

Demand Response

Energy Policy, Environmental Relationships and the Federal Sector

NAESCO

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Wedgemere Group

Demand Response & Advanced Metering Coalition (DRAM)

- Founded in 2001 as 501 c 6 trade association for the demand response industry
- Works with policymakers (federal and state), media, investment community and stakeholders on demand response policy and issues

DRAM Members

- Aclara
- Cellnet + Hunt
- Comverge
- Echelon
- EKA Systems
- Elster Electricity
- eMeter
- EnergySolve
- EnerNOC
- Ice Energy
- Itron
- Landis + Gyr
- Orion Energy Systems
- Sensus Metering
- Silver Spring Networks
- SmartSynch
- Trilliant Networks

Demand Response Coordinating Committee (DRCC)

- Founded in 2004 as charitable non-profit 501 c 3 organization
- Mission is to develop and facilitate the exchange of information and expertise on demand response among regions, states, and individual parties
- Served as the official U.S. stakeholder and funding group for the Demand Response Project of the International Energy Agency
- Responsible for the National Town Meeting on Demand Response Series of events and the DRCC Webinar Series

Demand Response Coordinating Committee (DRCC)

- National Town Meeting on Demand Response
 - June 2 & 3 in Washington, DC
 - Fifth in the series
 - Cosponsors include DOE, EPA, NASEO, National Council on Electricity Policy (NARUC, NCSL, NGA) and Electricity Future Coalition
 - One full day RT; One full day 2 track in depth sessions
 - Among Speakers Confirmed:
 - FERC Commissioner Suedeen Kelly
 - NERC CEO Rick Sergel
 - CPUC Chairman Mike Peevey
 - MA Energy Resources Commissioner Phil Giudice
 - www.demandresponsetownmeeting.com

Demand Response Policy – A History

- PURPA 1978
- Load Control
- Restructuring
- FERC directives to ISOs/RTOs
- RTP for large customers
- Competitive metering
- Default service pricing
- System benefit funding
- Mega-mandates (CA, Ontario)
- Portfolio standards
- EPACT 2005

EPACT 2005 – Smart Metering

- More than the name implied
- Four main provisions,
 - It is the policy of the U.S.....
 - DOE Report to Congress
 - FERC Report to Congress
 - New PURPA Requirement
 - States and other jurisdictional bodies must investigate whether or not to provide time-based pricing and advanced metering
 - Flexible compliance
 - All Sectors covered
 - Decide by August 2007

EPACT – Seeing the Forest instead of the Trees

- Everyone has been not only made aware but educated
- DR and AMI high on the NARUC agenda
- States that have issued a “technical No” have made other moves
- Utilities have begun to view things more opportunistically
- Other policy moves have been made, including in the legislatures
- A critical foundation of understanding and discussion has been established

EPACT – Federal Metering

- Requirement that Agencies develop plans to implement advanced metering
- Implementation to be accomplished by 2012
- Definition for “smart metering” served as precedent for metering policy efforts elsewhere

Energy Independence and Security Act

Title XIII – Smart Grid

- Section 1301 – Statement of Policy
- Section 1302 – System Report
- Section 1303 – Advisory Committee and Task Force
- Section 1304 – Technology RD&D
- Section 1305 – Interoperability Framework
- Section 1306 – Federal Matching Fund
- Section 1307 – State Consideration
- Section 1308 – Study of Effect of Private Wires Laws on CHP
- Section 1309 – Study of Security Attributes

Section 1301 – Statement of Policy

- It is the policy....to support....which together characterize a smart grid:
 - Digital information and controls
 - Dynamic optimization with cyber-security
 - Distributed Resources and DG, including renewable energy
 - Demand Response and Energy Efficiency
 - Smart technologies for metering, grid communications and distribution automation
 - Smart appliances and consumer devices
 - Advanced storage and peak-shaving technologies, including PHEVs and thermal-storage A/C
 - Information and control options to consumers
 - Standards for communication and interoperability
 - Identification and lowering of barriers

Section 1302 – Report to Congress on Deployments

- DOE shall report to Congress on status of Smart Grid deployments and barriers to such
 - 1 yr after enactment, then biannually
 - Shall include information on
 - Technology penetration
 - Communication networks capabilities
 - Costs
 - May include policy recommendations
 - Should take a regional perspective

Section 1303 – Advisory Committee and Task Force

- By 90 days post enactment, DOE creates Advisory Committee
 - Minimum of 8 members, representing full range of smart grid technologies, etc
 - Subject to Federal Advisory Act
 - Mission to advise DOE on
 - Development of technologies
 - Progress of transition to smart grid
 - Evolution of standards and protocols on interoperability and intercommunication
 - Optimum means of using federal incentive authority

Section 1303 – Advisory Committee and Task Force

- Within 90 days of enactment, DOE shall establish an interagency task force that
 - Provides an identifiable entity to embody the federal role in the transition to use of smart grid technologies
 - Shall meet at the call of the Director/Asst Secretary
 - Is Funded by authorization of such sums as necessary
 - Mission
 - Insure awareness, coordination and integration within DOE and elsewhere in the federal government, included but not limited to
 - R&D
 - Standards and protocols
 - Relationship of technologies to utility regulation
 - Relationship of technologies to
 - Infrastructure development
 - System reliability and security

Section 1304 – Technology RD&D

- Power Grid Digital Information Technologies
 - Advanced techniques for measuring peak reductions and efficiency savings
 - Investigate means for DR, DG and storage to provide ancillary services
 - WAN measurement and control including
 - Data mining
 - Visualization
 - Advanced computing
 - Communications in a highly distributed environment
 - New reliability techniques, including
 - Communications network capabilities in a grid control room environment

Section 1304 – Technology RD&D

- Power Grid Digital Information Technologies
 - Identify communications networks capabilities needed to implement advanced technologies
 - Investigate feasibility of a transition to time-based and real-time pricing
 - Develop algorithms for use in transmission software applications
 - Promote use of underutilized electric generation capacity in replacement of liquid fuels in transportation
 - Interconnection protocols to enable electric vehicles to help meet peak demand

Section 1304 – Technology RD&D

- Regional Demonstration Initiative specifically focused on advanced technology for power grid sensing, communications and power flow control, including:
 - Demonstrate benefits of concentrated investments
 - Facilitate transition to advanced technologies
 - Facilitate integration of advanced technologies into existing networks
 - Demonstrate protocols and standards for measurement verification of energy and emissions savings from DR and EE
 - Investigate differences in regulation and best practices

Section 1304 – Technology RD&D

- Authorization
 - Digital Information
 - Such sums as necessary for 2008 through 2012
 - Regional Demonstration
 - \$100M per year 2008 through 2012

Section 1305 – Interoperability

- Primary responsibility given to National Institute of Standards and Technology (NIST) of Department of Commerce
- Authorization of \$5M per year from 2008 to 2012
- Purposes:
 - Develop framework that includes protocols and model standards for information management to achieve interoperability of devices and systems
 - Alignment of policy, business and technology approaches to enable all electric resources, including demand resources to contribute to an efficient reliable electricity network
- Input must be solicited from:
 - DOE
 - Smart Grid Task Force and Advisory Committee
 - Stakeholders such as GWAC, IEEE and NERO
- Framework Developed shall be technology-neutral, flexible, uniform and voluntary

Section 1305 - Interoperability

- Framework shall be designed
 - To incorporate all resources, both generation and demand response and energy efficiency
 - To be flexible to accommodate regional differences and technology innovations
 - To consider voluntary standards that accommodate appliances and equipment that are manufactured to respond to grid emergencies and price signals via curtailment or load shedding
- Framework shall accommodate appropriate manufacturer lead time

Section 1305 - Interoperability

■ Timetable

- NIST to begin work 60 days post enactment
- Publish report on progress within 1 year
- Further reports as warranted
- Final report when work is judged to have been completed or that a federal role is no longer necessary

■ FERC

- If sufficient consensus reached, FERC shall proceed to rulemaking to apply standards to interstate transmission and regional and wholesale markets

Section 1306 – Matching Grants

- New DOE Program to provide reimbursement of 20% of smart grid investments
- Procedures published within one year
- Authorization of such sums as necessary

Section 1506 – Matching Grants

■ Eligible Investments

- Manufacture of Efficient Appliances
- Modifying special electricity equipment, e.g. motors
- Utility installment of Smart Grid-enabled T&D infrastructure
- Purchase and installation of metering and control devices and equipment
- Software to enable computers to engage in smart grid functions

Section 1306 – Matching Grants

- Qualifying Investments
 - Installation by regional system operator of equipment for coordination among utilities and regions
 - Non-utility owned DG
 - Devices to allow a vehicle to engage in smart grid functions (excluding storage costs)

Section 1306 – Matching Grants

- The term Smart Grid Functions shall include:
 - Ability to store, send and receive digital information through a combination of devices
 - Ability to do same to or from a computer or control device
 - Ability to measure and monitor as a function of time of day, power quality, source and type of generation, etc
 - Ability to sense disruptions in power flows and communicate on such instantaneously
 - Ability to detect, respond to, recover, etc relative to security threats
 - Ability of appliances and equipment to respond without human intervention
 - Ability to use digital information for grid operations that were previously electromechanical or manual
 - Ability to use digital controls to manage demand, congestion, and provide ancillary services

Section 1307 – State Considerations

- Two new “Standards” created under the Public Utilities Regulatory Policy Act (PURPA)
- New (17) Smart Grid Investments
 - Utilities must consider smart grid investments before proceeding with “traditional” investments
 - Utilities are authorized to recover costs of smart grid investments
 - Utilities are authorized to recover remaining book value of infrastructure made obsolete

Section 1307 – State Considerations

- New (18) Smart Grid Information
 - Purchasers shall be provided direct access, in writing or electronically, to information including:
 - Prices
 - Usage
 - Intervals and Projections
 - Sources and emissions

Section 1307 – State Considerations

- The PURPA Construct
 - No direct mandate to do
 - Requirement is to consider
 - Not just State Commissions
 - Commence a proceeding or set a hearing date within 1 year
 - Complete consideration and make determination within 2 years

Section 1308 – Effect of Laws on CHP

- DOE Study of the laws and regulations affecting the siting of private distribution wires on and across public rights-of-way
- Report to Congress within 1 year

Section 1309 – Grid Security

- DOE Report to Congress including a quantitative assessment and determination of impacts of smart grid systems on increasing the security of nation's electricity infrastructure and operations
- Report to be completed within 18 months

Elsewhere in the Bill – Title V (Efficiency)

- Two additional PURPA Standards
 - Integrated Resource Planning (IRP)
 - Integrate Efficiency into IRP
 - Adopt policy establishing efficiency as a priority resource
 - Rate Design to Promote Efficiency Investments (Decoupling)
 - Align utility incentives with energy efficiency (rate design)
 - Promote energy efficiency investment
 - Removing throughput incentive
 - Adopt rate designs to encourage efficiency
 - Offer customers info and services in energy efficiency and demand response

Elsewhere in the Bill – Title V (Efficiency)

- Section 529

Demand Response Assessment and National Action Plan

- FERC has lead
- Assessment of national potential in 5 and 10 year increments
- Assessment completed within 18 months
- \$10M per year authorized in 2008 through 2010
- Action Plan submitted to Congress within one year of completion of Assessment

Elsewhere in the Bill – Title V (Efficiency)

- Section 529

 - Demand Response Assessment and National Action Plan

- Action Plan Components

 - Technical Assistance needed by States
 - National Communications Program
 - Development of analytical tools, model contracts and other support materials

- Action Plan Implementation

 - FERC, together with DOE, to seek state agreements and submit implementation plan to Congress

Elsewhere in the bill (almost) – Taxes

- Accelerated Depreciation for Advanced Metering (aka Qualified Energy Management Devices)
 - Permanent Change from 20 years to 5-7 years
 - \$1.2 Billion tax benefit
 - Utility is taxpayer
 - Installations after January 1, 2008
 - Device Eligibility
 - Capable of hourly interval measurement and recording
 - Capability to exchange information with customer devices in support of time-based rates and demand response
 - Capability to allow providers to provide usage information to customers electronically
 - Utility must offer net metering

Elsewhere in the bill (almost) Federal Peak Reduction Standards

■ House-Passed Bill

- Provision struck that would have set peak reduction targets (in kW/MW) for federal agencies
- Would have also required agencies to participate in demand response programs
- Relied in part on advanced metering required by EPACK
- Provision was scaled back to goals based on FEMP/DOD resistance
- Provision ultimately dropped due to confusion over costs to implement

Elsewhere in the bill (almost) Federal Peak Reduction Standards

■ House-passed Bill

- Starting in 2009, each agency shall include in its annual report a forecast of peak demand
- Starting in 2009, each agency shall reduce its peak demand by 2% annually through 2020, or make such amounts available in the form of demand response
- Starting in 2010, annual reports have to include assessment of compliance, reasons for non-compliance, assessment of participation in DR programs, etc.

Elsewhere in the Bill (almost) Federal Peak Reduction Standards

■ Conference Compromise

- Federal agencies shall give preference to measures that address peak demand
- Agencies shall analyze participation in demand response programs for their large facilities
- Agencies shall report on peak reduction efforts in annual reports

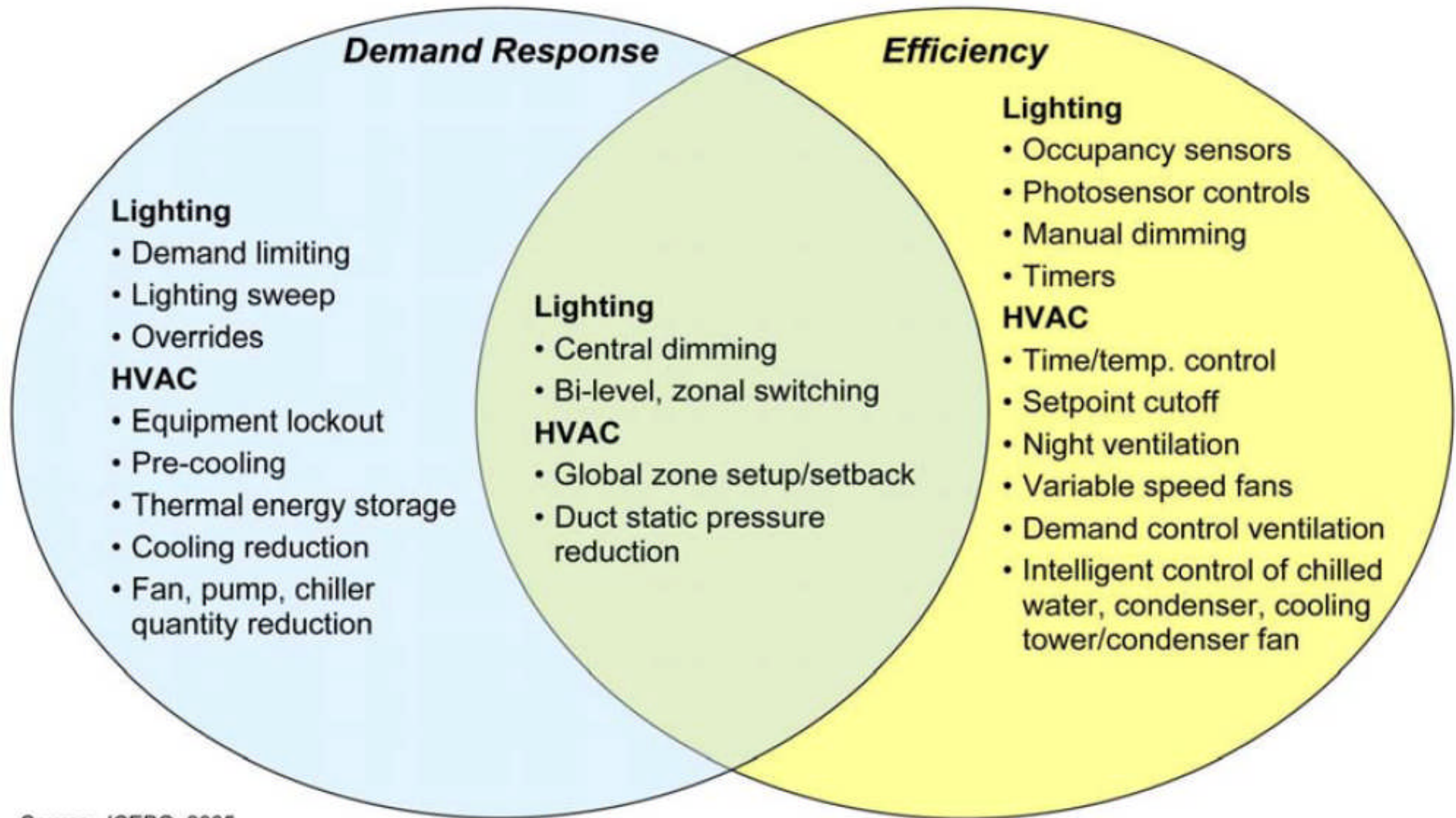
Elsewhere in the Bill (almost) - EPA

- Provision dropped which would have required EPA to:
 - Study environmental aspects/impacts of DR
 - Integrate DR into EPA Clean Energy and Energy Star programs

DR and Energy Efficiency

Siblings in the DSM Family

- Energy efficiency saves more kwh
- DR's highest value is KW
- DR results on average in a net conservation effect
- DR is dynamic, controllable and dispatchable a.k.a. "dynamic efficiency"
- DR is more measurable and verifiable
- DR technologies provide information that fosters overall energy efficiency

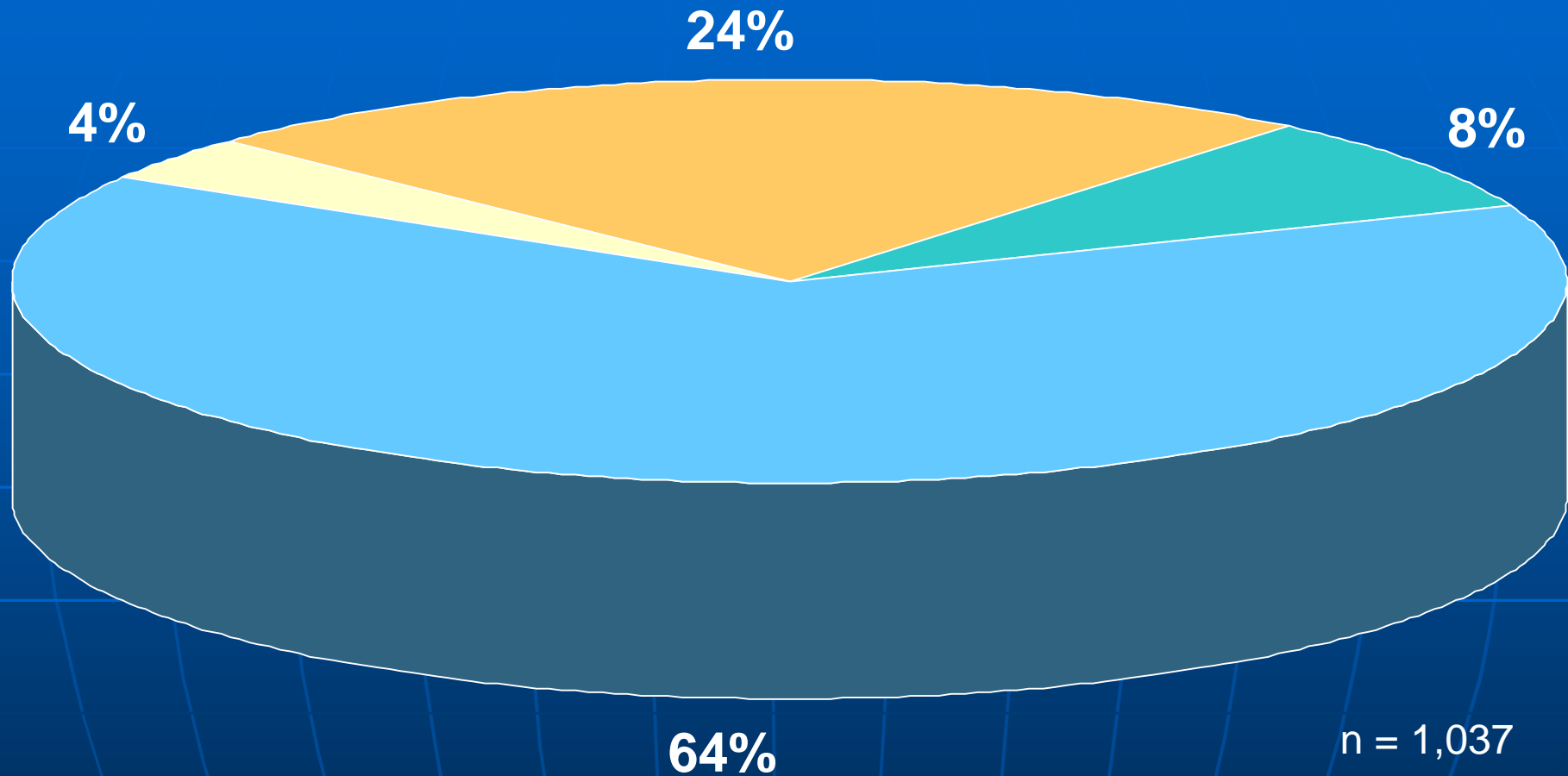


Source: JCEBO, 2005

Overlap of Efficiency and Demand Response

From Sila Kiliccote and Mary Ann Piette, Lawrence Berkeley National Laboratory

Typical Commercial Building DR



■ HVAC Only ■ HVAC & Lighting Only ■ Lighting Only ■ Multiple

California, multi-site building owners, source: ICF 2004

New Voices and New Views on Demand Response

- “Furthermore, if demand response can provide a functional equivalent to ten-minute reserves, then costs and pollution associated with maintaining combustion generators on hot stand-by are also avoided.”

Source: Regulatory Assistance Project, *Energy Efficiency Policy Toolkit*, November 2006

- “In addition we also recommend that the state [of Florida] consider implementing a robust demand response effort, which could save an additional 8% demand reduction in 2013 and 14% in 2023.”

Source: ACEEE, “Potential for Energy Efficiency and Renewable Energy to Meet Florida’s Growing Energy Demands” February 2007

Demand Response and Renewable Energy Marriage Partners?

- Wind resources in many parts of U.S. are off-peak resources
- Wind resources, whether on-peak or off-peak, are intermittent
- Mar 2, 2008, 6:41 PM – Texas
 - ERCOT experiences sudden drop in wind resource
 - Emergency DR Programs keep the lights on

New Voices and New Views

Societies of the future will rely on small, diversified and renewable sources of energy, ranging from windmills and solar photovoltaics to second-generation ethanol-and biodiesel-production facilities. Widely dispersed throughout the countryside, these streamlined facilities will make the industrialized world more secure and less dependent on unstable and threatening oil-producing nations. Off-grid applications of renewable power sources can provide energy for the 3 billion people now stuck in poverty.

In the industrialized world, these systems will require a newly designed distribution grid. An "electranet," or smart grid, will be flexible and allow homeowners and businesses to sell or buy electricity on to and off of the grid. It will allow individuals and families to monitor their consumption much as they monitor budgets and bank accounts today.

Former Vice President Al Gore, Newsweek "My Turn"
December 18, 2006

Demand Response and New Technologies

- Not just Meters and DLC Devices anymore.....
- Aggregated “Negawatts” and Network Control (see ISO & Utility Contracts)
- Smart Thermostats (see CA)
- Smart Appliances (see PacNW)
- Smart Homes (HAN) (see Zigbee, HomePlug, 6LoPAN)
- Smart Buildings (EMS/Optimization Technology)
- Smart Storage (see Ice)
- Dynamic Storage (see PHEV oil-elec trade-off)
- Dynamic Lighting

DR and the Environment

- DR technologies, and info they provide, stimulate overall efficiency
 - A new platform for creation of sustainable, institutionalized efficiency
- Net conservation effect
- Load flattening defers and/or avoids need for plants and lines
- Support for intermittent renewables
- Could involve off-grid generation
- DR alters generation dispatch and emissions
- Dynamic management of NOx and Sox
- Greenfill by way of PHEVs and other storage
- Measurement, verification and monetization of energy reductions under carbon constraining polices
 - A smart meter is a green meter
 - A smart grid is a green grid

NAESCO Areas of Interest

- What do federal agencies and DOD facilities need to consider in order to capture demand response value opportunities in their energy projects?
- Assessing the impact of the demand response provisions in the 2005 and 2007 energy bills on ESPC/UESC project development and implementation at government facilities
- What new demand response technologies are emerging and how they differ from available data collection software
- How does demand response fit into the climate change debate from a business or policy standpoint?

Thank You

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