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Planning Your Future: Capitalizing on Disruptive Energy Opportunities

Panel One:

Jeremy Townsend, *CLEAResult*
(moderator)

Vince Iamunno, *Honeywell*

Tom Kovalak, *AM Conservation Group*

Dr. Alexander Washington, *MS Public Service Commission*



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Tony Seba Video Snippet



Tony Seba



Clean Energy Action

Clean Disruption of Energy & Transportation

Tony Seba of Stanford University is recipient of the **Clean Energy Action 2017 Sunshine Award** and founder of RethinkX.

RethinkX
Disruption, Implications and Choices

TonySeba.com
RethinkX.com

Clean Energy Action, June 8, 2017 in Boulder, Co.
Cleanenergyaction.org

Video pro bono by Martin Voelker, Colorado Renewable Energy Society, cres-energy.org

Planning Your Future: Capitalizing on Disruptive Energy Opportunities

Panel Two:

Dr. Marilyn Brown, *Georgia Tech* (moderator)

Dave Bend, *Google*

Rekha Menon-Varma, *Vertaeon*

Tony Giroti, *Energy Blockchain Consortium*

Planning Your Future: Capitalizing on Disruptive Energy Opportunities

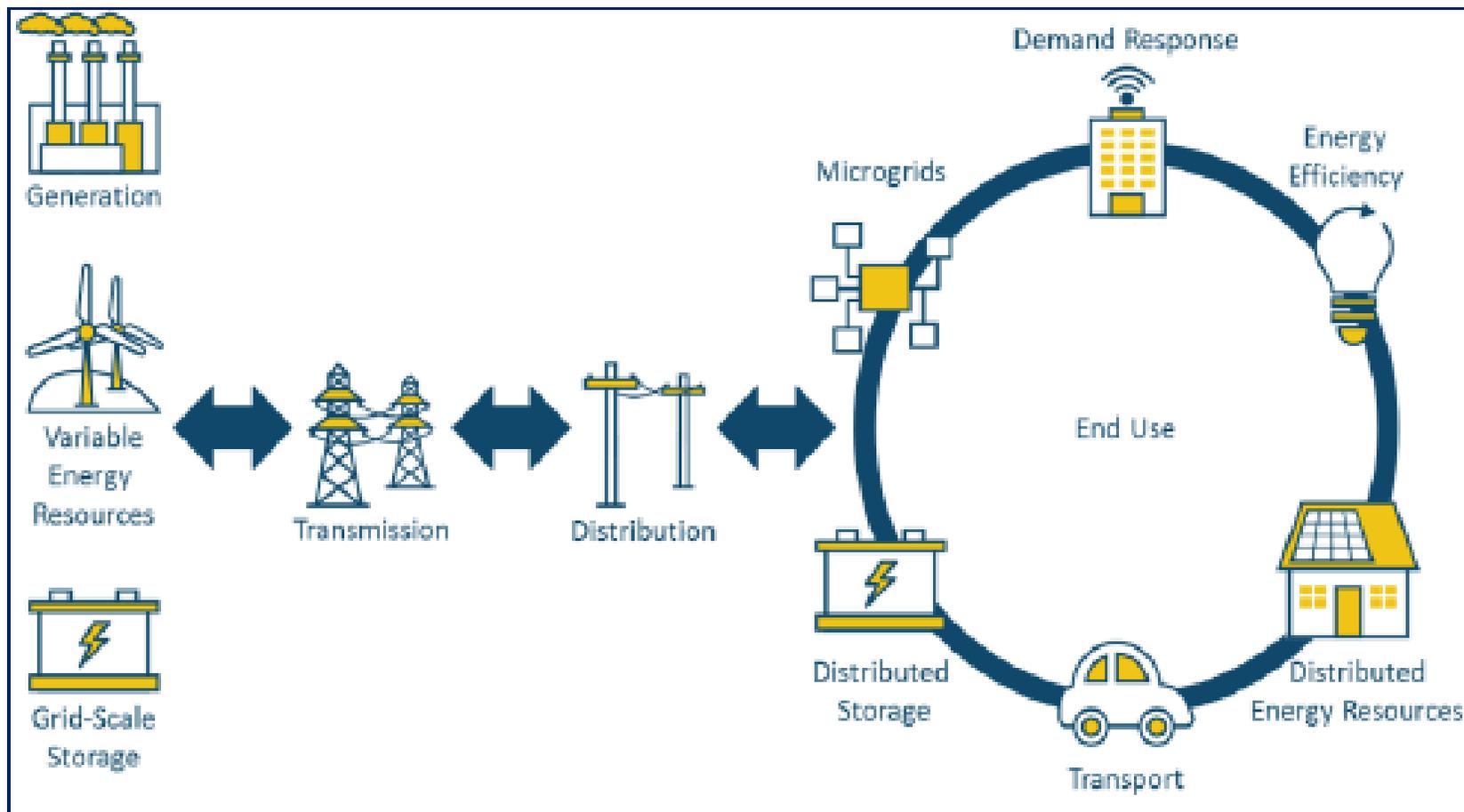


Dr. Marilyn A. Brown
Regents & Brook Byers Professor of Sustainable Systems
Georgia Institute of Technology

SEEA Conference on Energy Efficiency
October 24, 2018

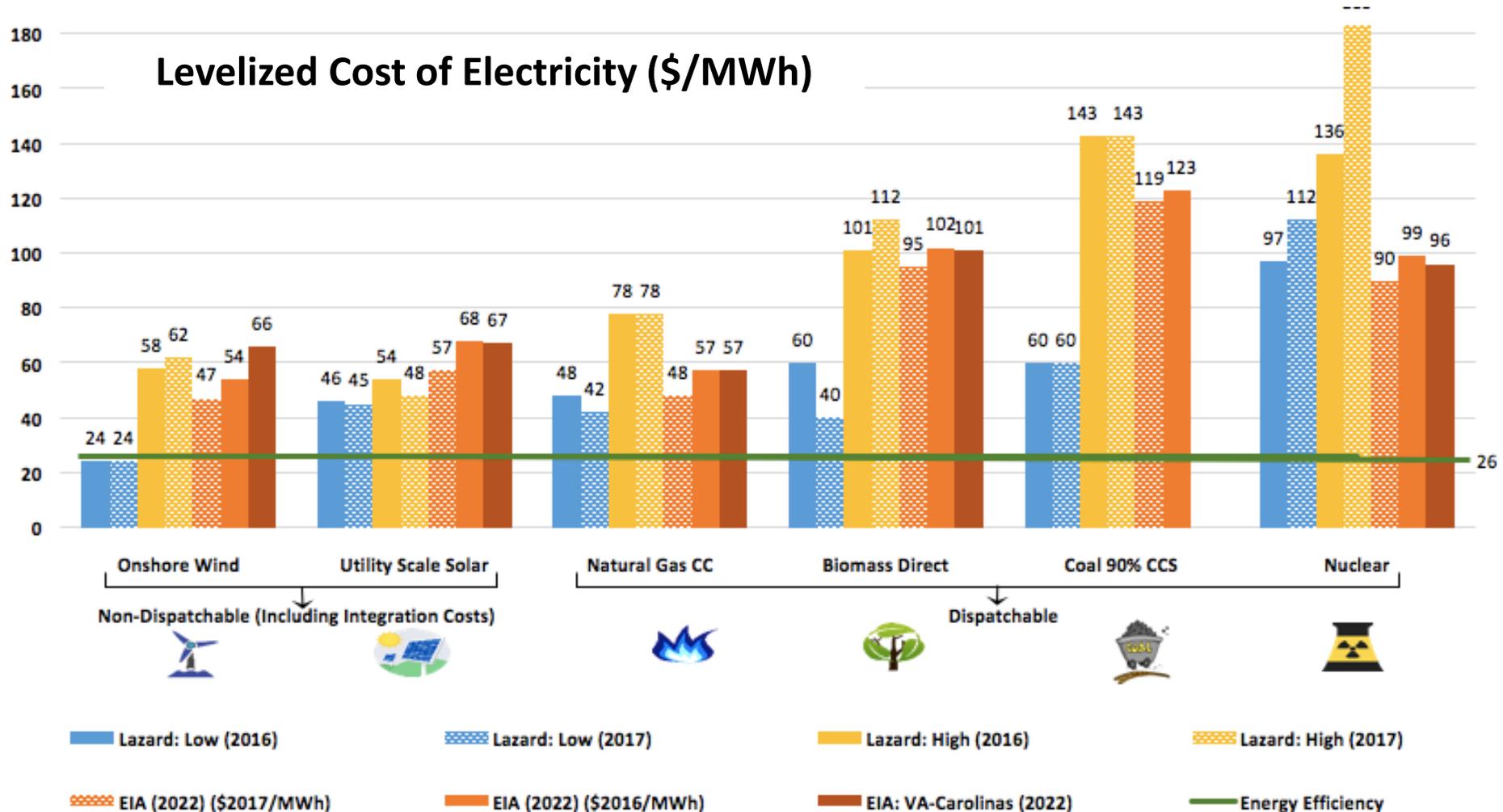
The Electricity Supply Chain is Transforming

And the utility business model is beginning to change, too.



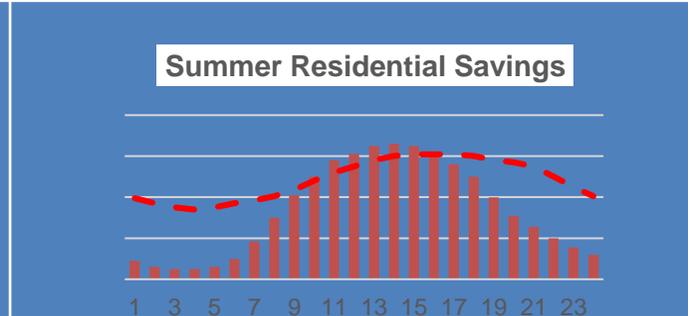
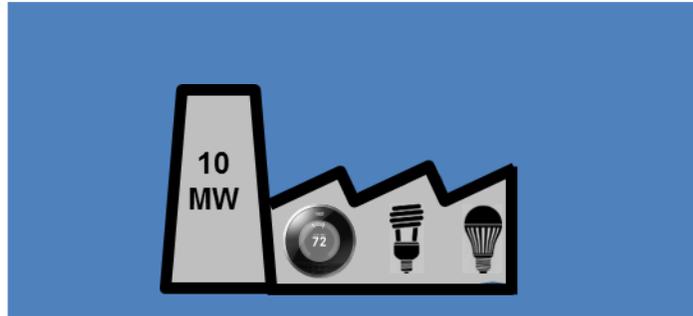
Source: DOE. 2017. Quadrennial Energy Review: Transforming the Nation's Electricity System, Figure S-3

Can Business Models & Policies Keep up with Technology Cost Curves?



Source: Brown, et al. 2018. <https://cepl.gatech.edu/projects/Biomass>

Virtual Power Plants: Managing Behind the Meter Assets



Building Block Design	Additional Specifications:
Three pricing tiers: 1.16 ¢/kWh to 2.74 ¢/kWh	Limited number of total blocks for each tier
Hourly fixed shape	Risk adjusted for program uncertainty 0% for first five years, 4% annually after year five, capped at 30%
Service life defined by existing programs and industry standards	Growth rate maximum of 25% first five years, 20% next ten, 15%
Capacity factors: 65% Residential, 80% Industrial, 79% Commercial	Risk adjusted for LPC delivery risk: 10 % per years first five years, then declining 2% per year

Source: Brown and Wang. 2015. *Green Savings: How Policies and Markets Drive Energy Efficiency* and Tennessee Valley Authority (2016) Integrated Resource Plan.

The Power of Consumers

Smart meters provide two-way communication:

- ✓ Powerful when combined with real-time electricity pricing
- ✓ WiFi enabled; controlled from computers & cell phones
- ✓ Interfaced with in-home, in-office, and smart phone displays

Sensors for temperature, humidity, motion, and light eliminate wasted energy (and improve comfort).

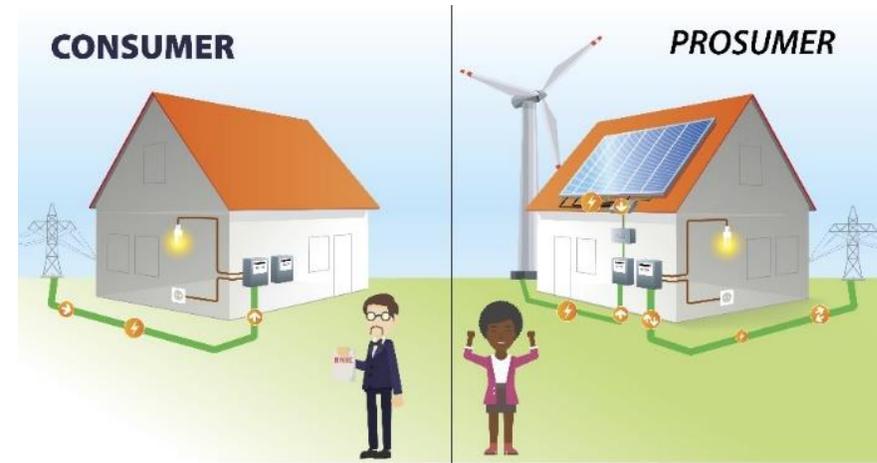


Thermostats that Learn and Manage

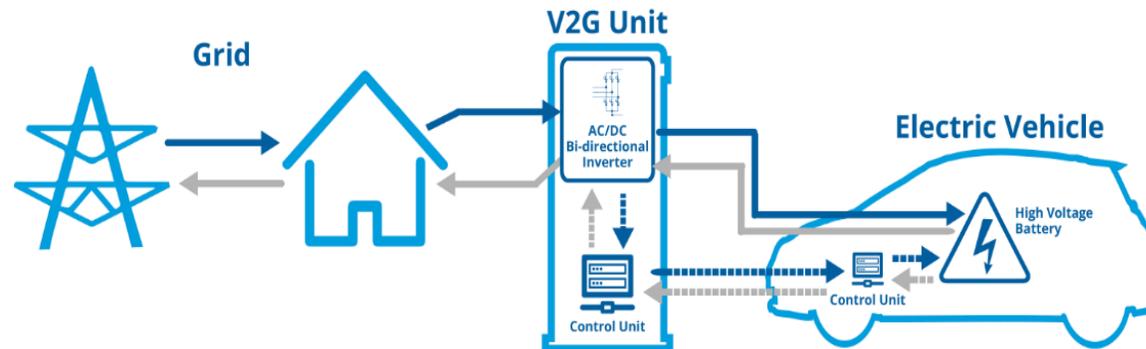


The Power of “Prosumers”

- Consumers are becoming producers – “Prosumers”
 - Facilitated by the falling cost of solar panels
 - Home battery systems are on the move
 - Many more EV models available and a growing charging infrastructure



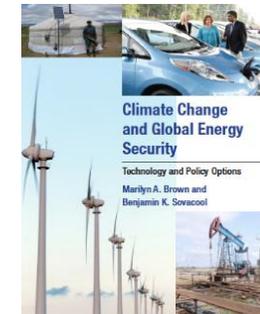
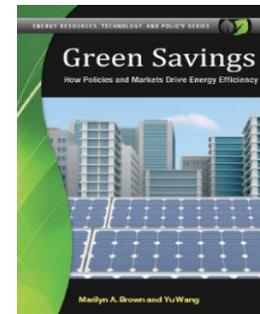
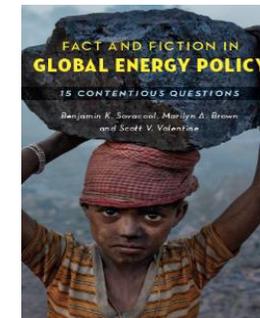
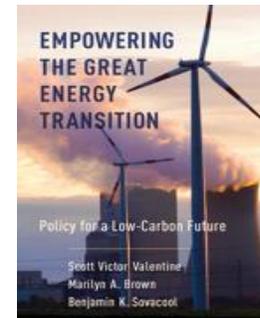
Grid-integrated vehicles could become another form of “prosumerism”



For More Information

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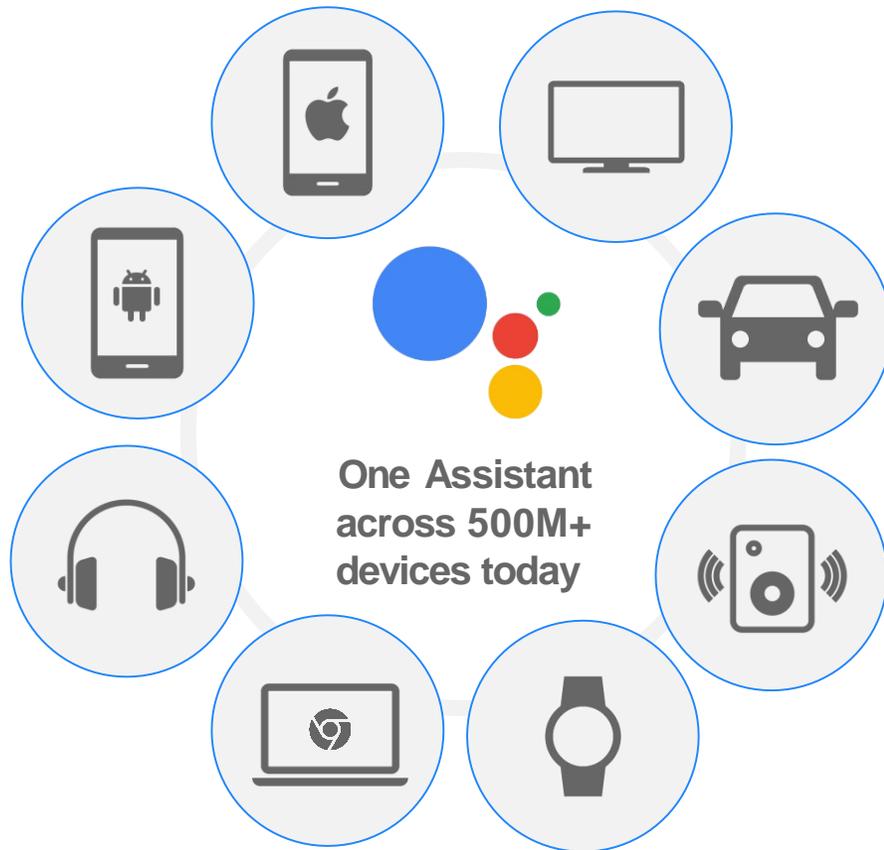




SEEA Conversation

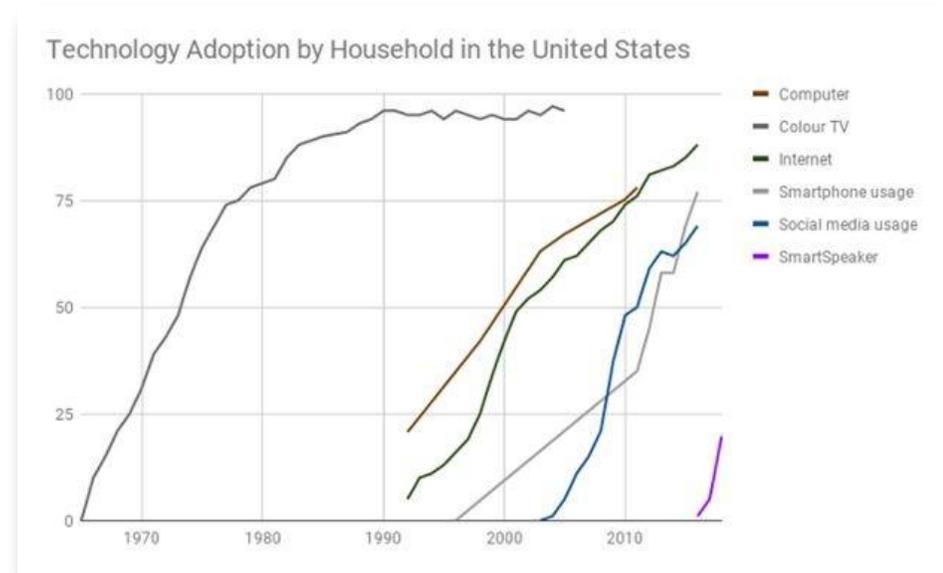
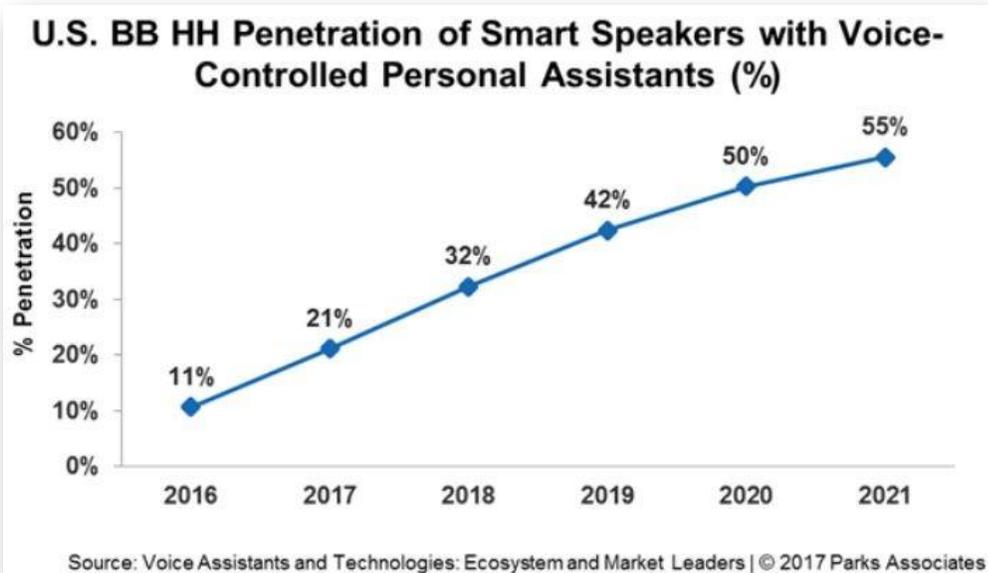
October 24, 2018

Assistant Ubiquity: Adoption grew 9x in the last 12 months



- Google Assistant will be available on **95% of Android devices**
- **10M+** smart devices in the home including smart speakers, TVs, headphones, etc
- **5,000+ devices across 225+ brands** that can

Smart speaker market growth



Voicebot Smart Speaker Consumer Adoption Report 2018 <https://voicebot.ai/2018/06/02/4reasons-cmo-care-about-voice/>

The Smart Home addressable market is significant

The number of smart homes is growing rapidly: expected to grow 3x to 327 million households with smart devices by 2021.



Source: Berg Insight, IBC,



By 2020, we estimate the average smarthome will have 5.5 devices.

...but Smart Homes, aren't very smart...yet

Despite the proliferation of devices, we're still far from the vision of seamlessly connected homes...

Well-positioned players still have the ability to create tremendous value.

-McKinsey&Company



A **Thoughtful Home** learns from you, applies *contextual understanding* to anticipate your needs, and magically adapts your home to people inside it.





ENERGY

SECURITY

SAFETY





5000+
Devices



225+
Brands

1,500+ smart home devices
200+ popular brands

Some utilities are already getting started



Reliant Speak and Save

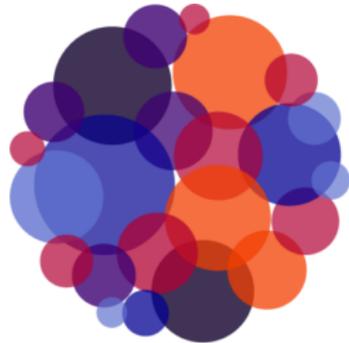
Sign up with Reliant and get a Google Home and a Nest Thermostat E

Use Google Assistant to check your usage, check your balance or pay you bill



BGE Google Assistant

Use Google Assistant to report an outage (mobile), check on your ETR, check your balance due



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2018 SEEA Conference

**What's New In Energy Efficiency?
SEEA Fusion Conference 2018**

Rekha Menon-Varma
Vertaeon LLC
10/24/2018

Some drivers & solutions: Industrial Energy Use

Why?



- Macro considerations – emission reduction targets, industrial sector largest consuming sector,..
- Reducing peak demand use, understanding disaggregated use
- Digital transformation – **Supply/Production***/Transportation

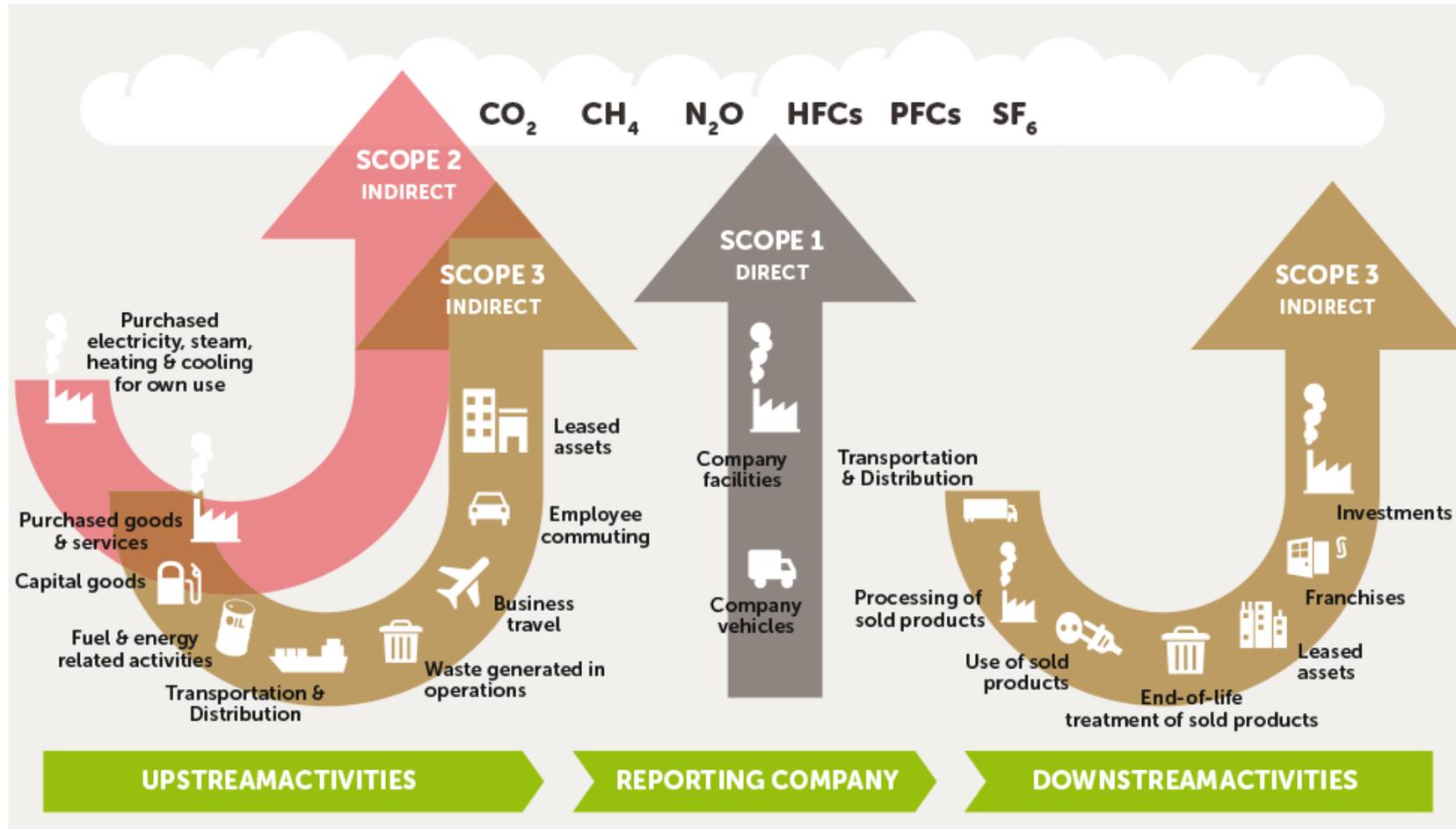
How?



- Higher efficiency equipment, newer technologies, controls, Energy Star/EPA,..
- Tracking energy use - energy assessments/audits, DOE's Industrial Assessment Centers, ISO 50001, shifting production throughput
- Sensors, advances in data warehousing/analytics..

**Vertaeon tracks energy consumption and efficiency in company operations and supply chains*

Emissions: What are Scope 1, 2 & 3?



Ref: Green Building Council, Finland

Energy: Analytics Considerations

- ▶ Can we leverage granular data for utilities, continuous basis, to analyze energy footprint and variations?
- ▶ Can it be combined with other types and sources of data?
 - ▶ *Managing/leveraging large & growing data sets effectively*
 - ▶ *Potential errors in manual processes – aggregation, analysis, modeling*
- ▶ Can the analysis be shared and reviewed site or organization-wide?
 - ▶ *Easy-to-understand analytics of complex information, Providing visibility and action items*
- ▶ Is the energy analytics platform flexible & scalable?

Opportunities to further improve Efficiency:

An excerpt from Vertaeon Energy Analytics Experiences..



Energy Bills (Plant Entry Point)

- Spend patterns
- Assessing Deviations
- Forecasting Deviations
- Clustering



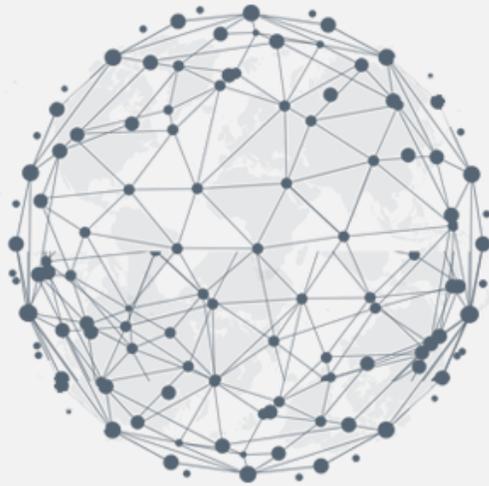
Energy Use Footprint and Benchmarking

- Use patterns
- Use intensity (normalized to tons or revenue)
- Benchmarking
- Variability analysis
- Predictive analysis



Monitoring & Tracking

- Meter-based and/or model-based monitoring and tracking
- Large volumes of data managed in systematic way
- Intuitive & User-friendly solutions
- **Ongoing!**



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Demystifying Blockchain

The Energy Blockchain

October 24, 2018

Tony Giroti

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Blockchain in Energy

Utility Transformation



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07 Cust. Expectations

- Consumers becoming Prosumers
- Demanding clean energy
- Always Connected
- Higher Customer Expectations
- Want Energy Management

06 New Biz Models

- Prosumers & DER integration
- Handle new disruptive technologies
- New Regulations & Energy Policies
- Net Energy Metering, others
- New Pricing models

05 Tech. Challenges

- Maintain Grid reliability with changes
- Integrate Transactive Energy
- Intelligent Devices, IoT
- AI, EV, Automation



04 Data & Security

Harness the Data in meaningful ways
Heightened Security demand
Tech on Grid Edge causes vulnerabilities

01 Digitization

- AMI/AMR, Smart Metering
- IT/OT Integration
- Distribution Automation
- IOT generating Data
- Data needs to be harnessed for Analytics

02 Decentralization

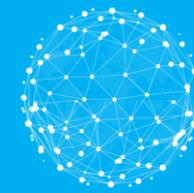
- From Large Power Plants to DER
- From Regulated/Vertically to Deregulation
- From Uni-direction to Multi-direction flow
- From Cust at single location to roaming EV

03 Democratization

- Demand Driven, Consumers playing a role
- Demand for Clean Energy / Renewables
- From Monopoly to Competition
- Democratization of the industry



Use Blockchain for



Engaging Cust Apps

- 07 Cust. Expectations
 - Consumers becoming Prosumers
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 - Always Connected
 - Higher Customer Expectations
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Creating Utility of The Future

- 06 New Biz Models
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Unlocking Data & Achieving Cyber Security

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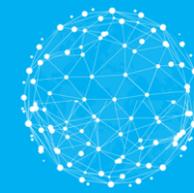
Harnessing Smart Grid Investment

Transactive Energy

Multi-party Transactions

Solving Problems Economically

EBC Use Case Catalog



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Energy Trading

4 Use Cases: 1. P2P trading & micropayments between Prosumers with Utility providing trusted authority and Customer Service,



Grid Mgmt., Transactive

4 Use Cases: 3. Manage DER generation & DER Service Coordination,



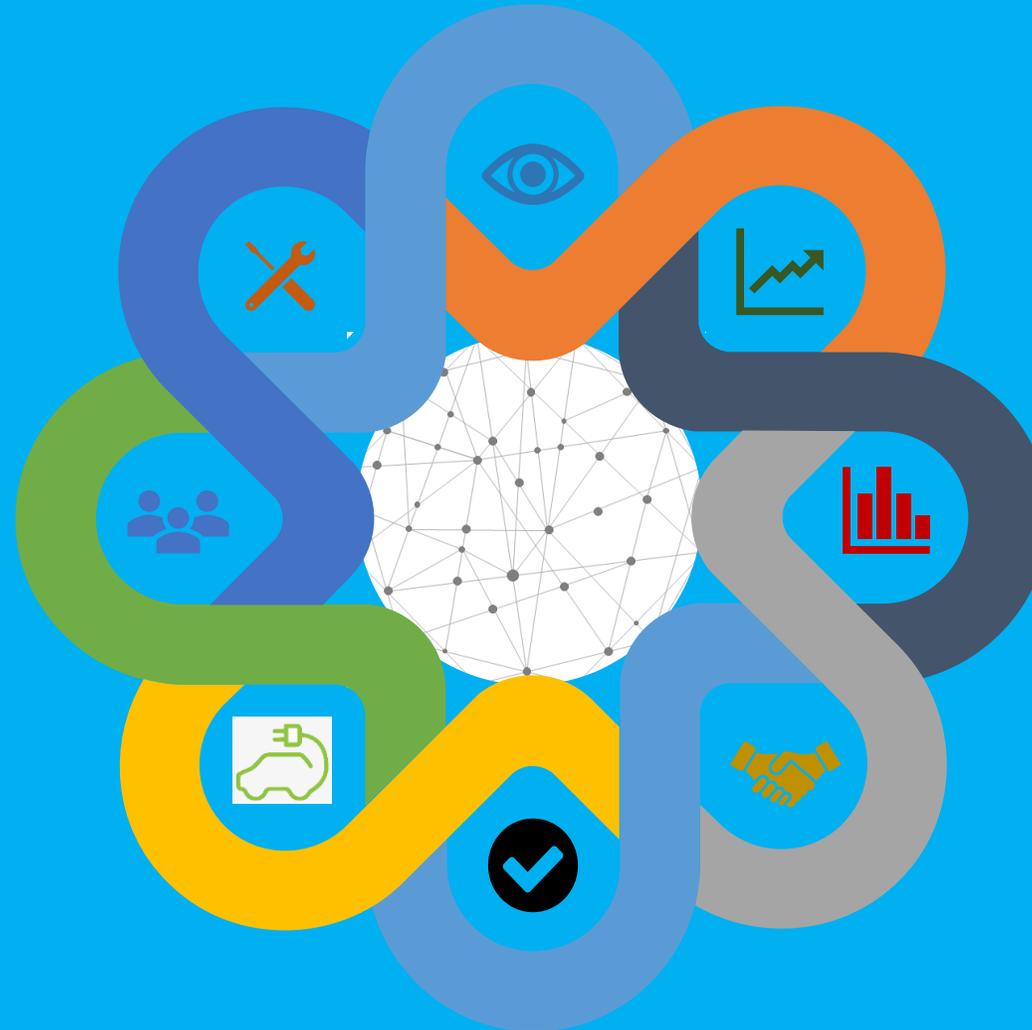
Empower Customers

6 Use Cases: 8. Provide Green energy choices, 9. Enable P2P home EV charging,



DER & EV Integration

3 Use Cases: 14. Enable EV Charging anywhere with unified billing, 15. Improve DER Integration



Emission Tracking

3 Use Cases: 17. Encourage Green Energy Usage, Energy Conservation, Energy Efficiency with Sustainability Attribution and other means,



Energy Data Mgmt

5 Use Cases: 21. Record, Store, Track Energy Data with MRV of Data, 23. Use load profile for energy procurement, infrastructure planning and VPP



Regulatory, Compliance

3 Use Cases: 25. Provide Transparency to Regulators & Customers, 26. Provide Regulators with framework to manage Energy Trading



Security

4 Use Cases: 28. Secure edge devices, 29. Protect Enterprise Data, 30. Grid Security: Build a trustworthy infrastructure for all Digital Services, including PKI, DC, DNS





Thank You

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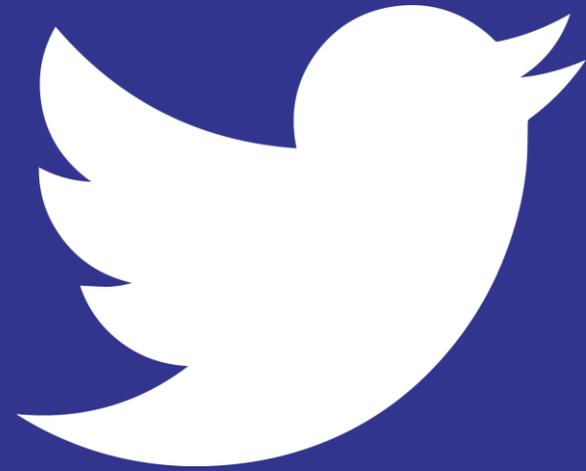
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To Join the Consortium or
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