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Benchmarking the Potential for Demand Response Programs

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Agenda

- Introduction—summary of IEA demand response project
- Summary of utility demand response survey approach
- Residential program results
- Commercial/industrial program results
- Contacts for further information

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Summary of IEA Demand Response Project

The International Energy Agency's demand response project develops tools for member countries and utilities to plan and implement DR (load management) programs. These include:

- Potentials for different types of DR programs.
 - Valuation of DR resources.
 - Best practices database.
 - Assessment of enabling technologies.
 - Developing marketing and communication plans.
 - Developing business cases for DR programs.
- Project amounts to an “Executive MBA” for DR.

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Summary of DR Potential Task

- Develop DR program performance benchmarks from top-performing longstanding DR programs. This will be the focus of this presentation.
- Develop customer survey approaches to estimating DR potential.
- Assess modeling approaches to estimate DR potential.

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Why DR Potential Studies are Important

- Demand response potential studies quantify the magnitude of DR resources that can feasibly be achieved over a given timeframe.
- DR resources will be more important to a utility if they can amount to 10% their peak demands, instead of 1% of their peak demands, for example.
- Quantitative DR potential estimates are most often used in utility resource plans, for program planning or screening, or as part of utility applications to build new generating plants.

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What's a DR Potential Study?

- A study that uses customer-level data to estimate the potential for discrete DR programs or rates.
- DR potential studies are not primarily focused on utility-level data such as load duration curves.
- DR potential studies can either be “snapshot” studies that estimate DR potentials for a current year, or forecasts that estimate potentials for a given number of years in the future.

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DR Potential Studies vs. Energy Efficiency Potential Studies

- Many of the concepts and approaches from energy efficiency potential studies have been carried over to DR potential studies.
- Utilities have conducted many EE potential studies in the past 30 years for a variety of planning and regulatory purposes.
- Utilities and energy agencies have just started to conduct rigorous DR potential studies in the past few years. Only about a dozen such studies have been identified to date.

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Utility DR Benchmarking Project

- Summit Blue surveyed 40 larger US and Canadian utilities to gauge the “state of the practice” regarding demand response (DR) there.
- The primary purpose was to determine DR program impacts obtained by top-performing US programs, and features of such programs. These results are used to provide benchmarks for top-performing DR programs.
- A secondary purpose was to investigate the methods and models currently used for DR potential studies, and how they compare to DSM potential studies.

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DR Potential Benchmarks Developed

- Residential direct load control (DLC)
- Commercial/industrial interruptible rates (IR)
- C/I demand bidding/buyback (DBB)
- Only 1 significant impact program found for each of residential TOD rates, C/I DLC, and C/I RTP programs. Limited applicability to other utilities currently.
- Data presented was self-reported by utilities, and checked for reasonableness, but not independently verified due to budget constraints.

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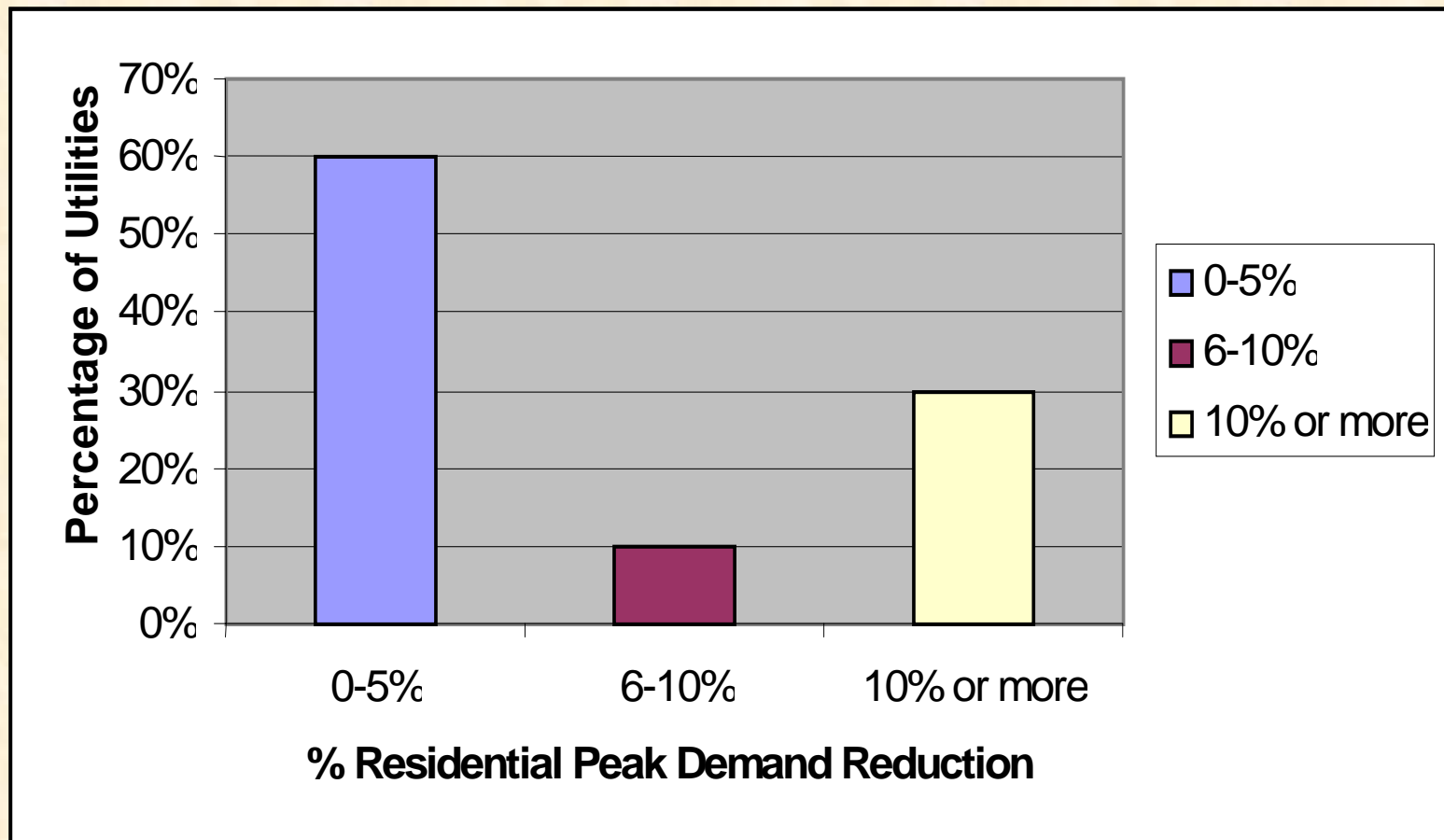
Residential Direct Load Control

- Through these programs, utilities control one or more of customers' air conditioners, water heaters, space heating systems, or pool pumps.
- Central air conditioners (CACs) are most commonly controlled. Typical control is 15 minute on-off cycling during peak demand periods.
- Control devices used most frequently are FM radio signals and paging signals.
- Many utilities have been offering these programs for 10 or more years.
- About 1/3 of utilities surveyed offer this type of program.

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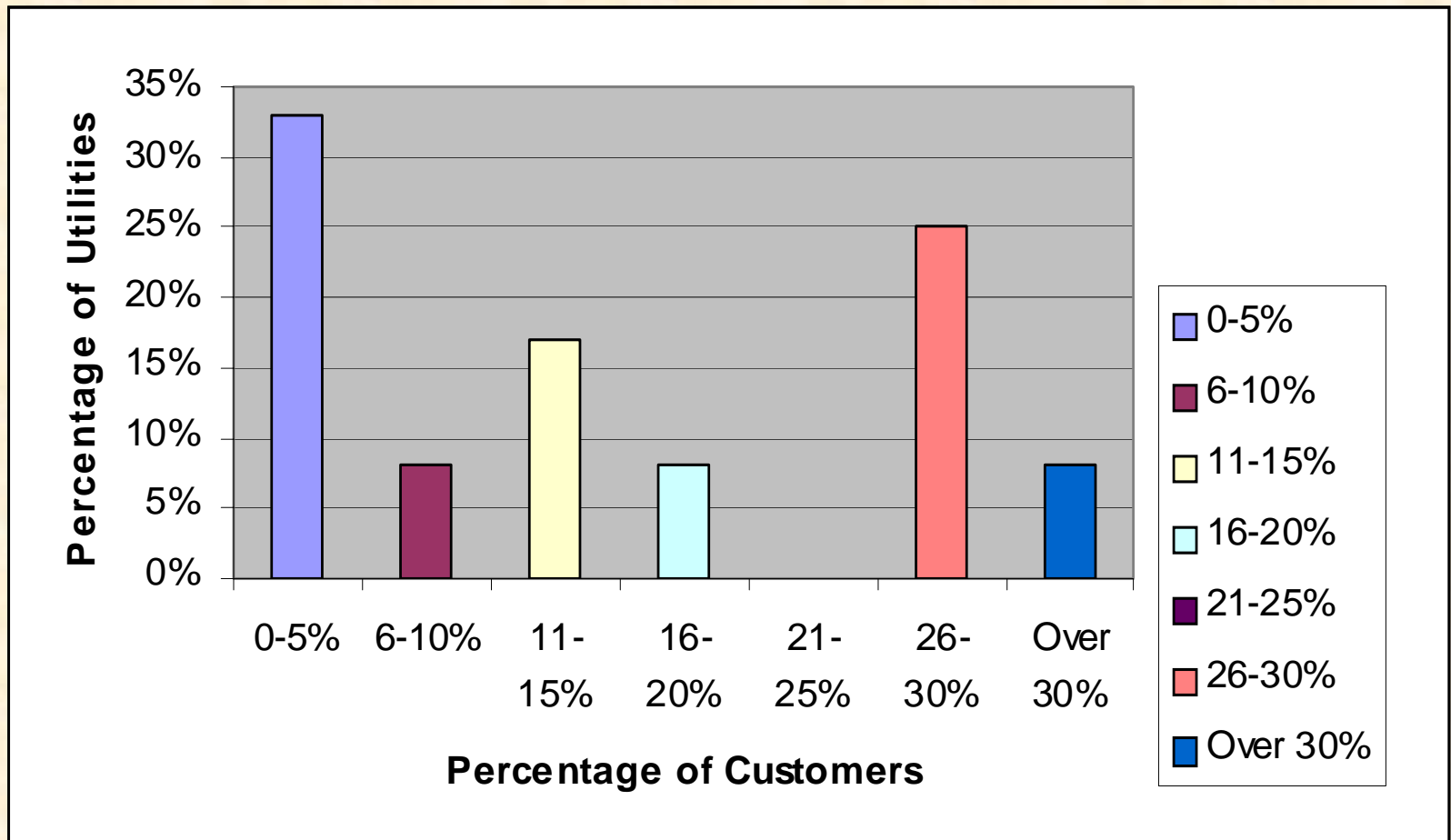
Residential DLC Program Impacts



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Residential DLC Participation



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Top Res DLC Program Features

- Longevity: all of the top-performing programs have been operating for at least 14-15 years.
- DSM requirements: Two of top three utilities based in states where law or regulations require electric utilities to spend significant money on “conservation” programs. DR programs that result in customers using less electricity overall qualify as conservation programs there.
- Economic factors of limited importance. All top performing programs conducted by low-cost utilities, and program incentives offered by top-performing programs not larger than average.

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Residential DR Pricing Programs

- Participation in residential Time-of Day (TOD), Critical Peak Pricing (CPP), and Real-Time-Pricing (RTP) programs is generally low, 3% or less for almost all the utilities surveyed.
- For CPP and RTP programs, this is not surprising, since these programs have all been offered for 4 years or less. Most of these programs have also been pilot programs, not full scale efforts to date.
- About 1/3 of utilities offer TOD rates, 14% offer CPP, and 5% offer RTP programs

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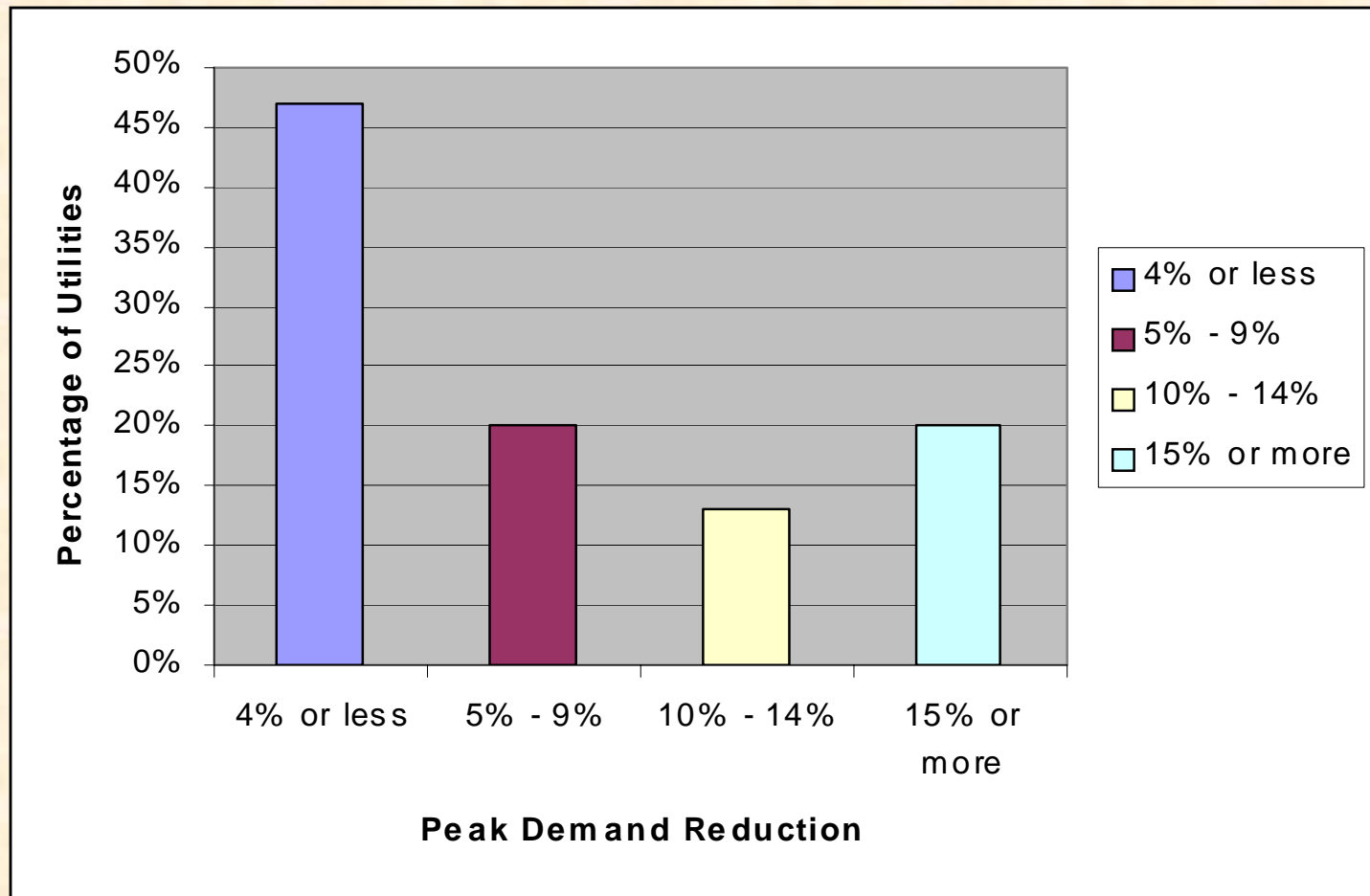
Commercial/Industrial Interruptible Rates

- Through these programs, utilities offer customers (usually) fixed price discounts for reducing their loads during peak periods.
- Customers usually are given 1-2 hours notice before a control period starts.
- Utilities often penalize customers if they don't reduce their loads to the contracted levels.
- Most utilities require customers to commit to minimum load reductions, which vary from as little as 50 kW up to 5,000 kW.
- Slightly more than half of utilities surveyed offer IR programs. Many utilities have offered these rates for 20 years or more.

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C/I Interruptible Rate Impacts



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Top IR Program Features

- Longevity: the top IR programs have been in operation for an average of 24 years, with a range of 14 to 37 years.
- Steel plants and other heavy industry participation. Several top performing programs get most of their demand reduction for these programs from steel plants.
- DSM requirements and incentives. Three of top five utilities are based in Minnesota and Iowa, where utilities are required to invest in DSM.

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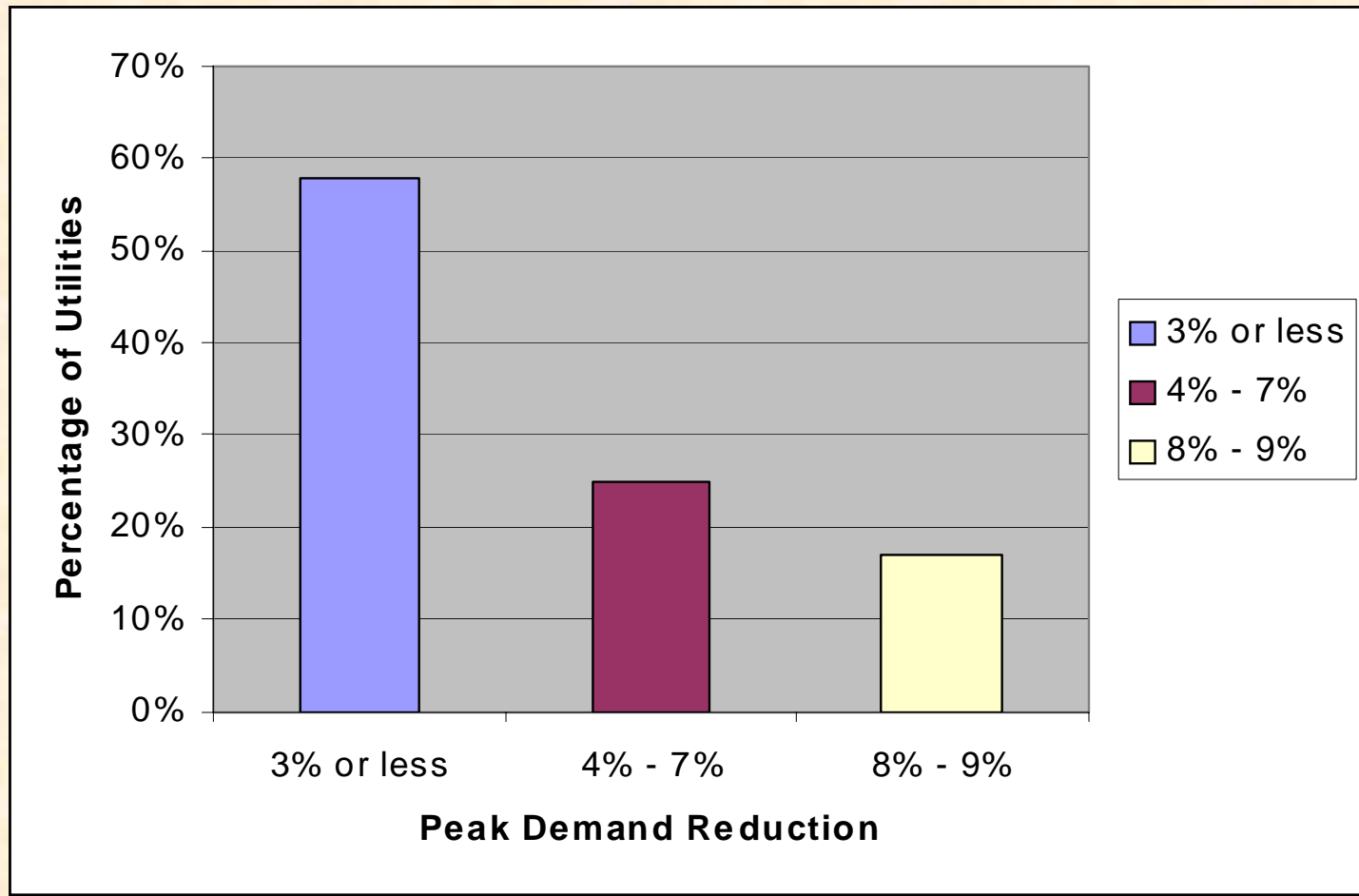
C/I Demand Bidding/Buyback Programs

- These programs are similar to IR programs, but are newer programs designed to be more flexible for customers. They generally eliminate mandatory demand reductions and penalties to customers.
- Utilities' load reduction discounts are usually tied to spot market electric prices in some manner.
- Utilities notify customers about a high electric price period, then customers declare how much they will reduce their load for the discount offered by the utility. This is usually done through a web site.
- Slightly less than half of utilities surveyed offer DBB programs.

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C/I DBB Program Impacts



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Top DBB Program Features

- Reported program impacts were realized several years ago when spot market electric prices were high. Most utilities have not used these programs much in the last few years when spot market prices have been lower.
- Program participation rates are low for top programs: .05% and .08% of all C/I customers.

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C/I Direct Load Control Programs

- These programs are very similar to residential DLC programs.
- About 25% of utilities surveyed offer this type of program.
- Almost 40% of utilities that offer a residential DLC program do not offer a C/I version.
- Average program impacts per customer are 4 kW, four times as large as average residential impacts.
- However, all but one utility reported program impacts of 1% of their C/I peak demands or less.
- Participation varies widely, from 1 to 10,000 customers per utility.

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C/I Pricing Programs

- Almost half of utilities surveyed offer C/I TOD rates.
- About 30% of utilities surveyed offer C/I RTP rates.
- Approximately 15% of utilities surveyed offer C/I CPP rates.
- Utilities reported very limited peak demand reduction impact data for these programs.
- Almost all the impact data that was reported amounted to 1% or less of utilities C/I peak demands.

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Contacts for Further Information

- Phase 2 of the IEA DR project is open for enrollment. Project web site is demandresponseresources.com.
- Contact me at 312-938-4242 or rgunn@summitblue.com.
- Contact Pete Scarpelli at RETX regarding the overall IEA DR project: 312-559-0756, pscarpelli@retx.com.
- Contact Dan Violette at Summit Blue regarding the DR valuation task: 720-564-1130, dviolette@summitblue.com.