



CPower

LEVERAGING YOUR GENERATION ASSETS TO GENERATE REVENUE

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A CPOWER
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A CLEAR PATH FOR ENERGY MANAGERS NAVIGATING EG REGULATIONS.

Properly permitted, your emergency generation—EG—is both a reliability asset and a revenue generator. EG provides a great opportunity to earn revenue and save on energy costs through demand response (DR) and demand management programs.

Unfortunately, the opportunity seems surrounded by a complex and occasionally contradictory thicket of environmental regulations. The full scope and intricacies of permitting often result in misinformation, missteps—and missed revenue opportunities.

In this white paper, we will walk you through the issues that face generator usage; the 2015 court ruling that threatened to eliminate the participation of EG in demand response, and the myth that grew up around it; and how customers and companies like CPower have risen to the challenge and defined a clear path for today's energy managers and engineers to monetize their EG assets.

We'll also explore the CPower classification system that has streamlined the generation permitting process, and shine a spotlight on how CPower helps a customer critically dependent on generators to keep the data flowing uninterrupted. Because we want you to know: you can leverage your emergency generation assets to promote sustainability, reinforce grid reliability, and generate revenue for you.

ISSUES AND CHALLENGES

The ability of EG assets to participate in demand response programs depends on their ability to meet a combination of federal, state, and local environmental regulations. At the federal level, the Environmental Protection Agency sets the benchmark that all state and regional departments of environmental protection (DEPs), at a minimum, must adhere to. All generation assets must comply with federal regulations laid out by the EPA in the Clean Air Act.

The DEPs, in turn, contribute their own regulations to comply with, which may not necessarily be in alignment with the EPA. That list is ever-changing and ever-growing; in fact, there are currently 134 proposed regulatory changes affecting EG and DR on the docket for the PJM Interconnection, New England, New York, and ERCOT ISOs.

That's a daunting set of conditions that has given rise to a veritable thicket of issues and challenges. For example:

Compliance. This is the first and foremost issue that must be met, and a complex one at that. Does the generator meet federal requirements? Does it have to meet RICE MACT and/or RICE NESHAP? Does it have to meet New Source Performance Standards (NSPS)? Is a permit required? What emission limits does it have to meet?

Risk Management. Is your generator going to be available during a true emergency? Will your operation be able to continue? Are you meeting all the regulatory requirements? Emission testing? Reporting? Record keeping? Maintenance and testing requirements?

Other regulatory requirements. What state requirements apply with which you must comply? Are there additional emission requirements? What type of permit is required? What program will be utilized? What FERC alert level protocol are you required to follow? Are there any other hour limitations?

So, how do we address these challenges and issues? How do we overcome them to reap the significant benefits of enrolling EG in DR? And—how did we get here?

THE VACATUR, THE AFTERMATH, AND THE BUSTED MYTH



In 2013, the EPA issued emission standard exemptions that permitted emergency reciprocating internal combustion engines—generators, in other words—to operate up to 100 hours a year for “emergency demand response.” This was a big jump up from the 15-hour limit imposed in 2010, and was welcomed as a sensible incentive to encourage further participation in DR, to the benefit of air quality and grid reliability.

Not everyone agreed with the new rule, however, and lawsuits quickly ensued. An unlikely coalition of environmental, state government, and large-scale commercial power generation organizations challenged the new rule, saying it encouraged the use of on-site generation at the expense of air quality and grid reliability.

In the end, the United States Court of Appeals for the DC Circuit vacated the 100-hour rule, on procedural grounds (the Court ruled the EPA did not follow the proper procedures in implementing its rule). The vacating ruling, or Vacatur, was issued on May 1, 2015, and was scheduled to take effect one year later, on May 1, 2016.

The Vacatur’s message was clear: There was to be no emergency generation in demand response programs. Thus the myth was born: You cannot enroll your emergency generators in DR programs.

A coalition that included CPower, some of its competitors, large industrial companies, and other interested concerns fought in court to stay the Vacatur while a new rule could be created or the old rule modified. In light of the Court’s decision, the EPA chose to forego any new or modified rule, and instead issued guidance on the Vacatur that clearly defined engines that meet the requirements for non-emergency generators as defined in Rice Neshap and NSPS, subparts ZZZZ, IIII, and JJJJ (most often referred to as Quad-Z, Quad-I, and Quad-J). Engines which meet these requirements would then be allowed to be reclassified as meeting federal non-emergency requirements and would thus be eligible to participate in demand response and other non-emergency use.

The Vacatur went into effect, as promised, on May 1, 2016. This effectively allowed engines which meet federal non-emergency requirements to participate in DR. It also effectively eliminated emergency generator use for DR (with a small exception which allows for their use via the 50-hour rule).

The EPA’s guidelines provided a level of certainty to the industry by clearly defining the engines that could participate and those that could not. The rules are still complex, and many engines that once participated in the program pre-Vacatur but had to drop out, are still out. Ironically, rather than remove generation from DR participation, the Vacatur instead has driven customers to upgrade their existing generators with the required aftermarket controls, or replace them outright with engines that comply with the new rules.

This has improved air quality, by reducing the amount of carbon monoxide and other greenhouse gases entering the atmosphere. It has provided strong support for continuing grid reliability. It has made a net positive impact on sustainability initiatives at both the private and public level.

Most of all, it has busted the myth that emergency generation cannot participate in demand response. You can. And it starts with bins.

THE BIN SYSTEM—APPLYING ORDER TO CHAOS



After the Vacatur was issued, the coalition began work on a parallel contingency plan, in the event that a successful re-entry of EG into DR could not be achieved. CPower realized that a simple method or tool was required to quickly classify and quantify the impact of the Vacatur. Recognizing that there was a broad distribution of engine types, makes, models, fuel types, size ranges, vintage, etc., it was

determined that a concise classification system was needed to divide the distribution of possibilities into a handful of categories, four at most.

The classification system needed to identify:

1. Which engines are governed by the vacatur and can still participate in DR with no modifications
2. Which engines are governed by the vacatur and can still participate in DR with a cost effective equipment upgrade
3. Which engines are governed by the vacatur and still can be used in DR but would require an extensive or longer payback (lower ROI) and would have tighter control requirements
4. Which engines are not governed by the Vacatur

The Bin classification system was crafted to provide this breakdown categorization, but it had other benefits. It simplified communications. With the Bin system, an entire company could be trained. It allowed a non-engineer who was not directly involved quickly understand which could be approved and which may need additional controls, thus allowing them to ask the right questions.

So— what is the Bin system that CPower created?

To be able to quickly identify, assess and communicate which EG met federal non-emergency systems, the Bin system is divided into four main bins. A major component of the first three bins is date of manufacture.

BIN 1: ENGINES THAT MEET THE NON-EMERGENCY USE EMISSION STANDARDS

- Typically emergency engines manufactured between 6/12/2006 and 12/31/2010 or
- Diesel engines smaller than 300-hp and manufactured before 6/12/2006
- Spark engines smaller than 500-hp and manufactured before 6/12/2006

Bin 1 engines currently meet federal non-emergency requirements and are defined by the NSPS subparts IIII for compression ignition engines or diesel engines, and subpart JJJJ for spark ignition engine.

The period between June 12, 2006 and January 1, 2011 is an important one. During this period, engine manufacturers were required to build engines where the standard was identical for emergency and non-emergency engines. Therefore, these engines can readily be reclassified as non-emergency without the need for additional aftermarket controls.

In addition, there is a subset of engines which are considered small and inconsequential by the EPA. Older compression ignition engines smaller than 300-hp and older spark ignition engines smaller than 500-hp both which were manufactured prior to 6/12/2006 can be reclassified as non-emergency engines and do not require additional aftermarket controls.

BIN 2: ENGINES REQUIRING ADD-ON CONTROLS TO MEET THE NON-EMERGENCY USE EMISSION STANDARD.

- Typically emergency engines manufactured before 6/12/2006

Bin 2 includes older larger engines manufactured prior to June 12, 2006. Diesel engines greater than or equal to 300-hp and spark ignition greater than 500-hp will require the installation of aftermarket emission controls to meet federal non-emergency requirements. This could include an oxidation catalyst, continual parameter monitoring system, and— additionally for diesel engines— a crankcase ventilation system. In addition, field emission testing will be required to prove a reduction of at minimum 70% of CO levels at 15% O₂.

BIN 3: EMERGENCY ENGINES WHICH CANNOT BE UPGRADED WITH AFTERMARKET CONTROLS

- Typically emergency engines manufactured after January 1, 2011

Bin 3 includes all engines built after January 1, 2011. These engines have a unique limitation defined by the EPA which precludes aftermarket emission controls being added to meet federal non-emergency requirements. The EPA issued guidance that states that, for non-emergency use a non-emergency engine must be procured from the manufacturer already fully equipped and able from initial start-up to meet certification requirements.

BIN NA: ENGINES WHICH WERE NOT IMPACTED BY VACATUR

CPower's final Bin classification, NA, includes generation assets that are considered "not applicable" because they are not impacted by the Vacatur. This includes cogeneration, turbines, CHP, microturbines, solar, wind, and other renewable generation resources. Generation assets in these categories are not impacted by the Vacatur. They are governed for the most part by other subparts of Clean Air Act.

The Bin system has been adopted by environmental consultants, DEPs, and has even been referenced in RICE NESHAP and NSPS. It has proven invaluable in providing clear, concise insight into the permitting process, revealing the different approaches that CPower and the customer must take to ready a generation asset to be permitted for DR participation—and leverage that asset to begin earning revenue for the customer.



UPGRADE OR REPLACE?

Over the past few years, CPower has met with the various state agencies across the country to introduce ourselves and present our approach to qualifying generators. With the help of Environmental Consulting firms, we have worked to understand, not only the federal rules and regulations, but also any additional state and local requirements which may vary across state agencies. Many agencies have created independent definitions for various terms such as “emergency” and “non-emergency” which are not necessarily in line with the federal EPA definition. It’s very important that we understand what is required by each agency so that we can make sure our customer’s generators are in compliance.

By meeting with the various DEPs, we were able to understand their interpretation of permitting requirements and, where possible, obtain buy-in from them. We explained the internal process that we follow when evaluating generators for participation in programs such as demand response, peak shaving, capacity tag management, peak demand management, etc. Thus we were able to position CPower as a company that will do what it takes to make sure that our customers are operating compliant generators, as cleanly as possible.

CPower’s engineering team works with each of our customers to gather the information necessary so that we can evaluate all generators at a facility. We will determine which generators may be eligible as-is, which generators may require aftermarket controls, or which generators simply cannot participate without being replaced. Once we complete our analysis, we then provide recommendations, cost estimates and next steps so that we can get you into the market and earning revenue as quickly as possible.

Our recommendations to organizations committed to enrolling their generators in demand response generally fall into two options: Upgrade or replace. Ultimately, our recommendation is based on our very thorough assessment of your assets (see below), but for the most part we follow these guidelines:

Upgrade your generator if:

- Your operations require a back-up energy source
- If the existing engine does not meet emission limits
- Your engine is older than 6.12.2006 and has seen a limited amount of operational hours
- You have a limited capital budget and replacement capital is not an option
- You want to support the grid via demand response participation
- Your facility needs generation for non-emergency operations, such as facility operational or maintenance requirements.
- You want to control energy spend via peak shaving, CAPTAG Management or Peak Demand Management

Replace your generator if:

- If the existing engine does not meet emission limits
- If your engine does not meet current or projected loads
- Your engine is older than 6.12.2006 and has seen a significant amount of operational hours and has become a maintenance burden
- You want to support the grid via demand response participation
- Your facility needs generation for non-emergency operations, such as facility operational or maintenance requirements.
- You want to control energy spend via peak shaving, CAPTAG Management or Peak You have generation that you need for emergency conditions
- You want to participate in demand response
- You have other non-emergency usage requirements

By helping customers upgrade existing generators or replace generators, we bring cleaner engines online to keep operations going in an emergency, reduce your carbon footprint and greenhouse gas emissions, and relieve stress on the grid to help prevent brownouts and rolling blackouts. One often overlooked point about onsite generation is that it can actually reduce both the need for additional power plants to be built and our reliance on existing coal-fired power plants.

And of course, it positions customers to create revenue streams that can be used to offset the costs of upgrading or replacing your generators.

There are scenarios where the customer cannot upgrade or replace existing assets. In cases like these, CPower draws in its extensive experience as a demand-side energy management solutions provider, to develop alternatives that can still offer environmental and financial benefits. For example:

- Load shedding during peak periods throughout the year, which will help reduce charges on your electric bill
- Curtailing smaller loads, such lighting or HVAC, in other demand response programs
- Automated Demand Response (AutoDR), which uses your building management system to curtail loads automatically

CPower engineers will work with you to identify potential curtailment strategies that will allow you to participate in these programs without the use of generation.

SPOTLIGHT: DATA CENTER

Few enterprises are as dependent on emergency generation as the nation's ever-expanding fleet of data centers. It's no understatement that America in the 21st century runs on data, and the loss of data for just a few minutes can have a catastrophic impact. According to a recent Ponemon Institute study, the average cost of a single data center outage today is about \$730,000. The data center outage that struck Delta Airlines in August, 2016, grounded about 2,000 flights over the span of three days and cost the company \$150 million.

While not quite that dramatic, CPower's recent work with a national data center owner provided a simple solution to a perplexing problem, and positioned the customer to use the financial benefits to fund further improvements to manage risk.

The company's Ohio data center site had eight emergency generators. All similar makes and models, seven had been manufactured, purchased, and installed at the same time. All qualified for DR permitting. The eighth, however, was replaced after January 1, 2011. It was built for emergency use only, and could not be upgraded with aftermarket controls.

The control system, which had been recently commissioned, was programmed to execute a sequence of operations that would initiate all eight generators simultaneously. Due to the company's interpretation of the Vacatur as it applied to their generators, they chose not to enroll the generators in the available demand response program, as they felt they would be out of compliance.

CPower performed a complete evaluation of the generators, the control system, and the company's operation to determine the best course for DR participation. CPower presented three options.

1. Make changes to the SCADA system that would allow for a demand response-specific sequence of operation that would not initiate the ineligible emergency-only generator. While technically the best solution, it would require additional capital cost. In light of the recent control system commissioning, the company rejected this option.

2. Develop an administrative SOP where all eight generators would be initiated during a DR event or test. This SOP would detail that, upon all eight generators coming up to full load, the emergency engine would be manually taken off-line, leaving the seven to participate in DR. To ensure compliance, there would be an administrative requirement to track, monitor and record the limited operation of the single emergency engine, as part of the SOP. This 5- to 10-minute operation would then be subtracted from the annual 50-hr non-emergency use limit. While this was a “no cost” option, it was hard not to miss the enormous administrative headache that lay ahead with this option, the company passed on this as well.

3. Take the emergency generator off-line first. Also a “no cost” option, this third solution proposed a much simpler administrative SOP. At the initiation of a DR event or test, the emergency unit would be manually shut off and taken out of service, using the same method used for maintenance. Once secured off-line, the other seven engines would be initiated and brought online for the duration of the DR event or test.

The customer approved the third approach, and began participation in DR. It proved to be “just right,” and the company was able to use this “no cost” option to earn revenue. Over time, they were able to use the revenue earned to implement the capital upgrade to their SCADA system as recommended in CPower’s first proposal.

SUMMARY: THREE THINGS TO DO, ONE TO KNOW

Leveraging your existing generation assets to generate revenue in demand response and demand management programs can convey healthy benefits to the environment and your bottom line. Before making a commitment, though, CPower recommends that you do the following to become acquainted with the compliance landscape.

1. Have a generator assessment completed on your existing and proposed generators and current permits, to ensure that they are compliant with federal, state, and local requirements. Compliance is the key to participation.
2. Stay abreast of any regulatory changes proposed at the federal, state, and local level. These changes may benefit you. Many local regulatory bodies, seeing the negative effect of conflicting and sometimes contradictory regulations, are moving to align their own rules with federal EPA rules.
3. Work with DEPs and federal agencies to understand the requirements for compliance. Understanding is the first step toward compliance.

THE ONE THING TO KNOW? **CPower can do all this for you, and more.**

We perform thorough generator assessments and provide an engineering budget estimate, scope of work, revenue projections, and ROI. We track and monitor regulatory changes, and can provide insight and recommendations. We work with regulatory agencies and environmental consultants across the nation to ensure your generation is compliant, and provide insight on pending changes that may impact your generator use.

In short: CPower can help you leverage your generation assets to generate revenue for your organization. For more information, contact CPower at **1-844-276-9371**, or email **info@cpowerenergymanagement.com**.

ABOUT THE AUTHORS

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Mr. Berkebile is CPower's Sr. Director of Engineering. He has been in the industry for more than 20 years, starting with Delmarva Power and proceeding through Conectiv Solutions, Enerwise Global Technologies, Converge and now CPower. He was responsible for CPower's approach to the new generator regulations, personally reviewing over 3000 generators from 2015-2017. Mr. Berkebile holds a BSME from Widener University and is a member of the National Engineering Honor Society.

ALISON KEEFE, Energy Engineer



Mrs. Keefe is a CPower Energy Engineer. For more than 11 years, she has worked for CPower and its various incarnations, including Xtend Energy, Consumer Powerline, Constellation Energy, and Exelon. Her roles have included dispatch, meter monitoring and troubleshooting, and project management. For the past two years she has focused exclusively on reviewing generators in the New England region. Mrs. Keefe holds a BS in Electrical Engineering from the University of New Hampshire.

CPOWER ENERGY MANAGEMENT Mastering your organization's energy use and spend is a challenge. But when you succeed, you'll improve your bottom line, enhance your sustainability efforts, and contribute to a balanced, reliable energy grid. CPower has extensive experience helping commercial, industrial, healthcare, government, and education customers achieve demand-side energy management success.

We're here to help. Start the conversation today. Call 1-844-276-9371, or email info@cpowerenergymanagement.com. Follow CPower on Twitter [@cpowerenergy](https://twitter.com/cpowerenergy) or online at www.CPowerEnergyManagement.com

