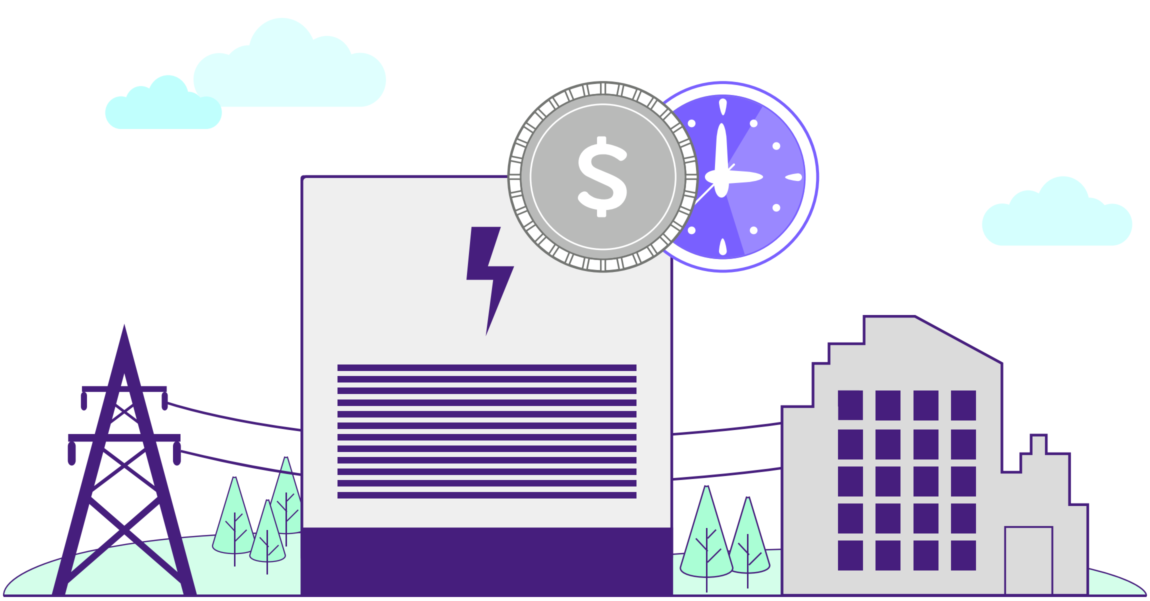
Financing Backup Generator Upgrades with Demand Response Earnings

enelx.com/northamerica

Table of Contents



Introduction

Backup Generators and Demand Response

One of the biggest challenges facing the grid is managing high levels of demand for electricity. When demand threatens to exceed available supply, electric utilities and grid operators need to rely on peaking power generation infrastructure, which can be expensive to operate, to prevent a power outage.

Since energy providers need to accommodate any increase in costs to meet peak demand levels, these costs often result in higher electricity charges for their customers.

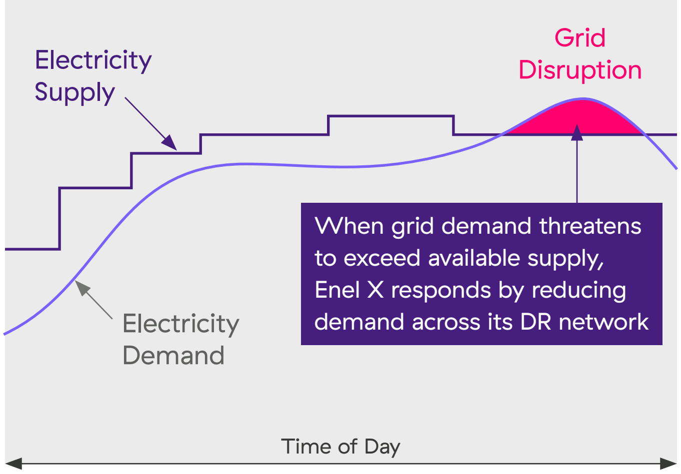
Demand response (DR) programs help to alleviate these challenges. Through DR programs, utilities and grid operators call on their customers to reduce demand from the grid temporarily when demand levels reach abnormal highs, and offer incentive payments in exchange for their participation. At scale, DR programs bring demand levels down at the time when the grid needs it most, reducing the need to build expensive infrastructure that may only operate a few times per year, and ultimately helping to prevent blackouts and other power quality issues.

One of the most common obstacles preventing many commercial and industrial (C&I) customers from participating in DR is avoiding disruption to operations in their facilities. While some participants can find creative ways to shutdown nonessential equipment or schedule their energy-intensive operations to participate in DR, others might not have the kind of flexibility to remove significant capacity from the grid.

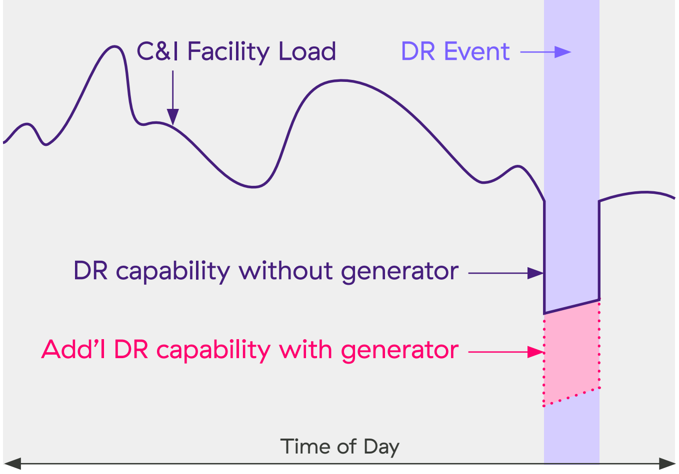
Since DR payments are based on the amount of capacity that a customer can remove from the grid on demand, those with backup generators available on-site can often earn higher payments than those that participate solely by shutting down equipment. Transitioning a facility's load onto a backup generator accomplishes the same goal for the grid while still providing a source of power for the facility to remain operational during a DR event. Some participants even enhance their payments through a combination of

Customers with backup generators available on-site can often earn higher demand response payments than those that participate solely by shutting down equipment.

DR Programs Help Maintain Grid Stability



Generators Increase DR Capacity

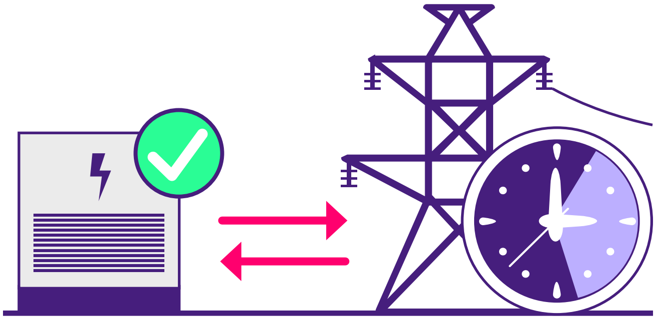


these practices, shutting down nonessential load while transitioning critical load onto their on-site generation resources during a DR event.

For the grid, these organizations combine to deliver valuable relief during periods of high demand for electricity. For energy consumers, DR offers a way to generate revenue from their backup generator.

Today, many large C&I energy users are partnering with DR providers to finance and implement equipment upgrades to meet compliance standards for participation in DR, increase their DR earnings potential, and improve their generators' overall performance and capabilities. The future DR payments provide a reliable source of revenue to finance the upfront hardware and installation costs, thereby eliminating the need for the energy consumer to make a capital investment.

This whitepaper will explain the history behind these kinds of agreements and walk through sample projects to explain how the economics work for all parties involved.



Backup generator upgrades enable DR participation, which ends up paying for the upgrades and more.

Benefits of Participating in Demand Response

Resilience

- DR participants receive advance notification when the grid is at risk of a power outage
- Testing and audits required for DR participation can ensure that a generator is capable of performing when needed

Operational

- Shifting load onto a generator can help earn DR payments while maintaining normal operations within the facility
- Remote transfer capabilities enable the DR provider to respond to a DR dispatch without requiring internal staff to transfer load manually on-site

Financial

- DR earnings provide an opportunity to generate a return on a necessary resilience asset
- In some markets, shifting load onto a generator can also significantly reduce demand-related charges on the energy bill

C&I energy users are partnering with DR providers to finance and implement equipment upgrades to meet compliance standards for participation in DR, increase their DR earnings potential, and improve their generators' overall performance and capabilities.

The Challenge

Complex Regulatory Standards Restrict Demand Response Participation

For several years, the US Environmental Protection Agency (EPA) permitted backup generators to participate in demand response for up to 100 hours per year. Considering that the average DR dispatch lasts from one to four hours—and most programs dispatch DR only one to five times per year—participants could leverage their backup generators to participate without concern of violating the EPA's rules.

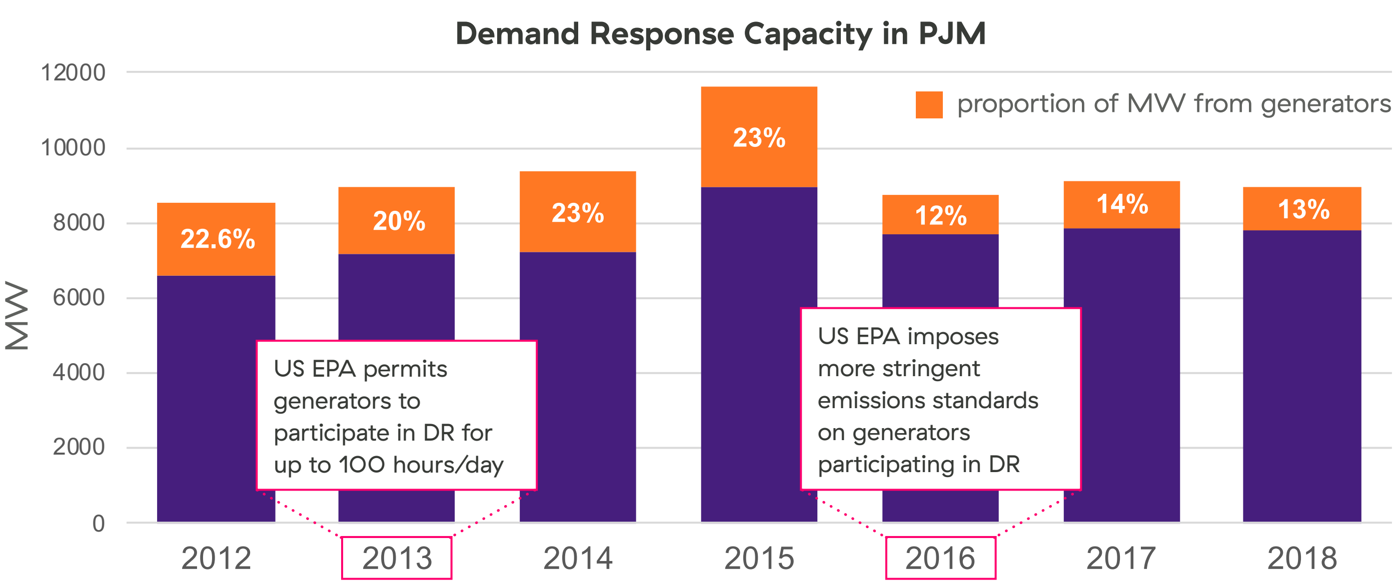
However, in 2016, the EPA implemented revised regulations that restricted DR participation to backup generators that meet its National Emissions Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines, which entail a number of airborne pollutants. Violation of these standards results in large fines, shut downs, or even potential prison sentences.

Simply determining whether a backup generator is eligible to participate under these standards is complex, and requires evaluating the asset's manufacture date, tier rating, and fuel type. For those that are not eligible, participants would also need to understand what equipment would be needed to bring their generators into compliance, and would also need to navigate and manage the vendors and service providers that could implement these upgrades.

Most importantly, DR participants with generators that did not meet the EPA's standards would need to find the capital to invest in these upgrades, which typically cost between $50K and $75K per generator.

Facing these obstacles, many organizations declined to upgrade their generators, and lost access to their DR programs.

As a result, the DR programs that relied on these participants lost access to a considerable amount of capacity. For example, PJM, North America's largest electric grid and DR program, saw its overall DR capacity decline from more than 11.6 GW in 2015 to more than 8.7 GW in 2016, with the amount contributed by backup generators decreasing from 23% in 2015 to 12% in 2016. Based on conservative estimates, this lost capacity resulted in an additional $100M in costs for the PJM grid, which are ultimately passed onto customers.



PJM has seen capacity from generators decline sharply since the 2016 regulation changes (Source: PJM)

The Solution

Financing and Implementing Generator Upgrades for Compliance

To help bring this capacity back into the DR programs—as well as help C&I energy consumers earn payments—Enel X began financing and implementing the equipment upgrades needed to bring generators into compliance with the EPA's standards. Through these agreements, Enel X recovers the upfront hardware and installation costs from the DR earnings, and uses the traditional DR revenue-share model to pass payments onto the customer after the project has been paid off.

To understand how these financing agreements work, it helps to look at some examples.

For one project, Enel X found that a large government facility in PJM could increase its DR earnings substantially if it were to upgrade six on-site generator assets to comply with EPA standards. With more than 4.5 MW of capacity enrolled in the program, the upgrade positioned the facility to earn more than $472K in additional DR payments over five years, after accounting for the project's costs.

Enel X recovers the upfront hardware and installation costs from the DR earnings, and uses the traditional DR revenue-share model to pass payments onto the customer after the project has been paid off.

With Enel X eliminating the need for out-of-pocket expenses, the organization was able to forego the lengthy budget approval process that the agency requires for most capital projects. This expedited the overall upgrade project, which enabled the organization to enroll in DR earlier than anticipated and generate an additional $95K in payments.

For another organization—a large hospital in Texas with access to the DR program administered by the Electric Reliability Council of Texas (ERCOT)—the key to successful DR participation was preventing any disruption to the facility's access to power. After upgrading seven generators and demonstrating their ability to transition the facility's full electric load onto the generators seamlessly, the hospital was able to enroll more than 4.2 MW in the program. For the hospital, this resulted in more than $465K in earnings over five years after deducting the upgrade costs.

In both cases, the financing and management of the upgrade project eliminated the barriers preventing these organizations from participating in DR.

Case Study: Large Government Facility

DR PROGRAM: PJM

NO. OF GENERATORS: 6

CAPACITY: Over 4.5 MW

INCREASED EARNINGS: Over $472K in 5 years

Case Study: Large Hospital in Texas

DR PROGRAM: ERCOT

NO. OF GENERATORS: 7

CAPACITY: Over 4.2 MW

INCREASED EARNINGS: Over $465K in 5 years

The Current State

Financing Additional Generator Upgrades Through Demand Response

The reliable income of DR payments is also proving valuable for financing additional generator upgrades.

Some organizations have financed wiring enhancements that increase the amount of electric load that a generator is capable of supporting. Others have used these financing structures to install closed transfer switch technology, which can enable a facility to transfer its electric load from the grid to a generator seamlessly, without disrupting power availability in the process.

These upgrades can cost as much as $100K per generator, and pose similar challenges to the upgrades needed to meet EPA compliance: technical complexity, vendor management, and access to capital to cover the required costs. Just as DR earnings can cover the costs required to help a generator qualify for DR, they also create opportunities to finance upgrades that can both increase DR earnings potential and improve a generator's capability as a resilience asset.

Distributed energy resources play a valuable role for both the grid and C&I energy consumers. Today, that value creates opportunities for energy consumers to integrate distributed energy resources without taking on the risk of a capital investment.

To discuss opportunities for your organization, reach out to the Enel X North America team today:
www.enelx.com/n-a/en/forms/contact-sales

Just as DR earnings can cover the costs required to help a generator qualify for DR, they also create opportunities to finance upgrades that can both increase DR earnings potential and improve a generator's capability as a resilience asset.

enel x