



A NATIONAL TOWN MEETING & SYMPOSIUM ON DEMAND RESPONSE

Berkeley California - June 26 and 27, 2006

U.S. Demand Response Coordinating Committee & Demand Response Research Center

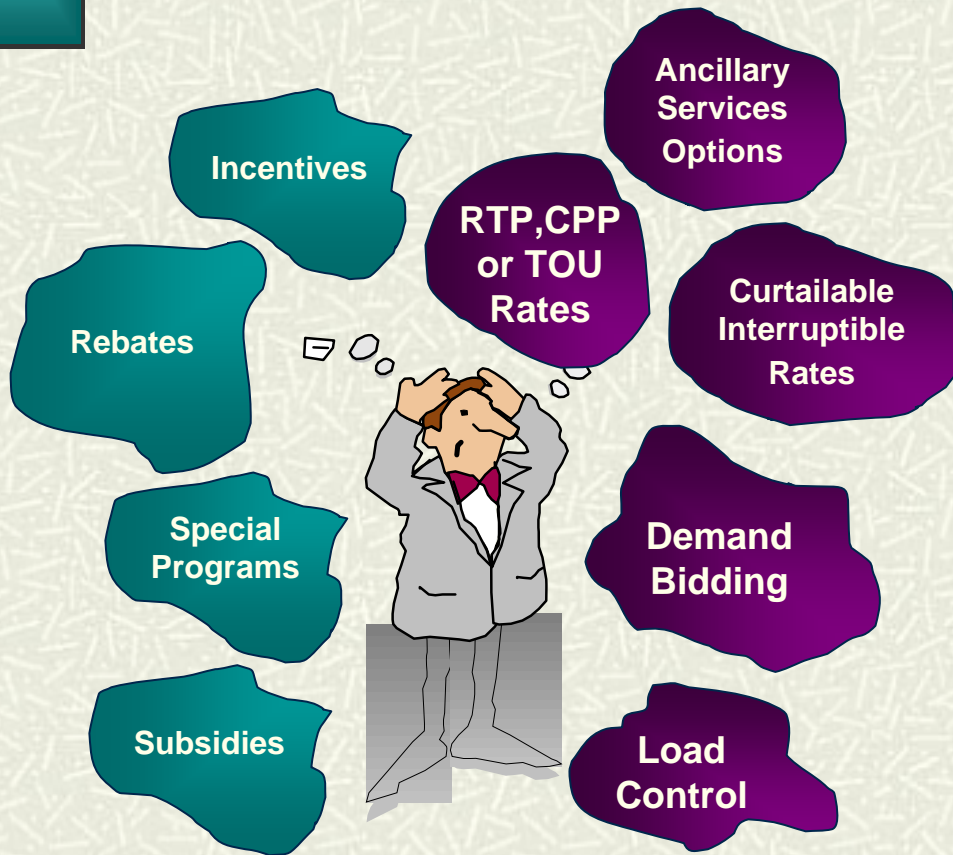
A Future Vision of Demand Response

Roger Levy

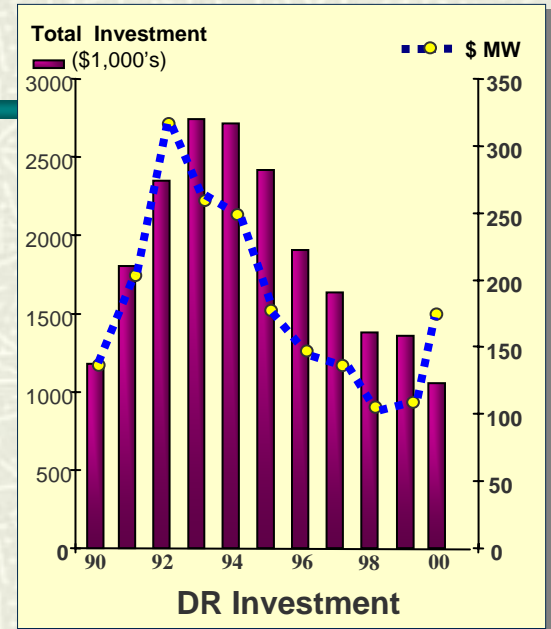
Demand Response Research Center

Program Development and Outreach Manager

Do you know where your demand response is tonight?



What to do ?



Alice came to a fork in the road.
'Which road do I take?' she asked.
'Where do you want to go?',
responded the Cheshire cat.
'I don't know.' Alice answered.
'Then,' said the cat, 'it doesn't
matter.'

Lewis Carroll.



Why do we need a Vision ?

The **P**resent - Where are you now

The **P**ossibilities - Where do you want to be?

The **P**ath - What is it going to take to get
where you want to be?

Vision – A way to figure out where you want to be.

What is the Vision?

1

No more rotating outages – ever!

What is the Vision?

1

No more rotating outages – ever!

2

Energy efficiency and demand response fully integrated under a unified default tariff / incentive structure.

- **Demand response is a condition of service.**
- **All customers, all load participates.**

What is the Vision?

1

No more rotating outages – ever!

2

Energy efficiency and demand response fully integrated under a unified default tariff / incentive structure.

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3

**Major appliances come “DR Ready” from the factory.
All buildings are “DR Enabled” .**

What is the Vision?

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Major appliances come “DR Ready” from the factory.
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4

Full automated system integration between the ISO, utilities and customers.

- **Integrated economic and reliability applications.**
- **Hierarchal Control - transformers to substations.**

What is the Vision?

1

No more rotating outages – EVER !

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Energy efficiency and demand response fully integrated under a unified default tariff / incentive structure.

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Better Reliability - Reduced Costs – Improved Customer Service

Policy

	Policy	Purpose
1	Advance Metering Systemwide	<ol style="list-style-type: none">1. Facilitate pricing.2. Support customer education.
2	Critical Peak Pricing as the default tariff	<ol style="list-style-type: none">1. Integrates efficiency and demand response on a common financial basis.2. Demand response becomes a condition of service for <u>all</u> customers.
3	Revised Outage Management	<ol style="list-style-type: none">1. Selected End-Use 'partial outages' in lieu of full rotating outages.2. Demand response becomes a condition of service for <u>all</u> customers.

Building and Appliance Standards

	Standards	Purpose
1	<u>Building Standards</u> Programmable controllable thermostats - all new buildings	1. Enable / automate customer economic and reliability response.
2	<u>Appliance Standards</u> Embedded Controls – HVAC, WH and selected end-uses	2. Enable system protection and redefine outage management. 3. Facilitate active grid management.
3	<u>Building Standards</u> Price Server Interface – all commercial buildings	4. Customer education.

Residential Example – Retrofit PCT

Residential
Minimum
Functionality

Design Standard

SETUP - Operation

- ❑ Ready to go out of the box
- ❑ Vertically integrated PCT
- ❑ Operational status indicators
- ❑ Lifestyle, Comfort, and Reliability settings
- ❑ Pre-programmed for CPP economic and reliability response
 - economic – customer choice
 - reliability – mandated standard

Lifestyle Settings

1. Weekday Workday 8:00am-5:00pm
2. Weekday Evening 6:00pm-10:00pm
3. Weekday Morning 6:00am-8:00am
4. Weekday Night 10:00pm-6:00am
5. Weekend Day 7:00am-9:00pm
6. Vacation Away

Comfort Settings

- Cooler
- Warmer

Economy Settings

- Standard (default)
- Moderate
- Super Saver

Residential Example – Embedded Control

Residential
Optional
Functionality

Performance
Standard

SETUP - Operation

- ❑ PCT functionality factory integrated into appliance controls
- ❑ Private service provider options
- ❑ Full home automation links
- ❑ Dynamic pre-cooling or standard setback based on notice available
- ❑ Communication interlocks with other appliances / loads
- ❑ End-use monitoring through utility or private service
- ❑ Near real-time bill monitoring
- ❑ Home monitoring and maintenance contracts
- ❑ Operation / displays through handheld remotes, computer or TV monitors

Commercial Example – Automated DR

Large
Commercial

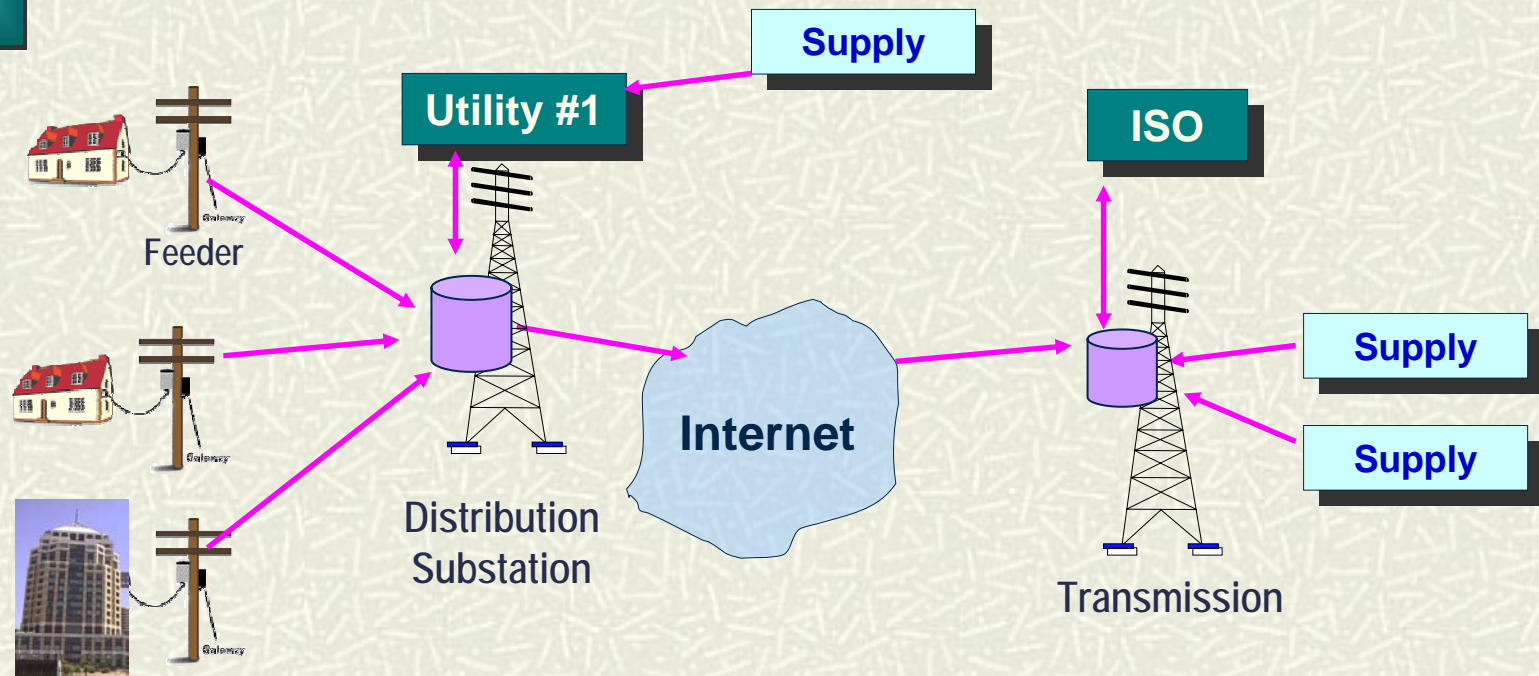
- Large commercial / retail office space
- National ownership and control
- Sophisticated capabilities

AutoDR

SETUP - Operation

- ❑ Internet link between the building automation system and *DR Automation Server*
- ❑ Price and reliability strategies programmed into Energy Management System, customized to building systems and tenants by the building operator
- ❑ Strategies integrate shifting, shedding, scheduling and backup/distributed generation.

'Statewide Power Management System'



Functions (SCADA)

- Monitor and control distribution system performance.
- Create Price Response database

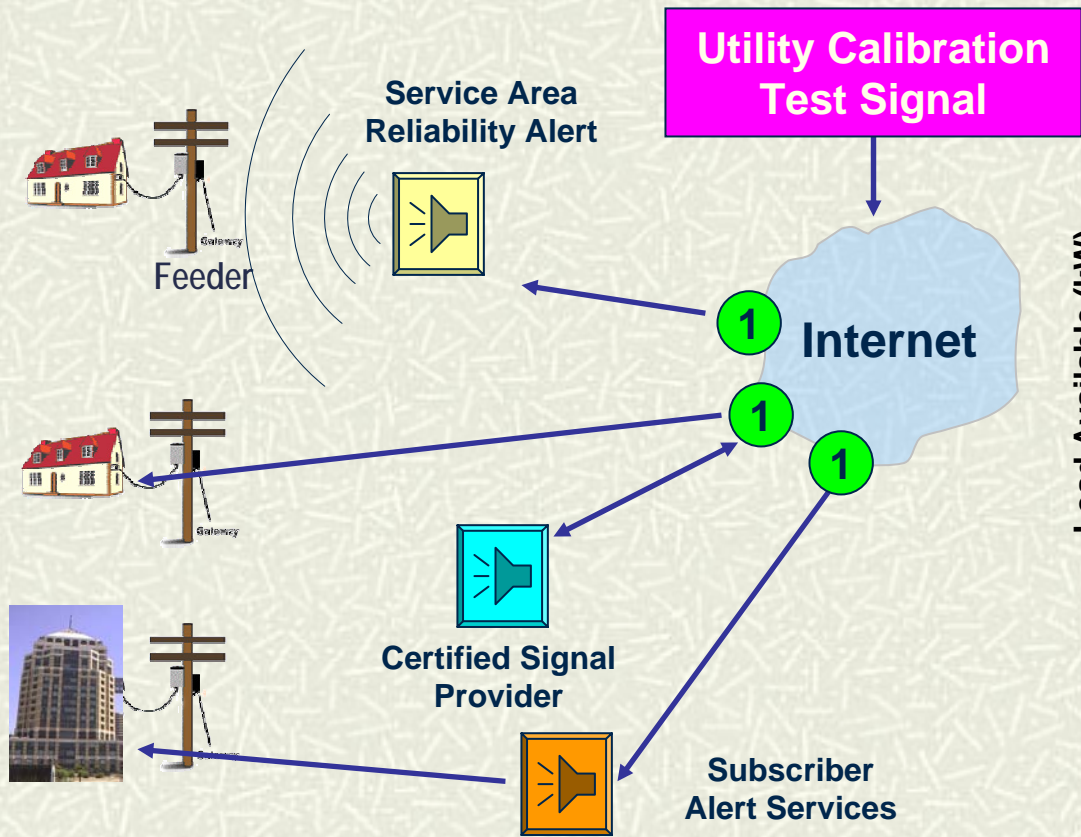
Functions (SCADA)

Monitor and **control** transmission system performance and linkages to utility distribution.

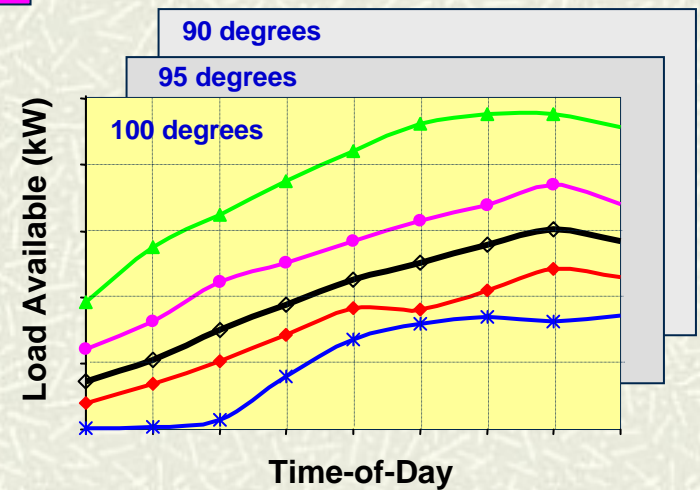
A DR / Price Response 'Rheostat'

Statewide Reliability Exchange

Statewide Power Management System

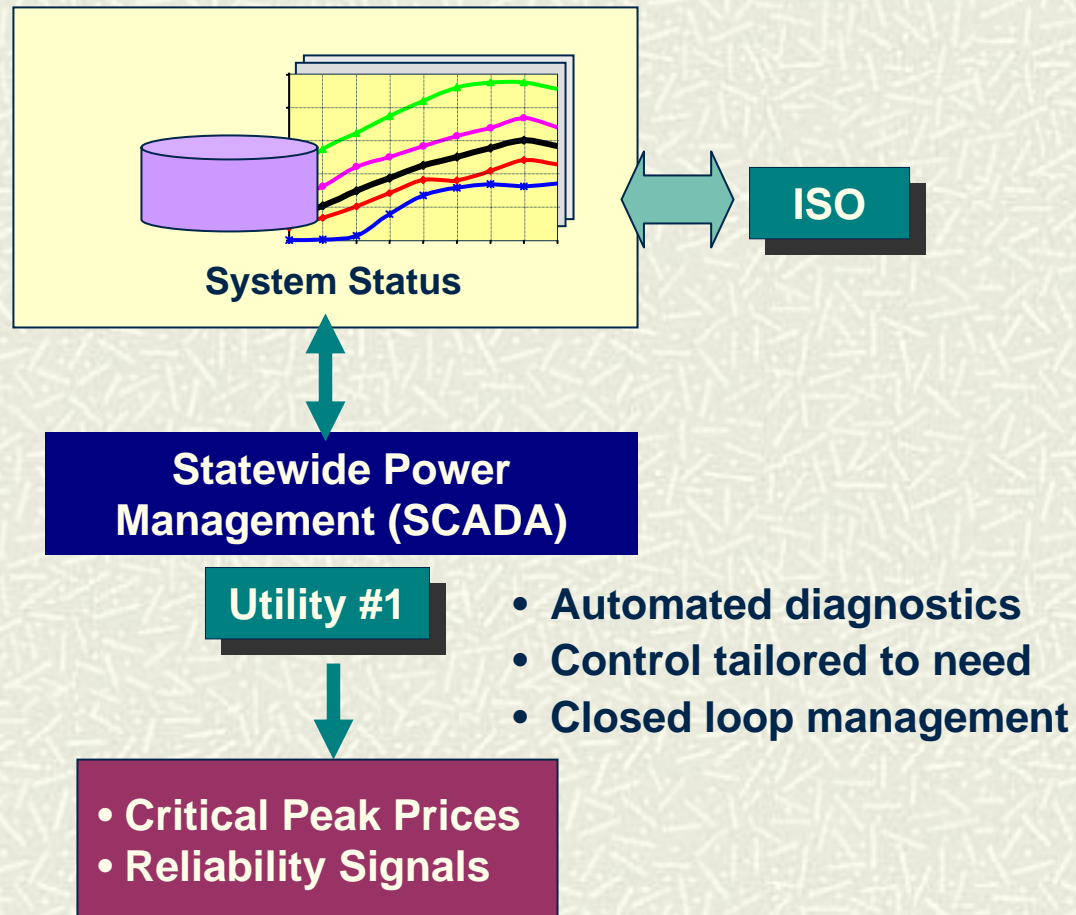


DR/Price Response Isograms
Feeder #12345-2

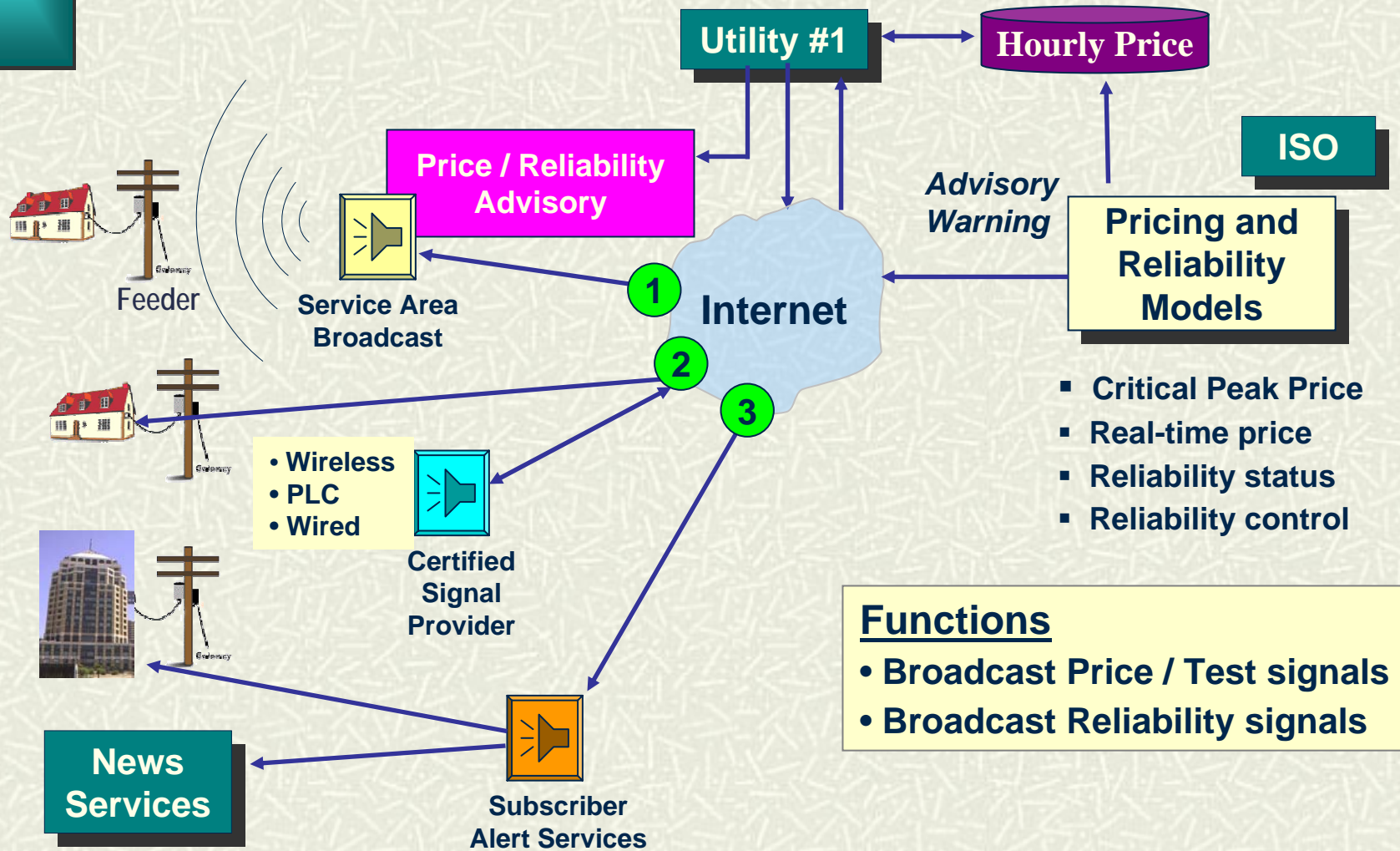


Function
Calibrate automated price and reliability response.

Emergency – Initiate a DR / Price Response



'Statewide Reliability Exchange'



More Information - References

- **A Vision of Demand Response 2015.**
<http://www.energy.ca.gov/2006publications/CEC-500-2006-001/CEC-500-2006-001.PDF>
 - **Advanced Controls and Communications for Demand Response and Energy Efficiency in Commercial Buildings.**
<http://drrc.lbl.gov/pubs/59337.pdf>
 - **Characterization and Demonstration of Demand Responsive Control Technologies and Strategies in Commercial Buildings.**
<http://drrc.lbl.gov/pubs/webcast.brief.final.mar23.pdf>
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