
**Response to Request for Information from the Department of Energy:**

[FR Doc. 2010-23251]

# Addressing Policy and Logistical Challenges to Smart Grid Implementation

November 1, 2010

**Introduction**

EnerNOC, Inc. ("EnerNOC") is pleased to provide these comments to the Department of Energy in response to the Request for Information "Policy and Logistical Challenges to Smart Grid Implementation." EnerNOC is a leading provider of demand response and energy efficiency solutions to utilities, Independent System Operators ("ISOs") and customers in the commercial, industrial and institutional ("CI&I") sectors. EnerNOC uses near real-time data collected from utility meters at CI&I customers to monitor and coach performance during demand response events, as well as to spot excursions outside normal building operating parameters in our SiteSMART energy efficiency service for large buildings and campuses.

EnerNOC was founded in 2001 and currently has over 4800 MW of demand response capability from over 8,000 individual sites across the U.S., Canada and the U.K. We work with over 100 individual utilities or grid operators and have 500+ employees, overwhelmingly in the U.S.

EnerNOC does not work with residential electric customers so our comments should be viewed through the lens of a provider to the CI&I sectors. Much of the debate about the Smart Grid has been with sole reference to residential customers. It is important, however, not to forget the needs of the CI&I sector because they consume the majority of the electricity in the U.S.[2], provide the bulk of the demand response capability in the U.S. and are a much more heterogeneous sector than the residential sector. Therefore, the thrust of EnerNOC's comments will apply to the CI&I sectors.

This RFI is very broad, touching on a wide range of technical and policy issues related to the Smart Grid and its many facets. There are dozens of un-numbered questions organized into five sections. EnerNOC's comments below will address several of the most important issues EnerNOC sees in the ongoing development of the Smart Grid. To the best of our ability these will be tied to individual questions posed in the RFI. To the extent that is not possible, we will rely on the RFI's allowance that

"…commenters may address any topic they believe to have important implications for smart grid policy regardless of whether this document mentions it."

[2] The CI&I sectors consume 61% of the electricity in the U.S. Energy Information Administration. Retail Sales of Electricity to Ultimate Customers: Total by End-Use Sector, 2009 (Million Kilowatthours/) http://www.eia.doe.gov/cneaf/electricity/epm/table5_1.html

## 1. Demand Response is Currently the Most Important Consumer Application of the Smart Grid

The RFI asks under its Section entitled "Interactions With and Implications for Consumers," the following question:

> "For consumers, what are the most important applications of the smart grid?"

EnerNOC perceives the smart grid as having two layers, the infrastructure layer and the application layer, which can be analogized to similar layers of the internet. The infrastructure layer - - wires, meters, communication channels, sensors and switches is analogous to the fiber optic cable, routers, and switches that form the physical infrastructure of the internet. The application layer – services such as demand response - is analogous to internet services such as e-mail, Amazon.com, Facebook and Mapquest. In both cases, a well-established infrastructure layer enables the application layer to flourish.

Today demand response is the most important application of the smart grid for consumers, particularly CI&I customers. According to the FERC National Assessment of Demand Response Potential, there are currently over 35 gigaWatts (GW) of demand response in the U.S ., the majority of which comes from the CI&I sectors. This demand response is beneficial both for participants and non-participants. For participants, demand response provides a way to reduce their overall energy costs by providing a resource to the grid. Non-participants and participants alike benefit because the existence of demand response reduces the need to build new power plants, transmission lines and other infrastructure, while also avoiding the need to run the most expensive power plants during hours of peak demand.

It is important to make two caveats regarding demand response and the Smart Grid. The first is that demand response predates the Smart Grid and not all of the existing demand response resources are Smart Grid enabled. For example, legacy interruptible tariffs at some utilities rely on fax or telephone notification of events and have no feedback mechanism as to whether customers complied, except billing records developed a month later.

The second caveat is a derivative of the first. Deployment of new smart meters is helpful to, but not necessary for, deploying demand response today. First, on the residential side, many demand response programs are dispatched using radio controlled switches on water heaters or on smart thermostats that are controlled by the utility, but not dependent on smart meters. For CI&I customers, companies like EnerNOC are using Smart Grid technologies to build their own networks of assets, independent of utility smart meter roll-outs. Broadly deploying smart meters with standardized data outputs for CI&I customers will certainly improve the ability of customers to participate in demand response (see Response 3 below) but is not absolutely necessary. EnerNOC is currently able to get usage data from the meter and transfer it via the internet back to our Network Operations Center in 1 or 5 minute intervals so that both

EnerNOC and the customer can see their performance in near real-time during demand response events.

**2. Access to Data Directly from the Meter is Important for the Development of the Consumer Facing Smart Grid**

The RFI asks under its Section entitled, "Utilities, Device Manufacturers and Energy Management Firms" the following question:

> "In particular, are changes needed to the current standards or standard-setting process, level of access to the market, and deployment of networks that allow add-on products to access information about grid conditions?"

It is imperative that energy usage information is accessible to the customer, or their designated third party, directly from the utility meter itself via wired or wireless connection using a NIST approved communication standard or protocol. This should be required of every smart meter deployment, whether by state public utility commission fiat or through DOE policy as a condition of access to federal funds.

Energy usage data needs to be received and acted upon in near real-time to affect real-time pricing markets, demand reduction, power correction, instantaneous energy efficiency, and other grid and consumer usage improvement strategies. Data access at a later time, such as 24 hours, precludes participation in many markets, products, and services that can yield substantial energy reduction and efficiency improvements. Even a delay of one hour on data access can prevent participation in these programs.

Today, EnerNOC is reading the usage of over 8000 CI&I customers in near real-time through the internet. This is necessary, as EnerNOC has firm commitments to provide thousands of MWs of load drop to different utilities and ISOs during demand response events. By monitoring the customers' usage in near real-time, EnerNOC can see which customers are responding to a demand response event, identify the underperformers and coach them to hit their commitment. This makes demand response more predictable and consistent for our utility and ISO customers. Getting this same data with even an hour delay (much less a 24 hour delay) would severely hamper our ability to ensure performance.

Currently, the way EnerNOC gets access to near real-time data is by requesting, and paying for, the utility to send a truck out to a customer's premises and install a physical wire output ("KYZ pulse output") on each meter. This can take up to 12 weeks for installation after the customer requests it because utilities are not set up to do mass installations of this type. Clearly this is not an ideal solution for the utility, the third party provider, or the customer.

To ensure that customers and their third parties have access to interval data on a near real-time basis, utilities will need to specify local outputs for their smart meters before deployment.

It is significantly cheaper and less time consuming to have the output installed at the factory when the meter is built. A separate channel can be set aside to provide the customer read-only access to its usage and other data recorded by the meter. The meter information can be sent from the meter to devices within the customer premises via wires or wireless communication protocols such as Zigbee. The type of output and the format of the data should be consistent with NIST designated standards in a machine-readable language.

Getting the raw data from the meter, as opposed to from the utility data system, has some security advantages as well. First, physical access to the meter in the case of a wired connection can be controlled by the customer. Therefore, the customer can grant access to their third party of choice, and block access to others. Second, in the case of a wireless read out, such as Zigbee, proximity to the meter is required and often a code, similar to the one used on home Wi-Fi networks, is required to read the data. No connection to the larger utility system is required, i.e. no log-in to a utility owned program that could be hacked.

Finally, while demand response is currently the best application of the Smart Grid (see Response 1 above), the most innovative applications are probably yet to be conceived. However, without access to raw meter data, further innovation will be stifled.

### 3. It is Important to Distinguish between Small, Medium and Large Commercial and Industrial Customers

The RFI has a Section entitled, "Interaction With Large Commercial and Industrial Customers." This seems to be a catch-all section for discussing issues for non-residential customers. However, this umbrella fails to address an important distinction between three sizes of non-residential customers.

There are small, mom and pop type commercial customers which share some similarities with residential customers. There are the very large customers such as steel mills, oil refineries and mining operations. These customers typically consume so much energy that they employ their own energy managers, are relatively sophisticated and often have custom tariffs or contracts to procure their energy. Finally, there are the medium sized customers: schools, hospitals, office buildings, big box stores, cold storage facilities, waste water treatment plants and small factories. These customers are characterized by an extremely heterogeneous use of energy and a lack of specialized personnel to deal with their energy usage.

This distinction is important because the medium-size customers, and their problems, are often ignored in the Smart Grid debate. The stereo-typical solution for the CI&I sectors is to treat the small commercial customers like residences and let the larger customers manage for themselves. This prescription misses that fact that hundreds of thousands of medium-sized customers are too unique to be treated via the mass market, but not large enough to do it themselves.

## 4. Automated Demand Response is a Good Tool but it Does Not Solve All Problems

The RFI asks under its Section entitled, "Interactions With and Implications for Consumers" the following question:

> "What are the implications of these insights for determining which tasks are best automated and which should be subject to consumer control?"

There is a lot of discussion in the industry recently about Auto-DR and Open ADR. The former is a term that is loosely used to describe fully automated demand response. The latter is a specific communications protocol for how to send data back and forth to automate demand response. It was developed by Lawrence Berkeley Laboratory's Demand Response Research Center and is now being considered in the NIST process.

Some in the industry believe that with automated demand response, most of the challenges associated with demand response will be solved by automation ("not reliable", "too complicated to do"). They then jump to the conclusion that with Auto-DR a utility or grid operator can easily run a multi-MW demand response resource which it can dispatch with the press of a button from its control room. While it is possible for a control room to have one button capability for a multi-MW demand resource, it takes a lot more than the use of Open ADR.

There are different levels of automation in demand response. Typically what we think about when discussing automated demand response are radio controlled water heaters or commercial buildings whose building management systems can receive a signal from a utility and immediately go into a demand reducing program mode. However, much of what we consider demand response these days is at least semi-automated. For example, signals to notify customers that a demand response event is scheduled to occur can be fully automated e-mails, texts and robo-calls that get automatically sent out to customers at the prescribed interval before the event. In addition, some customers can have automation with opt-in or opt-out. Opt-out is what most "fully automated" demand response options in the CI&I sector are. The customer's facility will automatically begin reductions unless the customer decides to override that day. Opt-in is where the facility is pre-programmed to drop load but will not start doing so until the facility operator acknowledges that she has received the signal and has no objections to going forward. In this case a customer has to make a decision but does not have to actually throw switches.

EnerNOC's experience indicates that many CI&I customers cannot, or will not, allow full automation of their demand response. The reasons are as varied as the differences among CI&I customers. Some customers are new to demand response and do not want to allow a partner to automatically shut down part of their operation until they understand more about it. Some customers have production lines that have to be shut down in a particular sequence and how fast they can shut down is dependent on where they are in the production process at the time a particular event is called. Building management systems (BMS) can make a pre-programmed

changes in building operations in response to an automated signal. For example a BMS could be programmed to raise the internal thermostatic set-point by four degrees and shut off certain banks of lights in response to a signal sent via Open ADR. However, only a minority of large buildings in the U.S. even have a BMS and virtually no small buildings have them.

In summary, fully automated demand response is a good tool that can enable some customers to participate in demand response programs more easily. In fact some customers such as grocery stores cannot participate without it. But, relying totally on fully automated demand response will leave a very large slice of the CI&I sectors unable to participate.

**5. Demand Response Specialists, Like EnerNOC, are Essential to Getting the Most Demand Response Out of the CI&I Sector**

The RFI asks under its Section entitled, "Utilities, Device Manufacturers and Energy Management Firms" the following question:

> "What is the potential for third-party firms to provide smart grid enabled products and services for use on either or both the consumer and utility side of the meter?"

Already, there is a new industry of third-party firms providing demand response services on the customer's side of the meter for sale to utilities and grid operators. While utilities do this for themselves in some cases, third party aggregators are more specialize for this role. Companies which specialize in providing demand response services in the CI&I sectors can overcome some of the challenges described above while creating extra value for both customers and utilities/grid operators.

For example, given the heterogeneity of medium-sized CI&I customers there are no standardized solutions that are widely applicable. Delivering solutions to the commercial building sector, the water and waste water treatment sectors and the agricultural processing sector, requires a wide range of experience and staff. ISOs never have this staff, and utilities rarely have the diversity of experience needed to adequately serve all these sectors. Moreover, many utilities do not have customer account managers except for their very largest accounts, thereby leaving untouched the entire medium-size CI&I customers.

Let's take a look at the problem posed by the "solution" of fully automated demand response. Suppose a utility, knowing that it has limited staff, decides that they will pursue an "Auto-DR strategy" only as a way of getting reliable demand response resources without a large investment in staff. But, by requiring Auto-DR they are immediately limiting the pool of customers they can draw from since many customers cannot, or will not, participate unless they can maintain control of their curtailment. Then, even for the customers who can participate, who is going to help them develop their automated curtailment plan? What if customers decide to opt-out during an event? What if customers lose connectivity prior to an event? Unless you have staff that can actively manage events, not just during the event but in the lead up to the event, the resource that is fully automated may not show up in the amount

the system operator anticipated. To actively manage hundreds of customers during an event you need not only staff but also a network operation center, connectivity to all the customers and software to help manage all the data they are presenting.

Specialized third party demand response providers can handle each of these responsibilities and thus play an important role both for customers and utilities and grid operators.

**Conclusion**

Thank you for providing the opportunity to comment on these important matters. If the Department has additional questions they should be directed to:

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