



# **Smart Grid– A Progress Report**

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# Forward to Fundamentals

**Electricity is the engine of prosperity and quality of life**

**Electricity is a consumer service-based enterprise**

**Technology can relieve cost pressures through elevation of electricity service value**

**Realizing these opportunities requires transformation of the electricity infrastructure & business model**



# Utility Frustration

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**“It’s all about the customer today and we know very little; and we have no regulatory incentive.”**

**“Customer price transparency is the key with education and automation.”**

**“Our infrastructure, policies and incentives are legacies of the 1930s.”**

# Value Being Lost to the U.S. Economy (\$ billion per year)

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- **Unreliability – 150**
- **Inefficiency – 100**
- **Productivity Penalty – 500+**

**Annual Cost to Correct – 25**

# Unlocking Smart Grid Benefits Requires

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- **Intelligent Technology**
- **Intelligent Policy**
- **Empowered Consumers**

**INTELLIGENCE = the ability to understand and deal successfully with new situations**

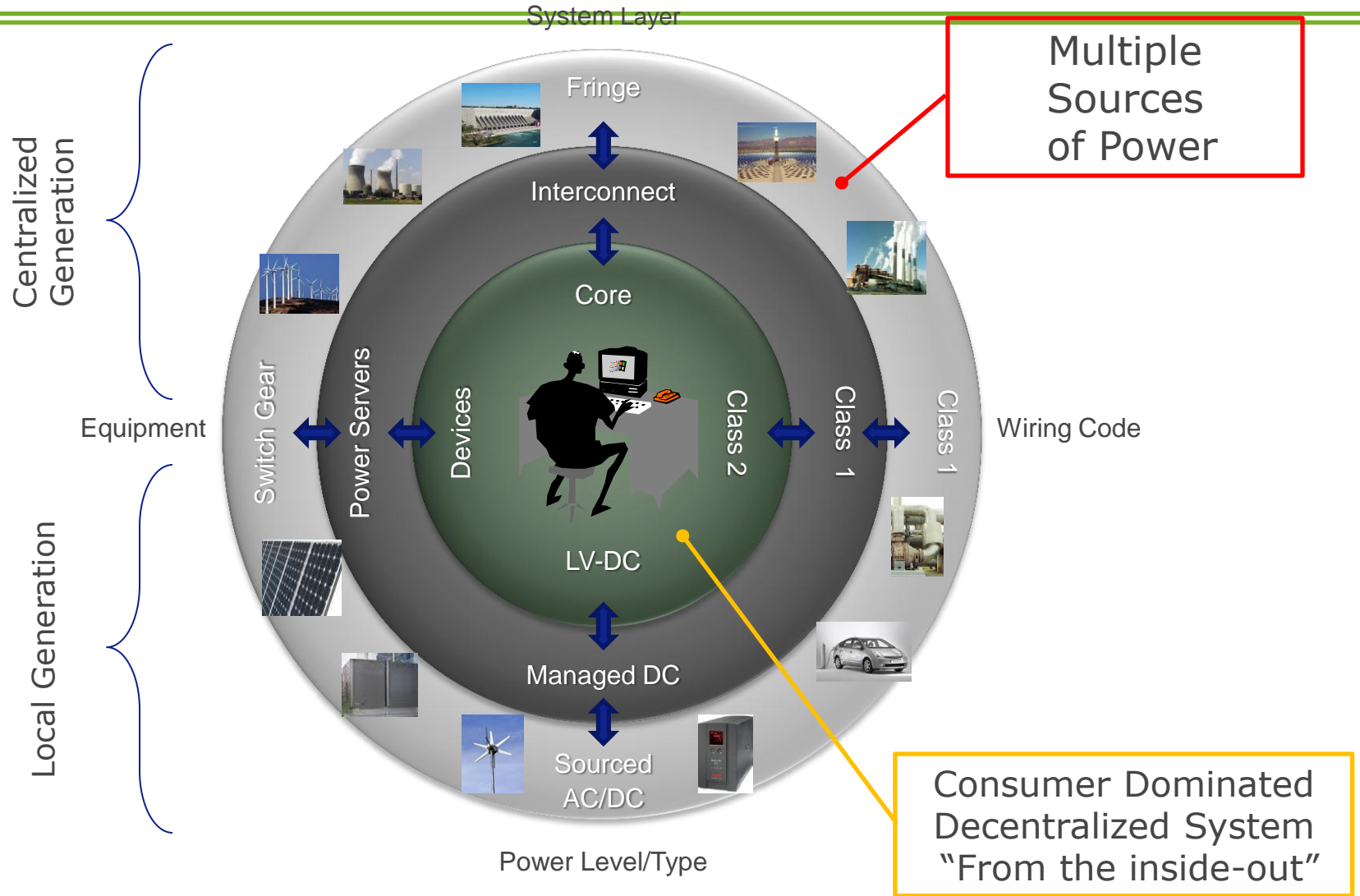
# Intelligent Grid

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**A truly intelligent grid system creates a fully integrated network that diagnoses and resolves problems as they arise and enables real time exchange of information and energy between the utility and its customers.**

# A User Centric View

Emergence of an asynchronous "Enernet"



# Gaining Customer Acceptance

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- **ENGAGE** through dynamic rates, technology and education
- **MOTIVATE** through savings and automated control
- **DELIGHT** through easy, enjoyable, fulfilling experiences



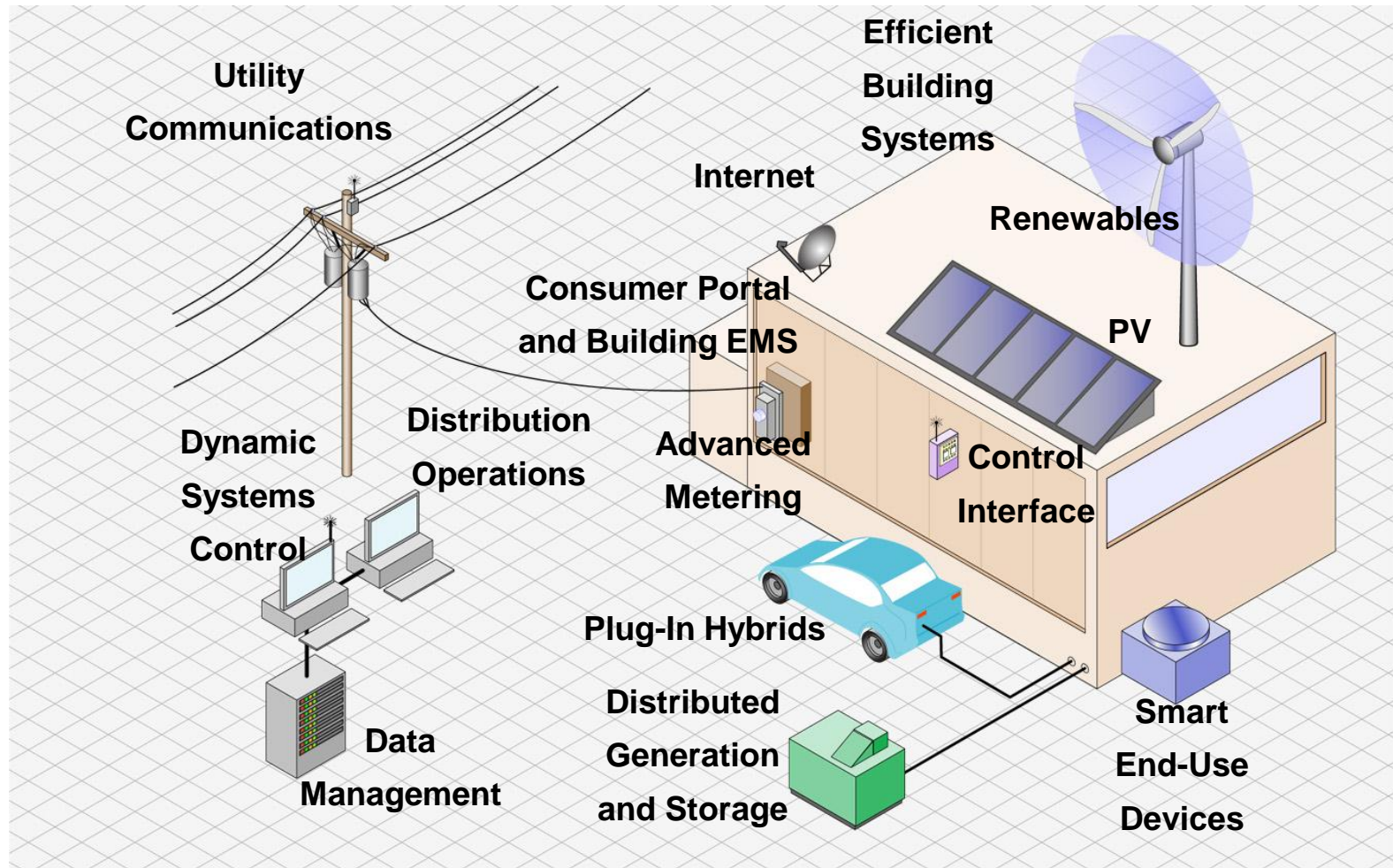
# Consumer Electricity Management Values

**Programs need to consider the full spectrum of values:**

- **Customized to my personal needs** **92%**
- **Simplify my life** **90%**
- **Easy to use** **89%**
- **Reduce my electricity bill** **80%**
- **Information access by third parties** **67%**
- **Able to personally purchase** **63%**

*Accenture "Revealing the values of the New Energy Consumer" (2011)*

# The Micro Grid & Its Role in Helping Meet These Challenges



# Key Characteristics of Smart Microgrids

- **Self-healing.** Grid Rapidly Detects, Analyzes, Responds and Restores.
- **Empowers and Incorporates the Consumer.** Ability to Incorporate Consumer Equipment and Behavior in Grid Design and Operation.
- **Tolerant of Attack.** Grid Mitigates and Resilient to Physical and Cyber Attacks.
- **Provides Power Quality Needed by 21<sup>st</sup> Century Users.** Grid Provides Quality Power Consistent with Consumer and Industry Needs.
- **Accommodates Wide Variety of Supply and Demand.** Grid Accommodates Variety of Resources (Including DR, CHP, Wind, PV).
- **Fully Enables Maturing Electricity Markets.** Allows for and is Supported by Competitive Markets.

# PPS<sub>o</sub>A PERFORMANCE METRICS



- **Reliability**
  - Ensures that the quality and safety are not compromised in the quest for cheaper energy.
- **Consumer Empowerment**
  - Measures the effectiveness of allowing consumer choice, participation and protection.
- **Cost**
  - Creates subsets of cost codes that would more specifically and accurately reveal waste and opportunities to invest more effectively.
- **Efficiency and Environment**
  - Promotes environmental responsibility and energy efficiency.



# POLICY IMPLICATIONS

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## **Focus on Consumer-Societal Benefits**

- **Seamless Supply/Demand Interconnect**
- **Consumer Empowerment**
- **Dynamic Pricing**

## **Help Utilities Deal with the Inevitable**

- **Universal Real Time Pricing**
- **Distributed Generation Microgrids**
- **Retail Service Competition**

# Intelligent Policy Recommendations

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- **Provide consumers with choice of access to transparent real-time electricity pricing.**
- **All customer-specific data belongs to the customer**
- **Establish strict distribution reliability and efficiency standards.**
- **Hold utilities publically accountable to specific system performance standards.**
- **Link utility earnings to service quality not quantity sales – performance-based rates.**

# Intelligent Policy Recommendations

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- **Expand net metering to include physical and virtual aggregation.**
- **Enable retail energy management service competition to incent entrepreneurial and utility innovation.**
- **Enable early adapters to easily demonstrate the benefits beyond doubt.**
- **Require absolute interoperability of smart grid components.**

HOW THE MICRO GRID REVOLUTION WILL UNLEASH CLEANER,  
GREENER AND MORE ABUNDANT ENERGY

# PERFECT POWER

TOP COMPANIES  
& TECHNOLOGIES  
TO WATCH

**ROBERT GALVIN  
AND KURT YEAGER**  
WITH JAY STULLER