Staff Workshop on

Defining the Pathway to the California Smart Grid of 2020

Contracting Opportunity Notice

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Overview

- Background on RFP
- Smart Grid Overview
- CPUC Comments
- Review of Key Elements of Proposed RFP
- Q&A Period
- Review the Next Steps
- Presentation on Smart Grid Activities and Technologies

Background on RFP

- Interest in Smart Grid increasing exponentially
- Energy Independence and Security Act of 2007
- California utility activity
- California Legislative activity
- PIER Energy Systems Integration Team Activities

Recent PIER Funded Smart Grid Research

To better understand:

1. What is the current status of the Smart Grid?
2. What new and emerging technologies are on the horizon that impacts the Smart Grid of the future?
3. How can we avoid incompatible systems being fielded that result in costly legacy systems that must be replaced much sooner than projected?
4. How do we help foster open access, competition and commercial growth of new and exciting technologies that provide California ratepayer new ways to meet their energy needs while at the same time saving them money?
5. Where can government help and where should government stay out?
6. What are the short, mid and long term Smart Grid infrastructure priorities for California?

PIER Research Ongoing at all Levels

Transmission

- Phasor Measurement
- Advanced displays
- Advanced comm & controls
- MRTU interface
- Energy Storage
- Renewables

Distribution

- Distribution Automation
- AMI
- Advanced C&C
- MRTU
- Energy Storage
- Renewables
- AMI

Integration

- Renewables
- Standards
- Protocols
- Reference designs
- Micro Grids
- Automation

Consumer

- Automating Demand Response
- AMI
- Dynamic Rates
- Home Area Networks
- Plug in Hybrids
- Renewables

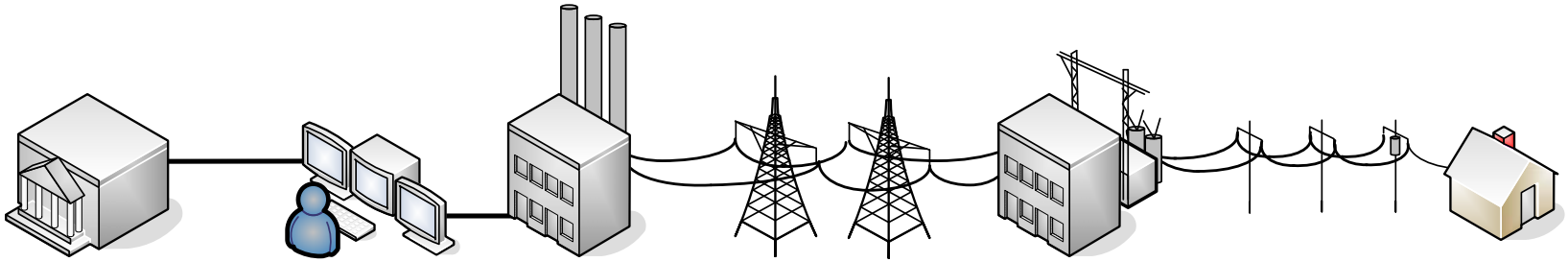
What is a Smart Grid?

The Energy Independence and Security Act of 2007: Extracts from Title XIII

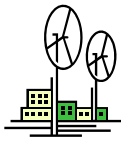
The Smart Grid includes:

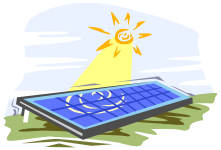
- Optimizing grid operations and resources to reflect the changing dynamics of the physical infrastructure and economic markets
- Cybersecurity
- Using and integrating distributed resources, demand side resources, and energy efficiency resources
- Deploying smart technologies for metering
- Communications of grid operations and status
- Distribution automation
- Integrating “smart” appliances and other consumer devices
- Deploying and integrating advanced electricity storage and peak-shaving technologies
- Transferring information to consumers in a timely manner to allow control decisions
- Developing standards for the communication and interoperability of appliances and equipment connected to the electric grid
- Identifying and lowering barriers to adoption of smart grid technologies, practices, and services

Merging Two Infrastructures

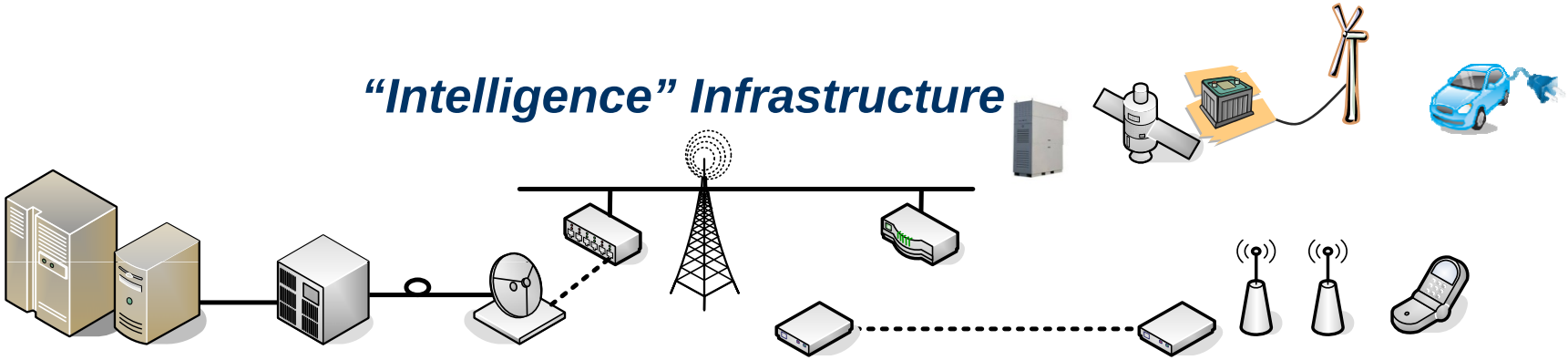


Electrical Infrastructure





"Intelligence" Infrastructure

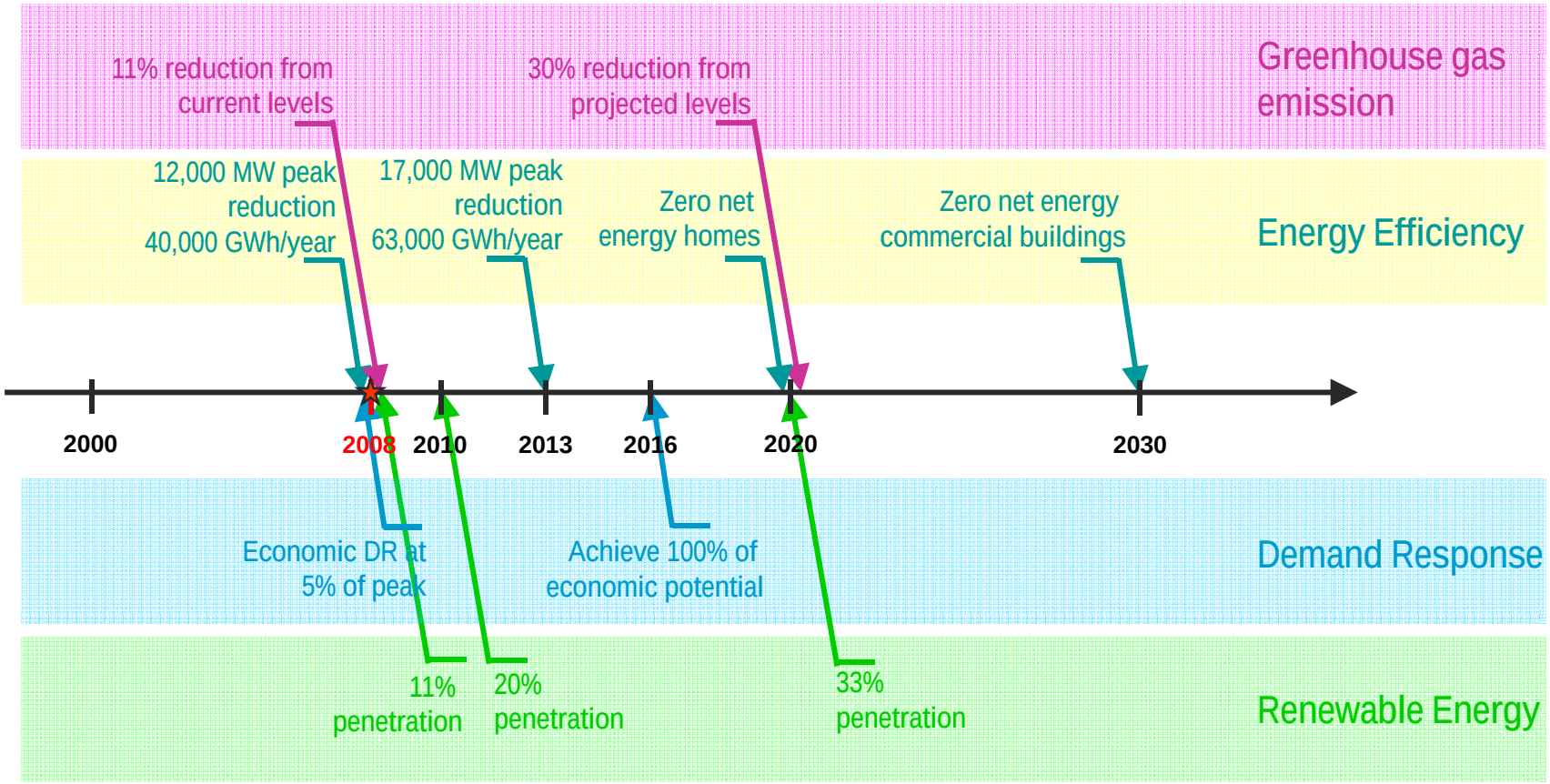


Why Smart Grid

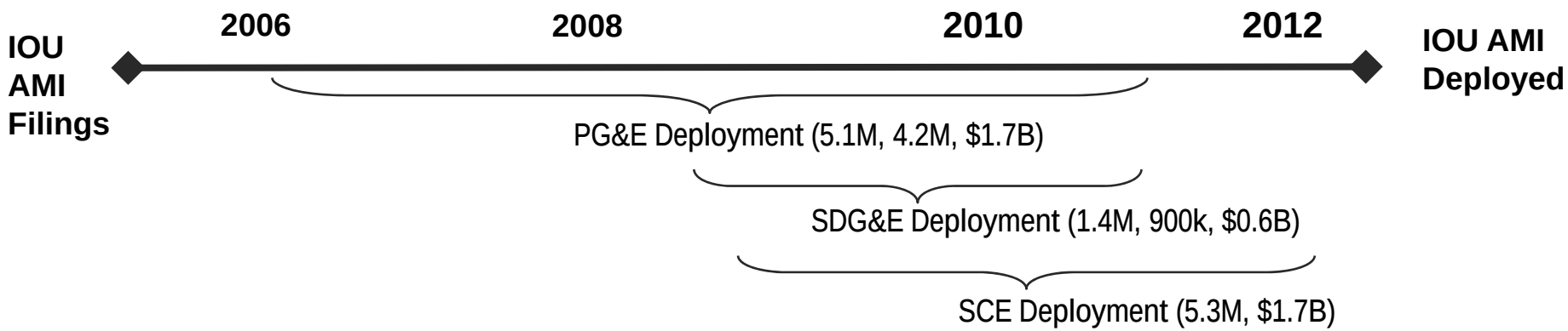
- Improved Grid Operations
  - Higher reliability
  - Less outage time / shorter outages / smarter decisions
  - More options to meet future needs
- Cleaner, Lower Costs Operations, More Efficient
  - New costs lowering technologies
  - Increased efficiency in operating existing systems
  - Meet needs with more environmentally preferred options
  - Higher utilization rates of installed systems
- More Options for Consumers
  - Lower overall energy costs
  - More choices on how to meet individual consumer needs
  - Dynamic rates to better integrated needs of grid and consumer
  - New technologies provide new demand side options

What is a Smart Grid for California?

California Energy Policy Targets



California AMI Deployment



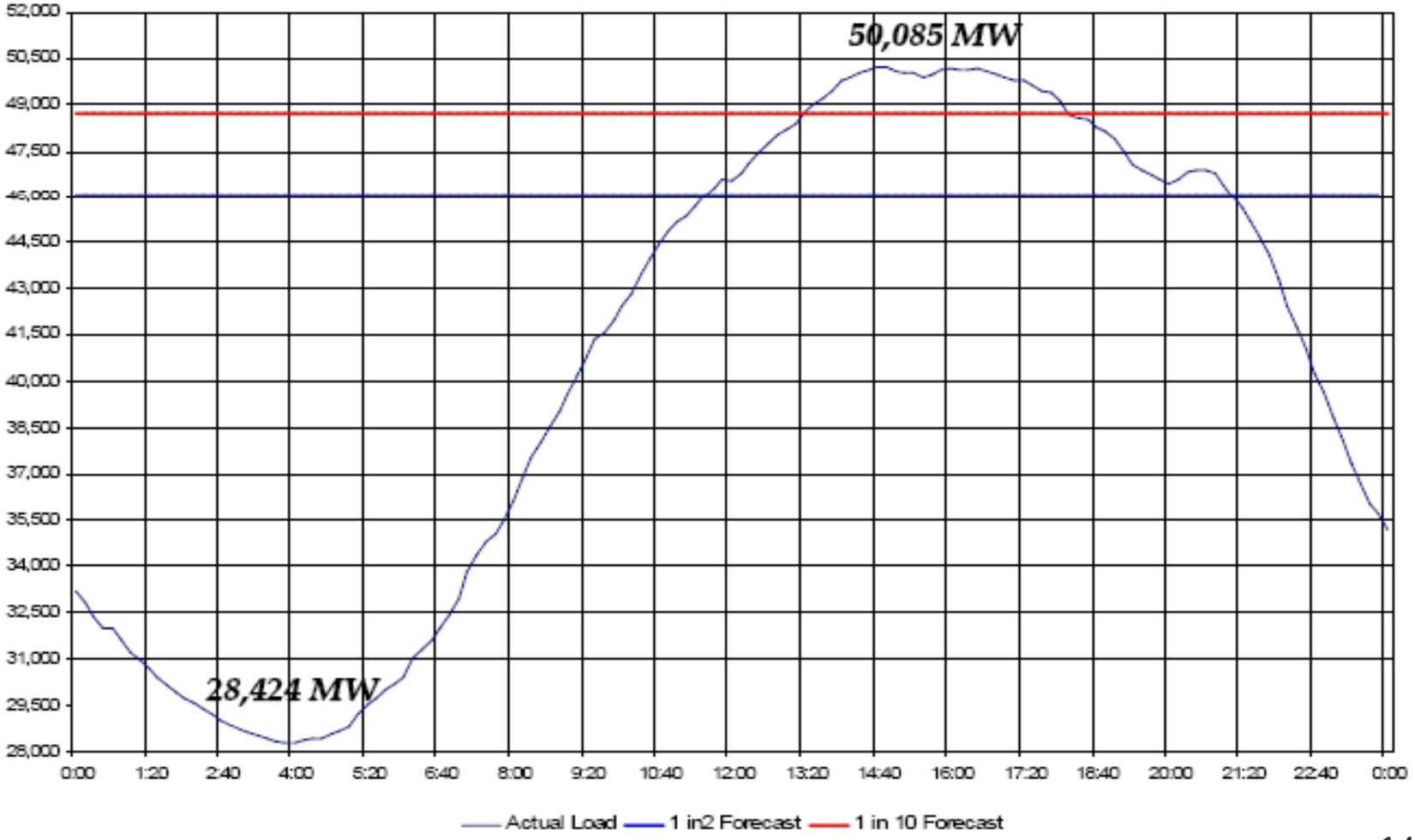
(Electric Meters, Gas Meters, Budget)

California Smart Grid Factors

- California energy policy
- Ongoing deployments
- California future energy growth needs
- California energy use profile

California's Electricity Demand is Dynamic

CAISO Load Curve July 24, 2006



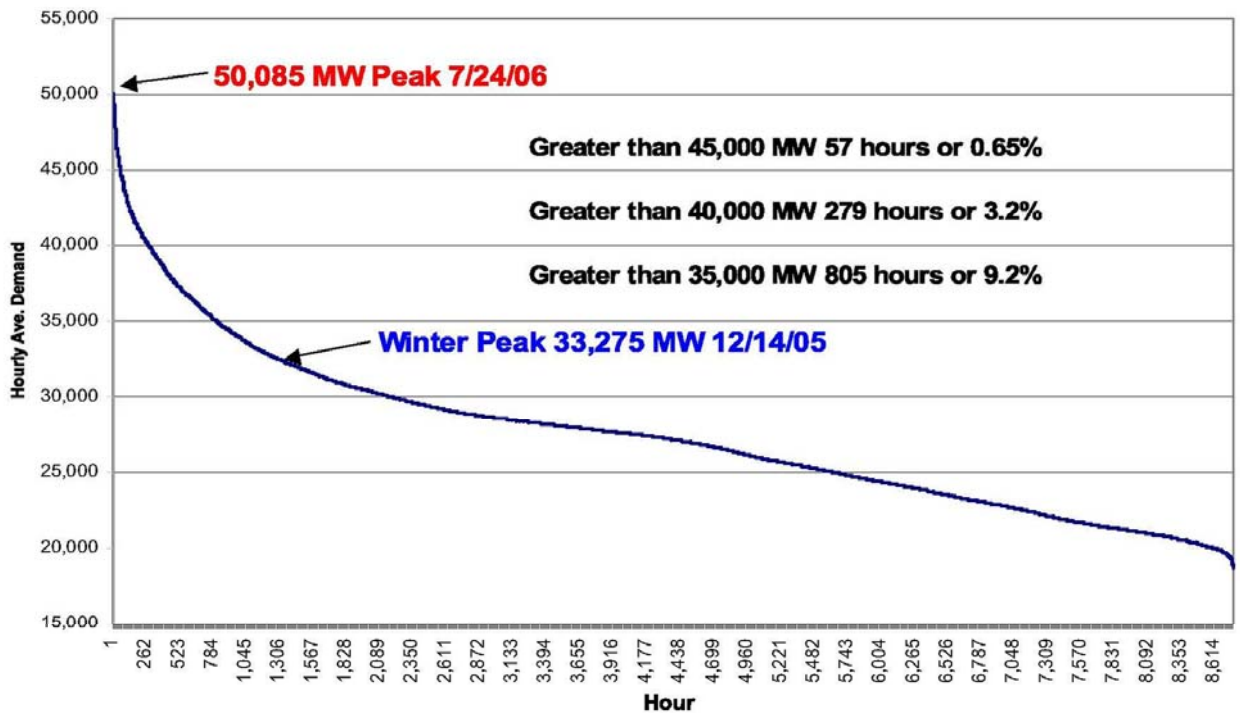
California's Highest Peak Loads Occur Less Than 60 Hours Per Year

California ISO
Your Link to Power

California Independent
System Operator Corporation

CAISO Load Duration Curve

Sept '05 to Sept '06



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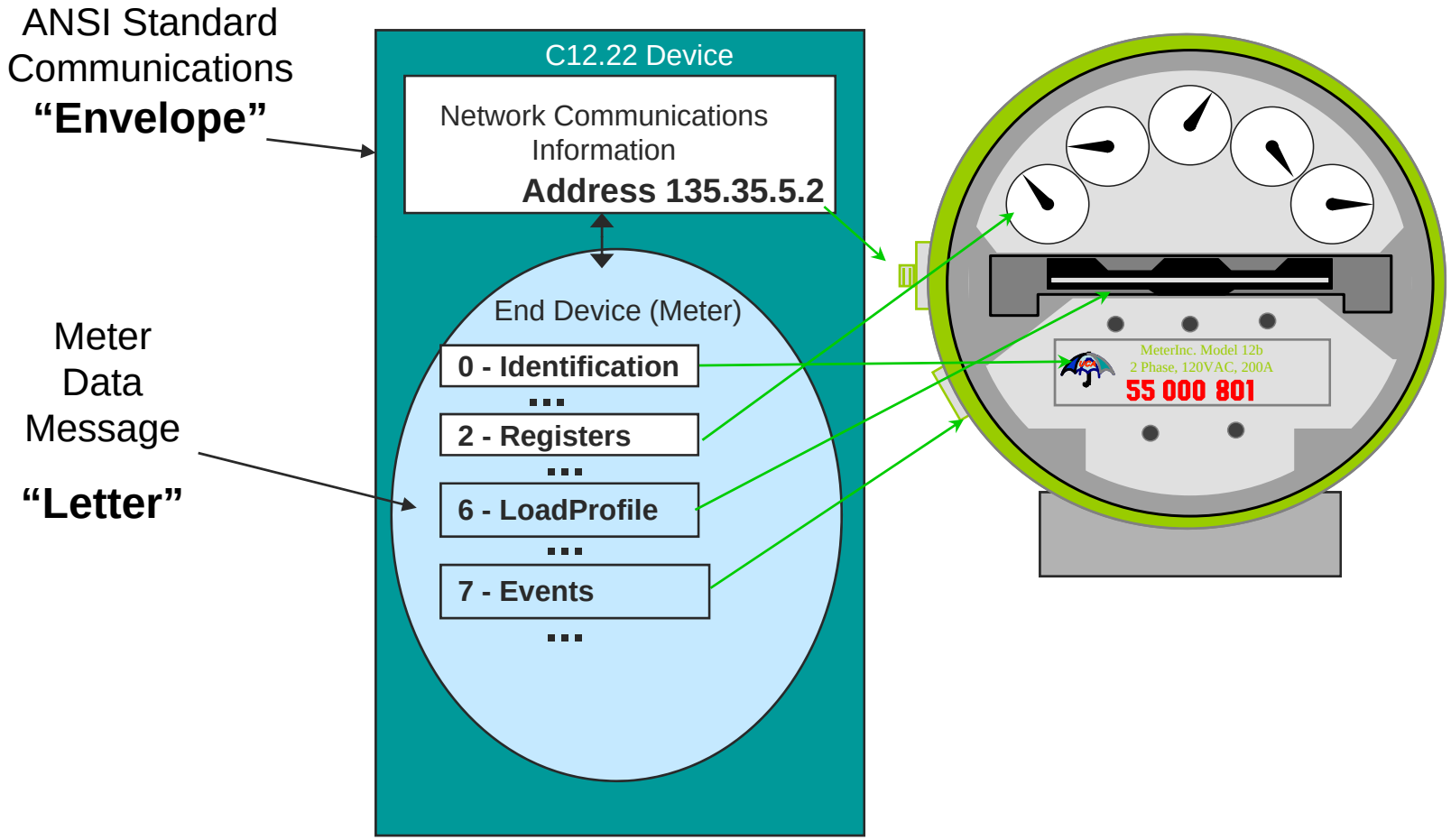
Research Recommendations

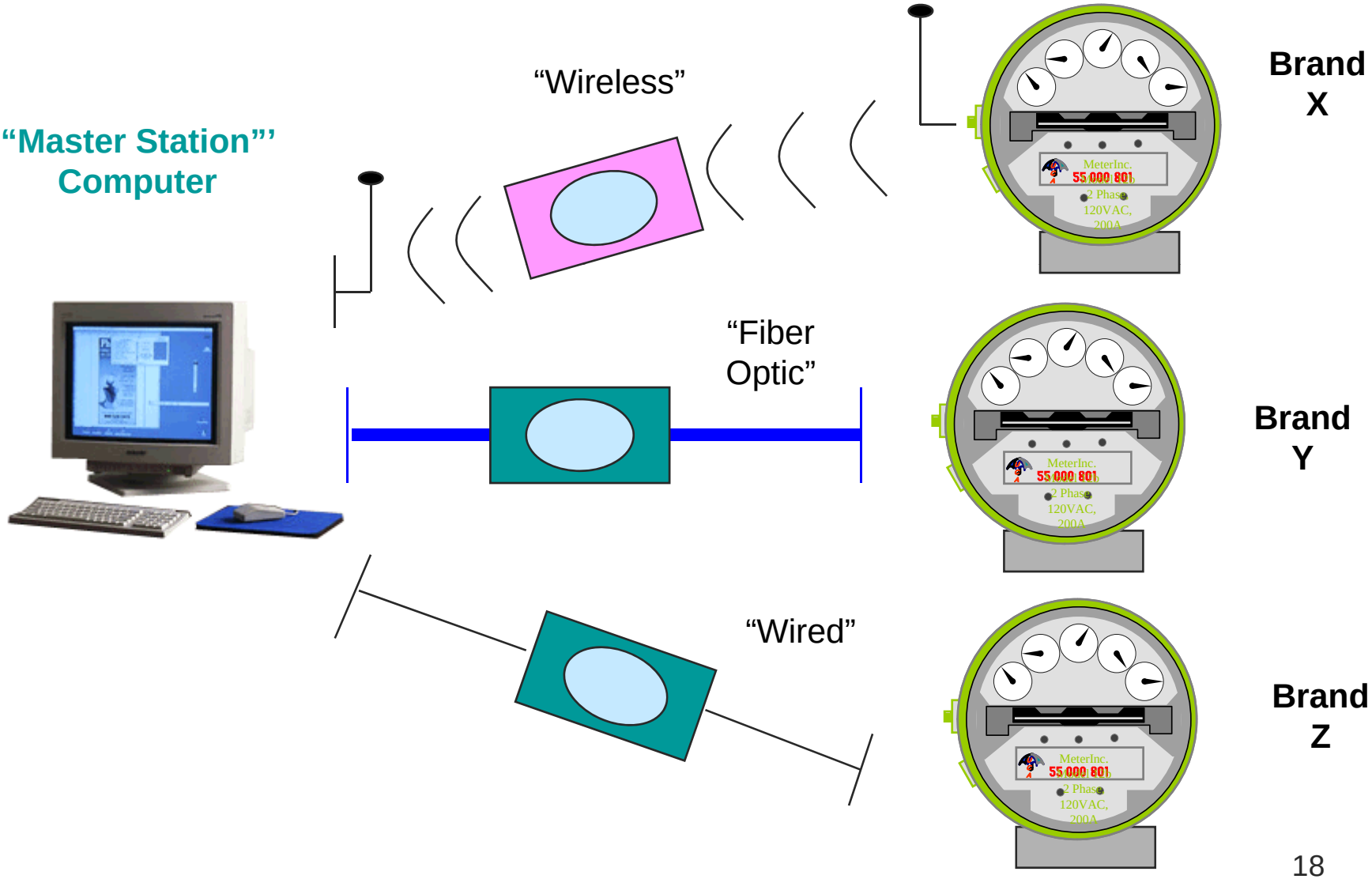
- Provide leadership role in defining Smart Grid
  - Bring together key stakeholders
  - Serve as conduit to definition
  - Develop coordinated and integrated definition

- Sponsor key Smart Grid field demonstrations
  - Demonstrate key technologies
  - Coordinate key integration demonstrations
  - Support open architecture
  - Coordinate critical infrastructure interface regulations, codes, and reference designs

Example of Key Concept for Smart Grid Architecture: Use a Common Language for Communications



Example Recommendation: Develop Designs that Make Use of Layered Communications…



Current Planned Research Activities

- Other Smart Grid Activities
  - Smart Grid tactical demonstrations through micro-grids
  - Assessing the capabilities of one-way and two-way communications
  - Researching new emerging technologies that have smart grid potential

CPUC Comments

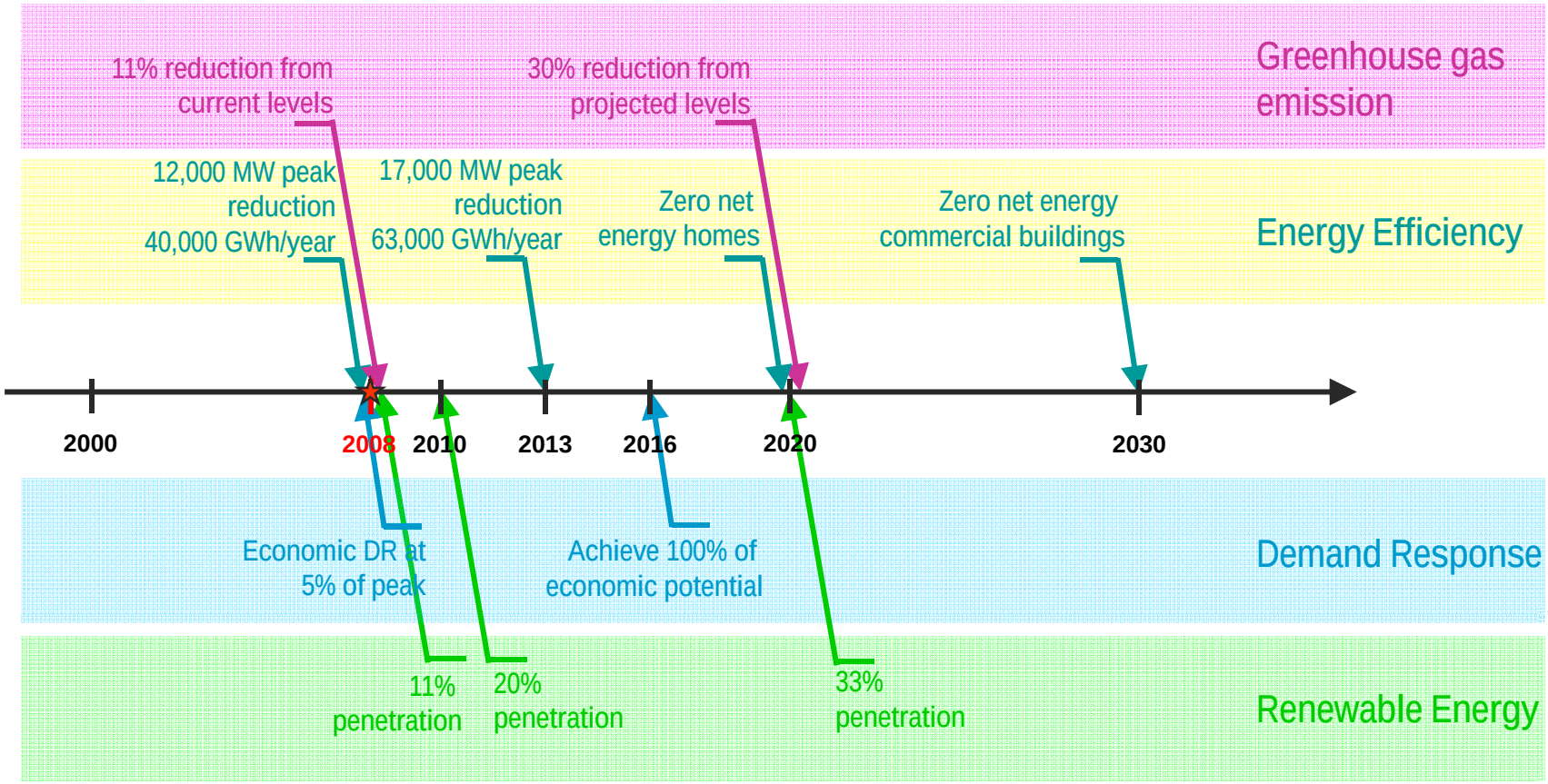
Review of Key Elements of Proposed RFP

- Define the following:
  - Provide baseline definition for Smart Grid 2009 (January 1)
  - Provide detailed definition for Smart Grid 2020 (December 31)
  - Define Pathway to the defined Smart Grid 2020
  - Explain reasons for selecting key capabilities for Smart Grid 2020

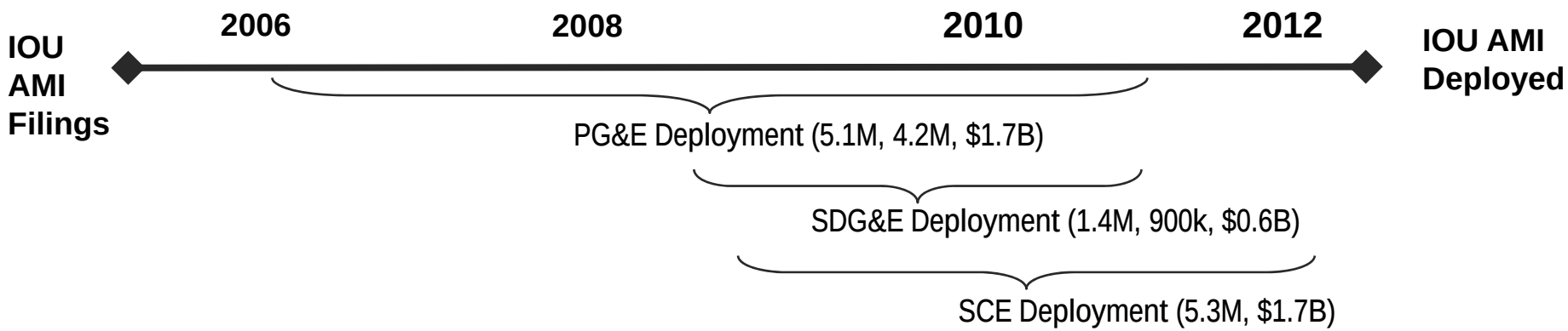
Review of Key Elements of Proposed RFP

- Define the following:
  - Provide simple business case rationale for key Smart Grid 2020 capabilities
  - Define benefits to consumer, utilities, state, economy, environment, etc.
  - Identify critical actions, polices, decision, funding support, and other items necessary to support the proposed Smart Grid 2020 definition
  - Identify critical standards, codes, protocols and reference designs and the critical timelines necessary for these items to support the definition

California Energy Policy Targets



California AMI Deployment



(Electric Meters, Gas Meters, Budget)

Review of Key Elements of Proposed RFP

Possible list of minimum technologies to address:

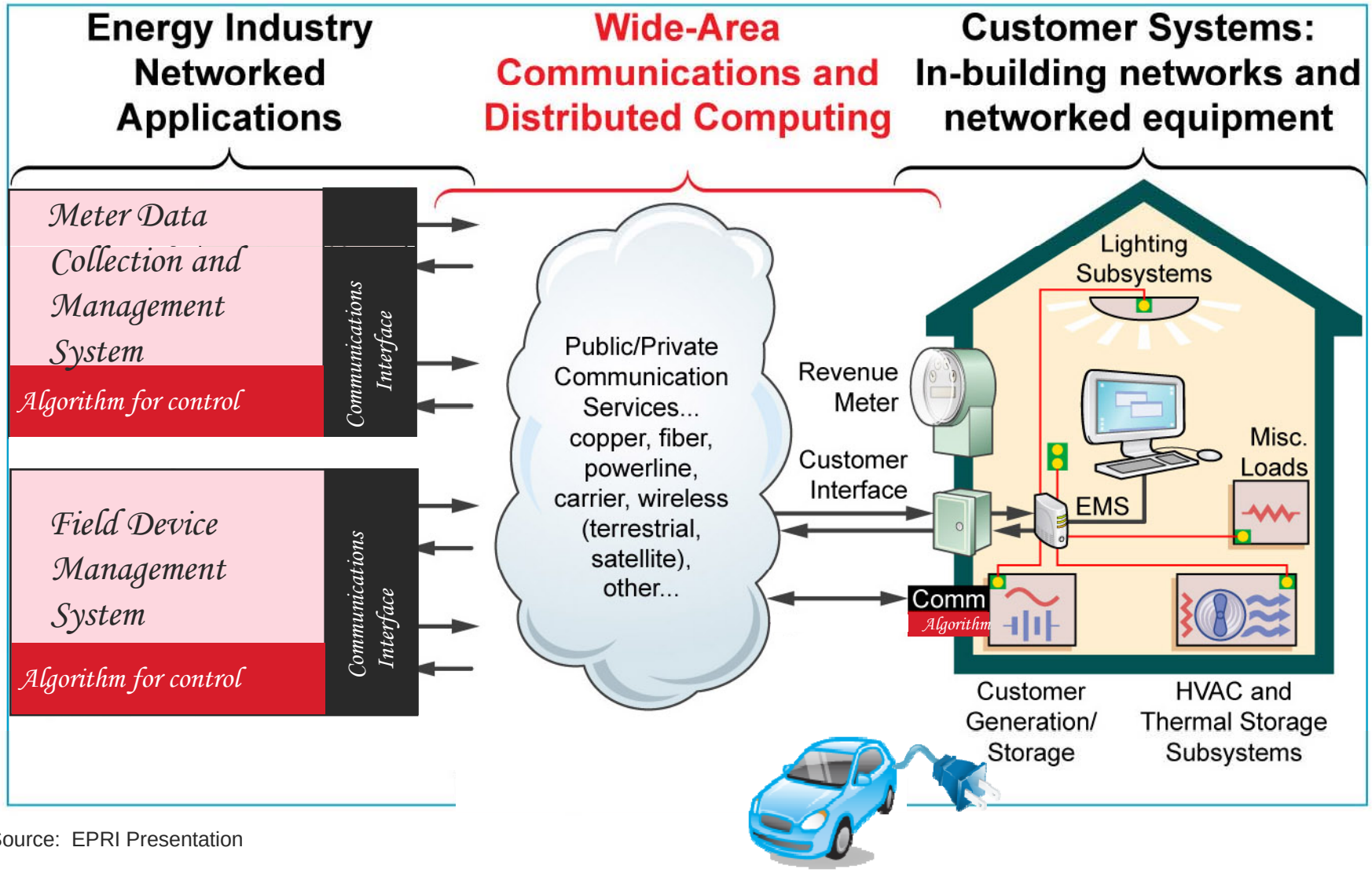
- Advanced Metering Infrastructure (AMI)
- Home Area Networks (HAN)
- Automated Demand Response--AutoDR
- Plug In Hybrid Electric Vehicles (PHEV)
- Distribution Automation (self healing capability)

Review of Key Elements of Proposed RFP

Possible list of minimum technologies to address:

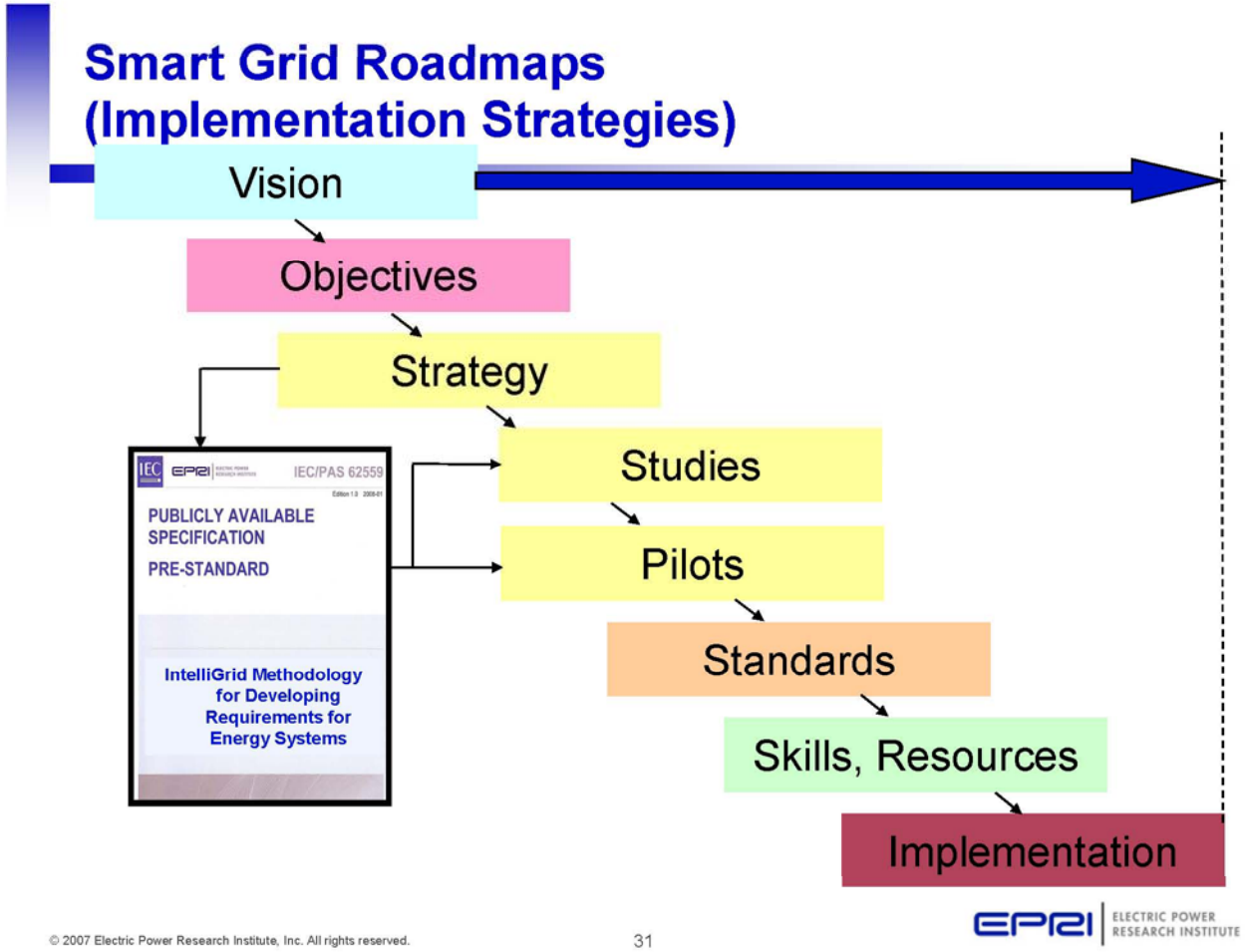
- Phasor technology for T&D stability support
- Renewable integration at transmission, distribution and end use levels
- Applications of electric energy storage
- Advanced communications technology (one-way and two-way)
- Grid asset optimizing technologies
- Intelligent software—intelligent agents

Smart Grid Infrastructure: Example of Logical Components



Source: EPRI Presentation

Review of Key Elements of Proposed RFP



Review of Key Elements of Proposed RFP

- Key “Cost Effective” Technologies

  - Identify the critical barriers
    - Recommend courses of action to reach Smart Grid 2020 definition (policy, incentives, demonstrations, etc.)

  - Identify key “Use Cases” that need to be developed
    - Define important elements that need Use Cases

Review of Key Elements of Proposed RFP

- Recommend:
  - Codes
  - Standards
  - Protocols
  - Reference Designs

- Identify/Recommend the implementing agencies or organizations for each

Review of Key Elements of Proposed RFP

- Must Address:
  - Electricity infrastructure
  - Natural gas infrastructure

- Other areas that may be addressed:
  - Water and energy relationship
  - Statewide services

Review of Key Elements of Proposed RFP

- Requesting two separate teams respond (separate contracts)
  - Utility lead team (prime contractor)
    - Utility
    - Utility Association
    - Utility Consultant (reasonable size)
  - Industry lead team (prime contractor)
    - Industry--manufacturer, service provider or implementer
    - Industry Association
    - Industry Consultant (reasonable size)
  - Can only be prime contractor for one proposal
    - Must identify your choice when proposal submitted

Review of Key Elements of Proposed RFP

- Requesting specific comments on:
  - Estimated level of effort anticipated to meet the needs as defined today
    - Provide Smart Grid definition in 6 months or less
  - Impact of specific match funds contribution requirement
    - What is reasonable
    - At what level could it prohibit responses
  - Impact of 6-Month time limit to complete effort
    - Phased deliverable approach
  - Desired interaction between two winning teams

Review of Key Elements of Proposed RFP

Next Steps

- Comments from today's workshop due to Energy Commission by Tuesday, August 19th
- RFP release planned for 4-6 weeks
- Proposals due 4-6 weeks after RFP release
- Contract award estimated in early 2009
- Energy Commission Smart Grid Conference April/May 2009

OPEN DISCUSSION

Next Steps

- Comments due by Tuesday, August 18, 2008
- Send comments to:

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916-653-3024