



Collision or Convergence?

Navigating Transformational Change in Customers, Technology and Business Model

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ICF International

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**Our industry will
change more in the
next 10 years than it
has in the last 100**

Signposts of Transformative Change

Exelon Network Services Provider Strategic Planning SCE Rate Challenge & OpX

ConEd RFI for Demand Management *PG&E Electric Vehicle Direct Current Fast Charging*

NY REV Proceeding

SMUD Smart Grid Roadmap

Duquesne Light Utility of the Future – Strategic Planning

Consumers Energy Smart Thermostat Pilot Program **ConEd DSIP/NY REV Support**

Georgia Power Value of Solar National Grid DSIP/NY REV Support

EEI National Conference

CAISO Battery Storage Strategy and Roadmap

NYSERDA Strategic DER Planning

Minnesota e21 Proceeding

PG&E Distributed Resource Plan

NYPA Storage Roadmap

San Francisco & LA Cty CCA Analysis and Implementation

DTE IRP

SCE Preferred Resources Pilot

SCE All Resource RFO

PG&E EE Proceeding Comments –EE/IDSM/DRP (2016)

Hawaiian Electric DER Integration and Grid Modernization Planning and Implementation

Will Change Bring Collision or Convergence?



Collision

- **Violent, forcible contact between two or more things**
- **Opposition or conflict between two or more people or things**

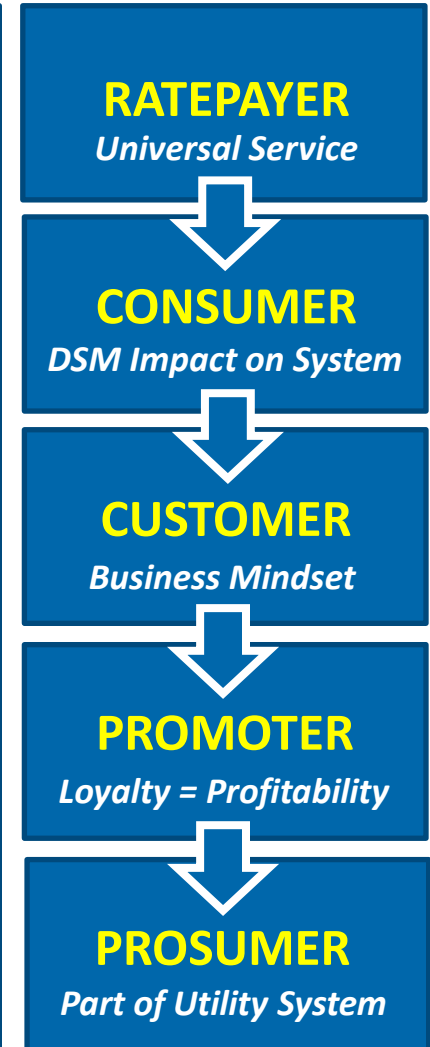
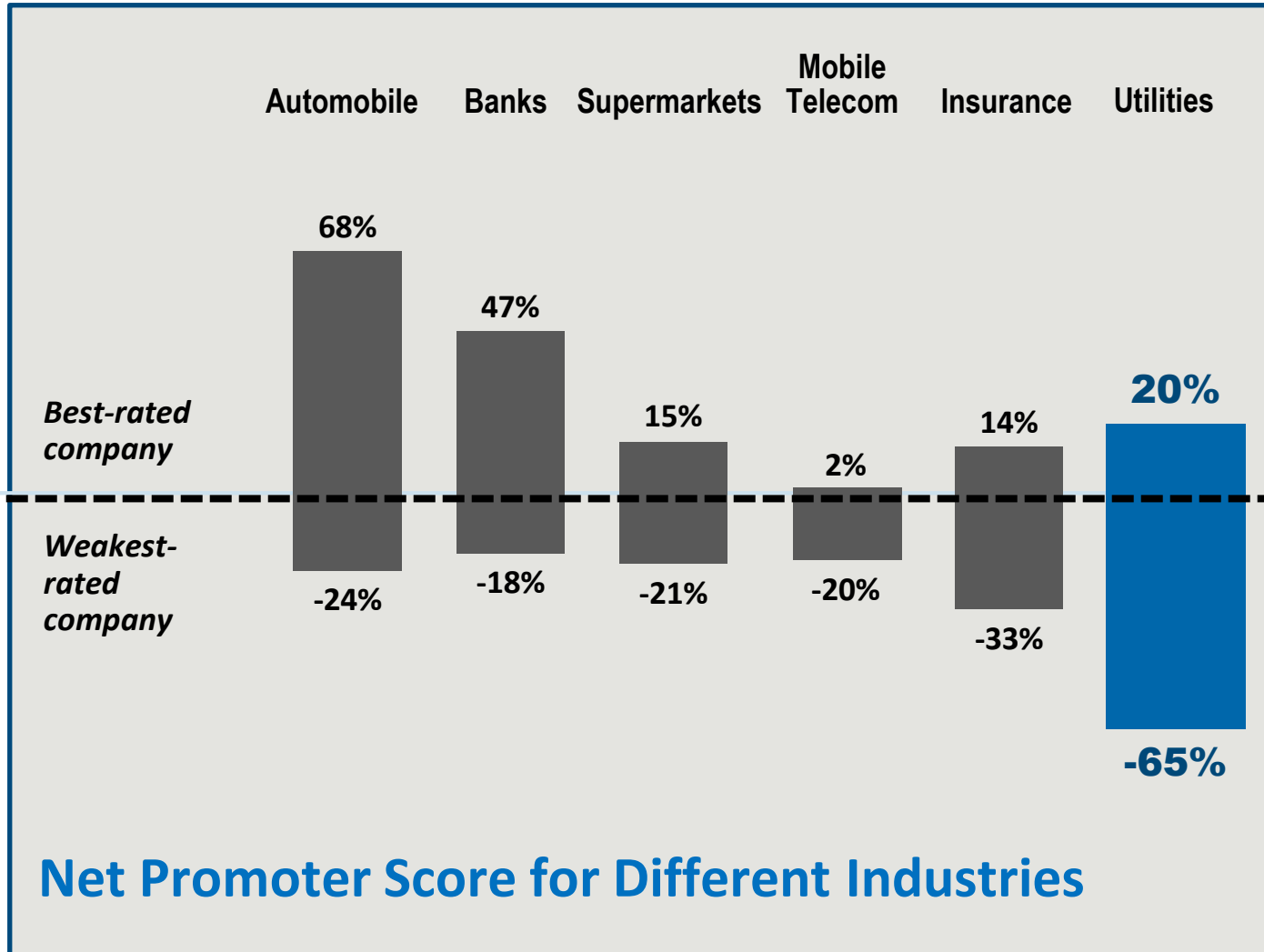


Convergence

- **The act of joining together as one**
- **Concurrence of opinions or results**

customers

Evolution of Utility Relationship with Customers



Source: Bain NPS studies; Bain analysis

Big Data + Analytics + Engagement + Connected

Today's
Digital Era
Consumers
View the
Energy
Ecosystem
as Broader
and Deeper
than the
Serving
Utility

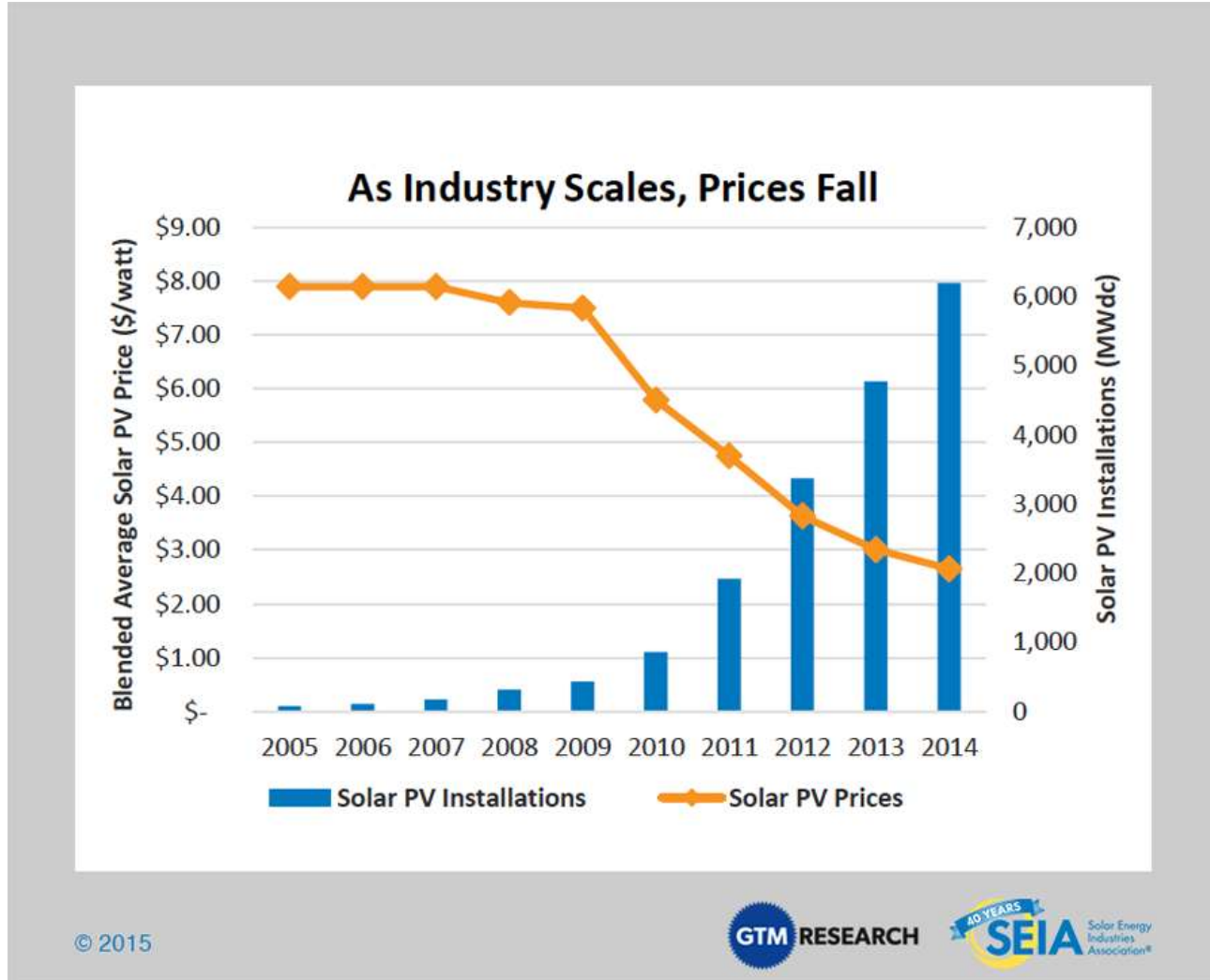


* Acquirer/Acquirees: Next - MyEnergy, Ioviv | Samsung - SmartThings | Allam.com - EngageHub | British Gas - AvriMe ** Bilateral Marketing Agreement with Vivint Inc *** In-house developed, licensed, or through exclusive partnership

Source: Smart Grid News

technology

Dawn of Distributed Energy Resource Era



A New Solar Project Is Installed in the U.S. Every Two Minutes

Source: Solar Electric industries Association

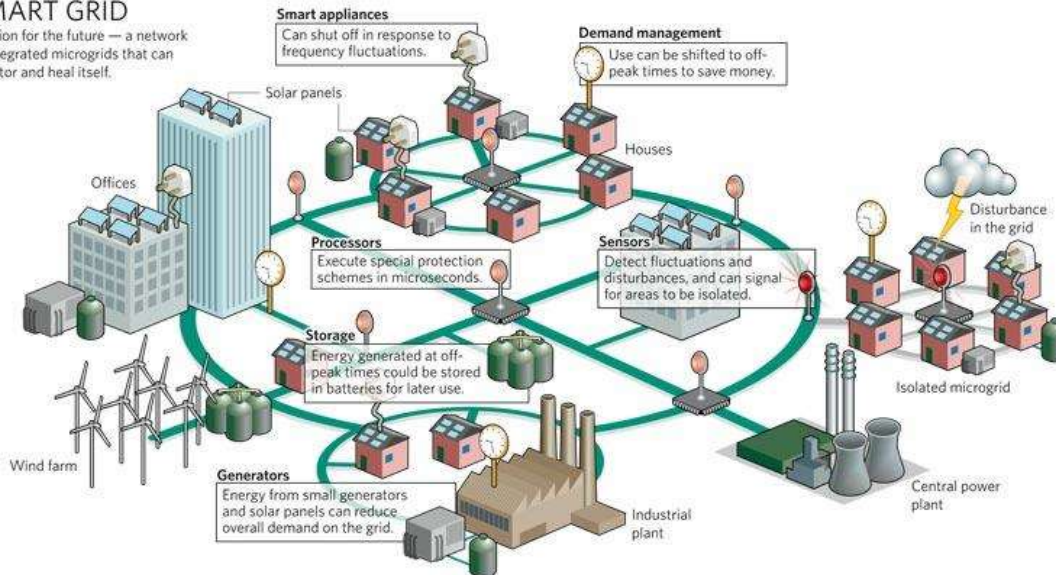
DER Necessitates a Modernized Plug & Play Grid

Next Generation
Advanced Power System
Components

Sensing and Power
System Measurement
Technology

SMART GRID

A vision for the future — a network of integrated microgrids that can monitor and heal itself.



High
Speed,
Two
Way,
Fully
Integrated,
Open
Architecture
Com.

Improved Interfaces and
Seamless, Real-Time
Decision Support

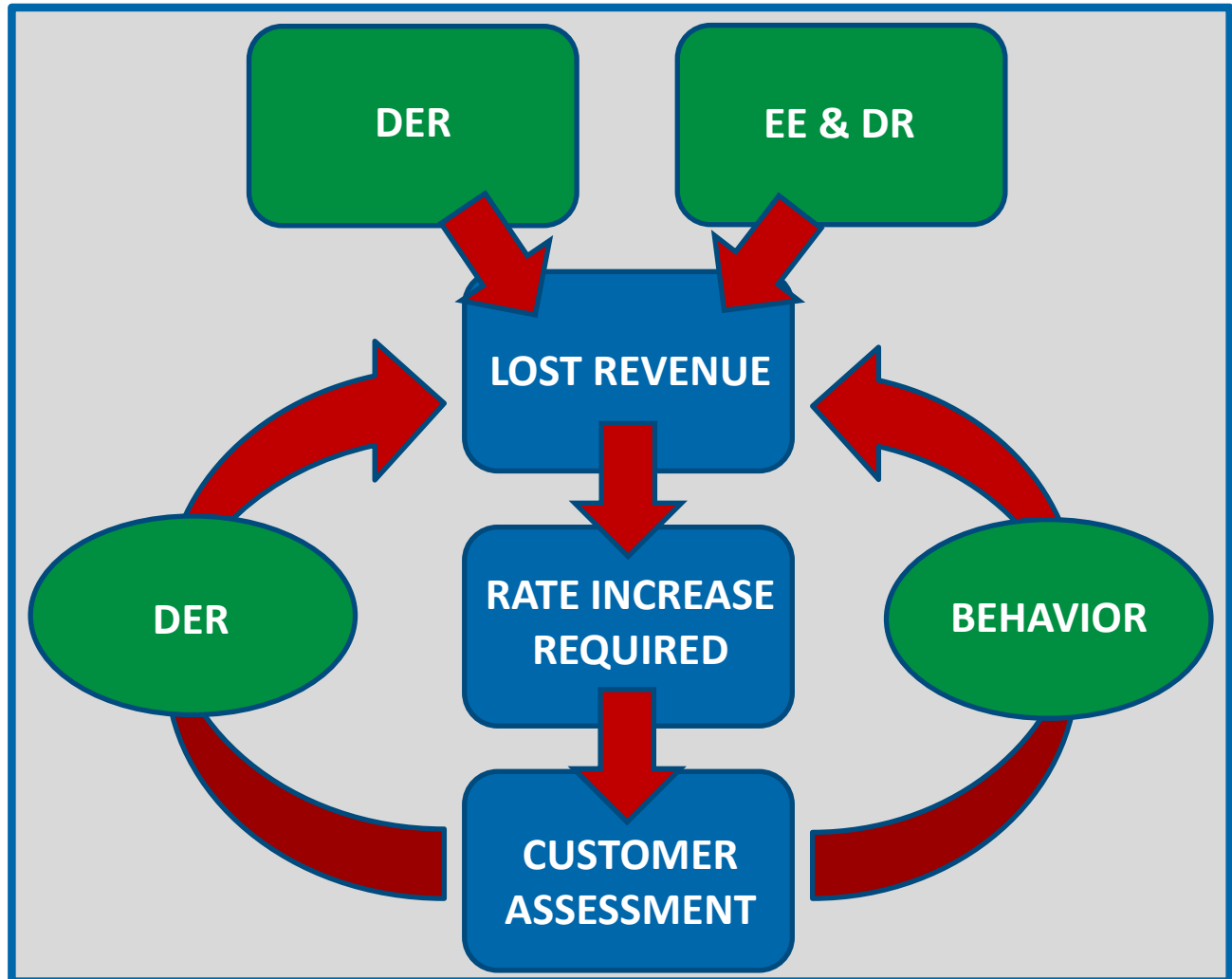
Advanced Diagnostic
and Responsive Control
Methodologies

Source: National Energy Technology Laboratory, "A Systems View of the Modern Grid, 2007"

business model

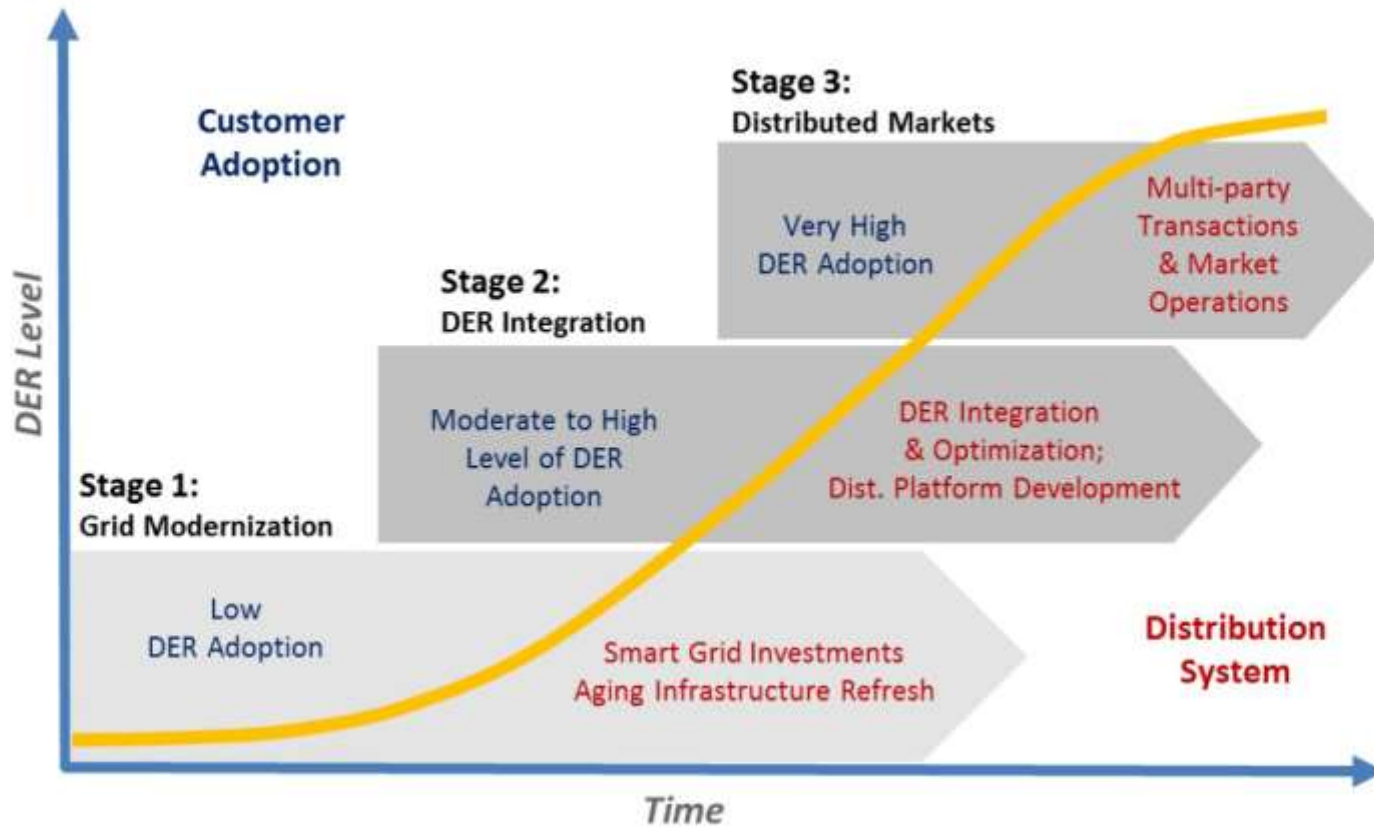
DER Erodes Traditional Utility Business Model

EI's
Depiction
of "Vicious
Cycle from
Disruptive
Forces"



Adapted from: *Disruptive Challenges: Financial Implications and Strategic Responses to a Changing Retail Energy Business*, EEI, January 2013

DER Drives Evolution of a New Role for Utilities

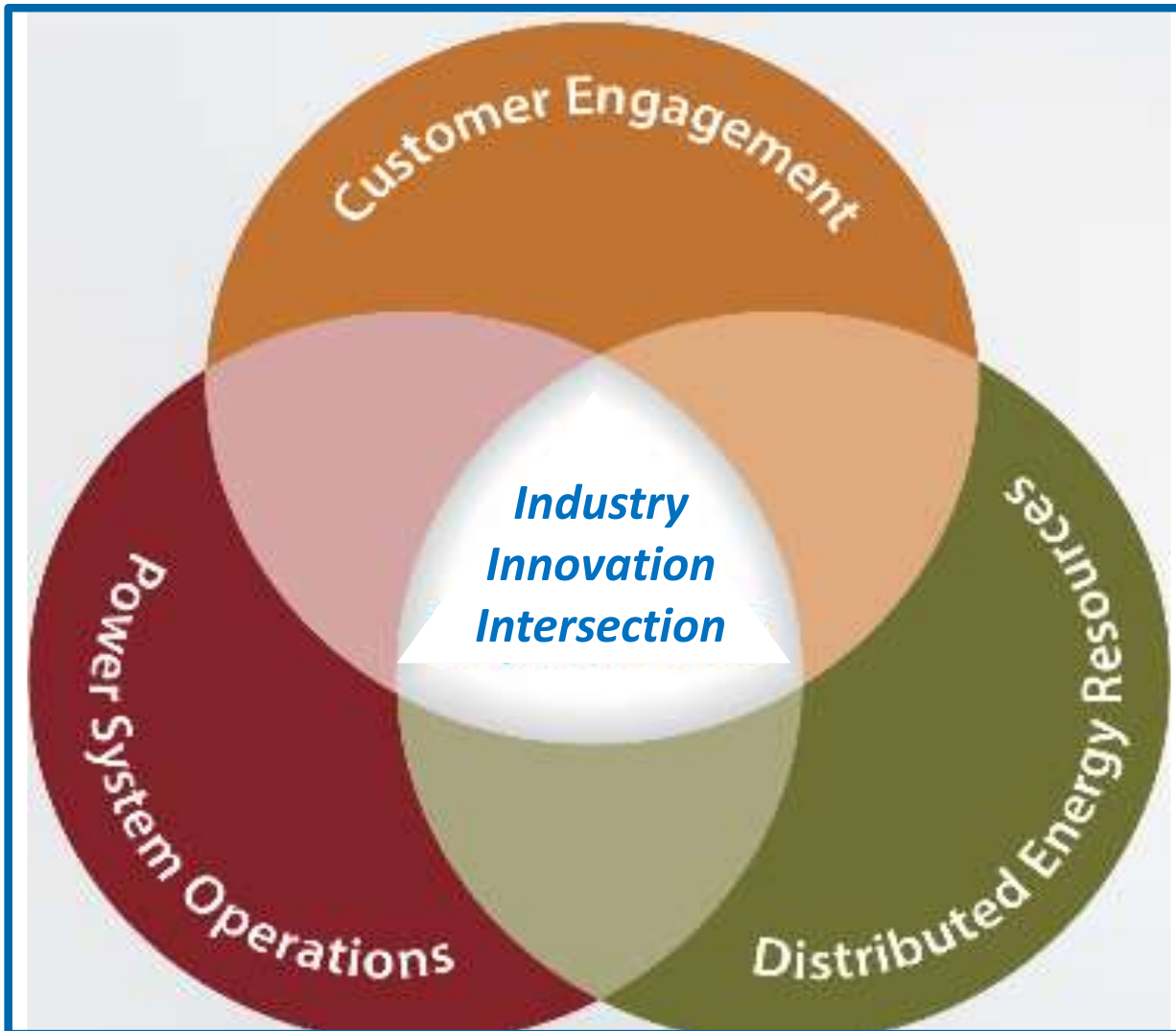


Who Provides Utility Services in a High DER Future?

Source: *Distribution Systems in a High Distributed Resources Future*, Paul De Martini and Lorenzo Kristov, October 2015

convergence

Transforming Collision into Convergence



*Convergence
Reveals Itself at
the **Intersection**
of **Industry**
Innovation and
Transformation*

Three Strangers You Need to Meet



Transition to Clean Energy

- America's electric utilities—which provide the critical infrastructure that enables all other infrastructures -- are at the **beginning of a profound but quiet transformation.**

*Lisa Wood
Edison Foundation*

Distributed Energy



Digital & Distributed Grid

- With respect to the power grid, software is eating it from the edge, as distributed energy resources of both energy supply and demand are **bringing the grid from its cable TV past into its Internet future.**

*Nancy Pfund
DBL Partners*

Grid Operations



Individualized Customer Services

- This evolving DER landscape offers companies ... a rare opportunity to redefine what it means to be an electric utility in the 21st century, and to **transform our industry and our relationship with our customers.**

*Pedro Pizarro
SCE*

Promoters/Prosumers

Source: Edison Foundation Institute for Electric Innovation, "Key Trends Driving Change in the Electric Power Industry", December 2015



thank
you

