



# **Demand Response (DR) Enabling Technology Development (ETD) Project**

**Gaymond Yee**

DR ETD Project Manager

**Ron Hofmann**

DR Program Advisor

June 6, 2006



# Agenda

<b>8:30am</b>	<b>Introduction and Discussion of the DR ETD Project</b> <i>Gaymond Yee and Ron Hofmann</i>
<b>8:45am</b>	<b>The New Grant Process</b> <i>Gaymond Yee, CIEE</i>
<b>9:00am</b>	<b>Energy Systems Integration Research Program</b> <i>Mark Rawson, CEC</i>
<b>9:30am</b>	<b>Commercializing UC Berkeley Intellectual Property</b> <i>Michael Cohen, UC Berkeley</i>
<b>9:45am</b>	<b>Morning Break</b>
<b>10:00am</b>	<b>New Thermostat, New Temp. Node, and New Meter</b> <i>UC Berkeley Research Team</i>
<b>11:30am</b>	<b>Network Security Architecture</b> <i>CyberKnowledge, UC Berkeley</i>



# Agenda

<b>12:10- 2:00pm</b>	<b>Posters and demonstrations on display</b>
<b>12:30pm -2:00pm</b>	<b>Lunch</b> (handouts with locations of nearby restaurants)
<b>2:00pm</b>	<b>Barrier-Immune Radio Communications for DR</b> (preview) <i>Dave Watson, LBNL</i>
<b>2:15pm</b>	<b>Service Based Universal Application Interface</b> <i>Paul Wright, UC Berkeley</i>
<b>2:45pm</b>	<b>California Demand Response Business Network</b> <i>Utility Integration Solutions</i>
<b>3:15pm</b>	<b>Afternoon Break</b>
<b>3:30 pm</b>	<b>California Demand Response Business Network</b> (continued)
<b>4:30pm</b>	<b>Adjourn</b>



# Introductions & Acknowledgements

- ◆ **California Energy Commission (CEC)**
  - ◆ **Martha Krebs** (PIER, CEC Deputy Director)
  - ◆ **Mark Rawson** (PIER, ESI Team Lead)
  - ◆ **Kristy Chew** (PIER, Contract Manager)
  
- ◆ **California Institute for Energy and Environment (CIEE)**
  - ◆ **Carl Blumstein** (Director)
  - ◆ **Karen Sharp** (Workshop Facilitator)
  - ◆ **Jack McGowan**



# Purpose of This Workshop

- ◆ **Introduce DR ETD Project to researchers and private industry that are not familiar to the project**
- ◆ **Present the new Grant proposal submittal, review, and award process**
- ◆ **Present progress and results of the 4 funded research projects and preview a new project**
  1. **New Thermostat, New Temperature Node, and New Meter**
  2. **California Demand Response Business Network**
  3. **Network Security Architecture**
  4. **Service Based Universal Application Interface**
  5. **Barrier-Immune Radio Communications for DR (new)**



# Background

- ◆ **CA energy crisis of 2000-2001**
  - ◆ Market power (Enron, et al)
  - ◆ Aging fossil fuel plants (pollution)
  - ◆ Flaws in deregulation (AB 1890)
  - ◆ Disconnect between wholesale and retail prices
- ◆ **Supply approach** (build more plants)
- ◆ **Demand approach** (load as a resource)



# Electric Power Industry In California

- ◆ **Energy companies (Enron, Calpine)**
- ◆ **CAISO (California Independent System Operator) balances supply and demand**
- ◆ **UDCs (Utility Distribution Companies manage local distribution systems)**
  - ◆ IOUs (investor owned utilities, e.g., PG&E)
  - ◆ Munis (publicly owned utilities, e.g., SVP)
- ◆ **Regulators (e.g., FERC, CPUC, CEC)**



# Regulatory Agencies

- ◆ **FERC <http://www.ferc.fed.us/>**
  - ◆ Regulates the transmission and wholesale sales of electricity in interstate commerce
- ◆ **CPUC <http://www.cpuc.ca.gov/>**
  - ◆ Regulates privately-owned utilities in CA
- ◆ **CEC <http://www.energy.ca.gov/>**
  - ◆ Created in 1975 for siting electric power plants
  - ◆ Responsible for standards & policy analysis





# Brief History of Recent California Electric R&D



- ◆ **Investor Owned Utilities (until 1996)**
- ◆ **EPRI (created by utilities in 1973)**
- ◆ **CIEE (funded by utilities starting in 1989 to manage energy efficiency R&D)**
- ◆ **PIER (created in 1996 by deregulation [AB1890] and initially funded in 1998)**
- ◆ **PIER <http://www.energy.ca.gov/pier/>**
- ◆ **PIER has ~\$60 MM/year through 2012**



## PIER R&D Areas

- ◆ **Environmentally-Preferred Advanced Generation (EPAG)**
- ◆ **Buildings End-Use Energy Efficiency**
- ◆ **Industrial/Agricultural/Water End-Use Energy Efficiency (IAW)**
- ◆ **Renewable Energy**
- ◆ **Energy Related Environmental Research**
- ◆ **Energy Systems Integration (ESI)**



## ESI

- ◆ **Improved Efficiency and Reliability of the Transmission System (T&D)**
- ◆ **Distributed Energy Resources Systems Integration (DER)**
- ◆ **Strategic and Enabling Technologies (e.g., storage, seismic, tools for market analysis)**
- ◆ **Demand Response to Electricity Prices and System Contingencies (DR)**



# PIER DR Program

- ◆ **Is there DR potential in CA's existing large commercial/industrial facilities?**
- ◆ **What enabling technologies need to be developed to deploy DR statewide?**
- ◆ **Can we learn lessons from other states?**
- ◆ **Can the CAISO use DR to help manage future electricity imbalances?**



# Enabling Technologies

- ◆ **Wireless communications**
- ◆ **MEMS sensors**
- ◆ **Network management**
- ◆ **Systems integration**
- ◆ **Low-cost packaging**
- ◆ **Energy scavenging and storage**
- ◆ **Real-time operating systems**



# DR ETD Project

- ◆ **CEC PIER Funded Project**
  - ◆ Project approved June 2002
- ◆ **Purpose of funding is to develop enabling technologies for a state-wide demand responsive electric power delivery system with “10/10” objectives**
  - ◆ 10 times the capabilities and 1/10<sup>th</sup> the cost
  - ◆ Create disruptive technology
- ◆ **Multi-disciplinary and collaborative research**
- ◆ **Leverage R&D spending by other institutions**



# California Institute for Energy and Environment (CIEE)

- ◆ **DR ETD Project: Technical coordination, project administration, and contract management of funded research**
- ◆ **Unit of the Office of Research, Academic Affairs Division of the Office of the President, University of California (UCOP)**
- ◆ **Located at 1333 Broadway, Suite 240 Downtown Oakland, CA**



# National Town Meeting on Demand Response June 26 & 27, 2006

- ◆ **Jointly presented by:**  
**U.S. Demand Response Coordinating Committee**  
**Demand Response Research Center**
- ◆ **Location:**  
**Doubletree Marina Hotel, Berkeley, CA**
- ◆ **Information and Registration:**  
**[www.DemandResponseTownMeeting.com](http://www.DemandResponseTownMeeting.com)**