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WHITE PAPER

Understanding Demand Response

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INTRODUCTION

The phrase *"Demand Response",* or DR, can have many different meanings, as well as many different approaches to achieve this request. With this being said, demand response has one main focus, and that is to reduce the load. The action can have several results, being either grid reliability or financial gain. This paper will explain these definitions and approaches.

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GRID SUPPORT

DR programs, when driven by the local utility companies, can be summed up simply as “Grid Support”. This is where either by development planning or un-expedited growth, there are areas within the utility distribution system where customers could experience un-stable delivery of electricity. This can be a localized event or an entire distribution event. The challenge for the local utility is that some of these load levels are not always present. An example of this would be during a hot summer day when all of the air handlers turn on, this now causes an increase in this customers load levels. The challenge for the utility company is they can approach this two different ways. The first approach is they can build up power generation along with transmission capabilities to be able to support these loads. This, of course, is not easily achieved, permitting, right of way challenges can extend construction timelines and capital equipment comes at a great expense. The alternative to this approach is to have customers reduce, or just turn off, their loads.

REVENUE DRIVEN

Demand response can also be an event that the decision to reduce load is made by the end-user. This action is done to avoid high demand charges. By having the ability to reduce the loads, it will ensure that these load charges do not come into play.

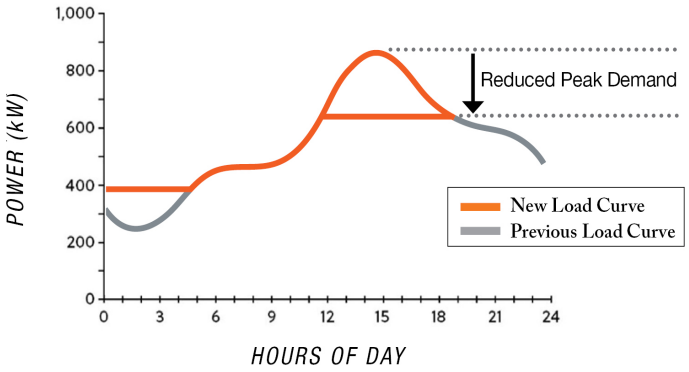

Figure 1.

Revenue driven demand response can be used several different ways. One would be peak shaving (see figure 1). This shows that a control system is constantly monitoring the client’s load levels. When the load starts to approach a load shed trigger, then a DR action is put into play. This could be anything that will reduce the load, like shutting down equipment and/or turning on local on-site generation. This action is solely triggered by site conditions and power requirements. These types of applications tend not to have long operation hours, typically 200 hours or less annually, and can be very sporadic depending on changing site conditions.

Another form of demand response is referred to as base loading. Unlike peak shaving, base loading (see Figure 2) is when a customer knows that this additional load is present every day and this load pushes them into the high demand rate charge category. This is now a daily occurrence and the facility will experience long daily operational hours of either partial operations or on-site generation.

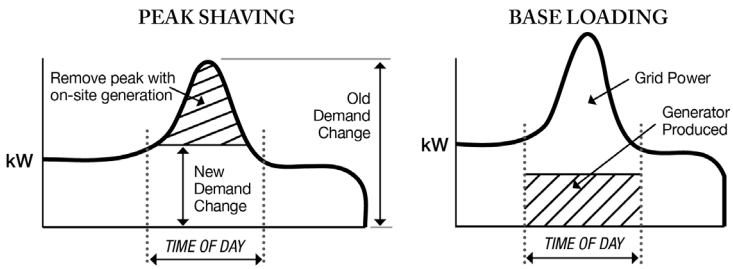

Figure 2.

HOW TO ACHIEVE DEMAND RESPONSE

There are several ways to achieve DR, either customer or utility driven. One of the easiest approaches is to just shed or turn off loads. The issue, however, is if the customer can operate without the equipment that is running at the time. It can be a very daunting task to find the right circuit breakers and to have the on-site personnel capable of performing this task both during and after the load shedding event.

A more secure approach is to utilize on-site generation. This can be accomplished by turning on the on-site generator and transferring the building load onto the generator which will result in load reduction. Having this on-site power generation for emergency back-up provides great benefits. Besides the most important benefit of life safety, this feature can keep daily operations going as to not affect the bottom line, as well as a place of refuge. Of course this comes at a cost, with the option of having DR these costs can be off-set, or in some cases actually achieve a true return on investment.

WHAT KIND OF GENERATORS CAN BE USED?

The EPA has very strict rules when it comes to running on-site generators when there is not an actual electrical outage at the

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site. If the generator is connected to a diesel engine, the engine must have a Tier 4 emissions rating. Tier 4 rated engines are 30% - 40% more expensive than everyday diesel engines. Tier 4 engines are only required when the units are either mobile or they are being used during non-emergency events. If the generator is connected to a natural gas engine, that engine generator must be labeled for non-emergency use. This labeling should come from the OEM. If the unit is labeled for emergency use the unit can be site certified, but this will have to be done every three years and becomes the sole responsibility of the end-user.

With careful planning demand respond has many different benefits including financially and increased system reliability.

For more information about these concepts or the variety of Generac products available, contact Generac Power Systems at www.generac.com or toll free at 1-844-ASK-GNRC.

Author Background

Dan Barbersek is the *Director of Energy Management Solutions* for Generac Industrial Solutions with over 38 years of experience in the energy industry as an application engineer—including 18 years in the UPS industry—he has a thorough knowledge of power technologies, from the conventional to the cutting edge. He has served in the United States Navy, where he completed Electrician's Mate "A" School, and is a member of IEEE, 7x24 User Group, EGSA and the North Carolina Healthcare Engineering Association.