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AABC Commissioning Group

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# Microgrids-as-a-Service: A New Approach to Solve Today's Energy Challenges

Course Number: CXENERGY1804



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# Course Description

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This session discusses how municipal, district, institutional, commercial campus or large buildings can benefit from a “Microgrid-as-a-Service” business model to stabilize long-term energy costs and upgrade critical energy infrastructure without upfront capital. The session showcases the “MaaS” model with recent projects with the Montgomery County, MD, Public Safety Headquarters and Correctional Facility as examples. The session examines specific energy challenges faced by this facility, commissioning processes undertaken to deploy the microgrid and benefits achieved.

# Learning Objectives

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At the end of the this course, participants will be able to:

1. To understand how to make the financial case for microgrid deployment by demonstrating how the added resiliency will contribute to the integrity of energy-dependent, mission critical operations related to business operations and health and safety impacts to building occupants and visitors.
2. To introduce the microgrid-as-a-service approach to financing.
3. To explain the commissioning process for microgrids, using two active Montgomery County projects as an example of how to meet laws, codes, zoning, regulations and standards in a regulatory-demanding jurisdiction.
4. To leverage microgrid technology as a means of enhancing resiliency and sustainability benefits, being seen as a contributing entity to the area's urban planning and ecology goals, and create both ownership and societal benefits and values through energy efficiency.

# Energy Mega Trends



**More  
ELECTRIC**

**2X** faster growth of  
electricity demand compared to  
energy demand by 2040

Source : IEA WEO 2014

**DIGITIZATION**

**10X** more incremental  
connected devices than  
connected people by 2020

Source : Cisco, Internet World Statistics

**DECARBONIZATION**

**82%** of the economic  
potential of energy efficiency in  
buildings and more than half in  
industry, remains untapped

Source : World Energy Outlook 2012,  
Internal Analysis

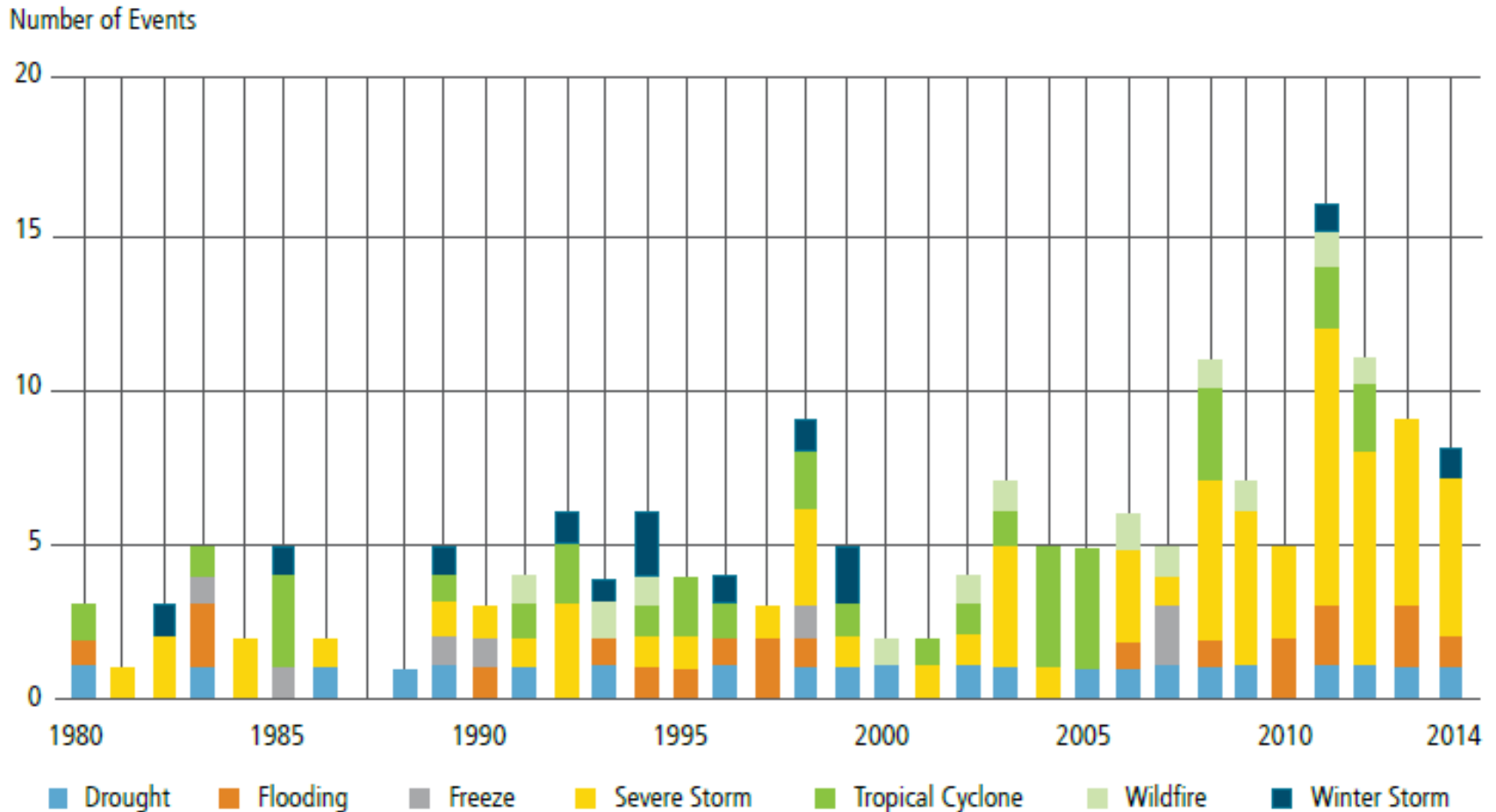
**DECENTRALIZATION**

**70%** of new capacity  
additions will be in  
Renewables by 2040

Source : BNEF

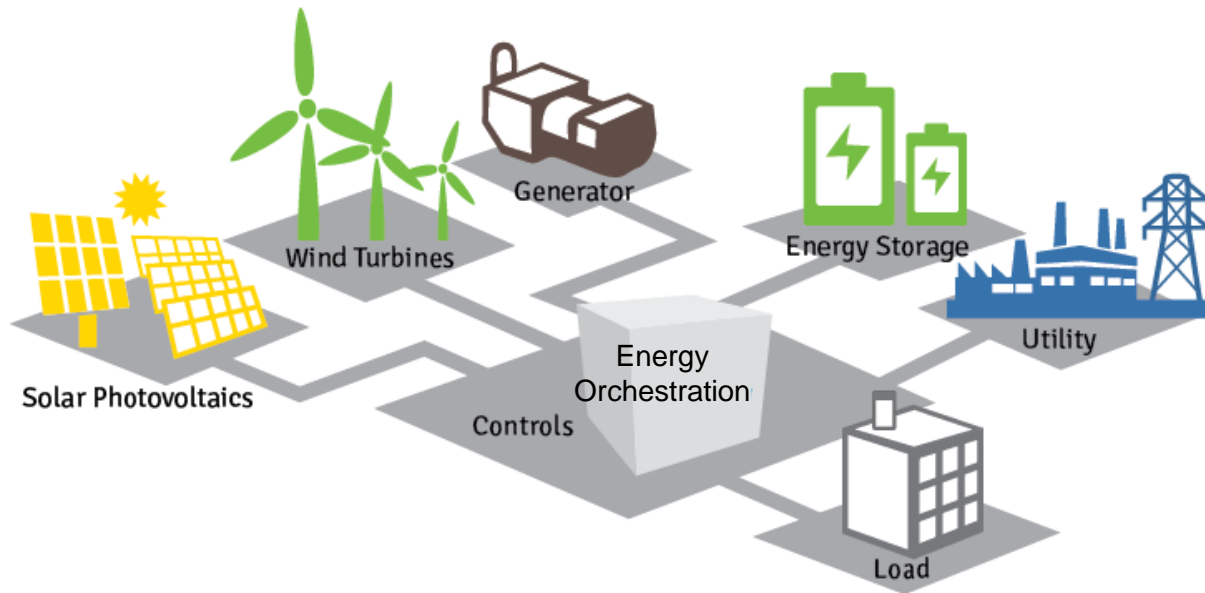
# What does the future hold?

US Billion Dollar Disaster Events per Year



# The New Energy Landscape

data demystifies energy, unlocking new ways to optimize energy resources and meet business objectives

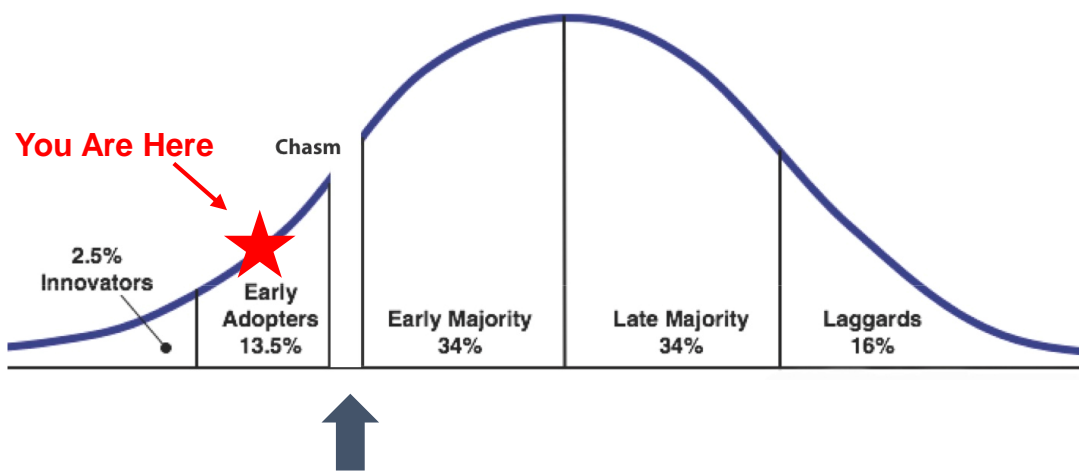


- Consumer-Centric
- Load-Centric
- Flexible, Modular, and Scalable



# Crossing the Chasm

## in the New Energy Landscape



### The offer required to cross the chasm:

- Allows consumers to co-optimize for energy and process
- Aligns ownership of assets to those with a prospectus based upon long term stable returns.
- Delivers an enduring outcome for the economic useful life of the asset
- Shields consumers from technical risk of emerging technology

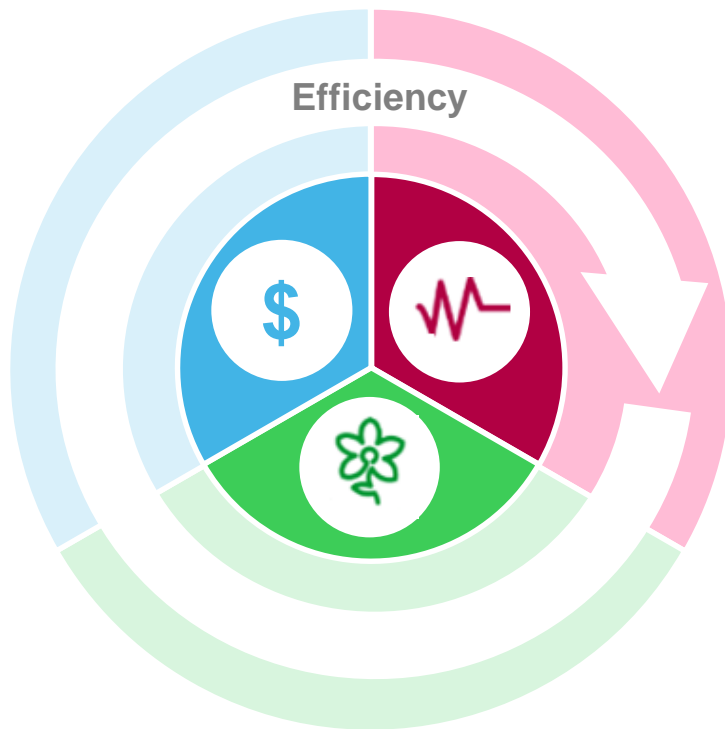
Early market participants are advanced energy prosumers who can quantify the value of improved reliability, flexibility, sustainability, and security to their corporate mission.

Reaching the larger market now requires overcoming high barriers to entry:

- Microgrids are expensive to deploy and require extensive engineering to implement.
- Optimized operation requires insight into:
  - Utility rate structures
  - Commodity energy trends
  - Weather and other correlated variables.
  - Analytics and Sophisticated Controls

# Integrated Energy Outcomes

Historically Passive Consumers are Thinking About Energy in a New Way



## Cost



- Lower / More Predictable Energy Costs
- Energy / Fuel Source Arbitrage
- Flexibility drives savings / incremental revenue

## Resilience



- Serve loads during times of grid stability
- Oasis for employees / customers – shelter in place
- Protect power sensitive / critical assets from poor power quality

## Sustainability



- Reduce carbon footprint
- Improve brand image
- Attract / Service carbon sensitive customers

# ...and taking control of their energy spend



From the Washington Business Journal:  
<http://www.bizjournals.com/washington/news/2017/02/10/montgomery-county-is-taking-two-large-buildings.html>

## Montgomery County is taking two large buildings off the energy grid

Feb 10, 2017, 1:49pm EST

Montgomery County is taking its correctional facility and public safety buildings off the grid.

The county has entered into a public-private partnership with **Schneider Electric** and **Duke Energy Renewables** to construct microgrid systems at the 300,000-square-foot jail in Clarksburg and the nearly 50-year-old, 408,000-square-foot police and fire headquarters in Gaithersburg.

It's a first-of-its-kind move for protecting the county from power outages and sustainability. The systems and natural gas generation of the electrical grid, which will ensure security measures and ensure

"This is the first advanced microgrid in the country, and our first big power outages, and our first

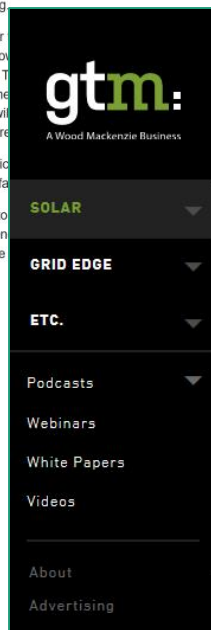
The buildings are expected to be completed by the end of the year. The county will only pay for the energy it uses. Pepco for its power now. The county has a dozen firms responded.



## Ohio State's Endowment Gets \$1 Billion With Campus Energy Deal

by **Janet Lorin** and **Brian Eckhouse**  
April 07, 2017 11:58 AM

Ennio SA Axiom to manage school's energy assets for 50 years



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UTILITIES

## How MGM Prepared Itself to Leave Nevada's Biggest Utility



Photo Credit: NRG Energy

The casino conglomerate expects to double its use of renewable energy and earn payback within 7 years.

by **Julian Spector**  
September 16, 2016

With a \$1 billion  
assets for 50 years.

# Case Study: Montgomery County Maryland



## Situation

- After a deadly gale caused widespread outages, Montgomery County set out to find partners to help mitigate the impact of future disasters to its over 1M residents.
- After robust bidding, Schneider Electric was selected to deliver two advanced microgrids to improve resiliency and sustainability at the Public Safety HQ and Correctional Facilities.



## Approach

- Deliver via innovative, public-private Energy-as-a-Service model eliminating up-front costs
- Infrastructure upgrades (low- and medium-voltage gear)
- Integration of existing generation assets.
- New Solar and Gas CHP generation
- Advanced controls and monitoring
- Advanced cybersecurity



## Outcomes

- Improve resiliency of county operations by upgrading existing aging electrical distribution infrastructure
- Provide the ability to island operations for >7 days without grid support
- Mitigate risk of escalating energy price over 15 years.
- Upgrade infrastructure without capex
- Reduce greenhouse gas and other emissions
- Create replicable models for other facilities and governments

# A New Approach to Resilience

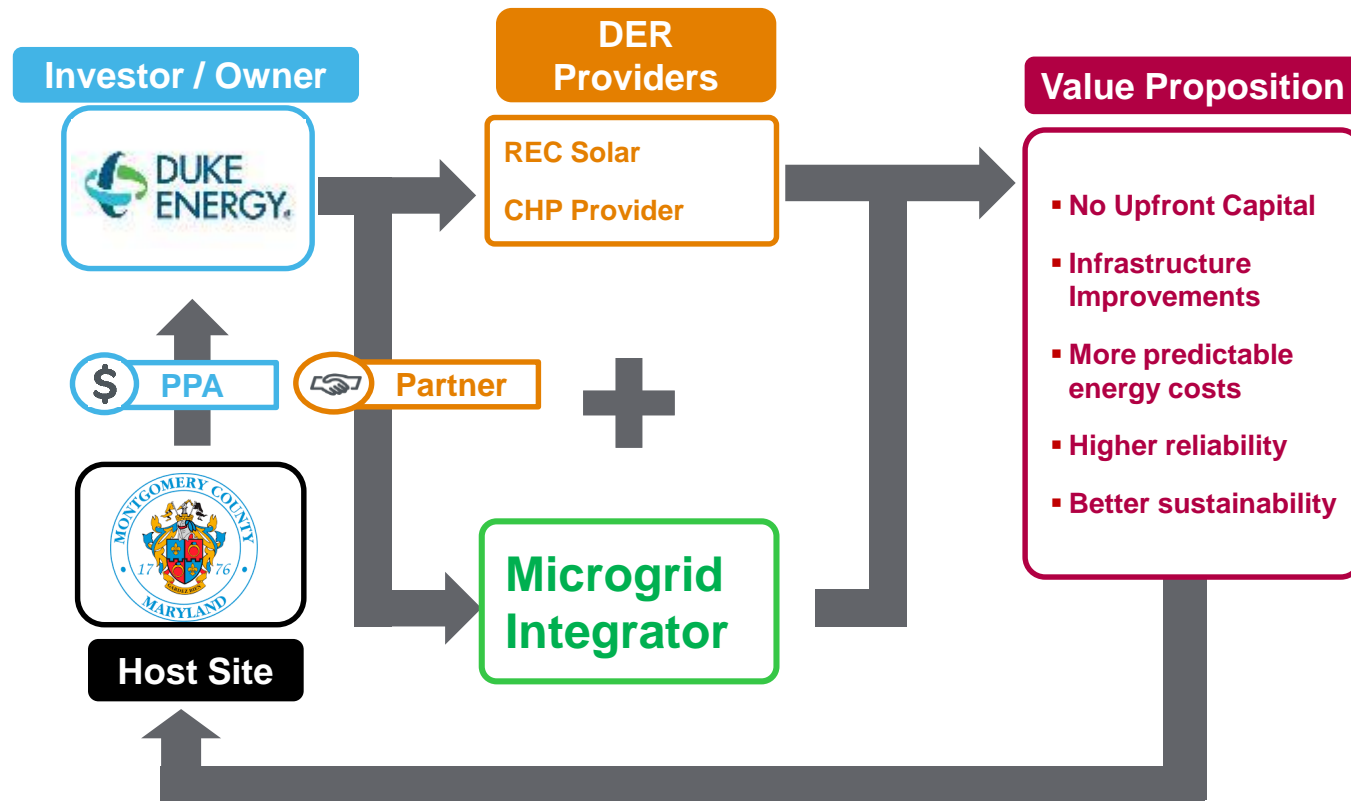
## Historic Approach

- Redundancy
- Diversity
- Efficiency

## New Approaches

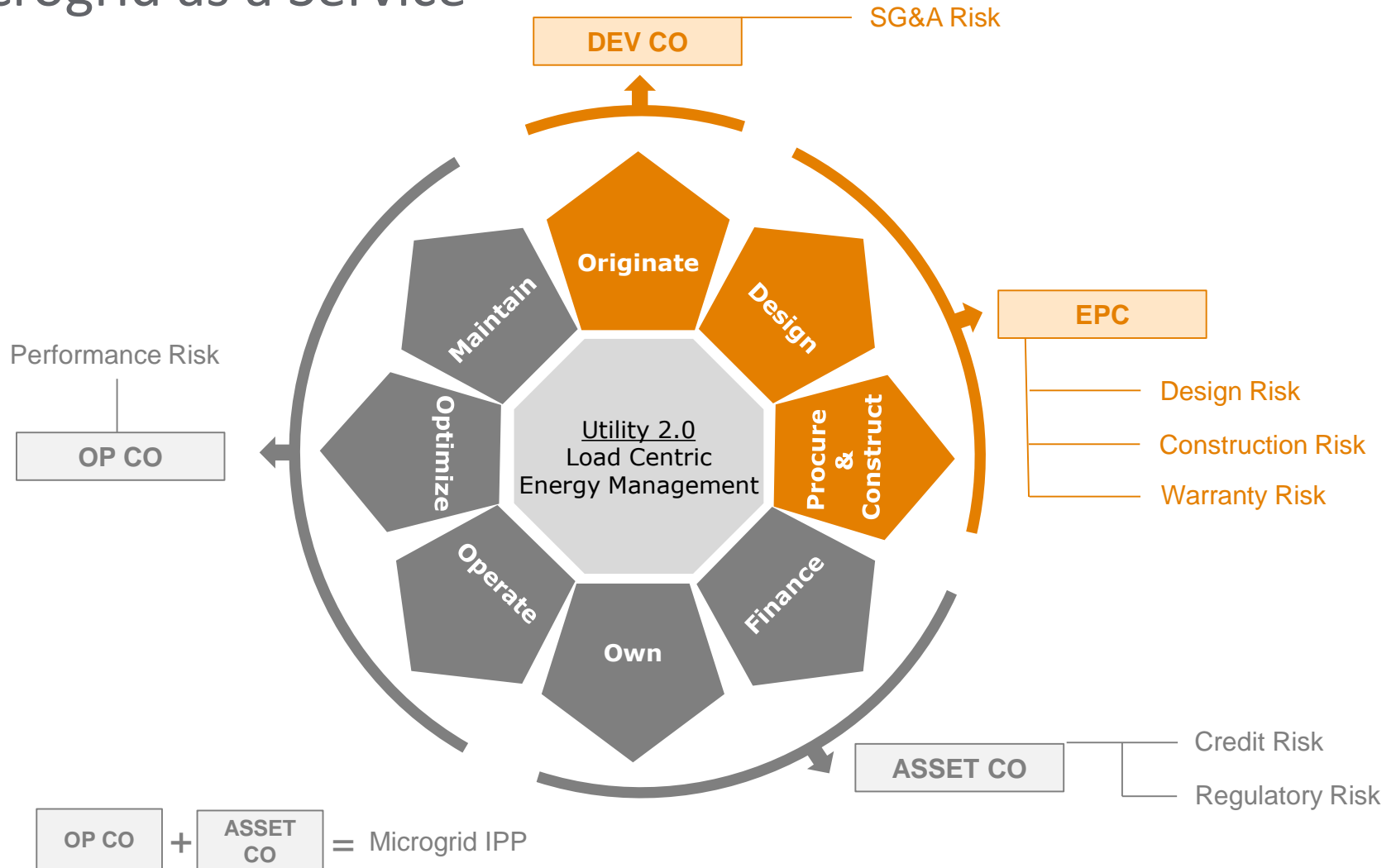
- Digitization: Internet of Things (IoT) unlocks better performance from existing assets:  
*“Smarts not parts. Software is the key. Don’t really need two of everything to insure resilience.” – Patrick Flynn, Senior Director, Salesforce.com*
- Targeted address of critical loads through modular, scalable microgrid solutions  
*“a fully redundant (2N) power architecture could more than double the 10-year TCO of a non-redundant (1N) power architecture. Although a significant cost penalty for 2N power is the doubling of electrical and mechanical equipment capital costs, the greater influence comes from energy costs associated with operating and maintaining this power equipment at 2N. Many smaller microgrids may be better than a single large one.” – Peter Asmus, Navigant*

# Microgrid as a Service



# Roles & Risks

## Microgrid as a Service



This concludes The American Institute of Architects  
Continuing Education Systems Course

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