

2012 Smart Grid Peer Review Meeting
San Diego, CA

**Los Angeles Department of Water and
Power – Smart Grid Regional
Demonstration Program**

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Smart Grid Regional Demonstration Program

Objective

- Integrate **Electric Vehicles** into the LADWP grid
- Demonstrate integrated **Demand Response** operation and technology.
- Develop a comprehensive portfolio of **Customer Behavior** studies
- Demonstrate next generation of **Cyber Security**



Life-cycle Funding (\$K)

FY10/11 – FY15/16

**\$60,280K
Match Grant**

Technical Scope

- Using test bed sites to deploy and demonstrate an integrated communication, demand response, and electric vehicle infrastructure, protected by the next generation cyber security.
- All this will be done in conjunction with consumer behavior studies identifying methods to influence consumer's energy usage patterns.

Needs and Project Targets

1. EV Infrastructure – How will adoption of EVs impact the Power Grid?

- EV charger rebate program (~ 200 level II chargers installed)
- Make Los Angeles EV ready
 - Publically accessible level II & III chargers
 - Power Distribution Equipment – is the distribution system ready for the EV penetration?
 - Distribution Effects
- One way charging vs. two way vehicle to grid demand response resource
- EV Metering
- Smart Charging – UCLA WINSmartGrid
- Fully Automated Microgrid – Distributing Station 88; Feeders 22-23 (Chatsworth)

2. Demand Response –

- AMI Infrastructure – Cellular and RF systems
 - Automatic Demand Response vs. Manual Demand Response
 - Advanced meter features will provide data in 15 minute intervals
- Deployment of smart appliances - residential customers participating in Home Area Network (HAN) demonstrations
- Building to grid (B2G) energy management - interactions of the smart grid with commercial buildings.
 - Optimizing load reduction events and minimizing building occupant negative impacts.
 - A campus test bed Micro-Grid that will show an integrated SG infrastructure that can accept DR control signals from LADWP and perform targeted load curtailment across campus,
 - The Micro-Grid acting as a utility operations center in making DR decisions.
 - DR software architecture will assist the facility operations in determining when to perform load curtailment and by how much based on Campus Consumption Forecasting.

Needs and Project Targets

3. **Customer Behavior – How do we influence traditionally non-interested customers to change their energy use behavior?**
 - Identify what additional factors, other than monetary, will convince the customer to change some part of their energy usage
 - Surveys, public outreach campaigns, education – City Council, LADWP Board, LAWDP Employees, public
 - Customer Segmenting – identifying what groups of customers respond to different messaging
 - Customer Engagement Policy

4. **Next generation Cyber Security/Cyber Resilience**
 - Jet Propulsion Laboratory (JPL) & University of Southern California (USC) – Information Sciences Institute (USC-ISI) DETER Test Bed
 - Security of New customer information
 - Two way IP communication increases risk to US electricity infrastructure
 - Ability of the grid to defend itself from sophisticated and agile cyber threats

5. **Project is on Schedule and currently procuring and installing our smart grid infrastructure**
 - Meter Installation to begin in November/December 2012
 - All Public level II chargers to be installed by June 30, 2012 approx.
 - Customer Behavior Outreach is ongoing

Design Phase

1. **A rigorous Design Period of 18 months**
 - Preliminary Requirements to Final Design
 - Detailed Design Documents (March 31, 2012 submittal)
 - System Integration: Integrating many new systems with each other and with legacy systems

2. **System Engineering Team was assigned to bring an end to end view of the solution**
 - AMI Experts
 - System and Data Flow diagrams
 - Test and Verification Plan
 - Address overlapping technical needs between project segments
 - Concept of Operations

3. **Telecommunication Team and System Integration – to deploy smart meter communication infrastructure to the back office**
 - Compatibility with existing data collection systems – Handheld data collection devices
 - Integration with new billing systems
 - Real Two Way Communications – send firmware updates and pull meter data
 - Meter testing and verification Plan – ensure accuracy of billing data
 - System testing and verification – ensure data pulled from the meter data management system is accurate

Technical Challenges

1. **Fully operational micro grid**
 - Inductive charging of electric vehicles
 - Local grid balancing
 - Automation from generating station to the home
2. **Campus test beds at UCLA and USC for micro grid demonstrations**
 - Integrated smart grid infrastructure in a commercial environment
 - Load curtailment events using different facility configurations
3. **JPL-Cyber Security and Grid Resiliency**
 - Grid Resilience against cyber attacks
 - Detect and recover from security compromises
 - Secure Data Management

Technical Accomplishments

Achieved in prior years

1. Design of a fully automated micro grid including automation from the generating station to the smart meter at the home – **we can do it because we are a vertically integrated utility**
2. Selecting an AMI vendor
 - Evaluation process
 - Involvement of meter experts
3. Completion of Final Design
 - Final Design phase completed March 31 2012.

Technical Accomplishments for FY 12

1. Charge Up LA (ongoing)
 - A residential charger installation program for those customers that are early adopters of EVs.
 - 1000 rebates are available to purchase and install a level II charger.
2. Retrofit older EV chargers at LADWP, prepare for a 72 EV fleet, and prepare Los Angeles for EV penetration
 - Chargers in publically accessible locations
 - Level III chargers
 - Distribution System Considerations
3. Garage of the Future – interaction of wind, solar, EV chargers, EVs, and V2G
4. AMI Meter Deployment (November 2012-June 2013)
 - 52,000 meter deployment in three micro grid areas
 - Cellular and RF Technology
5. First wave of customer engagement – Recruitment letters
 - Approximately 600 recruitment letters mailed out
 - Approximately 205 customer responded with a total of 7 negative calls

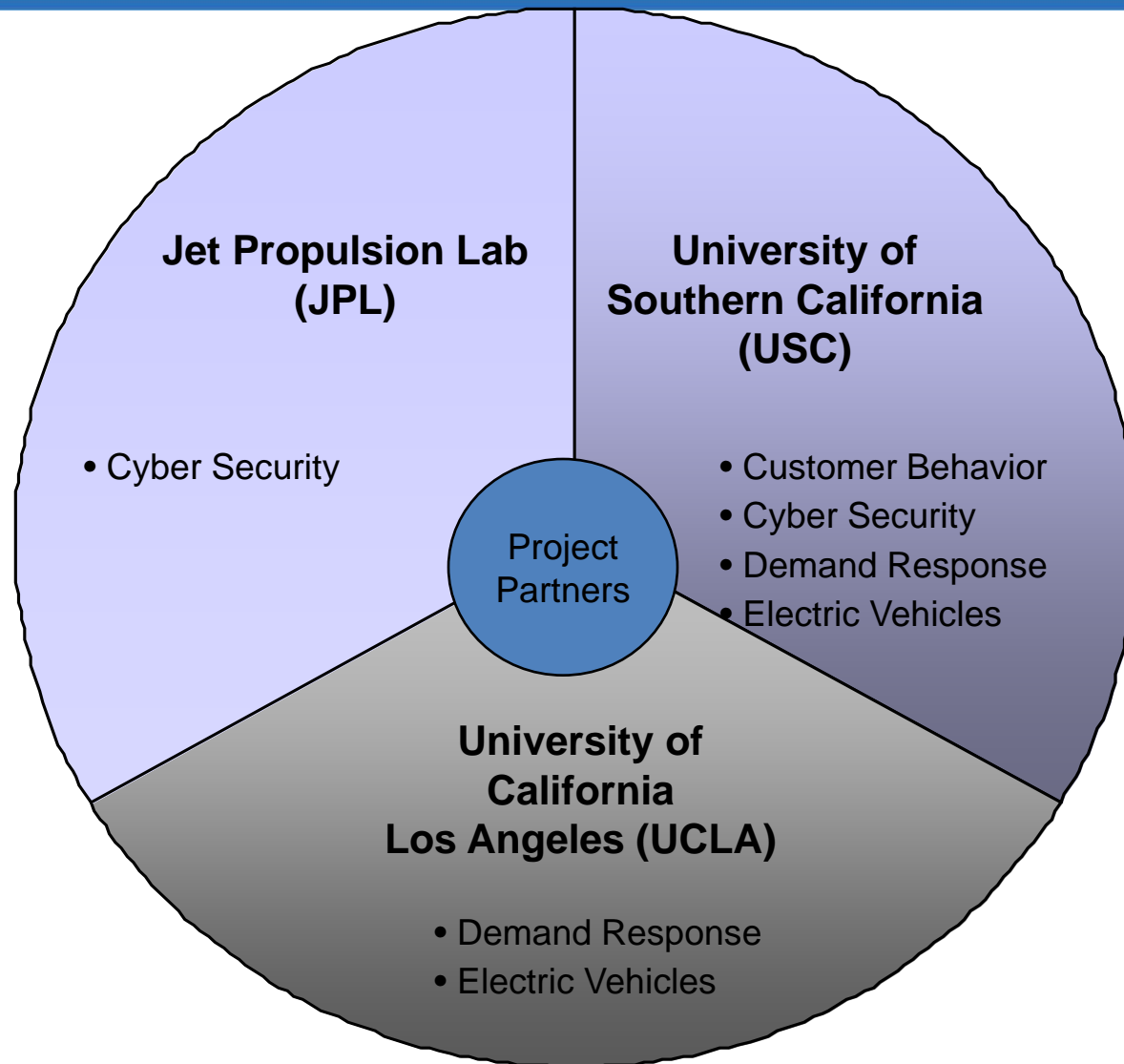
Future Technical Goals

1. Smart Appliances (March 2013)
1. LADWP's Smart Grid Demo Lab – Demand Response Control Center (June 2013)
2. Building to Grid Technology – USC Campus Test Bed (June 2013)
3. WINSmartGrid Communication Protocol – HAN (July 2013)
4. EV Sharing Programs – UCLA/USC (July 2013)
5. Behavioral Studies – across micro grids (operations)
6. Effective Security measures inside Smart Grid (operations)

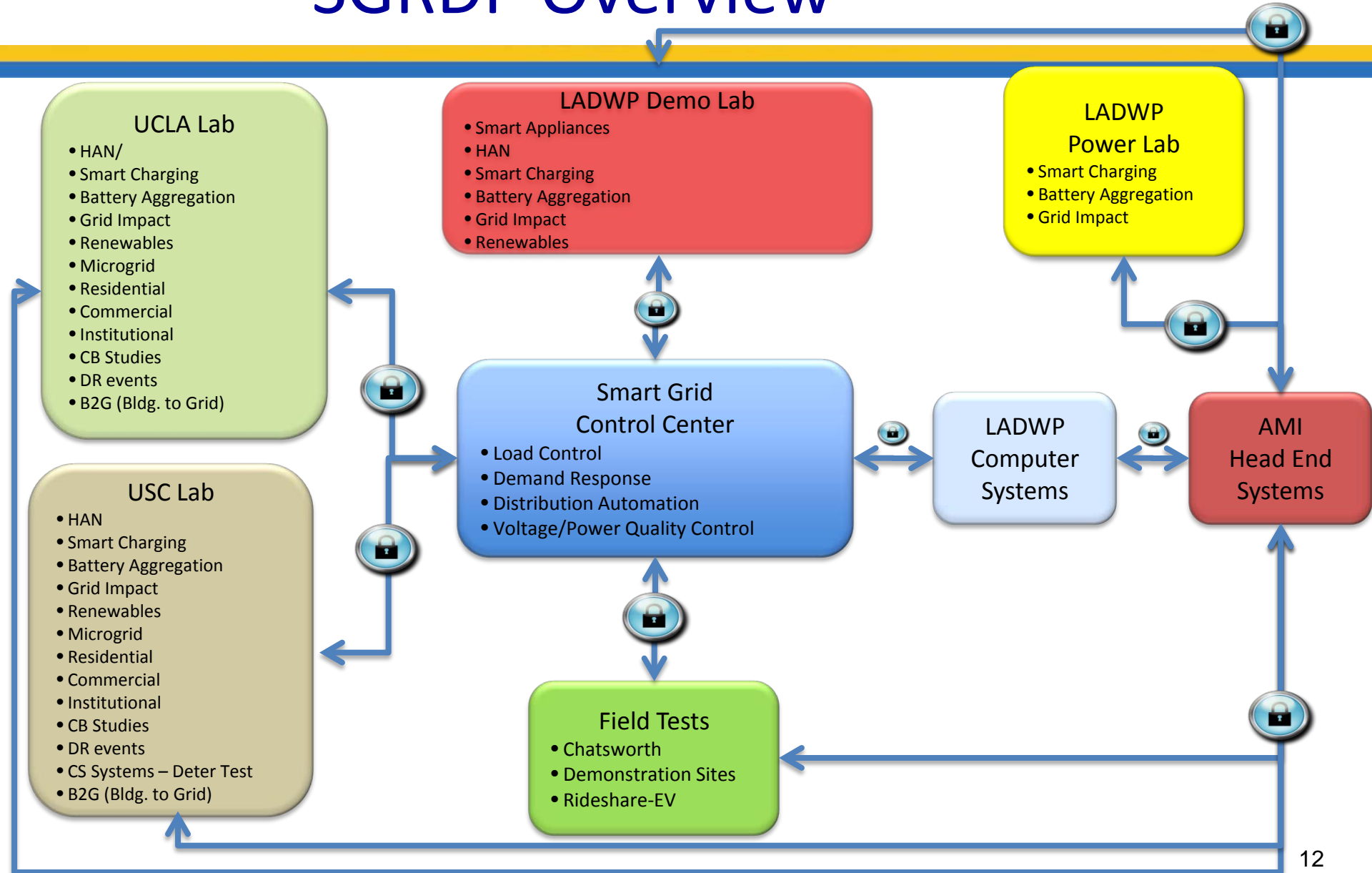
Demonstration Summary

1. Electric Vehicle Battery aggregation and backfill; distribution effects of EVs on the power grid; community storage on EV batteries; smart EV charging
2. Demand Response events using smart devices in the home and in campus test beds to precisely and reliably react to demand response events initiated by the utilities.
 - Smart Meter Deployment with two way meter communication with two completing technologies
3. Customer communications and Education
 - Strategies to change the consumers behavior
4. Grid Resiliency, Secure Data Management, effective security measures within the Smart Grid architecture

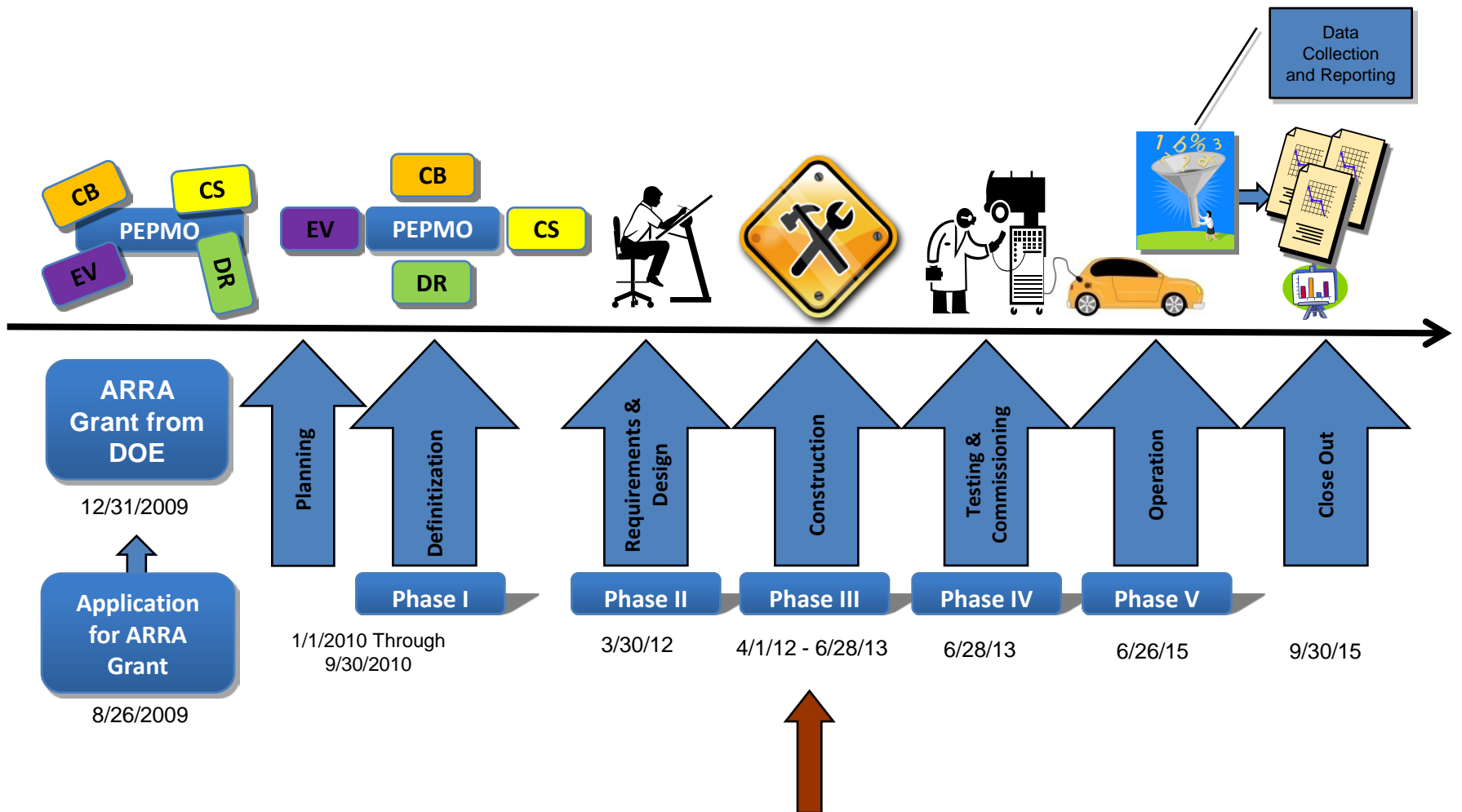
Interactions & Collaborations



SGRDP Overview



SGRDP Schedule and Milestones



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