



Opening Markets, Generating Exports

U.S. Trade and Development Agency

Geoffrey Jackson
Regional Director, East Asia

February 12, 2013

WWW.USTDA.GOV

Mission and Results

USTDA helps companies create U.S. jobs through the export of U.S. goods and services for priority development projects in emerging economies

USTDA links U.S. businesses to export opportunities by funding project planning activities, pilot projects, and reverse trade missions while creating sustainable infrastructure and economic growth in partner countries

For every dollar spent, USTDA generates over \$60 in U.S. exports



USTDA in China

- Focus on U.S. company access to Chinese development projects.
- Priority on environment, energy and transportation
 - Over 40% of portfolio focused on clean energy
- More than 270 projects since 2001
- Public/private partnerships drive project definition
 - Energy Cooperation Program



China is USTDA's largest single country portfolio.

USTDA Program Activities

Matching U.S. Commercial Interests
with Development Opportunities

International Business Partnership Program

- Reverse Trade Missions
- Conferences
- Workshops

Project Development Program

- Feasibility Studies
- Pilot Projects
- Technical Assistance

International Business Partnership Program

Reverse Trade Missions:

USTDA brings foreign project sponsors to the United States pending upcoming procurements to observe the design, manufacture, and operation of U.S. products and services.

Organizing 3 upcoming Clean Energy RTMs from China



International Business Partnership Program

Conferences/Workshops:

USTDA organizes an event in China every other week. The goal is to connect U.S. firms with foreign buyers. They are designed to highlight upcoming projects overseas, as well as showcase U.S. goods and services.

Held US-China Smart Grid Dialogue with FERC and NEA in Shenzhen, June 2012



Project Development Program

Feasibility Studies:

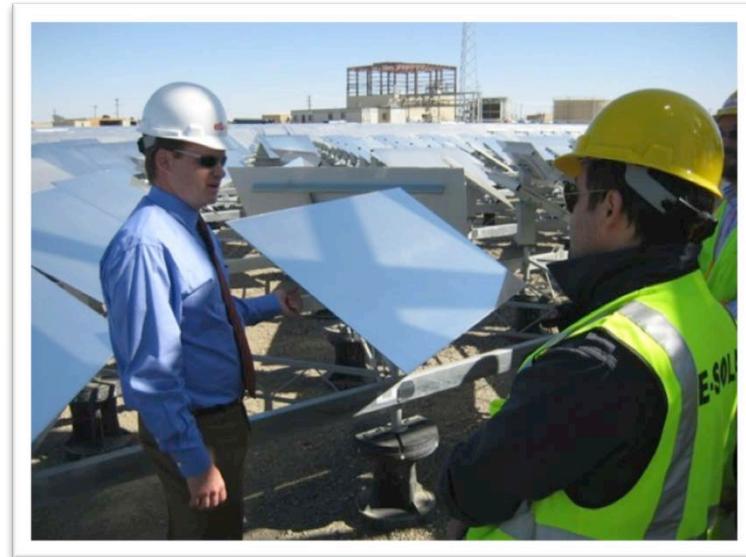
USTDA-funded and U.S.-led feasibility studies link foreign project sponsors with U.S. businesses at the critical early stage of project development. Analysis includes:

- Technical
- Financial
- Legal
- Environmental
- Lifecycle costing

Pilot Projects:

USTDA-funded pilot projects demonstrate the effectiveness of commercially proven U.S. technologies and equipment in the foreign buyer's setting.

Example: China Demand Response Pilot Project with Honeywell and AECOM



Contacts

The following contacts would be useful to companies pursuing the China Smart Grid market:

- USTDA (DC): Country Managers Lida Fitts lfitts@ustda.gov, 703-875-4357 or Verinda Fike vfike@ustda.gov
- Xiaolei Wan, USTDA Coordinator in Beijing , 8610-8531-4534 xiaolei.wan@trade.gov
- Elizabeth Shieh, Commercial Service (Beijing), 86-10-8531-3589, elizabeth.shieh@trade.gov
- Andrew Bennett, Commerce (DC), DC, 202.482.5235, andrew.bennett@trade.gov
- Ray Cheung, Director, Energy Cooperation Program (Beijing), rcheung@amchamchina.org, 86.10.8519.0876
- Yumin Yeh, Manager, Sustainable Development and Strategic Partnerships, US-China Clean Tech Center, (Los Angeles) yumin.yeh@icet-usa.org, 213.247.5703

Getting Involved



USTDA

UNITED STATES TRADE AND DEVELOPMENT AGENCY

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July 27, 2012

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[Business Opportunities](#)

[News & Events](#)

[Photo Gallery](#)

[Publications & Resources](#)

[About USTDA](#)

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**FEATURED IN JULY:
EAST ASIA &
EURASIA**

USTDA Features East Asia and Eurasia In July
Highlights Include Regional Export Opportunities, News and a Webinar

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Recent USTDA Smart Grid Projects in China

Smart Grid Standards Development: Under a recently-completed USTDA grant, GE worked with the China Electric Power Research Institute (under State Grid) to develop Chinese standards for smart grid infrastructure that are appropriate for China and harmonized with U.S. standards.

Smart Meter Standards Development: In cooperation with the National Energy Administration, USTDA is funding a series of technical meetings in China between Chinese and U.S. smart grid experts and standards developers to identify and develop common electricity metering standards and draft a roadmap for continued U.S.-China smart grid technical standards harmonization. China's Electrical Equipment Industry Association is working with the National Electrical Manufacturers Association (NEMA) on this project.

Smart Grid Demand Response System: A USTDA grant to China's State Grid Electric Power Research Institute funded a just-completed feasibility study on the development of a demand response system and pilot project for China's electric grid and to assist in the drafting of a national smart grid implementation strategy. Honeywell Laboratories was the lead contractor and shared costs of this study.

Smart Substation Communication Architecture Pilot Project: A USTDA grant is supporting a pilot project and technical assistance on smart grid substation communication architecture for the China Electric Power Research Institute (CEPRI). This project will develop and demonstrate a model for smart grid communication at the substation level, which will serve as the basis for a new Chinese standard for future smart grid communication network deployment. This project will pave the way for introduction of state-of-the-art integrated communications capability at the 8,100 substations being upgraded to Smart Substations during the next three years. Project contractor Cisco (San Jose, CA) is sharing costs of the study.

China Smart Grid Standards

USTDA Webinar

February 12, 2013

Matt Lecar
Principal
GE Energy Consulting



imagination at work

Over a century of GE history in China

History

- **1906:** GE started business in China
- **1908:** First lighting plant in Shenyang
- **1925:** Acquisition of Anderson/Meyer Trading Company, servicing electrical industry in China.
- **1991:** First JV of GE China, GE Hangwei Medical Systems, Beijing
- **1994:** GE China co, Ltd established
- **2000:** Global Research Center, Shanghai
- **'08 & '10:** GE proudly sponsored Beijing Olympics and USA Pavilion in Expo



Vice Premier Li Keqiang met GE Chairman Jeff Immelt

Current Presence

- **16,000+** employees, ~ supporting 90,000 jobs through JVs & sourcing
- **\$5 billion** in revenue for 2010, \$4.2 billion in sourcing
- **59 legal entities**, 26 manufacturing facilities with output of ~\$1.3B
- **320+** offices across 174 cities
- **2,200** people in R&D
- **550+** patents originated in CTC by 2010

Overview of GE's USTDA Project

- US Trade and Development Agency (USTDA) grant to the China Electric Power Research Institute (CEPRI) to fund a one year study of smart grid best practices from current US deployments and apply lessons learned for China in the development of technical standards and regulations.
- Survey and assess recent advances in the US in planning, construction, and demonstration projects in smart grid technologies, smart power distribution systems and monitoring approaches, and customer-side energy management solutions
- Provide recommendations for technical standards and regulations
- Project included 5 trips to China (and one week hosting a delegation around the US) between August, 2011 and August, 2012



About CEPRI



国家电网
STATE GRID

中国电力科学研究院
CHINA ELECTRIC POWER RESEARCH INSTITUTE

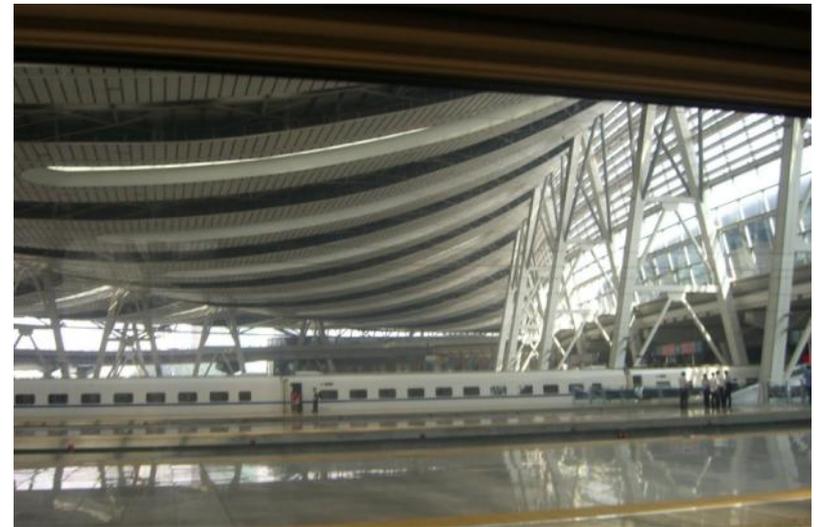


- Technical R&D arm of State Grid with 2,300 engineers at multiple facilities: UHV test center, grid simulation lab, equipment test and certification for metering, EVSE, etc.

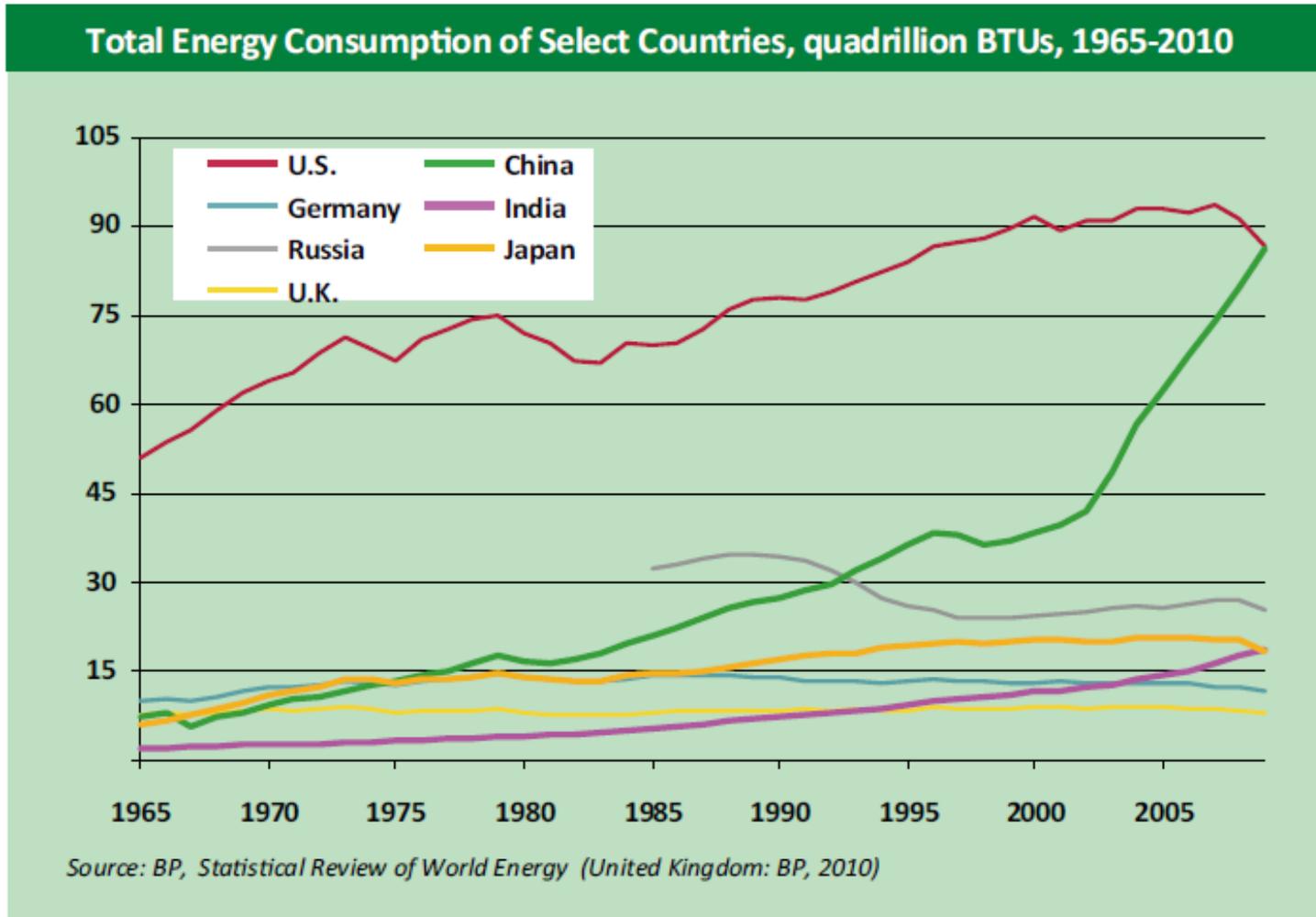
Smart Grid R&D Center
Power System Department
High Voltage Department
Power Electronics Department
Power Automation Department
Transmission and Transformation
Engineering and Construction

Information & Communication Department
Metrology Department
Department of Power Distribution and
Utilization & Rural Electrification
Renewable Energy Department
Electrical Engineering & New Material
Department

A few images



Why China matters



Context for Smart Grid in China

- Rapid demand growth outstripping supply of conventional resources
- Rapidly rising standard of living (especially in urban coastal areas) – reduced acceptance of supply disruptions, air pollution
- 5th 5 year plan includes US\$ 500B commitment to electric infrastructure
- Large build out of UHV transmission (both AC and DC) to connect remote resource rich regions to coastal load centers
- “Pilot” deployments of AMR, EVSE in big cities
- Distribution infrastructure still in poor shape in many areas
- 70% of load is industrial, a lot of it power intensive heavy industry
- Residential demand is increasing but may not have same discretionary character (lots of window AC in big cities)
- Not much off-street parking; EV charging will mostly be public/shared

Example: Status of EV infrastructure

- EVSE standards not in place
- Most charging expected to be in public areas (streetscape, parking garages, depots) due to high density urban living
- Deployments to date driven by government and SOEs; unclear opportunity for foreign manufacturers
- 70% coal in electricity supply mix, so environmental benefits of EV are questionable in the near term
- “Success is: I install 1000 charge points”



Status of SG Standards Activity

- Internal Enterprise Standards:
 - ✓ State Grid (SGCC) has developed internal standards covering planning, dispatching, communication, information sharing, generation, transmission, substation, distribution, consumption, etc.
 - ✓ China Southern Grid also has standards process (but SGCC is leader)
- Industrial Standards
 - ✓ China Electricity Council (CEC) and National Energy Administration (NEA)
 - ✓ Industry represented by China Machinery Industry Federation (CMIF) and China Electrical Equipment Industry Association (CEEIA)
- National Standards
 - ✓ National Standards (GB) are administered by the Standardization Administration of China (SAC), developed by National Professional Standardization Techniques Commission (NSTC).
- International Standards Cooperation
 - ✓ CEPRI has taken a leadership role in IEC PC 118 (Interoperability). Proposed participation in NIST SGIP 2.0 still pending.

Feedback on Project from CEPRI

- (1) Chinese experts know America's smart grid research and pilot projects in detail, which we cannot know from Websites.
- (2) It provides us with the opportunity to visit LLNL , LBNL, and EPRI. It makes it possible for the two Labs and CEPRI to know each other and try to find opportunities to cooperate in demand response and wind power forecasting, etc.
- (3) In some seminars in China we introduced the research results of the project , and more Chinese experts know what GE has done in smart grid technology innovation, such as smart meter, thermostat, smart washing machine , heater, etc. providing basis for future cooperation.
- (4) Chinese experts know the achievements of US in smart grid standardization... became experts of IEC PC118 and SEP 2.0 and OpenADR2.0; the two specifications provide important reference for PC118.
- (5) We know the primary standard organizations including some alliances , such as Zigbee , Homeplug , OpenADR and so on. We knew the SGIP would become SGIP2.0 and then wrote a report on applying for membership of SGIP 2.0 and submitted it to SGCC. Now the application is in the process of approval.

(Quoted from email communication with Ms. Dongxia Zhang, CEPRI Project Manager)

Chinese Project Examples

Zhangbei Renewable Demonstration

- State Grid owned and operated hybrid renewable/storage site
- Currently 20 MW solar (100 MW future), 100 MW wind (500 MW future), “10’s of MWs” of battery using 3 chemistries (lead acid, Li-Ion, Vanadium flow)



Tianjin EcoCity District

- Green high rise luxury housing development and public transit
- Building integrated storage
- Maximize renewables with urban in-fill wind and solar
- State Grid DA pilot for high reliability

GE
Energy Consulting

Thank you!



imagination at work





The Association of Electrical and
Medical Imaging Equipment Manufacturers



China Smart Meter Standards Development

Gene Eckhart
February 12, 2013



Summary

-  Grant funding by the U.S. Trade and Development Agency provided to China Electrical Equipment Industry Association (CEEIA)
-  Technical Assistance project between CEEIA and NEMA
-  Focuses on a pilot project to identify process needed to harmonize smart meter standards between China and USA.



Project Objectives

-  Understand the issues, applications, and development statuses of the two meter standards series, ANSI C12 and IEC 62056.
-  Develop a harmonization proposal for bridging the two metering protocols.
-  Deliver the harmonization proposal separately to the Chinese and U.S. national Smart Grid standards authorities.



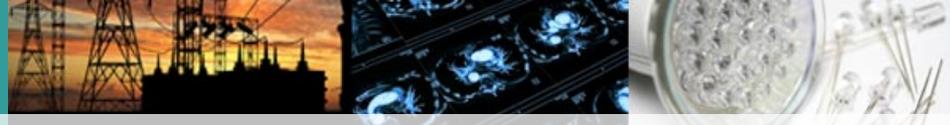
Approach

-  Evaluate progress of smart meter installation programs based on IEC and ANSI standards in Europe, China, and the U.S.
-  Determine the extent to which IEC 62056 and ANSI C12 are currently being used in China and the U.S.
-  Determine the future standards development plans in each country.
-  Working group in place to conduct evaluation and analysis.
-  Consider any additional country-related requirements, e.g. State Grid procurement requirements, U.S. utilities' test requirements, etc.



In Play

-  Analysis of the ANSI C12 series of standards to identify functional requirements.
-  Comparison of IEC meter standards and Chinese GB standards.
-  Testing specifications of meters required by State Grid Corporation of China.
-  Comparison of testing protocols between ANSI C12 and IEC meters.



Common Requirements

Accuracy Testing

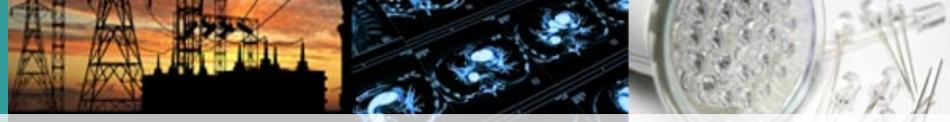
- 💡 Load performance
- 💡 Variation of power factor
- 💡 Variation of voltage, frequency
- 💡 Effect of internal heating
- 💡 Effect of poly-phase loading
- 💡and others.



Common Requirements, cont.

External Influences

-  Voltage interruptions
-  External magnetic fields
-  High voltage line surges
-  Current surge in the ground conductor
-  Variation of ambient temperature.

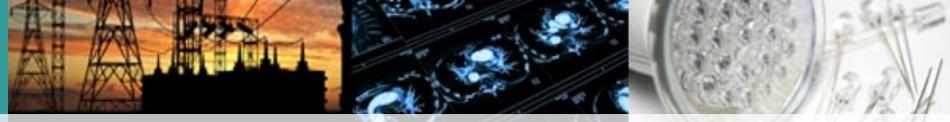


Communication Protocols

- 💡 Suite of ANSI C12 Protocol Standards vs.....
- 💡 China Protocol Standards based on IEC 62056

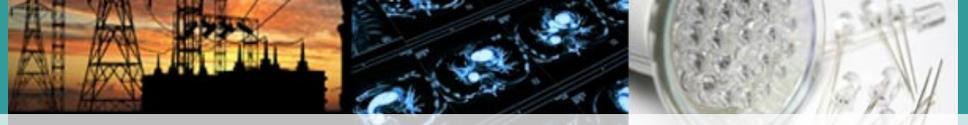
- 💡 ANSI C12.18, C12.19, C12.21 and C12.22

- 💡 GB/T 19897.1- 2005 (IDT) Direct Local Data Exchange
- 💡 19897.2-2005 (IDT), and 19897.3-2004 (IDT)
- 💡 GB/T 19882.33-2007 (IDT) COSEM Application Layer
- 💡 19882.31-2007 (IDT), and 19882.32-2007 (IDT)



Functional Requirements

-  Rapidly expanding list based on deployment experience.
-  Two key categories, measurement and data storage and communications.
-  Smart meters must have advanced capabilities even though not all are used in every application.



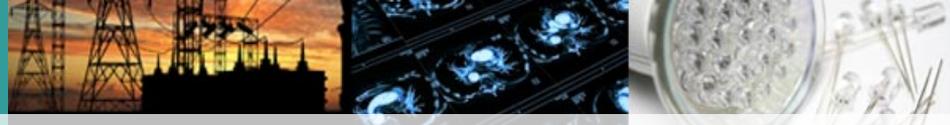
Next Steps

-  Final meetings of Working Group to develop recommendations to ANSI and GB authorities.
-  Public workshop in China to disseminate findings.
-  Issue final report.



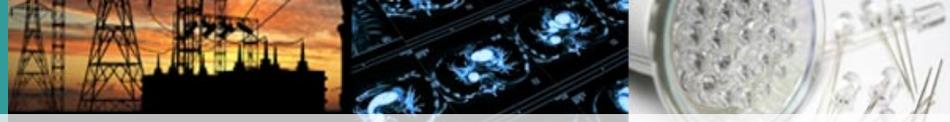
Smart Grid Roadmap Development

-  Concept: using lessons learned from smart meter project develop an approach to develop a Smart Grid roadmap.
-  Close cooperation with NIST.
-  Basic elements are now being defined.



Policy Questions

- 💡 Degree to which foreign suppliers may participate in the development of China's Smart Grid, how the USG may be best able to engage.
 - Many opportunities for foreign suppliers but they need to work on:
 - Learning the relevant Chinese Standards
 - Know the bidding requirements
 - Make their products well known in China
 - One of the best measures taken by USG is the USTDA Standards and Conformity Assessment Cooperation Program.
 - Provides platform for U.S. industry to show advanced technology
 - Can make a positive influence on Chinese standards.
 - Can bring U.S./Chinese experts to meet and explore possibilities of further cooperation



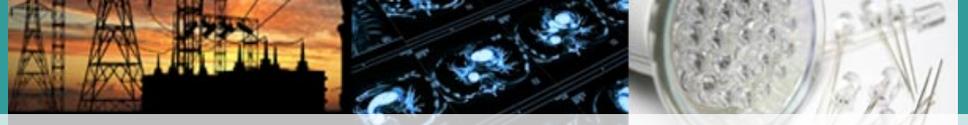
Policy Questions, cont.

- 💡 How China is carrying out standards development, and degree to which foreign stakeholders may participate and whether on the same terms as locals.
 - China is developing standards through Chinese TCs and SCs.
 - Foreign stakeholders could participate in TC/SCs as members, but it could be equally valuable to provide comments or recommendations as observers.
 - Members need to be very well known in China, available for all the meetings, conversant in Chinese, etc.



Policy Questions, cont.

- 💡 What standards are being developed by State Grid as “enterprise standards” vs. standards developed by MIIT or SAC.
 - All enterprise standards are consistent with the standards developed by MIIT or SAC or government bodies, but they may add some extra requirements or more critical requirements.



Thank you!

Contact Info

Gene Eckhart

gene.eckhart@nema.org

Paul Orr

Pau_Orr@nema.org

Wen Shanlin

wen@nema-beijing.org

Honeywell Smart Grid Activities in China

USTDA Webinar

Feb 12, 2013

Ed Koch

Senior Fellow, Honeywell

Honeywell

USTDA Key Project Participants

Honeywell



国家电网公司
STATE GRID
CORPORATION OF CHINA



Honeywell

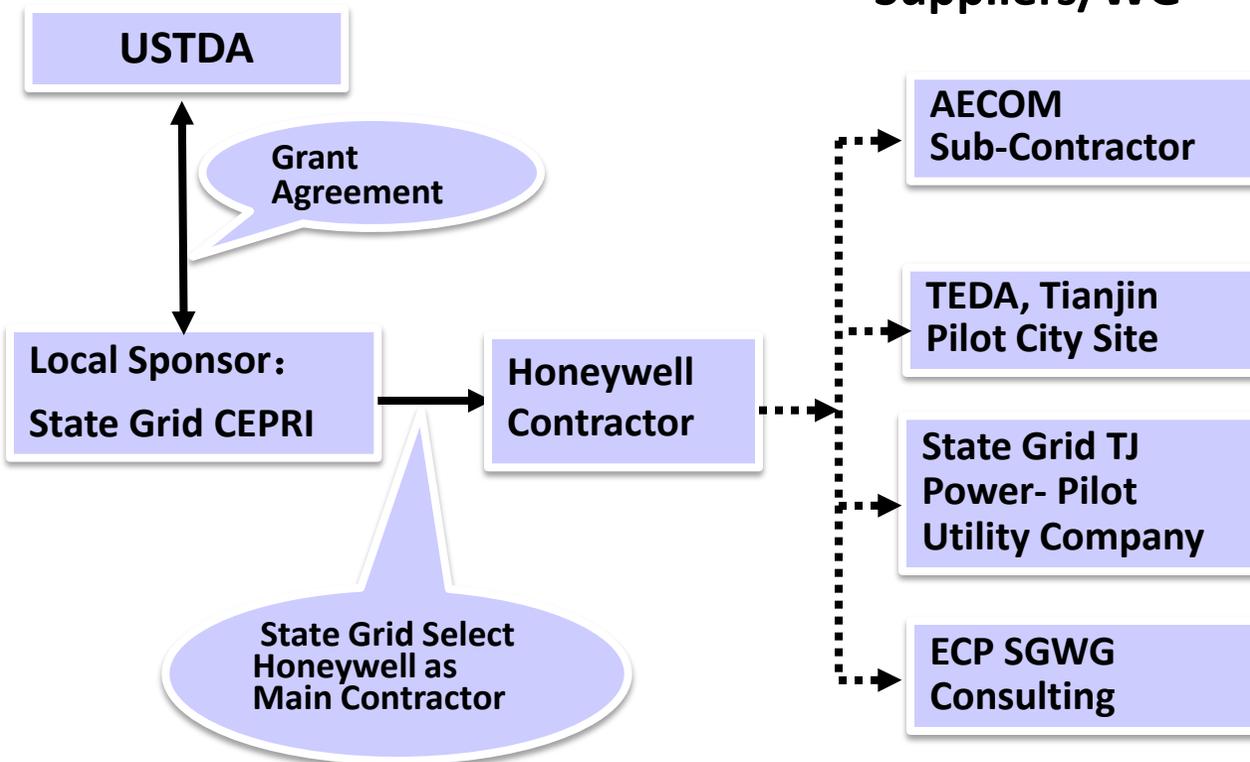
AECOM®



USTDA Project: “Demand Response Demo/Feasibility Study”

Honeywell

Grant Application



Project Tasks Required :

1. Project design, planning/ specification definition
2. Data collection, analysis, world best practice case study
3. Pilot city/participants selection, pilot strategies/proposal, system design specifications, incentive mechanism study
4. Pilot implementation
5. Legal, market, cost analysis
6. Economic analysis, financing mechanism
7. Environmental/develop. analysis
8. U.S. export analysis
9. Project reporting/meeting

Project Objectives & Value to China:

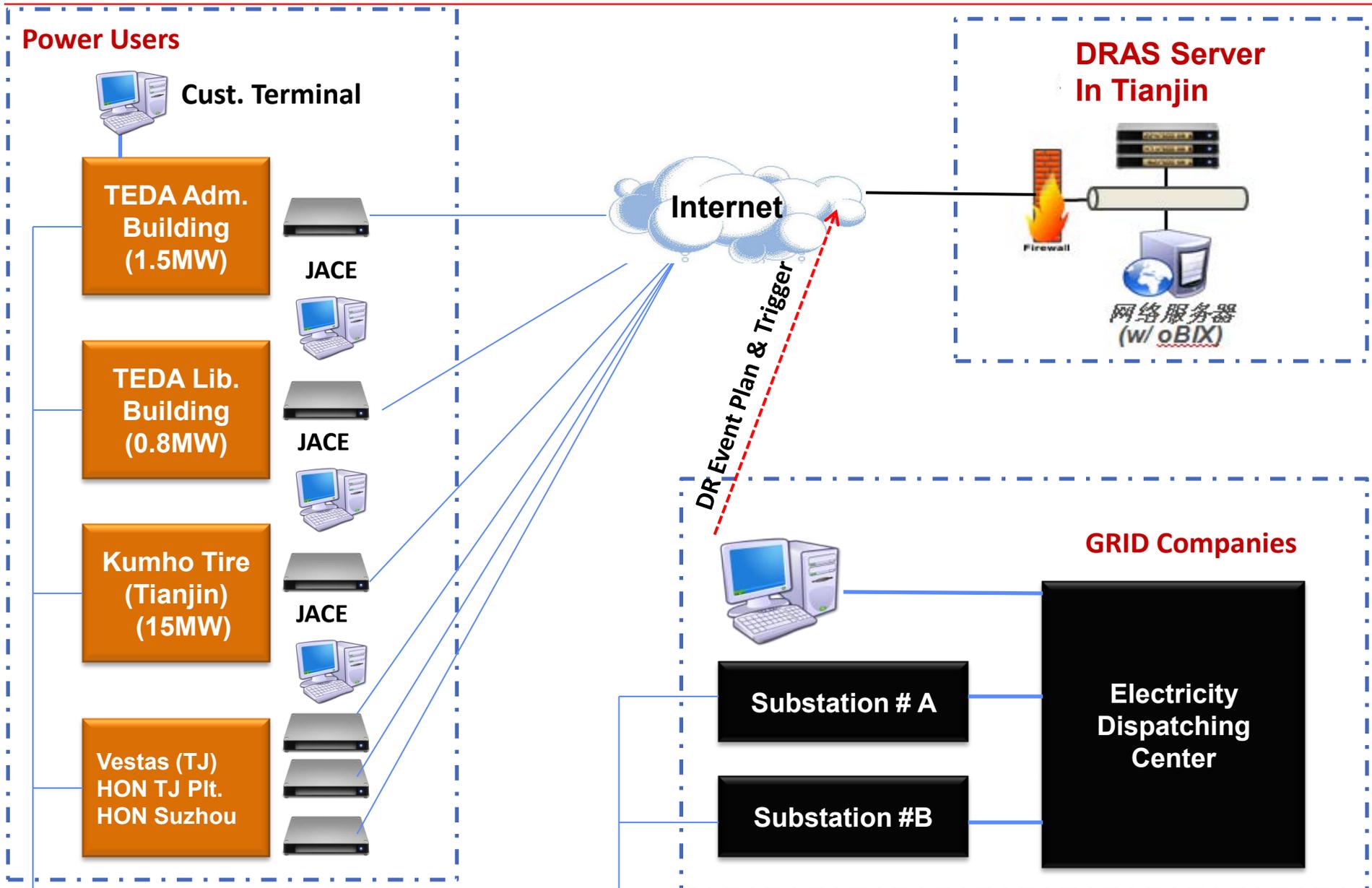
1. Under China infrastructure to build a world class DR platform & conduct DR scale-up feasibility Study
2. To contribute to China’s DSM initiatives
3. Build a successful U.S./China collaboration case

Key Deliverables:

1. Technical demo w/ minimal 2 comm. Bldg, 1 industrial plant
2. Submit to State Grid/NEA/USTDA 8 task reports , and final reports
3. Project results to be confirmed by China experts at 2 major meetings

USTDA Project Demo Architecture

Honeywell

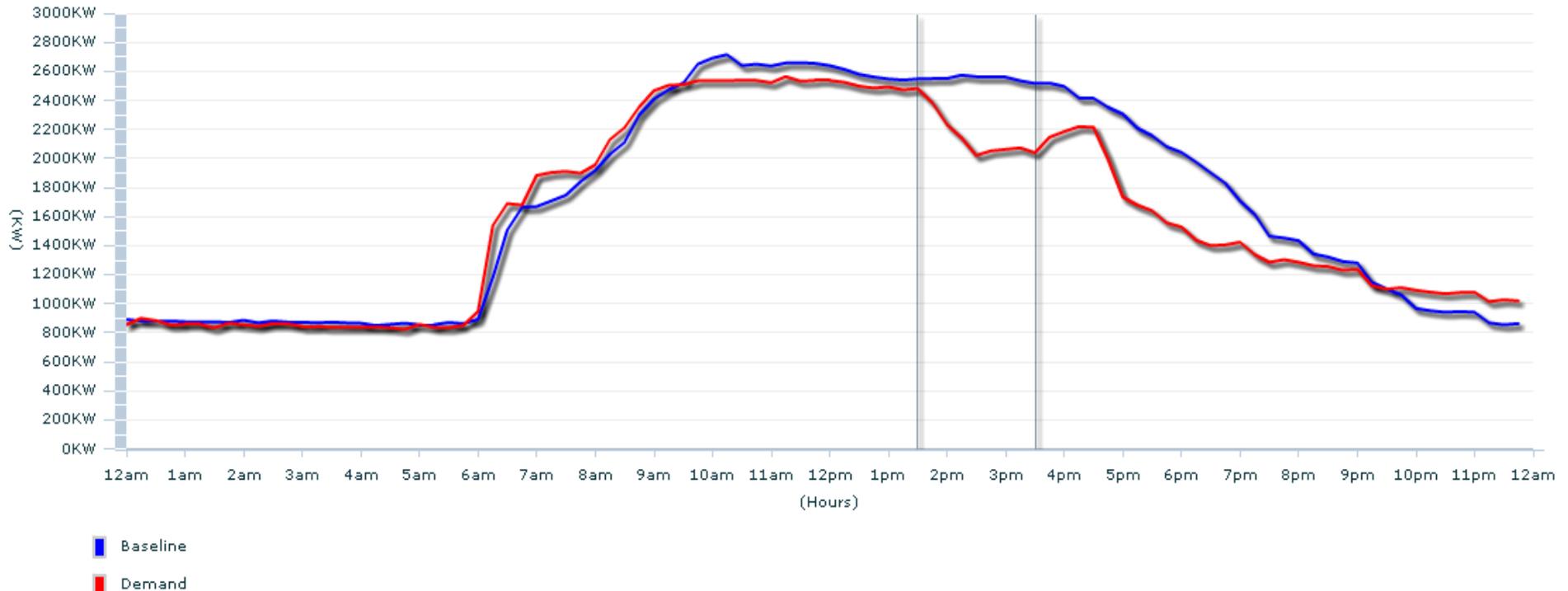


Aggregated ADR Shed Curve, TEDA Adm/Lib Buildings, 15.1%, July 06/12

Total 385.75KW shed, admin building contributes 279.38 KW and lib building contributes 106.37 KW. The total percentage of shed is about 15.1%. Baseline Method: 3/10, top 3 days average for past 10days

Usage Client Status Events Participation

	Baseline		Actual		Shed	
	Avg(KW)	Total(KWH)	Avg(KW)	Total(KWH)	Avg(KW)	Total(KWH)
Entire Day	1,703.95	40,468.75	1,603.67	38,087.08	100.28	2,381.66
During Event	2,552.01	5,104.03	2,166.27	4,332.53	385.75	771.50



USTDA Project Wrap-Up Meeting/Status

Honeywell

USTDA Project “Demand Response Demo/Feasibility Study” Wrap-up Meeting, Nov. 28, 2012



Project Current Status :

1. Project reporting meeting was held Nov. 28, 2012, with the participants from China NDRC, SGCC, NEA, USTDA, USDOE, ECP, TEDA Gov., Suzhou Demo City Gov. official, and HON/AECOM/CEPRI project team members/leaders
2. All 9 tasks were successfully completed on time, and got project Grantee – SGCC CEPRI’s approval, including all sub-task invoice written approvals in the end of 2012
3. Project Executive Summary reports has been distributed to affected parties, final full reports is in translation from English to Chinese, will release end of Feb., 2013
4. US team has prepared full documents, will submit to USTDA for a formal project wrap-up mid-Feb, 2013

Key Findings From the Study Project

1. The potential benefit to China could be significant. If the participation rates are higher enough, the peak load reduction using CPP programs alone has the potential to reduce 5.2 percent of China's total electric peak load.
2. For China, automated peak load reduction could be an extremely valuable energy resource. This project demonstrated the capability of Honeywell's AutoDR solution to collect such energy resources in the GRID. The technology demonstrated meets the key requirements of China's DSM demo city initiatives.
3. Government policies and incentive mechanisms serve important roles in establishing the conditions for participation. This project suggests further effort to explore appropriate incentive programs in China.
4. This project demonstrated that automated peak load reduction may offer many advantages over manual or even semi-automated approaches, e.g. more reliable shed reduction, faster response, less labor intensive operations and improved monitoring of event performance.
5. "Smart Grid-ready buildings" have the potential to provide a valuable resource to assist China in achieving its permanent and temporary load reduction targets.
6. Advantages may be realized by combining base load and peak load reduction activities. Building owners are likely to operate with greater efficiencies and utilities likely will experience large and more consistent results.
7. When including economic, social and environment factors, the large scale implementation of peak load reduction in China could yield the benefit-to-cost ratio in the range of 2:1 to 10:1.

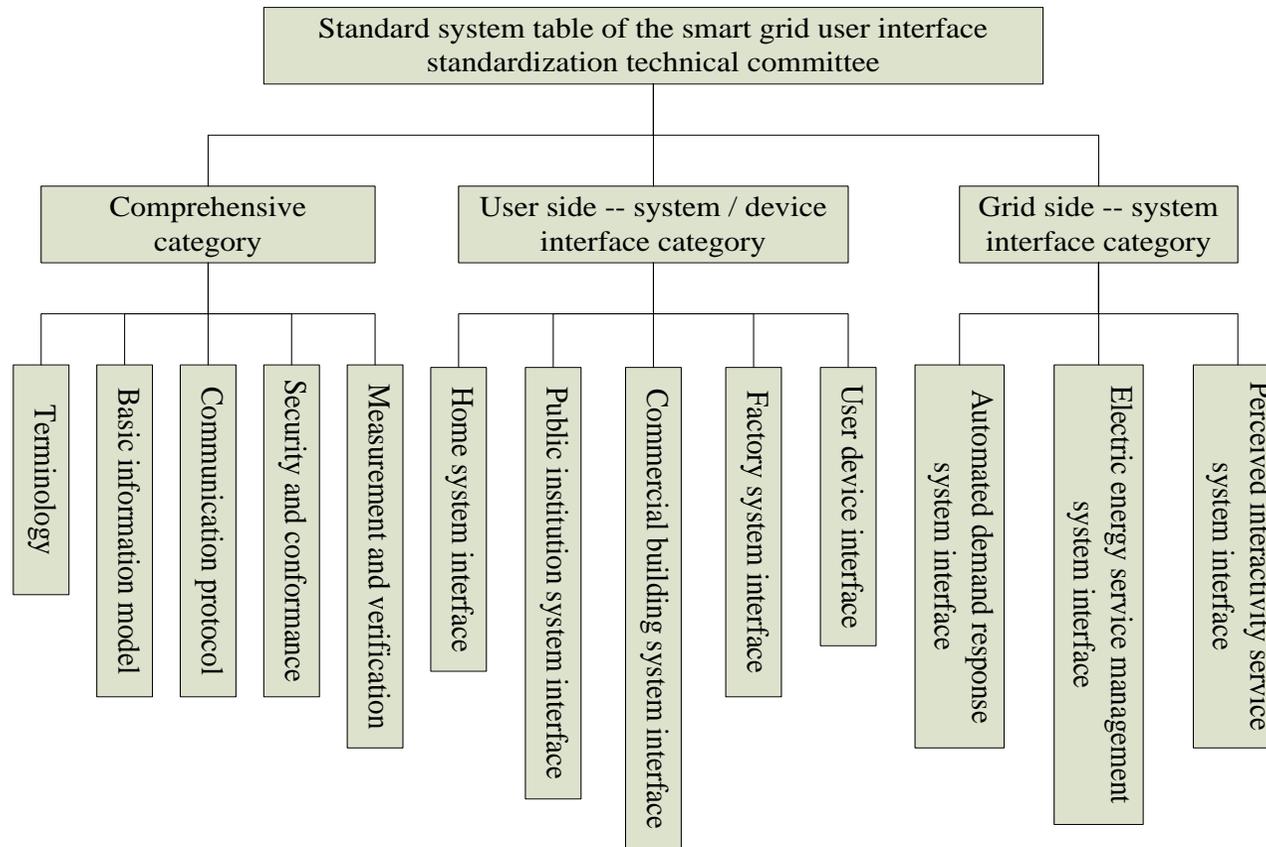
Standards Development Activities

Standards of DSM/DR system

Standards category	Title of standards
Smart Home System	<p>Technical Specification for Residential Smart Home Gateway</p> <p>Technical Specification for Residential Smart Interactive Terminals</p> <p>Technical Specification for Residential Smart Socket</p>
Smart Power Consumption	<p>Function Specification for Smart Residential Communities</p> <p>Guideline for Smart Park Construction</p>
Electric Vehicle charge/ discharge	<p>Technical Specification for EV Charging and Battery Swapping System</p> <p>Interface Specification for EV Charging/ Discharging Facility</p> <p>Communication Protocols for EV Charging/ Discharging System</p>
Electric Consumption Data Acquisition System (AMI)	<p>Technical Specification for Electric Consumption Data Acquisition System</p> <p>Communication Protocols for Electric Consumption Data Acquisition System</p> <p>Technical Specification for Smart Metering Information Exchange Security Certification</p> <p>Technical Specification for Electric Consumption Data Acquisition System Security Protection</p>
Power Energy Service Management Platform	<p>Technical Specification for Power Energy Service Management Terminal</p> <p>Design Specification for Power Energy Service Management System Slave Station (Enterprise Master Station)</p> <p>Technical Specification for Data Concentrators of Power Energy Service Management System</p> <p>Communication Protocol for Power Energy Service Management Service System</p> <p>Interface Specification for Power Energy Service Management Platform System</p>

Standard Development Categories for PC118

Standardization Administration Committee (SAC) plan to establish a TC to develop SGUI related Standards in China. The standard system table is shown as follows.



Standards used on Auto DR Pilot Project in Tianjin

Grid Side

Utility

DRAS



User Side

C&I

DR Gateway



DO, BACnet, KNX, Lonwork...

Facility EMS

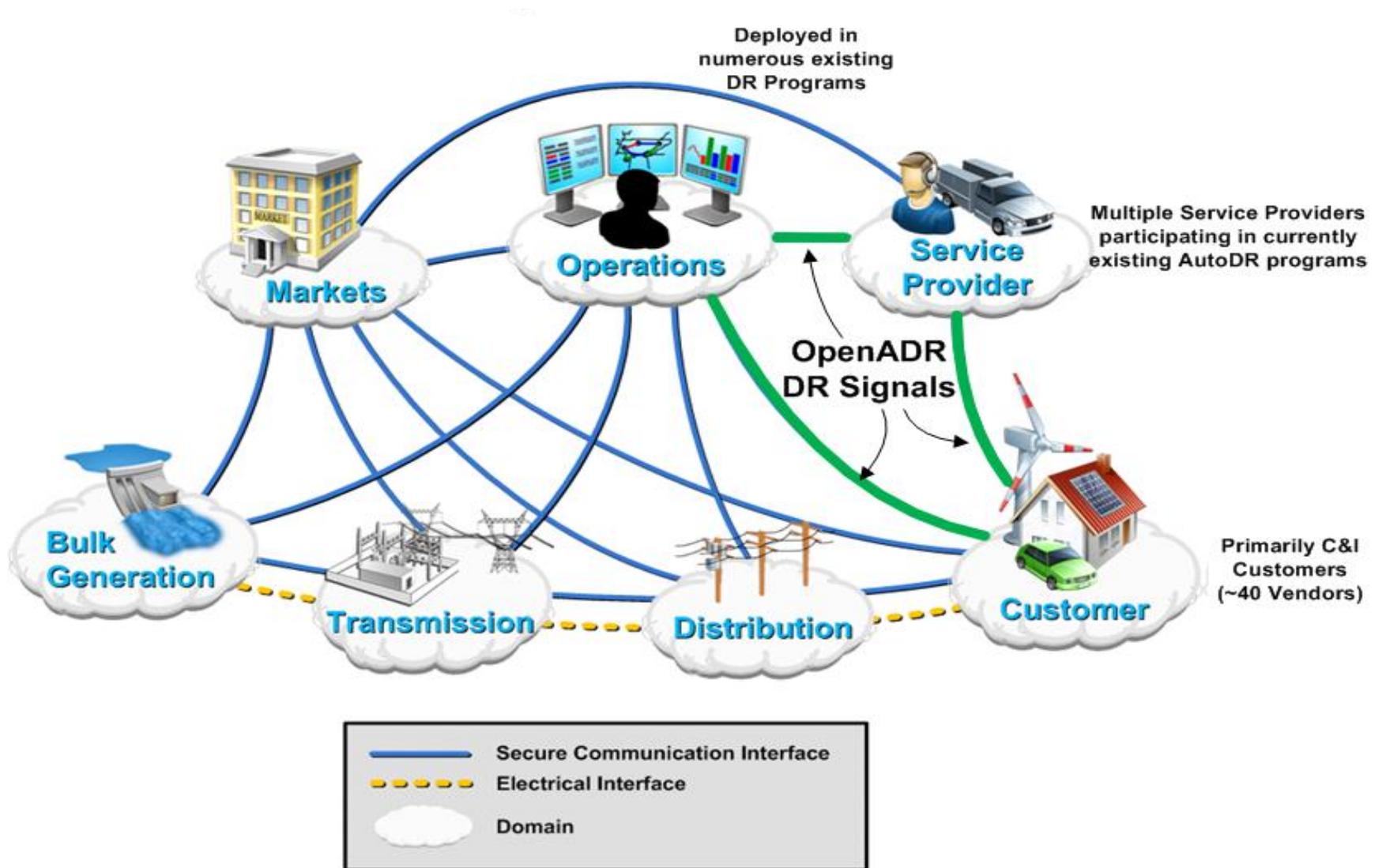
Modbus

Meter

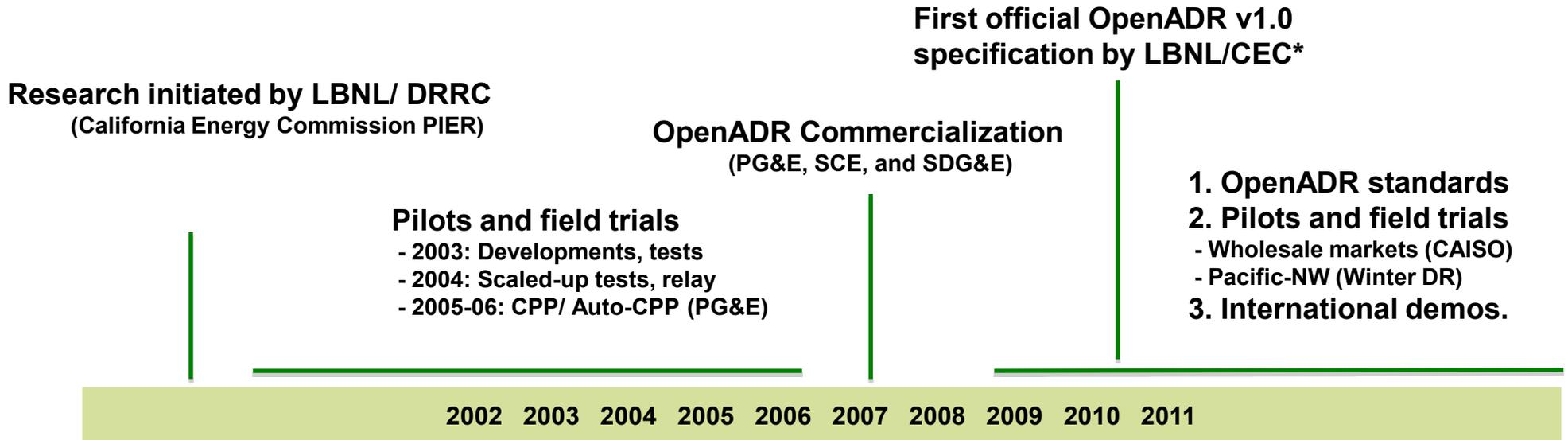
Meter Data
oBIX

OpenADR 1.0
Reliability Signal
(High, Moderate, Normal)
Price Signal (simulated)

OpenADR in the SGIP Conceptual Model



OpenADR History and Timeline



1. OpenADR donated to OASIS and UCAIug
 - UCA OpenADR Taskforce formed
 - OASIS EI TC formed
2. NIST Smart Grid, PAP 09
3. Honeywell Smart Grid
 - ARRA 80MW Auto-DR w/ SCE



OASIS WS-Calendar, EMIX, and EI specification completed

*OpenADR v1.0: <http://openadr.lbl.gov/>

Thanks