



CALIFORNIA ENERGY COMMISSION

**Load Management Standards  
Workshop on Enabling Technologies  
June 19, 2008**



# Enabling Technologies: Past, Present, Future

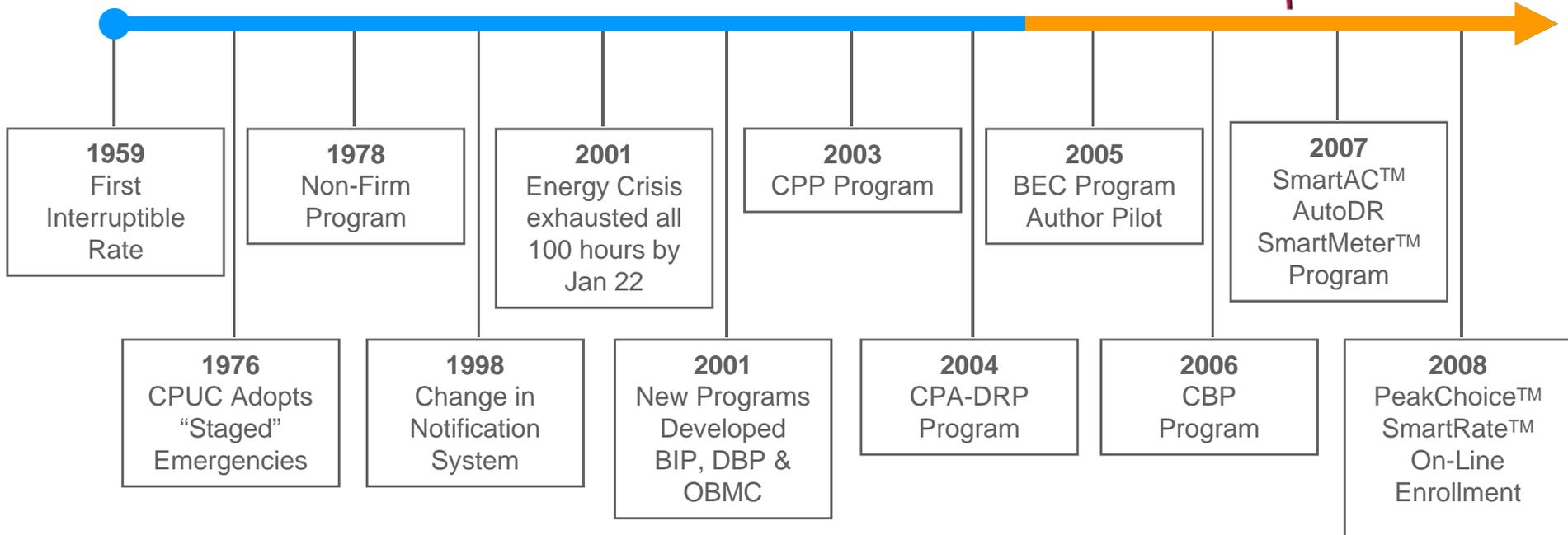
## Notification Only



## Notification and Control



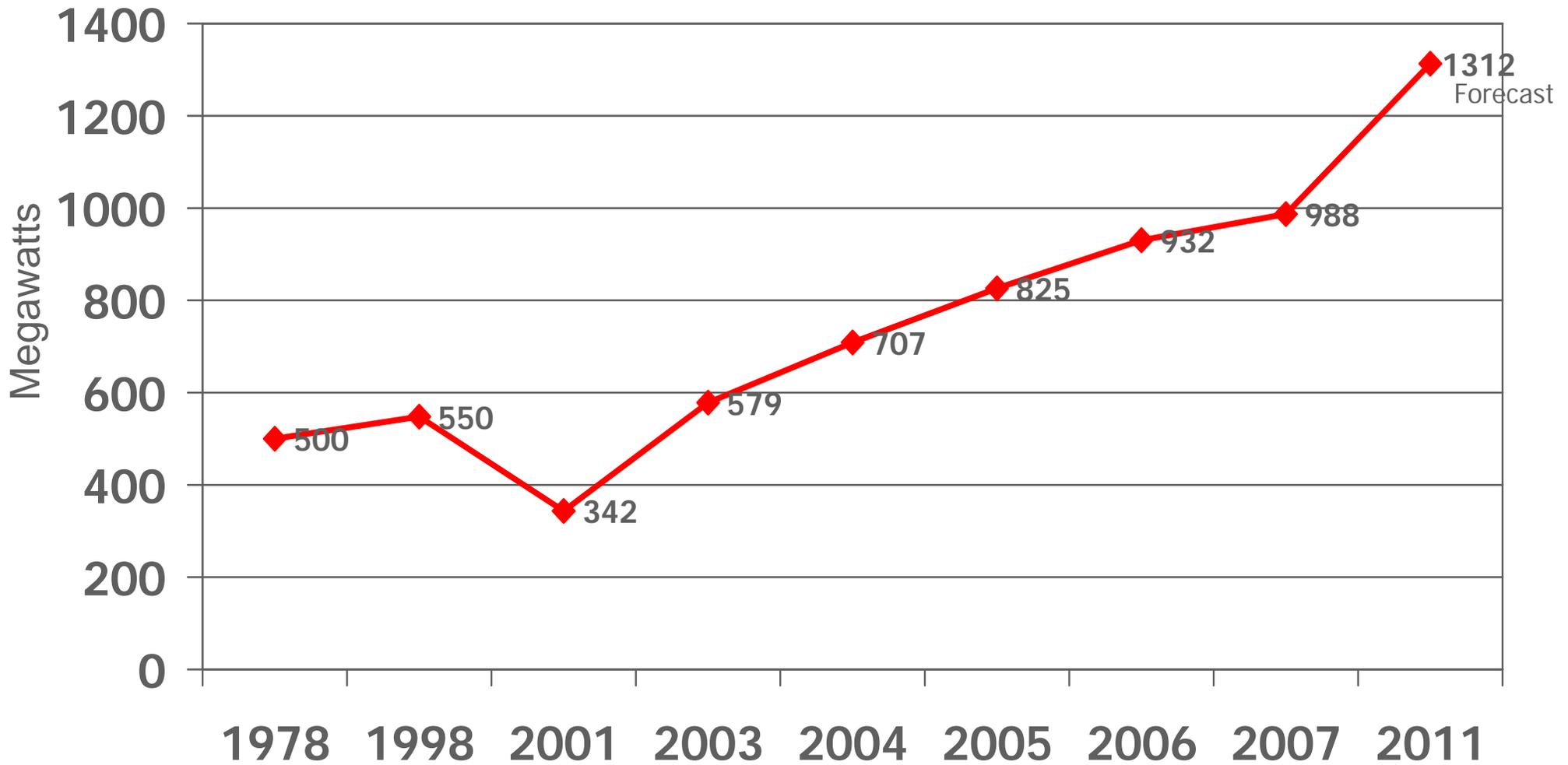
PG&E SmartMeter



- BIP - Base Interruptible Program
- BEC - Business Energy Coalition
- CPA-DRP - California Power Authority – Demand Reserves Partnership

- CBP - Capacity Bidding Program
- CPP - Critical Peak Pricing
- DBP - Demand Bidding Program
- OBMC - Optional Binding Mandatory Curtailment (OBMC)

# Demand Response Participation



\* MWs prior to 2008 based on Subscribed MWs. Starting in 2009 MWs based on actual reductions.

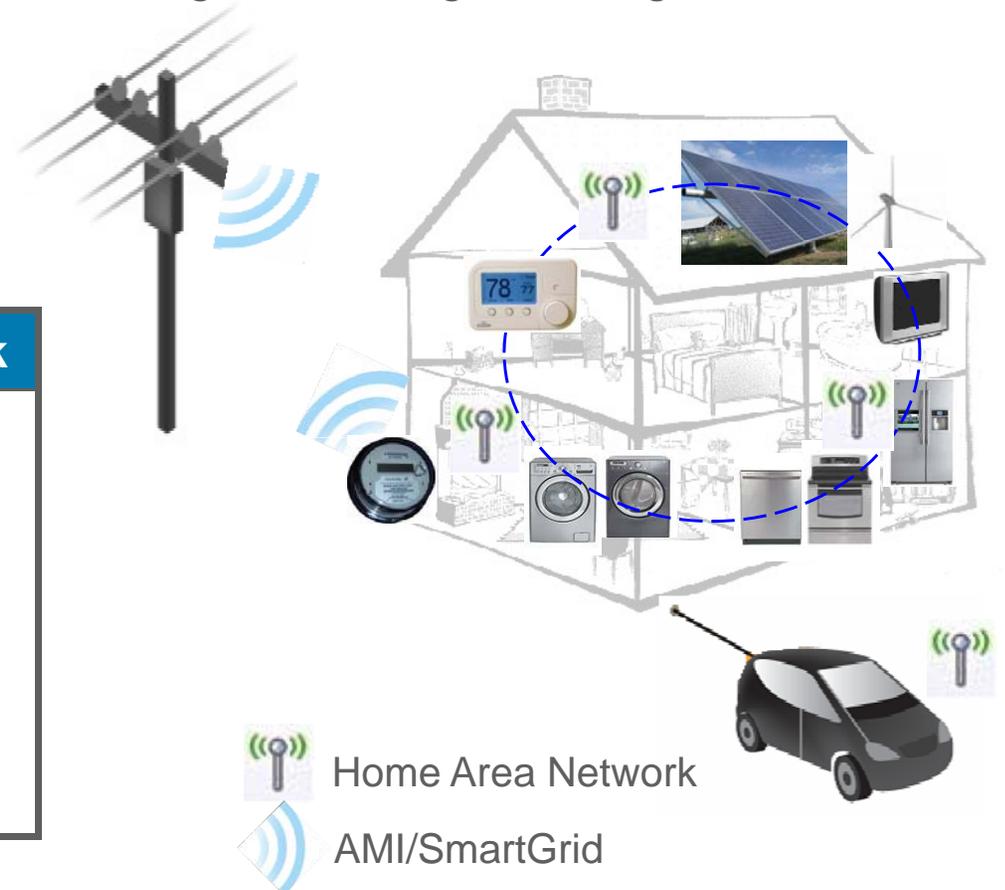
# Communications Technologies

- Many developing load management activities (both demand side management and energy efficiency) require two-way communications capability
  - California’s IOUs are installing the communications infrastructure to support these developing load management opportunities

AMI/SmartGrid	Home Area Network
<ul style="list-style-type: none"> <li>• Powerline Carrier</li> <li>• Radio Frequency</li> <li>• Third-party                             <ul style="list-style-type: none"> <li>– Cellular/3G</li> <li>– Leased Lines</li> <li>– WiMAX</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Zigbee</li> <li>• 6LoWPAN</li> <li>• Homeplug</li> <li>• WiFi</li> <li>• LonWorks</li> <li>• ZWave</li> <li>• Insteon</li> </ul>

## Home Area Network Concept

*HVAC, IP-enabled appliances and distributed generation will all be tied together through an integrated EMS*



# Requirements to Make this a Reality...

- In order to achieve commercial success, HAN architecture will need to adhere to the following tenets:

Key Tenet	Consideration
Open Architecture	True IP addressability end-to-end. Example of consumer electronic devices which have gradually migrated to open IP from proprietary solutions
Interoperability	Enhance value and broad appeal of network by ensuring interoperability of multiple devices for the HAN (i.e.: Metcalfe's Law); Further, "install" must be easy and simple and not require a call to a "help line"
Future Flexibility	"Flash" download alternative communications protocols (i.e.: 6LoWPAN)  Integrate Homeplug and Zigbee into a common application layer to drive efficient designs, common silicon, and integration of both PLC and wireless HAN as standard components in smart meters
Scale Economies	Create a sizeable market opportunity and set clear technology requirements to provide device manufacturers a clear development path

- Ensuring a large market opportunity with standardized, interoperable product will help develop this market. It is critical to avoid "feature creep" – or hedging strategies by implementing "back-up to back-up" measures – that have the potential to add cost, confuse manufacturers and introduce delay (e.g.: "format war") as manufacturers will be tempted to "wait it out" until a clear market and specifications emerge

# Current and Future Potential HAN Applications

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- Load Shifting/Shaping/Limiting
- AC Cycling
- Automated Demand Response
- In-Home Displays
- Energy Management Systems
- PHEV SmartCharging
- Distributed Generation/Storage Control

# Benefits of Enhanced Communications

SmartAC<sup>®</sup> + PG&E SmartMeter<sup>®</sup> in the near future...



- Two-way communication via meter
- Disconnects identifiable via interval data
- Participation and Load impact measurable via interval data
- PCT = In-Home Display
- Potential DIY installation

# Other Emerging Technologies

## In-Home Displays and Smart Appliances



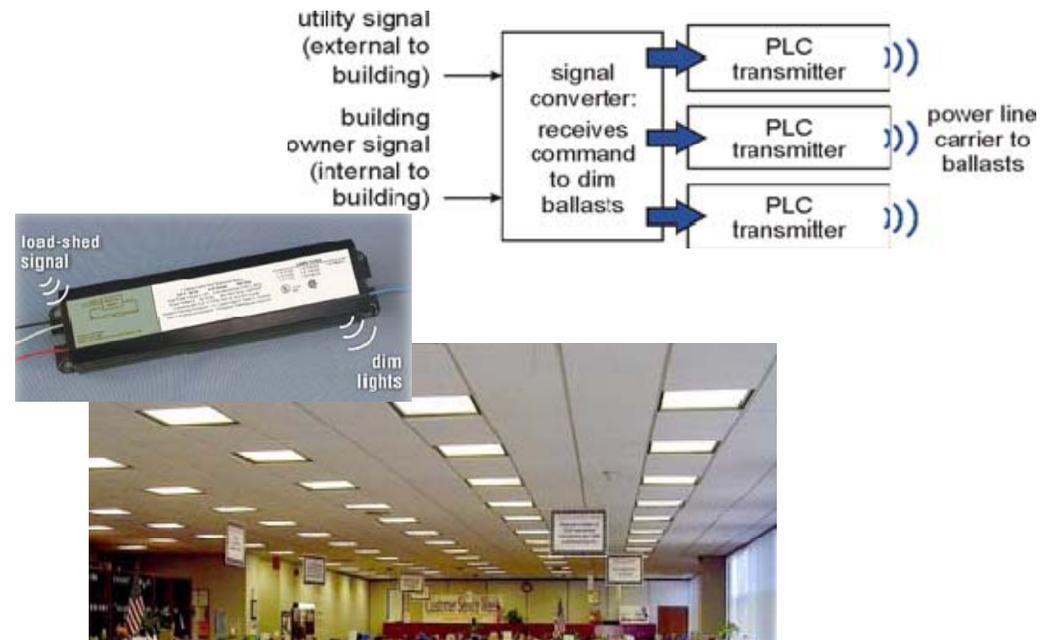
- Energy savings through information feedback
- Instantaneous and cumulative cost information

## Comfort Control



- Local and remote processing to optimize control of:
  - Temperature
  - Humidity
  - Weather
  - Historical data
  - Pre-cooling

## Integrated Wireless Lighting



- Optimizing around passive and active variables including daylight, ambient light, task specific or occupancy
- Controls provide both energy efficiency and demand response benefits

# PeakChoice

- PeakChoice allows customers to create a semi-customized DR program to meet their personal requirements and needs
- Participants can tailor the program by selecting from the following options:

## Reduction Amount & Commitment Level

*How many kW you can reduce  
Making a best effort to reduce vs. committing to reduce*

## Event Duration

*Number of hours you have to reduce for each event*

## Event Notification Lead Time

*Minimum notice you need before you  
reduce energy*

## Event Window

*What time of day an event can occur*

## Maximum Number of Events

*Number of events you will participate in*

## Number of Consecutive Event Days

*Number of consecutive event-days you  
can participate in*