



CMU 5th Electricity Conference

Connection of Various Distributed Generation Sources to the Grid **V** *(NEW SMART)*

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Carnegie Mellon

CMU Interaction

- **Power Systems Experience Center** – Warrendale, PA
- Power Xpert meter HMI design – Maya Design Inc.



Eaton Corporate Overview

- Founded in 1911 by J.O. Eaton
- World Headquarters in Cleveland, OH
- Chairman & CEO - Alexander M. Cutler
- A premier diversified industrial manufacturer
- Does business in more than 150 countries
- More than 75,000 employees worldwide

Electrical



Fluid Power



Truck



Automotive

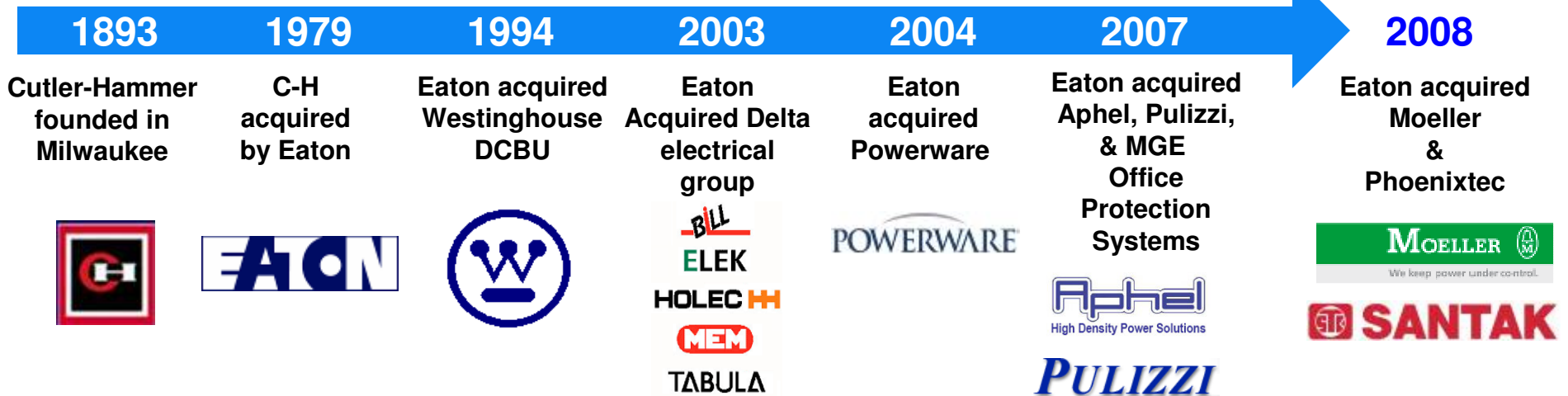


Eaton's Electrical Group

- Multi-billion dollar globally-enabled electrical manufacturer
- IEC, ANSI and NEMA product solutions
- Broad range of Engineering Service Solutions
- Continuous technology leadership investment
- Strong financial integrity
- Over 35,000 employees
- 70 factories in over 30 countries



Eaton's Electrical Group - World Headquarters
Pittsburgh, PA



Eaton's Ethics Story



THE WINNERS OF THE WORLD'S MOST ETHICAL COMPANIES ARE THE STANDOUTS. EACH FORCES OTHER COMPANIES TO FOLLOW ITS LEADERSHIP OR FALL BEHIND. EACH USES ETHICAL LEADERSHIP AS A PROFIT DRIVER.

INDUSTRIAL MANUFACTURING

Caterpillar
// UNITED STATES

Danfoss
// DENMARK

Deere
// UNITED STATES

Eaton
// UNITED STATES

Miliken & Company
// UNITED STATES



“Sustainability by Design” - Inherent in Everything Eaton Does



Making a positive difference in the world by going beyond compliance.

- Building stronger communities
- Creating a world-class workplace
- Reducing greenhouse gas emissions
- Minimizing and effectively managing waste
- Conserving, reusing and effectively treating water
- Sustainable technology innovations:
 - Eaton’s Hybrid Power Systems
 - Industry-leading POW-R-Command lighting control system
 - High-pressure systems for aircrafts
 - Fuel efficient superchargers
 - Eaton’s valve actuation technology

Our Electrical Business is Broad-Based

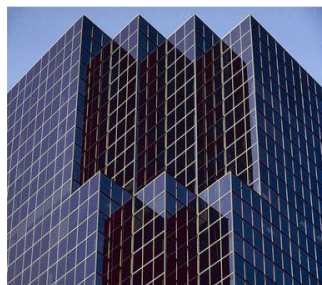
Engaged - All Segments of the Electrical Landscape



Residential



Light Commercial



Commercial



Utility / Industrial



Critical Power



**Structured
Wiring & Load
Centers**



**Integrated
Facility Systems**



**Switch
Gear**



**Motor Control &
Switch Gear**



**Uninterruptible
Power Supply**

Product Basket – Heavily Focused on Circuit Switching & Control Technology

Industrial

Motor Control Centers
 Medium & LV Switchgear
 Medium Voltage Control
 Unit Substation Transformers
 Electro-Centers
 Contactors & Starters
 Pushbuttons, Relays, TBs
 Sensors
 AF Drives
 Chiller Starters
 Operator Interface & PLCs
 Panelboards &
 Switchboards
 Transformers
 Transfer Switches &
 Systems
 Paralleling Gear
 Protective Relays
 Metering Devices
 Communications
 Products
 Surge Protectors
 Safety Switches
 Industrial Circuit Breakers
 Medium & LV Breakers
 & Fuses
 Engineering Services

Commercial

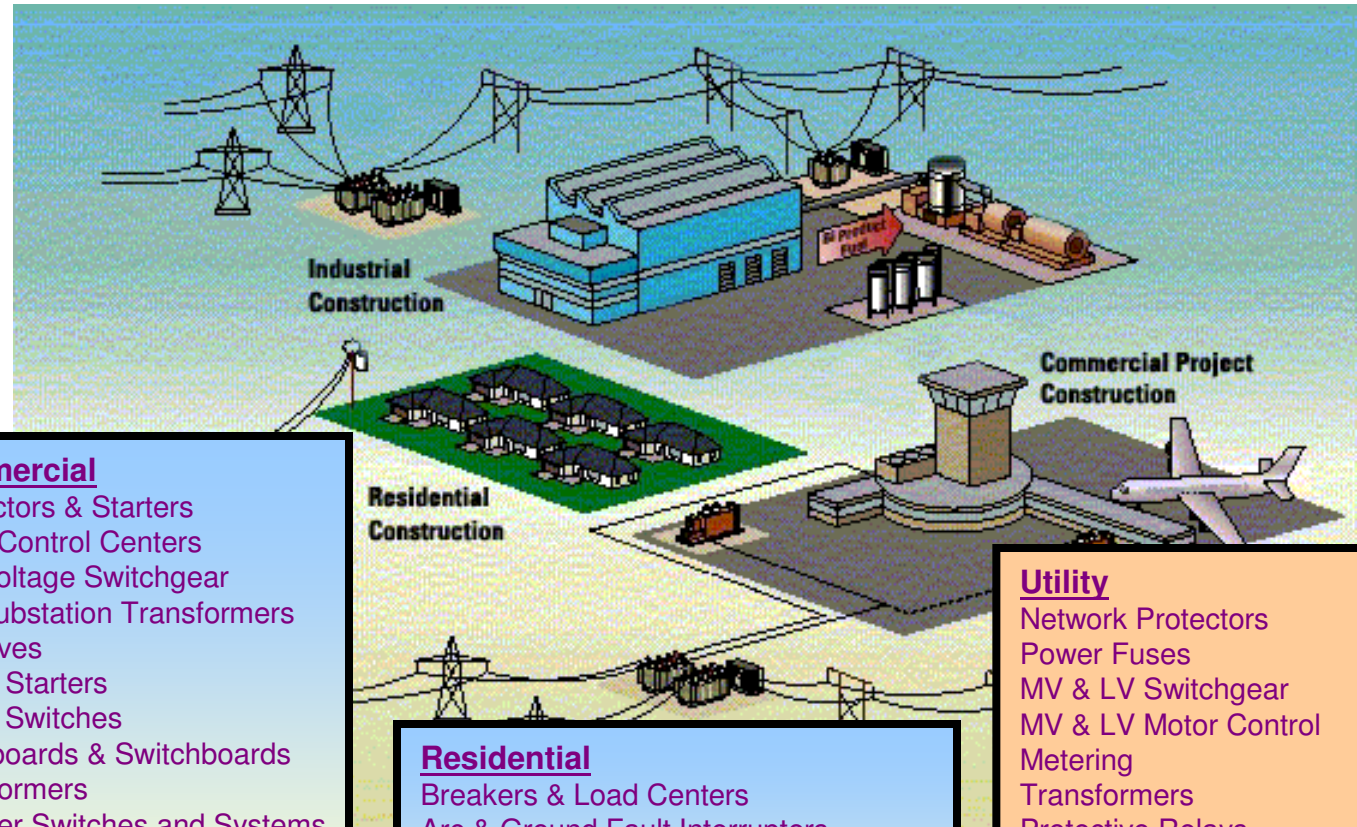
Contactors & Starters
 Motor Control Centers
 Low Voltage Switchgear
 Unit Substation Transformers
 AF Drives
 Chiller Starters
 Safety Switches
 Panelboards & Switchboards
 Transformers
 Transfer Switches and Systems
 Paralleling Gear
 Metering Devices
 Industrial Circuit Breakers
 Communications Products
 Surge Protectors
 Engineering Services

Residential

Breakers & Load Centers
 Arc & Ground Fault Interrupters
 Group Metering & Meter Centers
 Power Outlet Panels
 Safety Switches
 Air Conditioning Disconnects
 Surge Protectors
 Transfer Switches and Systems

Utility

Network Protectors
 Power Fuses
 MV & LV Switchgear
 MV & LV Motor Control
 Metering
 Transformers
 Protective Relays
 MV & LV Circuit Breakers
 Panelboards, Switchboards
 Transfer Switches
 UPS & Power Quality
 Replacement Components
 Engineering Services



Connection of Various Distributed Gen. Sources to the Grid - **Transmission**

- Wind Farms – Collector Switching, Substations
- Solar Farms – PV Inverters
- Small Hydro - Automation



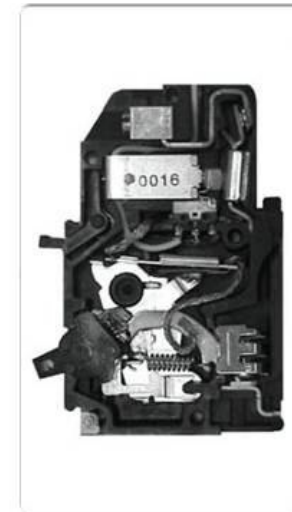
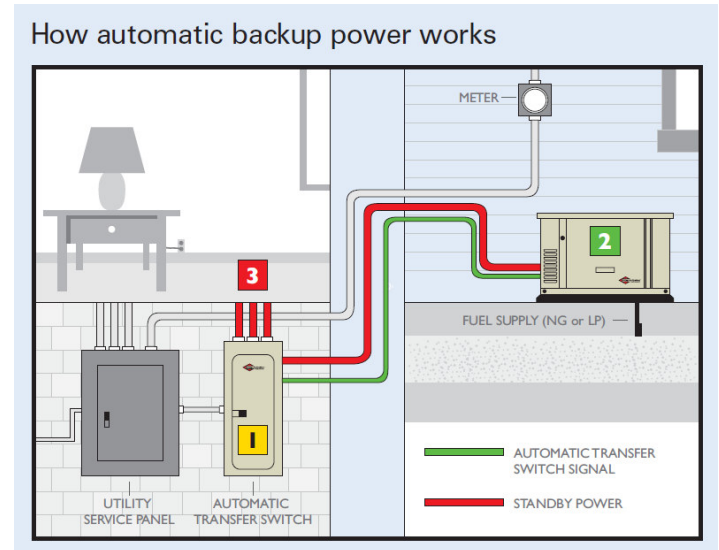
Connection of Various Distributed Gen. Sources to the Grid - Distribution

- Connections to LV Network Systems (NSTAR)
- Hybrid Drive Systems
- PHEV Charging
- Engine/Generators (CAT/ISO)
- Fuel Cells (Altergy.com)
- DOE / PGE Project – Multiple DG Sources on a Circuit



Connection of Various Distributed Gen. Sources to the Grid - Residential

- Backup Generators / Transfer Switches
- Smart Breakers
- Home Heartbeat System



Whatever the Generating Source...

- Whether it clicks, spins, hums, chugs, splashes, or glows, if it connects to the **(new smart)** grid, we're probably involved in controlling, switching, and communicating with it.

QUESTIONS



EATON

Powering Business Worldwide