

# Utility of the Future & Getting There: Austin Energy's Ongoing Journey



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## What is the Smart Grid?

**4 Disciplines** = Electric Grid + Communications Network  
+ Hardware + Software

- Redefines how we: Generate, Distribute, Consume or “Prosume” electricity
- The Smart Grid monitors, controls, and manages the creation, distribution and consumption of energy.
- The Smart Grid of the future is distributed, interactive, self-healing and reaches every device.



## Greatest Thing Since?

- Simply Put:
  - Smart devices
  - 2-way communication ability
  - Advanced control systems
  
- Societal change equal to:
  - Transcontinental Railroad – 1869
  - Interstate Highway System – authorized 1956
  - Internet/Web – 1969/1989



## What drives the Smart Grid in Austin, TX?

- Citizen & Board of Directors (Council) who are progressive-minded
- Best Managed Utility in the US
- 2010 Goals
  - Get AA bond rating
  - Get to 83% in customer satisfaction index
  - Get SAIDI to 40, SAIFI to 0.5
- 2020 Goals
  - Get to 800 MW of energy efficiency
  - Get to 35% mix of renewable energy in our generation
  - Get to 200 MW of Solar generation



## Complimentary Strategies

- Energy Storage
- Smart Grid and the Pecan Street Project
- Electronic Transportation
- Economic Development & Societal Sustainability



# Why do we need the Smart Grid?

Computer Industry Evolution



Mainframe



Minicomputer



PC



Laptop

Telecom Industry Evolution



SS7 Switch



PBX



Fax / phone



Wireless phone

Electric Industry Evolution



Power plant



Co-gen plant



Solar Roof Top



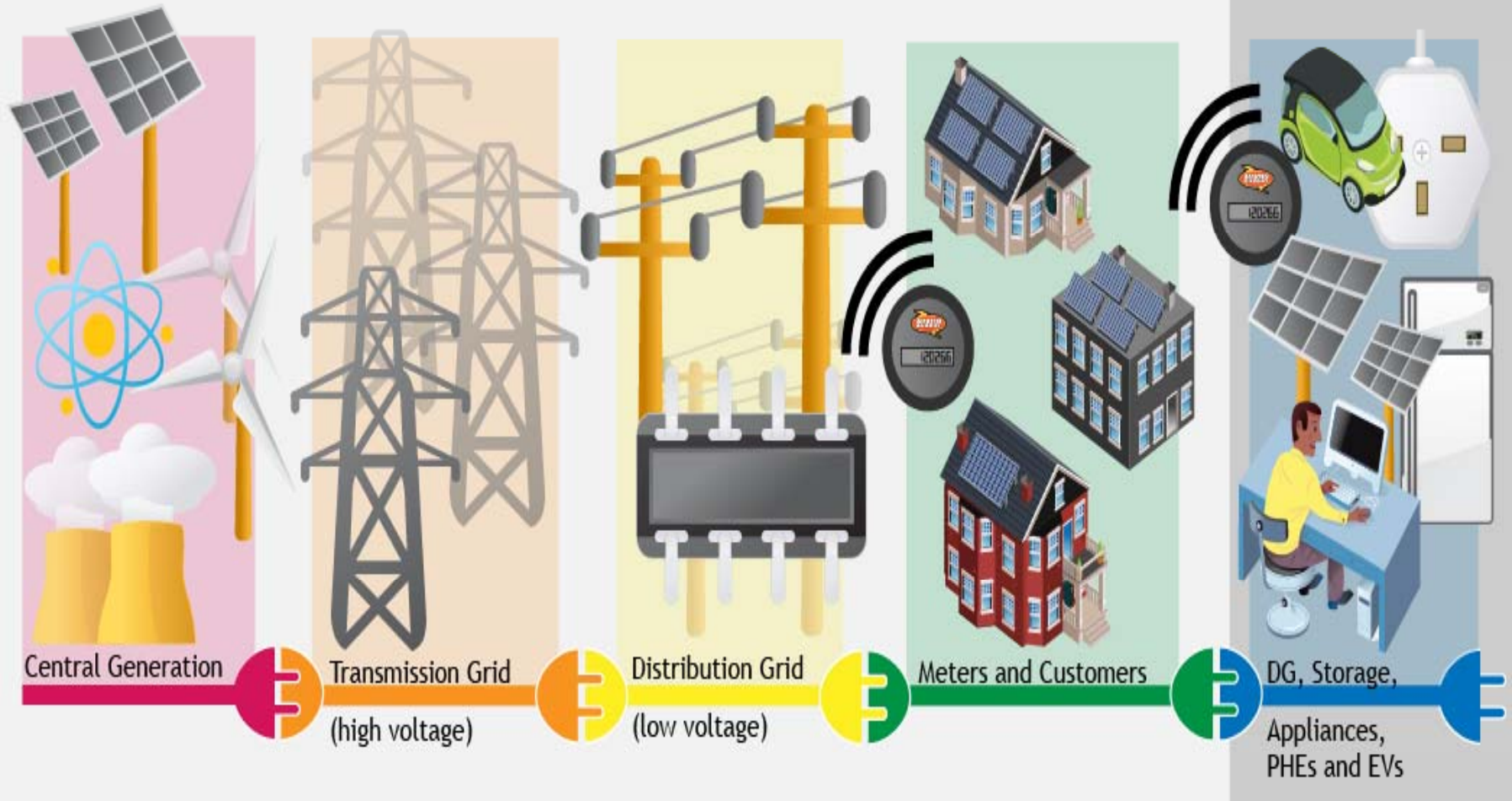
Electric Car



# Austin Energy Smart Grid

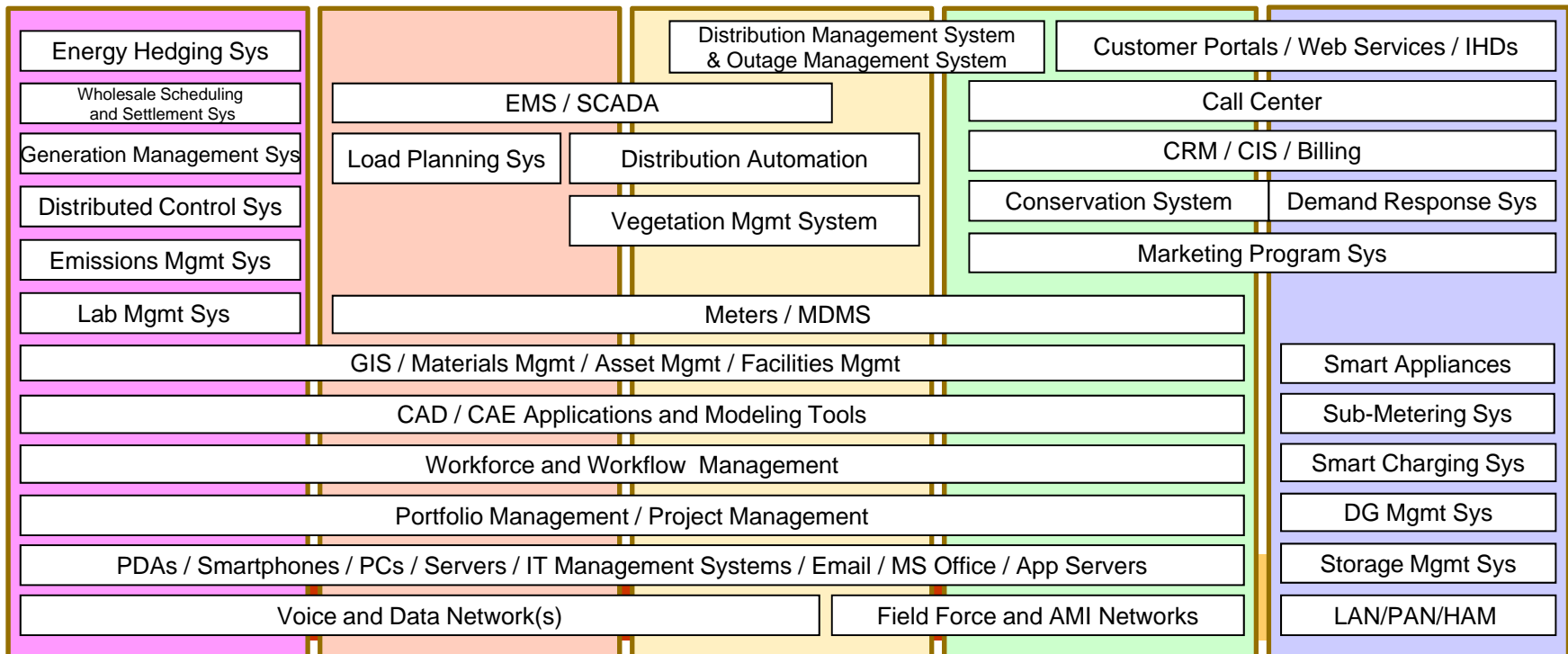
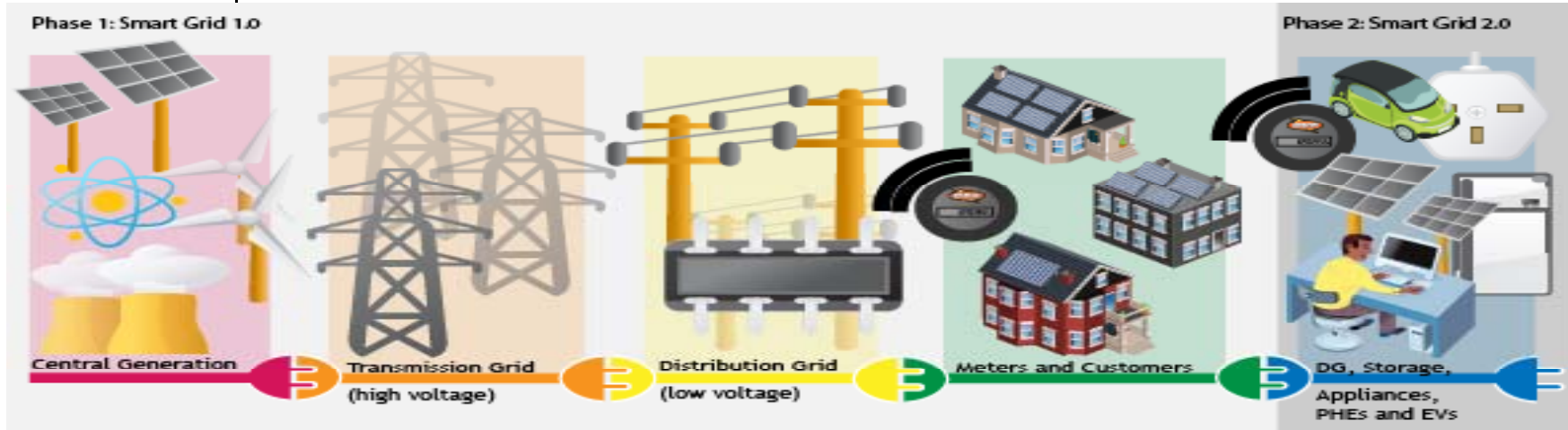
Phase 1: Smart Grid 1.0

Phase 2: Smart Grid 2.0



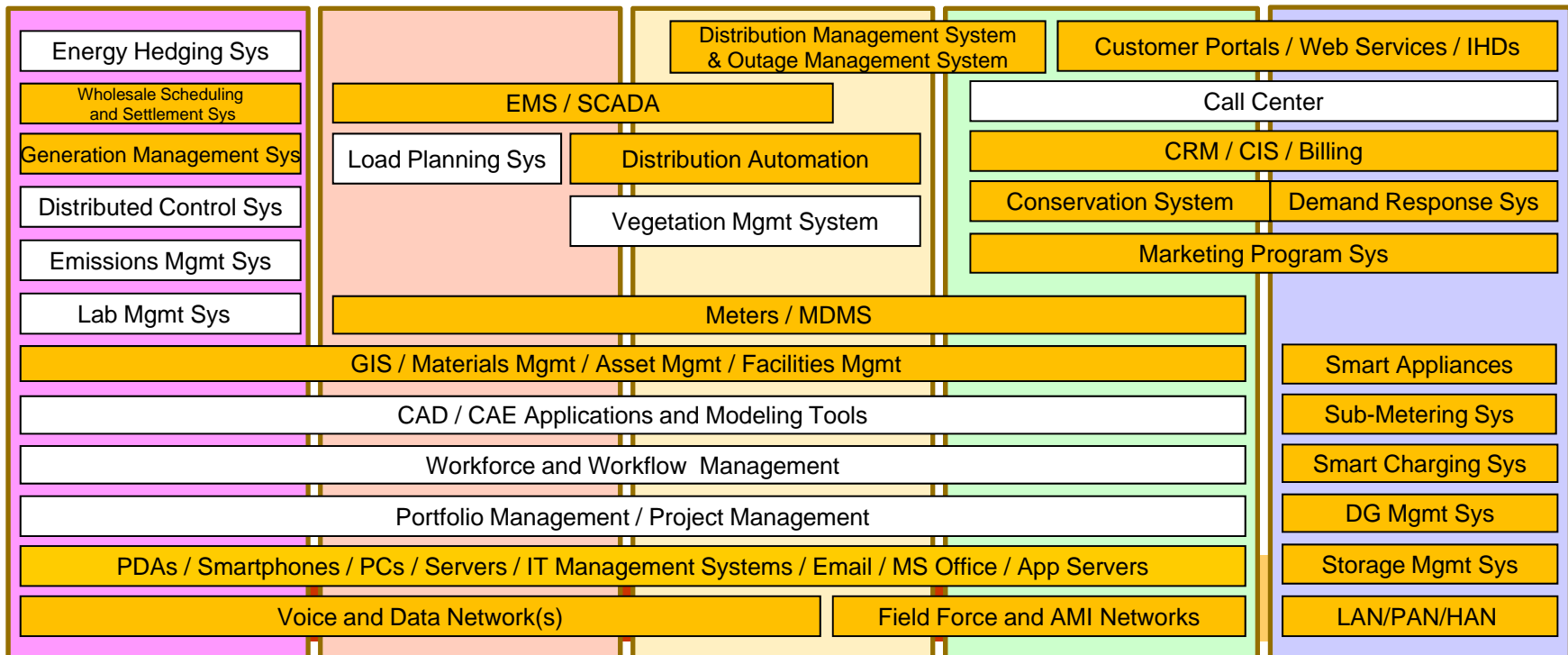
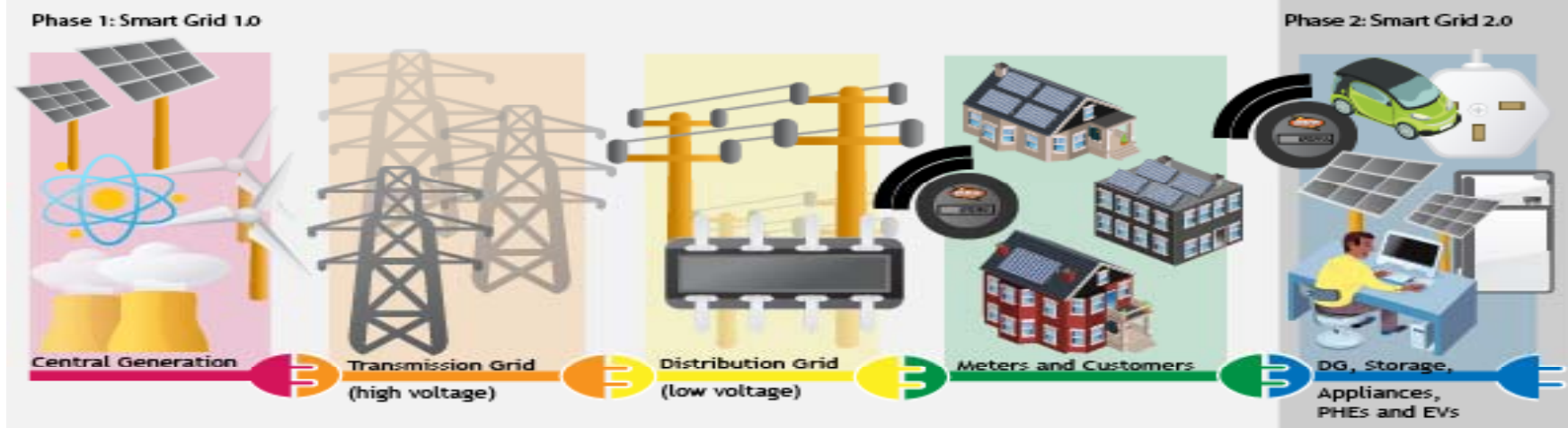


# AE Smart Grid Architecture





# AE Smart Grid New Systems



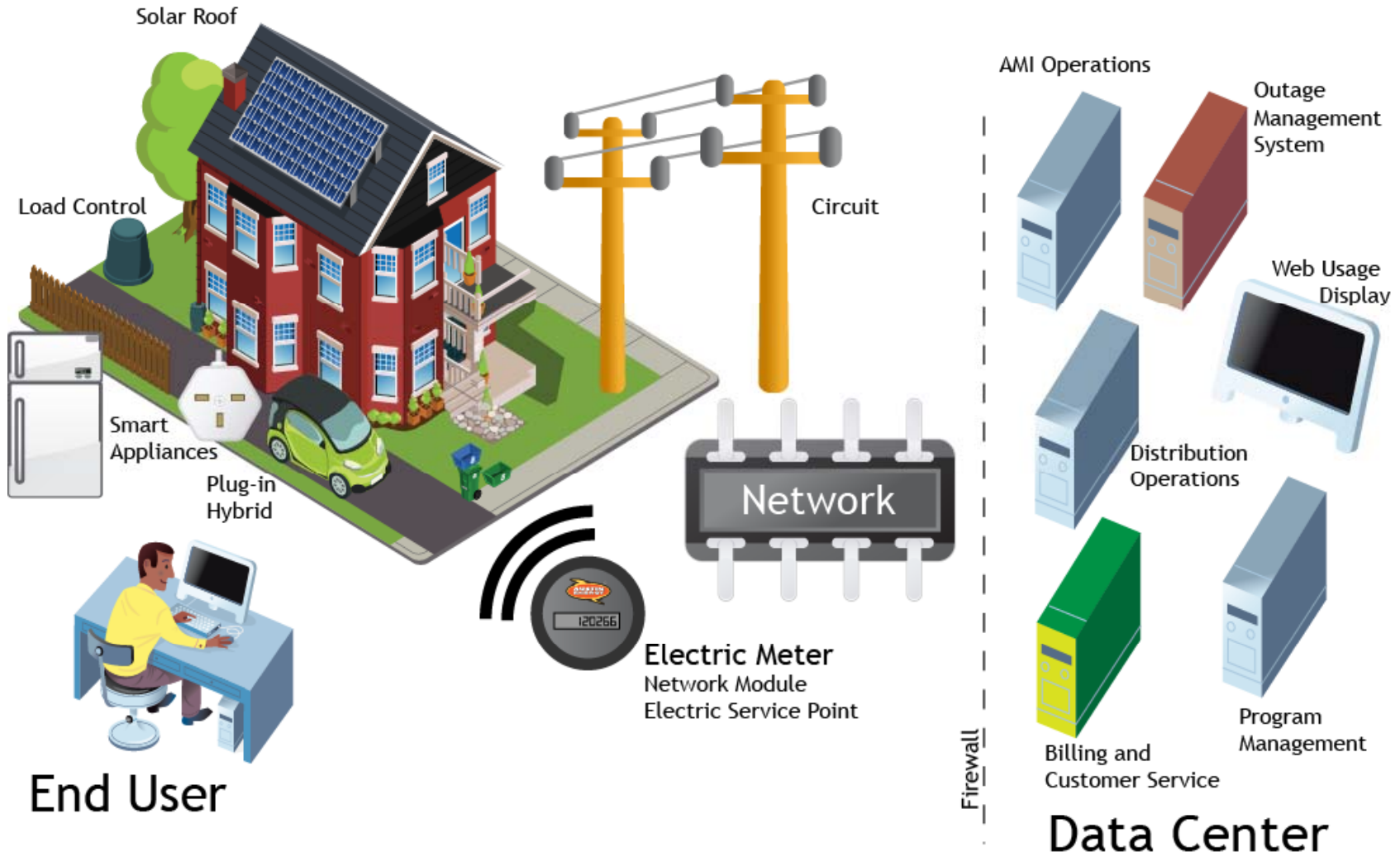


## AE Smart Grid Program Status

- Enterprise Architecture deployed in 2006
  - Portal, Enterprise Service Bus, Data Warehouse, Business Intelligence, Cyber Security, IT Management Tools, Fiber backbone
- 2-way RF network upgraded in 2007
  - One way RF network built in 2003
- Nodal Market Tools deployed in 2008
  - New Generation Management System, New Network Model, SCADA/EMS Upgrades, Maximo / Power Plant for Generation
- All 410,000 smart meters installed in 2009
  - First deployment of 127,000 smart meters in 2003
- New Meter Data Management System deployed in 2009
- 86,000 smart thermostats installed (22% of homes in Austin)
  - Started in 2003, 80k residential, 6k commercial, double by 2015
- New Billing System replacement in progress (mid 2011)
  - RT/TOU Pricing, Pre-pay, Web2.0, TXT/SMS, Self-service
- New Distribution Management System in progress (mid 2011)
  - Piloting now with 2,500 sensors



# AE Smart Premise





## Smart Grid 2.0 and the Pecan Street Project

### WHAT IS THE PROJECT?

A city-wide **laboratory** concept devoted to:

- exploring new ideas
- researchers and entrepreneurs can develop, test and implement the urban power system of the future.



## Smart Grid 2.0 and the Pecan Street Project

- **WHAT IS ITS PURPOSE?**

- serve as a hub of clean energy development in Austin
- implementing pilot projects
- working with innovative companies in the smart grid arena
- continually seeking new opportunities to deploy cutting-edge technologies in the real world.



## Smart Grid 2.0 and the Pecan Street Project

### **Mission:**

- We will establish the City of Austin as America's clean energy laboratory
- We will design and implement an energy generation and management system that generates a power plant's worth of power from clean sources within the city limits
- We will deliver it over an advanced delivery system that allows for unprecedented customer energy management and conservation.



## Smart Grid 2.0 and the Pecan Street Project

### **Pecan Street Project, Inc., Structure:**

- The Pecan Street Project, Inc., is led by a Board of Directors composed of representatives from the project's founding partners:
  - The City of Austin
  - The Greater Austin Chamber of Commerce
  - Austin Energy
  - Austin Technology Incubator
  - Environmental Defense Fund
  - The University of Texas at Austin



## Some Pecan Street Opportunity Areas

- **Distributed Generation/Renewable Energy**
- **Low-Tech/Low-Emission Options, including Solar Water Heaters, Building Positioning, Shading, etc.**
- **Energy Efficiency, Demand Response, and Load Measurement and Control**
- **Networked Storage**
- **Water Conservation**
- **Transportation**



## **Some Pecan Street Opportunity Areas**

- **Operations and Systems Integration, including Technology and Systems Modeling**
- **New Utility Business Model and New Market Entrants**
- **Customer Interfaces and Impacts and Behavioral Economics**
- **Legislative/Regulatory Requirements and Fundraising**
- **Economic Development and Technology Commercialization**
- **Workforce Training**



## Some Pecan Street Opportunities

- **Lab and Smart Grid Consulting**
- **Reference Manual**
- **Pecan Street House**
- **Energy Consumption Data Services**
- **HAN Rebates or Subsidies**
- **Partner Energy Program**
- **Planet Saver Program**
- **Industrial & Large Commercial Energy Storage**
- **PHEV Charging Stations**



## New Customer Side Smart Grid Apps

- Monitor, Control and Management of Premise Equipment Beyond Meter (DG, Storage, Electric Vehicles, Smart Appliances)
- DSM/DR Management and Analysis
- Pre-paid, TOU, RT signals and services
- Enhanced Breaker Protection
- DG Volt VAR Control
- DG Load Control
- Integration of Premise EMS with Utility Systems
- Premise EMS Real-Time Analysis Tools
- DG Power Quality Assessments
- DG Load Forecasting
- Premise Predictive Equipment Maintenance / Asset Management



## Customer Benefits

- Reduce Outages Significantly
- Increase Power Quality Significantly
- Faster notification and restoration times from outages
- Receive usage information to better understand and manage their bills, and ability to participate in energy efficiency and demand response programs
- Reduced inconvenience by no longer needing to unlock gates and tie up dogs for meter reads
- Improvements in timeliness and accuracy of billing, fewer estimated bills
- Remote service turn-on and shut-off
- Customer can call Utility Customer Service for real-time meter read or via in-home display, portal, smart phone
- Customer can manage smart appliances via portal / IHD
- Ability to participate in Pre-pay, TOU, Real-Time, other pricing programs



## New Utility Side Smart Grid Apps

- Monitor Equipment of Feeder
- Network Switching Management/Analysis/Optimization
- Relay Protection Coordination
- Integrated Volt VAR Control
- Direct Customer Load Control
- Integration of DMS(OMS)/AMI/GIS
- Distribution System Real-Time Analysis Tools
- Multi-Level Feeder Configuration
- Emergency System Restoration Support
- Dispatcher Training and Simulation
- Power Quality Assessments
- Demand Response Analysis
- Load Forecasting
- Predictive Equipment Maintenance / Asset Management



## AE Benefits

- Reduced operating costs (less truck rolls)
- Improved outage management – ability to quickly determine if power is off or on
- Reduced number of delayed and estimated bills
- Reduced energy theft
- Monitor and Manage Power Factor rates
- Lower procurement costs
- Improves load profiler
- Improves distribution load management and planning
- Greater historical load and usage data
- Better asset management and maintenance
- Reduces need for additional generation and transmission capacity
- Supports any market price-responsive tariff requirements



## Take Away Points

- Not Easy
- This is a journey and not a destination
- Do you have the right Enterprise Architecture?
- Strike a close partnership with the business

IT is in charge of:

- execution
- best practices

Business is in charge of

- Deliverables
- Culture change
- Defining benefits that will be given back to the CEO/customers



# Thank You

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