

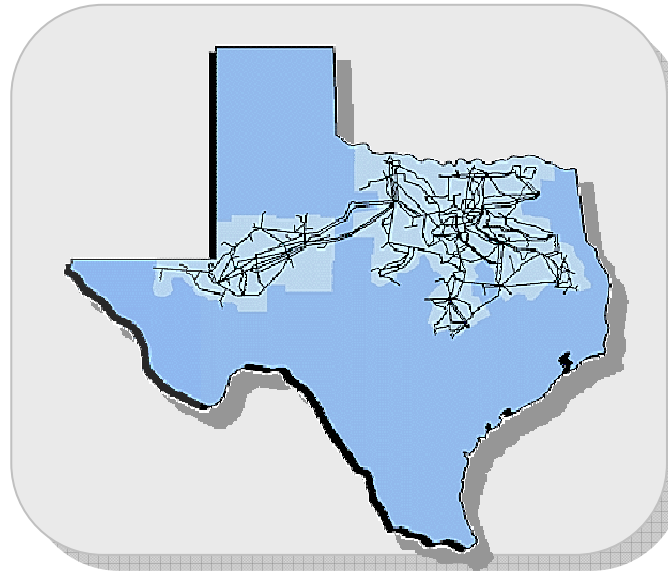
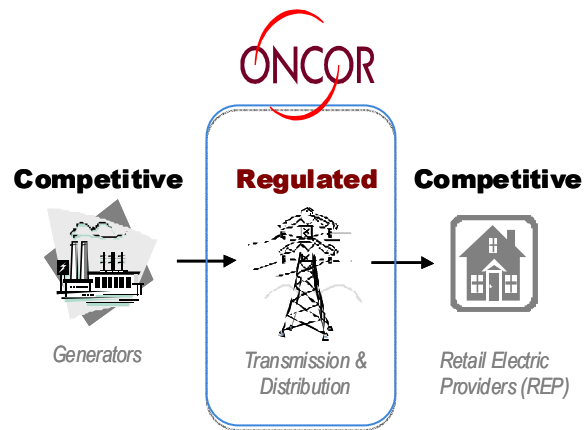


# Smart Grid Overview

**Mark Carpenter**  
**Vice President CTO**  
**Oncor**

**NAESB Board Meeting**  
**Sept 23, 2010**

# Oncor: Who We Are

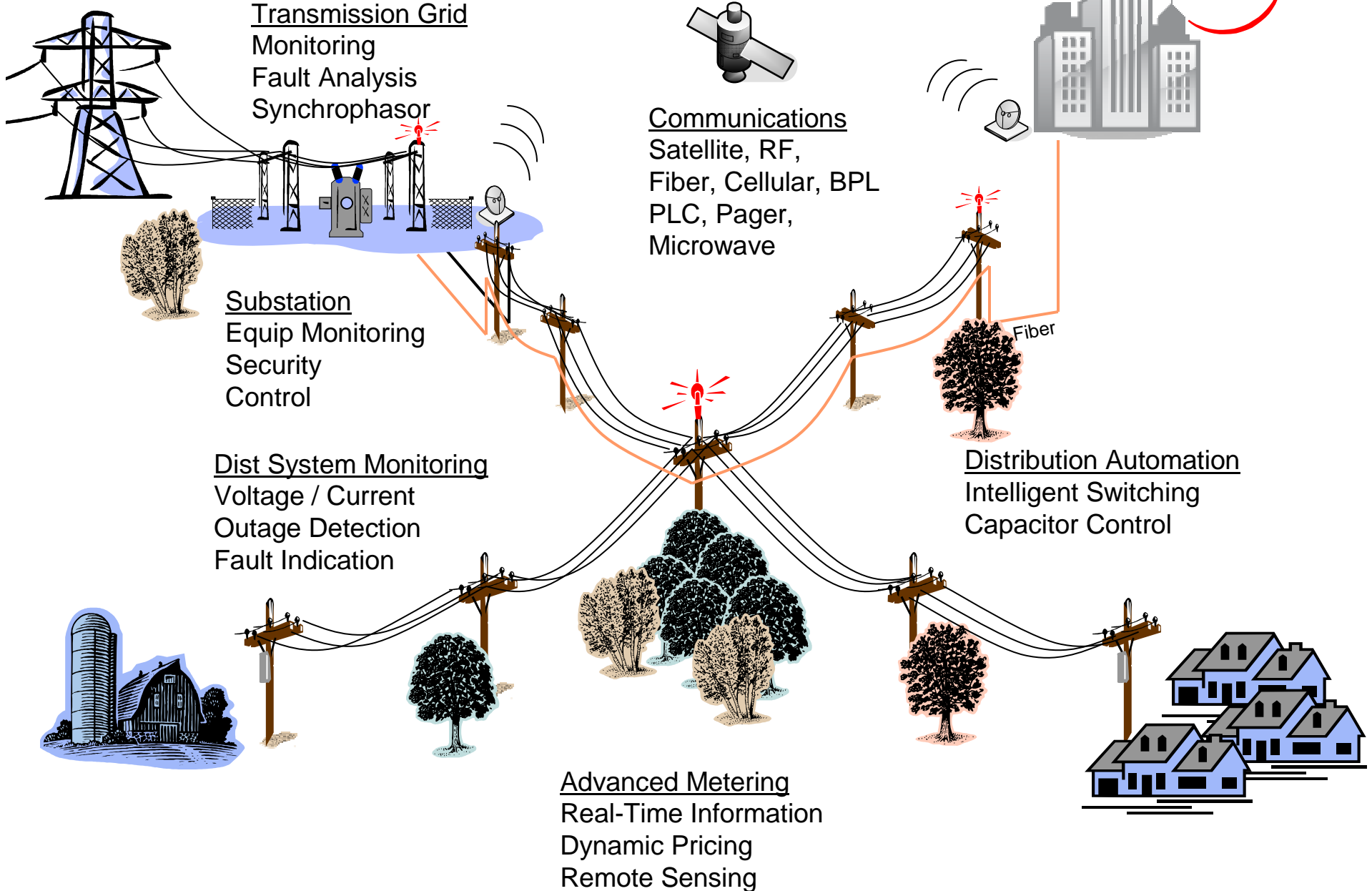


Our **3,700 employees** serve **7.5 million people** - about a third of the state of Texas.

Texas' largest regulated transmission and distribution utility - 6<sup>th</sup> largest in the U.S.



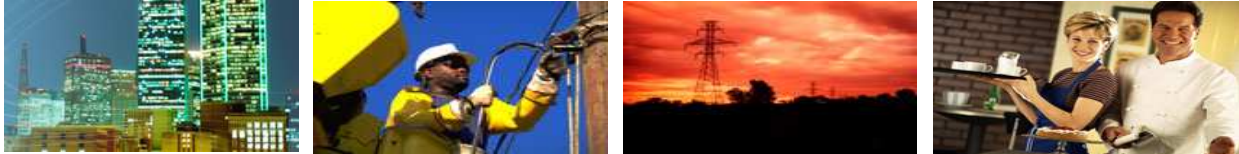
# At Oncor, Smart Grid includes ...





# Transmission and Substation Initiatives

# Oncor has nearly completed its transmission protection system modernization initiative



- Begun in 2004, ~1,200 units complete
- Fault recording and reporting
- Self testing, remote diagnostics
- Advanced synchrophasor functions for enhanced real-time grid monitoring



**Before**



**After**

# Static VAR Compensators - Reliable Operations while Reducing the Need to Run Local Generation



**SVC is a robust, advanced technology used to provide high speed grid voltage support during electrical disturbances**

- **SVCs use advanced electronics and high speed controls to switch capacitors and reactors in response to electrical disturbances**
- **Oncor's SVC is the largest and fastest acting in the world**
- **Second unit was put in service this summer**



**Oncor Parkdale SVC Installation**

# Transmission Dynamic Line Rating Project



- The available capacity of a transmission line depends on its operating temperature
- Dynamic line rating technology monitors the tension in a transmission line and relates it to the temperature of the line
- A real-time reading is then sent to a SCADA interface device at a station near the device, and from there is transferred to Oncor's TMS system
- The available capacity of the line can be obtained in near real time

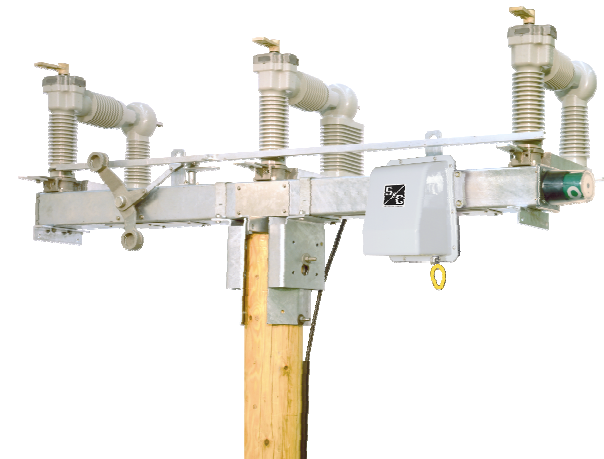


# Distribution Initiatives

# The “Self Healing” network is based on automated switching technology

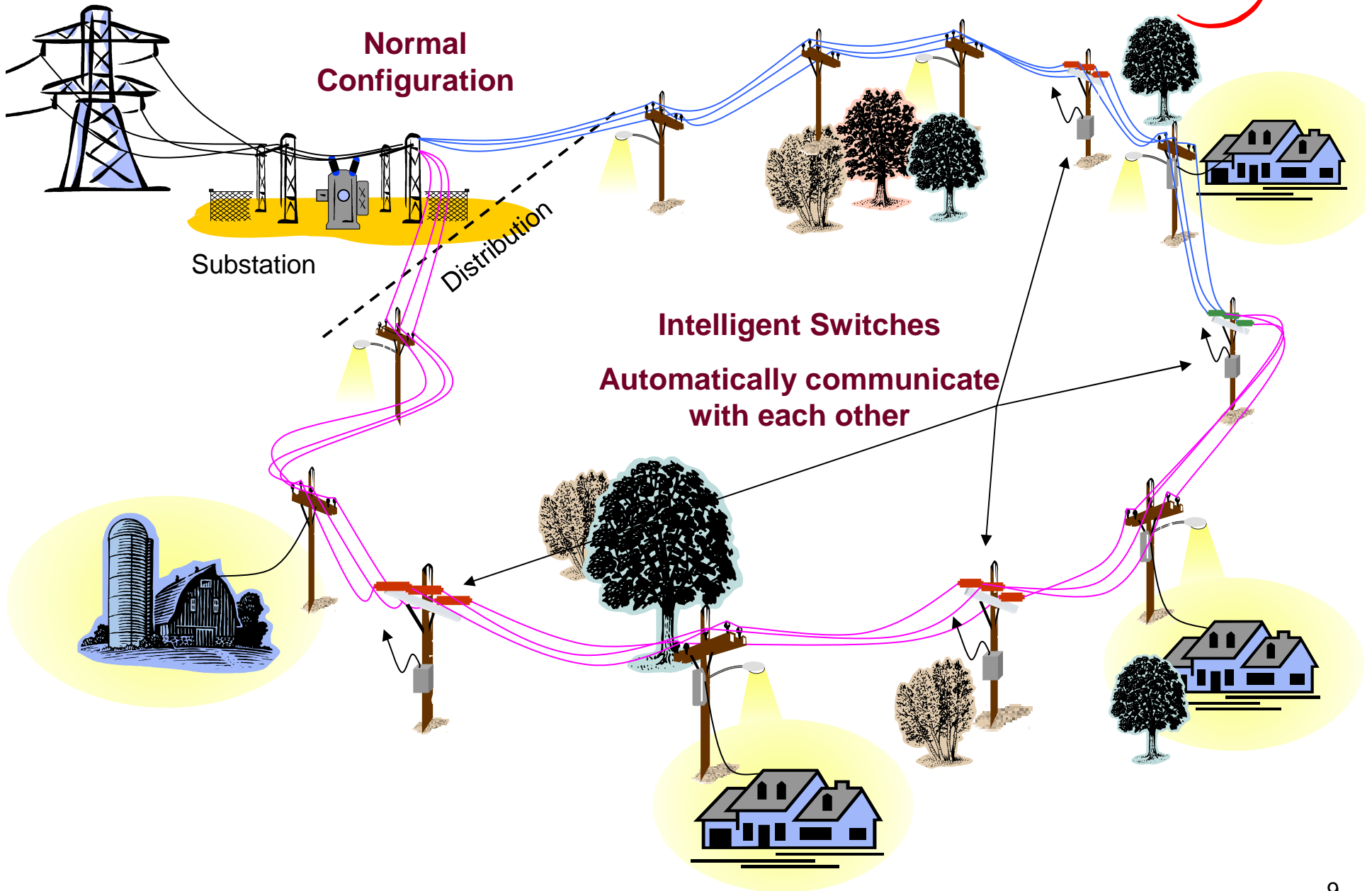


- **Oncor utilizes the S&C IntelliTeam II®**
- **An automatic fault isolation and service restoration system using distributed intelligence and peer-to-peer communications to restore service without human intervention**

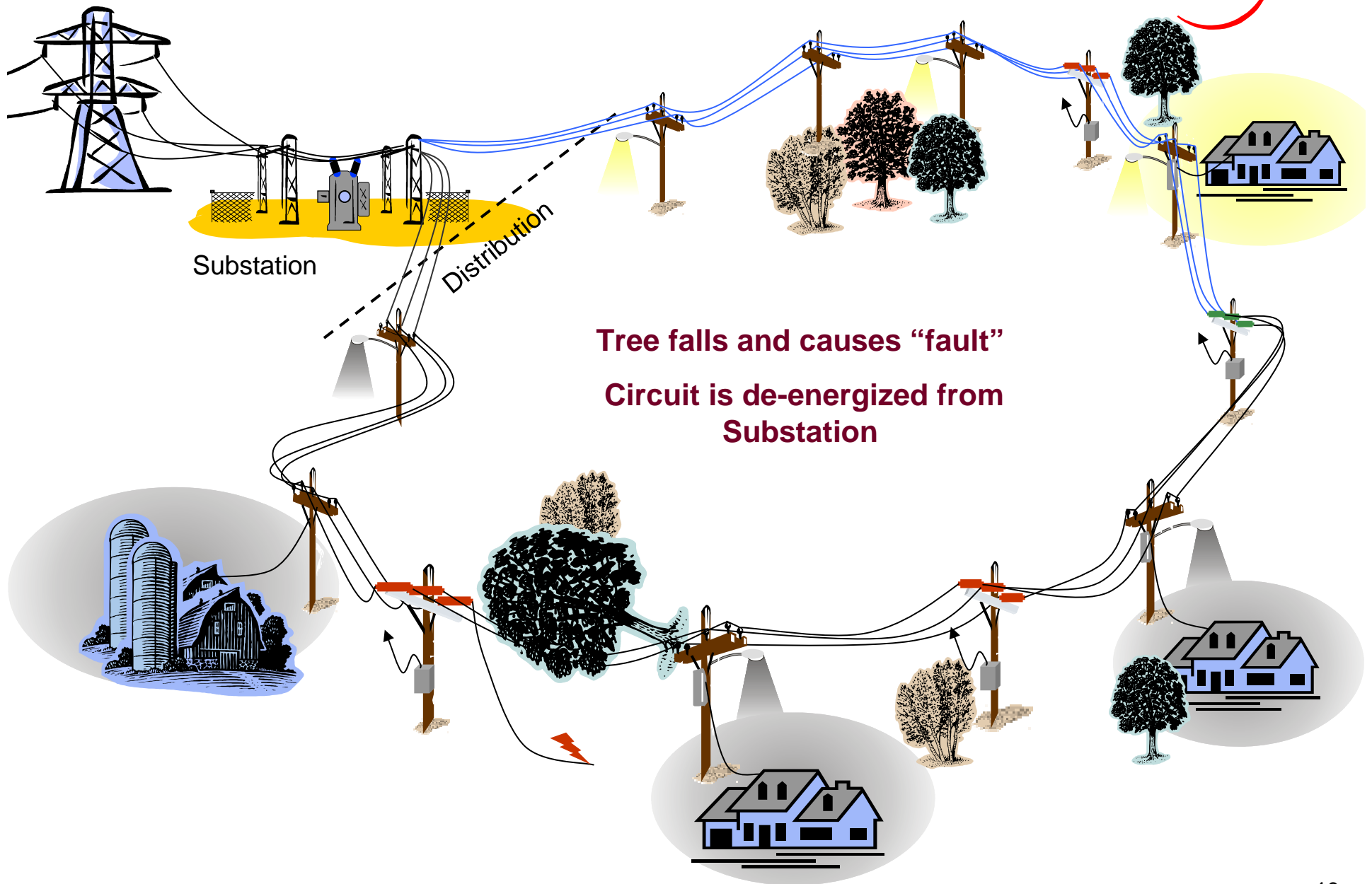


- **Installation of smart switches can improve reliability 40 to 60 percent, depending on how deployed**
- **Over 550 units presently installed on the system, and Oncor continues to install approximately 100 switches per year**

# Distribution Automation Overview

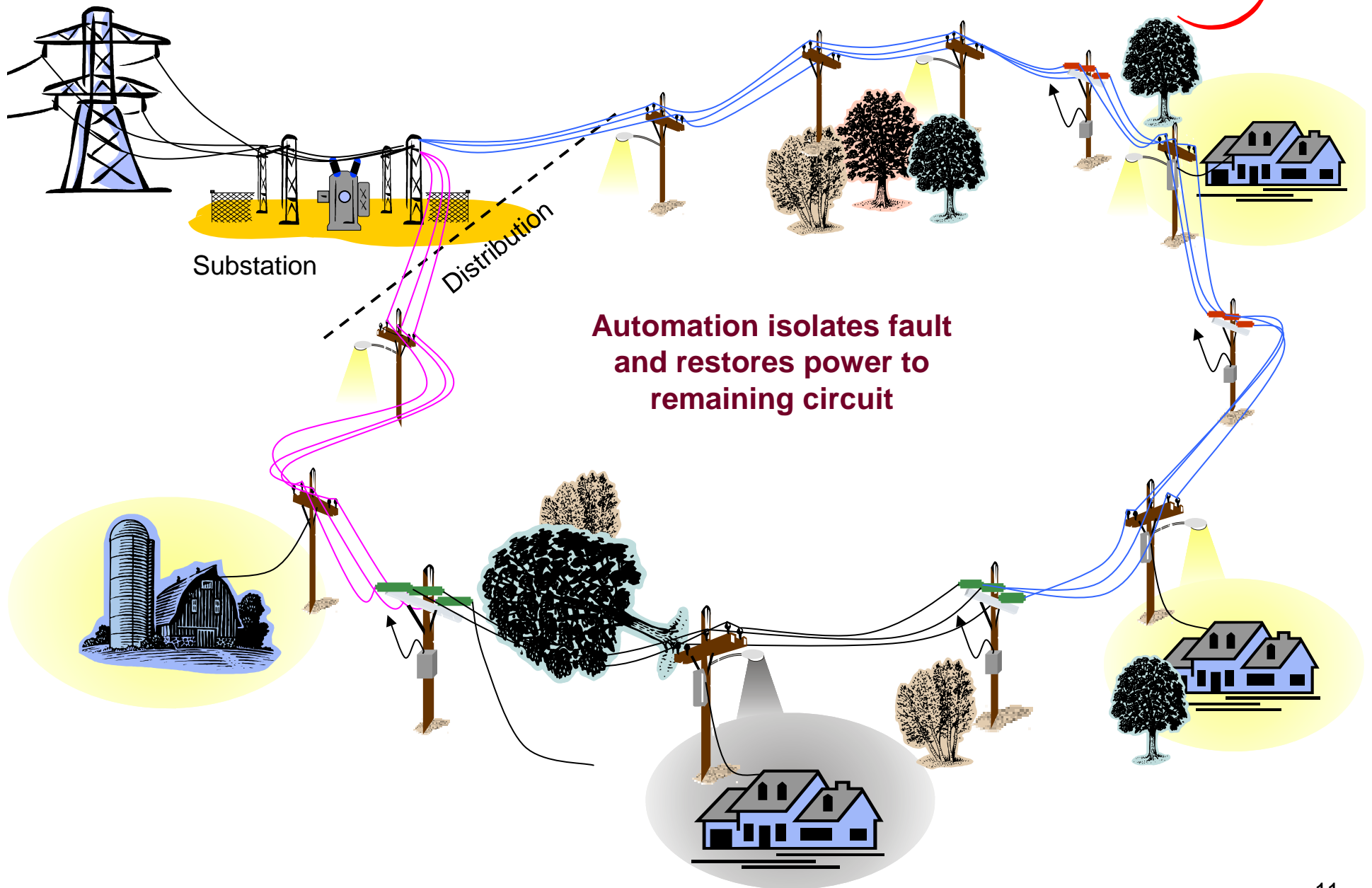


# Distribution Automation Overview

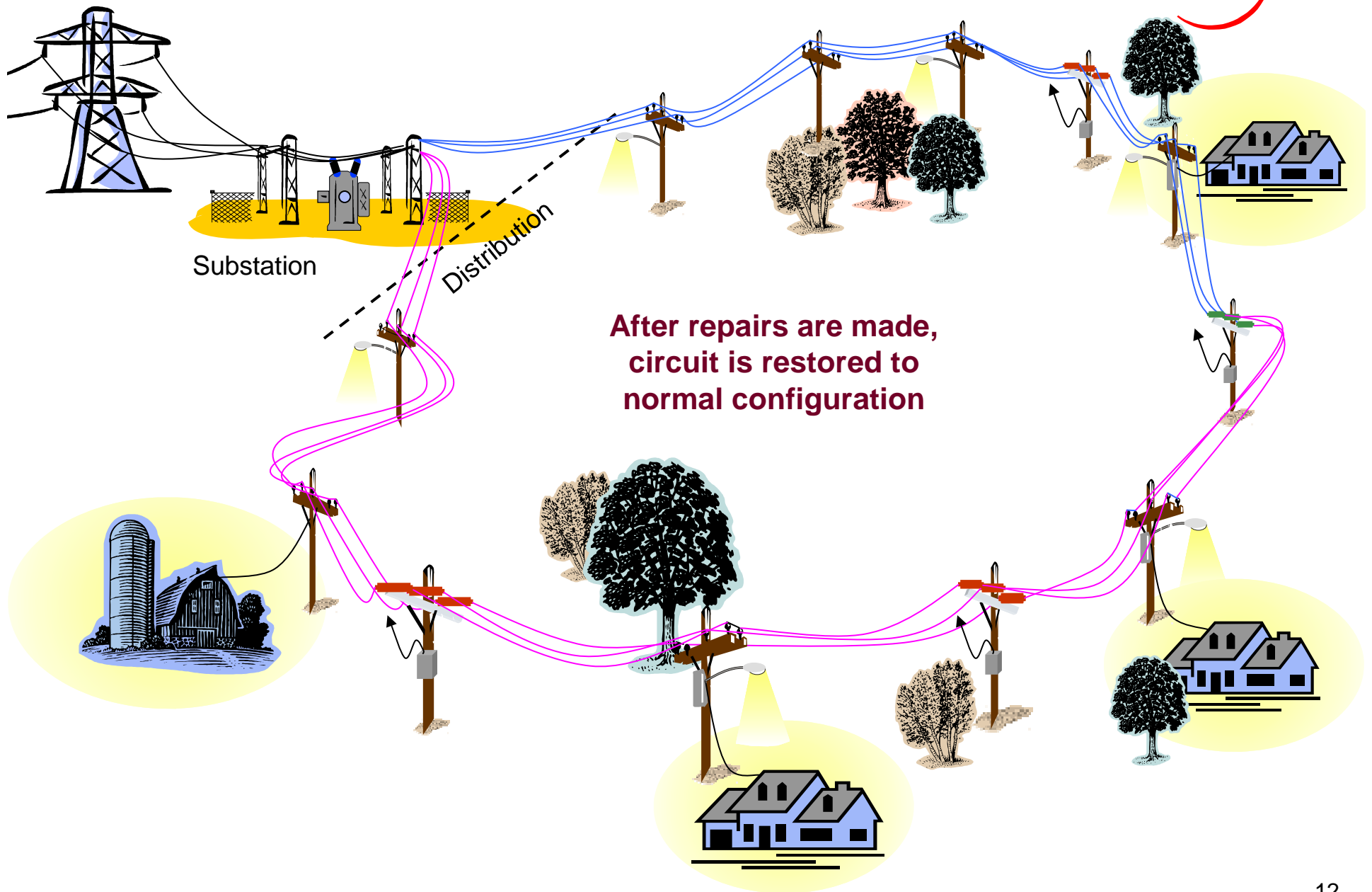


Tree falls and causes "fault"  
Circuit is de-energized from  
Substation

# Distribution Automation Overview



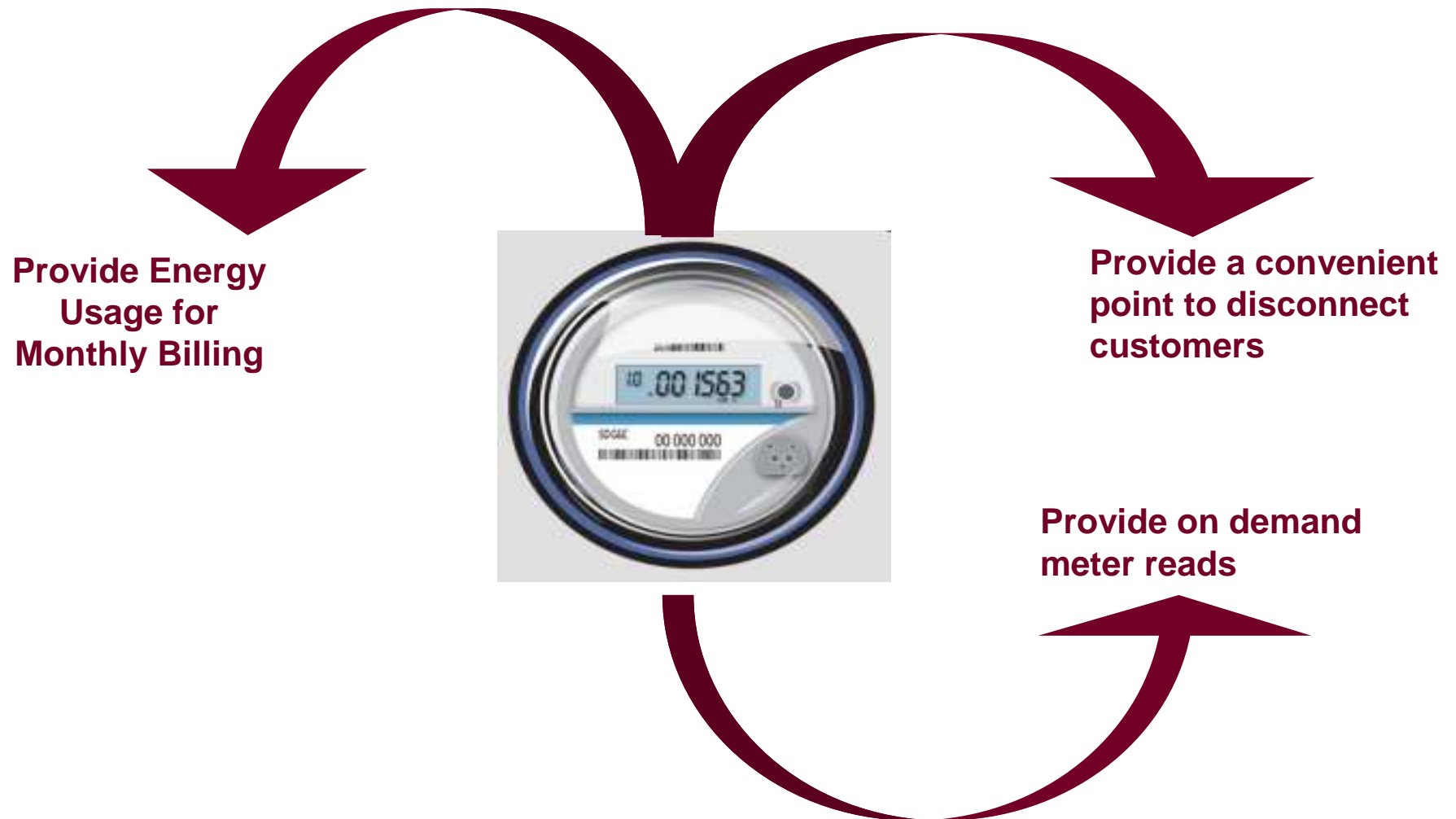
# Distribution Automation Overview



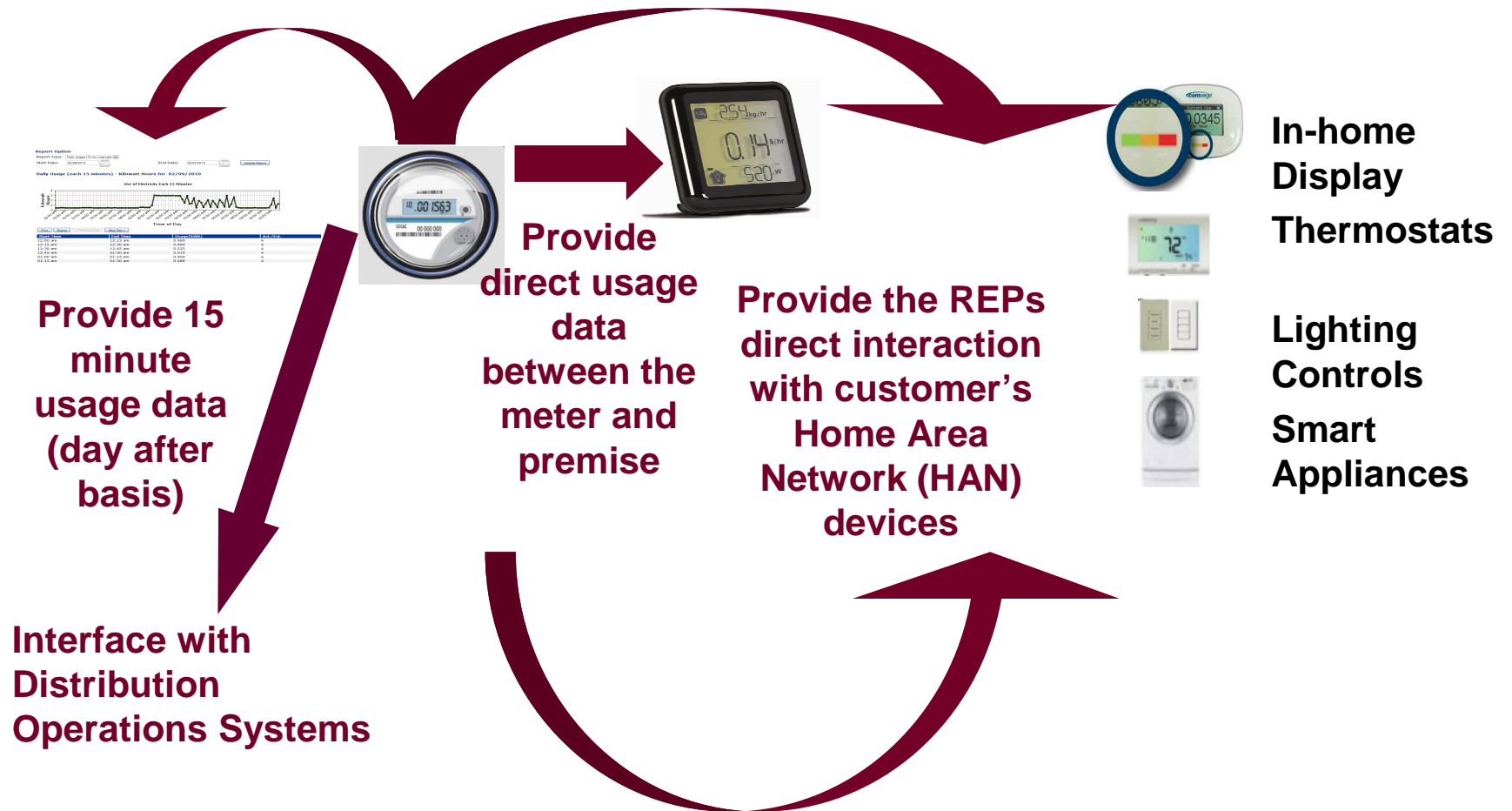
# Advance Metering System (1.2 million meters and counting)



## Providing Old Functionality in an Enhanced Way



# Providing New Services and Functionality

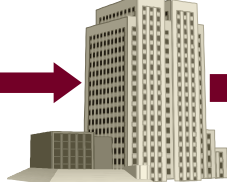


# REPs AMS HAN Capability

Smart Meter  
Texas Portal



Oncor IT  
System



Via ZigBee Smart Energy  
Profile (SEP) 1.0



Provide the REPs  
direct interaction  
with customer's  
Home Area  
Network (HAN)  
devices



In-home  
Display  
Thermostats

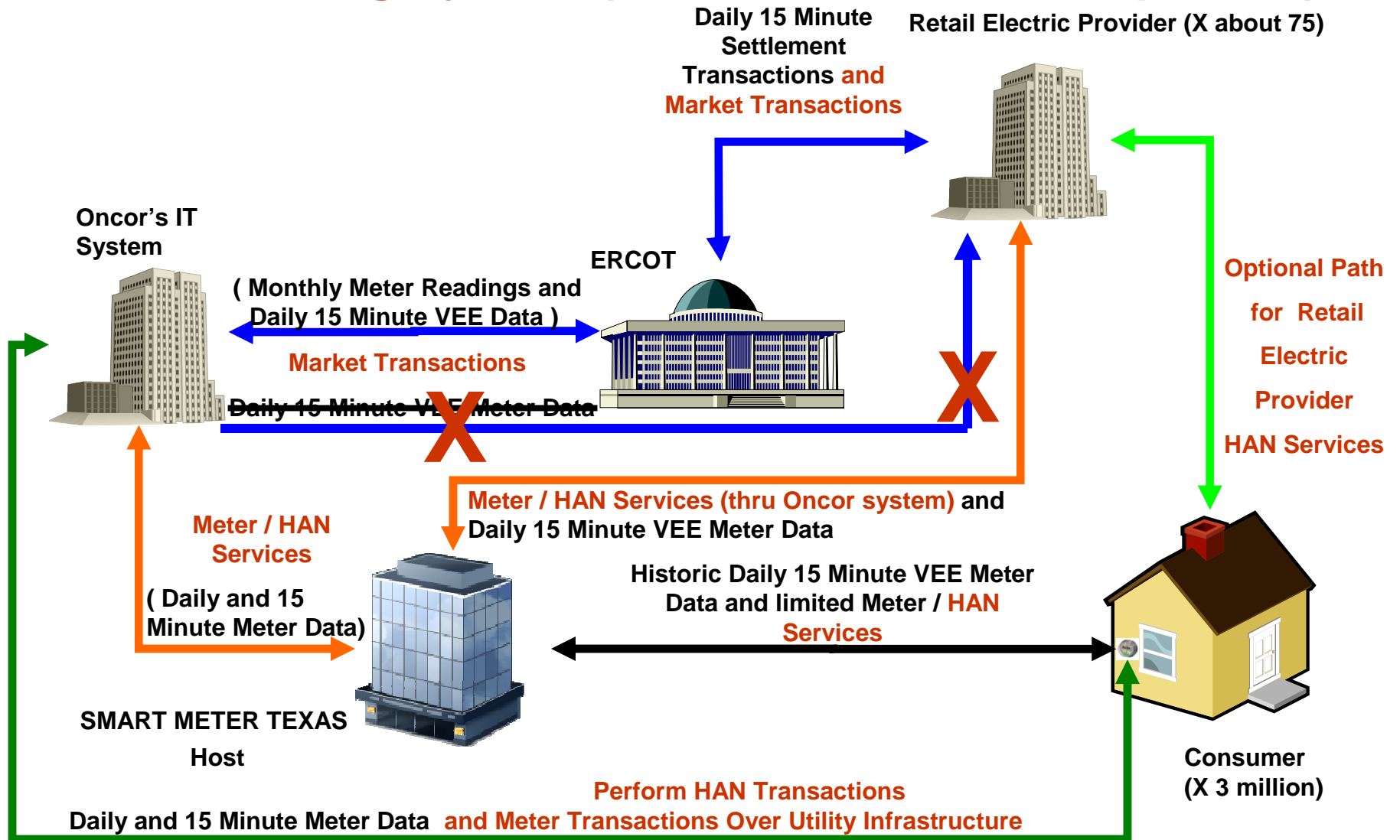


Lighting  
Controls  
Smart  
Appliances



- Text messaging
- Load control:
  - direct;
  - through thermostat adjustment.
- Pricing
  - Current Price;
  - Next or Future Price;
  - Pricing Event;
  - Time of Use (TOU) with 5 Pricing Tiers.

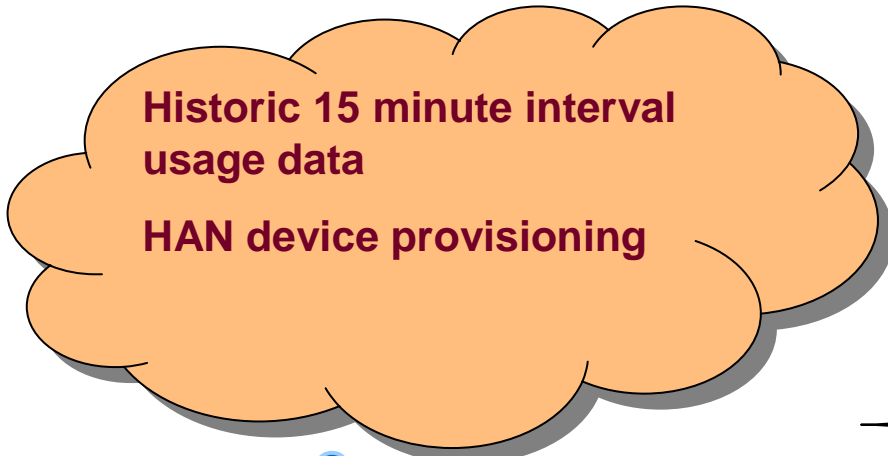
# Advanced Metering System (Market/Customer Perspective)



# Smart Meter Texas Portal



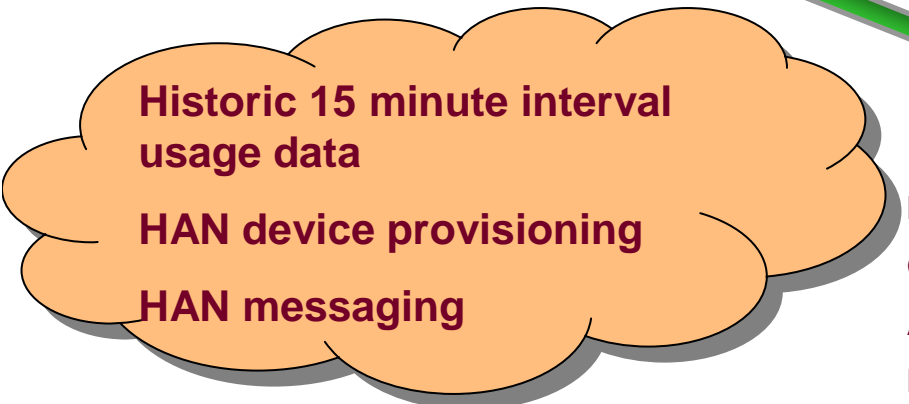
# Smart Meter Texas Portal



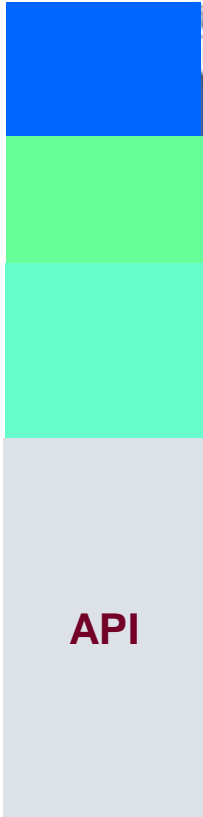
**Customers**

**TDSPs**

**REPS**



Separate GUIs



NOTE:  
 GUI - Graphical User Interface  
 API - Application Programming Interface  
 HAN - Home Area Network

# Texas is Ready for Electric Vehicles



## 1. Texas consumers interested:

- Reasonable commute distances
- Environmental benefits
- Gas prices

## 2. Car technology has evolved:

- Plug-in hybrid electric technology eliminates range anxiety
- Improved batteries and longer range



## 3. Electric grid is ready:

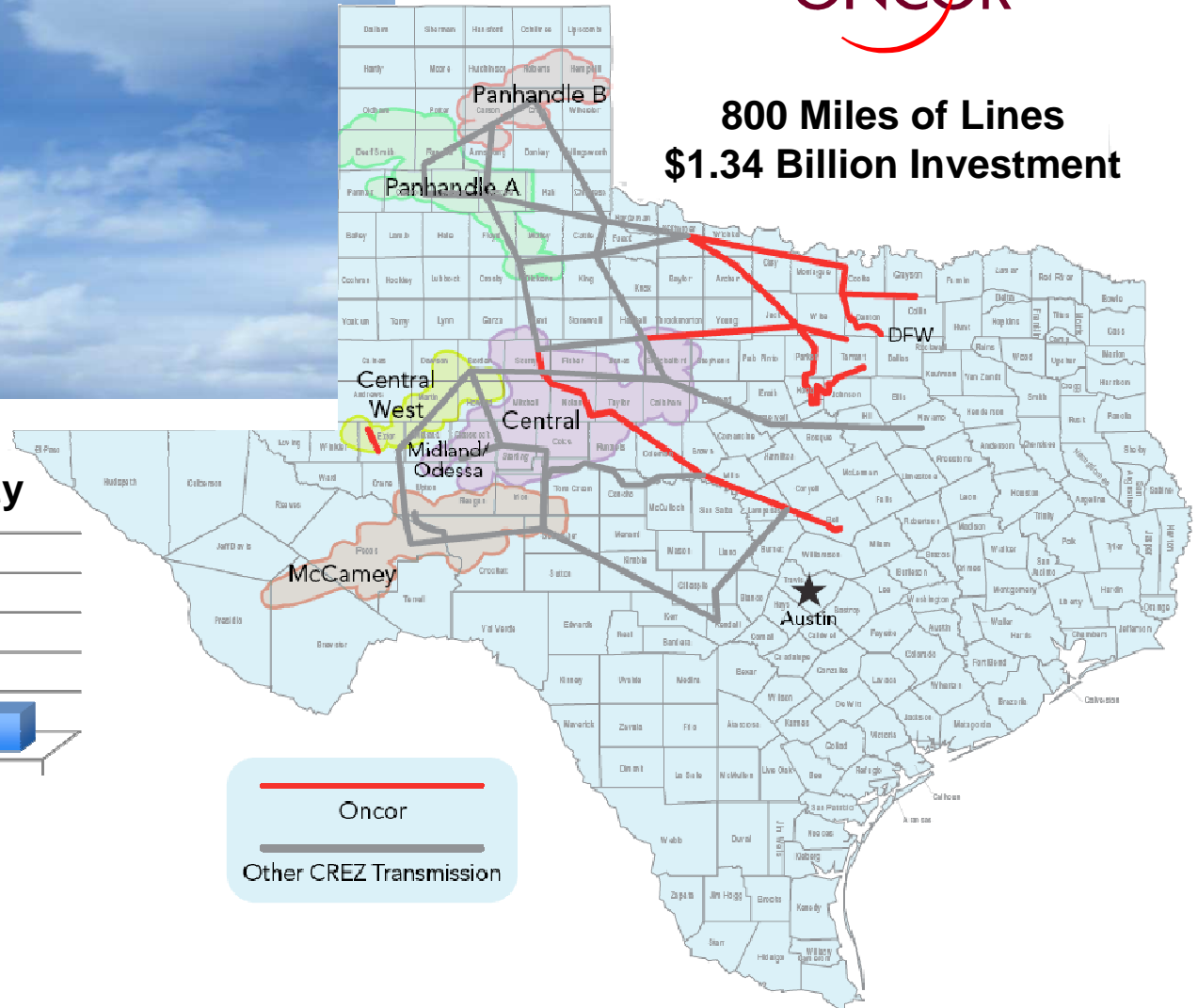
- Ample supply of off-peak power
- Smart grid technology helps to monitor EV adoption for reliability purposes, as well as create opportunities to incentivize time-of-use rates and maximization of resources

# Texas is Making an Investment in Building New Lines to Bring Wind Power to Market

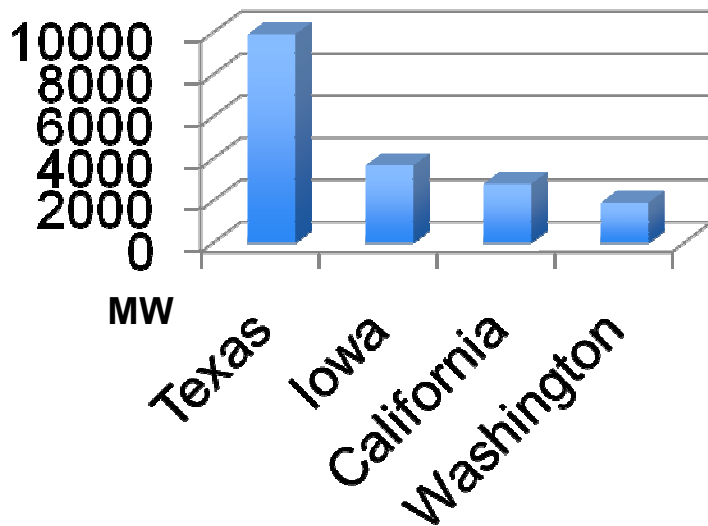
ONCOR



**800 Miles of Lines**  
**\$1.34 Billion Investment**



**Installed Wind Capacity**



— Oncor  
— Other CREZ Transmission

# The Anticipated Benefits of the Additional Wind Power CREZ will Provide



**Reduction of carbon dioxide by up to 16% and nitrogen oxide emissions by up to 13%**



**Conservation of 17 billion gallons of water each year**

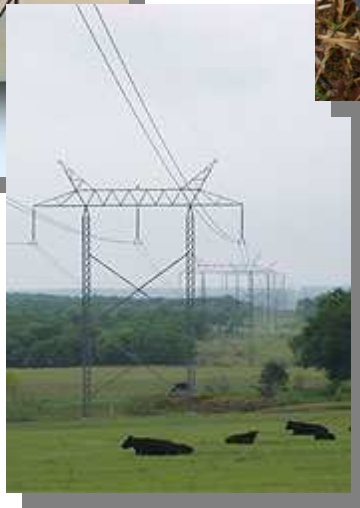


**Economic development and “green” job growth**



**\$160 - \$355 annual savings for residential customers**

# The Smart Grid Ties the Pieces Together...



... Creating a Smarter, Greener World.

# Questions?