Cyber security and electric system resilience in an interconnected world

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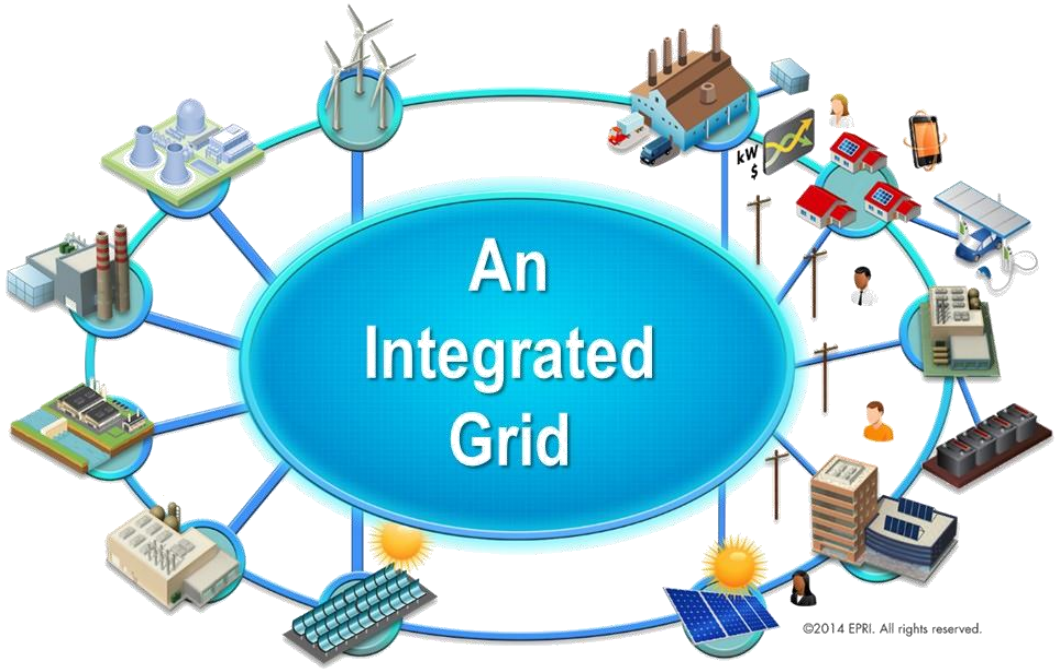
Fifth Annual EPRI-IEA Expert Workshop: Challenges in Electricity Decarbonisation
November 8, 2018

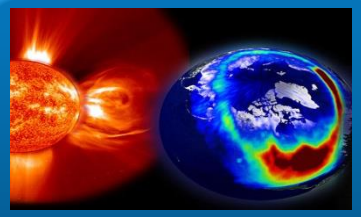
Some impacts of electrification and decentralization

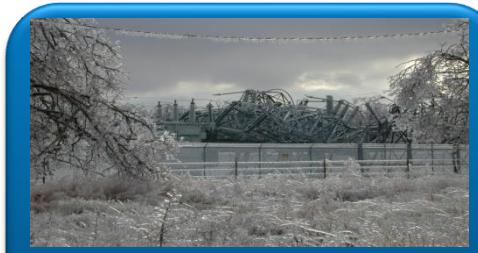
- Resilience is more important than ever
- New opportunities for local resilience – non wires alternatives
- New challenges for cyber security with decentralization
- IoT integration poses additional challenges



Grid Resilience must address many concerns


Physical Security


GMD/ EMP


Hurricane/ Ice Storms

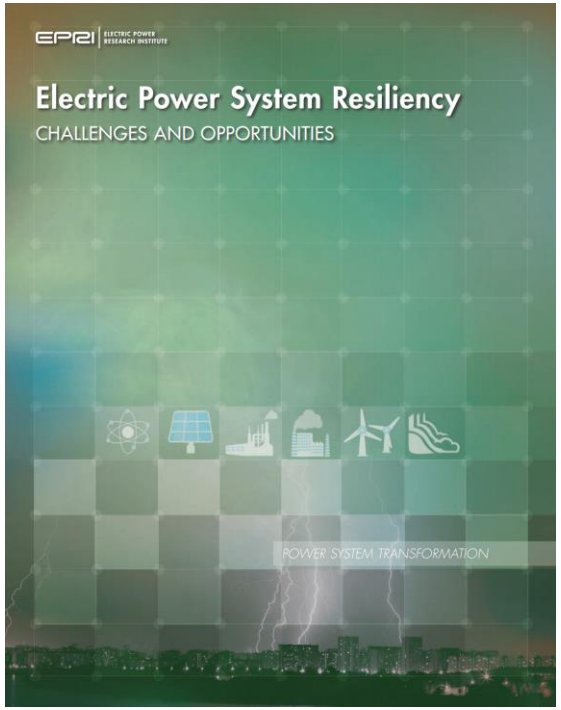

Tornados/Winds


Cyber Security


Floods

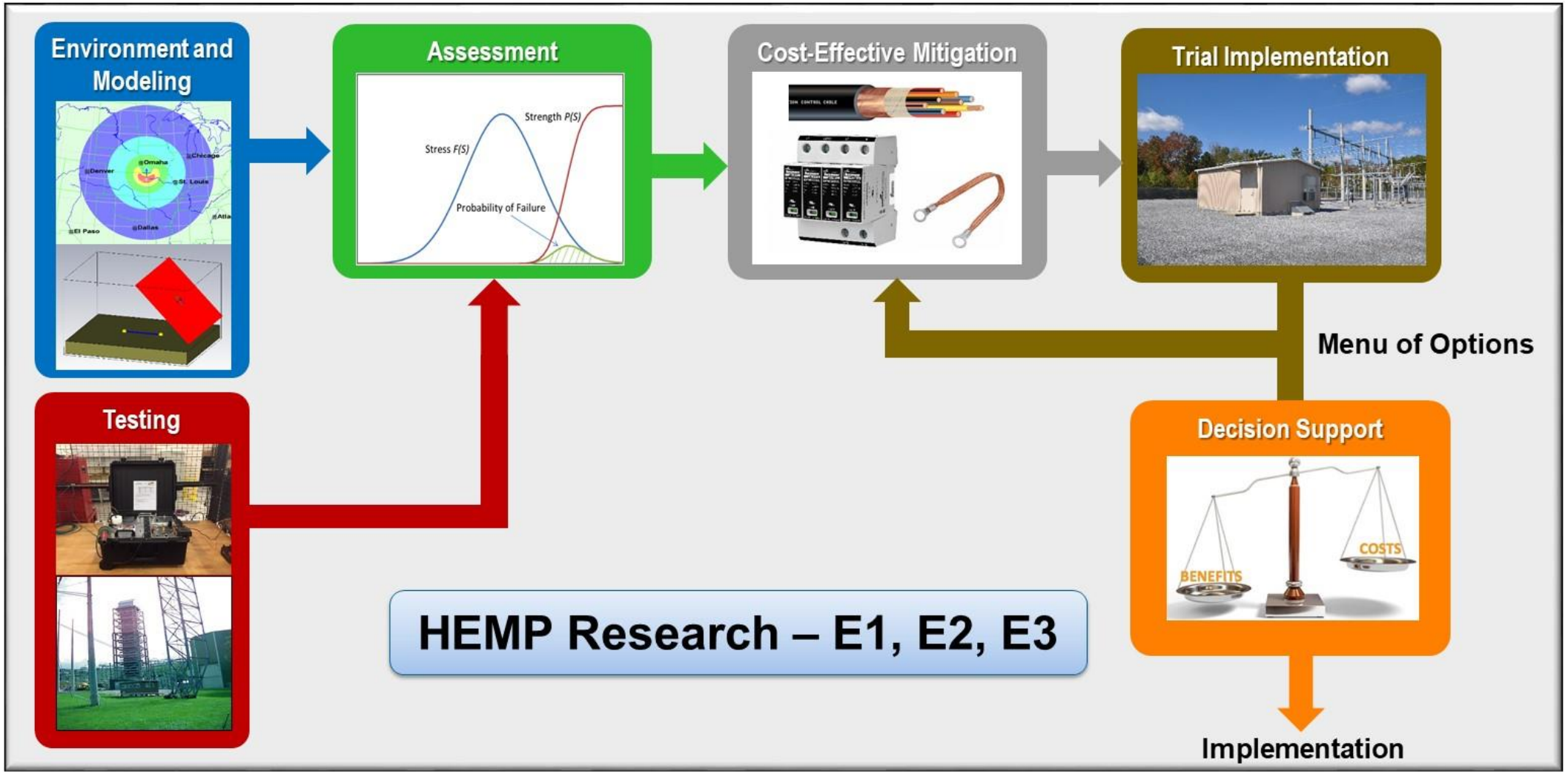

Seismic


Fires



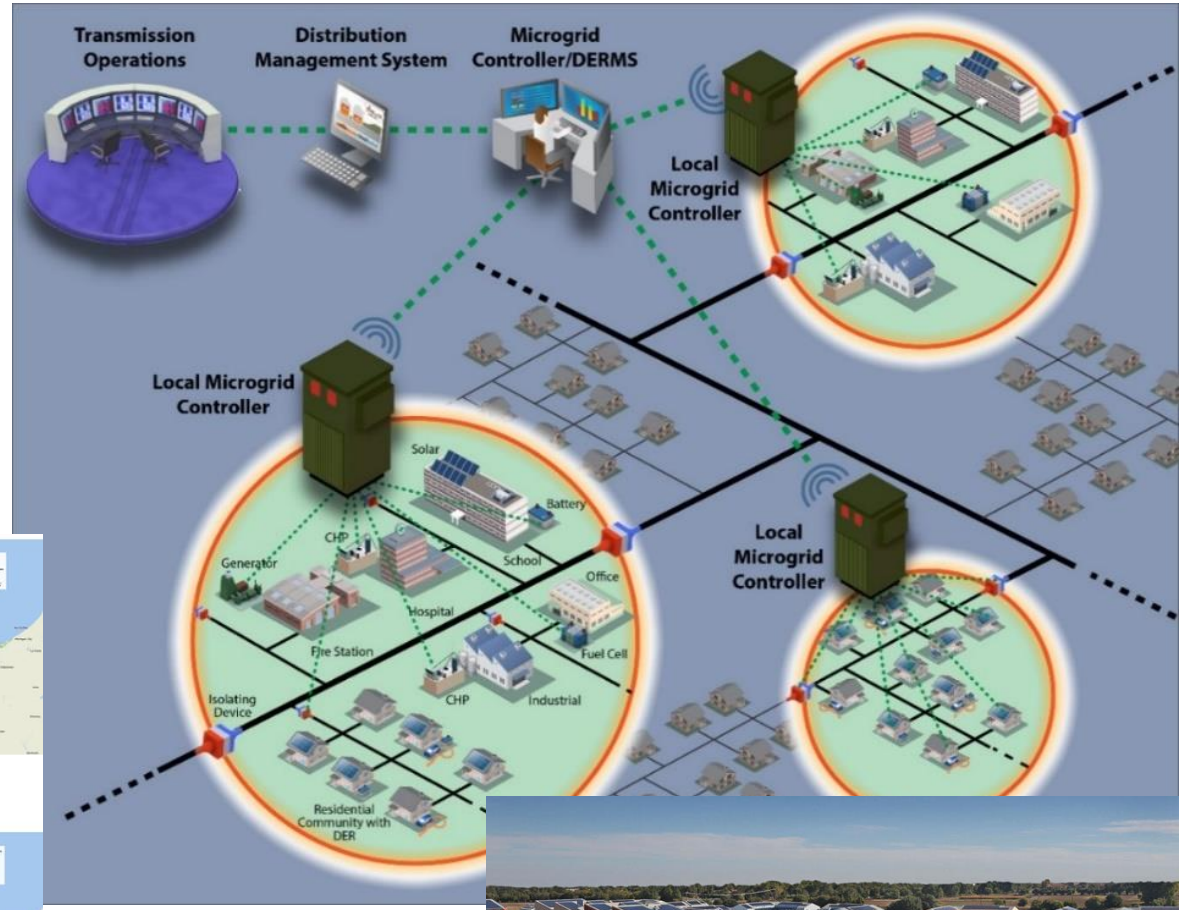
R&D to Assess PREVENTION, RECOVERY & SURVIVABILITY

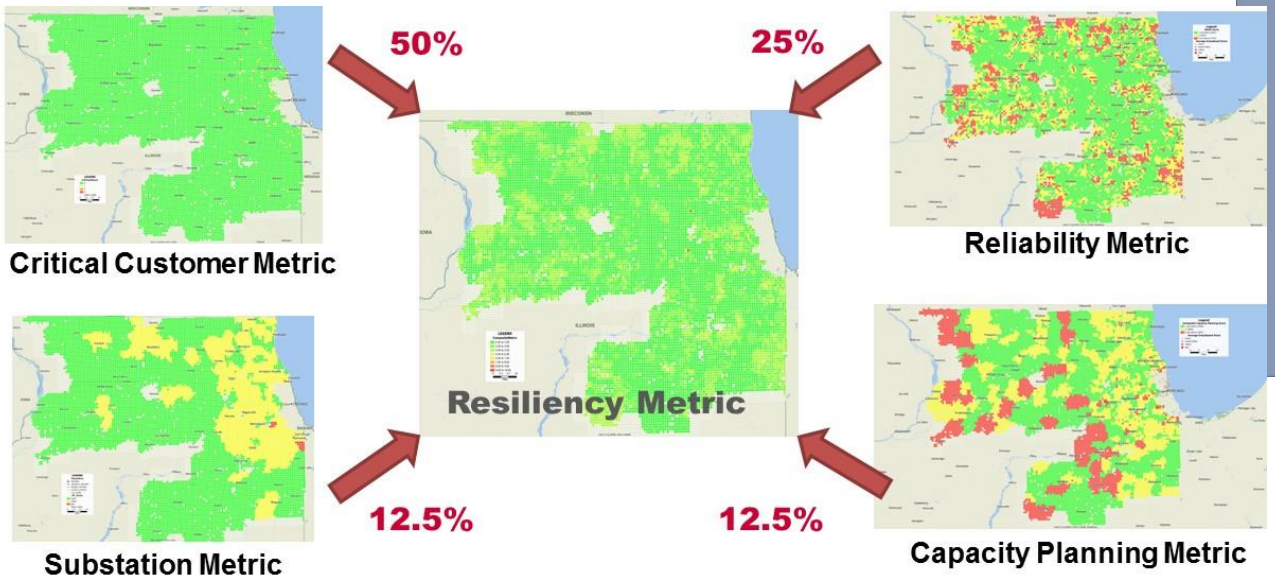
Research on Geomagnetic Disturbances (GMD) and High Altitude Electromagnetic Pulse (HEMP)



Using local resources for reliability and resiliency

Local energy systems can incorporate local storage, generation, and advanced energy management to optimize energy use while also providing local resilience.





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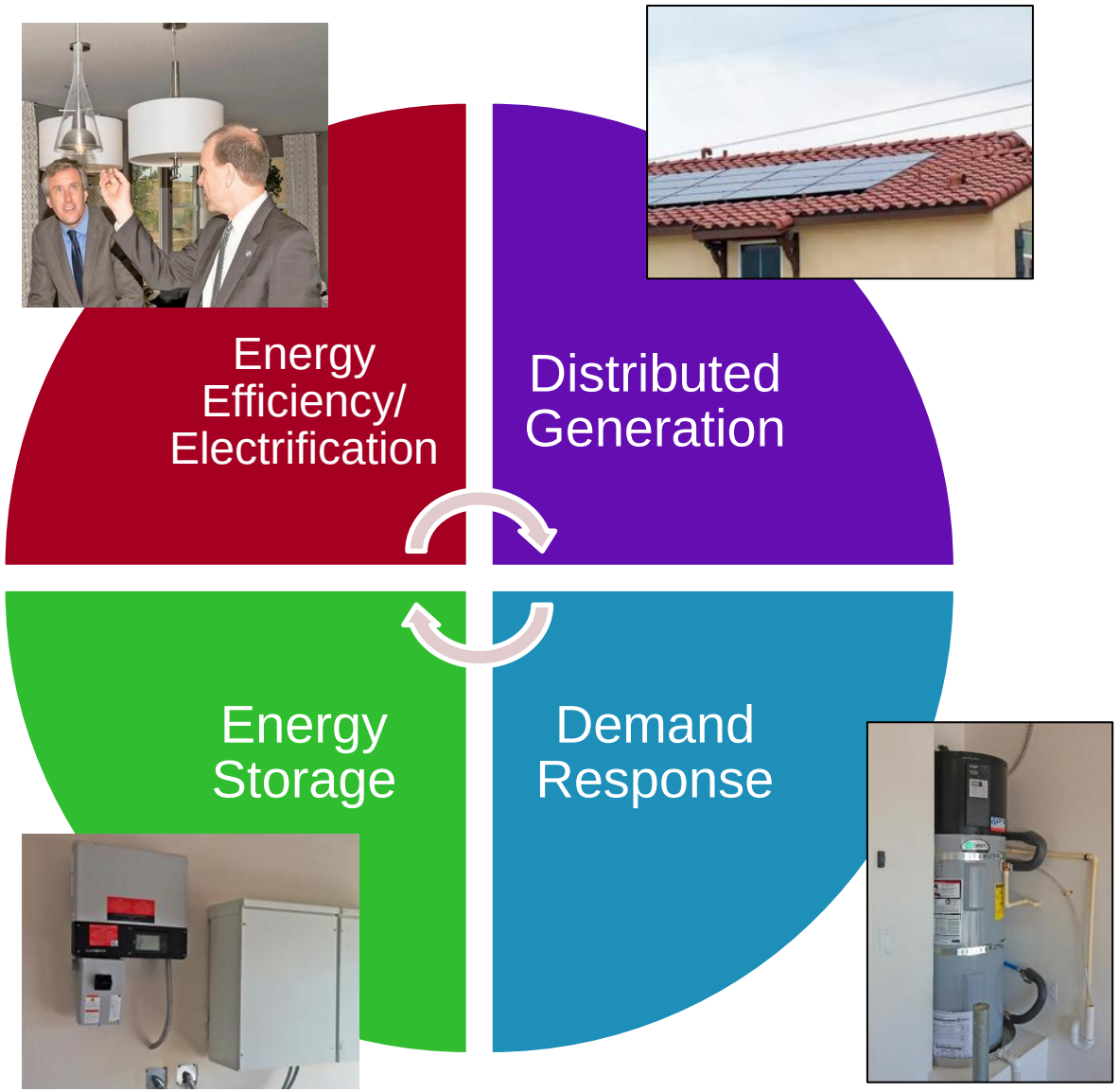
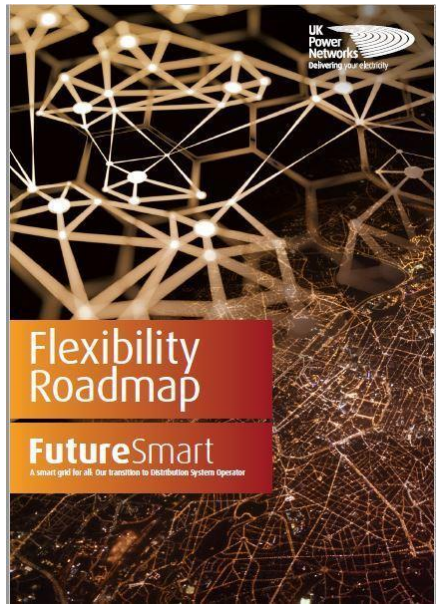
Reliability and Resiliency can be part of Advanced Energy Communities



Examples

Alabama Power Smart Neighborhood (Birmingham)

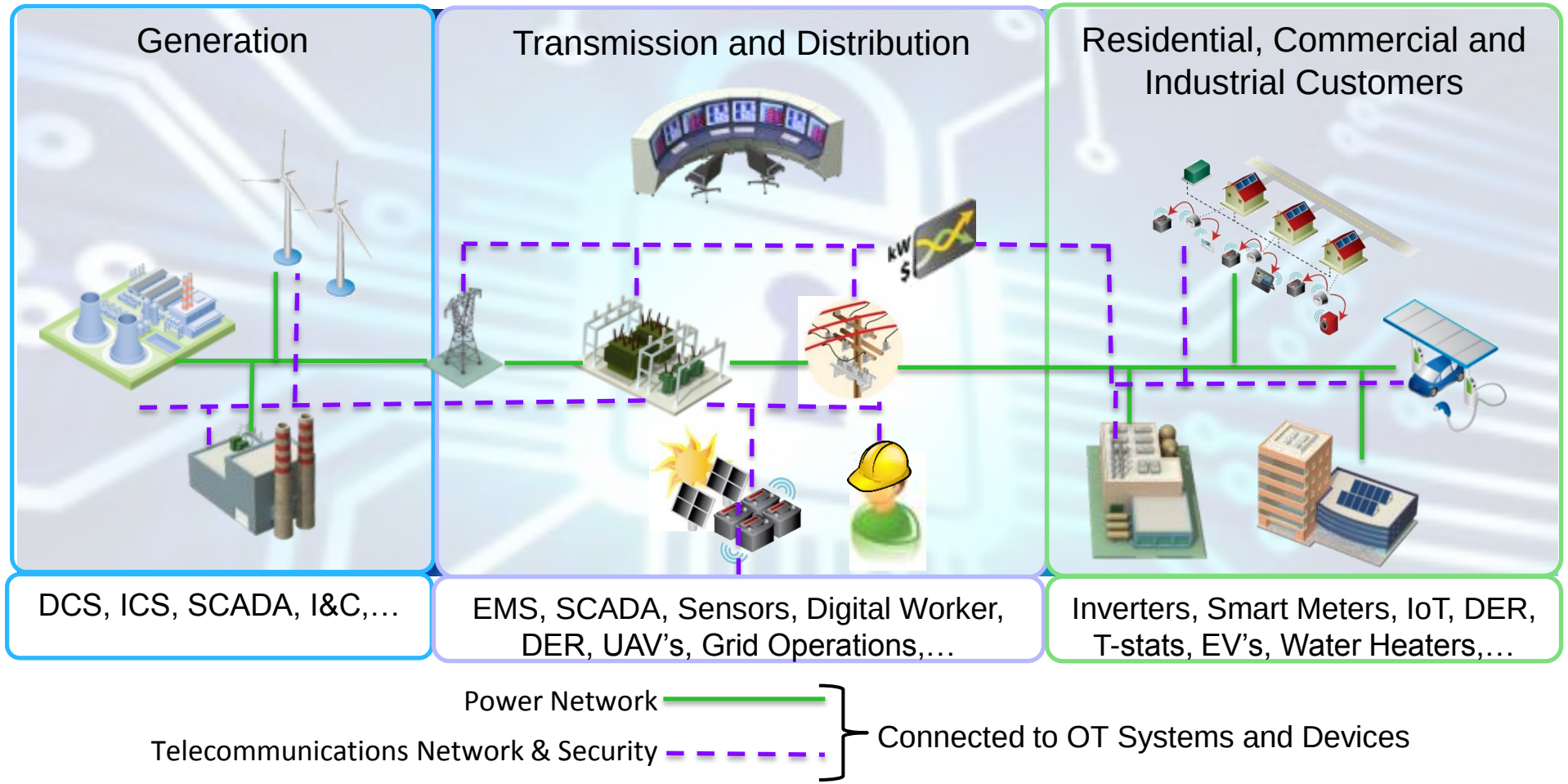
ESB Networks – The Dingle Transition Initiative



UK Power Networks Flexibility Roadmap

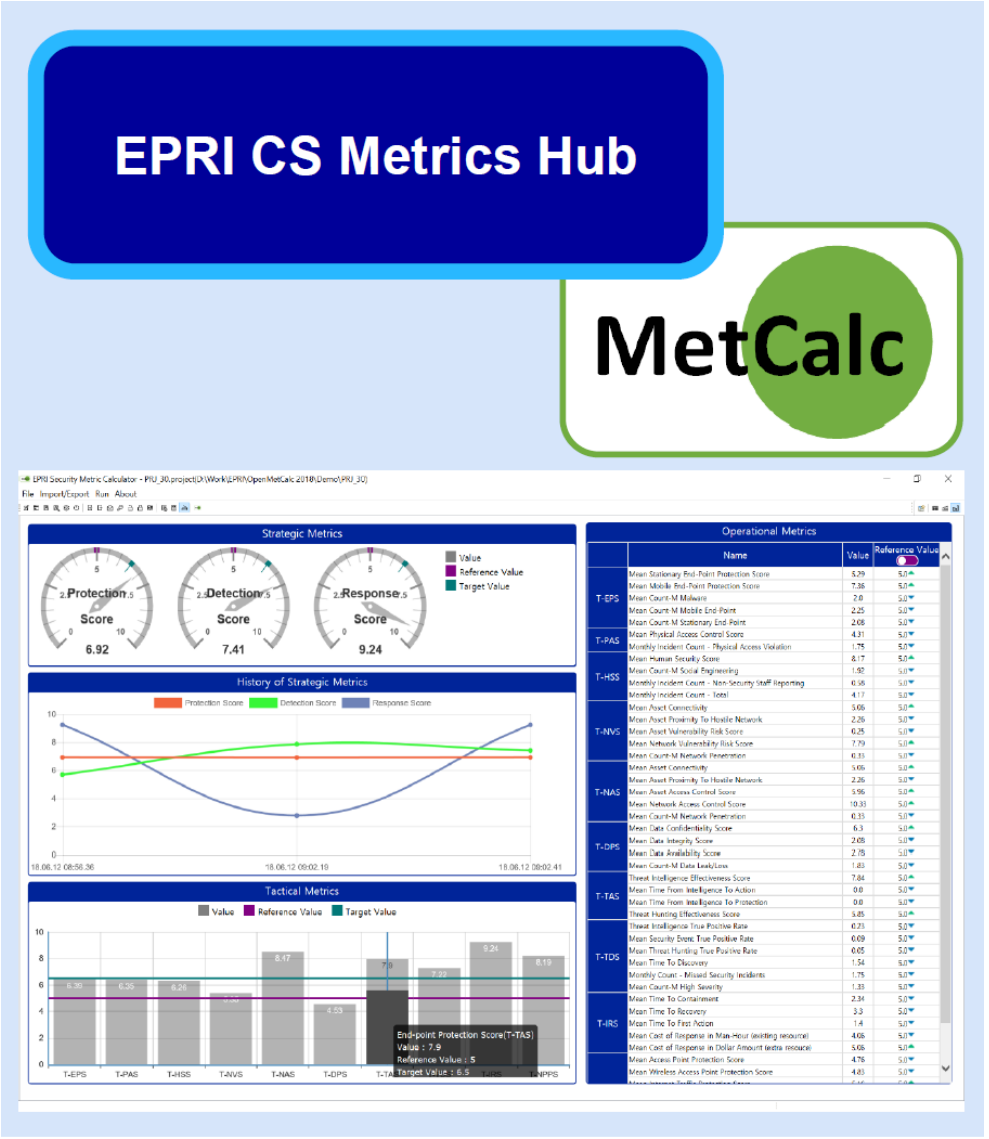
Exelon Com Ed – Bronzeville Smart Community

New cyber security challenges for the Integrated Grid



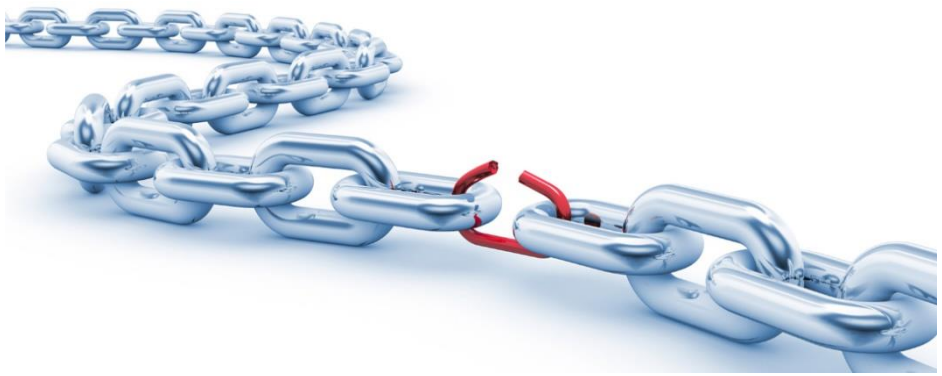
Cyber security metrics – tracking progress

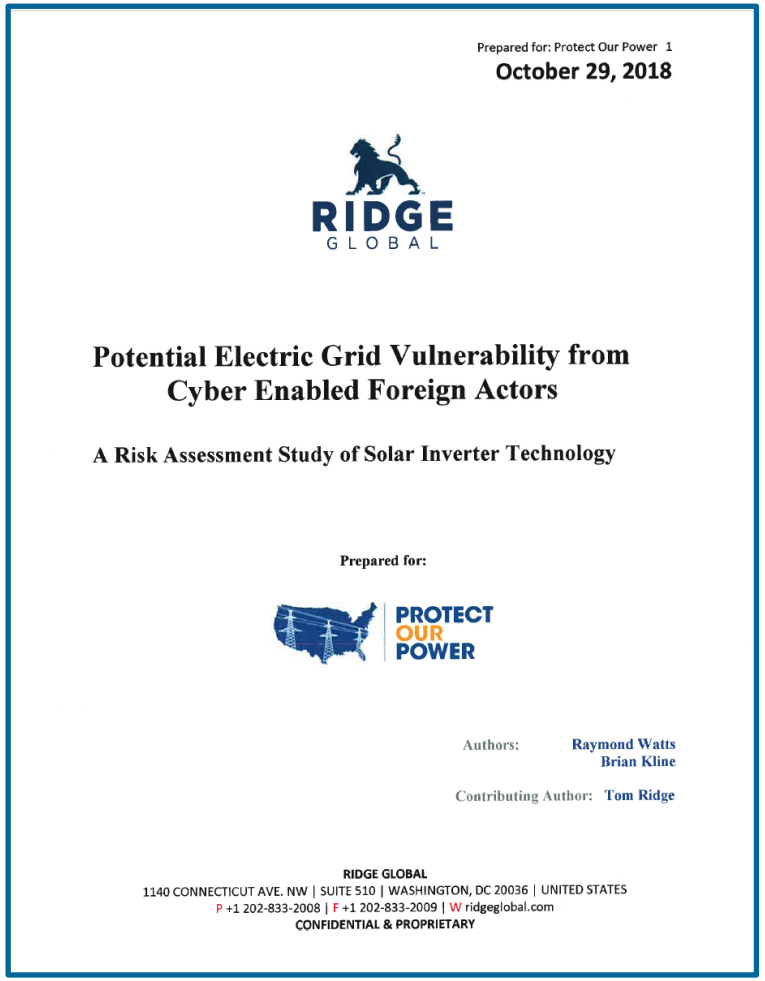
- Open data model
- Automated data collection approaches for metrics calculation
- Benchmarking, industry coordination, analytics
- Industry coordination (NIST-CSF, ES-C2M2, NERC CIP, …)



What is cyber security vulnerability of DER?

- Hardware
- Protocols
- Local controllers
- Distributed Energy Resource Management Systems (DERMS)
- Aggregators and Cloud Interfaces
- Supply Chain
- Lack of understanding potential attack scenarios





Prepared for: Protect Our Power 1

October 29, 2018

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Potential Electric Grid Vulnerability from Cyber Enabled Foreign Actors

A Risk Assessment Study of Solar Inverter Technology

Prepared for:

PROTECT OUR POWER

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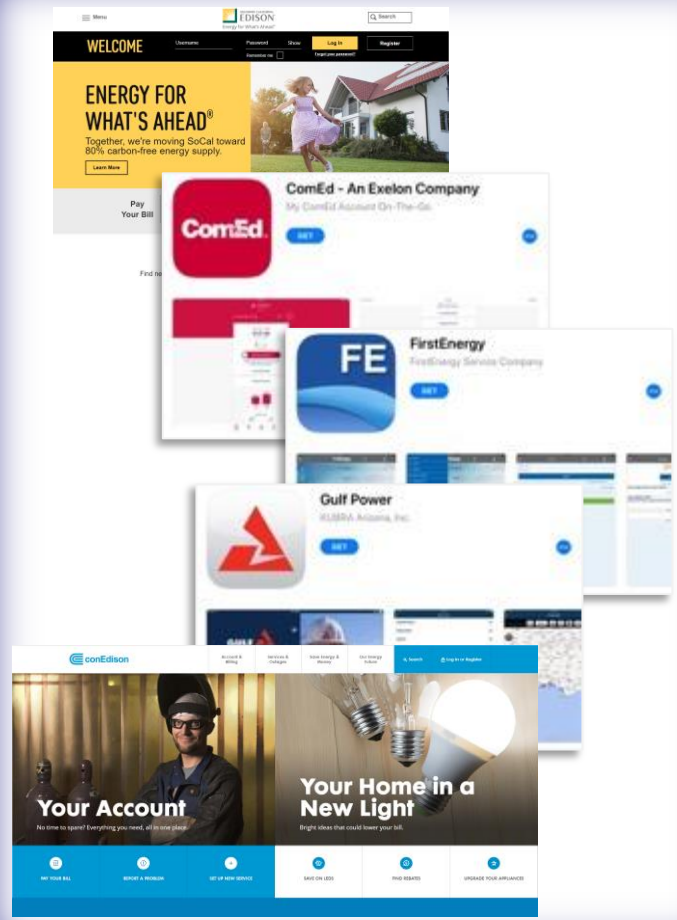
https://protectourpower.org/wp-content/uploads/2018/11/Ridge-Global-and-Potential-Electric-Grid-Vulnerability.pdf

Creating a Shared Integrated Grid

Customer Engagement



Connected Devices = Shared Economy

Community Level Coordination

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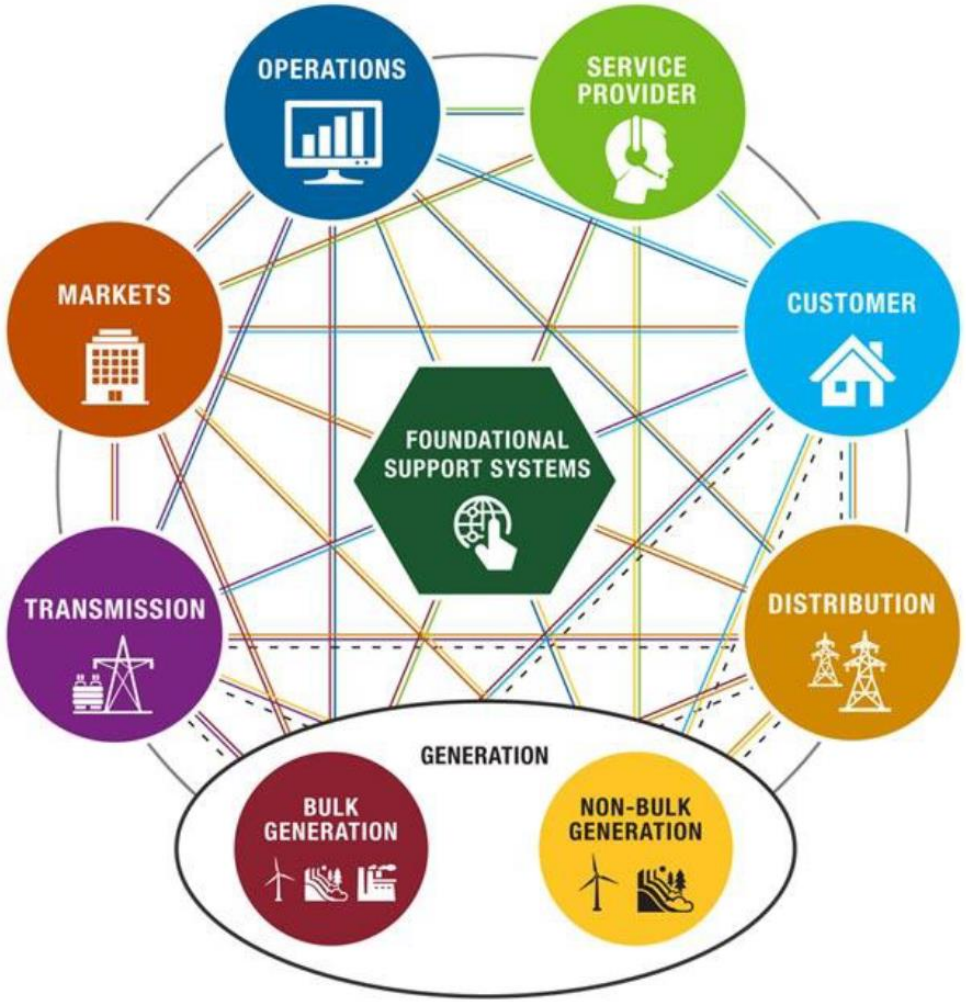
IoT Integration – the platform concept



eIoT: The Development of Internet of Things Applications in Energy Infrastructure

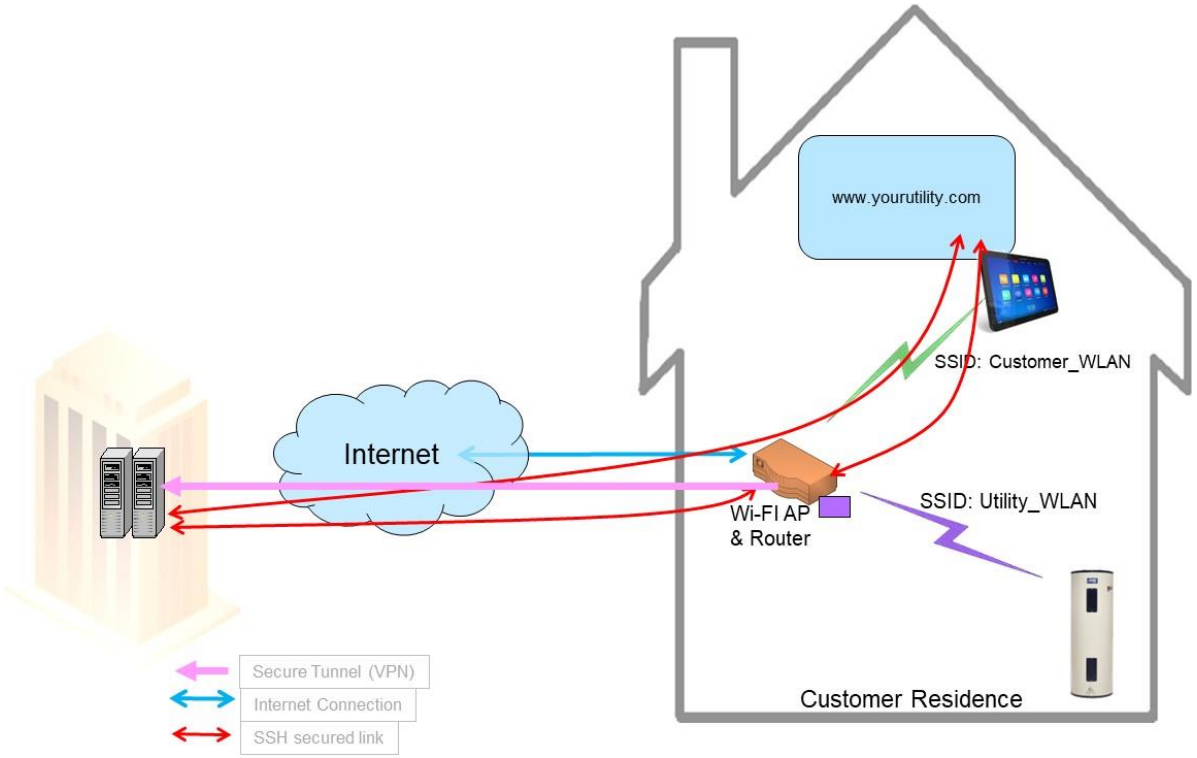
THAYER SCHOOL OF ENGINEERING AT DARTMOUTH | LINES LABORATORY FOR INTELLIGENT INTEGRATED NETWORKS OF ENGINEERING SYSTEMS

by: Steffi O. Muhanji, Alison Flint, Amro M. Farid

Modified: October 1, 2018

Enabling technologies

1. Security at the device



Managed WiFi for Residential IoT

2. Security in the Cloud

Trusted Internet as an Identity-Based Overlay

EPRI Cyber Security Focus

Transmission

Distribution

Energy Utilization

Cyber Security

Identify Gaps and Research Emerging Technologies

Apply Research via Practical Demonstrations and Technology Transfer

Standardization and Industry Outreach

Collaborative Efforts

Together…Shaping the Future of Electricity