Integrated Distributed Energy Resources Management Pilot
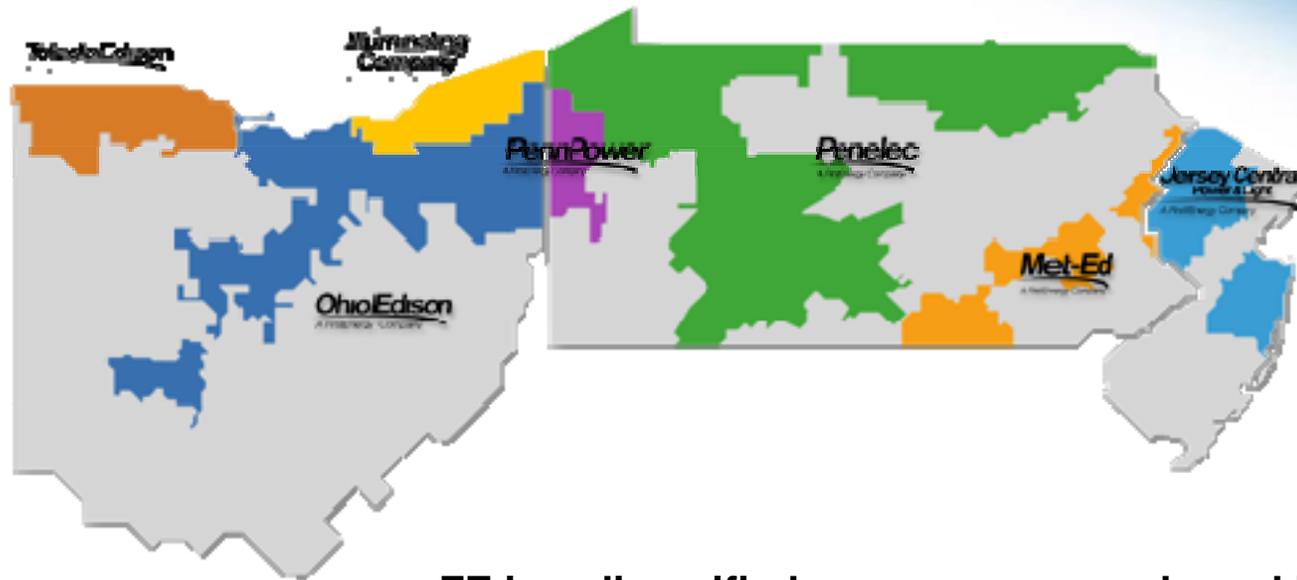
Said Abboudi
Chief Business Development Officer
BPL Global EMEA

Outline

- **Jersey Central Power & Light / FirstEnergy Facts**

- **BPL Global Facts**

- **Integrated Grid Communications and Automation solution**

- **Integrated Distributed Energy Resources Components and Capabilities**

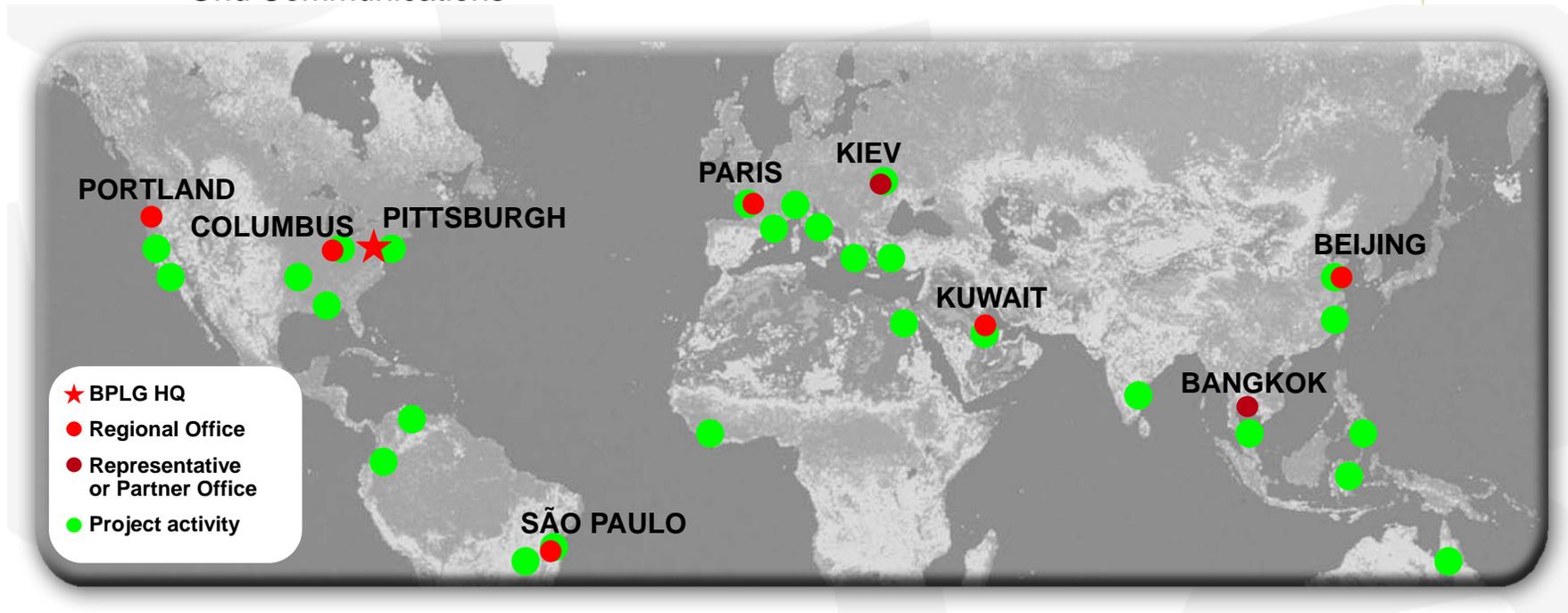- **Integrated DER Operations Delivery Phases**

JCP&L/FirstEnergy

Rankings among Electric Utilities

Assets	9
Customers	5
Revenues	8
Market Cap	7

» **FE is a diversified energy company based in Akron, OH, USA**

» **JCP&L is one of FE's seven electric utility operating companies**

» **Nation's 5th largest investor-owned electric system**

» **JCP&L serves 1.1 million customers of 4.5 million FE customers**

» **128,000 miles of transmission & distribution lines**

» **FE has nearly $12 billion in annual revenues**

» **FE owns and operates more than $31 billion in assets**

BPL Global

» **BPL Global is a Smart Grid Solutions provider based in Pittsburgh, PA**
» **BPLG offers integrated Smart Grid solutions from generation to the premises**
» **Areas of Expertise include:**
   » Grid Efficiency
      » DER
      » Demand Management
   » Grid Reliability and Operational Productivity
   » Grid Communications

PORTLAND
COLUMBUS   PITTSBURGH
PARIS   KIEV
BEIJING
KUWAIT
BANGKOK
SÃO PAULO

★ BPLG HQ
● Regional Office
● Representative or Partner Office
● Project activity

BPL Global Provided Solutions

Operations Center ↔ **Energy Market**

Centralized Generation | **Transmission Grid** | **Distributed Renewable Generation & Storage** | **Distribution Grid** | **Residential and C&I Demand**

Transformer Monitoring Extend asset life and improve reliability	**Distributed Energy Resource Management** Optimize underutilized renewable generation and storage resources	**Reliability** Protect & extend asset life
Substation Automation Improve productivity and reliability		

Load Management Meet demand growth for ~1/3 the cost of new generation

Grid Communications - Enable smart grid

Power SG® Solutions

Delivers the Intelligent Grid

| Substation Monitoring and Applications | Feeder Monitoring and Automation | | Utility DER System Integration | Customer System Integration |

Local system and device assessment   **Integrated DER management**

FULL INTEGRATION ACROSS COMMON COMMUNICATION PLATFORM

Communications Infrastructure

Storage & Distributed Generation

Transmission Automation

Substation Automation

Distribution Automation

Customer Integration & AMI

Integrated DER System Capabilities

DER Master Control (MC) **–**
monitors wholesale energy market for price and/or capacity requirement signals for service opportunities and for system reliability; aggregates DER from multiple Local Managers for optimal wide area management

DER Local Manager (LM) **–**
monitors condition of the local grid (distribution feeder) to identify, assess and manage efficiency and reliability service requirements

Active monitoring

| DER Master Controller Configurable Market Based Services			
DER Local Manager Configurable Operations Based Services			
Distributed resources		Load management resources	
Distributed generation	Distributed Advanced Storage	C&I Direct Load Control	Residential Direct Load Control

Granular management of connected assets

Fully Integrated DER Project Delivered in 3 Phases

- **Phase 1 – Direct Load Control and Management**

- **Phase 2 – State Monitoring w/Integrated Storage**

- **Phase 3 – Intelligent, Integrated DER Management**

Phase 1 - Direct Load Control and Management

- **Premises load information viewed by Operator on user interface**

- **Local Grid Sensing and Control**

- **Load management validation and verification via reports and audit logs**

- **Customized load control programs to support operations and capacity constraint events**

Power SG™ Demand Dispatch and Demand Response
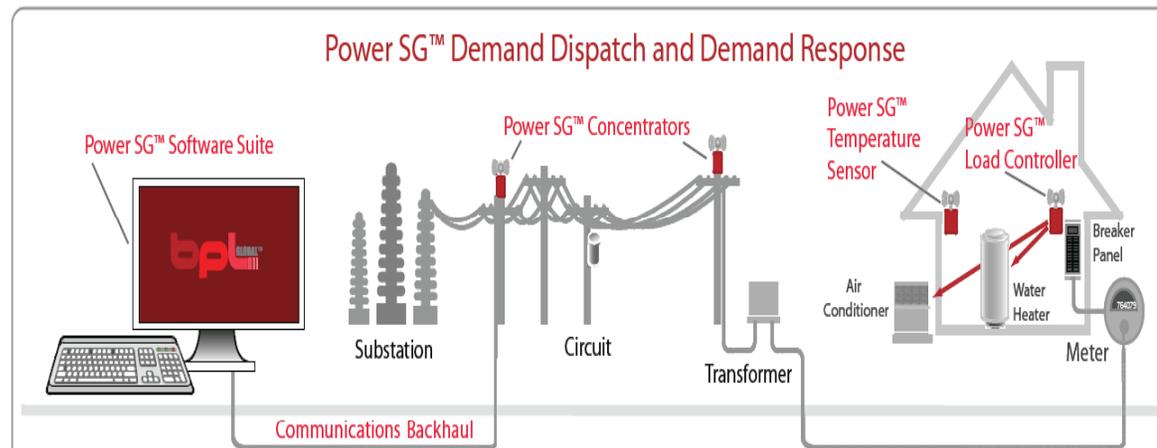
# Integrated DER Management Pilot Details

- **Project deployed starting Summer of 2008**

- **8 MW; 3500 residential customers, up to 100 C&I customers**

- **2-way Communications focused on Direct Load Control**

- **Targeted high growth area substations and associated circuits in JCP&L territory**

- **Operate for Operations and PJM Programs**

- **Project approved by NJ Board of Public Utilities**

- **BPL Global, co-development vendor**

Beyond the Pilot......
# Distributed System Integration Expansion

- Additional 15 MW residential and commercial direct load control

- State transition moniroting

- Electricity storage in substations and distributed on the grid

- Permanent peak load shift using thermal energy storage

Control Interface

Ice Bear 30
Storage A/C
5.5kW continuous x 6 hours
32 kWh storage
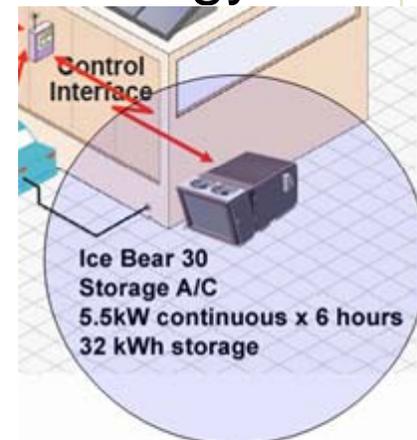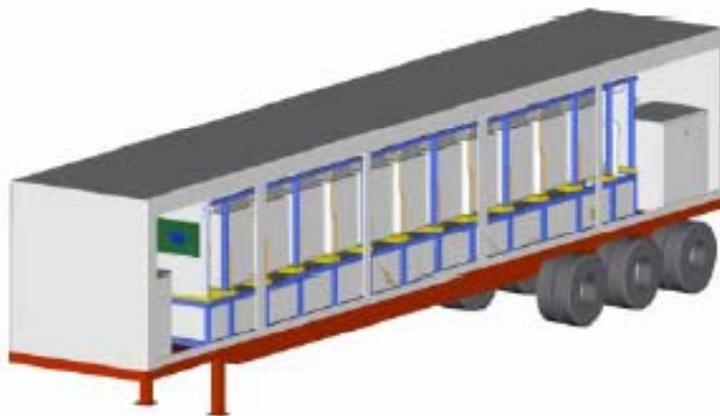
Phase 2 - State Monitoring w/Integrated Storage

- **Monitor and visualize state transitions of individual devices**
  - Line mounted sensors

- **Action plans for state management**
  - Operator created
  - Push enabled
  - Real time verifiable

- **Integrated electricity storage**

- **Integration of substation IEDs/EMS/SCADA systems**

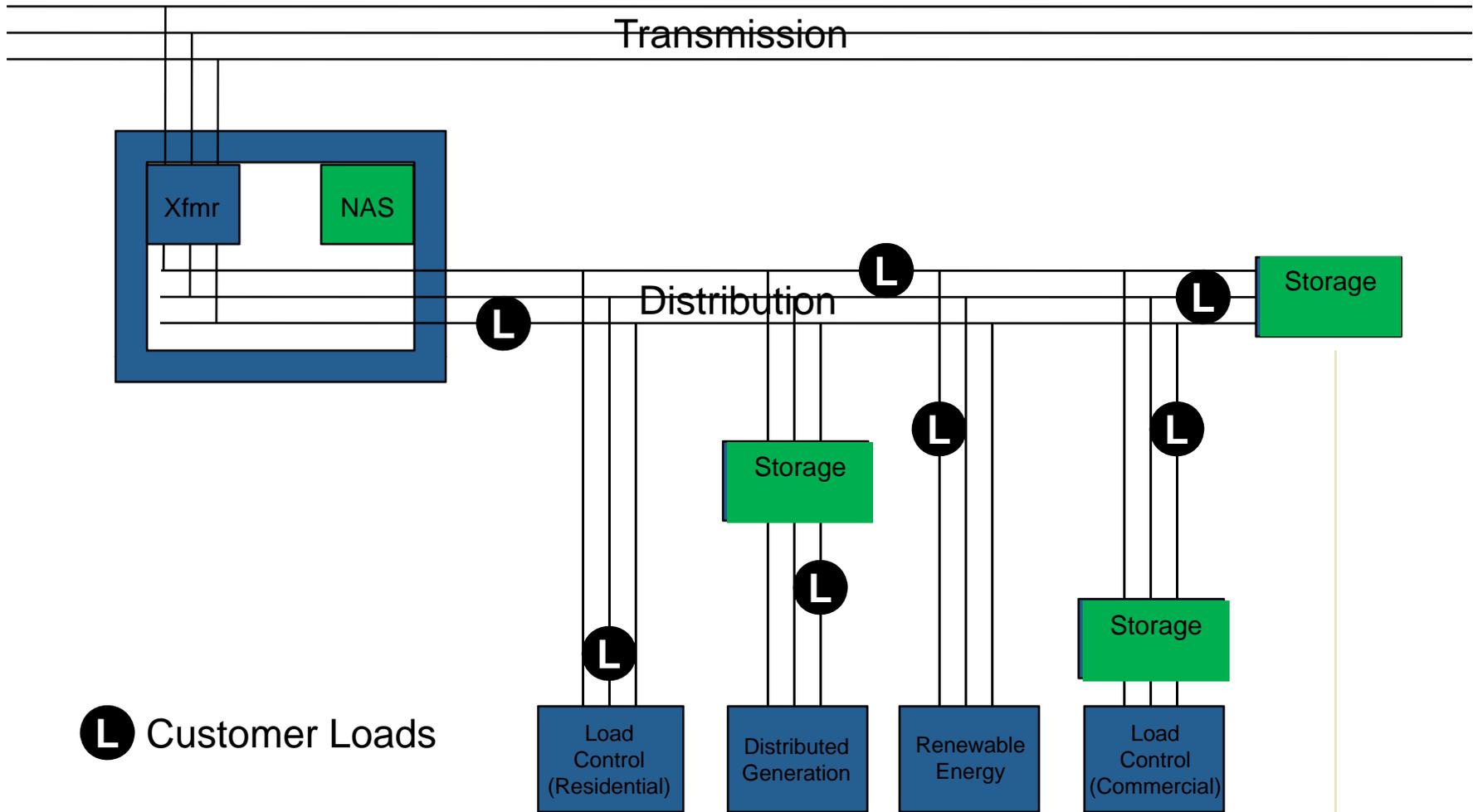- **Customized verification reports**
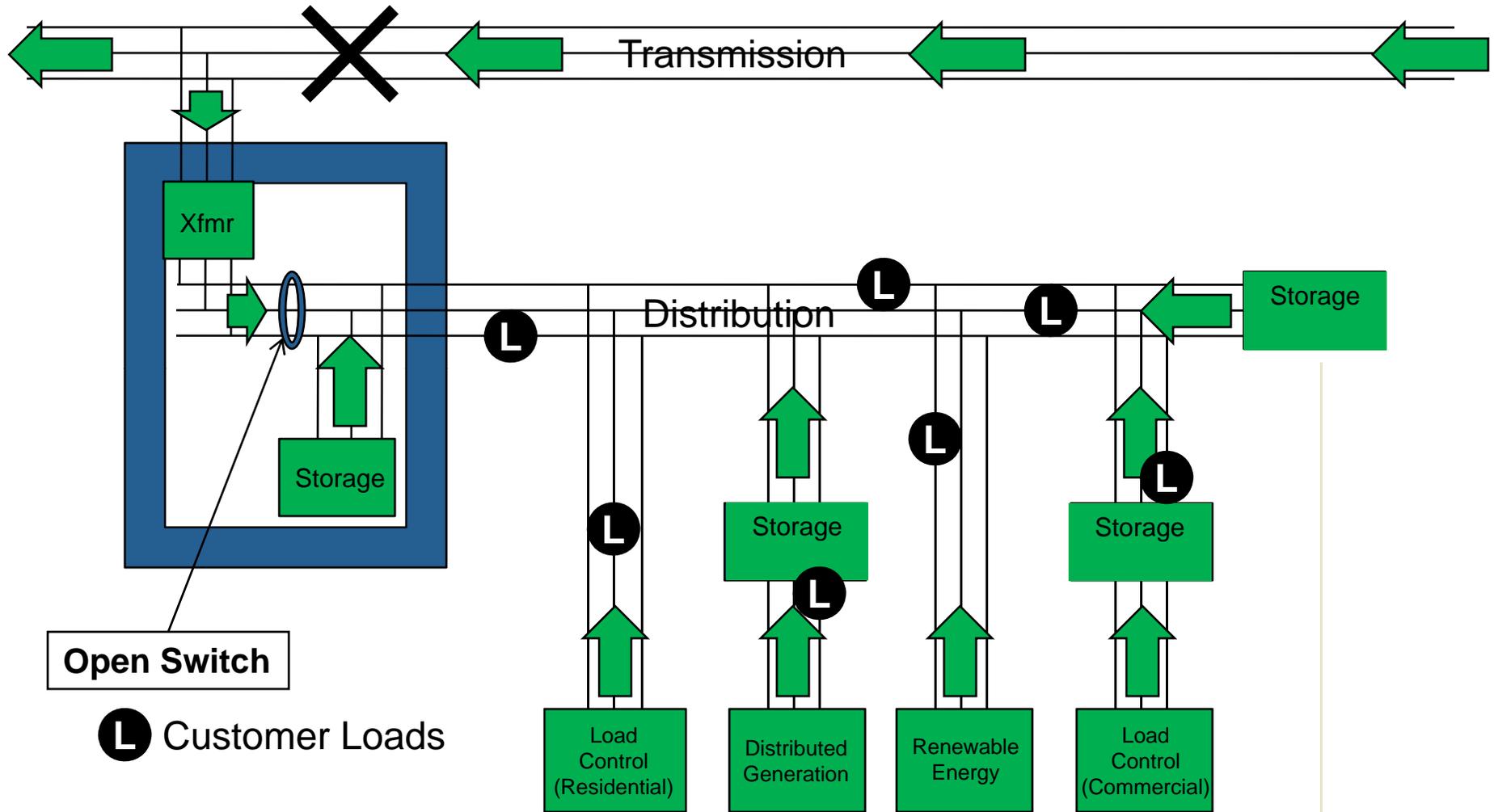
Typical Hybrid DER Configuration
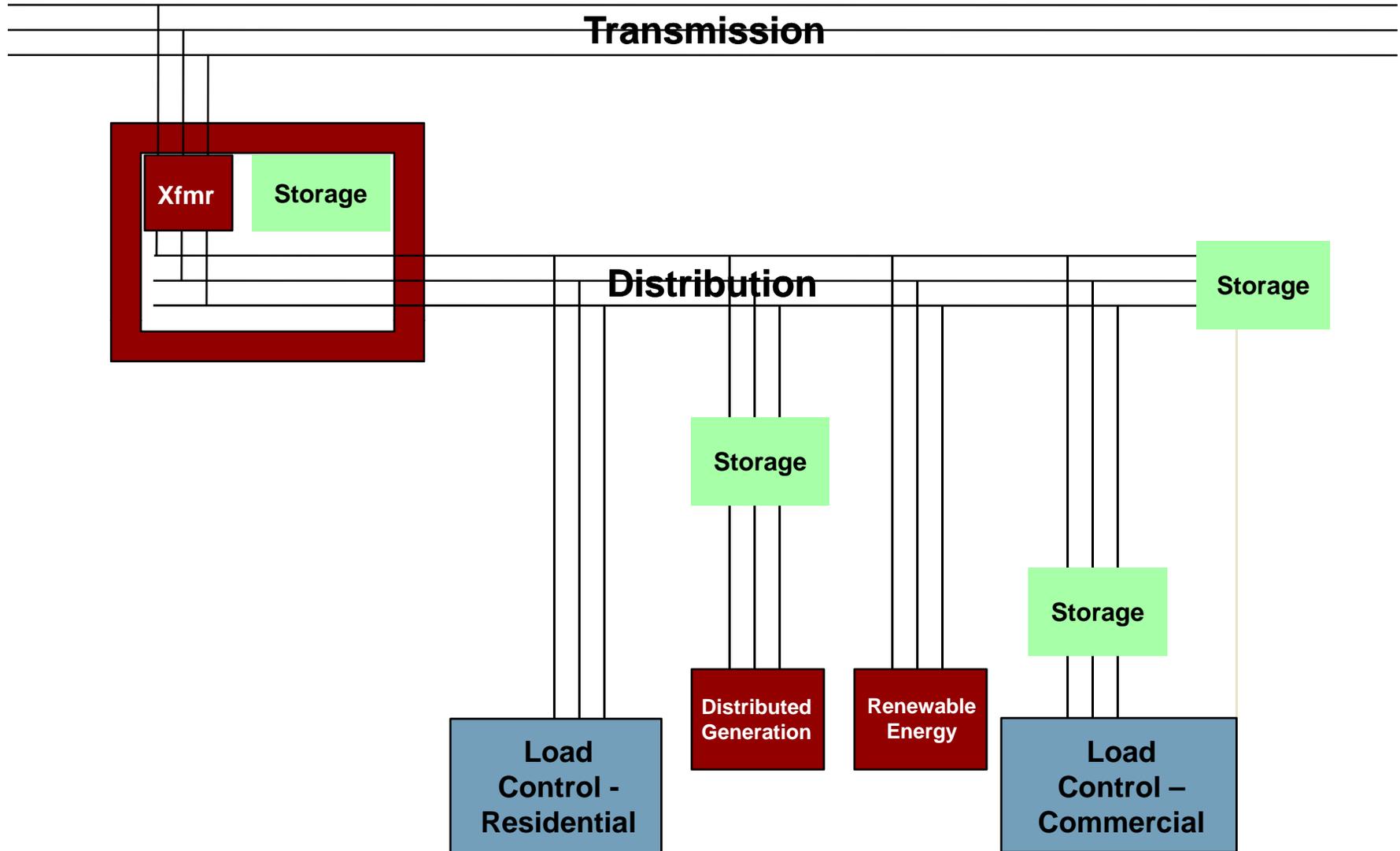
Phase 3 - Intelligent, Integrated DER Management

- **Full state estimation**
  - Normal, Stressed or Emergency Conditions

- **System wide alarm coordination**
  - Minimize outage restoration times, improve operational reliability metrics

- **Automated action plan & coordinated response based on utility developed rules**

- **Integrated DG operations**
  - Utilize installed assets more efficiently

- **Enhanced weather analysis**
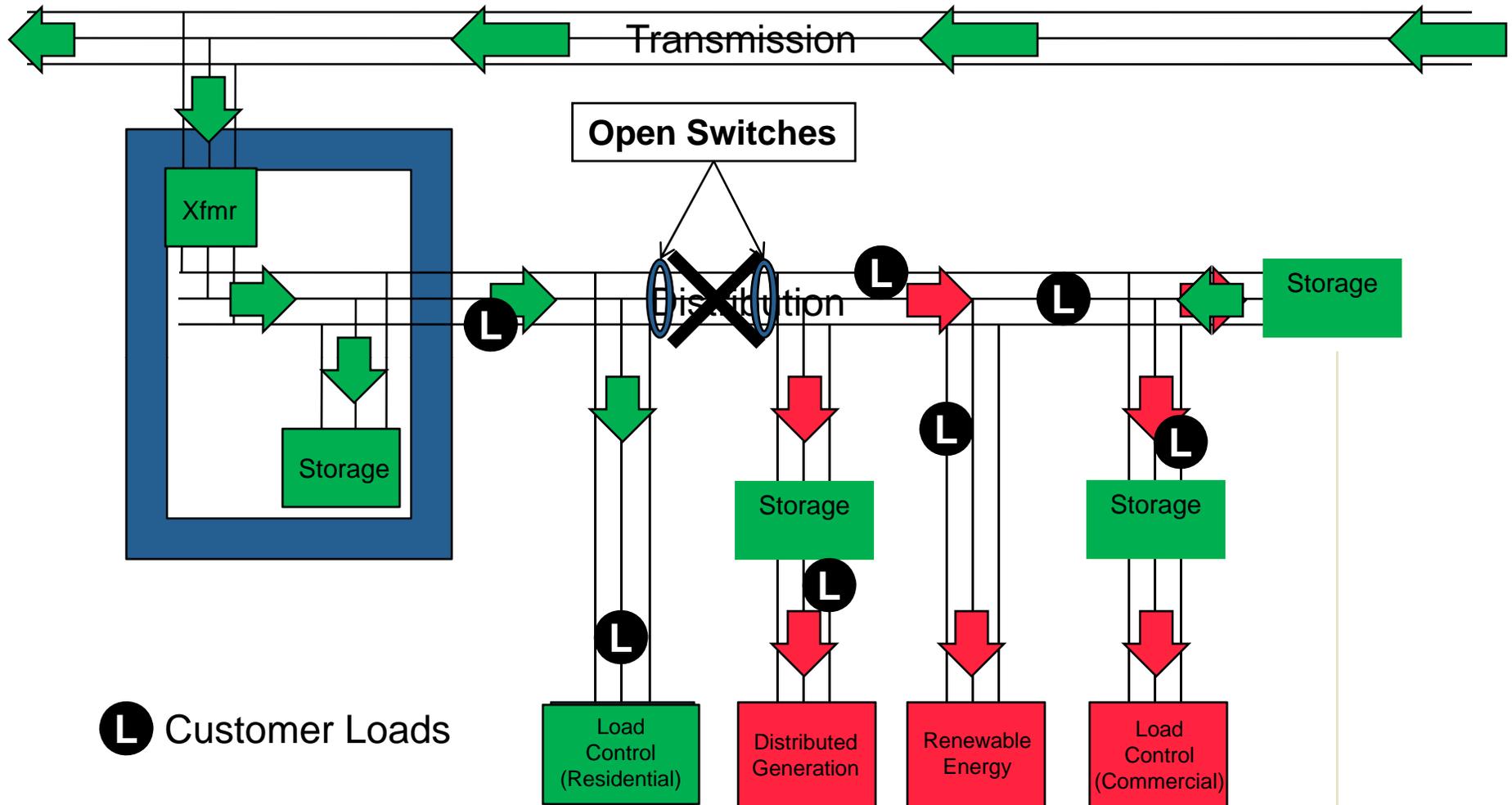 - Localized weather information to improve load forecasting

Typical Hybrid DER Configuration

Hybrid DER Configuration – Emergency

Open Switch

L Customer Loads

Transmission

Xfmr

Distribution

Storage

Storage

Storage

Storage

Load Control (Residential)

Distributed Generation

Renewable Energy

Load Control (Commercial)

Hybrid DER Configuration – Emergency

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