MICROGRID KNOWLEDGE
CONFERENCE SERIES

# Microgrid 2018
CONFERENCE

# How to Value and Monetize Resiliency in Microgrids

Moderator:
**Matt Wheatley**, Vice President of Sales and Commercial,
*Centrica Business Solutions*

Panelists:
**Mark Feasel**, Vice President Utility and Smart Grids, *Schneider Electric*
**Philip Fischer**, Program Director – Distributed Storage, *NEC Energy*
**Robert Kirslis**, Senior Microgrid Application Engineer, *Eaton*
**Sadzi Martha Oliva**, Commissioner, *Illinois Commerce Commission*

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**Vice President, Centrica Business Solutions, a Direct Energy company**

# How to Value and Monetize Resiliency in Microgrids

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**Commissioner Oliva**

**Illinois Commerce Commission**

# Illinois Commerce Commission

- Public Utility Commission
- 5 Commissioners appointed by the Governor
- Regulates investor-owned utilities operating within the state

**Mission:**

To ensure adequate, efficient, reliable, safe and least-cost public utility services.

# Where is Illinois now?

- Planning & strategically integrating new technologies for the grid of the 21st Century
- Future home of 2 utility-scale microgrids
  - Currently: Ameren Illinois
  - Soon-to-be: ComEd

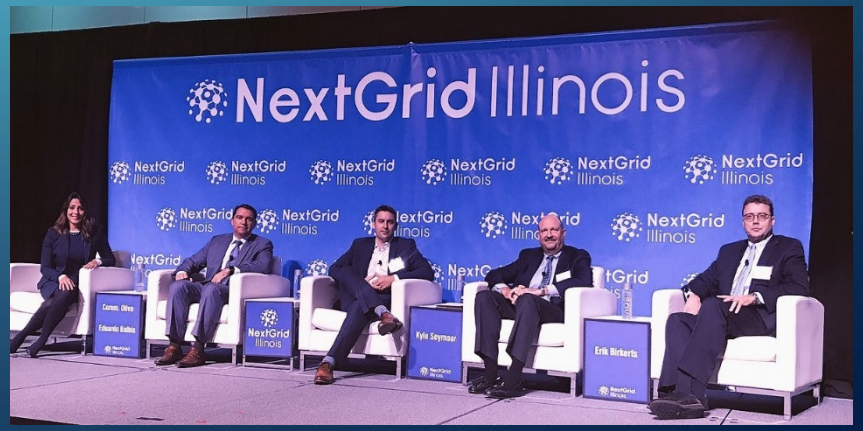

# How did we get here?

- Electric Infrastructure Modernization Act
- Future Energy Jobs Act

# What is next?

- NextGrid Illinois

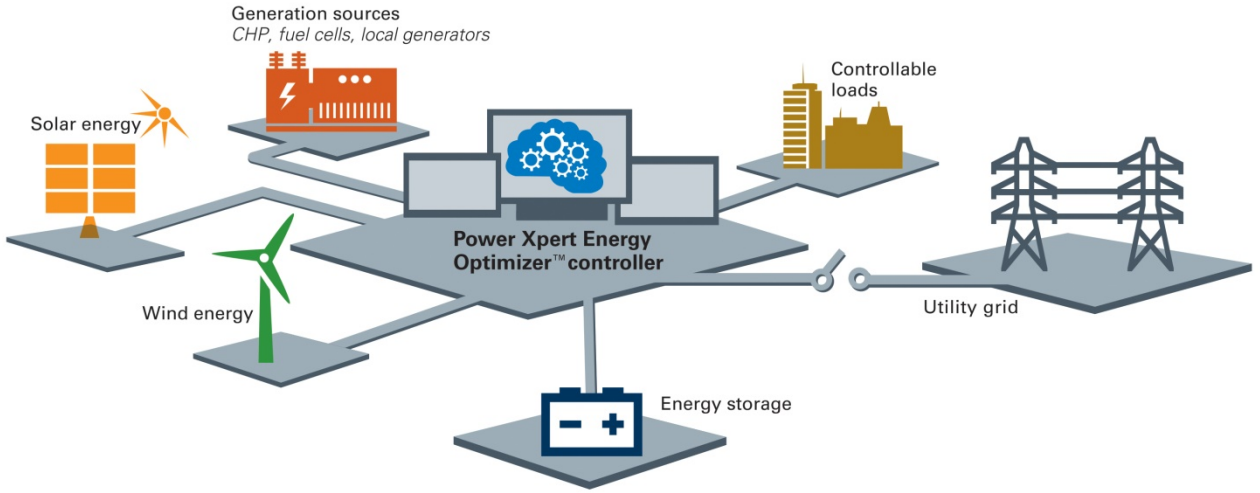
www.nextgrid.Illinois.gov



**Robert Kirslis**

**Senior Microgrid Application Engineer, Eaton**

# Power Xpert Energy Optimizer™ controller for microgrid and energy storage applications




**Peak shaving**
- Reduces demand charge
- Maintains constant demand during day or night
- Reduces energy charges

Revenue Generating

**Renewable firming**
- Reduces generation variation with energy storage
- Reduces utility demand through stored energy
- Increases power quality

Revenue Generating

**Islanding**
- Continuous operation of islanded power systems.
- Uninterrupted power when the utility is down
- Mission critical operations continue

Resiliency down time reduction

**Frequency regulation**
- Maintains balanced frequency flow
- Maximizes efficiency of system
- Controller provides performance data in real time

Revenue Generating

Powering Business Worldwide

# Capital Cost Shifting

| Traditional System | kWh Production | Proposed System | kWh Production | Green / Regulatory Compliance |
|---|---|---|---|---|
| Utility | Yes | Utility<br>*Peak demand $$<br>*Load Shedding $$ | Yes | Yes |
| UPS | No | PV / Inverter | Yes | Yes |
| Battery Plant | No | Advanced Batteries / Energy Storage | No* | Maybe |
| Standby Generator | No | Continuous Duty NG Generator / Turbine, Fuel Cell | Yes | Maybe (CHP) |
| Other | No | Wind Turbine | Yes | Yes |

*Energy storage systems can be used for arbitrage, effectively offsetting utility costs during peak demand periods

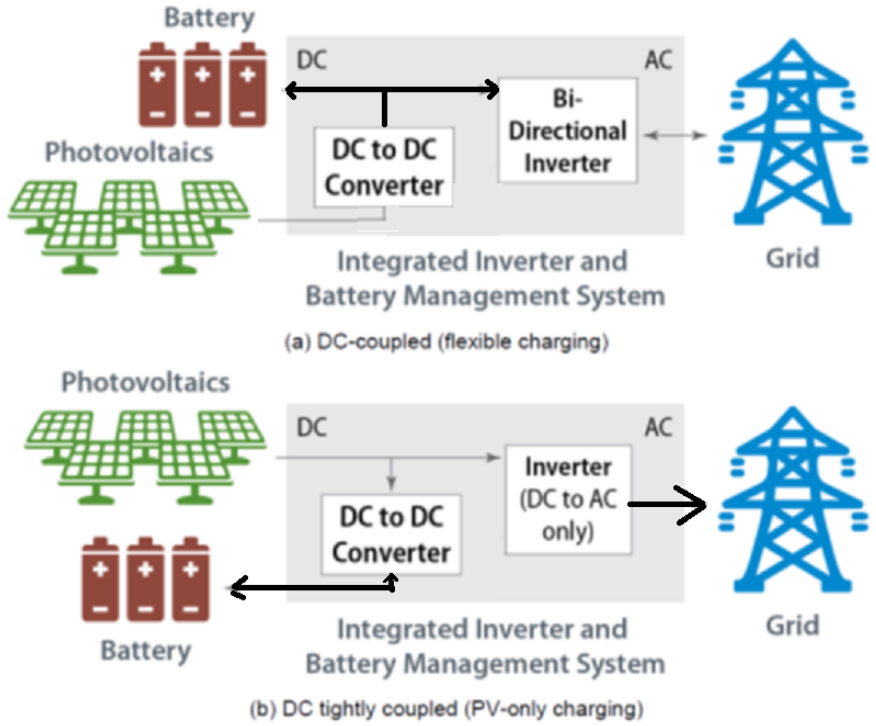
**Philip Fischer**

**Program Director – Distributed Storage,**
**NEC Energy**

# About NEC Energy Solutions

# Microgrid Capabilities

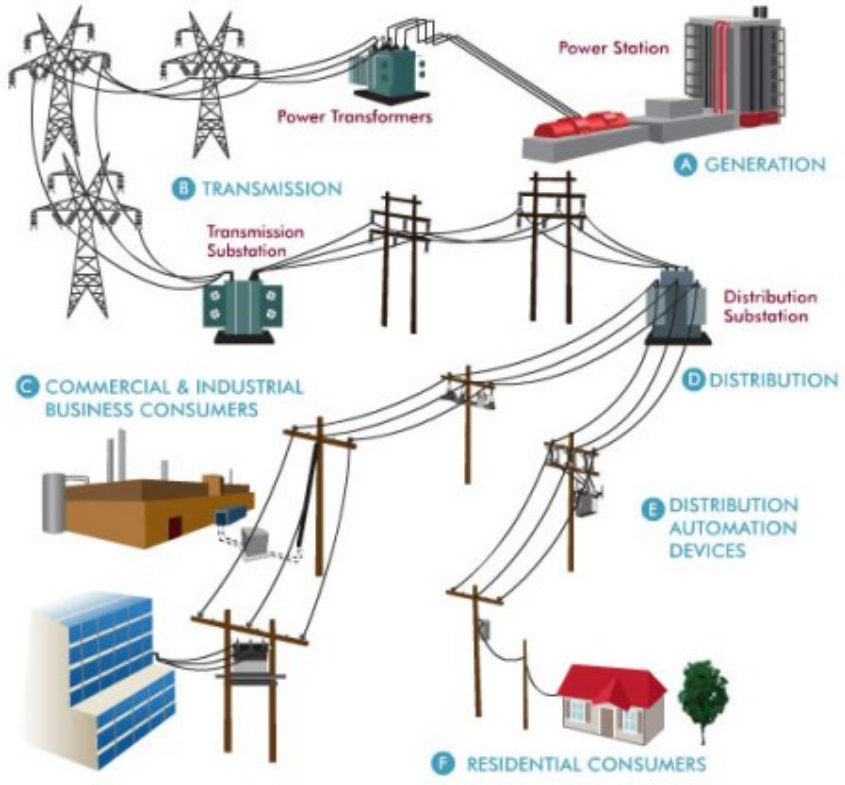
- Grid Connected
  - Optimization for Economic Operation
  - Support Integration of Renewables
  - Support Market Participation
- Islanding
  - Emergency Support
  - Managing Critical/Non-Critical Loads to Available Generation
  - Support Integration of Renewables
  - Optimization




**Revenue streams outside of the microgrid can help pay for the premium of energy surety!**

# Challenges of Operation

- Hard to maintain voltage and frequency stability
- Large imbalances between load and generation
- Strong interaction between controllers of energy resources
- Use of different generation technologies
- Low power quality
- Lack of sufficient reserve margin
- Smaller short circuit current




**It's really complex and expensive!**

**Mark Feasel**

**Vice President Utility and Smart Grids,**
**Schneider Electric**

# The Path to Resilience is Evolving

**Historic Approach**

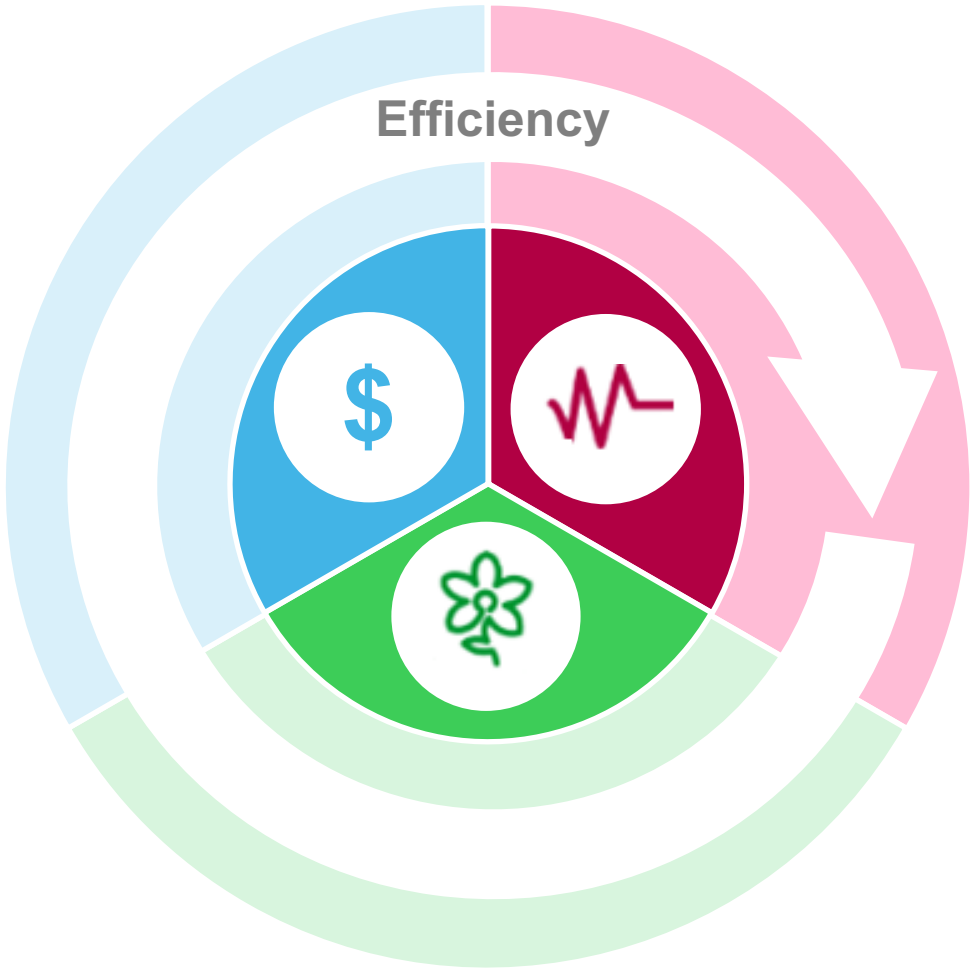
- Redundancy
- Diversity
- Efficiency

## Digitization and Modular approaches are disrupting the cost of Resilience

- 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*

# 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

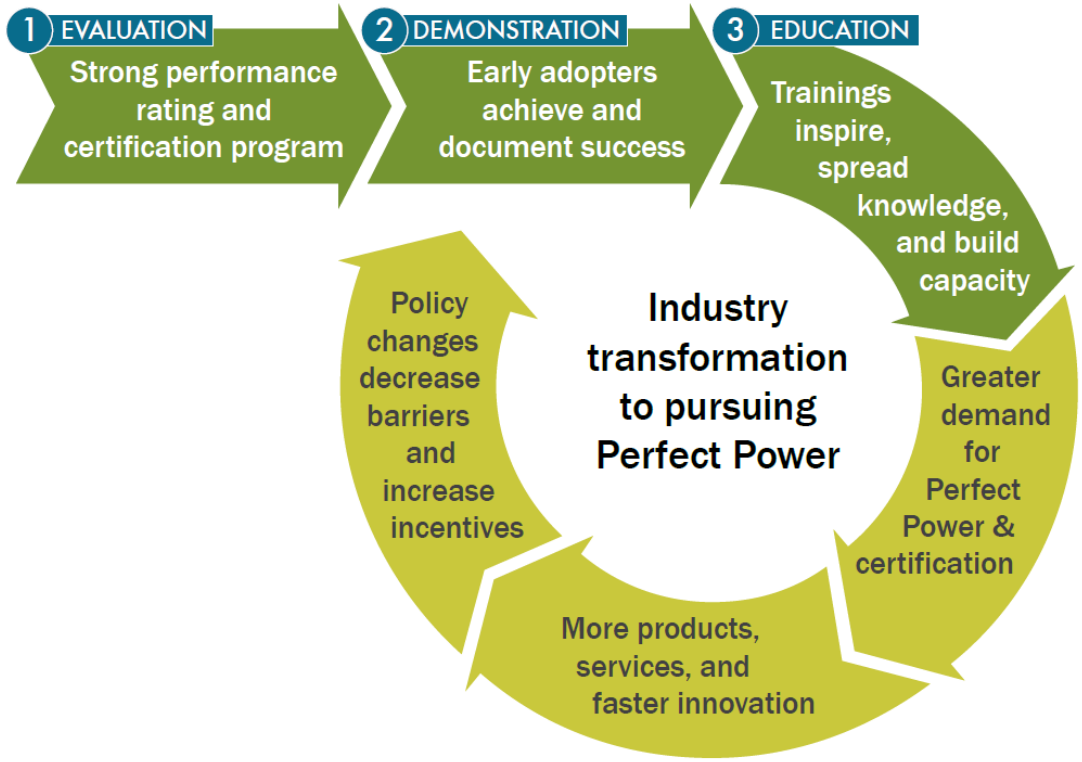
- Serve loads during times of grid instability
- Oasis for employees / customers – shelter in place
- Protect power sensitive / critical assets from poor power quality

## Sustainability

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

# Standardized Industry Assessment Programs Drive Adoption

## US Green Buildings Council – Performance Excellence in Energy Renewal - PEER




### RELIABILITY, POWER QUALITY AND SAFETY

To ensure that the quality of power and the safety of the public are not compromised in the quest for ever-cheaper energy, power reliability must be examined.

| PERFORMANCE GROUPS AND CRITERIA |
| --- |
| **Prerequisites:** Communications Backbone; Advanced Metering; SCADA; Emergency Response Plan; Safety Review of Design Changes |
| **Sustained Interruptions:** SAIDI; SAIFI; CELID-5; ASAI |
| **Momentary and Other Interruptions:** MAIFI; CEMMI-5; AIFI |
| **Reliability Design Features:** Damage and Exposure Prevention; Island Capability; Alternative Source of Microgrid Supply; Critical or Key Load Resiliency; Power Resiliency for Essential Services; Distribution Redundancy and Auto Power Restoration |
| **Power Quality Improvements:** Power Quality Measurements; Power Quality Design Features |
| **Risk Mitigation:** Upset Condition Risk Mitigation; Identify and Mitigate Unforeseen Risks |