

RATE MAKING AND REGULATORY FRAMEWORKS FOR THE FUTURE ENERGY SECTOR

2017 CEA RITG POST CAMPUT
WORKSHOP

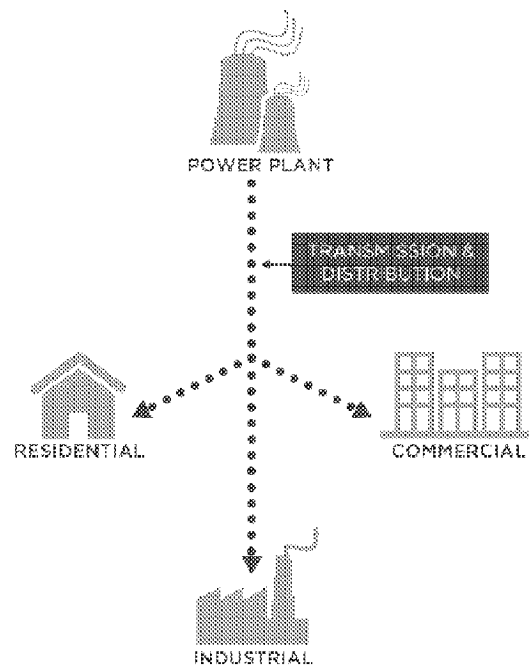
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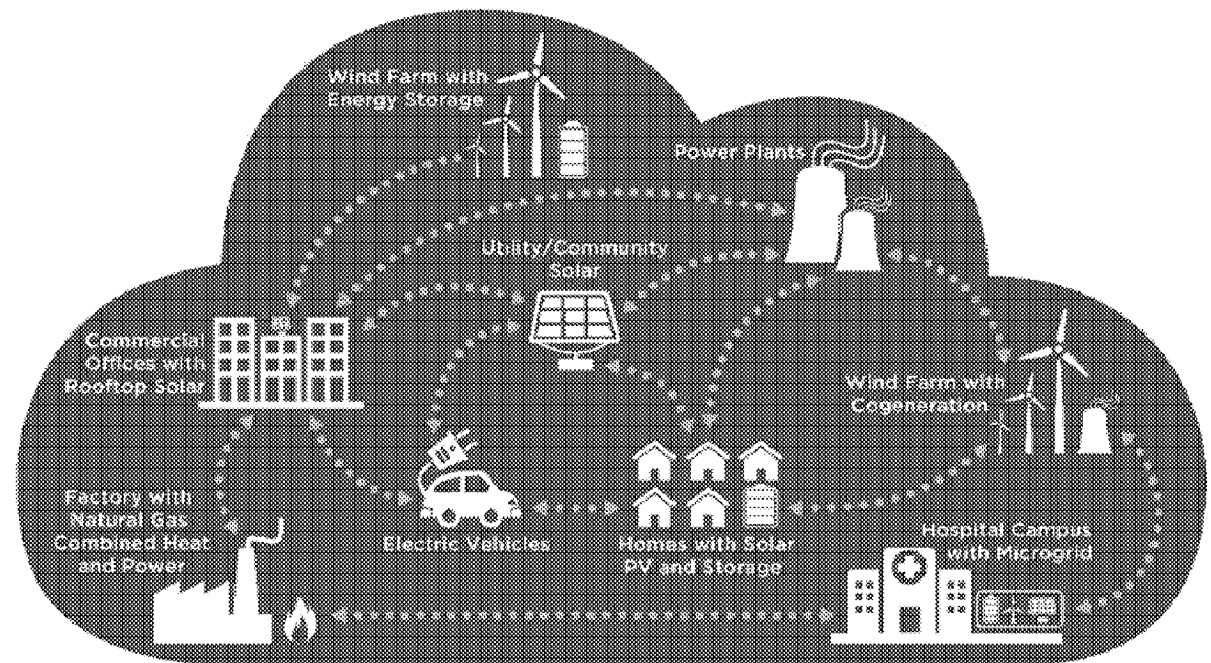
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THE EMERGING ENERGY CLOUD

TODAY: Traditional Power Grid
Central, One-Way Power System



EMERGING: The Energy Cloud
Distributed, Two-Way Power Flows



¹ Navigating the Energy Transformation: Building a Competitive Advantage for Energy Cloud 2.0 ([white paper](#))

DIMENSIONS OF CHANGE

Dimension	CLEAN	DISTRIBUTED	INTELLIGENT
Customers	• Rise of Community Choice Aggregation • Carbon free energy • Sustainability	• Self-generation/storage • Security/reliability • Cost savings	• Accessibility/control • Transactive energy • Digital communication
Policy and Regulation	• Evolving energy policies • Carbon reduction targets and cap & trade • Paris Accord	• Self-generation incentives • Net energy metering • Feed-in tariffs	• Grid modernization • Standardization
Strategy and Business Models	• Utility-scale renewables • Green pricing • Community aggregation	• DER build, own, and operate • Energy services • Microgrid as a service	• Network Orchestrator • Variable rate design • Smart grid as a service
Operations	• Renewables integration • System upgrades • Load balancing	• Aggregation • Two-way power flow • Asset management	• IT/OT convergence • Customer engagement • Cybersecurity
Technology	• Utility-scale renewables • Distributed renewables • Intelligent devices	• DER • Volt/VAR • Microgrids	• IT/data analytics • Advanced metering infrastructure • Blockchain



WHAT'S NEXT? → ENERGY-AS-A-SERVICE

A \$17B MARKET NOW AND GROWING TO \$40B+ IN 2024

The EaaS market is still evolving, but most offerings include one or more of the following components, broadly characterized into three applications.

<u>EaaS Application</u>	<u>EaaS Product & Service Components</u>
Supply Services (Production & Procurement)	• Solar • CHP • Backup Generation • Fuel Cell • Storage • Microgrids • Large-Scale Renewable Energy
Demand Services (Consumption)	• Energy Efficiency (e.g. Lighting, HVAC, other industrial equipment) • Building Optimization & Commissioning (project based)
Energy Optimization Services	• Energy Monitoring & Load Management • Demand Response • Building Energy Management (BEM) • Other "Energy" Software as a Service & Management

EaaS offerings bundle various product and service components, with varying levels of partner responsibility, to deliver customized solutions.

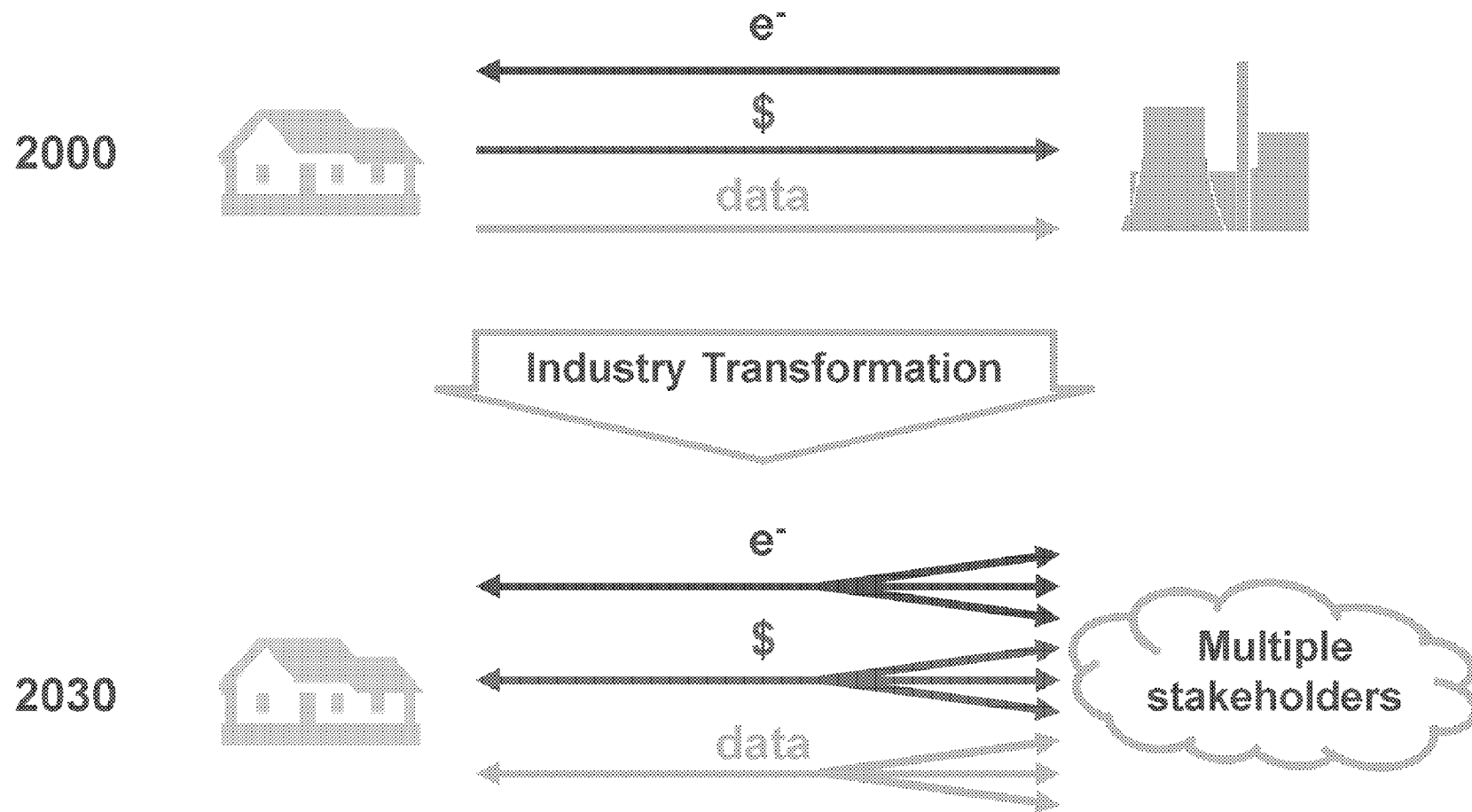
FAST FORWARD TO 2030

In the 2030 energy landscape, the world is very different, with the customer sitting at the heart of the Energy Cloud

- The Energy Cloud is a mature set of technologies
- Data is as valuable a commodity as electrons
- The industry has undergone significant digital transformation
- Utility business models have transformed from supply- to service-based
- Markets are far more competitive in 2030 compared to 2017
- The smart grid of 2017 has transitioned to a neural grid
- Distribution operators have evolved into distribution service orchestrators to manage this neural grid
- Two separate, yet complementary technology platforms underpin the market, transactive energy and distribution orchestration platforms
- In 2030, prosumers trade their self-generated power on the open market

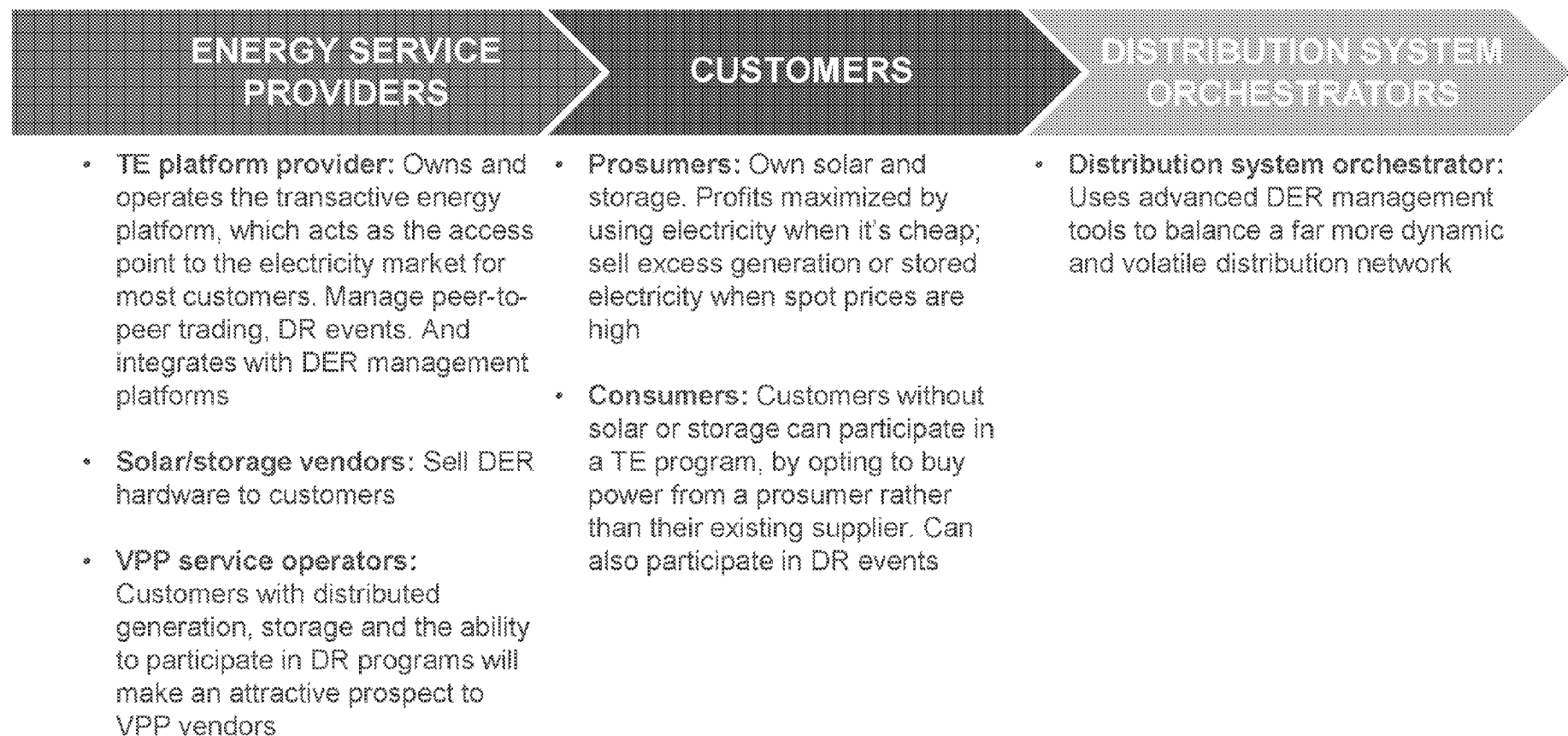
FLOW OF GOODS

Flows of cash, electrons, and data are bidirectional between multiple stakeholders.



STAKEHOLDERS

The Energy Cloud value chain of 2030 is dominated by three sets of stakeholders, all focused on the lower voltage networks.



NETWORK BUSINESS REVOLUTION

None of this new energy market would be possible without a revolution in the networks business.

- The shift from a supply- to service-based market has transformed the customer relationship, but networks have also made a 180° shift.
- Old supply-based model, networks businesses were concerned with the safe and reliable delivery of power from generators to the customer premise.
- Assets were the beating heart of a distribution network operator's business; the majority of assets were not digitally connected
- The service-based model of the 2030s means network operators' primary focus is now on end customers and networks are far more dynamic, volatile, and unpredictable
 - Two way power flows with rapid switching between imports / exports from individual premises
 - Self consumption and storage
 - Power hungry appliances such as EVs and heat pumps place new demands on system
 - Dispatchable supply connected directly to low voltage systems

ROLE AND NATURE OF REGULATION

The tension between innovative technology and regulation is nothing new.

- Textbook examples from recent past
 - Digital music / video
 - Taxi
 - Hotel
 - Airspace (drones)
- Timing of emergence of new business models and evolution of regulation not aligned
- Aim should be regulations that are flexible, transparent, and participatory, drawing on new models of collaboration between public and private sector

CONTACT

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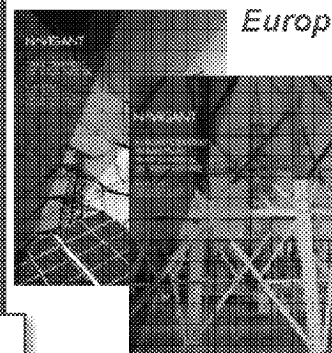
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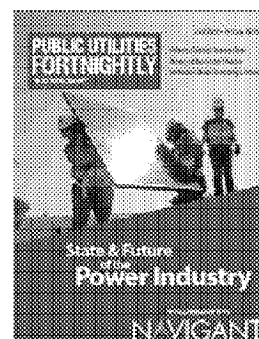
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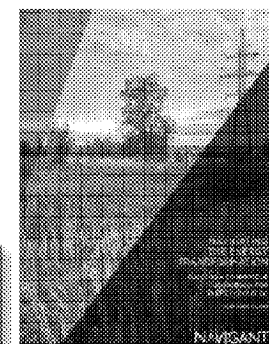
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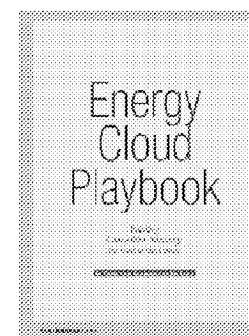
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NAVIGATING THE
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ENERGY CLOUD
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