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Utility Resilience Programs

White Paper

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List of Acronyms

DER	Distributed energy resource
DRC	Demand Response Credit (Tariff)
ETS	Electric thermal storage
NCBC	Naval Construction Battalion Center
RAS	Resiliency Asset Service (Tariff)
TVA	Tennessee Valley Authority
UESC	Utility energy service contract
UPS	Uninterruptible power supply

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1 Introduction

1.1 Background

Energy resilience is becoming increasingly important to federal agencies for maintaining operations during extreme weather events and power outages and for improving the overall resilience posture of their sites.[1] However, improving resilience can be an expensive undertaking, especially for the federal government. This is because resilience strategies[2] include systems that often have complex designs and high upfront costs that federal agencies cannot cover solely through direct funding or appropriations.

In limited-funding environments, facility managers can conduct resilience planning to prioritize the vulnerabilities of their facilities and building systems. Preventing the loss of critical energy loads can sometimes justify the expense involved in implementing resilience improvements within facilities where it is vital for them to stay operational. Additionally, some resilience measures can directly support the utility grid by removing or shifting facility energy loads during times when the grid is under stress or by providing backup power to the site if the grid goes offline.

In general, financial incentives offered through utility programs usually target energy efficiency upgrades—those that have proven cost-effective outcomes—and then only partially cover the cost of the project. Resilience measures on their own typically are not regarded as having good return-on-investment since the value of resilience is difficult to measure in cost benefit analyses. Therefore, resilience strategies tend to be treated as separate solutions and often go unfunded.

Connecting federal agencies with their serving utilities on resilience strategies may help to implement resilience projects without reliance on appropriated funds. New utility programs are coming online that encourage utility-customer partnerships for cost-sharing resilience strategies that benefit both parties. In section 3 of this paper, we present a landscape analysis of utility resilience programs and provide examples of what a handful of utilities are currently offering to promote energy resilience at customer sites and across the power grid.

1.2 Drivers for Resilience

Maintaining power to serve essential facility loads during grid outages is a primary driver for implementing resilience strategies, especially for critical mission facilities. Conventional resilience strategies at federal facilities include system redundancy, power

[1] Resilience posture is an agency's overall approach and strategy to maintain continuity of critical facility systems and minimize negative impacts from potential risks and adverse events.
[2] A resilience strategy involves using proactive measures, namely resilience measures, to enhance the ability of facilities and their systems to withstand and recover from disruptions or adverse events.

backup supplies, and substitution infrastructure.[3] The goal of these strategies is to provide reliable and continuous power.

Low frequency, high-impact hazards are difficult to predict and can significantly disrupt mission critical operations at federal sites. Recent hurricanes in the United States have caused major impacts and widespread damage. For example, in 2012, Super Storm Sandy caused over $90 billion (B) in collective damages to federal, state, and local property in New York, New Jersey, and Connecticut. In 2017, Hurricane Maria destroyed much of the electric grid in Puerto Rico, totaling $116B in damages, and Hurricane Irma's winds and flooding knocked out the grid infrastructure in much of western Florida at a cost of $64.5B. Hurricane Michael caused $31.5B in damages and nearly destroyed the entire Tyndall Air Force Base located in northwestern Florida in 2018. The most costly U.S. storm on record is Hurricane Katrina—a category 3 hurricane that occurred in 2005—which resulted in over $200B in damages to Gulf Coast states (National Oceanic and Atmospheric Administration National Centers for Environmental Information, 2025).[4]

Utility participation in resilience planning is increasing as customers require greater grid reliability in the face of extreme weather events, natural hazards, and increased power demand. One prominent source of increased demand is data centers. A study by Lawrence Berkley National Laboratory found that data centers consumed 4.4% of the total electricity in the United States in 2023 and are expected to consume 6.7% to 12% by 2028 (U.S. Department of Energy, n.d.).

[3] Substitution infrastructure refers to replacing existing infrastructure with different systems, assets, or energy sources that offer more reliability and economic or environmental benefits. This can include fuel switching, replacing fuel-powered equipment with electric alternatives, and installing dual fuel systems or combined heat and power.
[4] Cost values listed in this paragraph are based on 2025 Consumer Price Index adjusted costs.

Regulatory bodies, such as public utility commissions or public service commissions, can support resilience strategies implemented through programs and support financing options that go beyond traditional energy efficiency and demand response programs.[5] Regulations can encourage utilities to provide resilience services through contractual partnerships with select customers for the benefit of the broad customer base. For instance, utilities can strategically partner with customers with flexible load requirements or with space available to house distributed energy resources (DERs)[6] in order to scale up resilience and improve overall grid reliability. In turn, this can provide security for entire communities within the utility service area.

Reliability is the capacity of a system to maintain stable and uninterruptible power with minimal disruptions or outages.

Resilience is the ability of a system to prepare for, withstand, and rapidly recover from power disruptions.

Source: Grid Modernization Laboratory Consortium

While both are crucial, ***reliability*** focuses on preventing disruptions, whereas ***resilience*** emphasizes the ability to withstand and recover from disruptions when they do occur (National Conference of State Legislatures, 2024).

Figure 1. Reliability vs resilience

To a limited extent, private entities are investing in resilience without regulatory push or utility involvement. For example, hospitals are increasingly implementing their own microgrids to ensure continuity of life-saving medical services during a power outage. In some industries, businesses are investing in backup generation to avoid revenue losses associated with outages. Typically, these private investments are not grid-connected

[5] Demand response programs reward customers for reducing their energy consumption or cycling equipment off during peak demand periods. Incentives include reduced utility rates (i.e., time-based rates) and bill credits.
[6] DERs can increase survival time during a grid outage when onsite fuel supplies are limited. Examples include renewable energy technologies (e.g., solar photovoltaic), energy storage, and combined heat and power.

and provide resilience benefits to the host customer only (Sandia National Laboratories, 2021).

Federal requirements can drive more action for resilience strategies at federal facilities. Since 2018, the annual National Defense Authorization Act has directed the U.S. Department of Defense to enhance the energy resilience posture of their installations and facilities with policies requiring onsite backup power sources, islanded microgrids,[7] and/or utility-supported DERs. Title 31, section 501, of the United States Code, as amended by the 2022 Disaster Resiliency Planning Act, directs agencies to incorporate natural disaster risk information, such as results from vulnerability risk assessments or similar types of evaluations conducted by the agency, into real property asset management systems and investment decisions.

[7] A self-supporting power system that operates independently from the utility grid, using its own distributed generation and storage resources to power onsite loads. It's designed to maintain a stable power supply even during grid outages or operate as a standalone power system.

2 Leveraging Utility Partnerships for Resilience

Federal agencies are forming partnerships with their utilities to implement energy and resilience projects to meet agency energy efficiency and affordability goals while also supporting the power grid during peak demand periods or interruptions. Federal-utility partnerships exercise existing and emerging financing mechanisms to cover the cost of implementing resilience measures. For example, utility energy service contracts (UESCs) allow federal agencies to bundle energy conservation measures of varying payback periods into one project. Resilience measures with longer payback periods can be considered in UESCs because the bundling of long and short payback measures can result in positive net cost savings.

The federal government has had success using UESCs to implement resilience strategies. For instance, the Naval Construction Battalion Center (NCBC) partnered with the Mississippi Power Company in a UESC to deploy a microgrid consisting of a 15-acre solar photovoltaic array with battery storage and backup generation. The microgrid was designed to ensure mission readiness at NCBC while increasing grid-connected DERs in the utility's service area. This resilience strategy allows the Navy base to more effectively deploy disaster recovery activities in the event of a grid outage (U.S. Department of Energy Federal Energy Management Program, 2020).

2.1 Utility Resilience Programs

Similar to UESC projects, onsite power generation at federal sites requires a large outlay of capital to pay for the design and installation of such systems. Additionally, these systems require specialized skillsets to handle their operations, maintenance, and testing. Emerging utility resilience programs uniquely employ federal-utility partnerships to implement resilience measures at federal sites without the upfront cost burden to agencies. Technical assistance is also afforded to the agencies.

In utility resilience programs, a contract is established for the utility to design and implement resilience assets (e.g., DERs) on federal sites in exchange for a fixed fee—a "resilience tariff"—paid monthly by the federal agency through their utility bill. The utility serves as the owner and operator of the asset(s) for the duration of the contract term. The utility controls the DERs in order to serve loads when the grid is under stress and pushes generated energy onto the grid where power is needed. During other times, the site can use DER-generated energy to offset utility-supplied power and as backup power if the grid goes offline.

Resilience tariffs build off the more common feed-in tariffs, which guarantee above-market prices for electricity generated from customer-sited assets, and investments are incentivized through long-term contracts. Both tariffs promote the adoption of advanced and emerging energy technologies, require state public utility commission or public service commission approval, and are administered through utility-sponsored programs.

To improve the resilience posture of their facilities, federal agencies may be able to leverage newer utility programs and practices that incentivize technologies using the

tariff model. A handful of vertically integrated utilities[8] currently offer resilience programs. These programs generally fall into two categories: 1) DER programs and 2) load curtailment programs.

2.1.1 DER Programs

Through DER programs, utilities support locating generation assets at utility customer sites on the customer side of the utility meter (i.e., "behind the meter"). DERs entail small, modular energy generation and storage technologies that provide supplemental or backup power to a primary generation source. Depending on the program, eligible resources may be limited to generators or may include renewable energy technologies, battery energy storage systems, or microgrid controls. These assets improve overall grid resilience by increasing the amount of dispatchable energy available to the grid during high-demand periods or grid interruptions. During other times, the site can use the power directly for regular or critical operations and to offset or supplement their grid energy usage.

Federal agencies can benefit from this partnership by having no upfront costs to implement onsite DERs and access to the energy to use onsite when the grid is not stressed. Another benefit to the agency may be commitment from service providers to maintain a certain level of electricity service at all times—known as resilience uptime guarantees. These certainties are especially important for sustaining critical systems, such as data centers and electric vehicle charging infrastructure.

2.1.2 Load Curtailment Programs

Load curtailment is another resilience strategy that utilities incentivize using the tariff model. Curtailment programs offer financial incentives to customers who are able to reduce their energy demand to an agreed upon maximum number of kilowatts at the request of their utility. During a time of stress on the grid, facilities can benefit by reducing their load on the grid as much as possible to prevent issues such as brownouts or blackouts from occurring and affecting their operations. This also helps to increase the resilience of the grid for the surrounding community.

Although the site is responsible for installing, operating, and maintaining any equipment required to meet the load curtailment requirements (e.g., DERs, battery energy storage systems, or microgrid controls), the incentives received for load curtailment can aid in shortening the return on investment. Load curtailment programs serve customer resilience needs and make customer-sited resilience assets more affordable while also supporting the grid for the surrounding community. Federal agencies benefit by having energy generated onsite to reduce dependency on the grid during non-curtailment times and serve backup power needs if the grid goes offline.

[8] A "vertically integrated utility" is a utility company that owns and controls all stages of the electricity supply chain: generation, transmission, and distribution. They exist in regulated utility markets.

Depending on the program, the participation period may be limited to summer months only, or it could be year-round. Facilities enrolled in the program are notified in advance of a curtailment event, ranging from a minimum of 30 minutes prior to 2 hours prior, depending on the program. Some programs set a maximum number of curtailment hours that could be required during a single event, while others come to an agreement with the customer to provide a set number of curtailment hours during an event.[9]

2.1.3 Other Programs

Some utilities offer programs through which customers can sell excess energy to the utility that they've generated using their own equipment. While this does not directly support the installation, operation, and maintenance of resilient technologies, it may make backup generation and storage systems more financially feasible by shortening the return on investment, thereby supporting the implementation of DERs.

It is common for utilities to also offer programs through which facilities can receive incentives for electing to have a portion of their energy mix come from renewable energy sources. This is often seen in the form of renewable energy certificates[10] available for the customer to purchase. Renewable energy certificate programs are not explored further in our landscape analysis as they do not directly support the implementation of resilience measures at customer sites and therefore are not regarded as utility resilience programs in this paper.

[9] Load curtailment is an intentional reduction in power consumption to help balance the supply and demand of an electrical grid.
[10] Renewable energy certificates are a tradeable commodity that represent the property rights to all non-power attributes of electricity generated by a renewable energy source. They are used to validate renewable energy use.

3 Landscape Analysis

3.1 Examples of Existing Programs

Pacific Northwest National Laboratory conducted a landscape analysis of existing utility resilience programs to identify current opportunities for federal facilities as well as additional examples of what is available for agencies if no resilience programs are offered by their serving utilities. This landscape analysis included six utilities that offer at least one of the resilience programs described in section 2.1, covering a total of 15 states. The intent of this landscape analysis was to provide a sample of existing utility resilience programs rather than a comprehensive list of all utility resilience programs available.

3.1.1 Georgia Power

Georgia Power Company (Georgia Power) offers three DER programs. The first is the DER Customer Pilot Program, which is implemented under two tariffs: the Resiliency Asset Service (RAS) Tariff, and the Demand Response Credit (DRC) Tariff. Under the RAS Tariff, Georgia Power provides resiliency as a service in the form of a customer-sited, behind-the-meter DER. Georgia Power maintains ownership of the DER and is responsible for the design, procurement, installation, operation, and maintenance of it. The DRC Tariff allows Georgia Power to utilize assets in operation under the RAS Tariff to provide the customer with more reliable services during a system disruption event.

There are two new DER programs that are similar to the Customer Pilot Program, but each operates under its own tariff. They are the DER Colocation Program and the DER Customer Owned Program. Table 1 compares these three programs (Georgia Power, n.d.-a).

Table 1. Georgia Power Distributed Energy Resource Programs

	DER Customer Pilot	New DER Colocation Program	New DER Customer Owned Program
DER Asset Ownership	Georgia Power	Georgia Power	Customer
Capable of Pushing to the Grid	No	Yes	Yes
DER Metered Separately	No	Yes	Yes
Max Term Length	Asset Life	Asset Life	Through 2031
Technology Allowed	Dispatchable	Dispatchable with Firm Fuel Supply	Dispatchable with Firm Fuel Supply
Eligibility	**Resiliency Asset Service:** 200 kW Annual Peak Load **Demand Response Credit:** 100 kW Demand Reduction but Can Aggregate Facilities if Each Is >200 kW	Installed Asset Nameplate ≥ 10 MW	Installed Asset Nameplate ≥ 1 MW and < 10 MW, Can Aggregate if Each Is 250 kW or Greater
Program Tariff Cost/Credit	Monthly Levelized Payment and Credit **Resiliency Asset Service:** Capital and O&M Costs **Demand Response Credit:** 100% Capacity Value (Firm Load Only)	Lump Sum Upfront Payment Capital and O&M Costs Less than 75% of System Value	Monthly Levelized Credit for 75% of the System Value
Fuel Cost Responsibility	Customer	Georgia Power	Georgia Power
Operational Use Cases	Local Outage, Extreme Supply and Demand Conditions	Local Outage, Economic Dispatch	Local Outage, Economic Dispatch
Rate Limitations	Certain Marginal Rates Ineligible	No Limitations	No Limitations

Source: Georgia Power Company.

Georgia Power also offers a Curtailable Load Program that pays a monthly credit to the customer in exchange for reducing their demand. The contract has a term length of 6 years and is renewed at the beginning of each calendar year, at which time either party

can choose to decline renewal of the contract and only serve the remainder of the term. The customer must be able to achieve a 200-kW reduction in demand in order to be eligible. Georgia Power notifies the customer at least 30 minutes prior to when the customer must provide load curtailment. The customer works with Georgia Power to agree on a firm demand level, measured in kilowatts, that the customer is not allowed to exceed during a curtailment event; they also agree upon the number of curtailment hours that the customer will provide during each event and set a maximum number of curtailment hours per year (Georgia Power, n.d.-b). There are approximately 300 federal facilities in the Georgia Power service area.

3.1.2 MidAmerican Energy

MidAmerican Energy Company also offers a Curtailment Program in their Iowa and Illinois service areas. The program is similar to Georgia Power's in that the minimum electricity requirement is 200kW. However, customers can choose to enroll in a year-round participation period or limit their participation to the summer months only (June–September), with different incentive amounts provided based on the participation period chosen. Curtailment events last a maximum of six hours, during which customers must reduce their use of electricity from MidAmerican Energy Company by the contracted amount and cannot exceed the agreed upon firm power level. MidAmerican Energy Company provides those enrolled with a warning of potential curtailment events at least two hours in advance (MidAmerican Energy Company, n.d.). There are approximately 70 federal facilities located within the service areas where this program is offered.

3.1.3 Florida Power and Light

Florida Power and Light offers an Optional Supplemental Power Services program. The backup power systems included in this program are generators, battery energy storage systems, and other energy sources that do not act as a primary power source. Service contracts typically last 10 to 20 years, during which time Florida Power and Light remains responsible for the permitting and maintenance of the power equipment, making it easier for the customer to utilize the installed technology (Florida Power and Light, n.d.). There are approximately 325 federal facilities located within the Florida Power and Light service area.

3.1.4 Xcel Energy

Xcel Energy offers the Empower Resiliency program in their Minnesota and Wisconsin service areas. Through the program, Xcel Energy provides the analysis, design, construction, and maintenance of resiliency assets. Rather than pay the upfront capital, the customer pays for the resiliency improvements through their electricity bill over an agreed-upon contract period, typically 10 years, at the end of which ownership transfers to the customer. Technologies offered through this program include generators, battery energy storage systems, solar photovoltaic systems, and microgrid controls (Xcel Energy, n.d.). There are approximately 125 federal facilities located within the Xcel service areas where this program is offered.

3.1.5 Duke Energy

Duke Energy offers a Premier Power Service program in their North Carolina, South Carolina, Kentucky, Indiana, and Florida service regions. The program provides customers with the design, installation, maintenance, operation, and permitting of custom onsite generating equipment (Duke Energy, n.d.-a). The service is paid for through a fixed monthly fee on the customer's power bill, with no upfront capital required (Duke Energy, n.d.-b). There are approximately 450 federal facilities located within the Duke Energy service areas where this program is offered.

3.1.6 Tennessee Valley Authority

The Tennessee Valley Authority (TVA) offers a Dispersed Power Program, through which customers can establish a power purchase agreement with TVA and sell up to 80 MW of excess generation from wind, solar, biomass, or combined heat and power systems (Tennessee Valley Authority, n.d.).[11] These systems are located onsite at customer physical locations, and the customer retains claim to the renewable energy generated. The power purchase agreement allows the customer to receive stable and low-cost electricity with no upfront cost, while TVA benefits from tax credits and income from the sale of electricity. There are approximately 425 federal facilities located within the TVA service area, 100 of which are TVA facilities as TVA is a federally owned utility.

[11] A power purchase agreement is a long-term contract where a third-party developer (e.g., utility) installs an energy generation system on a customer's site to generate and sell the power to the customer for a predetermined rate and time period.

4 Barriers and Opportunities

4.1 Barriers

As mentioned earlier, one of the main barriers to implementing resilience measures at federal facilities is their high upfront costs for design and construction. Although utilities can front the capital for these projects through utility resilience programs and long-term contracts, the cost burden of the projects could be passed down to the broad customer base, such as through rate hikes or added fees.

Typical cost-of-service[12] regulations may fail to provide utilities with adequate incentives regarding community priorities for infrastructure hardening and disaster recovery. Statutory requirements can make the use of emerging technologies and pilot programs difficult to justify due to their inherent lack of proven cost-effectiveness. Moreover, emerging technologies generally face a low rate of commercialization and adoption initially. As more turnkey solutions are demonstrated, traction on resilience solutions should continue to grow and with measurable results. Nonetheless, new services and products provided directly from the utility to the consumer could be viewed by some as undermining the competition from other third-party service providers and product suppliers.

Regulations relevant to the technologies and practices supported by utility resilience programs can also act as a barrier. For example, many programs that incentivize the installation and use of DERs include generators, but there are regulations placed on the fossil fuel consumption of some federal agencies that may impact the use of fuel-using generators. For example, the U.S. Department of Defense's Electrification of Standard Building Operations memorandum establishes various electrification requirements for new military construction and major renovation projects as well as existing buildings. Generators strictly used for the supply of emergency backup electricity are exempt from compliance with the policy, but those used in part or entirely for peak shaving or load shifting are subject to the rule (U.S. Department of Defense, 2023).

Federal facility managers undertake resilience planning to assess, identify, and prioritize the risks that they need to address. Despite these efforts, resilience planning and implementation is an inconsistent practice across the federal government. Some federal sites have whole-building generators serving backup to both critical and noncritical loads, while some sites have only uninterruptible power supply (UPS) for short duration power outages and others have generators for critical loads only. Many stakeholders struggle with understanding resilience planning and how to apply resilience strategies at their sites.

[12] "Costs of service" refers to expenses incurred by a utility to provide services to customers. They include operations and maintenance expenses and capital investments paid by the utility.

Another barrier to accessing these utility resilience programs is simply the lack of them. There are currently a limited number of utilities, serving a finite number of federal facilities, that offer these programs. Furthermore, the nomenclature used to describe these programs varies from utility to utility, and program information is not widely accessible. Some utilities do a good job of promoting these programs on their public-facing websites while others do not.

4.2 Opportunities

While resilience programs are offered mainly through vertically integrated utilities, strategies that support grid resilience can be expanded through smaller utilities, such as co-ops and municipalities. These utilities may not have the capital to cover the cost of grid-connected, commercial-scale generation assets, but they can apply the tariff model to implement a large number of simpler systems at customer locations to support load management on the grid. For instance, the San Isabel Electric Association—an electric co-op located in Pueblo, CO—utilizes a time-of-use tariff to incentivize customers who purchase an electric thermal storage (ETS) unit from the utility and consume the stored electricity during peak demand periods. These customers receive discounted rates when recharging their ETS during off-peak times and can utilize the stored energy as backup power during grid outages. Collectively, 1,500 San Isabel Electric Association co-op members have installed ETS and shift approximately 10 MW of electric load off the grid during each peak demand period (Hight, 2025). The utility maintains and warranties each ETS unit through utility-customer contracts.

Community microgrids may be another way for federal facilities to work with their service provider(s) to improve the resilience posture of their sites, as well as that of the surrounding communities. For example, the Lincoln Electric System Community Microgrid in Lincoln, NE, supports a federal building, police department, state office building, state capitol building, and various gas stations and stores (Lincoln Electric System, n.d.). Likewise, the NCBC partnered with Mississippi Power Company to execute an enhanced use lease for Mississippi Power Company to design, manufacture, and install a microgrid system in exchange for NCBC providing the land necessary for a solar farm (U.S. Department of Energy Federal Energy Management Program, 2020). Finally, U.S. states continue to create grant programs focused on improving the reliability and security of their local utility grids.

5 Conclusion

The creation of new types of utility programs focused on resilience can help federal agencies better engage with their utilities for project investment and implementation support. Federal agencies can now leverage partnerships with their utilities to strengthen the resilience posture of their sites. These partnerships are unique two-way opportunities in which utilities yield the financial and operational capabilities for implementing resilience strategies while agencies provide the siting for grid-connected DERs and participate in load management activities to minimize stress on the grid.

Utility resilience programs offer contractual agreements and tariff-type price models to ensure that future energy projects are affordable for federal agencies to pursue, bringing traditionally high-cost resilience projects within reach. Regulatory mechanisms can provide the framework for resilience programs so that more utilities can provide offerings, eventually allowing a greater number of federal facilities to benefit from these emerging programs.

Finally, federal-utility partnerships can help to ensure new infrastructure projects with long lifespans will be resilient to high-impact, low-frequency hazards in the future. A better understanding of available utility programs and affordable resilience strategies can guide agencies' resilience planning activities, ensuring that federal facilities and their surrounding communities become more resilient to hazards while enhancing the overall reliability and security of the grid.

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