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Powering the Digital Age

Propane's Role in Low-Emission Data Center Infrastructure

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Executive Summary

The rapid expansion of data centers is a defining challenge for the US energy system. These facilities are no longer niche components of the digital economy but critical infrastructure underpinning commerce, communication, and national competitiveness. Their extraordinary growth trajectory is colliding with a power sector already strained by transmission bottlenecks, interconnection delays, and decarbonization initiatives. Meeting this demand requires more than incremental improvements to existing utility infrastructure; It calls for flexible, scalable solutions that can be deployed rapidly while maintaining compliance with evolving environmental and regulatory requirements.

By analyzing market trends, policy developments, and technological pathways, it is clear that propane merits serious consideration as part of the data center energy portfolio. Its attributes—portable storage, indefinite shelf life, nationwide delivery infrastructure, and significantly lower emissions than diesel—position propane as a fuel capable of bridging immediate reliability needs with longer-term sustainability goals. When utilized in generator sets, integrated into microgrids, or combined with renewable resources, propane offers a pathway to data centers that are resilient, efficient, and adaptable to site-specific conditions.

The policy landscape is equally critical. State energy choice statutes, energy security plans, and resilience programs provide frameworks in which propane can operate alongside other distributed resources and often exceed the regulatory limits of intensive source fuels. These policies not only expand the range of tools available to data center operators but also reinforce the importance of diversified energy strategies in ensuring reliability and public confidence. As regulators, utilities, and industry stakeholders grapple with the dual mandates of resilience and decarbonization, propane offers a pragmatic option that aligns with both objectives.

The opportunity of propane power is substantial. From edge-computing hubs to hyperscale campuses, propane has the potential to displace hundreds of millions of gallons of diesel annually, reducing emissions while providing dependable backup and primary power. Realizing this potential will require continued collaboration among policymakers, technology providers, and the propane industry itself. Investment in education, demonstration projects, and regulatory engagement will be essential to ensure that decision-makers recognize propane's value proposition relative to competing fuels in time to meet the demand placed by billions of cloud computing users.

The convergence of surging energy demand, utility price hikes, infrastructure constraints, and regulatory pressures is reshaping how data centers approach power supplies. Propane is well positioned to play a significant role in this evolving landscape. By combining technical capability with market availability and policy alignment, propane offers a credible and scalable solution for one of the most pressing energy challenges of the coming decade. For regulators, operators, and industry leaders, propane represents not only a market opportunity but also a means to safeguard the resilience and sustainability of the digital economy.

I. Introduction: The Data Center Energy Challenge

Utility Interconnection Delays:

The rapid growth of AI-driven data centers is overwhelming an already strained US power grid, causing utility interconnection delays. The Energy Information Administration has documented that average electric system outage times have roughly doubled between 2013 and 2020.[1] A recent report from the US Department of Energy found that in 2023, data centers consumed approximately 4.4% of all US electricity and are expected to consume up to 12% of all US electricity by 2028.[2] As demands for power increase, data center operators are experiencing years-long delays for grid connections and expansions, hindering development timelines,[3] which increases the risk for interconnection delays. Utility companies are grappling with how to finance necessary infrastructure upgrades without unfairly burdening captive customers. If the predicted load cannot be met, regardless of additional investment made in grid infrastructure, then ratepayers may face the burden of subsequent cost recovery.[4]

Utility companies are grappling with how to fuel power generation for data centers, fund billions in new infrastructure, and how to avoid significant impact to ratepayers. A data center in northern Virginia partnered with Virginia's largest utility to construct a 300-megawatt substation on site of a data center in Loudoun County, solely to provide direct power.[5] The interconnection problem is not just a logistical issue that utilities are facing. Given the surging power demand of data centers, electricity prices are rapidly rising. The Institute for Energy Economics and Financial Analysis, an independent market monitor for PJM—the world's largest energy market which spans13 mid-Atlantic and Midwestern states, plus the District of Columbia—estimates that data centers were responsible for an added $9.3 billion in additional costs to ratepayers.[6] As power demand surges and utility commissions struggle to evenly distribute the financial burden of facilities across the rate base, the need for co-located, dispatchable energy sources is becoming critical.

1 Lindstrom and Hoff. *U.S. electricity customers experienced eight hours of power interruptions in 2020.*
2 Shehabi et al., *2024 United States Data Center Energy Usage Report.*
3 Rochas, *AI boom spurs Big Tech to build clean power on site.*
4 Rochas, *AI boom spurs Big Tech to build clean power on site.*
5 Data Center Coalition, *Economic, Environmental, and Social Impacts.*
6 Kunkel. *Projected data center growth spurs PJM capacity prices by factor of 10.*

Regulatory hurdles are impeding the expansion of critical infrastructure needed for AI-driven data centers. In November 2024, the Federal Energy Regulatory Commission (FERC) rejected an amended interconnection service agreement that would have facilitated expanded power to an Amazon data center from a nuclear power plant in Pennsylvania.[7] The challenges in expanding grid capacity without negatively effecting captive utility customers and navigating overbearing regulatory hurdles shed light on another alternative—propane: a non-utility regulated, portable, storable energy solution well poised to meet the growing power demands of AI-driven data centers and foster self-sufficient energy.

Propane offers an appealing solution to data centers looking for abundant, reliable power without the regulatory headache and delays that come with grid connection. The propane industry is not regulated by state public utility commissions. Retail propane marketers do not have an exclusive service territory in which the state has authorized them to operate, they are not monopolies, and they do not have the power of eminent domain.[8] Therefore, propane has not been subjected to public utility regulation.

Prospective data centers need power immediately. Propane serves as a drop-in solution to meet demands. Once fuel usage is estimated based on a data center's power needs, the requisite amount of fuel can be delivered according to regular and demand-driven plans to ensure timely refuels. Once an appropriate generator set or microgrid is installed, data centers can have behind-the-meter, 24/7 available power without interconnection delays or burdensome regulatory hurdles. For developments choosing propane for primary generation needs, there is no need to seek utility approvals for tank installation and there is no concern of downtime during grid outages. Propane can be paired alongside renewable energy sources to decrease carbon emissions while ensuring reliable, 24/7 power (e.g., running propane generators at night and during inclement weather when solar energy is not available). According to the Propane Education & Research Council, propane-fueled power generation can be scaled modularly, enabling data center developers to deploy capacity in phases aligned with construction schedules. This flexibility allows facilities to monetize operational space earlier and avoid the all-or-nothing timelines of large grid interconnection projects.[9]

Emissions Compliance:

The environmental impact of data center expansion is significant. Morgan Stanley estimates that roughly 40% of all carbon emitted in the US by 2030 will come from data centers, while globally the data center industry will emit 2.5 billion tons of CO_2 by 2030.[10] This surge is primarily driven by "hyperscalers," such as Google, Microsoft, Meta, and Amazon. Hyperscalers engaged in artificial intelligence will drive up data center power demand more than 165% by 2030, according to Goldman Sachs.[11] Cryptocurrency transactions and mining consume more electricity than the entire annual energy consumption of the Netherlands,[12] with a carbon footprint comparable to that of New Zealand, producing 36.95 megatons of CO_2 annually.[13]

Greenhouse gas emissions are divided into "scopes" to classify the varying types and levels of emissions from entities, based on the popular Greenhouse Gas Protocol, a widely used standard to measure emissions developed by the World Business Council for Sustainable Development and the World Resources Institute.[14] Roughly 31% to 61% of data center carbon emissions fall within scope 2 emissions,[15] which encompasses

[7] Federal Energy Regulatory Commission, *Order Rejecting Amendments to Interconnection Service Agreement.*

[8] National Propane Gas Association, *My State.*

[9] Vishwanathan, *The Opportunity for Propane in Microgrids.*

[10] Reuters, *Global data center industry to emit 2.5 billion tons of CO2 through 2030.*

[11] Goldman Sachs, *AI to Drive 165% Increase in Data Center Power Demand by 2030.*

[12] University of Cambridge, *Bitcoin Electricity Consumption Index.*

[13] Digiconomist, *Bitcoin Energy Consumption Index.*

[14] Greenhouse Gas Protocol, *Standards & Guidance.*

[15] Moore, *Data Center Carbon Footprint: Scope 1, 2, & 3 Emissions.*

emissions from the generation of electricity that is purchased by an organization and is used to power operations.[16] A majority of scope 1 emissions from data centers, however, come from diesel usage for back-up generators and natural gas for heating.[17]

As data centers expand, operations must keep pace with the growing push to meet sustainability and decarbonization goals by both governments and shareholders. Environmental, social, and governance (ESG) requirements are a set of standards used to measure an organization's environmental and social impact[18] as developed by a consortium of global financial institutions and the United Nations.[19] ESG requirements, while sometimes self-imposed, often come in the form of government mandates, such as the California Climate Corporate Data Accountability Act, which requires corporations with revenues over $1 billion to report their greenhouse gas emissions.[20] With state governments imposing various emissions reporting requirements, data center operations must utilize low-carbon energy sources while maintaining consistent power for continual functions.

Fortunately, propane:

- Is classified as a clean alternative fuel under the Clean Air Act of 1990 and the National Energy Policy Act of 1992.[21]
- Is more efficient than grid electricity, as more than 60% of energy used for electricity generation is lost in conversion.[22]
- Has an excellent source-site ratio of 1.01, compared to 2.80 for electricity from the grid, meaning almost no energy is lost as it travels from tank to application.[23]
- Is methane-free.[24]

For data center operations that must meet state greenhouse gas emissions compliance, stakeholder ESG expectations, air quality standards, and more, propane stands as an environmentally friendly, reliable, and energy efficient option to meet data center and regulatory needs.

[16] Sotos, *GHG Protocol Scope 2 Guidance.*
[17] Climate Impact Partners, *Scope 1, 2, and 3 Emissions.*
[18] Krantz and Jonker, *What is environmental, social and governance (ESG)?.*
[19] The United Nations Global Compact, *Who Cares Wins.*
[20] *California SB-253 Climate Corporate Data Accountability Act.*
[21] *40 CFR 85.*
[22] Sanchez, *More than 60% of energy used for electricity generation is lost in conversion - Today in Energy.*
[23] Energy Star, *Use Portfolio Manager.*
[24] Alternative Fuels Data Center, *Fuel Properties Comparison.*

II. Data Centers and Power Infrastructure: Current Landscape

Modern Data Center Landscape

Today's data centers overwhelmingly depend on utility grid electricity for their primary operations, supplemented by on-site backup power systems to protect against even momentary outages. In the US, data centers collectively consumed approximately 4.4% of total electricity generated in 2023—a figure expected to rise sharply, up to 12% of total US electricity by 2028 due to expanding artificial intelligence workloads.[25] Grid power for data centers largely mirrors the national generation mix, which remains dominated by natural gas (42%) and coal (16%), followed by nuclear and renewables.[26]

A baseline understanding of the current landscape for data center development and their energy needs, is achieved through an examination of the world's largest data center market—the Commonwealth of Virginia. The Virginia Joint Legislative Audit and Review Commission's 2024 report on data centers highlights the scale and policy implications of the industry's rapid growth in the Commonwealth. [27] Data centers accounted for approximately 21% of Virginia's total electricity consumption in 2024, with demand projected to exceed 30% by 2030 if current trends continue. This surge, forecast to require more than 7,000 megawatts of additional capacity over the next decade, is concentrated primarily in northern Virginia and is creating a strain on the regional transmission system, accelerating the need for new power generation resources, and prompting utilities to evaluate grid infrastructure upgrades and demand-side solutions.

Virginia's carbon reduction mandates under the Virginia Clean Economy Act impose pressure to reduce emissions from all sources, including backup generation.[28] Diesel emergency generators, common in the sector, face heightened permitting scrutiny from the Virginia Department of Environmental Quality due to their nitrogen oxides (NO_x) and particulate matter emissions.[29] As the leading market for data centers, Virginia exemplifies two converging challenges: insufficient grid capacity to meet projected load growth and ever-tightening emissions requirements for on-site generation.

With lower particulate and NO_x output than diesel,[30] propane systems offer a low-emission and flexible solution to a prevalent issue facing data centers. Propane can be stored on-site, has an indefinite shelf life, and can support operational continuity during utility outages or interconnection delays. When deployed in standalone systems, integrated into microgrid configurations, or paired with renewables, propane can meet even stringent policy requirements, like those in Virginia.

Beyond Virginia, similar dynamics are emerging in other major data center markets. In locations where grid congestion or multi-year interconnection delays are common—such as northern Virginia and Dublin, Ireland—operators often rely on "bridge" power solutions, including modular natural gas turbines and mobile diesel plants to bring facilities online before

[25] Shehabi et al., *2024 United States Data Center Energy Usage Report.*

[26] US Energy Information Administration, *Short Term Energy Outlook.*

[27] *Report to the Governor and the General Assembly of Virginia: Data Centers in Virginia 2024.*

[28] *HB 1526 and SB 851 Virginia Clean Economy Act.*

[29] Virginia Department of Environmental Quality, *Data Center Air Permit Guidelines.*

[30] United States Energy Information Administration, *Carbon Dioxide Emissions Coefficients.*

permanent grid capacity is available.[31] As proposed facilities move further from dense utility infrastructure, the role of co-located, on-site generation becomes more important. Propane microgrids, combined heat and power systems, and generators enable facilities to operate independently of utility pipelines or transmission lines, providing flexibility in site selection and scalability in capacity. Given the propane industry's well-established delivery infrastructure,[32] even remote sites can be reliably serviced by truck transport, allowing developers to bypass the lengthy timelines and capital costs associated with new pipeline development.

Emerging Microgrid Models & Propane Capabilities

Propane: A Versatile Solution

Given the unprecedented growth in data center demand—driven by cloud computing, streaming, and AI—operators are under immense pressure to secure reliable, scalable, and increasingly low-carbon energy solutions. Propane offers a compelling option to meet these demands across backup, bridge, and prime power applications.

Propane generators can deliver comparable rapid response and extended runtimes for backup power to traditional diesel systems, while offering lower particulate matter and NOx emissions—an advantage in jurisdictions tightening air quality standards. Unlike diesel, propane does not degrade over time, ensuring the reliability of fuel in standby tanks and minimizing the need for costly polishing or additives.

In the context of bridge power, which many data centers deploy to avoid congested utility interconnections, propane-power generation systems can be rapidly installed and scaled. This approach ensures data centers achieve early revenue streams and service-level commitments, even before grid infrastructure catches up. Propane's broad distribution network through more than 4,000 distributors[33] and its ease of on-site storage give it a logistical edge over highly regulated, fixed-route natural gas pipelines, which may not be available or feasible on accelerated construction timelines.

Regarding prime power generation, propane can support dedicated microgrids for large campuses, even pairing with renewable systems like solar or wind to ensure consistent uptime while still contributing to corporate sustainability goals. Notably, propane-powered combined heat and power (CHP) systems offer reliable, efficient, on-site power, all while providing significant cost savings and reducing emissions.[34] Propane CHP systems can use propane-powered engines to generate on-site electricity while capturing thermal energy for heating and hot water, producing additional opportunity for steam-based power generation.[35] Excess electricity can be sent back to the grid, ensuring dependable heat and power. Facilities using CHP generate their own electricity and thermal energy, minimizing exposure to excessive time-of-day and demand charges on the local grid.

III. Microgrid & Generator Technology

The integral piece connecting reliable energy sources like propane and data center operations is the technology to deliver the necessary power. For data centers, microgrids and generators are not simply a resilience measure, they are rapidly becoming strategic necessities to maintain uptime, manage costs, and comply with evolving environmental regulations. It is critical for both interested data center developers and the propane industry to have a baseline understanding of existing technology that can integrate propane into daily operations to enhance the reliability of data center development and lower emissions.

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[31] Aggreko, Overcome Data Center Power Constraints With Off-Grid Generation.

[32] RBN Energy, U.S. Propane Infrastructure Map.

[33] National Propane Gas Association, Today's Propane: Clean, Low-Carbon, Abundant American Energy.

[34] US Department of Energy, *Combined Heat and Power (CHP) Technical Potential in the United States.*

[35] US Environmental Protection Agency, *What is CHP?*.

The Role of Propane in Data Center Generators/Microgrids

Backup generation is a consideration that every data center development must consider. Reliability, affordability, fuel access, and emissions profile impacts are all top of mind for data center developers. Unlike diesel, propane offers:

- Lower NO_x and negligible particulate matter (PM) emissions,[36] aiding compliance with strict state and local air quality standards.
- An indefinite fuel shelf life, allowing long-term on-site storage[37] unlike diesel, which has a limited shelf life.[38]
- Rapid start-up and load-carrying capacity to support seamless transfer during power loss.
- Deployment flexibility, from small-edge computing installations to multi-megawatt hyperscale facilities.

Because propane can be delivered by truck and stored on-site in large volumes, it supports data centers in remote or grid-constrained locations without reliance on pipeline infrastructure or the need for constant refills due to its shelf life.

What is a Microgrid?

Microgrids are localized energy systems that can operate independently or in conjunction with the traditional power grid, providing enhanced energy resilience and sustainability. With increasingly unpredictable weather events, and the emergence of large-load customers like data centers placing additional strain on grid infrastructure, microgrids have become an attractive solution to the problem of power availability. Typically, most microgrids can operate on either a "grid-connected mode" allowing for an exchange of electricity, or they can operate in "island mode" disconnected from the main grid and operating autonomously, providing power during outages or in remote areas.[39] It is critical to note the distinction between generators and microgrids. A generator is a standalone device that converts fuel into electricity; It is typically a single-power source, often used for backup or prime power. A microgrid, however, is a system that can include generators, but also batteries, control software, and more, acting essentially as a self-contained electric network that can operate independently or with the main grid.

While this paper has thoroughly articulated the advantages of low-carbon propane as a fuel source, it is critical to examine emerging and available technologies accessible to bridge the gap between propane fuel providers and data center developers.

[36] US Environmental Protection Agency, *AP42 1.5 Liquefied Petroleum Gas Combustion, update July 2008.*
[37] Johnson, *Fuel Diversification to Improve Transportation Resilience: a Backgrounder.*
[38] Ericson and Olis, *A Comparison of Fuel Choice for Backup Generators.*
[39] Prubakar, *Microgrids | Grid Modernization.*

Emerging Propane Technology

Enchanted Rock is a Houston-based company specializing in resiliency microgrids – that is, onsite generation designed for backup power and operational continuity. Enchanted Rock develops microgrids that operate primarily on natural gas, providing co-located power generation. Their natural gas gensets emit 10 to 100 times fewer nitrogen oxide (NO_x) emissions than diesel, and under 1% of Tier 2 diesel generator emissions levels. Enchanted Rock utilizes 400+ operational units, with more than 37,500+ hours of utility outages covered, specializing in servicing data center and critical infrastructure facilities.[40]

Recently, Enchanted Rock has developed a propane-powered microgrid model. This model offers data center customers the option for co-located power generation outside of traditional utility infrastructure and beyond the limits of natural gas pipeline infrastructure. Below is a comprehensive table of Enchanted Rock's CARB Ultra-Clean package on propane, which is their Standard Low Emissions package on natural gas, CARB Ultra Clean package on natural gas, a Tier4f diesel generator, and the CARB-DG Certification requirements. The emissions numbers on propane are based on a "zero-hour" testing environment. This is a process which is often used to establish a minimum reliability level for assemblies or components, providing insights into performance and durability:

Generator Emissions Profile

ENCHANTED ROCK
The Power is On.

	HC / VOC lb/mW-hr	CO lb/mW-hr	PM lb/mW-hr	Nox lb/mW-hr
ERT500 Generator (Propane) w/low emission package Zero Hour Testing Results	0.057319	0.00		0.044092
ERT500 Generator (NG) w/standard emission package	0.351	3.205	0.116	0.138
ERT500 Generator (NG) w/low emission package	0.02	0.10	0.05	0.07
Tier 4f Diesel Generator	0.42	7.72	0.044	0.88
CARB-DG Certification Requirements	0.02	0.10	-	0.07

Source: Enchanted Rock (2025)

Enchanted Rock's ERT500™ low-emissions propane generator boasts the lowest carbon monoxide (CO), and NO_x emissions of all presented models, and the second lowest volatile organic compounds (VOC). Notably, Enchanted Rock's propane model meets the CARB-DG Certification requirements for both CO and NO_x–the most stringent air quality standards in the country.

For data centers seeking reliable, low-carbon energy solutions, technology like Enchanted Rock's ERT500 CARB Ultra-Clean propane model is an ideal example of how propane microgrids can be implemented at scale, meet some of the most stringent emissions requirements in the country, and afford data centers the opportunity to expand beyond established utility infrastructure when looking for development locations.

[40] *Enchanted Rock Fact Sheet*, Enchanted Rock, (2025), https://enchantedrock.com/enchanted-rock-fact-sheet/

Propane Generator Availability

In addition to microgrids, there are other, widely available generator technologies that can integrate propane effectively into data center operations:

- **Rolls Royce mtu 8V0110 GS130**: This model delivers 130 kW at 60 Hz and is engineered for standby, prime, or continuous power applications using liquid propane. It features high-efficiency combustion for reduced emissions, and compatibility with parallel operation for microgrid configurations.[41]
- **The Generac SG 130**: A spark-ignited generator designed for standby or continuous operation on liquid propane. These units are EPA-certified under 40 CFR Part 60 Subpart JJJJ for stationary spark-ignition engines, making them compliant with strict federal emissions requirements.[42]
- **Kohler KG125**: Designed to operate on liquid propane. Kohler's gaseous-fueled gensets offer high reliability for critical infrastructure and can be integrated into microgrid systems with advanced load management and automatic transfer capabilities.[43]
- **Wildcat Roughneck**: The Roughneck series offers EPA-certified standby and prime power configurations ranging from 30 kW to 440kW, capable of operating on liquid propane. Designed for heavy-duty industrial applications, these units provide scalability for microgrid or backup integration, making them suitable for data centers in both rural and grid-constrained areas.[44]

The propane industry has established relationships with both the generator and microgrid industries for decades, working hand-in-glove to bridge low-carbon fuel options with reliable, advanced technologies capable of servicing the data center industry today. This market availability provides data center developers with multiple technology pathways to incorporate propane as a primary or backup energy source, enhance resilience, meet air quality standards, and reduce reliance on diesel.

IV. Market Opportunity Assessment

Understanding the scale of potential fuel demand from the rapidly expanding data center sector is critical for positioning propane as a viable energy solution and informing the propane industry of the potential market opportunities available. Data centers represent a diverse set of facility types, ranging from microgrids and edge sites to colocation campuses and hyperscale facilities—each with distinct power requirements and operational profiles. A market opportunity assessment provides a framework to translate these energy demands into estimated propane volumes, offering the propane industry insight into the potential scale of the gallons that could be displaced from diesel or integrated into long-term supply strategies.

For each of the original equipment manufacturers (OEM) mentioned, the latest EPA Nonroad Large Spark Ignition Engine Certification data has been used to calculate the hourly consumption of propane gallons based on the maximum specified power of each base engine used for the power generation unit.

[41] Rolls Royce Group, *mtu 8V0110 GS130 Gas Generator Set 130 kWe/60 Hz/Standby/208 -600V.*

[42] Generac Power System, *SG130 Industrial Spark-Ignited Generator Set.*

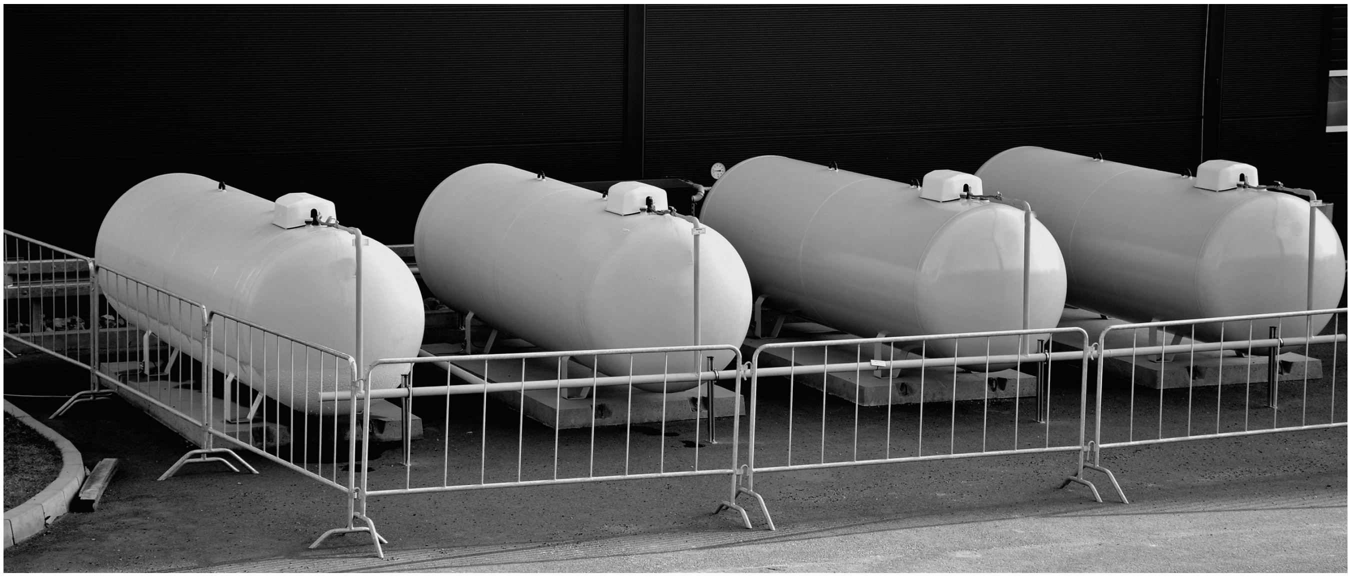
[43] Kohler Co., *Model: KG125 Spec Sheet.*

[44] Wildcat Power Gen, *Wildcat Power Gen.*

Based on the power requirement of each data center type on a daily basis, the number of genset units required has been calculated. Multiplying the number of units with annual backup operational hours and hourly consumption value yields the annual gallons consumption data. This modeling is presented as a simulation using publicly available data and defined assumptions, not as an exact prediction of market outcomes. Only simulations for back-up generation are presented in this model data analysis. For propane and data center industry members who are interested in exploring propane pathways for data center power generation, more precise numbers can be calculated based off of OEM usage and specific power demand of a data center site.

The results illustrate gallon opportunities across key data center categories:

- **Edge Data Centers**: Edge data centers are smaller facilities. Consumption estimates range from approximately 18,000 gallons to 36,000 gallons annually. While a smaller market opportunity per site, edge data centers tend to be more common than hyperscale campuses.[45]
- **Hyperscale Facilities**: Modeled consumption reflects roughly 360,000 to 720,000 gallons per site annually. A barrier to note is that hyperscalers rely more on utility interconnections and use generators primarily for limited backup.[46] Hyperscale campuses nonetheless represent highly visible, strategic opportunities for propane adoption in select locations.
- **Medium Colocation Facilities**: Modeling demonstrates that colocation facilities consume between 70,000 and 140,000 gallons annually per site. The facilities present steady gallon demand potential, particularly when sustainability goals and emissions compliance drive shifts away from diesel.47
- **Microgrids**: The data reflects annual consumption of about 19,000 to 22,000 thousand gallons annually. The scalability of microgrid deployment across distributed and critical infrastructure settings suggests a meaningful cumulative opportunity for propane.[48] This scenario significantly depends on the size and scale of the data center that a microgrid campus may be serving.



[45] Drew, *How Much Power Does a Data Center Use?.*

[46] Spencer and Singh, *What the data centre and AI boom could mean for the energy sector.*

[47] CoreSite, *Determining Colocation Power Requirements as Density Increases.*

[48] Ton and Smith, "The U.S. Department of Energy's Microgrid Initiative."

Edge Data Centers					
S.No	OEM Name	Data Center Daily Requirement in MW	Number of Units	Annual Backup Hours	Annual Gallons per Thousand
1	Rolls Royce	5	9	50	31.9
2	Generac	5	29	50	34.0
3	Kohler	5	32	50	34.7
4	Wildcat	5	34	50	36.1
5	PSI	5	12	50	33.8
6	PSI	5	25	50	34.2
6	MESA	5	10	50	33.3
7	Jenbacher	5	3	50	18.0
8	Guascor	5	5	50	21.0

Hyperscale Facilities					
S.No	OEM Name	Data Center Daily Requirement in MW	Number of Units	Annual Backup Hours	Annual Gallons In Millions
1	Rolls Royce	100	177	50	0.64
2	Generac	100	582	50	0.68
3	Kohler	100	637	50	0.69
4	Wildcat	100	676	50	0.72
5	PSI	100	238	50	0.68
6	PSI	100	493	50	0.68
6	MESA	100	196	50	0.67
7	Jenbacher	100	68	50	0.36
8	Guascor	100	94	50	0.42

Medium Colocation Facility					
S.No	OEM Name	Data Center Daily Requirement in MW	Number of Units	Annual Backup Hours	Annual Gallons In Millions
1	Rolls Royce	20	35	50	0.13
2	Generac	20	116	50	0.14
3	Kohler	20	127	50	0.14
4	Wildcat	20	135	50	0.14
5	PSI	20	48	50	0.14
6	PSI	20	99	50	0.14
6	MESA	20	39	50	0.13
7	Jenbacher	20	14	50	0.07
8	Guascor	20	19	50	0.08

Microgrid Facility					
S.No	OEM Name	Data Center Daily Requirement in MW	Number of Units	Annual Backup Hours	Annual Gallons per Thousand
1	Rolls Royce	1.5	3	100	19
2	Generac	1.5	9	100	20
3	Kohler	1.5	10	100	21
4	Wildcat	1.5	10	100	22
5	PSI	1.5	4	100	20
6	PSI	1.5	7	100	21
6	MESA	1.5	3	100	20
7	Jenbacher	1.5	1	100	11
8	Guascor	1.5	1	100	13

Source: Propane Education & Research Council, 2025

V. Public Policy Landscape: Barriers and Opportunities

Limited power and grid infrastructure availability is straining data center growth in established markets such as northern Virginia and California, and pushing developers to emerging and tertiary markets where power is more accessible. As data centers become one of the dominant drivers of electricity demand in the US, the policy landscape is shifting rapidly. Public utility commissions, state legislatures, and federal agencies are grappling with how to manage the infrastructure, permitting, emissions, and energy implications of data center expansion.

According to the Electric Power Research Institute (EPRI), data centers could consume up to 9.1% of total US electricity generation by 2030, with significant concentration (roughly 80% of the national data center load) in just 15 states—led by Virginia, Texas, and California.[49] In several of these states, data centers already account for over 20% of electricity

[49] Aljbour, Wilson, and Patel, *Powering Intelligence: Analyzing Artificial Intelligence and Data Center Energy Consumption.*

consumption,[50] creating regulatory pressure to limit emissions, manage grid interconnections, and define permissible energy sources for backup or prime power.

According to the EPRI, a typical new data center of 100 to 1000 megawatts represents a load equivalent to a new neighborhood of 80,000 to 800,000 homes,[51] larger than many cities across the US. States are responding with emissions disclosure laws, capacity planning mandates, and in some cases local moratoria on data center construction due to power and land use concerns. In this environment, energy policy is not a secondary concern, but a central variable in site selection, design, and operation.

Propane is emerging as a fuel that can help data centers navigate these legislative and regulatory pressures while meeting resilience and emissions goals. Propane's cleaner combustion profile compared to diesel—with 15-20% lower CO2 emissions and dramatically reduced NO_x and particulate output—is more compliant with tightening state-level permitting rules and generator testing limits. In January 2025, The Virginia Department of Environmental Quality issued new data center air permit guidelines, in which they stated that while data centers in northern Virginia have traditionally utilized EPA Tier II diesel generator sets for backup power, due to air pollution control concerns, they now recommend that "data center applicants consider backup power technologies with lower emissions."52 For data center developers, it is critical to have a foundational understanding of how propane can afford developers the opportunity to leverage incentives and navigate burdensome regulations, providing energy freedom and flexibility in the wake of increased regulations and complex stakeholder goals.

Energy Choice

As policymakers grapple with the scale and speed of data center growth, one of the most consequential arenas of state-level energy policy is the question of energy access. Across the country, certain municipalities have begun to adopt local ordinances aimed at mandating electrification, often limiting or banning infrastructure for gaseous fuels in new construction. In response, a growing number of states have enacted "energy choice laws" that preempt local restrictions and ensure that end users, including data centers—which are zoned as light industrial or heavy commercial facilities[53]—retain the right to choose from a full suite of energy sources, including propane. These policies are increasingly relevant as data center developers look beyond traditional utility connections and seek fuel-secure solutions that avoid long interconnection times, emission permitting delays, or grid reliability risks. For data centers operating in remote locations, wildfire-prone regions, or constrained grid zones, the ability to use propane, without facing legal or regulatory exclusion, is not only a matter of resilience, but of long-term operational viability.

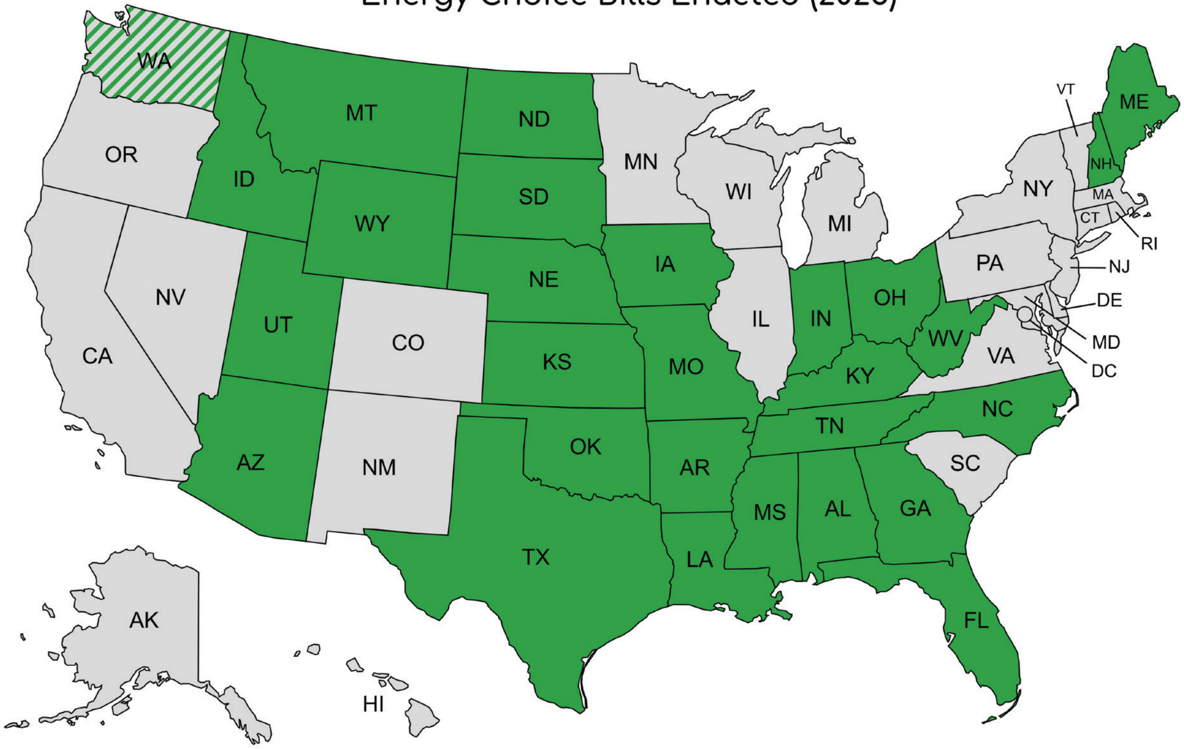
[50] Id.

[51] Aljbour, Wilson, and Patel, *Powering Intelligence: Analyzing Artificial Intelligence and Data Center Energy Consumption.*

[52] Virginia Department of Environmental Quality, *Data Center Air Permit Guidelines.*

[53] LightBox Holdings, *Zoning and Land Use Considerations for Data Centers.*

Energy Choice Bills Enacted (2025)

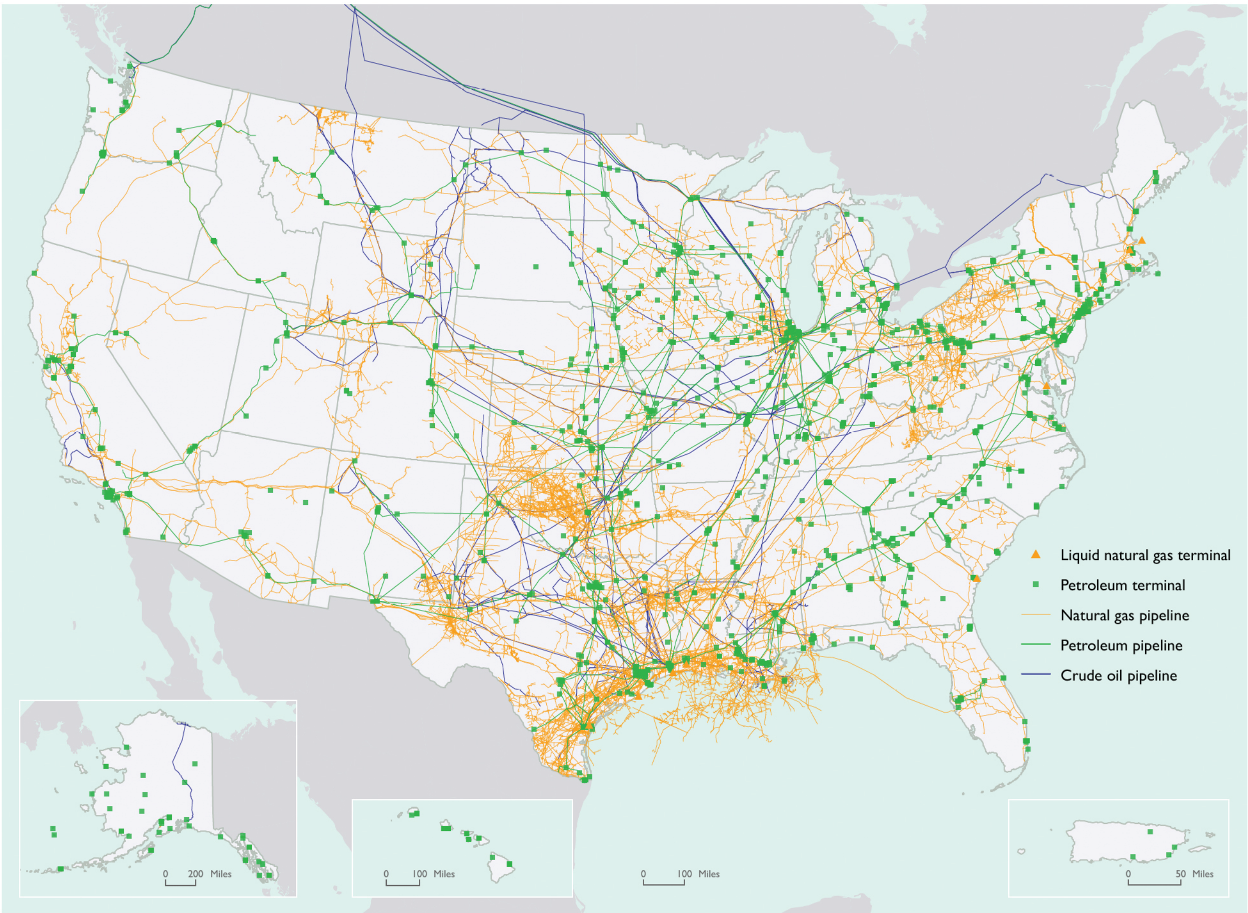


Source: National Propane Gas Association (2025)

As of July 2025, 28 states have enacted energy choice laws, protecting consumer and commercial access to energy. These statewide protections ensure that data centers cannot face discriminatory bans on energy sources that best fit operational or emergency backup needs, even in jurisdictions favoring grid electrification. Collectively, these 28 states represent 51% (4.5 billion gallons) of all propane sold in 2023. As such, propane remains a protected, abundant, and reliable energy source for data center operations looking to secure an easily accessible and dependable energy option.

In western states, where land in proximity rapidly developing cities is more accessible, energy choice is critical given the lack of natural gas pipeline infrastructure.

U.S. Petroleum and Natural Gas Pipelines: 2019



SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, based on the U.S. Department of Energy, Energy Information Administration, U.S. Energy Mapping System, available at www.bts.gov as of November 2019.

Infrastructure Resilience & Grid Reliability Planning

Many states are introducing legislation to strengthen energy resilience—particularly in response to extreme weather, grid instability, or rapid load growth. Data centers, now often defined in state energy security plans as critical infrastructure and included in the "Information Technology" and "Communications" sectors by the Cybersecurity & Infrastructure Security Agency,[54] are increasingly expected to contribute to or align with resilience strategies.

Texas has passed Senate Bill 6 (SB 6) which, effective September of 2025, obliges large-load customers—including data centers drawing over 75 megawatts—to participate in grid reliability plans. This includes cost-sharing for interconnection (including bearing the cost of grid infrastructure upgrades necessary to serve facilities), mandatory backup power capable of supplying 50% of demand during emergencies, and participation in demand-response or curtailment programs.[55]

Propane stands as a natural solution to the stringent regulations posed by SB 6. Data centers which set tanks sufficient for on-site power generation in conjunction with a microgrid or adequate generator will have behind-the-meter, co-located power—without the need to locate near natural gas infrastructure. As such, developers will be able to avoid the insurmountable costs of covering grid infrastructure expansion. Senate Bill 6 also provides ERCOT the authority to require large-load customers, like data centers, to curtail operations, switch to on-site backup generators, or completely cut power

[54] Cybersecurity and Infrastructure Security Agency, *Critical Infrastructure Sectors.*

[55] Chernicoff, *Texas Senate Bill 6: A Bellwether On How States May Approach Data Center Energy Use.*

remotely if the grid is under extreme stress.[56] For operations utilizing propane for behind-the-meter prime generation, there is no need for an involuntary pause in operations due to grid constraint.

Additionally, Texas has established the Texas Backup Power Package Program through Senate Bill 2627 and related legislation, providing up to $1.8 billion for grants and loans to deploy behind-the-meter backup systems and microgrids for critical facilities. The legislation provides grants or loans for the operation of a Texas backup power package that provides power sources from a combination of propane and photovoltaic panels and battery storage.[57]

Distributed Energy & Utility Frameworks

Several states are modernizing utility regulations to encourage distributed energy resources and clean fuels—making propane a part of a recognized, low-emissions strategy.

- Colorado's House Bill 21-1238 reforms gas utility demand-side management (DSM) rules to include the social cost of carbon and methane in cost-effectiveness evaluations and requires utilities to set energy savings targets for natural gas DSM programs.[58] This legislation elevates cleaner fuel technologies and efficiency as preferred options. For example, propane-powered microgrids paired with renewable energy can deliver resilience while scoring favorably under DSM cost-benefit frameworks.

Propane does not contain methane.[59] When released into the air, methane is slow to break down and produces a global warming effect 28 times that of CO_2 over a 100-year period.[60] Propane affords data center developments the opportunity to establish co-located, behind-the-meter power, while avoiding concerns of expensive grid infrastructure costs, lengthy interconnection wait times, and concerns of methane leaks.

As outlined in the Propane Education & Research Council's 2023 microgrid analysis, propane's portability and independence from pipeline infrastructure position it to thrive in distributed generation frameworks.[61] In states adopting fuel-neutral distributed energy resources incentives, propane systems—particularly those running on renewable propane—can qualify for clean energy credits while providing the dispatchable power that intermittent renewables cannot.[62]

- In March of 2025, the Michigan Public Service Commission adopted measures to accelerate the interconnection of distributed energy resources, including backup and prime power generation, by streamlining review timelines and improving utility accountability.[63] These changes create an advantageous environment for data centers to deploy on-site propane generation as part of resilient energy strategies. Propane-fueled systems can be quickly installed, scaled to demand, and operated within emissions thresholds, allowing developers to leverage Michigan's expedited interconnection framework to bring facilities online faster and with fewer regulatory bottlenecks.
- The Arizona Corporation Commission has formally adopted a fuel-neutral policy framework that supports a broad array of distributed energy resources, including dispatchable generation. In Decision No. 71819, the Commission emphasized that utilities should not discriminate based on fuel type and must evaluate all energy solutions on equal footing.[64] This regulatory stance creates a favorable environment for data centers deploying propane-fueled microgrids or backup systems, particularly in rural or fire-prone regions where grid access is constrained.

[56] Id.
[57] *Texas Senate Bill 2627 Powering Texas Forward Act.*
[58] Colorado General Assembly, *Public Utilities Commission Modernize Gas Utility Demand-side Management.*
[59] Alternative Fuels Data Center, *Fuel Properties Comparison.*
[60] Propane Education & Research Council, *Myth Busting.*
[61] Michigan Public Services Commission, *MPSC takes action to strengthen power grid and maximize customer value from distributed energy resources.*
[62] Vishwanathan, *The Opportunity for Propane in Microgrids.*
[63] Id.
[64] Arizona Corporation Commission, *Decision No. 71819 In the Matter of the Notice of Proposed Rulemaking on Electric Energy Efficiency.*

Critical Infrastructure Resilience

- Utah's SB 132 establishes a new program within the Office of Energy Development to enhance the availability of resilient and reliable power for critical infrastructure when the grid fails to meet necessary demands. The program authorizes grants, loans, and technical assistance for distributed energy resources, microgrids, backup generation, and energy storage, with priority given to projects in grid-constrained or high-outage-risk areas.[65] The legislation supports dispatchable on-site generation, creating an opportunity for propane-fueled systems to qualify. Propane's ability to operate independently of pipeline infrastructure and to be stored on-site in bulk for extended periods of time due to its indefinite shelf life[66] makes it well-suited to meet the program's resilience and environmental objectives—particularly in rural or remote locations where natural gas service is strained or unavailable, and where critical facilities require continuous service.
- Oregon House Bill 2066 modifies the state's Community Renewable Energy Grant Program to expand eligibility and adjust funding criteria for projects that improve energy resilience in critical infrastructure. The bill directs the Oregon Department of Energy to prioritize projects that deploy microgrids and other distributed energy resources capable of maintaining essential services during power outages. While the legislation emphasizes renewable generation, it also supports hybrid and dispatchable systems that can integrate low-emission fuels to ensure reliability. This framework allows propane microgrids and generators—especially when paired with renewable and storage components—to qualify as part of a resilience solution, offering a dependable, lower-emission alternative to diesel in rural or grid-constrained regions of the state where critical facilities, including data centers, require 24/7 power.

State Energy Security Plans

Most state energy offices issue "state energy security plans," typically per statutory requirement. Effectively, these plans focus on ensuring the reliability, resilience, and security of the states' respective energy infrastructure by ensuring adequate energy supply, and energy preparedness strategies during times of emergencies. Throughout the US, propane has played a key role in energy security planning, serving as a key energy source for critical operations during times of disaster.

- North Carolina's Draft 2025 Energy Security Plan prioritizes the deployment of distributed energy resources and microgrids to enhance resilience for critical infrastructure, including data centers.[67] The plan highlights the importance of fuel diversity and supply security, underscoring the value of on-site stored fuels like propane that are not dependent on pipeline infrastructure to ensure an undisturbed energy supply for critical infrastructure during times of natural disaster and grid outages.

Regulatory Advantages of Propane Engines

At the federal level, backup power systems for data centers are regulated under the EPA's New Source Performance Standards for stationary internal combustion engines. Diesel compression-ignition (CI) engines are covered by 40 CFR Subpart IIII § 60.4200–60.4219, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines. Under 60.4200, these provisions apply to owners and operators of stationary CI engines that commence construction after July 11, 2005. Compliance requires meeting the emission limits for the applicable model year in 40 CFR Part 1039, which form the EPA's Tier 4 standards. These Tier 4 standards achieve approximately 95% reduction in nitrogen oxides (NO_x) compared to lower tiers, and the EPA notes they are "based on the use of advanced exhaust emission control devices"[68] such as diesel particulate filters and particulate matter (PM) and selective catalytic reduction for NO_x.

Propane spark-ignition (SI) engines are regulated separately under 40 CFR 60.4230–60.4248, Standards of Performance for Stationary Spark Ignition Internal Combustion Engines. Section 60.4231 sets limits for NO_x, carbon monoxide, and volatile organic compounds, but does not impose a PM standard on gaseous-fueled SI engines.[69] This omission reflects propane's combustion profile, where PM emissions are inherently low. The EPA's AP-42, Volume I, Chapter 1.5 – Liquified Petroleum Gas Combustion confirms that "PM emissions are very low."[70]

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65 *Utah Senate Bill 132.*

66 Johnson, *Fuel Diversification to Improve Transportation Resilience: a Backgrounder.*

67 NC Department of Environmental Quality, *North Carolina Energy Security Plan.*

68 Federal Register, Control of Emissions of Air Pollution From Nonroad Diesel Engines and Fuel; Final Rule.

69 *40 CFR* 60.4231

70 US Environmental Protection Agency, *AP42 1.5 Liquefied Petroleum Gas Combustion, update July 2008.*

Emergency-use provisions are also important for data center operations. Under 40 CFR 60.4211 for CI engines[71] and 60.4243 for SI engines,[72] emergency units may operate without hour limits during emergencies and may run up to 100 hours per year for maintenance and testing. For large diesel systems, that typically means Tier 4 certification with diesel particulate filter and selective catalytic reduction after-treatment and more rigorous PM/NO_x demonstration in permit applications. A propane SI system of similar capacity can usually meet 60.4230–60.4248 requirements without particulate controls. For developers, that difference often translates into a simpler, faster permitting path and a lower compliance burden when choosing propane for backup or microgrid roles at data centers.

Notably, propane-powered engines are compatible with combined heat and power systems and hybrid renewable energy configurations. Such integrations can enhance total site efficiency and reduce overall carbon intensity—offering data centers a way to meet both operational resilience and environmental performance goals.[73]

The above policies and regulations illustrate two critical shifts: first, that states are demanding resilience through on-site backup power and cost-sharing for grid expansion; and second, that utility frameworks are evolving to favor cleaner, low-carbon fuel options. Data centers face new expectations around grid transparency, demand response capability, and fuel emissions performance. Propane emerges as a strong strategic fit within this environment: it is a dispatchable, storable, low-carbon fuel that:

- Qualifies under resilience grant programs
- Meets legislative mandates for backup power
- Aligns with DSM and federal regulatory frameworks that value lower emissions
- Offers a practical bridge between intermittent renewables and grid-reliant power

By embracing propane in microgrids or generator configurations, data centers can satisfy both policy mandates and operational reliability while positioning themselves in compliance with evolving fuel-neutral frameworks that reward clean, resilient energy solutions.

VI. Conclusion

The accelerating growth of digital infrastructure—driven by artificial intelligence, cloud services, and data-intensive applications—is exerting unprecedented pressure on the US electric grid. Data centers represent a significant share of national electricity demand, and their rapid expansion is colliding with transmission constraints, prolonged interconnection timelines, and increasingly stringent environmental regulations. Simultaneously, the sector requires unmatched reliability, as even brief interruptions carry significant economic and operational consequences. Propane is the scalable fuel that can meet all demands placed on the rapidly growing data center sector, providing clean power for technology that serves billions globally.

[71] *40 CFR* 60.4211

[72] *40 CFR* 60.4243

[73] Vishwanathan, *The Opportunity for Propane in Microgrids.*

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