The Hon.
Robert Powelson

NARUC President

NARUC Summer Policy Summit

The Honorable Colette Honorable

"Bless her heart"

NARUC Summer Policy Summit

The Hon.
Brien Sheahan

Chair, Task Force on Innovation

NARUC Summer Policy Summit

2017 Innovation Awards

PRESIDENTIAL TASK FORCE ON INNOVATION

Category 1: Innovators in Regulatory Policy

- **Subcategory 1:** State-level Innovation in Regulatory Policy
  - Eligible nominees: a state commission or state organization
- **Subcategory 2:** Municipal-level Innovation in Regulatory Policy
  - Eligible nominees: a city, town, or village
- **Subcategory 3:** Individual Innovator in Regulatory Policy
  - Eligible nominees: An individual – commissioner, commission staffer, local government leader, or local government staff

Category 2: Utility Industry Innovators

- **Utility Industry Innovation by Functions and Values**

- **Subcategory 1:** Utility Industry Innovation in Customer Care, Engagement, and Empowerment

- **Subcategory 2:** Utility Industry Innovation in Reliability, Resiliency, or Security

- **Subcategory 3:** Utility Industry Innovative Pilots or Demonstration Projects

Category 2: Utility Industry Innovators (Cont.)

- **Utility Industry Innovation by Sector**

- **Subcategory 1:** Utility Industry Innovation in Water and Sewer
- **Subcategory 2:** Utility Industry Innovation in Electricity
- **Subcategory 3:** Utility Industry Innovation in Gas
- **Subcategory 4:** Utility Industry Innovation in Telecommunication

Send Questions and Nominations to InnovationAwards@naruc.org

Innovation: The Catalyst for Integration

NARUC Summer Policy Summit

Energy in the Emergent Era

NARUC Summer Committee Meeting | Russell Stokes, CEO GE Power

July 2017

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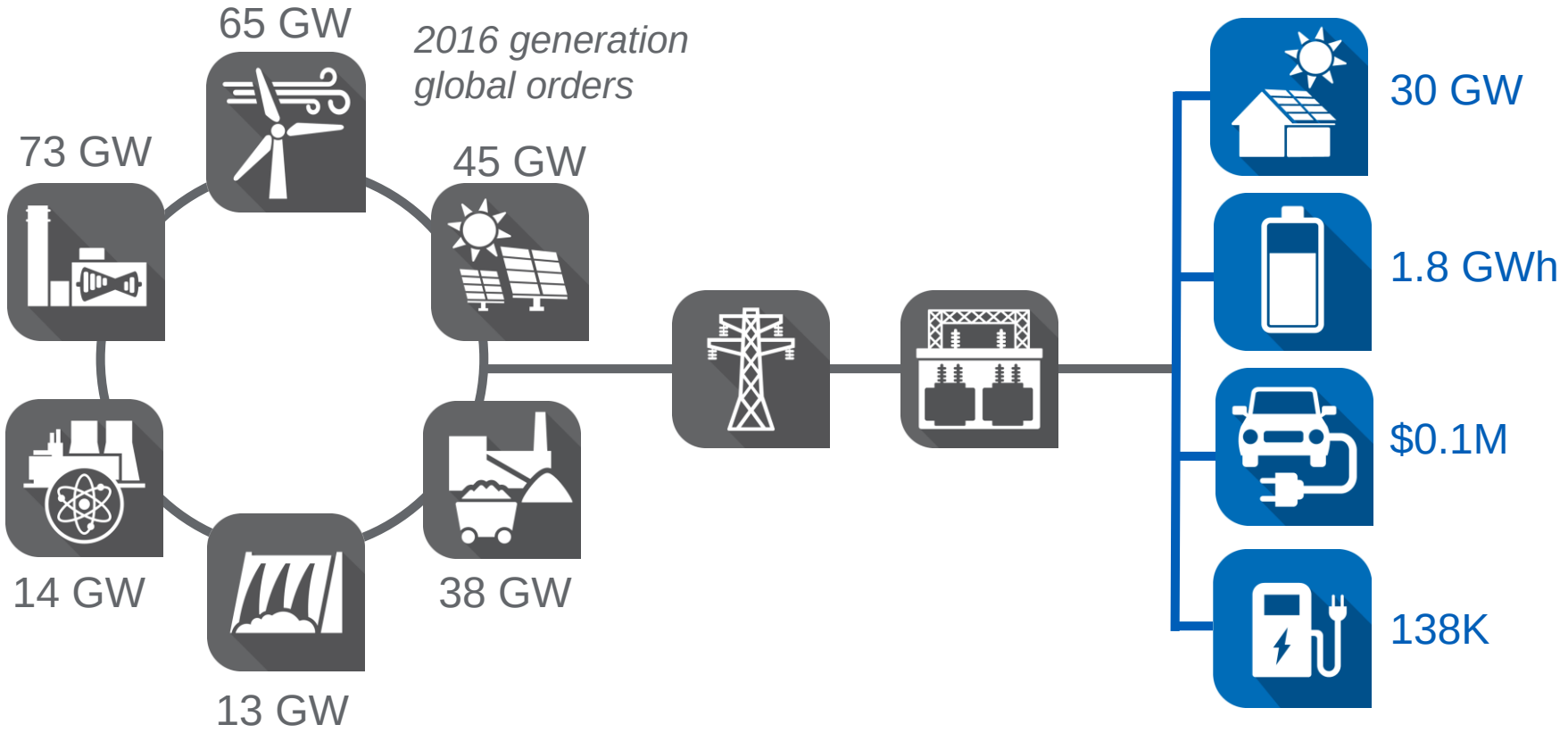
5B	3T	400M	50%
Internet Users	IP Devices	Electric Cars	Reduction in CO_2
2020	2030	2040	2050

The power grid will become increasingly diverse

affordable, reliable, more sustainable



- Local control
- 2-way flow
- Solid state
- Network micro-optimization
- Scalable generation and load

High voltage transmission

Bigger, scale lowered cost
Efficiency through technology

+

Distribution networks

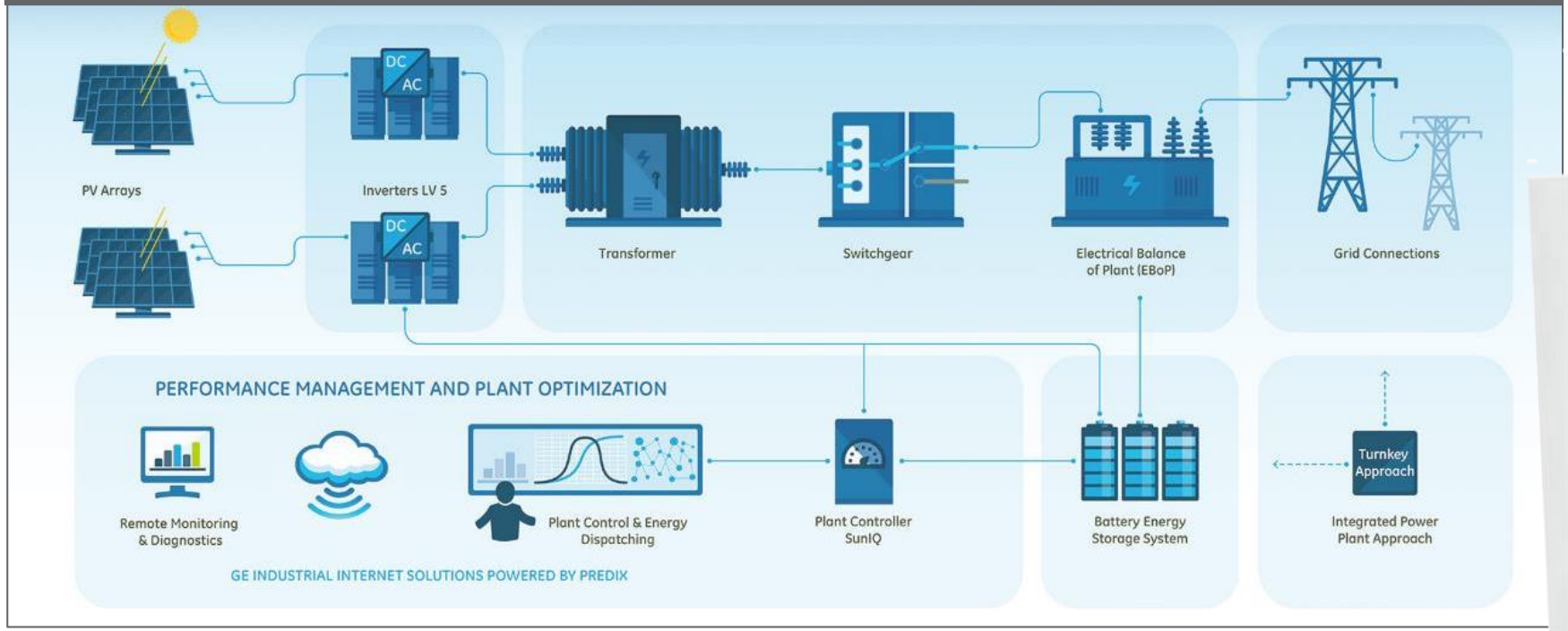
Few economies of scale
Simpler, solid state
Efficiency through data

Solar PV is fastest growing gen technology

...moving towards a combination of centralized + distributed multi-directional system

Wing-to-wing, connected, digital ecosystem

Providing more efficient & sustainable solutions for cost effective solar PV power



Clean Technica

GTM Predicts 27% Drop In Solar Prices By 2022

A new report from GTM Research has highlighted what is becoming an increasingly common refrain these days — solar prices simply continue to fall, and they're not slowing down, either, with GTM predicting that average global solar project prices will decline 27% by 2022.

gtm:

Global Solar Market to Hit 85GW in 2017 —Double the Amount Installed in 2014

Los Angeles Times

California invested heavily in solar power. Now there's so much that other states are sometimes paid to take it

On 14 days during March, Arizona utilities got a gift from California: free solar power. Well, actually better than free. California produced so much solar power on those days that it paid Arizona to take excess electricity its residents weren't using to avoid overloading its own power lines.

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Battery storage becoming economical

... paradigm shift on generation dispatch and decarbonization

GE Hybrid Enhanced Gas Turbine

- **10 MW/4.3 MWh battery** energy storage system + **50 MW LM6000** aeroderivative gas turbine
- Battery capacity designed to provide immediate energy while gas turbine starts and reaches load
- Greenhouse gas emissions & air pollution ↓ **60%**
- Demineralized water consumption ↓ **45%, saves 2 million gallons of water annually**

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Tesla to Build World's Largest Battery in Australia

Analyst Reaction by Ali Asghar / 10 July 2017

On July 7, 2017, a consortium consisting of French energy company Neoen and Tesla won a State Government tender to build the world's largest lithium-ion battery in South Australia. This plant adds much needed power capacity that eases the supply shortage in the state and enables a set of wind farms to provide dispatchable power. But it is not on its own a cure for all that ails the state, which will still be dependent on the interconnector to meet peak demand without additional

EDITION: UNITED STATES

REUTERS

Business Markets World Politics Tech Commentary Breakingviews Money Life

BUSINESS NEWS | Tue Apr 18, 2017 | 12:15am BST

Edison, GE unveil new battery systems at California gas plants

A major California utility and General Electric Co (GE.N) on Monday unveiled a first-of-its-kind battery storage system that will enable instant power output from a natural gas peaking plant to accommodate the state's changing electricity needs while decreasing greenhouse gas emissions.

gtm.

SOLAR
GRID EDGE
ETC.
Podcasts
Webinars
White Papers
Videos

Inside GE and SoCal Edison's First-of-a-Kind Hybrid Peaker Plant With Batteries and Gas Turbines

Combining a battery's speed and flexibility with a turbine's efficiency and longevity to meet Southern California's solar-influenced grid needs.

by Jeff St. John

Micro-grids becoming more prevalent in and emerging and mature segments

… providing affordable and resilient access to power

Nice, France Microgrid Project

- 4 year microgrid demonstrator project including islanding and demand response
- Solar generated power above 1 MW, integrated energy storage
  - ↓ generation costs by up to 20%
  - ↓ carbon footprint

ENGINEERING.COM

Nice Microgrid: Solar, Storage, & Reliability

Way down in the south of France, an experimental microgrid is demonstrating both the technical and business sides of local power production and distribution. The Nice Grid Project combines rooftop photovoltaic resources, strategically placed battery banks, and a smart control system, all of which provide on-site generation, peak load shifting, and islanding.

ELECTRIC LIGHT & POWER

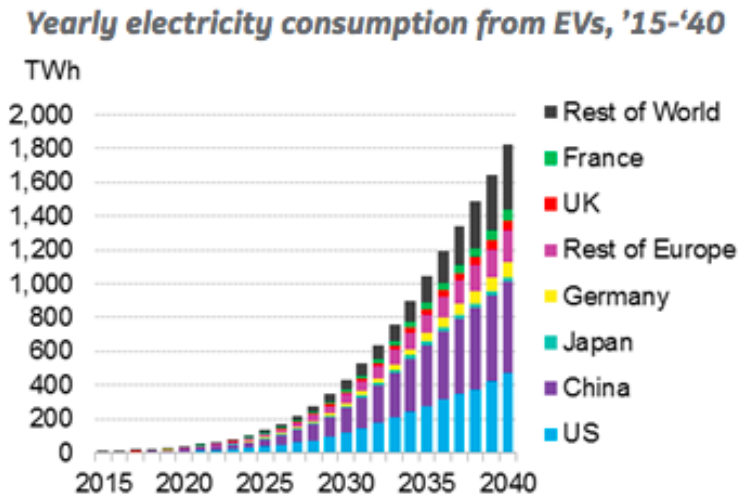
N.J. utilities board develops 13 microgrids to improve storm resiliency

The New Jersey Board of Public Utilities is furthering the state Energy Master Plan's (EMP) priorities of improving energy resiliency and increasing the use of DER microgrid technologies by funding 13 Town Center DER Microgrid feasibility studies.

The India project specifically required a cost-effective microgrid solution that could be deployed and managed in remote areas. This is where GE's expertise and leadership in the development of microgrid electrical systems, advanced controls, and Industrial Internet capability converged to help make the microgrid project a success.

Convergence of energy and transportation sectors

… creating new business models and transforming the roles of the utility & consumer



Clean Technica

Electric Cars Will Total More Than 50% Of All New Car Sales By 2040, BNEF Forecasts

July 6th, 2017 by Steve Hanley

FUTURITY

Electric cars can power buildings from the parking lot

Using energy stored in the batteries of electric vehicles to power large buildings not only provides electricity for the building, but also increases the lifespan of the vehicle batteries, new research shows.

PROTERRA

Electric buses are now cheaper than diesel/CNG and could dominate the market within 10 years, says Proterra CEO

electrek

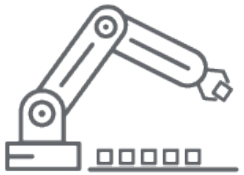
A new all-electric and autonomous cargo ship is planned for operation in 2018

The pace of change is accelerating

… we ALL must continue to evolve to remain relevant in the energy future

IoT

Artificial Intelligence



Robotics & Automation

Machine Learning

Additive/
3D Manufacturing

Virtual/
Augmented Reality

… policy and regulatory landscape must also keep pace with technology innovation

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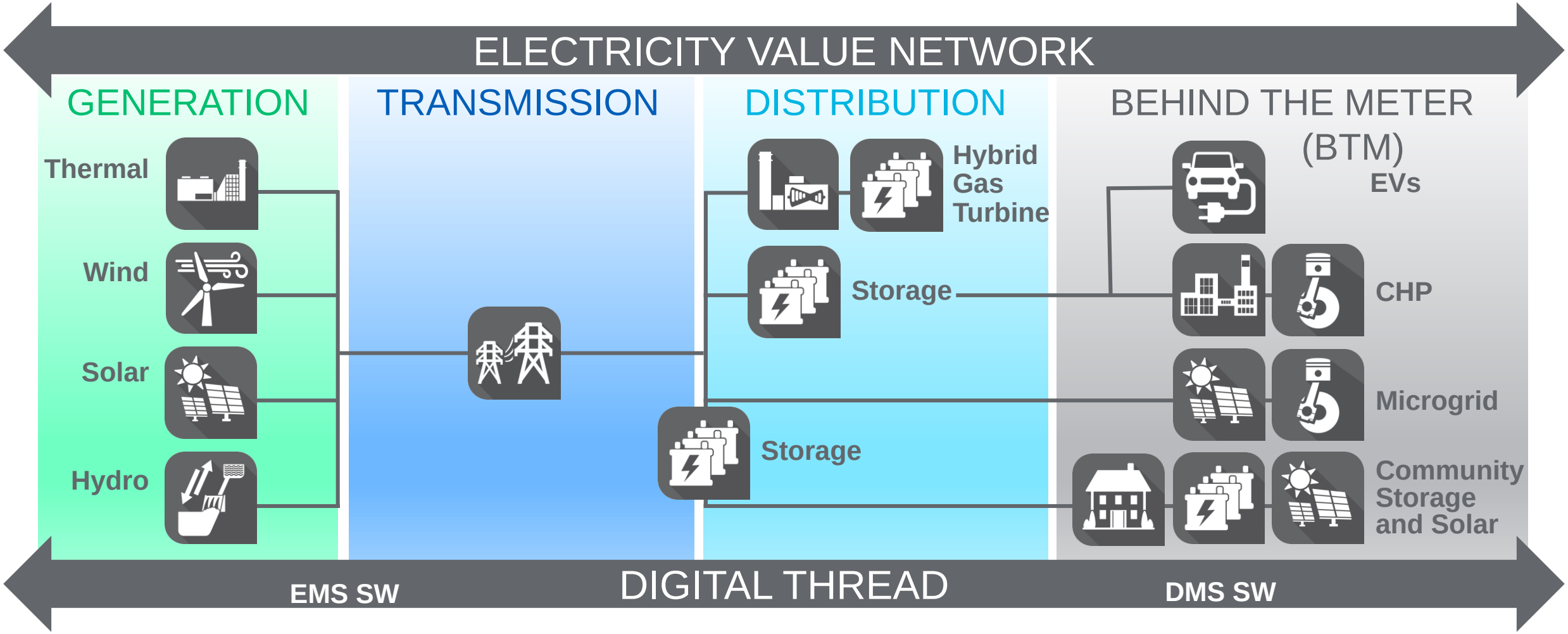

SYSTEM-OF-SYSTEMS BENEFITS

- ↓ Delivered cost of electricity
- ↑ System flexibility
- ↑ Resiliency
- ↓ Greenhouse gases
- ↓ Curtailment of renewables
- ↑ System diversity (energy independence)

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Innovation: The Catalyst for Integration

NARUC Summer Policy Summit

Innovation: The Catalyst for Integration

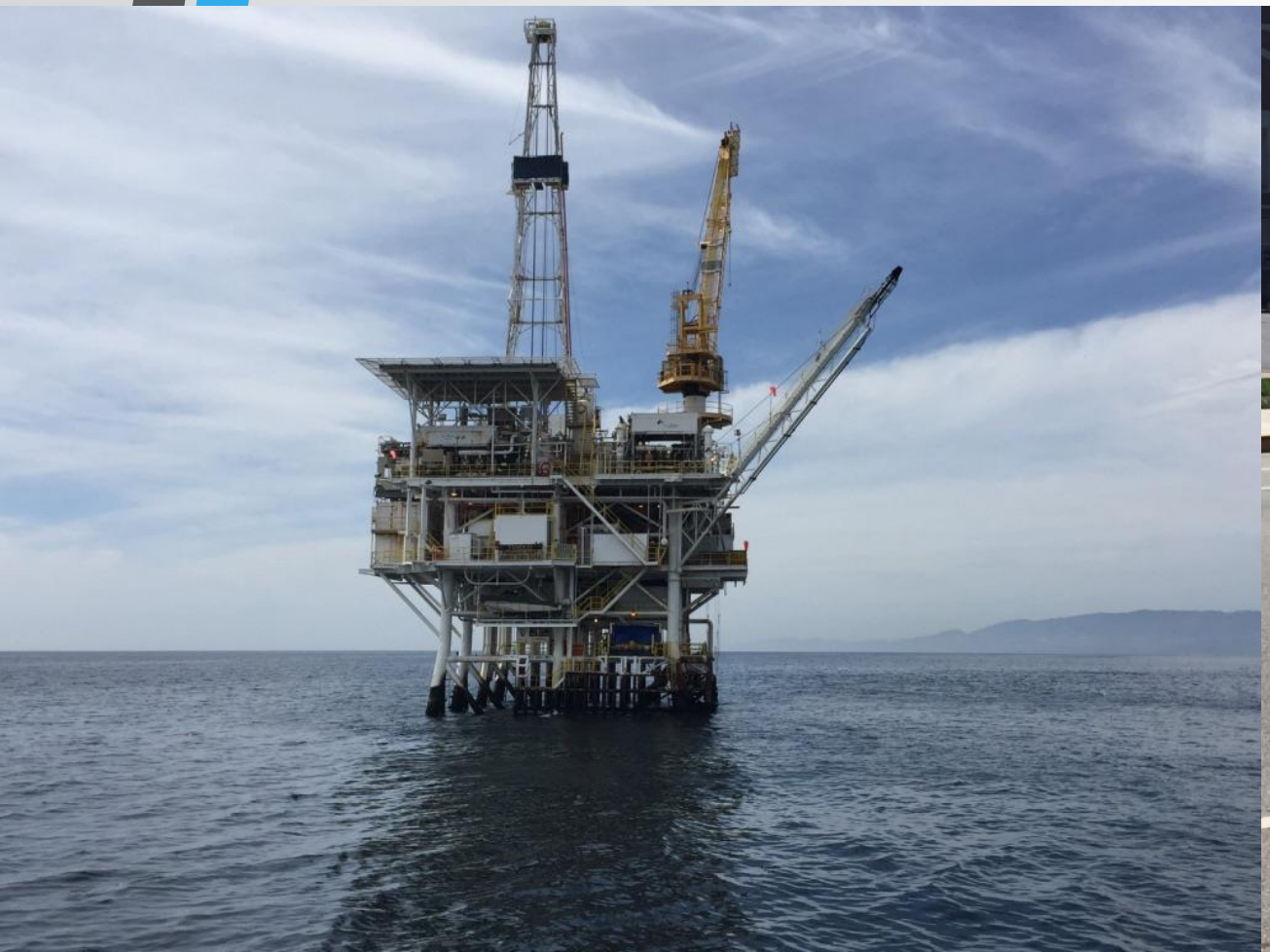
NARUC Summer Policy Summit 2017

Dennis V. McGinn, *Vice Admiral (Retired)*, US Navy

Former Assistant Secretary of the Navy

Energy, Installations, Environment

New Business Models, Markets, and Partnerships



Emerging Technologies: Innovation in Energy Production and Management

Old Energy, New Energy

Changing Landscape of Electrical Grid Technology

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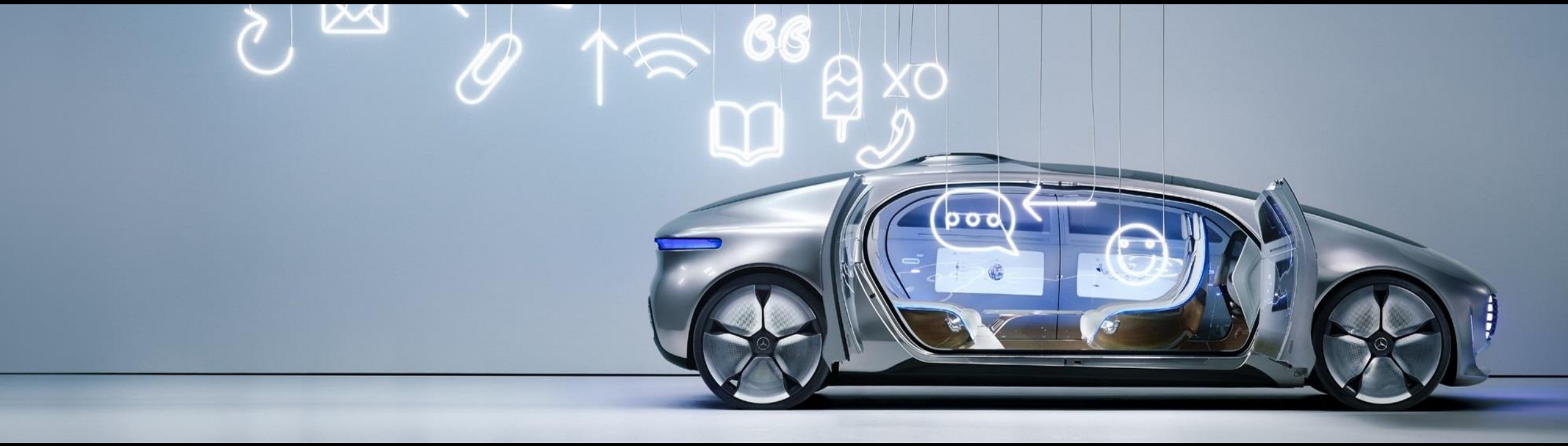
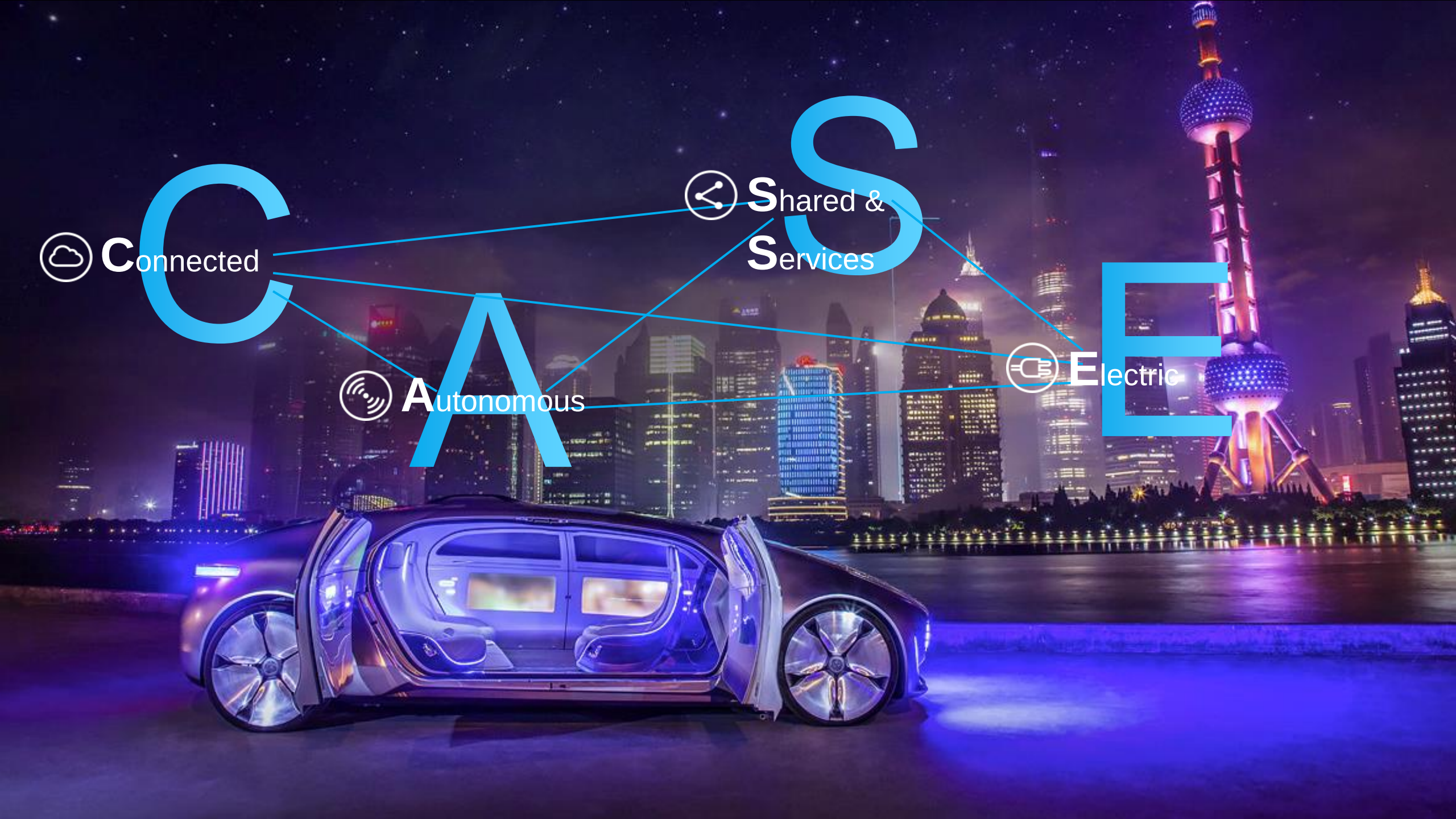


Innovation: the Catalyst for Integration

The Future of Vehicle Electrification and Integrated Energy Solutions

Boris von Bormann
CEO, Mercedes-Benz Energy Americas
July 18, 2017

Mercedes-Benz

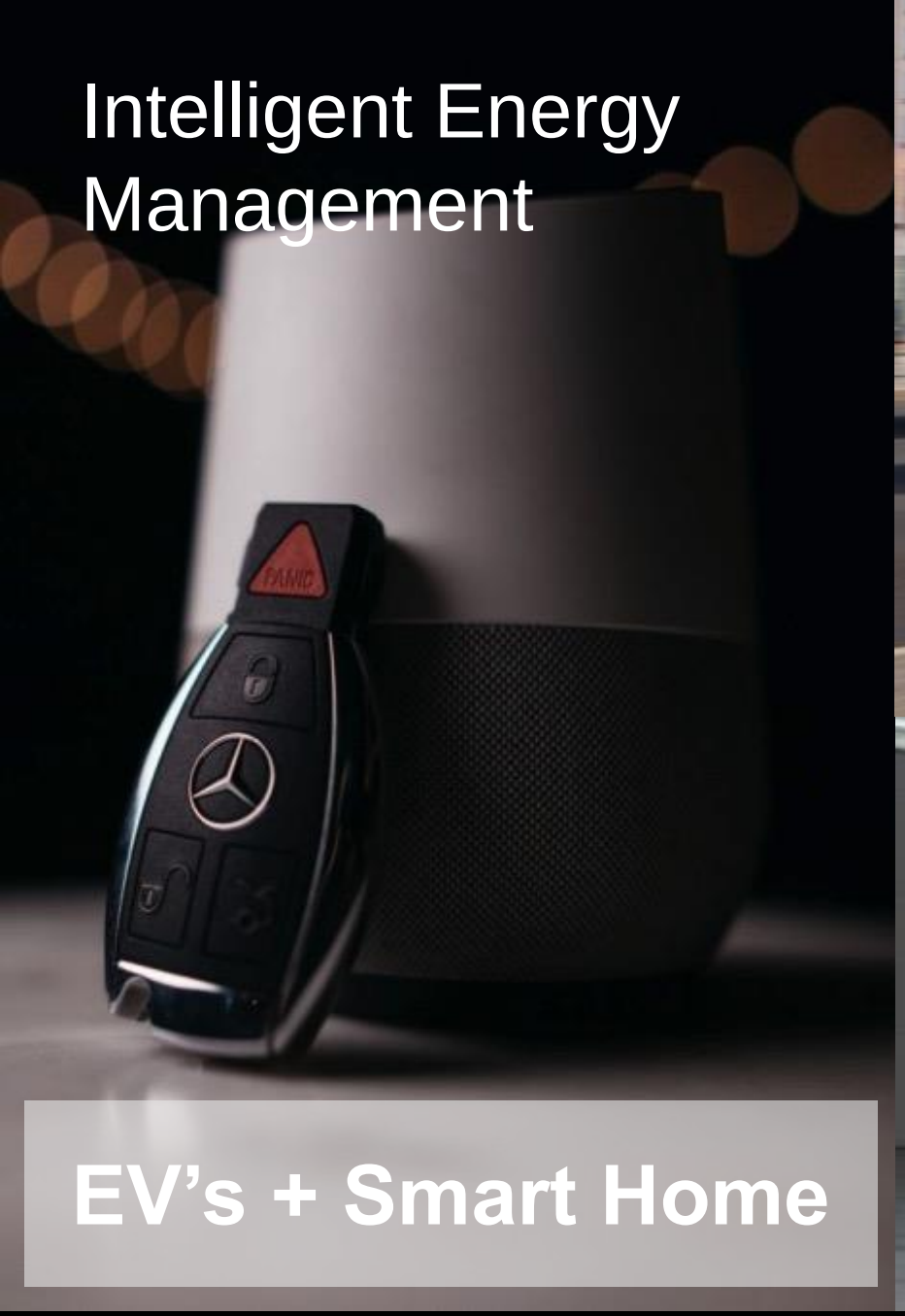

C
Connected
A
Autonomous
S
Shared &
Services
E
Electric

Mercedes-Benz Energy

Ecosystem of Home Energy Solutions Supporting EV's

- Home energy storage
- Rooftop solar PV system
- Electric vehicle
- EV charging station
- Energy management
- Smart home technology
- Virtual power plant
- Financing

Intelligent Energy Management



EV’s + Smart Home

Managed Charging for Public + Private Charging Infrastructure

Electric Fleet Management

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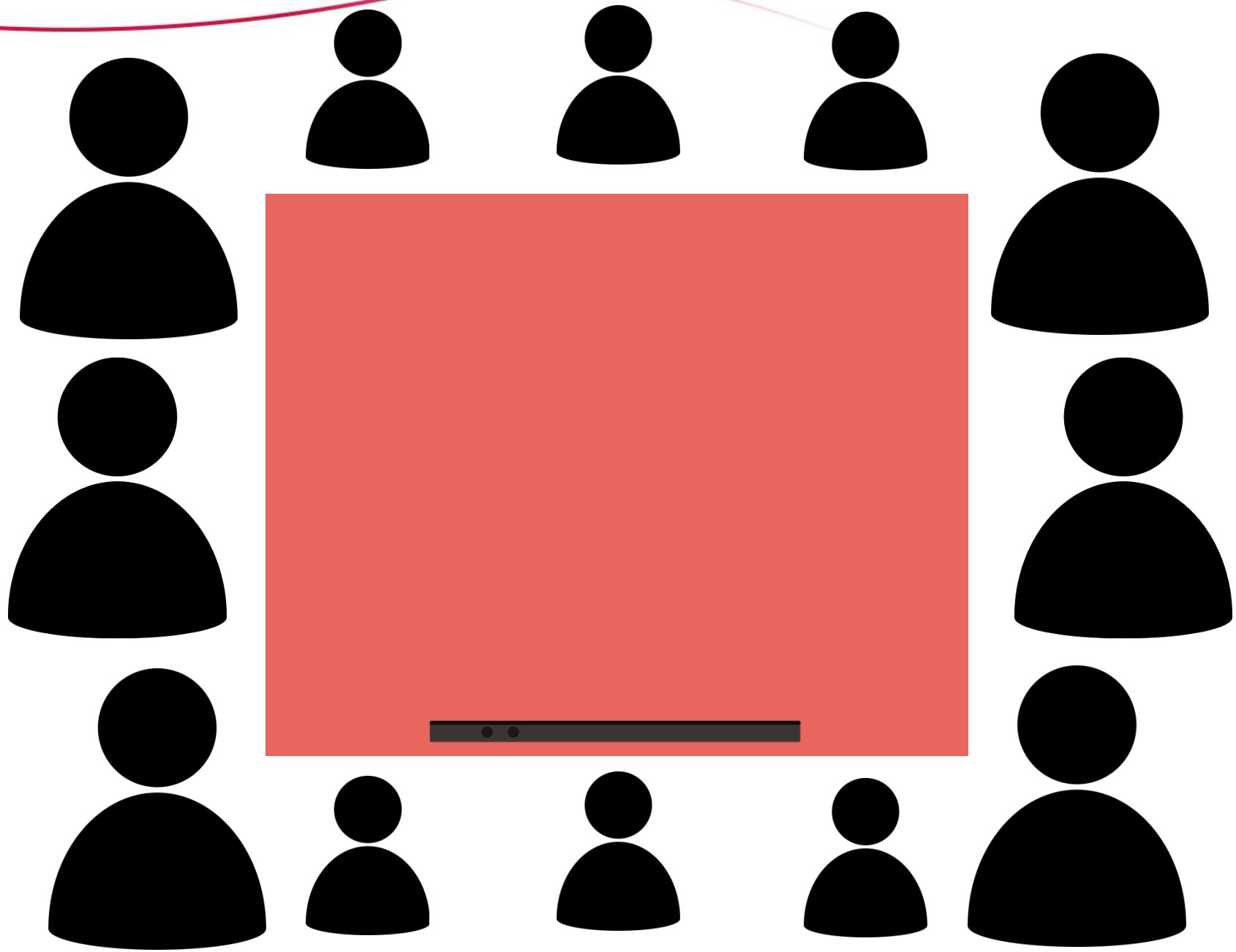
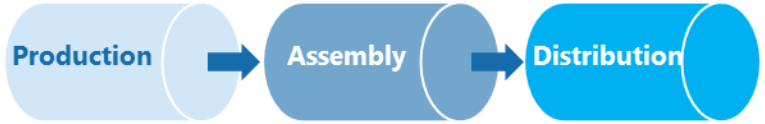


Pipeline to Platform

Pipe Model – focus on the product

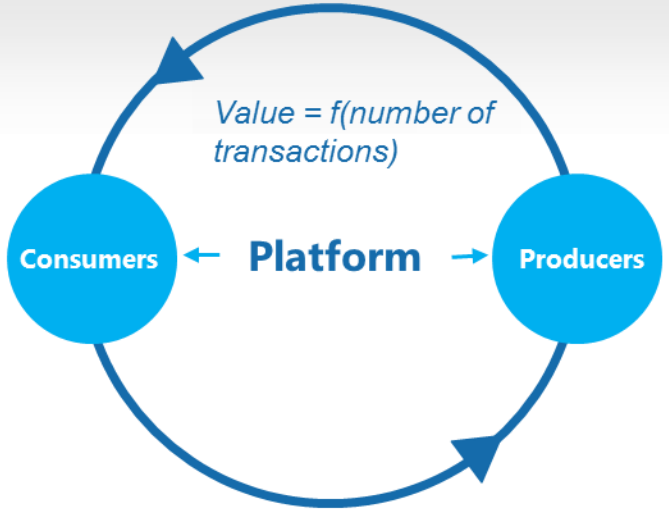
Value = f(qualities of the final product)



- **Companies produce, assemble, and distribute goods** and services to end customers through a process
- Value is created through the **optimization of this process**

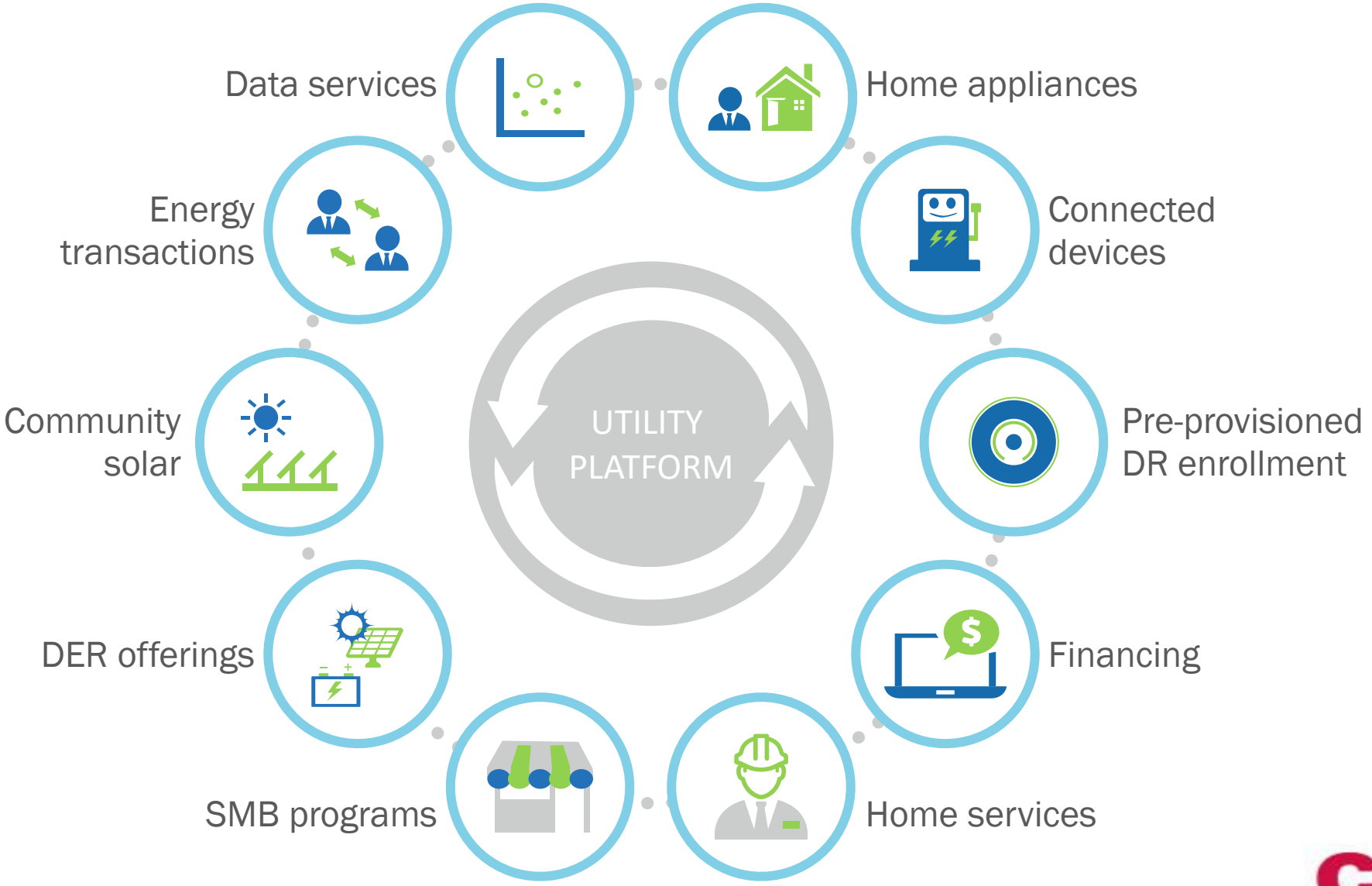
Platform Model – focus on the interaction

Value = f(number of transactions)



- Companies **enable interactions** between both producers and consumers, with parties potentially shifting between roles
- **Value is generated** through creation, curation, and consumption of content
- 3 types of exchanges: **information, goods/services, currency**

Platform for Utility of the Future



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Platform Layers

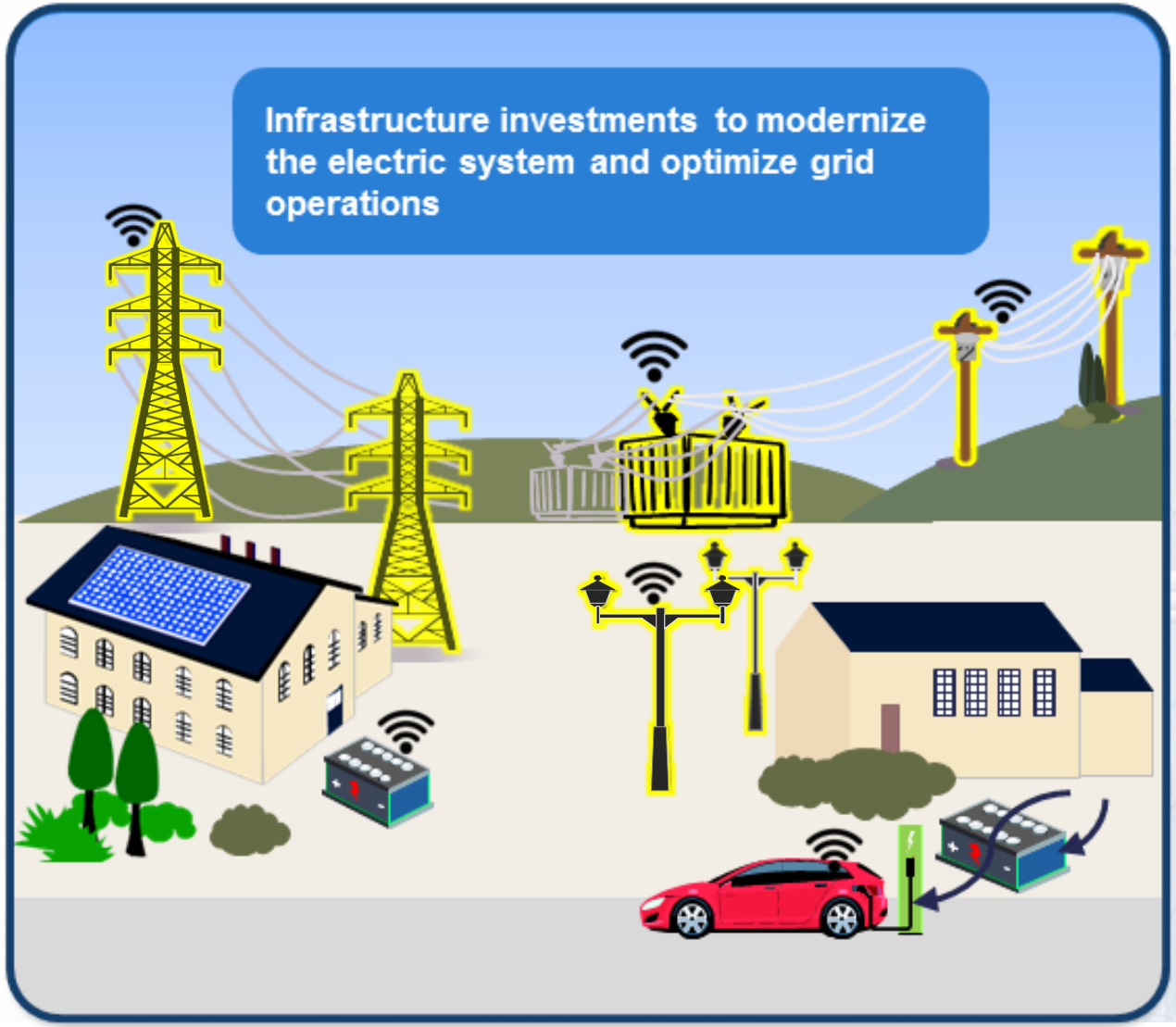
4 **Services & solutions marketplace**

3 **Transactive commodity exchange**

2 **System operation and planning**

1 **The physical asset base**

Layer 1



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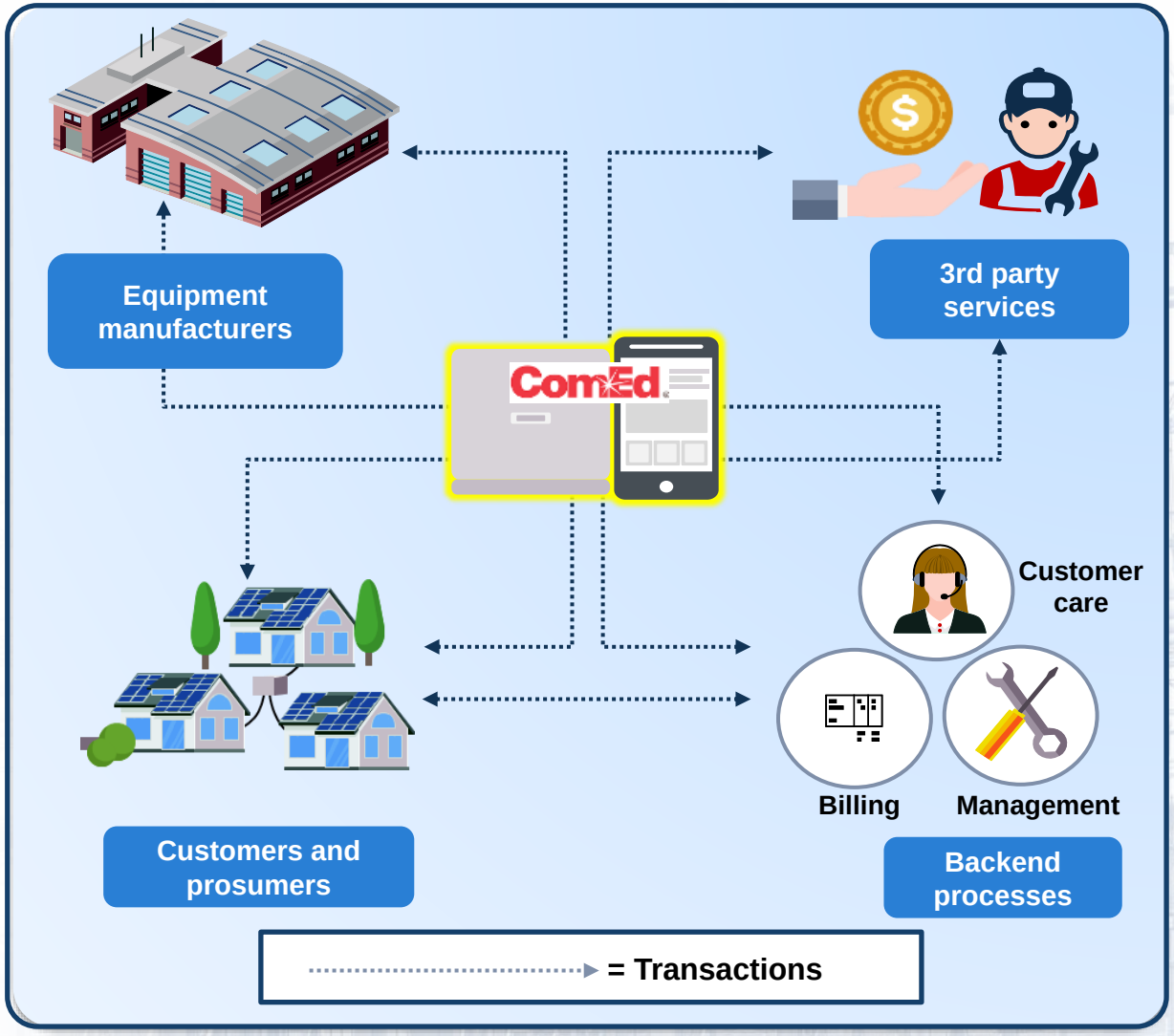
Layer 4



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Innovation Lab Pilot: Voice Assistant

https://www.youtube.com/user/CommonwealthEdison/videos

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