



Smart Grid Strategy & Deployment

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Transmission & Distribution

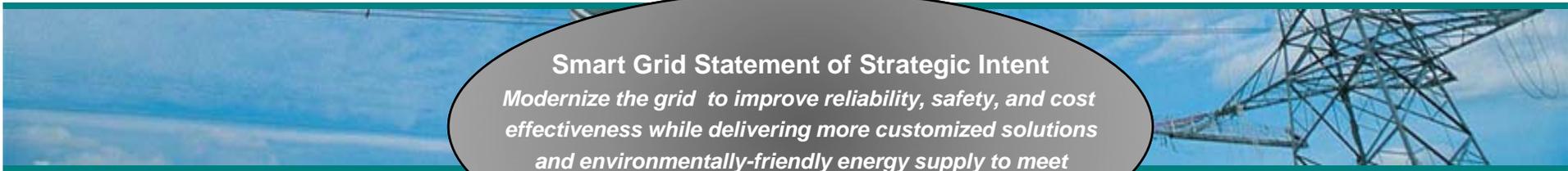


Edison International Vision

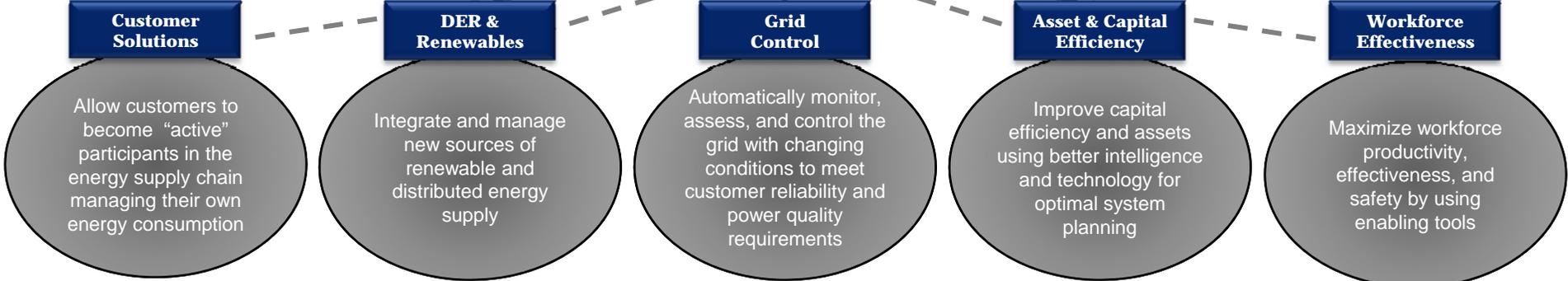
“An increasingly clean and diverse supply of generation is flowing over a smarter and more reliable electricity grid to serve customers who are using electricity more wisely, and in more ways, than ever before.”

John E. Bryson
CEO, Edison International





Smart Grid Statement of Strategic Intent
Modernize the grid to improve reliability, safety, and cost effectiveness while delivering more customized solutions and environmentally-friendly energy supply to meet customer energy management needs



Strategic Objectives

- | | | | | |
|--|---|--|--|---|
| <ul style="list-style-type: none"> • Provide real-time info and response capabilities enabling customers to adapt their energy use to changing grid conditions • Enable the grid to automatically adjust to changing loads and supply requirements | <ul style="list-style-type: none"> • Integrate renewables into bulk power system to meet requirements for green energy supply • Enable DER integration to improve grid stability, support customer end-use requirements, and improve power supply options for economic dispatch | <ul style="list-style-type: none"> • Prevent catastrophic bulk power system failures • Minimize service disruptions due to distribution system failure • Provide timely and accurate information about service issues | <ul style="list-style-type: none"> • Increase power throughput on transmission and distribution assets • Improve capital efficiency through condition-based maintenance/replacement • Use better info on load and grid operating performance to improve system planning | <ul style="list-style-type: none"> • Use advanced visualization and control systems to support and automate decision-making • Use emerging field technologies to improve crew safety and efficiency |
|--|---|--|--|---|



Strategic Objective

Enable DER integration to improve grid stability, support customer end-use requirements, and improve power supply options for economic dispatch.

Initiatives :

- Energy Storage Systems
- Distributed Generation
- DER Integration/Management Systems
- DER Strategy Development
- DER Tracking Database
- PHEV Integration
- Microgrids (Catalina Island)
- Distribution Harmonics
- Universal “Plug-and-Play” DER Interfaces



Strategic Objective

Prevent catastrophic bulk power system failures

Initiatives:

- Real Time Grid Monitoring
- Power System Outlook (PSO)
- Synchronized Measurement and Analysis in Real Time (SMART®)
- Voltage VAR Control Using PMU Data
- Phasor Wind Penetration (Renewables Integration)
- Phasor Black Start Capabilities
- Protection Using PMU Data
- Dynamic Voltage Control
- Dynamic Nomograms
- C-RAS Coordination
- Advanced Visual Interfaces PMU data on SCADA
- Predictive Grid Control System



Strategic Objective:

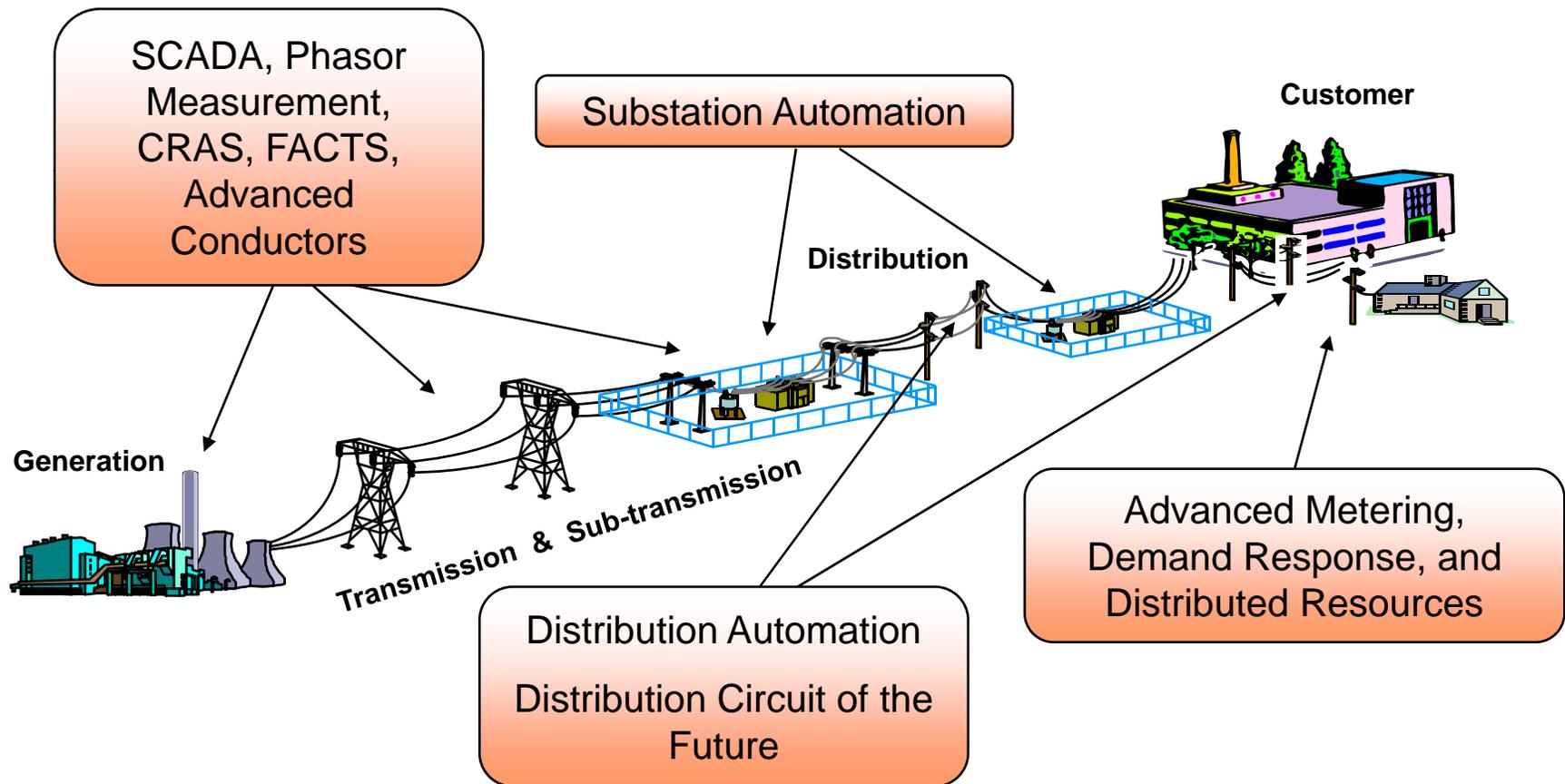
Minimize service disruptions due to distribution system failures

Initiatives:

- *Distribution Automation*
- *Next Generation Substation Automation*
- *DCMS + EMS Coordination & Integration*
- *Substation Gateway for DA Integration*
- *Dynamic Voltage Control*
- *Cable Monitoring*

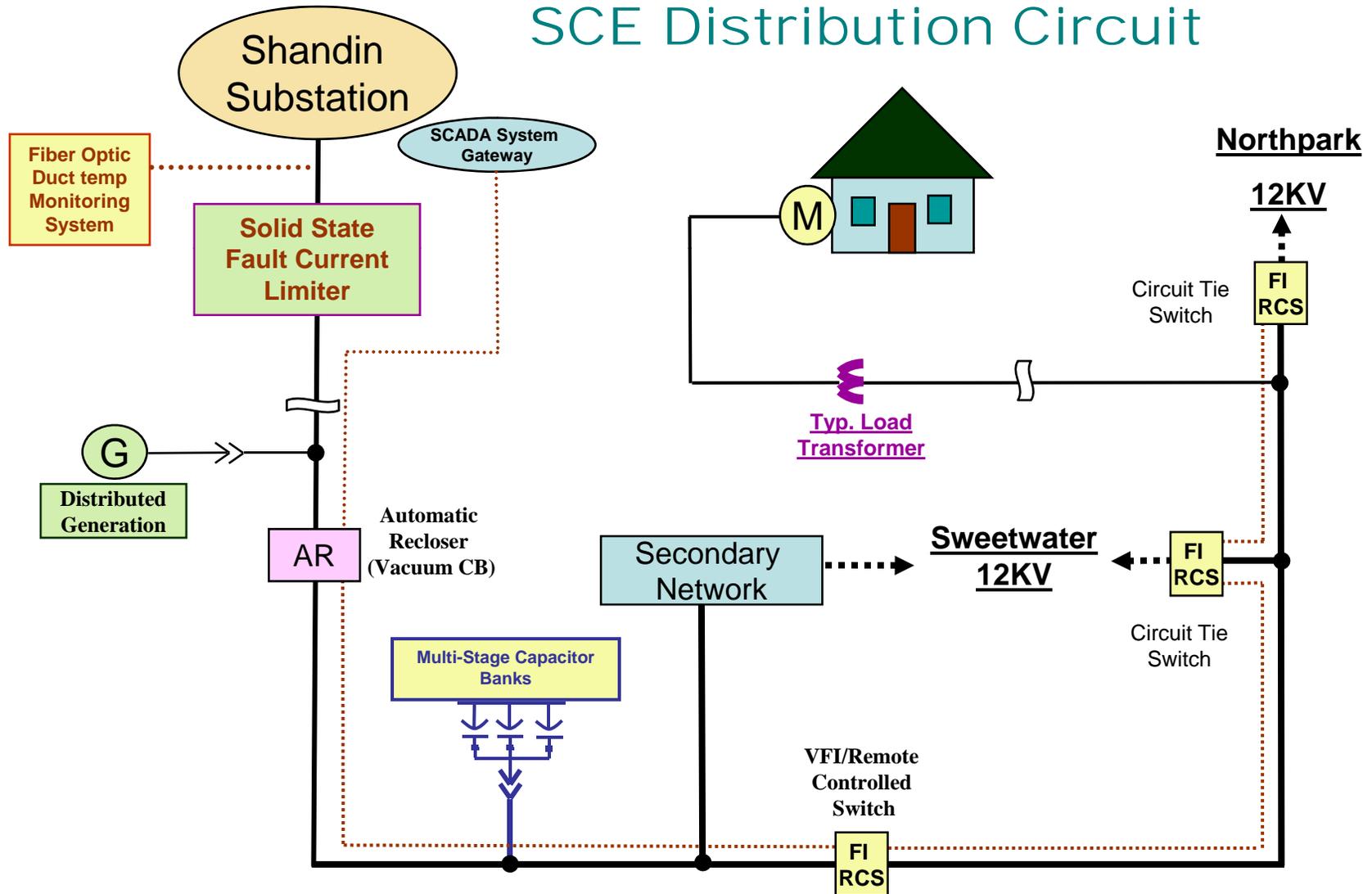


SCE Smart Grid Activities



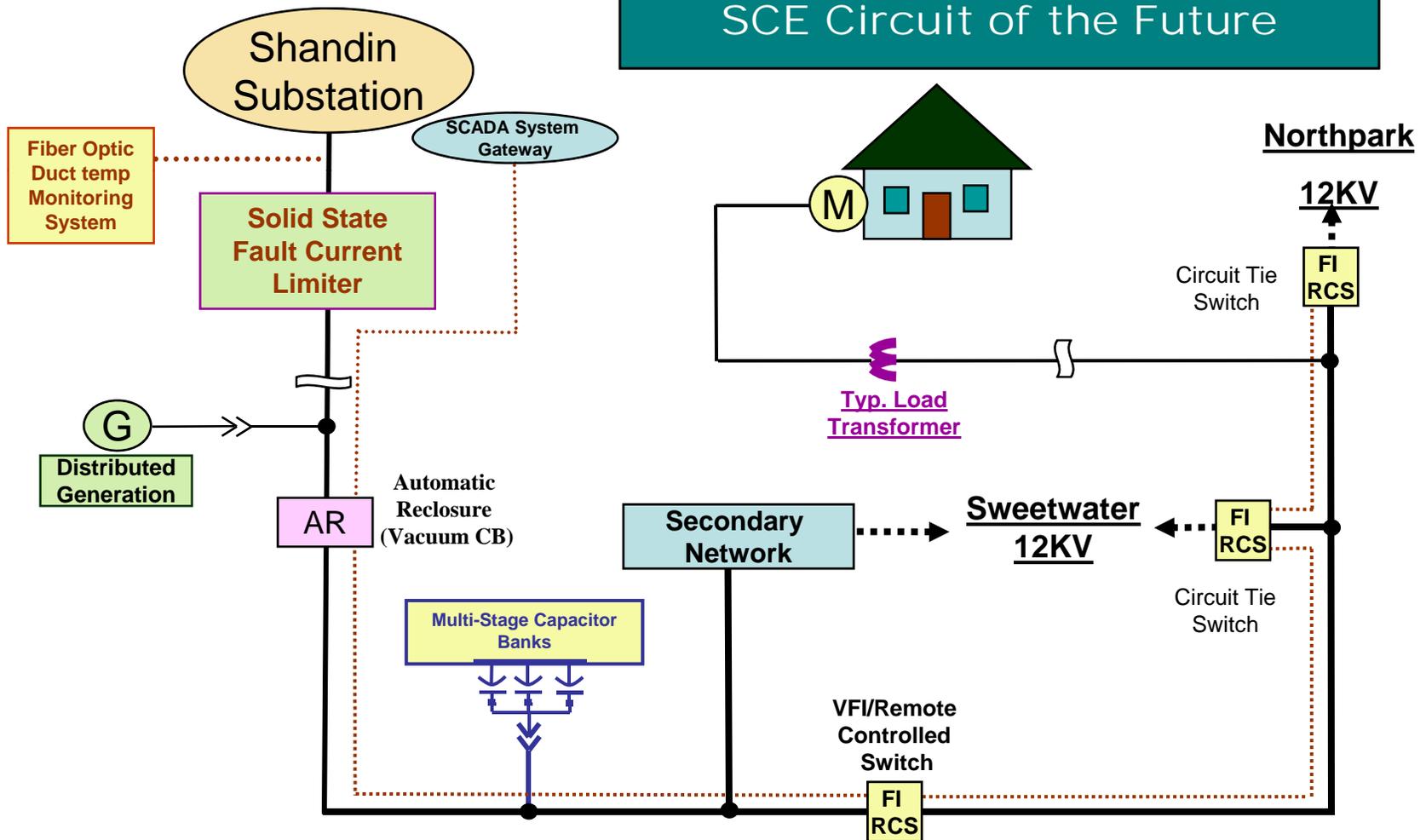


SCE Distribution Circuit



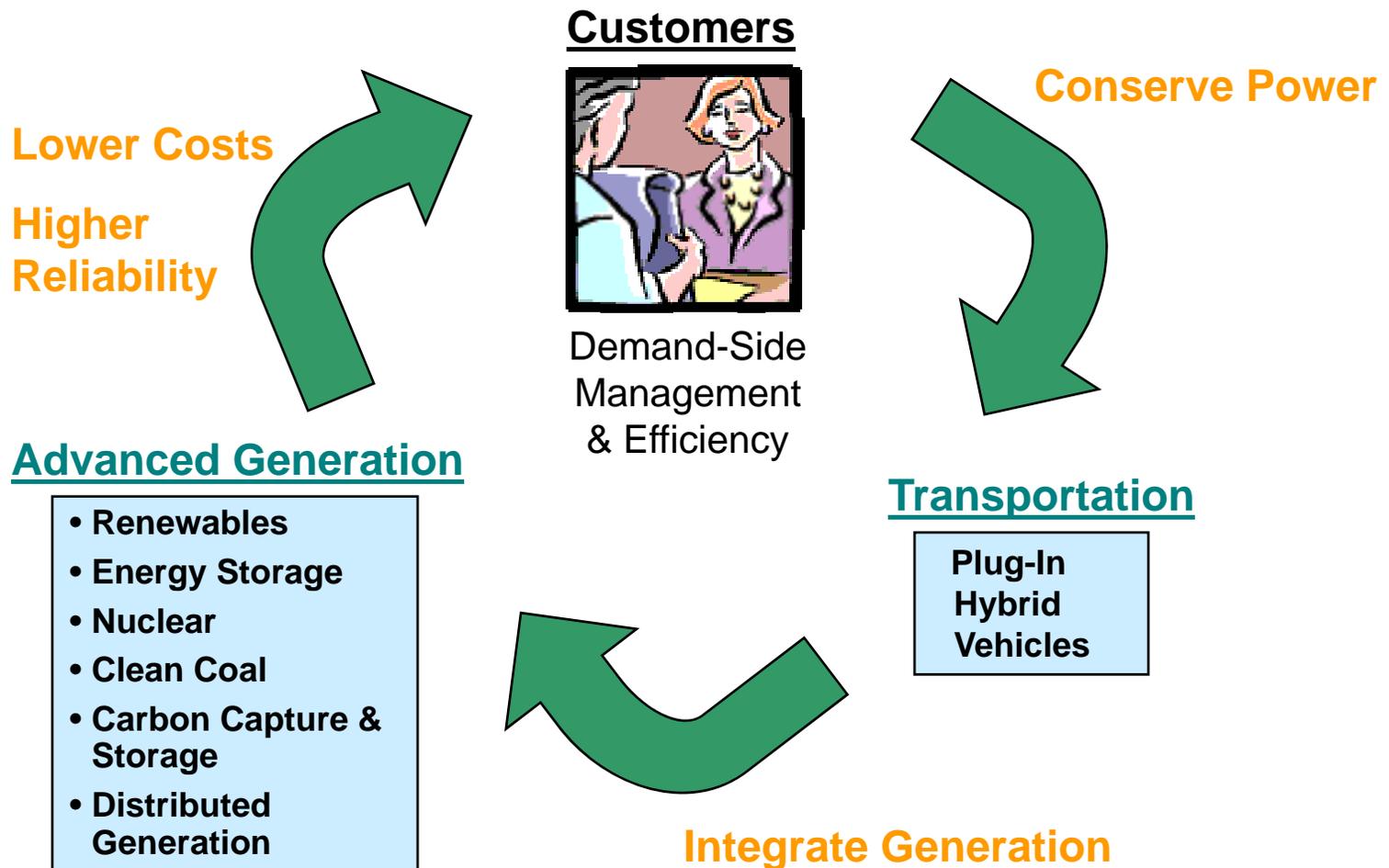


Moving Beyond the Traditional SCE Circuit of the Future





SmartGrid/SmartConnect as Enabling Technology





SmartConnect Technology

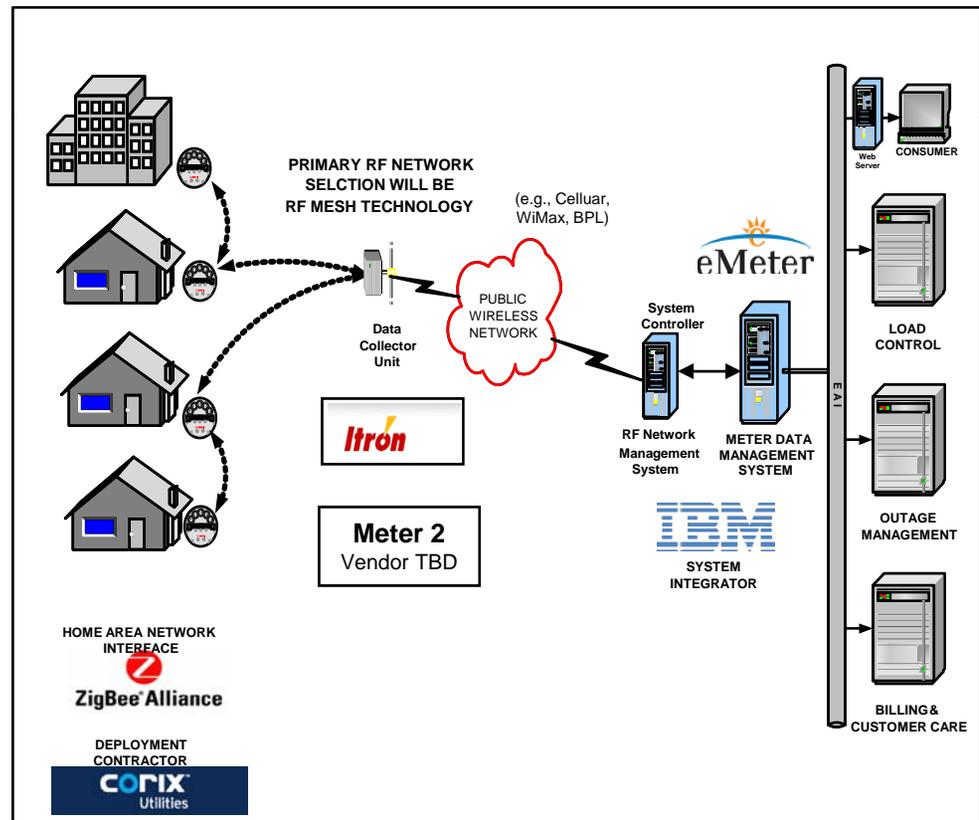
Technology & Vendor Map

3rd Generation Electronic meters:

- 200A integrated service switch
- Home Area Network interface
- Energy & voltage measurement
- Outage detection & service status
- Theft/tamper detection
- Remote firmware upgradability
- Robust security

Multi-Tier Telecom Network

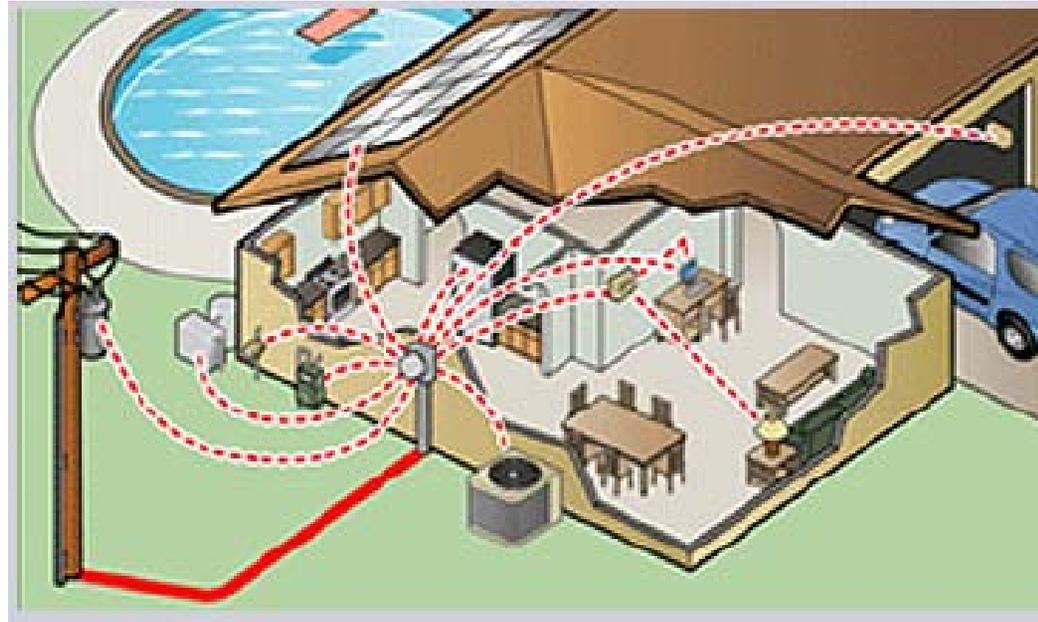
- Designed for flexibility & security
- 2-way narrowband 900MHz RF LAN
- Open standard ZigBee 2.4GHz HAN
- Cellular based WAN with flexibility for technology changes





What a Smarter Grid Means for Customers

- Enhanced utility service reliability
- More stable, higher-quality electricity supply
- Shorter customer outages, faster service restoration
- A “self-healing” grid
- New Customer program and service options
- Increased customer control of energy costs

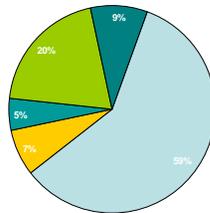


EIX Vision for Clean Energy Future

Integration of Information Technology with Energy Technology Delivers Environmental Benefits



Low Carbon Fuel Mix



Energy Management & Efficiency

- Reduced Cost & Rate Pressures
- Meeting Customer Expectations for Value & the Environment



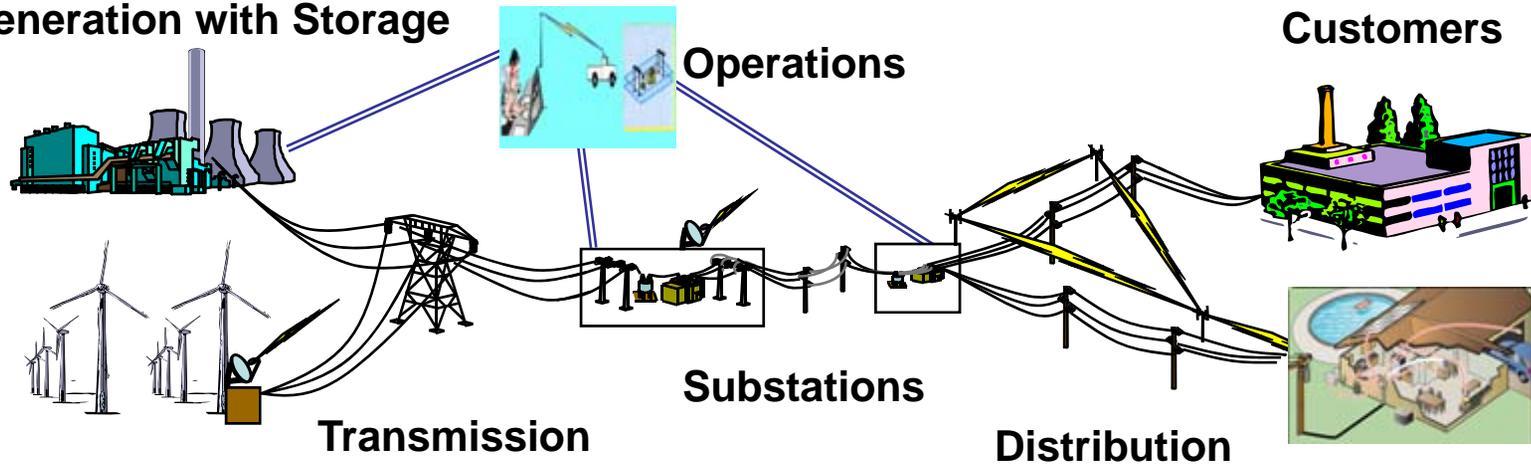
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An Overview of the Smart Grid

Interoperability from the generator to the customer

**Conventional and Renewable
Generation with Storage**

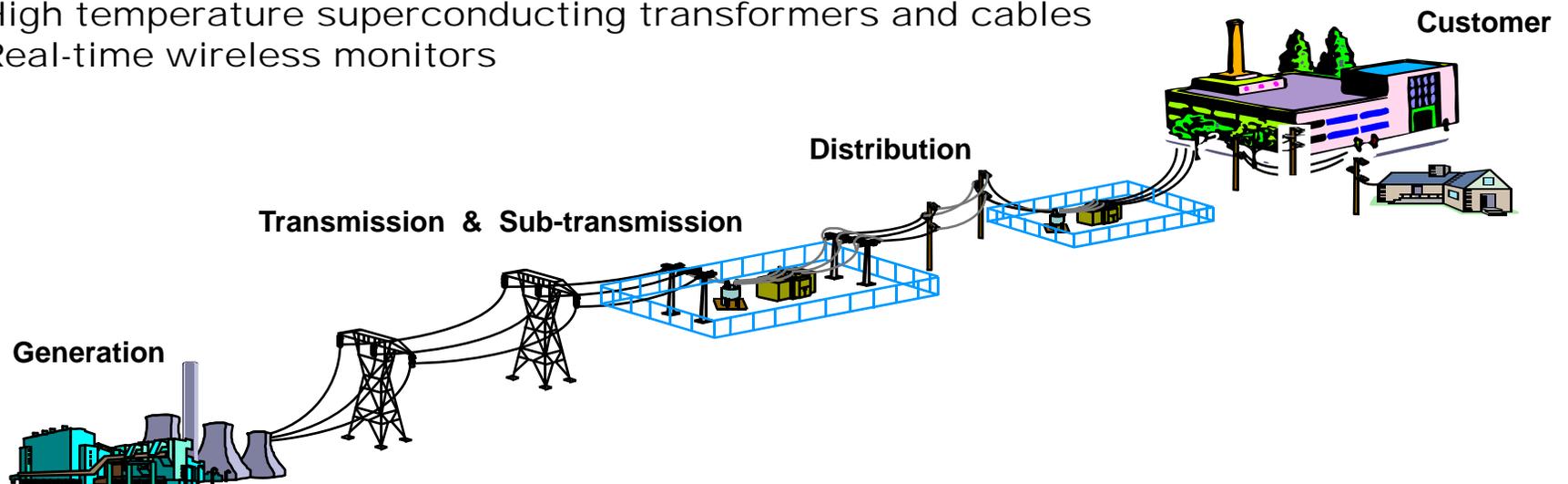


Self healing, more reliable, safer, and flexible



Smarter Transmission

- More intelligent protection schemes
- Real-time equipment monitoring
- Predictive data
- Centralized voltage and VAR control
- Dynamic nomograms
- Centralized Remedial Action Schemes (CRAS)
- Flexible AC Transmission Systems (FACTS)
- Static VAR compensation
- Synchronized phasor measurement
- High temperature superconducting transformers and cables
- Real-time wireless monitors





Smarter Distribution

- Avanti, SCE's "Circuit of the Future"
- High Speed Communications
- Transmission Technologies for Distribution Use





Workforce, Asset & Capital Efficiency Using Smarter Worker Tools

The lineman of the future's tools may include:

- Wearable computers
- Wireless communications with a central database and live support staff
- Wireless video transmission
- Heads-up displays
- RFIDs
- Video recognition and diagnostics
- High-tech personal protective equipment

