

DOE Transmission Reliability Program Peer Review

Overview of Load as a Resource

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Goals

Vision/Goal: *Improved reliability and system efficiency through responsive demand*

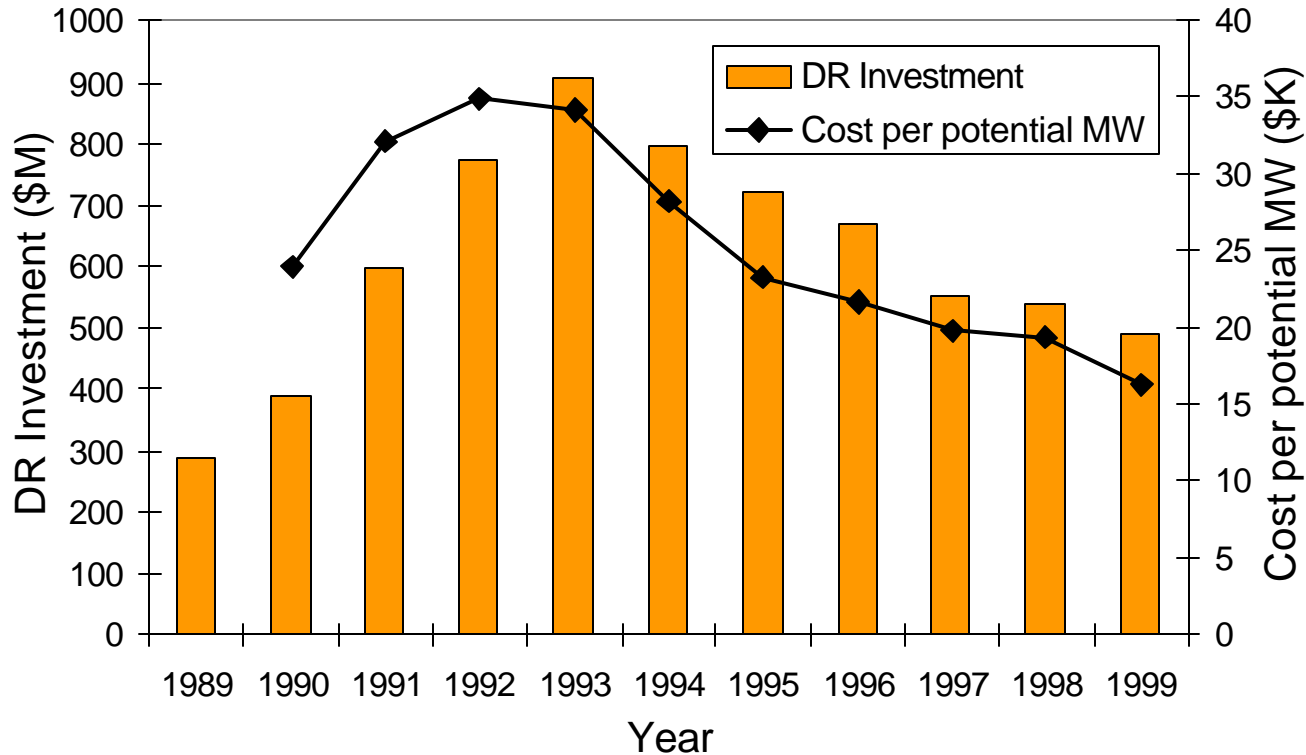
Responsive demand has tremendous potential for increasing electricity reliability and promoting the efficient functioning of electricity markets

Key questions:

- What is the value of responsive demand?
- What demand-response programs and technologies can most effectively enable customer participation?
- What is the technical and market potential for load participation in competitive markets?



The Challenge: Utility Investments in Load Management Have Decreased By ~45%



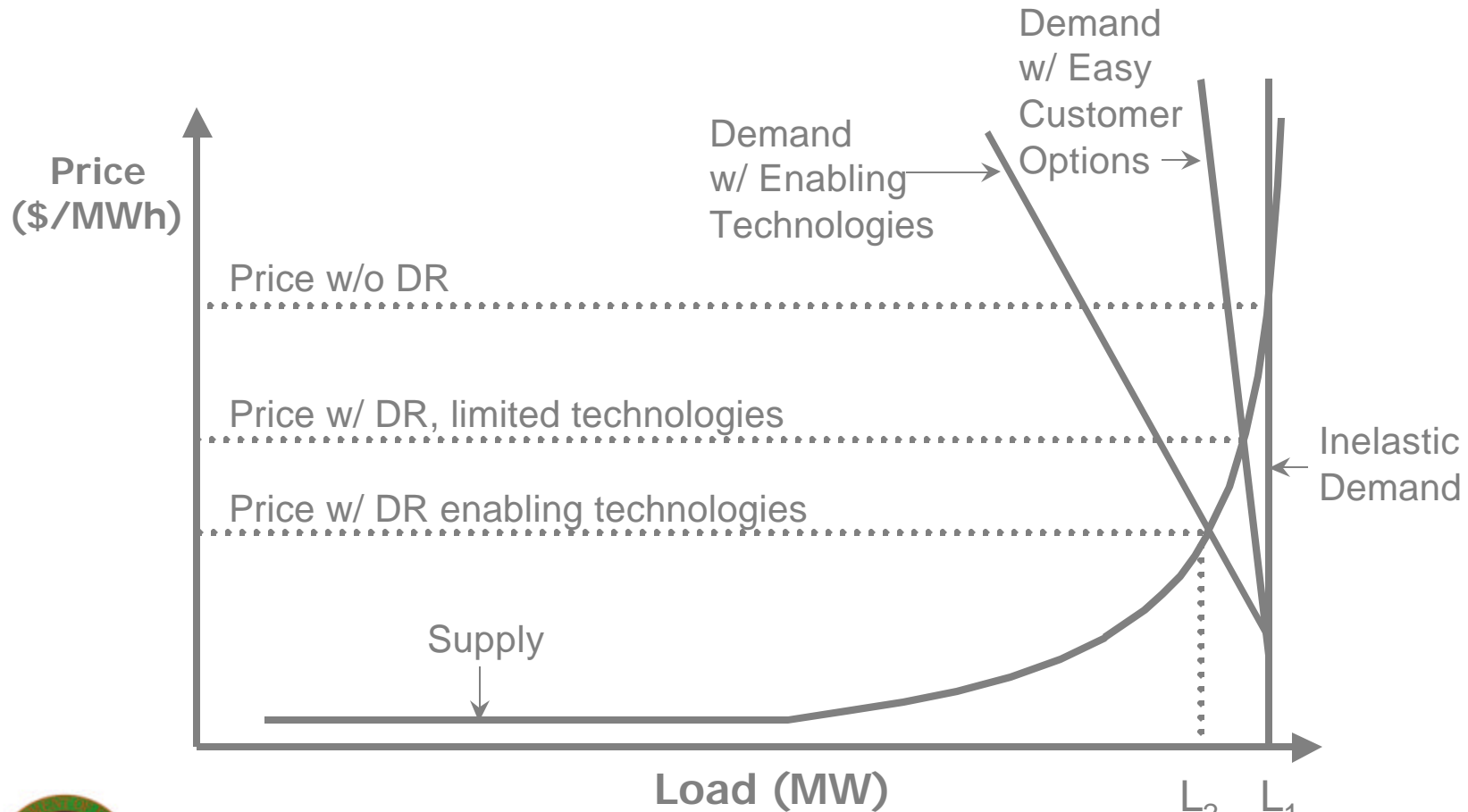
Load management “legacy” programs are eroding at many utilities with onset of restructuring

Load as a reliability resource for providing ancillary services and price-responsive load in real-time and day-ahead energy markets are revolutionary (new) concepts



Benefit: Price-Responsive Load Can Reduce Wholesale Prices and Volatility

Small reduction in demand = LARGE reduction in price



Program Balance

Load as a Resource

**GOAL: IMPROVED RELIABILITY AND
SYSTEM EFFICIENCY THROUGH
RESPONSIVE DEMAND**

Scoping Studies:

- Load-as-a-Resource Scoping Study
- Value of Demand Responsive Load (DRL)
- Identify Enabling Technology Gaps
- Assess DR Program Designs

2000-2004

Proof of Concept:

- Prototype New DRL Approaches (e.g., for Spinning Reserves)
- Fill Enabling Technology Gaps (anticipated solicitation)
- Assess Benefits of DRL and Ancillary Services

2001-2004

Demonstration Projects:

- Demonstrate DRL for Spinning Reserves and other Ancillary Services
- Demonstrate DRL w/ Novel Enabling Technologies
- Assess Benefits of DRL
- Estimate the Technical Potential for Load Participation

2003-2005

Commercial Acceptance:

- Integration of Responsive Loads and DER
- Research on Advanced Technologies and Controls for DRL
- Program Design and Evaluation

2004-2008



What is the value of responsive demand?

- CERTS is using experimental economics techniques to address this question.
- **Finding to date:** Price responsive load is an effective way to lower both the average price and price volatility.
- Future work will focus on developing methods to assess benefits to all consumers of load reductions and ancillary services provided by responsive demand.



What programs and technologies are most effective?

- Two states – New York and California – have been conspicuous leaders in the demonstration of demand response programs
- We are assessing them to examine:
 - Market segmentation and recruiting strategies;
 - Alternative pricing schemes and program designs;
 - The value of participant access to interval load data;
 - Measurement, verification, and settlement approaches; and
 - The role of enabling technologies, back-up generation, and aggregators.
- Identification of gaps in enabling technologies is underway; technology partnerships will follow



What is the technical potential for load participation?

- CERTS is working with industry partners to demonstrate the technical feasibility and potential for provision of spinning reserve by reducing loads.
- Issues:
 - Can loads respond as rapidly and reliably as generation?
 - Which loads are best for providing spinning reserves vs. peak shaving or reduced energy consumption?
 - How difficult are the aggregation and communication issues?



Accomplishments

- Scoping study--June, 2001
- Evaluation of NY/CA summer 2001 load programs--FY01
- Review of SCE existing load management programs--FY01
- Experimental economics on value of demand response--FY 01
- NERC interest in receiving waiver for load providing spinning reserve--FY01



Funding and Partnerships

DOE Funding: \$700K through FY01

\$500K in FY02

- CEC resources have supplemented DOE funding by approximately 50%
- Other partners and collaborators include
 - NERC, CAISO, NYISO
 - Utilities: LIPA, NYSEG, SCE, SDG&E
 - Aggregators: AES Newenergy, Consumer Powerline, Global Energy Partners
 - States Research Organization: NYSERDA
 - Technology manufacturers (Digi Log)
 - Commercial and industrial loads (California DWR, 4 NY hotels)
- An expanded level of effort is needed to capitalize on the full potential of *load as a reliability resource*.

