, can make the grid cheaper and cleaner. A recent analysis by Duke University's Nicholas Institute underscores the potential for leveraging flexible loads to enable demand growth while mitigating the need for large expenditures on new capacity. For example, estimates suggest that if new loads such as data centers could make their electricity use flexible 0.5% of the time, existing power infrastructure could accommodate up to 98 GW of additional load nationwide without adding new resources.[95]

Technology companies can ease pressure at times of peak energy by "engaging in utility demand-response programs, staging highly-intensive processes to be coincident with lower net system demands, investing in storage to shift demand periods, and offering backup batteries as system resources."[96] These strategies can be further enhanced by participating in or enabling virtual power plants, which aggregate distributed energy resources such as batteries, EV chargers, and flexible loads to provide coordinated support to the grid during times of stress.

To tap into this potential, a number of initiatives, including the Electric Power Research Institute's DC Flex Initiative, are exploring how data centers can enhance their demand flexibility.[97] In a recent demonstration project in Phoenix, Arizona, Emerald AI demonstrated that its software could reduce the power consumption of AI workloads by 25% over three hours during a grid stress event while preserving computing service quality.[98]

To this end, utilities are beginning to navigate the complexities of designing flexible interconnection policies and rate structures. These efforts aim to give data center developers greater transparency into how flexible operations might be valued and compensated. The Department of Energy found last year that technology companies state that flexibility is possible if they are given appropriate signals.[99] Google just announced two novel utility agreements with Michigan Power and Tennessee Valley Authority, committing to shift or reduce power demand at its machine learning facilities during periods of peak grid stress.[1009] Some analysts also suggest that "flexible data centers may also be able to secure space on capacity-constrained grids more quickly than inflexible competitors."[101]

Technology companies can further support utilities by reducing unpredictable demand patterns, including fluctuations and demand ramps, as a sudden surge or drop in demand can pose serious reliability risks to the grid.[102] Battery energy storage systems can serve as resources in managing these issues and are an important source of flexibility for the grid. Most data centers have on-site batteries to keep systems running briefly during grid disruptions until diesel generators start up, but using batteries for full backup power is more technically complex and expensive.

Companies are nonetheless investing in new battery technologies to improve demand flexibility, particularly as an avenue to faster grid connection.[103] Significant examples include Google's data center in Belgium, which includes 2.75 MW of battery storage that will replace the need for diesel backup generators and provide energy to the grid to improve grid stability;[104] Google's deal with Intersect Power to build, by 2030, $20 billion in renewable energy and energy storage assets colocated with data centers;[105] and Scandinavian Data Centers's battery storage system which will act as backup power and help stabilize the electrical grid.[106]

5.3 Drive Energy Efficiencies

The most accessible and lowest-cost solutions to drive efficiency and reduce energy use follow the straightforward principle of designing data centers to do more with less.[107] Many of these efficiency enhancements, including improved software and hardware design and enhanced cooling, are currently available and ready to be deployed at scale.[108]

Foremost among these solutions is software optimization. More efficient software products can reduce compute requirements and decrease idle time, and low-demand programming structures can decrease baseline processing requirements.[109] By decreasing the computing power necessary to execute tasks hosted at large datacenters, electricity and cooling demand fall, and computing clusters can do more with less.

This principle applies to hardware as well. A growing number of high-efficiency AI inference-specific hardware products are on the market,[110] and companies can prioritize chipsets (the collection of electric components that enable the functioning of a computer system) that achieve high electrical and thermal performance. By focusing on modular design and proactive, predictive maintenance, data centers can optimize run time and decrease upkeep requirements.[111]

In addition to electricity demand, cooling systems are a key limiter for the performance and sustainability of modern data centers. Cooling solutions range from basic to advanced. Environmentally aided "free cooling" where data centers are in geographies with easy access to natural heat sinks, such as abundant cold air and water, is an ideal solution to enhance thermal performance and decrease cooling demand.[112] However, when not feasible, liquid immersion cooling, where computing chips are directly submerged in fluid, is often cited as a highly effective cooling solution and enables up to 50% reduction in cooling energy consumption.[113] Other technologies, such as direct-to-chip cooling, provide flexible solutions to cool data centers more efficiently and meet variable computing needs.[114] As new demand profiles emerge, technology companies need to continue to actively engage with utilities to plan right-sized energy generation.

5.4 Maximize Site Selection for Clean Energy Potential

Attracting technology companies is a priority for many states because they can serve as drivers of economic development. To help accelerate the transition to a decarbonized economy, technology companies can use this leverage to condition their expansion decisions on whether that growth can be supported with clean energy resources. At a fundamental level, utilities are not monolithic and are diverse in their approaches to resource planning and procurement and consideration of their customers' requirements. When a technology company elects to site or interconnect with a utility that has made little climate progress and does not have plans to substantively reduce emissions, the credibility of the technology company and its climate goals are put at risk. When expanding operations, large customers committed to climate action should factor in a utility's climate pledge and history of decarbonization while engaging utilities to find creative solutions to employ clean energy in service of new data center load growth.

Given the current backlog of gas turbine availability,[115] along with the multi-year wait for interconnection for solar and wind projects, colocating data centers and new low-carbon resources – solar, wind and battery storage – near an existing generator with an approved connection may help meet demand more immediately. This is referred to as "power couples", and through this approach, data centers can be connected to clean power behind the "point of interconnection" – between peaker plants (simple-cycle turbines, usually gas or coal-powered, which are used only during periods of peak electricity demand) and the grid at large. According to RMI's *Power Couples*[116] report, combining renewables and storage with existing gas plants could satisfy over 30 GW of new data center (or other high-load) demand with an average of 88% carbon-free energy for under $100/MWh, lower than the Levelized Cost of Energy of building a new gas plant.[117] An additional 20 GW of new data center or other high-load demand can be met at prices below $200/MWh. While $200/MWh is more expensive, it is a reasonable trade-off for near-term access to reliable power, which is what technology companies are prioritizing. This also avoids passing costs of new gas generation on to customers, improving the affordability of electricity for the average customer, while avoiding or substantially reducing their GHG emissions. Fortunately, the strategy has strong potential in regions with high electricity demand including PJM (the regional transmission organization for much of the Mid-Atlantic), ERCOT (the organized market for most of Texas), and the Southeast.

5.5 Invest in Renewable Energy

The voluntary energy procurement market is highly nuanced. Aligning corporate renewable energy targets with best practices for expanding and maintaining clean energy supply depends greatly on the quality of a company's procurement strategy.

An emerging solution, Clean Transition Tariffs allow large customers to pay a premium for clean energy from advanced or emerging technologies. An example is the Clean Transition Tariff partnership between Google, NV Energy, and Fervo Energy. Under this arrangement, NV Energy will purchase electricity from Fervo's 115-megawatt Corsac Station Enhanced Geothermal Project and sell it to Google at a predetermined rate. This agreement allows Google to match its grid electricity use with clean firm power while ensuring Google provides sufficient financial guarantees that protect NV Energy from the financial costs of commercializing enhanced geothermal.[118]

Similar programs have been adopted or are in progress at utilities such as Duke Energy, Idaho Power, and Portland General Electric.[119] However, regulators have a role to play in ensuring that the share of system costs (fixed, transmission, reserve) associated with increased data center demand does not get fully passed on to existing ratepayers. If structured carefully – and conducted transparently – Clean Transition Tariffs can support grid decarbonization and reduce long-term emissions.

Like Clean Transition Tariffs, Utility Green Tariffs and PPAs can lead directly to new renewable energy projects and decarbonization of the grid. While high-quality tariffs and PPAs can be more expensive methods, investors need to consider the incremental cost of securing clean, reliable power by technology companies relative to the financial scale of leading technology companies and the impact of continued GHG emissions on their portfolios.

Figures from Goldman Sachs on a Green Reliability Premium, calculated prior to the rollback of federal wind and solar incentives, suggest that an average Reliability Premium across low-carbon solutions would result in 4% of 2026 forecasted EBITDA for key hyperscalers, equivalent to a 1 percentage point impact to projected average 2026 cash returns on cash invested.[120] Even with adjusted figures removing incentives, the relative cost of a Green Reliability Premium is small for hyperscalers. By contrast, the cost of climate inaction and meeting demand with additional fossil fuels pose far greater risks to portfolio performance. Paying more for reliable, clean power today is a strategic trade-off to reduce far greater financial losses tomorrow.

5.6 Be Transparent about Strategies to Achieve Renewable Energy Targets

Given the nuance of the renewable energy procurement market, investors should begin by requesting enhanced disclosure to evaluate the integrity and impact of corporate clean energy strategies. Key disclosures include a breakdown of procurement types, a percentage breakdown of energy sources associated with those procurement types, and how this procurement mix is expected to evolve over time. Investors should also seek to understand the length of procurement contracts, the relative scale of financial contributions, and whether the contract resulted in a direct and additional investment in clean energy infrastructure.

Companies should also provide clear information on their approach to time-specific (e.g., annual vs hourly) electricity procurement. Google is a leading example of a company disclosing its clean energy procurement on an hourly basis.[121] This will support investors in understanding how a company's energy investment decisions are contributing to the near- and long-term clean energy transition. This level of transparency is essential for distinguishing between targets that affect meaningful energy decarbonization and those that do not. Investors and companies can refer to the report from Center for Resource Solutions for a more comprehensive list of indicators.[122]

Companies should also use their influence to encourage third-party disclosure and target-setting frameworks such as the Greenhouse Gas Protocol and the Science-Based Targets initiative to adopt rigorous and credible standards for emissions reporting and target setting. Both globally recognized frameworks are currently under revision and have offered opportunities for feedback and engagement from corporate entities and investors.[123] Other disclosure and target-setting standards are in development, including those by Electric Power Research Institute and International Organization for Standardization, and investors should critically and independently evaluate the legitimacy of any external standard and its ability to define and drive real-world science-based decarbonization.

It is also essential for investors to track changes in technology companies' location-based emissions, which are calculated based on the emissions intensity of the grids that physically deliver electricity to each asset. Relying solely on market-based emissions reporting to communicate climate progress can be misleading. These figures – especially when prominently featured in sustainability reports – can obscure the reality that companies are still drawing gas and coal-fired electricity from their local grids. Investors should encourage robust and consistent location-based emissions reporting on data center energy use and clean energy procurement in company sustainability reports and through CDP.

5.7 Be Transparent in Scenario Analysis

Another critical step in reducing overbuild of new gas plants is ensuring utilities are transparent throughout the resource planning process by fully disclosing the assumptions behind each resource scenario evaluated. This includes disclosing the forward-looking cost assumptions for both high-carbon and renewable resources, as well as any technological assumptions such as generation capacity and asset life of each resource, on five-, 10-, and 15-year timeframes.

Access to these core assumptions enables investors to evaluate whether utilities have accurately accounted for key fundamentals, including declining renewable energy costs, evolving market trends, regulatory shifts, and implications of different energy resources on the company's GHG trajectory. Without such information, it is difficult for investors to understand whether a company's response to growing energy demand is aligned with industry best practice and whether capital allocation decisions are financially sound now and in the future.

5.8 Challenge Utilities on Modeling Assumptions

Technology companies have a powerful role to play in shaping the future of the energy grid by partnering and engaging fully with utilities in the planning of major infrastructure investments through utility regulatory proceedings like IRPs, rate cases, and Certificates for Public Convenience and Necessity. These proceedings determine how utilities meet future energy demand, whether through clean sources like wind and solar or investment in high-carbon infrastructure. While large customers typically engage to advocate for their own rate interests, these forums also provide an opportunity to engage and even challenge utilities to deploy a cleaner energy system. At the most fundamental level, technology companies should seek to meet their energy needs with clean energy and engage utilities to limit continued or expanded reliance on high-carbon assets.

Depending on the state, active engagement can take several forms. Technology companies can intervene formally in proceedings by submitting comments, providing expert analysis, or partnering with environmental and public interest groups to advocate for cleaner utility portfolios. IRPs are a key area to ensure a utility is appropriately forecasting energy demands and is not biased toward fossil fuels. An important example of this advocacy for accurate accounting occurred when Microsoft submitted a public comment challenging the core assumptions behind Georgia Power Company's resource planning. Microsoft noted, "Several of Georgia Power Company's modeling assumptions undervalue renewable energy's contribution to meeting energy and capacity needs and resource adequacy on Georgia Power Company's system. This undervaluation then results in overbuilding carbon-intensive resources that may otherwise not be necessary."[124]

Ultimately, by showing up, speaking out, and holding utilities accountable, large customers can help utilities better understand customer needs and drive grid decarbonization. Technology companies' voices can shift regulatory outcomes, unlock clean energy investment, and ensure that utility plans are consistent with a sustainable, affordable, and climate-aligned energy future.

CONCLUSION

The U.S. electric grid is under growing strain from the surge in data center demand driven by AI development—demand that may not fully materialize but is already triggering plans for high-carbon infrastructure. Building new gas capacity to meet speculative projections or extending coal power use beyond planned closure dates is not only short-sighted but also exposes both utilities and technology companies to serious regulatory, financial, and reputational risks.

For investors, this translates into mounting risk at the enterprise level and undiversifiable systemic risk across portfolios from mounting and current climate costs. Now is the time for investors to actively engage with both sectors, pushing utilities to prioritize clean energy deployment and holding technology companies accountable for their energy use impacts. This is especially true as technology companies remain one of the few actors that can compensate for the lost financial incentives of the IRA.

Greater transparency and certainty are urgently needed to support smarter decision-making. More can be done with renewable energy. A clean, reliable grid is possible, but only if the companies shaping its future take responsibility for building it.

> "Now is the time for investors to actively engage with both sectors, pushing utilities to prioritize clean energy deployment and holding technology companies accountable for their energy use impacts."

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