



BNP Media is a Registered Provider with The American Institute of Architects Continuing Education Systems. Credit earned on completion of this program will be reported to CES Records for AIA members. Certificates of Completion for non-AIA members are available on request.

This program is registered with the AIA/CES for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product. Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

Copyright Materials



This presentation is protected by US and International Copyright laws. Reproduction, distribution, display and use of the presentation without written permission of the speaker is prohibited.

© BNP Media 2006



OpenADR Communications Standards

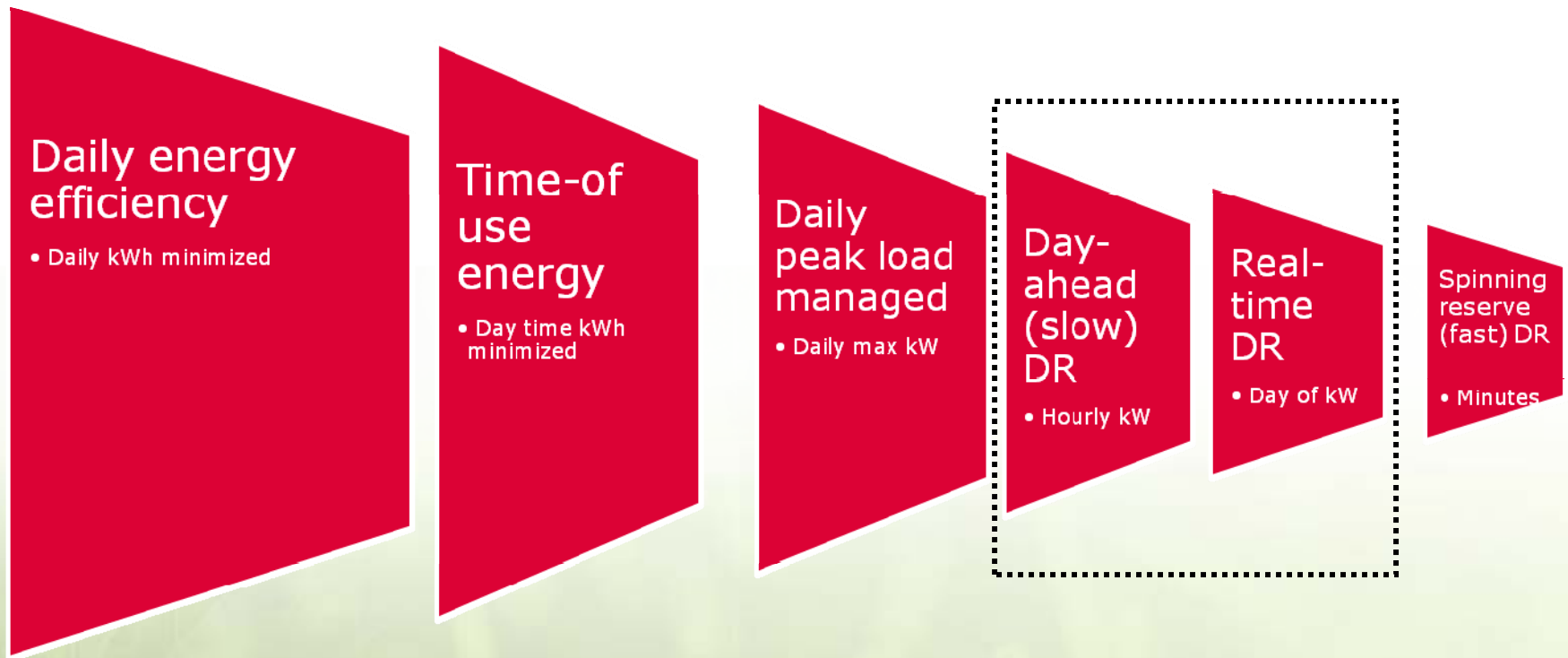
Ed Koch
CTO, Akuacom

Learning Objectives



- Definition and history of Open Automated Demand Response (OpenADR) concept
- Empirical results from Automated Demand Response in CA
- DRAS concept and what is being standardized with OpenADR
- OpenADR and BACnet
- Standards effort and status

Energy Management/DR Spectrum



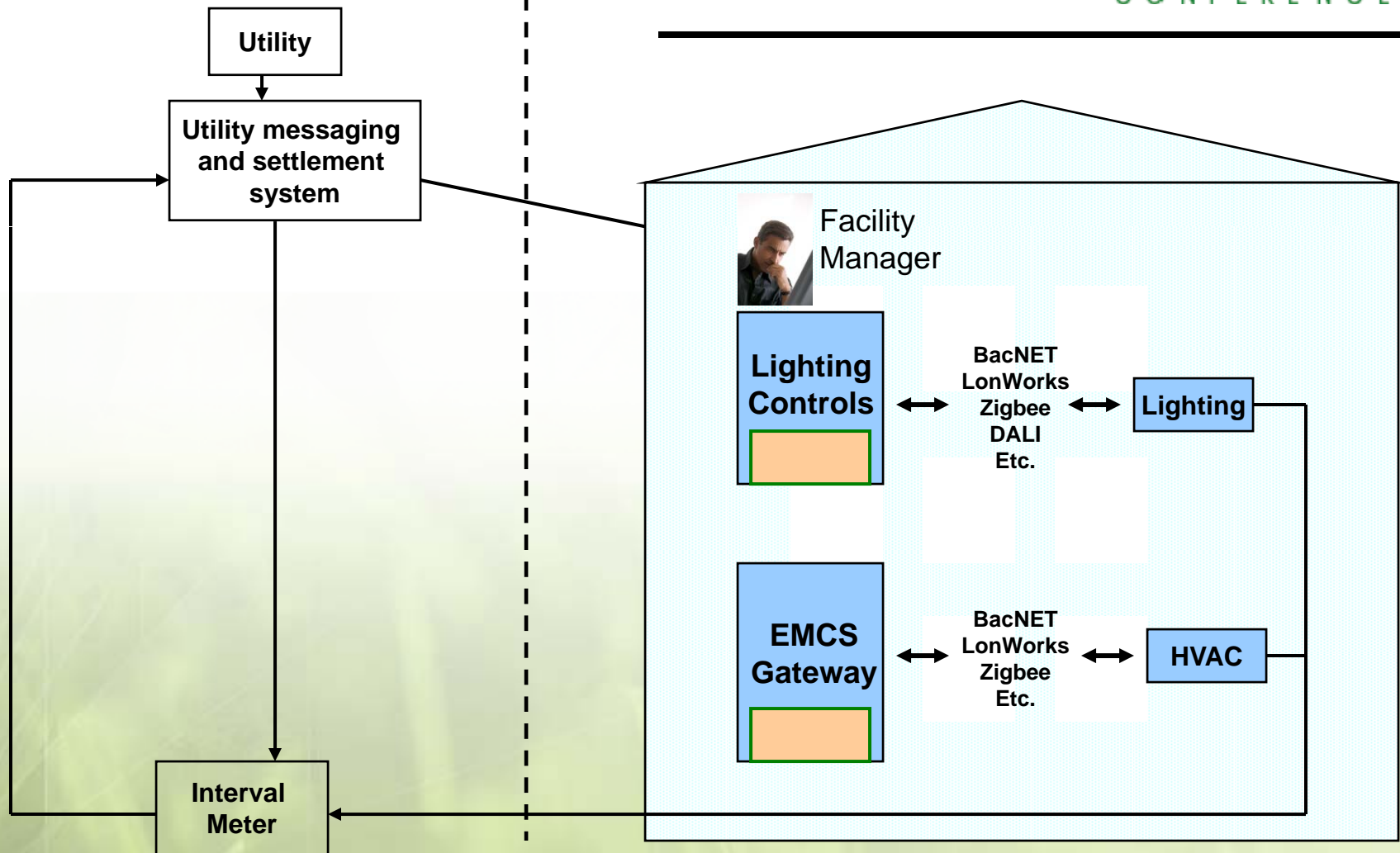
Service Levels Optimized

Service Levels Temporarily Reduced

Manual DR

Utility Owned

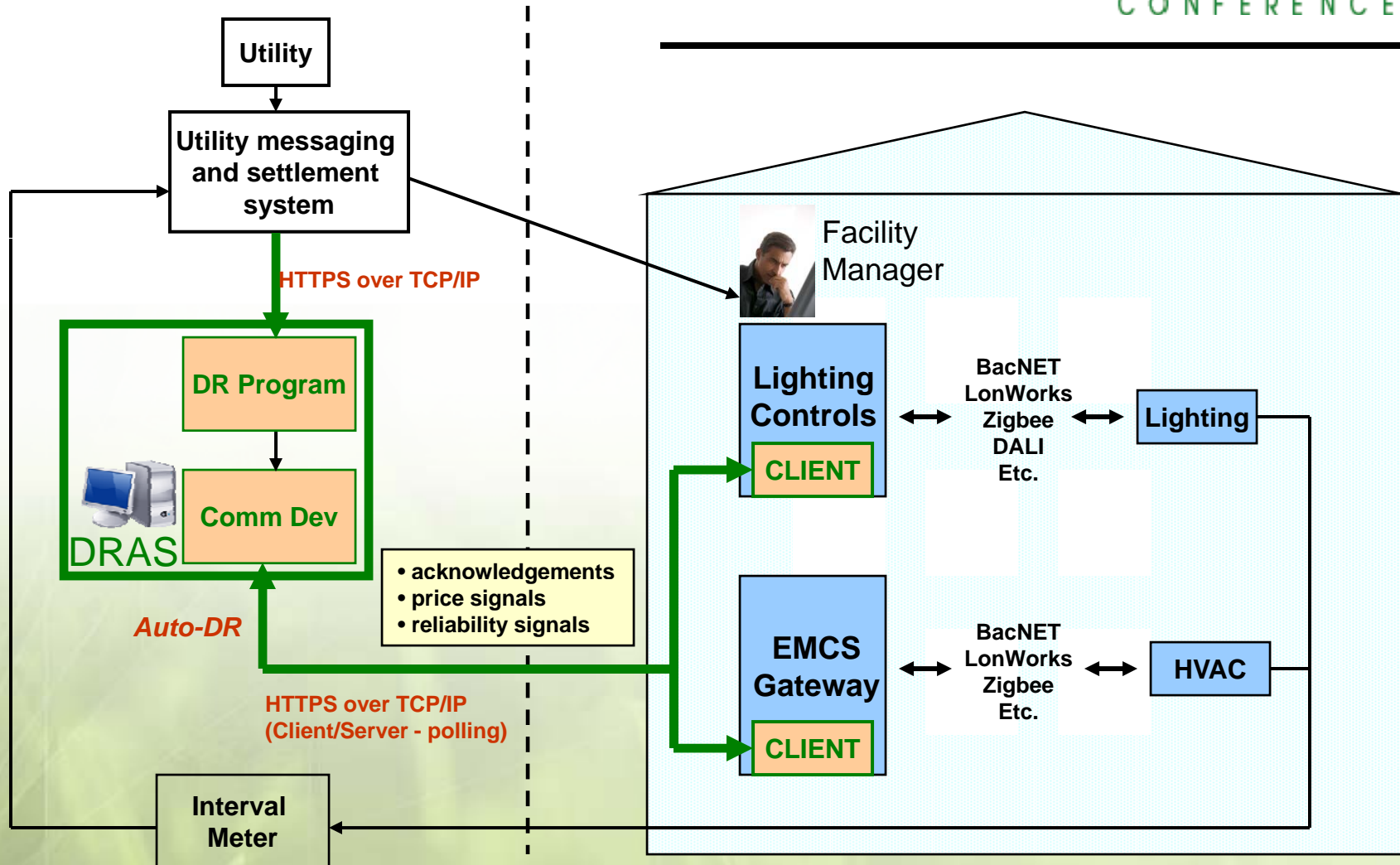
Consumer Owned



Automated DR with DRAS

Utility Owned

Consumer Owned

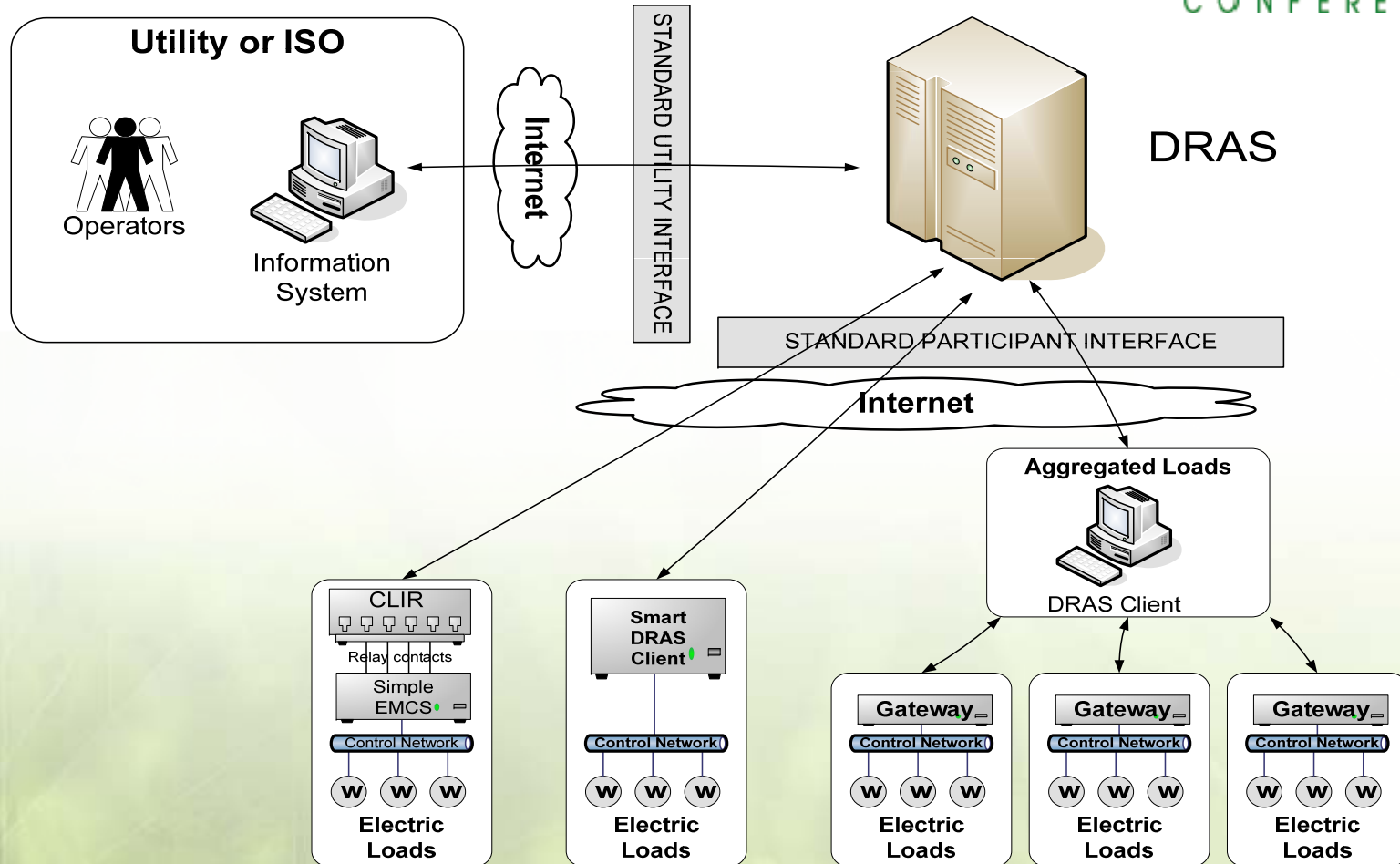


History

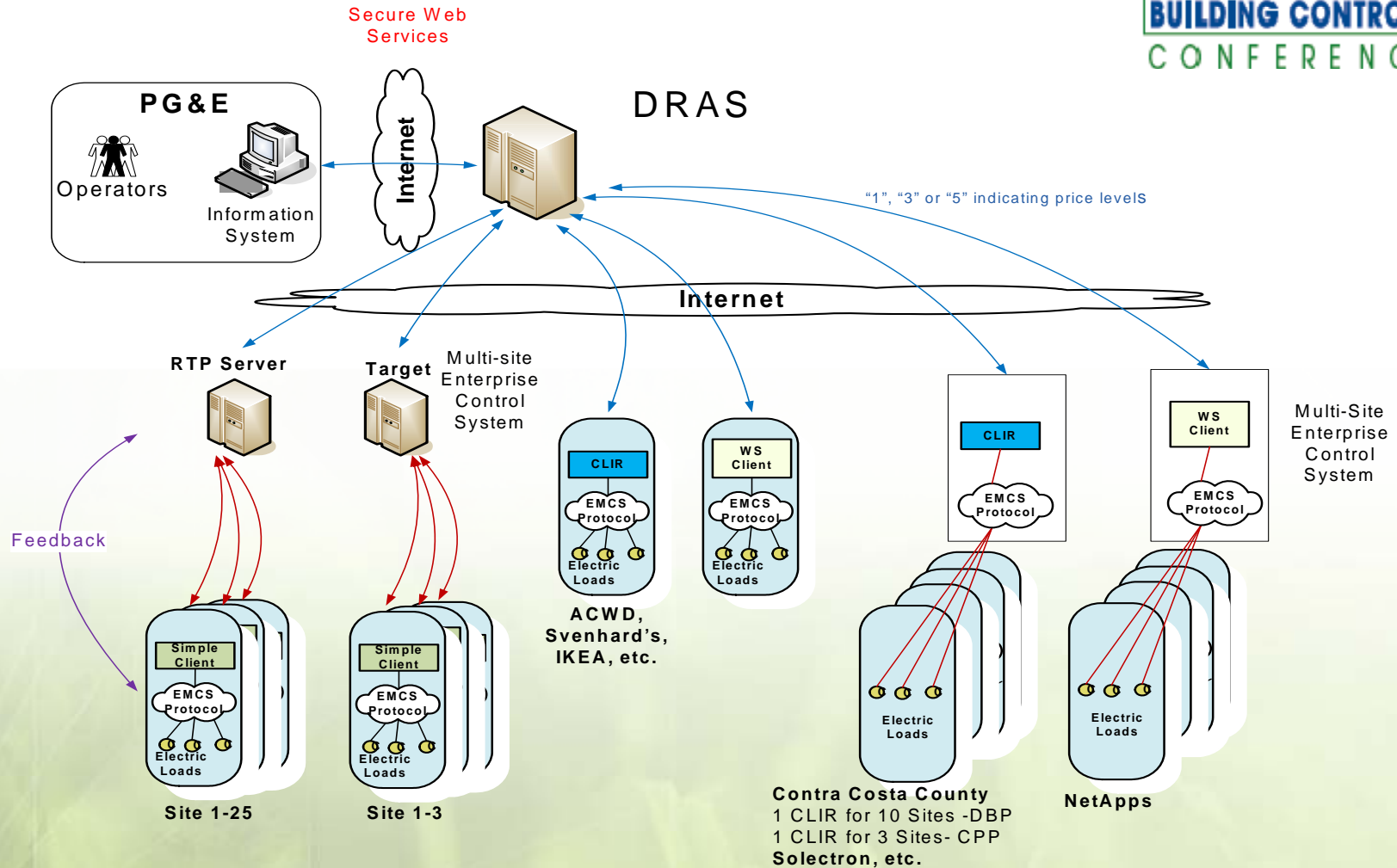


- 2002 - Research begun at LBNL Demand Response Research Center (DRRC) into automated DR. Funded by CEC and PIER.
- 2003 – Initial development at DRRC using XML exchange of information with limited field trials.
- 2004 – Use of internet relays in field trials to support automation with simple EMCS, scaled up field tests.
- 2005 – Development of DRAS concept. Collaboration with PG&E’s CPP DR program.
- 2006 – Expanded field trials and use in PG&E’s Pilot DR programs. Development of CLIR box for use as Simple DRAS Client.
- 2007 & 2008 – Commercialization and use of DRAS in PG&E, SCE, and SDG&E DR programs.
- **2007 – Standardization effort for Open-ADR begins**
- **2008 – First draft of proposed standard released for public review 5/08, second draft scheduled for 4th Qtr 08.**

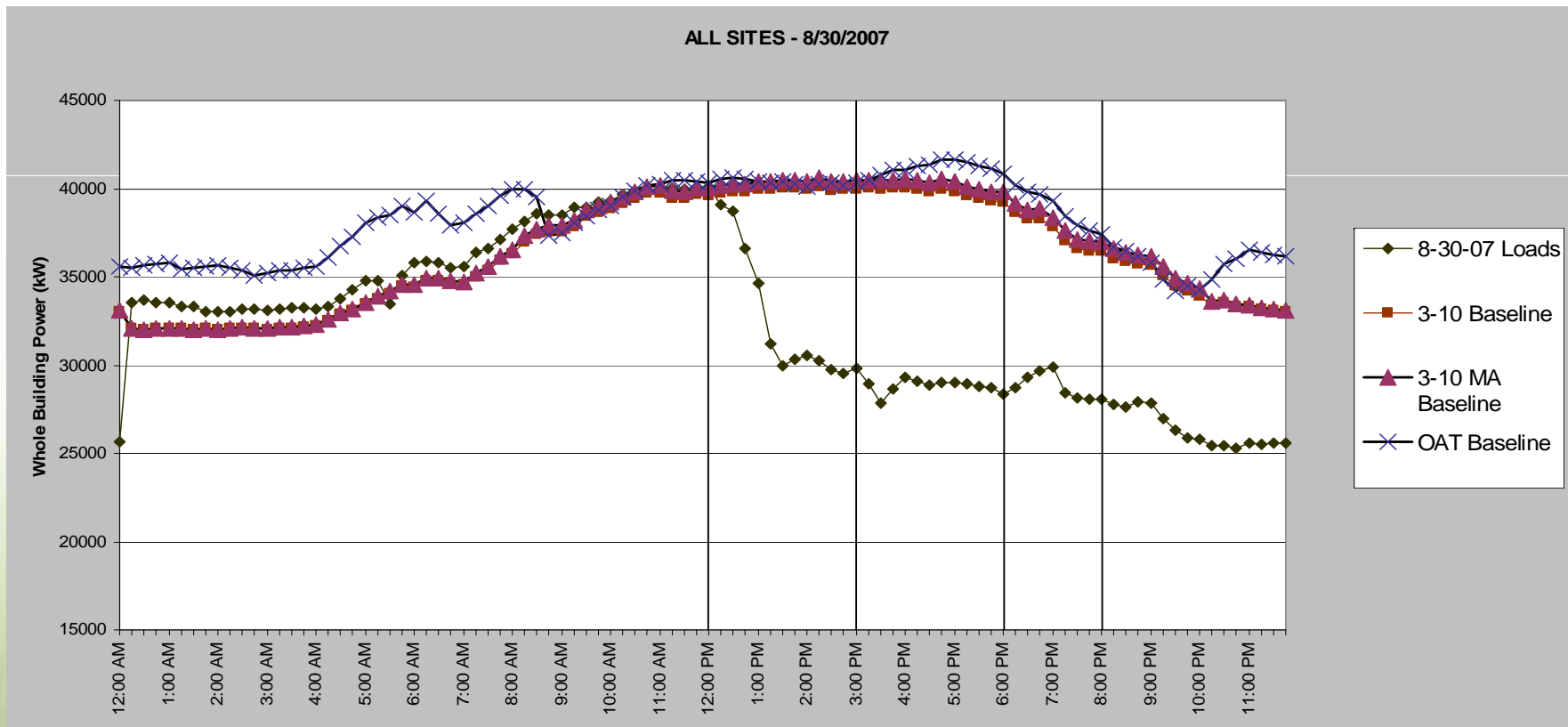
OpenADR and DRAS Concept (C&I)



Actual Deployment Scenarios (PG&E)



PG&E Load Shape Impacts for August 30th CPP and DBP Events



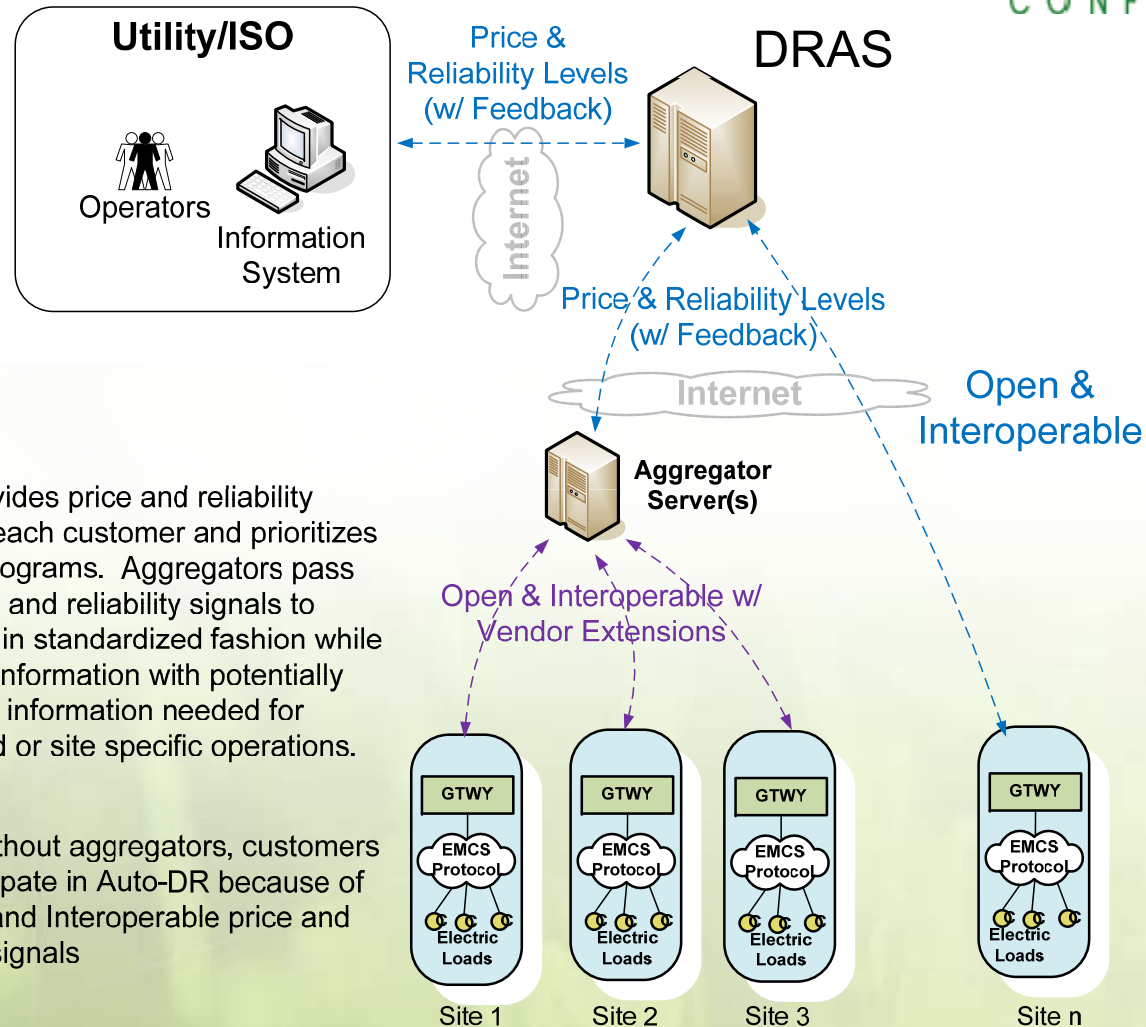
Reductions represented nearly 12 MW!

OpenADR Communications Standardization



- **Impact interoperability**
 - Reduces “vendor lock-in”
 - Increases innovation
 - Lowers technology costs
- **Change a utilities current business practices**
 - Allows DR technology specifications to be interoperable
- **Impact reliability**
 - AutoDR can be used for price or reliability DR
 - Standards are secure and reliable
- **Impact pricing or financial planning for a utility**
 - CORNERSTONE of technology development is to enable DR with dynamic tariffs – facilitate ubiquitous response capabilities

Vision for OpenADR Standards



DRAS provides price and reliability signals to each customer and prioritizes different programs. Aggregators pass down price and reliability signals to customers in standardized fashion while extending information with potentially proprietary information needed for aggregated or site specific operations.

With or without aggregators, customers can participate in Auto-DR because of the open and Interoperable price and reliability signals

Synergistic Efforts



- **Facility/Building Systems**

- **BACnet** Standard Project Committee (SPC) and Analysis Program (<http://www.bacnet.org/>) – UIWG and XMLWG
- **LonMark™ International** (<http://www.lonmark.org/>)
- **Organization for the Advancement of Structured Information Standards (OASIS)** (<http://www.oasis-open.org/>) and **Open Buildings Information eXchange (oBIX)** (<http://www.obix.org/>)
- **Continental Automated Building Association (CABA)** (<http://www.caba.org/>)
- **American Society of Heating Refrigerating and A/C Engineers (ASHRAE)** (<http://www.ashrae.org/>) – RP1011

- **Utility/ISO and Smart Grid**

- **IntelliGrid™** (<http://intelligrid.info/>) Living Laboratory Project – EPRI and Enernex
- **Advanced Metering Infrastructure (AMI)** – SDG&E (<http://www.sdge.com/ami/>), PG&E (<http://www.pge.com/smartmeter/>), and SCE (<http://www.sce.com/PowerandEnvironment/ami/>)
- **OpenAMI** (<http://www.openami.org/>) and **UCA International Users Group** (<http://sharepoint.ucausersgroup.org/>) – **Open Home Automation Network (OpenHAN)** (<http://www.ucauiug.org/OpenHAN/>)
- **Gridwise™** (<http://www.gridwise.com/>) and **Gridwise Architecture Council (GWAC)** (<http://www.gridwiseac.org/>)
- **Programmable Communicating Thermostats (PCT)** (<http://pct.berkeley.edu/>) – CEC/PIER
- **CA Independent Systems Operator (CAISO)** (<http://www.caiso.com/>) – MRTU & Standardization of Bidding Message Models
- **Southern Company RTP XML Demonstration** (<http://www.southerncompany.com/>) – OpenADR TAG
- **NIST Smart Grid Standards Interoperability Framework**

- **International Standard Bodies**

- **International Electro-technical Commission (IEC) Technical Committee (TC) 8** (<http://www.iec.ch/>) – 61850
- **American National Standards Institute (ANSI)** (<http://www.ansi.org/>) and **International Standards for Integrating Enterprise and Control Systems (ISA-95)** (<http://www.isa-95.com/>) – EPRI
- **UCA International Users Group** (<http://sharepoint.ucausersgroup.org/default.aspx>)
- **Institute of Electronic and Electrical Engineers (IEEE) Power Engineering Society (PES) Intelligent Grid Coordinating Committee** (<http://ieee-pes-td.com/>)

- **Industry Initiatives**

- **New Energy Alliance (NEA)** (<http://www.newenergy.com/>) – Constellation New Energy
- **Demand Response and Advanced Metering Coalition (DRAM)** (<http://www.dramcoalition.org/>)
- **Utility Standards Board (USB)** (<http://topics.energycentral.com/centers/datamanager/view/detail.cfm?aid=1699>)
- **Alliance for Retail Energy Markets (AReM)** (<http://www.retailenergymarkets.com/>)
- **IBM Smart Grid initiative**

OpenADR Standardization Status



- Recruited participation from major stake holders including:
 - Utilities and ISO's including CAISO, PG&E, SCE, SDG&E, etc.
 - Variety of national standards bodies including NIST, OpenAMI, OpenHAN, IEC TC-8, etc.
 - Facility controls vendors and organizations including BACnet, LonMark, OASIS/oBIX, etc.
 - End user organizations including aggregators and Retail Energy Alliance (Big box retailers representing 3B square feet of retail space)
- First draft released for public review released 5/08
 - <http://drrc.lbl.gov/openadr>
- **Updated draft for public review fall 08**

Future Directions



- Enabling technologies for Small Commercial facilities
- Integration with AMI efforts for residential DR
- Prediction of facility responses to future DR events
 - Feedback of facility state
 - Better models for predicting facility response
- Real-time monitoring of facilities responses to DR events

Contact Info



Ed Koch

CTO, Akuacom

ed@akuacom.com

415-256-2583

