



Association of Edison Illuminating Companies

Load Research NewsLetter

Summer
2009

Load Research for the Customer Side of the Smart Meter

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The smart grid brings with it an expanded role for electric utilities, giving both utilities and consumers new tools that will change the way we keep supply and demand in balance and help meet the challenges of climate change.

Climate legislation seems close—so much now depends on what the mechanism, limits, and timetables will be. This will put pressure on historic supply options, creating challenges for utilities as they near minimum reserve margins in many regions of the country.

New generation must contend with long horizons, constrained supply, and lack of transmission. For these reasons, utilities have been focused on enlisting consumers to help reduce the need for building new generation.

Historically, utilities have used direct load control (DLC) to help cycle air-conditioners, water heaters, and other large devices to reduce peak demand. These programs provide consumers with a payment in exchange for the right of the utility to provide some control over when their large appliances would operate. Generally, consumers do not know when the utility exerts that control, nor do consumers have the ability to override it. Utilities have also used rate designs showing customers that the same average on-peak and off-peak prices would apply for the entire season, regardless of the actual cost of power on those 15 or so days a year when utilities experience their highest demand or supply costs. From a certain perspective, load research has been fairly straightforward.

The smart grid expands the utility’s efforts to the customer side of the meter, ensuring that consumers have the information and tools they need to respond to both extraordinary price periods and periods of uncertain reliability—and this is where the new role of load research becomes important. With the smart grid, utilities will be able to provide signals to either consumers or their devices just on those days that require additional consumer response and that preset programs should be initiated. For example, the utility would send a price signal to the consumer on one of the hottest days of the summer. Consumers or their smart thermostats would receive the signal and move the temperature set-point up a degree or more, depending on the customer tolerance for a temperature change. Pilot programs across the country have shown that peak demands are reduced by roughly 15 percent when customers move their own thermostats or roughly 30 percent when those signals go directly to the smart thermostat. Moreover, these reductions have been shown to have a big impact on the utility’s ability to avoid or delay new generation requirements which would have been needed to meet increasing peak demands.

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But unlike traditional DLC—utility-controlled and dependable—the customer’s response to price signals is unknown. How much the utility can count on a response to a price signal to reduce peak demand on the hottest days of the year? The demand response that utilities need to count on in order to keep supply and demand in balance hinge on so many new factors beyond whether or not a customer has a relay on its air conditioning unit. These factors include the size of the homes, the presence of central air conditioning, household education levels, micro-climates—and the list goes on. Load research will help answer these questions.

What about other uses? If everyone takes a morning shower, electric water heaters will respond and reheat the water during the morning shoulder period and float for hours. But on that critical peak day, will the water heater restart during the afternoon critical peak period? Or, more important, will consumers opt to save money by preventing the restart until after the critical peak period ends?

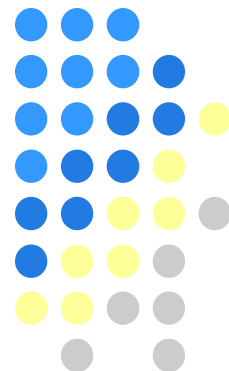
What about refrigerator defrosters? Self-defrosting refrigerators have a 600-watt element that keeps them from icing over. What is the peak reduction potential of ensuring that the defrost cycle is prevented from operating during a six-hour critical peak period, or even during normal peak periods?

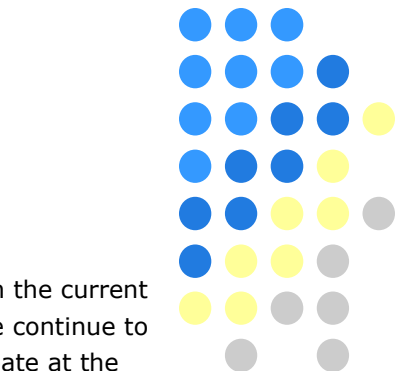
What about electric dryers? Would consumers be willing to have the 4,000-watt heating element turned off during a critical peak period and have the dryer just keep tumbling the load until rates return to normal, using just 100 watts?

Much depends on the utility, its customer base, and its generation base. But once load research goes to the customer side of the meter, the elements of the research are multiplied, particularly by human factors. Before those who are in charge of keeping supply and demand in balance can rely on the demand response from signals to consumers and their devices, they need a better understanding of the anticipated demand responses. To that extent, load research enters the domains of marketing, customer behavior, and customer demographics. With new technologies, new smart rate designs, new communication paths and new tools, utilities need a new understanding of how much they can count on consumers and their devices to help keep supply and demand in balance. This is the important new role for load research.

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Words from the Chairperson

Billy Nix

MANAGER, eBusiness & Customer Analytics & Load Research
SOUTHERN COMPANY SERVICES

The Load Research community is encountering many opportunities and challenges in the current political and economic climate. The members of the AEIC Load Research Committee continue to work diligently to establish a strong network for us to share information and participate at the national level in this changing environment. Our individual levels of skill are enhanced as we work together, sharing experiences and knowledge to incorporate new ideas and technologies.

Congratulations to everyone on the publishing of **Manuel Etudes de profils de consommation** (French translation for Load Research Manual) and the white papers **“Demand Response Measurement & Verification – Application for Load Research”** and **“The Role of Load Research in Automated Meter Infrastructure/ Meter Data Management Initiatives”**. These are outstanding achievements and clearly demonstrate the hard work and contributions each of you have made. Thanks for your hard work.

As we look forward, our plan is to continue to share and enhance our knowledge by working with business segments that touch the Load Research arena. Toward that goal, please share your thoughts and experiences with committee members. We are interested in your thoughts and ideas. Your input will continue to guide the Load Research Committee in establishing a continued path to success.

Finally, we are pleased with the active involvement of more than 30 companies with the Load Research Committee and would like to welcome our newest member, David Williams from Gulf Power in Pensacola, Florida.

Upcoming Events

Annual Load Research Conference	Sandestin, FL	Aug. 9-12, 2009
Load Research Workshop	West Palm Beach, FL	Sep. 21-23, 2009
Load Research Intermediate Course	Atlanta, GA	Fall 2009
Load Research Fundamentals Seminar	New Orleans, LA	Spring 2010

PG&E's SmartAC™ Program

Michael Alexander

MGR., DEMAND RESPONSE PROGRAM POLICY – PG&E

Pacific Gas and Electric Company ("PG&E") is an investor-owned gas and electric utility serving roughly 15 million people (roughly 5.2 million electric meters) across its nearly 70,000-square-mile Northern and Central California service area. The service area stretches from the cool coastal city of Eureka in the north to blazing hot Bakersfield in the southern Central Valley and from the Pacific Ocean in the west to the Sierra Nevada Mountains in the east.

The service area contains practically every global climate type with the exception of the tropics and countless micro climates. PG&E is a summer peaking utility with its system peak driven by customers' need for air conditioning. The 50 highest load hours in the year represent 0.6% of the total hours while those hours typically require about 10% of peaking generation capacity. PG&E's historic system peak of 22,550 MW occurred in July of 2006 during a 1 in 35 year heat storm.

As a result of that heat storm, California regulators directed the California utilities to increase Demand Response (DR) capability and PG&E specifically to implement an air conditioning control program. PG&E's SmartAC™ program rolled out in summer 2007 with 5,000 program participants. As of May 2009, there are over 125,000 participants. The program is a direct load control program where residential customers receive a one time \$25 incentive (\$50 for commercial customers) for PG&E to install either a programmable communicating thermostat (PCTs) or load control switch in households and small businesses with central air conditioning. The controls allow A/C equipment to be remotely cycled or PCT settings to be adjusted when triggered, thereby reducing aggregate air conditioning demand. Events are only called under emergency or in anticipation of emergency conditions between May and November for periods of up to six hours and limited to a maximum 100 hours per season.

On May 1st PG&E filed load impact evaluations with the CPUC for its entire DR portfolio including SmartAC. As expected, SmartAC load impacts are the most sensitive the weather conditions. Importantly, SmartAC provides substantially larger load reductions when they are needed the most. In other words, load impacts available under extreme conditions are significantly larger than load impacts available under more moderate conditions. The SmartAC program is designed to provide load reductions during extreme conditions. Since events can only be called under emergency or in anticipation of emergency conditions, load reduction resources available per customer across a 2-6 pm event window for the highest system load day are nearly 300% greater than these same resources available for a typical event day under 1-in-2 (normal) weather conditions. Load reductions also vary substantially by hour. For the highest system load day under 1-in-10 (extreme) weather conditions, assuming projected 2012 program enrolment, SmartAC would deliver over 171 MW of load reduction, while the average for the event window is 144 MW.

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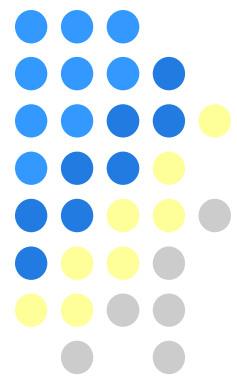


Table 7-1:
Program Specific SmartAC Residential Average Customer Load Reductions (kW)
by Weather Year, Local Capacity Area, and Day Type
Event Period (2-6 pm) - 2012 Enrollment

Weather Year and Day Type	GREATER BAY AREA	GREATER FRESNO	HUMBOLDT	KERN	NORTHERN COAST	SIERRA	STOCKTON	OTHER	ALL
1-in-10 (2003)									
Typical Event Day	0.266	0.744	0.041	0.744	0.269	0.412	0.412	0.329	0.400
May Peak Day	0.190	0.480	0.026	0.480	0.194	0.271	0.271	0.216	0.267
June Peak Day	0.619	0.843	0.046	0.843	0.635	0.839	0.839	0.613	0.701
July Peak Day	0.585	0.952	0.052	0.952	0.612	0.635	0.635	0.503	0.652
August Peak Day	0.407	0.746	0.041	0.746	0.420	0.507	0.507	0.395	0.490
September Peak Day	0.514	0.471	0.026	0.471	0.553	0.346	0.346	0.286	0.433
October Peak Day	0.042	0.038	0.002	0.038	0.046	0.017	0.017	0.017	0.032
1-in-2 (2004)									
Typical Event Day	0.112	0.569	0.031	0.569	0.108	0.253	0.253	0.208	0.247
May Peak Day	0.068	0.382	0.021	0.382	0.059	0.242	0.242	0.180	0.183
June Peak Day	0.322	0.426	0.023	0.426	0.336	0.367	0.367	0.278	0.342
July Peak Day	0.197	0.724	0.039	0.724	0.195	0.356	0.356	0.288	0.348
August Peak Day	0.284	0.886	0.048	0.886	0.288	0.432	0.432	0.355	0.444
September Peak Day	0.423	0.654	0.036	0.654	0.445	0.424	0.424	0.340	0.454
October Peak Day	0.061	0.050	0.003	0.050	0.067	0.017	0.017	0.020	0.043

A discussion of Analysis techniques used in developing Demand Response load impacts estimates may be seen in the AEIC Load Research Committee's white paper titled "Demand Response Measurement & Verification". For a copy of the complete SmartAC evaluation report go to the California Measurement Advisory Council (CALMAC) searchable website: <http://www.calmac.org/search.asp> or email Michael Alexander at maa6@pge.com

French Language Version of Load Research Manual

AEIC is pleased to announce that the Load Research Committee has recently published its well-known **Load Research Manual, Second Edition**, in the French language.

The AEIC Load Research Manual is considered the most comprehensive resource manual in the industry that describes both the theory and practice of load research. It is consistently referenced by electric utilities, consultants, and manufacturers in the United States, Canada, and in other countries around the world.

"This new French language version of the Load Research Manual should make both basic and advanced information about load research available to a much larger group of load research professionals," said Billy Nix, Chairman of the Load Research Committee. "We are indebted to our AEIC member company, Hydro Québec, and, specifically Marcel Côté, Manager of Allocation, and his staff for translating the **Load Research Manual** from English to French," he said.

The French language version of the **Load Research Manual, Second Edition** is available through the AEIC office, 600 North 18th Street, Birmingham, AL 35203, by phone: (205) 257-3839 or by email at: secretaryaeic@bellsouth.net.

New AEIC Demand Response White Paper – “DR M&V”

Cheryl Hinder

Director, Load Analysis and Settlement – BG&E

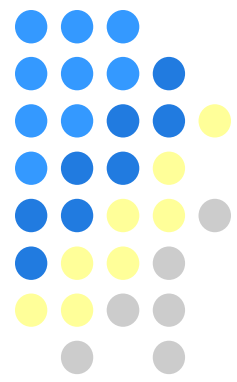
As energy prices increase and concern for the environment continues to grow, energy efficiency, demand response and conservation programs, collectively known as Demand-Side Management (DSM) are making a comeback and are even making news headlines. The recent rise of AMI and Smart Grid make demand response, and particularly dynamic pricing programs more cost-effective and attractive. Such programs are not new to members of the AEIC Load Research Committee, who might agree with Yogi Berra’s quote, “It’s like déjà vu all over again.” Several committee members, who have used load research methods to evaluate the impacts of DSM programs, have pooled their experiences to collaborate on the Committee’s “Demand Response Measurement & Verification” white paper.

The mission of the Load Research Committee is to promote responsible load research activities in the electric utility industry. To accomplish this mission, the Committee develops and disseminates source material on the conduct of load research and its appropriate applications through a variety of means such as reports, workshops, seminars and conferences. Measuring the impacts of DSM programs has been a both a longstanding and timely topic for reports during AEIC events.

The DR M&V white paper provides a glossary of key DSM terms. From AMI to TOU, a list of acronyms (CPP, PTR, DLC, TOU and RTP to name a few) is provided to give the reader a better understanding of how demand response fits into the DSM umbrella of programs. Insights into various types of DSM programs, whether they are geared to the mass market or to large industrial and commercial customers, designed to reduce peak load or promote conservation are also provided.

An overview of various types of demand response programs and appropriate methods for estimating DR impacts are the core content of the paper. DR programs share a common goal, the reduction of peak demands. To measure how much demand has decreased, one needs to know the baseline demand, or the demand that would have existed, had the program not been in effect. Methods for developing baselines are described, as well as methods for estimating the savings by comparing the actual usage to the baseline usage, including regression methods, engineering algorithms, and other statistical approaches.

The DR M&V white paper may be found on the AEIC website, <http://www.aeic.org>.



The Load Research Newsletter is published by the AEIC Load Research Committee’s Marketing Subcommittee. Please forward items that you feel are of interest to your fellow load research practitioners to Susan Romer at susan.romer@nstar.com.