

EVOLVING ELECTRIC BUSINESS MODELS AND THE INTEGRATED GRID

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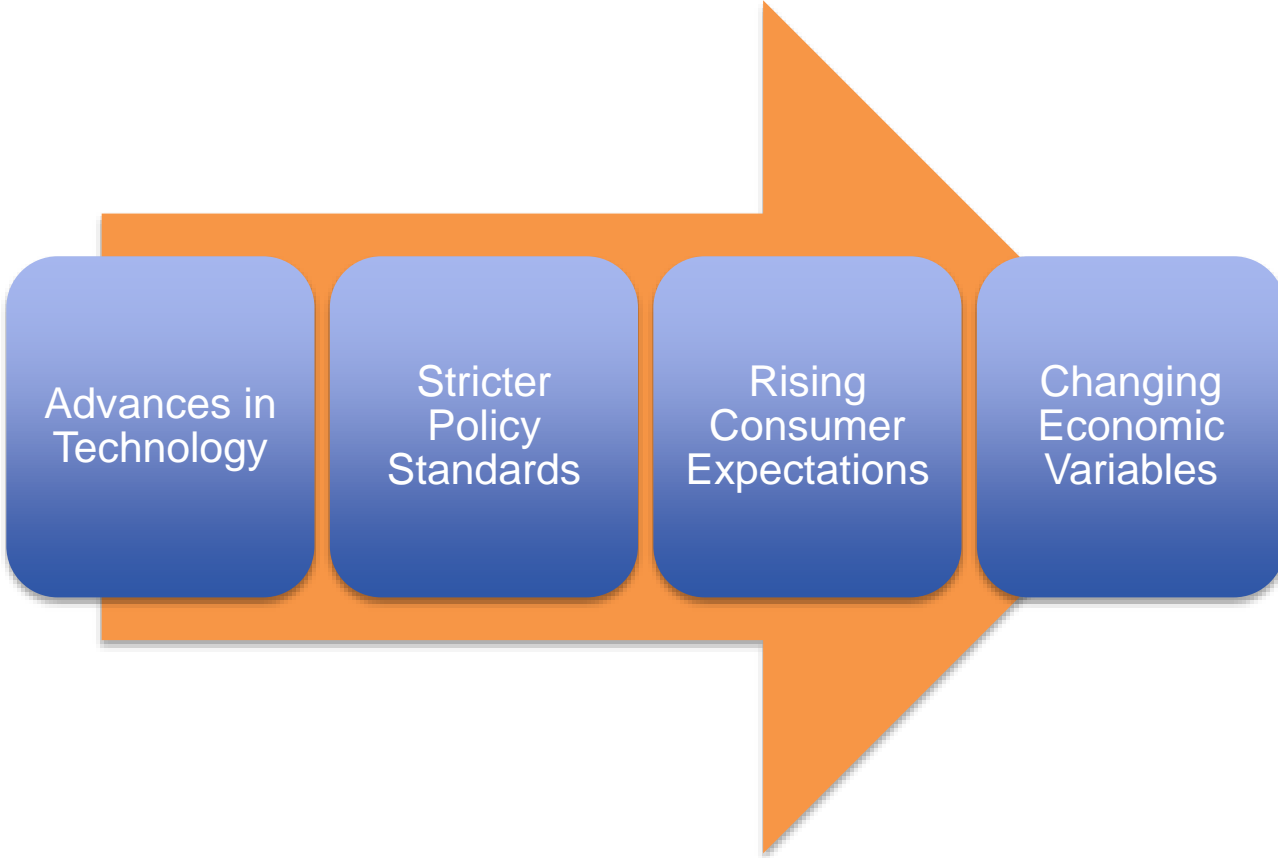
TRADITIONAL UTILITY BUSINESS MODEL



- Utility profits are tied to inputs (capital investment)
- Historically worked well during era of rising sales and declining incremental costs

WHY IS THE UTILITY BUSINESS MODEL CHANGING?

FOUR DRIVERS OF CHANGE



ADVANCES IN TECHNOLOGY

New technologies

- Increasingly competitive advanced energy generation options
- Customer-sited DG
- Advanced metering functionality/smart meters
- Growing deployment of EE and DR
- Electric vehicle market growth

Challenges & Opportunities

- Variable RE integration
- DER ownership and integration
- Data access and security
- Flat load growth
- More customer control over energy use/costs
- New challenges and opportunities from EVs

STRICTER POLICY STANDARDS

- Renewable Portfolio Standards
- Energy Efficiency Resource Standards
- EPA's proposed Clean Power Plan
- Reliability, Resiliency & Restoration concerns with increase in extreme weather events



RISING CONSUMER EXPECTATIONS

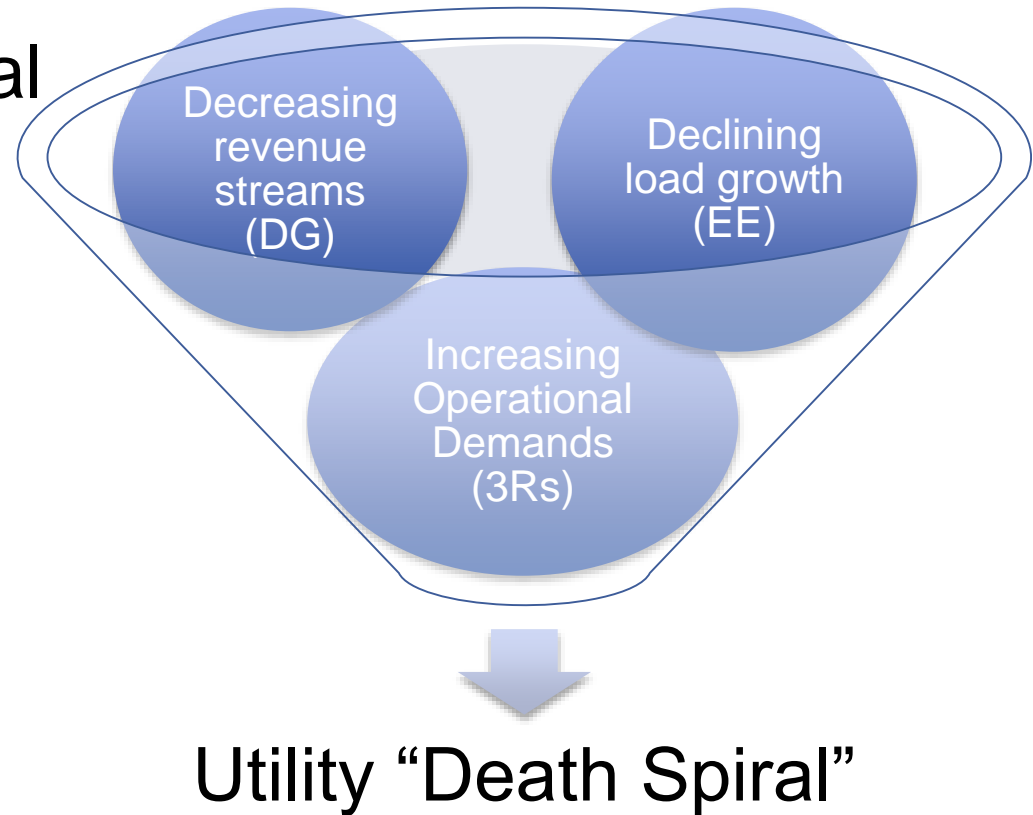
- Customers want to control where their energy comes from
- Increased reliability
 - Islanding, backup power



- Smart meters
 - Ability to track usage and change behavior patterns
- Comfort

CHANGING ECONOMIC VARIABLES

- With increased political and consumer expectations utilities have to improve functionality, but how will they pay for it?



EXPECTATIONS OF WHAT THE GRID CAN DELIVER ARE CHANGING.

Core Attributes

- Universal access
- Safety
- Reliability
- Affordability

Emerging Attributes

- Environmental sustainability
- Resiliency
- Adaptability/flexibility
- Greater customer control
- More service options

Additional Pressures

- Need to replace/renew aging infrastructure (rising costs)
- Minimal to declining load growth (falling revenues)
- Variable renewable energy integration (wholesale & retail)
- Cyber and data security

New regulatory models & utility business models are needed to meet all these expectations.

LIKELY CHARACTERISTICS OF THE EMERGING BUSINESS MODEL

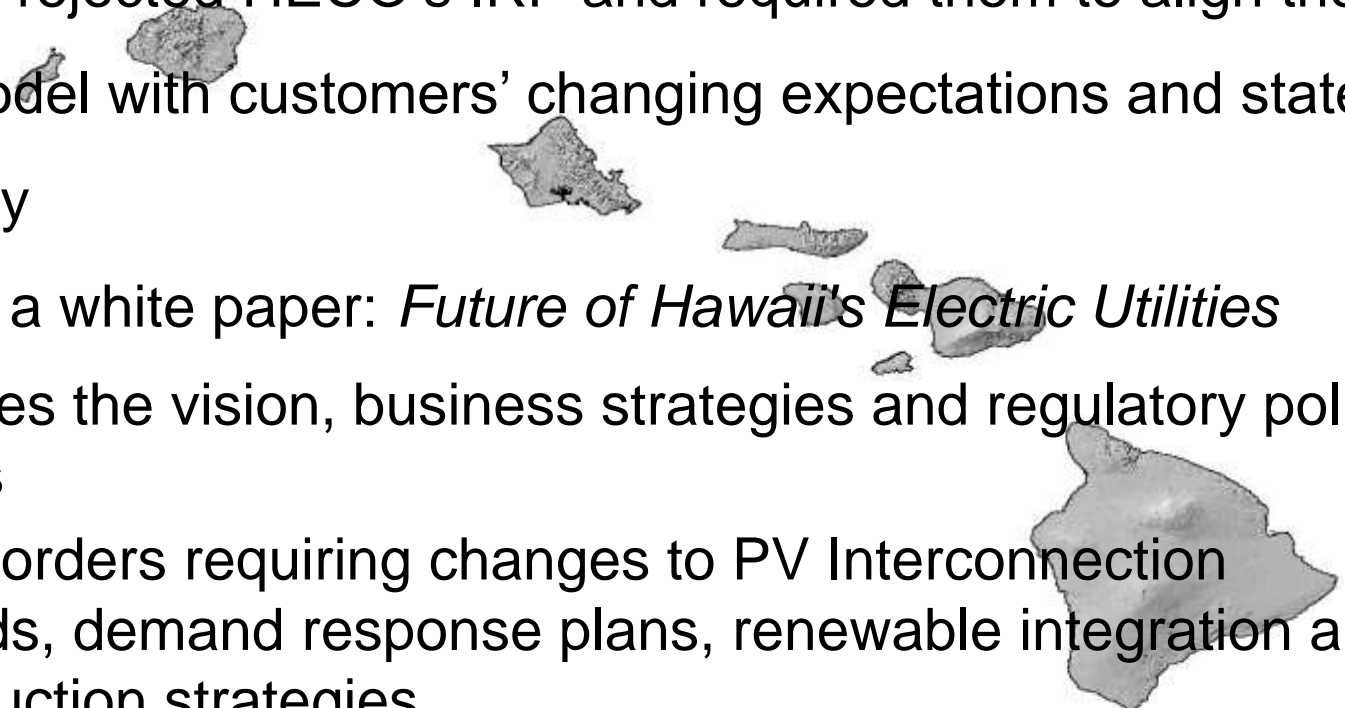
- Focus more on performance
 - Outcomes vs. input (capital expenditures)
- Revenue and profit not tied to volumetric sales
- Utility role as market enabler and not just poles and wires company

TALE OF TWO STATES: HAWAII

- About 75% of Hawaii's electricity comes from oil
- High electricity prices have led to rapid distributed PV deployment
- High DG penetration is not compatible with business model and physical attributes of the grid.



TALE OF TWO STATES: HAWAII (SOLUTION)

- Hawaii PUC rejected HECO's IRP and required them to align their business model with customers' changing expectations and state energy policy
 - PUC issued a white paper: *Future of Hawaii's Electric Utilities*
 - Articulates the vision, business strategies and regulatory policy changes
 - Multiple orders requiring changes to PV Interconnection standards, demand response plans, renewable integration and cost reduction strategies
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TALE OF TWO STATES: NEW YORK

- Hurricane Sandy showed NY needs to be more resilient
- Aging infrastructure needs to be replaced
- Rising peak demand and flat energy demand
- Compliance with clean energy policies
- No way to make necessary investments under current business model without rates going up

THE “REV” PROCEEDING ATTEMPTS TO ADDRESS ALL OF THESE.

AEE's 21st Century Electricity System Initiative

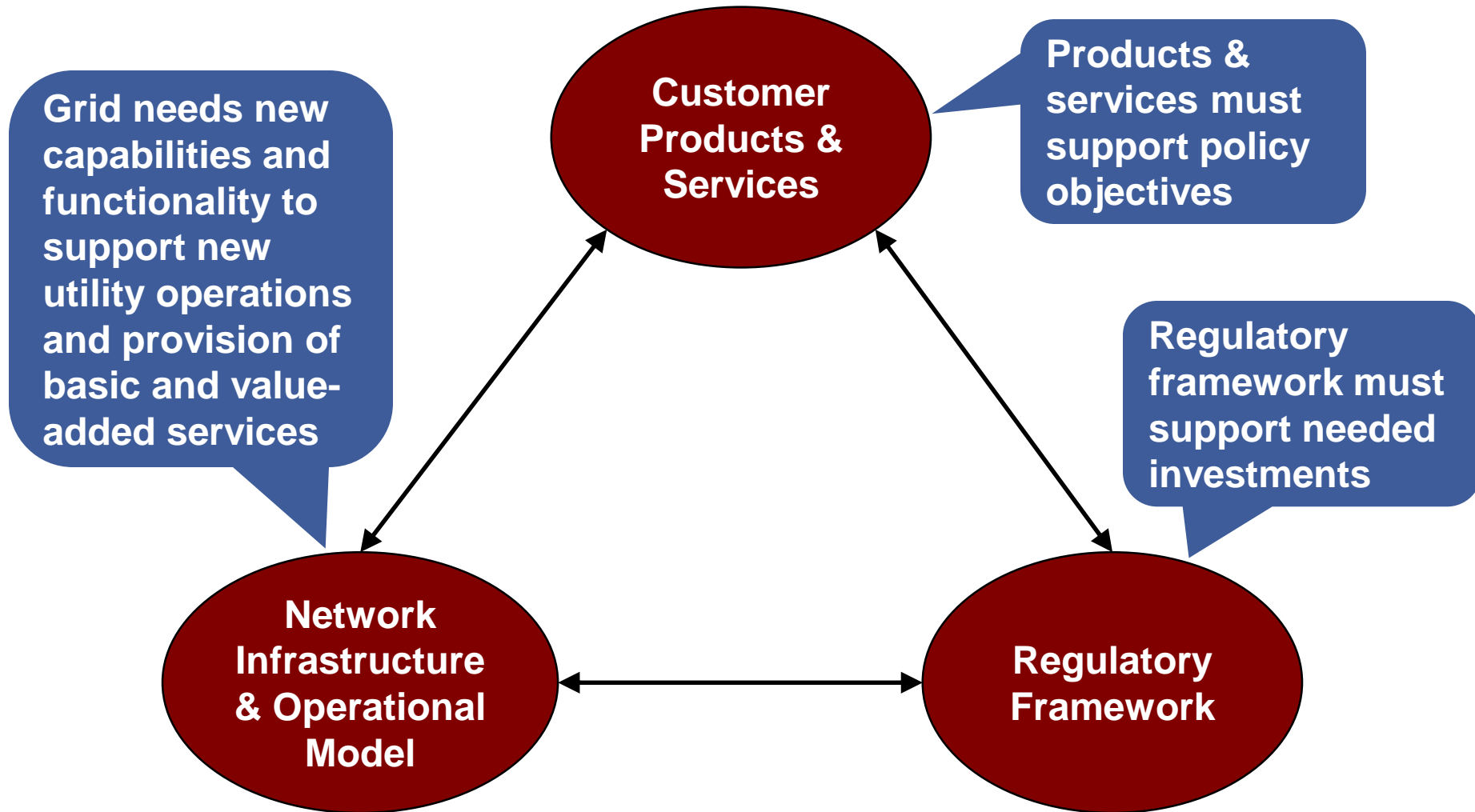
AEE Institute and MIT held five CEO forums in 2013-2014

After NY CEO Forum, AEE Institute facilitated the development of a Position Paper by an informal NY working group*

AEE Institute is actively engaged as a stakeholder in the NY REV proceeding (with ACE NY and NECEC)

These activities are closely aligned with AEE's PUC Engagement Program.

New York Working Group View: Three “pillars” of the future industry model



New York WG View: Regulatory Framework – Outcome Categories

Outcome category	Description of possible metrics of success
Advancement of Clean Energy Goals	Clean energy policies, integrating significant DER, & further reductions in GHG.
Customer Engagement	Social media channels, managing energy use/conservation, & access to new energy services; Customer awareness, ability to propagate information & anticipate customer needs.
Operating Safe, Reliable, & Resilient Systems	Network resiliency, self-healing capabilities, adaptability, customer initiated resiliency solutions.
Operational Efficiency	Utilization of the network, e.g., efficient asset utilization & load factor management.
Innovation	Utilities measured on portfolio of projects, ability to be forward looking, & processes for looking at new ideas.

Currently utilities are measured on the ability to maintain reliability safety, and adequate service. In the future, utilities should be measured by outcomes that go beyond these metrics.

NY REV:

Key issues addressed by AEE Institute

- Supporting a transition to **outcomes-based regulation**.
- Making **DER a core part of utility planning and operations**.
- Developing a comprehensive framework* for evaluating **benefits and costs**.
- Addressing **DER ownership** by utilities and non-utilities.
 - Important role for non-utility companies
 - Utility ownership OK for basic service under certain circumstances

NY REV:

Key issues addressed by AEE Institute (cont'd)

- Transition of **clean energy programs**
 - Establish updated goals and ensure funding
 - Transition to new programs as results are demonstrated
- Ensure **timely access to data** for non-utilities and customers
 - Deploy AMI where cost effective (by class)
 - Access to distribution system info, e.g., load pockets
- Incent utilities to support and pursue all cost-effective **energy efficiency**



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