SIEMENS

June 30 Legislative Energy Commission Meeting

Modernization of the Grid

Ken Geisler, VP Strategy
Siemens Smart Grid US/Canada

8/18/2014
Minneapolis, Minnesota

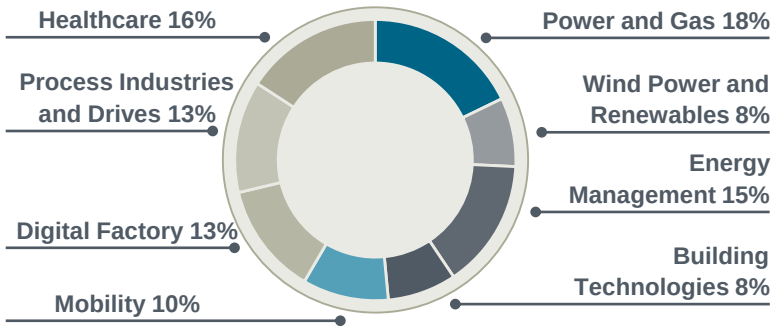
Key figures for fiscal 2014
Siemens at a glance

(continuing operations; in millions of €, except where otherwise stated)	FY 2014	FY 2013	% Change[1]
Volume			
Orders	78,350	79,755	1%
Revenue	71,920	73,445	1%
Profitability and capital efficiency			
Return on capital employed (ROCE)	17.2%	13.7%	
Net income[2]	5,507	4,409	25%
Capital structure and liquidity			
Free cash flow	5,399	5,378	
(in thousands)	Sep. 30, 2014	Sep. 30, 2013	
Employees			
Total	343	348	
Germany	115	117	
Outside Germany	229	231	

1 Comparable, excluding currency translation and portfolio effects.

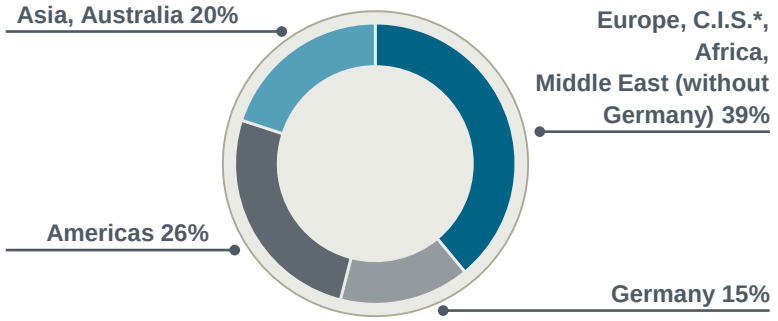
2 Continuing and discontinued operations.

Revenue by industrial business



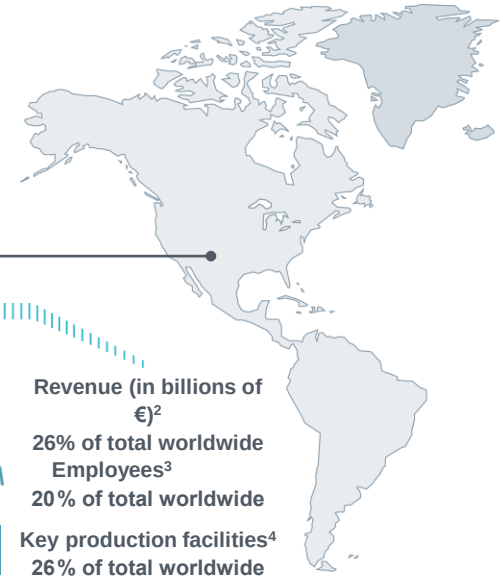
Not included: Financial Services (SFS)

Revenue by region



* Commonwealth of Independent States

Global presence
Close to customers all over the world



Germany

10.9 Revenue (in billions of €)[2]
115,000 15% of total worldwide Employees[3]
69 33% of total worldwide Key production facilities[4]
24% of total worldwide

Europe, C.I.S.,[1] Africa, Middle East (including Germany)

38.7 Revenue (in billions of €)[2]
211,000 54% of total worldwide Employees[3]
139 62% of total worldwide Key production facilities[4]
48% of total worldwide

Americas

18.8 Revenue (in billions of €)[2]
70,000 26% of total worldwide Employees[3]
76 20% of total worldwide Key production facilities[4]
26% of total worldwide

Asia, Australia

14.4 Revenue (in billions of €)[2]
62,000 20% of total worldwide Employees[3]
74 18% of total worldwide Key production facilities[4]
26% of total worldwide

All figures refer to continuing operations.

1 Commonwealth of Independent States.

2 By customer location. 3 As of September 30, 2014. 4 Fifteen employees or more.

Evolution of the Energy Grid

1900

1980

Thomas Edison develops the **first electric systems**

1950

Rural Electrification and continued **Industrialization**

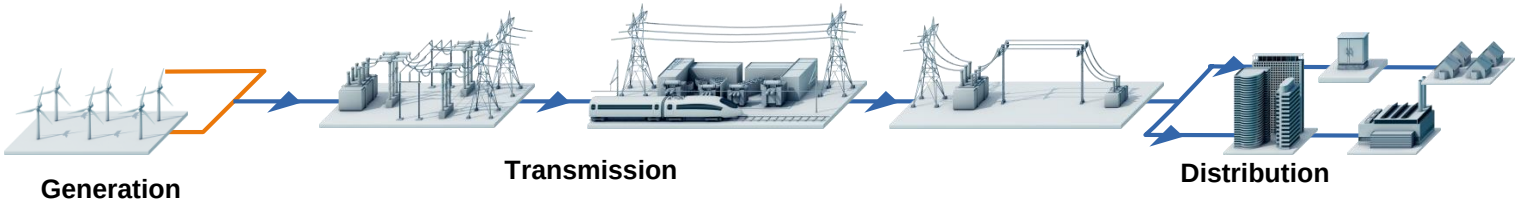
Grids are required to power the sprawling growth of **suburbanization**

2020

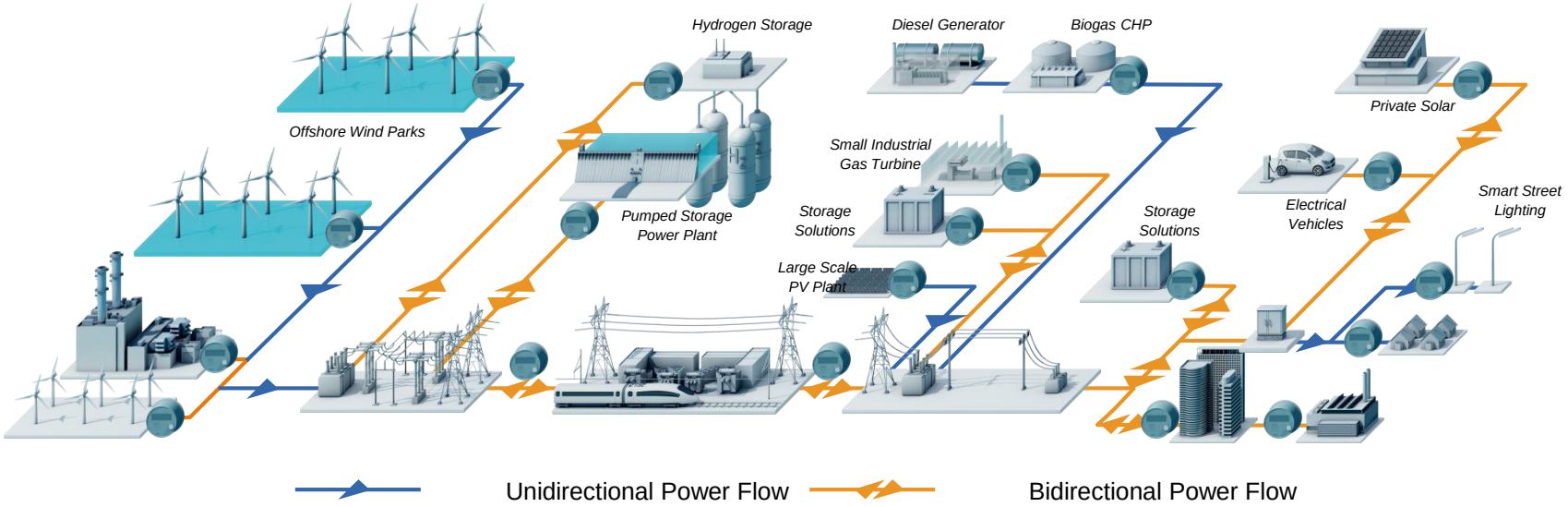
"**Re-urbanization**" of cities is changing the way we work and live and has the potential to expand awareness, education, and responsibility to energy use

Decentralization of Grid Design and Generation

From centralized, unidirectional grid …

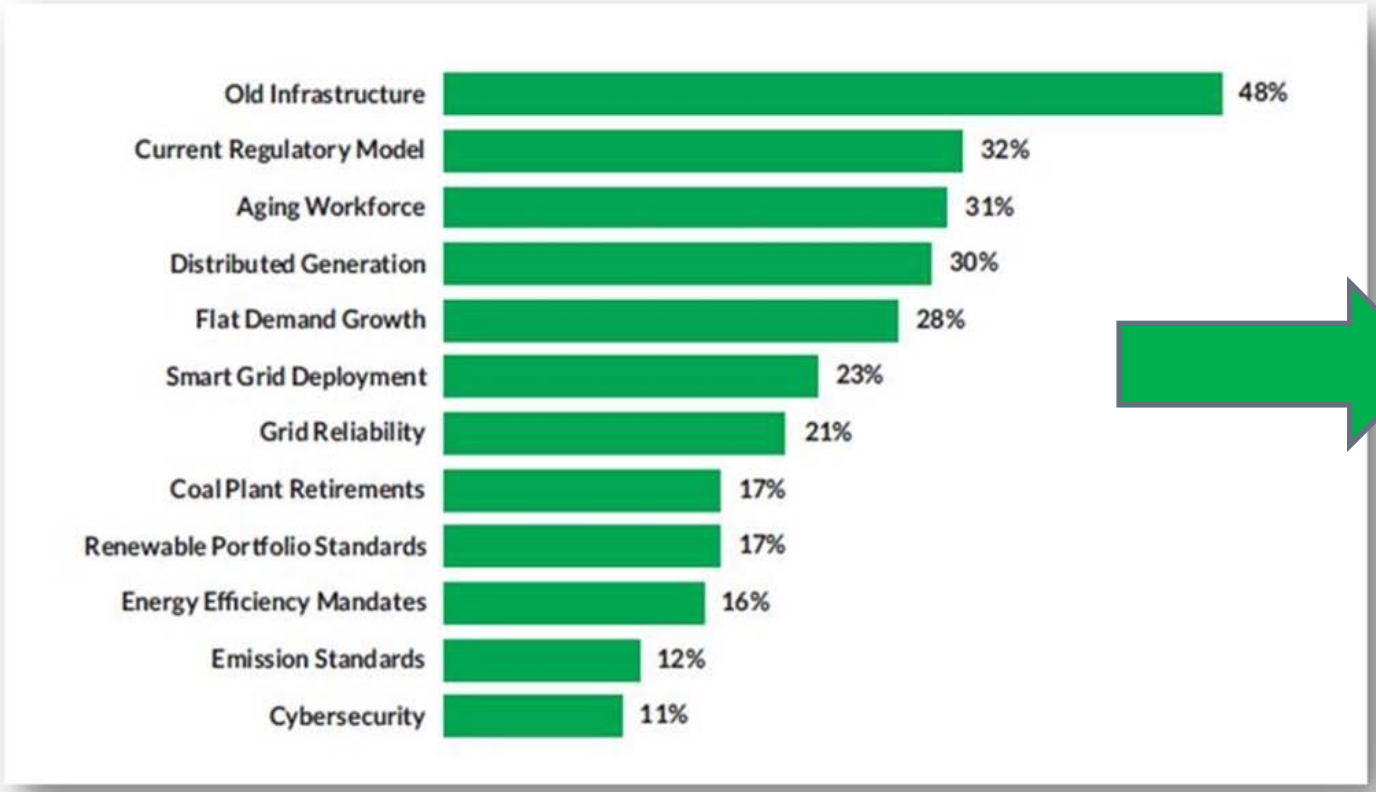


… to distributed energy and bidirectional energy balancing



The State of the Utility Market

Key Challenges identified by sampling of 527 IOU/Muni/Coops



Key Grid Capabilities

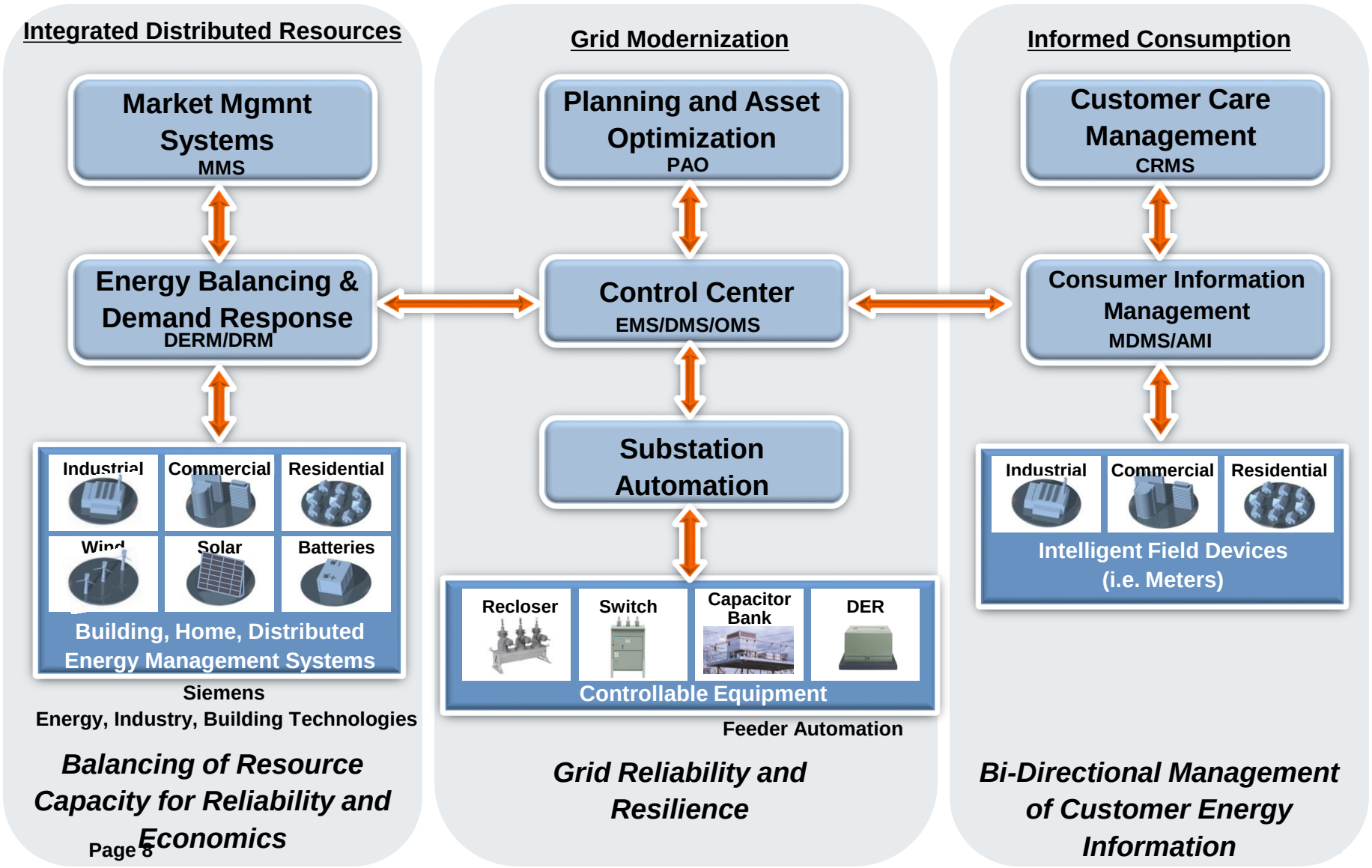
- **Resilience**
- **Sustainability**
- **Efficiency**
- **Reliability**

Source: Utility Dive, The State of the Electric Utility, February 2014

Grid Capabilities and Applied Technologies

Grid Capability	Characteristics	Applied Technologies	
Resilience	Decentralized Design, Firm Local Generation, Multi-utility Integration, Critical Infrastructure Support	Decentralized Gas/Digester Generation, Combined Heat and Power, Micro-grids, Community Storage, Integrated Building/Rail/Water/Public Safety, Community Notification	**Outside Regulated Utility Business Model**
Sustainability	Variable Local Resources, Energy Use Follows Available Generation, Two-way Flow of Energy	Integration of Variable Renewable Resources, Demand Management, Distributed Energy Resource Management, Storage, Adaptive Protection	
Efficiency	Active Grid , Visibility, Automate Outage Response, Streamline Operations	Distribution Management, Substation Automation, Feeder Automation, Voltage/VAR Management, AMI/Smart Metering, Social Media	**Within Regulated Utility Business Model**
Reliability	Passive grid, One-way Distribution of Power, Reactive Problem Response	Centralized Generation, Radial Distribution, Reactive Trouble Dispatch and Outage Management	

Integrated Resilient Grid Solutions



Efficiency Technologies & Key Elements

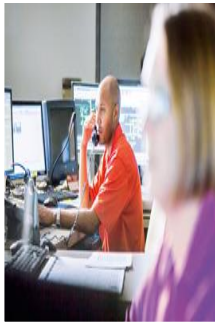
- Grid Visibility
- Automation
- Problem Avoidance
- Volt/VAr Management
- “Fleet” Management

ANEC, VA

Feeder Automation
“Self-Healing” Grid

Hawaiian Electric, HI

Substation Automation
“Self-Healing” Grid



ONCOR, TX

Control Center
Advanced Distribution Management

A&N Electric Cooperative

Feeder automation (SDFA)

ANEC's decentralized Distribution Feeder Automation project aims to increase the reliability of power supply to its customers, by automating the fault detection, location, and isolation tasks and automatically restores (FLISR) service to viable sections of line, thus minimizing outage time and dispatch expenses.

Key features	▪ SIPROTEC 7SJ80 protection relay ▪ IEC61850 communication protocol ▪ RuggedComm Hardened Wireless Broadband WiMAX
Customer benefits	▪ High speed FLISR functionality to greatly enhance reliability of feeders ▪ Switching to optimize feeders without operator intervention ▪ Increased reaction time ▪ Maximize stable supply of power ▪ Rapid feeder reconfiguration ▪ Scalable

Self- Healing Grid Automation (SICAM)

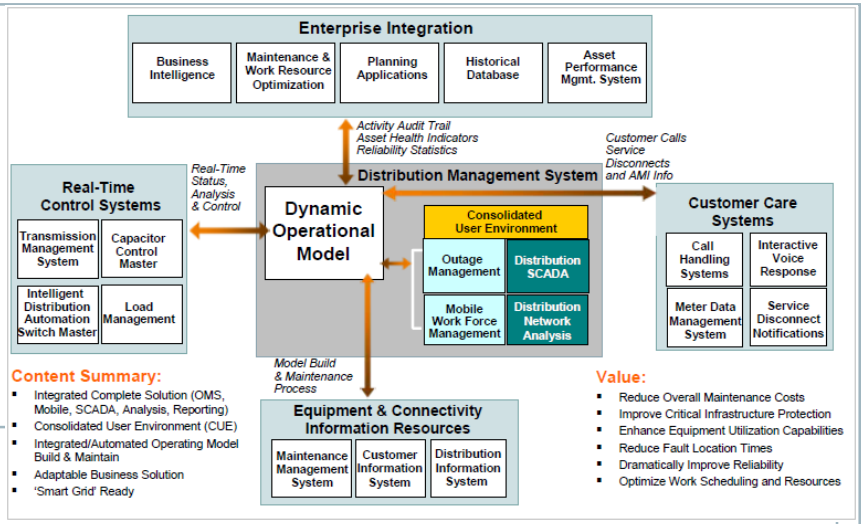
Hawaiian Electric Company, Oahu, USA

SIEMENS

- Automation of 46kV sub-transmission system
- To address overload & reliability issues in East Oahu
- Automated high-load distribution circuits to feed sections of East Oahu
- Creates intelligent decentralized hierarchical control systems
- Substations & devices become intelligent agents supervised by the control center, providing robust contingency situations, maintenance switching, fault isolation & restoration

Oncor Smart Grid Applied Systems Program (ADMS)

The Smart Grid Applied Systems program at Oncor focuses on the modernization, automation and integration of the Distribution Operations Control Centers. It is designed to leverage the significant investment that Oncor has already made in initiatives for Advanced Metering and Feeder Automation. The program, which includes Mobile Workforce Management, Outage Management, Distribution SCADA and Distribution Network Analysis, is a significant step in an overall transition to a Smart Grid.



Key features

- A single highly efficient user interface for all DMS functions
- Visually correlates and integrates large amounts of field information
- Supports management of the distribution network and mobile work crews integrated with control and load/voltage conditions
- Utilizes all available information from Distribution Automation and Automated Metering Infrastructure sources
- Establishes a generalized model-based integration platform for simplified integration with other enterprise systems

Customer benefits

- Significantly improved operator efficiency
- Cost-effective D-SCADA extension
- Proactive avoidance and correction of equipment overloads and low voltage conditions
- Increased utilization of existing assets

Sustainability and Resiliency Projects

- Grid Connected Energy Districts
- Integrated Renewable and Firm Generation
- Storage
- Distributed Energy Resource Management
- Critical Infrastructure Support

ConEdison, NY

Distributed Resource Management

Parker Ranch, HI

Community Sustainability

Co-op City, NY

Community Micro-grid

Pantex, TX

Military Sustainability

SGDP Major Accomplishments

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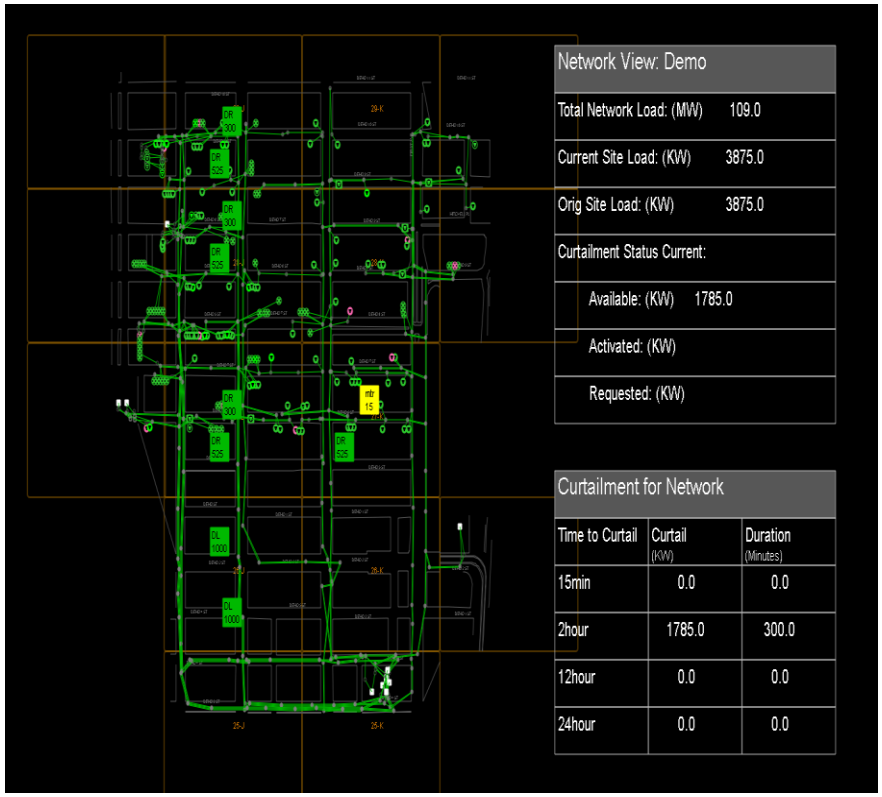
- Developed secure interoperable platform
  - Integrate legacy & smart grid data systems with established standards
  - Provide wide area situational awareness of interconnected grid assets
  - Support for decision aid tool to enable targeted demand response
- Developed blueprint for urban, underground smart grid deployment and open possibilities to establish competitive markets for energy and energy-related value added services
- Developed Secured Web Services for internal and external communication with third party providers



Wide Area Situational Awareness

Parker Ranch, Hawaii
(Microgrid Feasibility Consulting)

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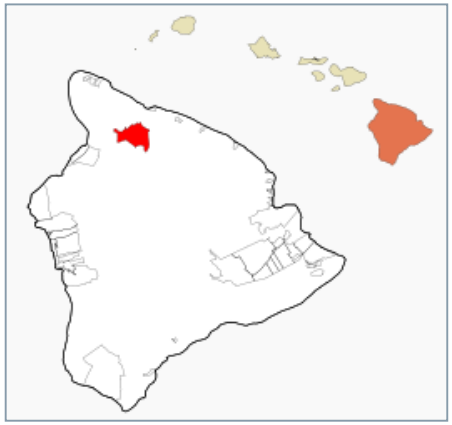

Microgrid Implementation Stages

1) Immediate Ranch Projects 3-5MW
2) Community Microgrid ~20MW
3) Strategic Concepts >50MW

- 250,000 Acres, including the city of Waimea (~7,000 residents)
- 175 Miles of water pipeline, with 4 reservoirs, 2 wastewater lift stations with 40hp motors
- Hospital, Commercial area, Industrial Park
- Potential and preference for renewable resources (solar, wind, tidal water, etc.)
- Desire for integration with local utility
- Focused on environmental and economic strategic goals

Proposed Scope

Consulting	Design	Gen Assets	System level	Commu-nication	Supervis. level	MG Int.	Const.	O&M

Decentralized Resilient Energy-Districts

Revealed by Hurricane Sandy

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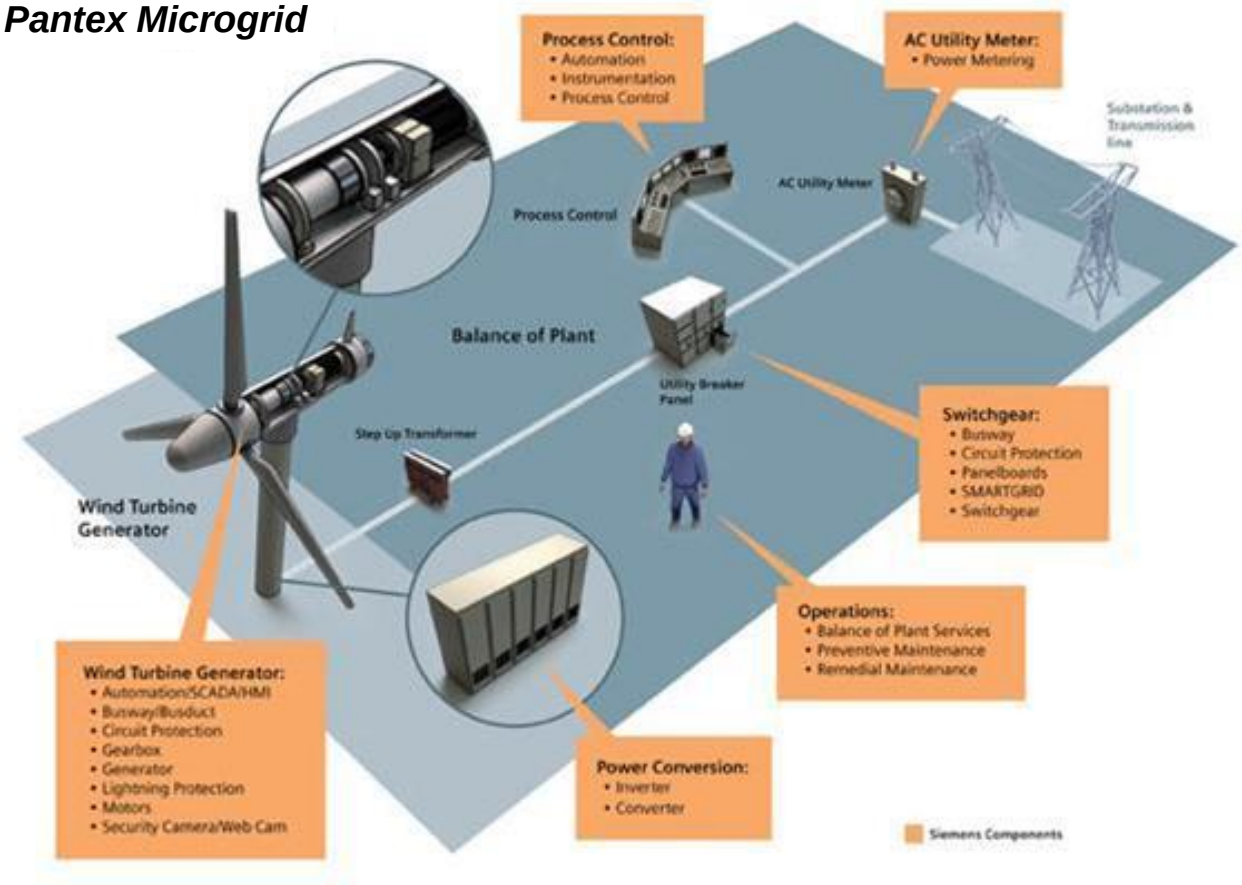
Co-Op City, Bronx, NYC

- 14,000 apartments
- 35 high-rise buildings
- 40MW steam turbine generator, plus CHP
- Operates on a micro grid
- Retained power for 60,000 residents

Pantex, Military Microgrid

Pantex Microgrid



PROJECT BENEFITS:

Cost-effective Microgrid to provide Energy Security for the NNSA Pantex facility in Texas by integrating high availability, renewable Wind power.

11.5 MW total power generation from five reliable Siemens 2.3 MW Wind turbines.

Uptime ensured with real-time monitoring from Siemens warranty & maintenance team, supporting over 4.6 GW of wind power generation across the US.

Microgrid approach includes utility interconnect to enable excess power sale to local grid.

Developed and financed via Siemens Energy Savings Performance Contract (ESPC) with DoE. Low cost financing without leveraging US Federal tax incentives

Energy savings for NNSA Pantex 100% funds the project, including multi-year maintenance.

Siemens team includes TVIG, an award-winning Veteran-owned small business.

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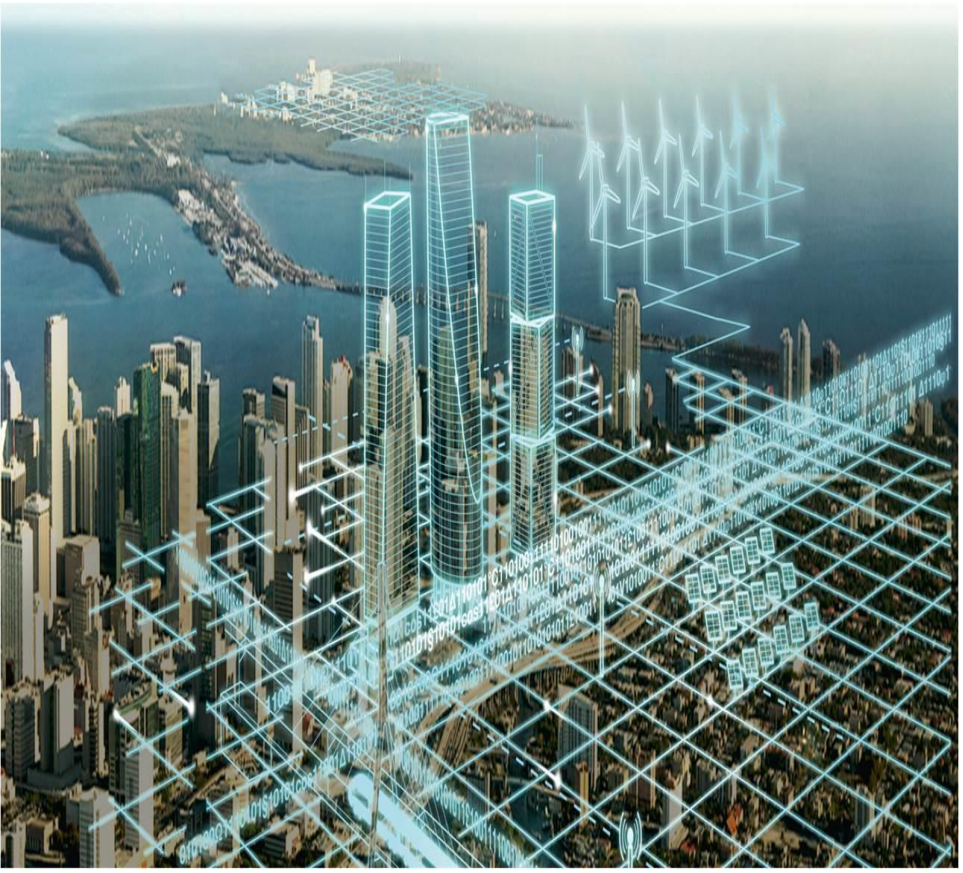
Thank you!



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