



Driving Strategic Thinking for Utilities with Data & Analytics

Beth Massey, PhD

Agenda item 7: Unlocking energy efficiency potential
through digitalization

Eighth session of the Group of Experts on Energy Efficiency

Introduction



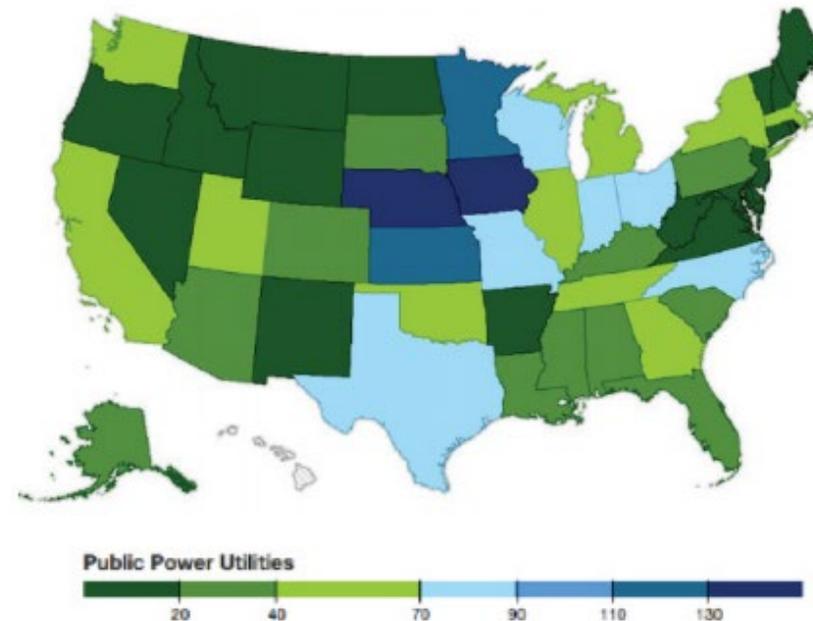
- Beth Massey, PhD CS, MSc. SW Eng/Math, BSc. CS
 - Director, Connected Analytics, The Energy Authority
 - 10 years in Ireland, developing Demand Side solutions with collaborative teams of industry stakeholders,
 - Head of Research International Energy Research Center Ireland 6 years,
 - NASA, DoD, and others...

The Public Power Sector in USA



A public power utility:

- Brings **electricity** to homes and businesses
- May **generate** and/or **buy** power
- Is a **not-for-profit** entity
- Is owned by the **community**
- Is usually a division of **local government**
- Is **transparent** (subject to sunshine laws)
- Involves **citizens** in decision-making



Who does public power serve?

- More than 2,000 community-owned electric utilities serve more than 48 million people.¹
- Public power utilities serve small communities as well as large cities, including Los Angeles, San Antonio, Nashville, Orlando and Seattle.
- Public power serves customers in 49 states—all but Hawaii—and five U.S. territories.
- Three million businesses receive their power from a publicly owned electric utility.

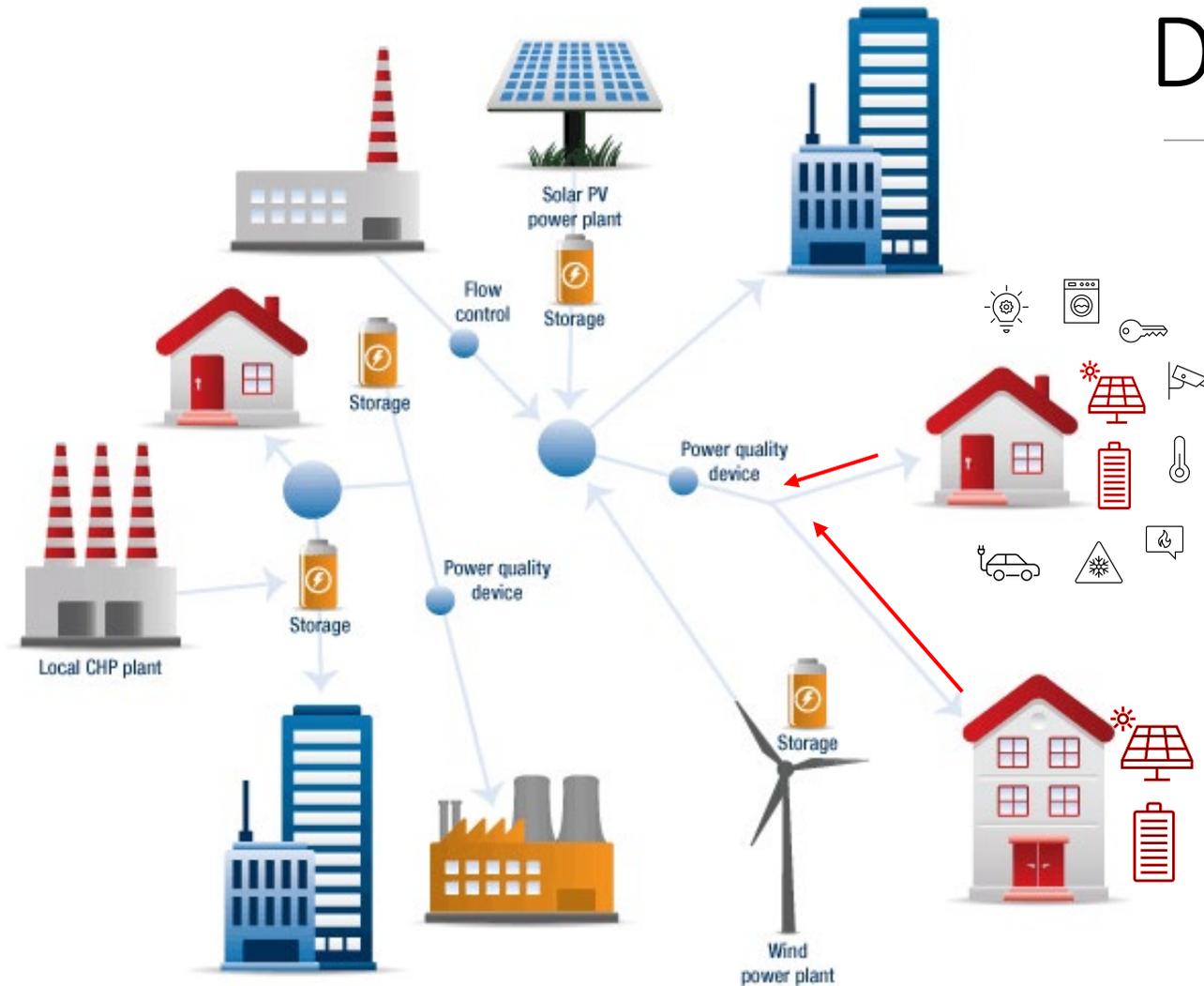
¹ Based on U.S. Census Bureau statistics of 2.54 people per household/meter.

Public Power: An Important Contemporary American Institution

Today's Takeaways

- Data is a strategic asset for utilities
 - Strategic Use Cases are Key to Effective Deployment of Digital Technologies
- Analytics Maturity builds Competitive Advantage
 - To achieve substantial grid impacts and benefits for customers and utilities
- Innovation is Key to Successful Transition
 - Transition of valuation -> monetization

Data is Everywhere!



- Rapid growth of IOT devices drives change to utilities' perspective of data
- A 'conversation' amongst the network assets
- The Data is now a strategic asset of the integrated utility

Image courtesy of: <https://medium.com/ieee-mec-sb/distributed-energy-resources-8dee35bef67b>
Modifications by TEA

Challenges for the Digital Transformation



Talent and Culture gaps



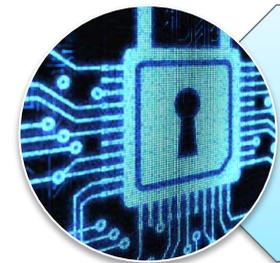
Consumer Privacy Concerns



Expensive, Energy-Intensive
Data Storage and Technologies



Conflicting needs of
Infrastructure vs Regulatory
Requirements



Security Issues

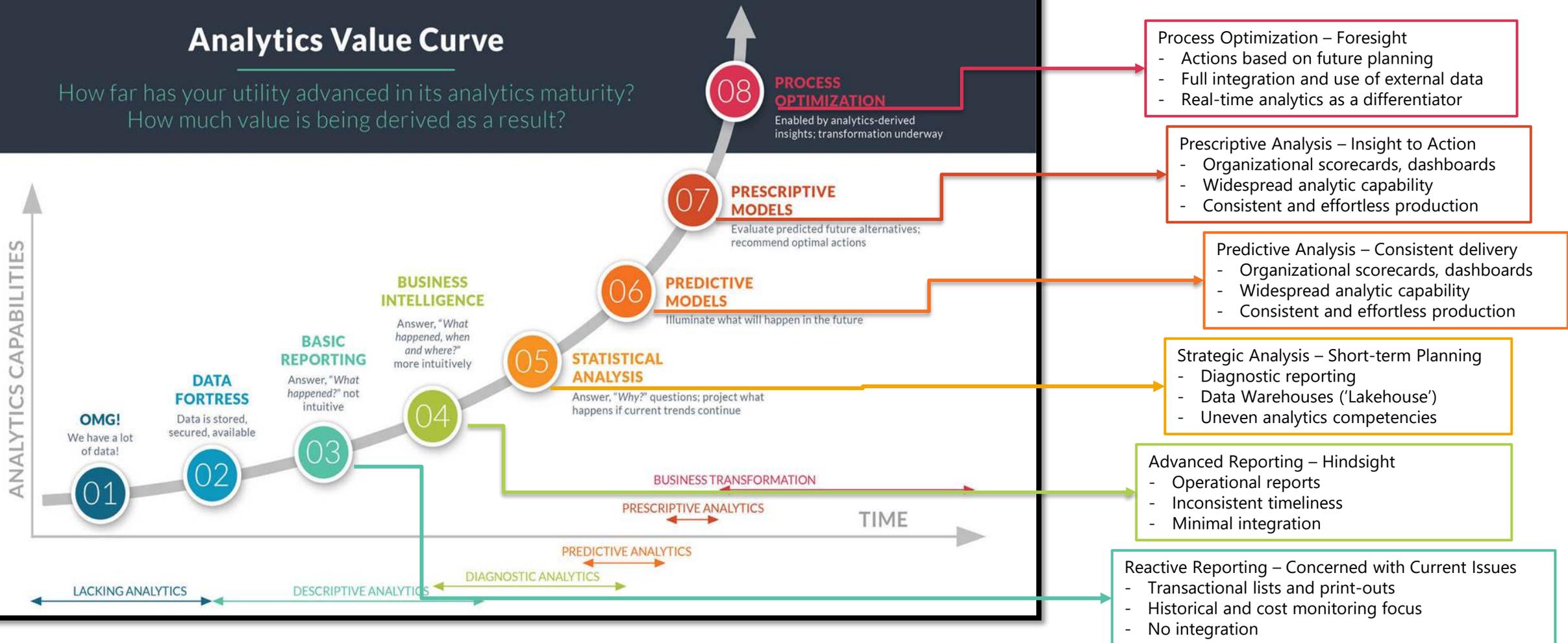


Standards For Data Quality
and Integrated Technology
Offerings

Data and Analytics Maturity is Important

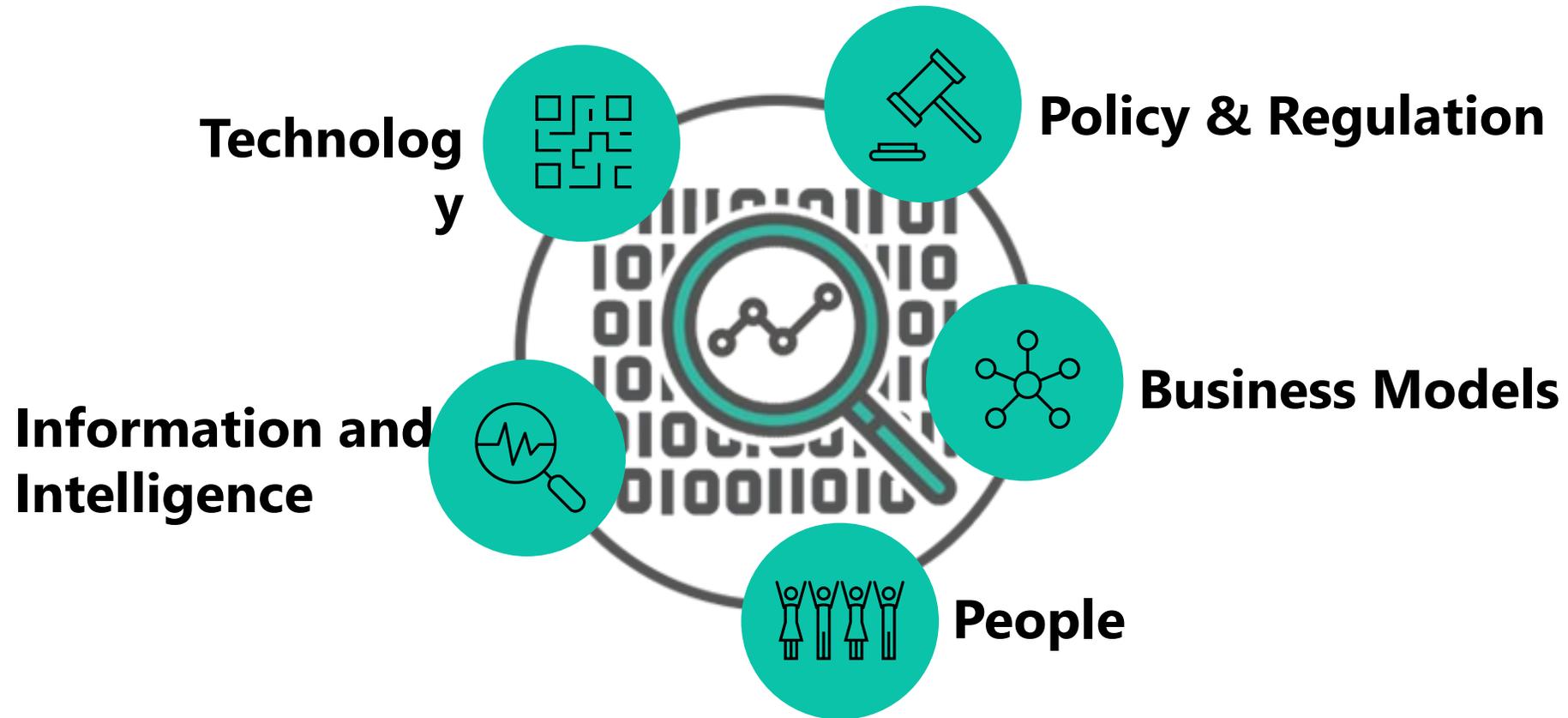
Analytics Value Curve

How far has your utility advanced in its analytics maturity?
How much value is being derived as a result?



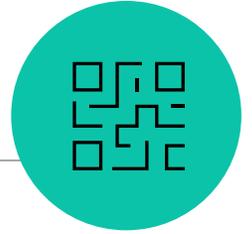
Is your Data helping you ask the right questions?

Strategic Lenses for Data & Analytics



The interplay amongst the drivers influences the impact for decision makers

Technology – Innovation is Key



- Digital Twins for:
 - Grid networks
 - Cities & Communities
 - AR/VR for daily tasks

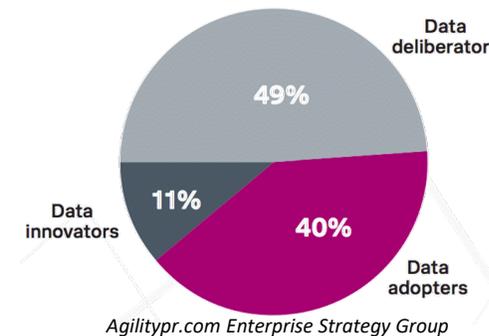


www.digitalengineering247.com

- Workforce Up-skilling
 - Re-skill in-house labor force with new tools, methods and systems
 - Create a culture of Innovation through organic processes



- Be a Data Innovator
 - Data Maturity leads to increased profitability
 - Data needs to create actionable insights



"Coming together is a beginning, staying together is progress, and working together is success." – Henry Ford



The Value of Big Data

Volume: Quantity of Data

2,500,000,000,000,000,000 bytes of data created everyday



Veracity: Trustworthiness or accuracy of Data



Only 14% of organizations are prepared for the Data Age. Of the unprepared 86%, only 8% say they'll be ready in time.
<https://www.agilitypr.com/wp-content/uploads/2020/09/data1.png>

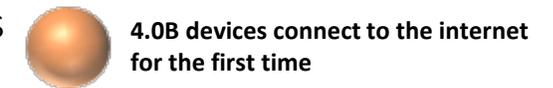
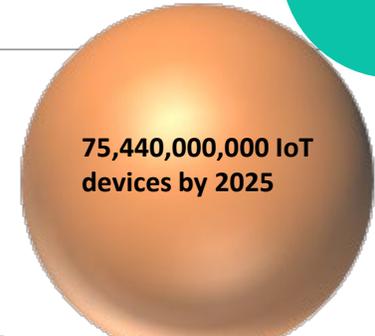
Value: The main purpose of gathering the Data

12.5% Increase in total gross profit¹

Velocity: Generation Speed

Variety: Numerous types of Data and their sources

Variability: How much this constantly changes



Visualization: Accessibility / Readability of Data



1- www.agilitypr.com, March 2020

Develop Energy Citizens

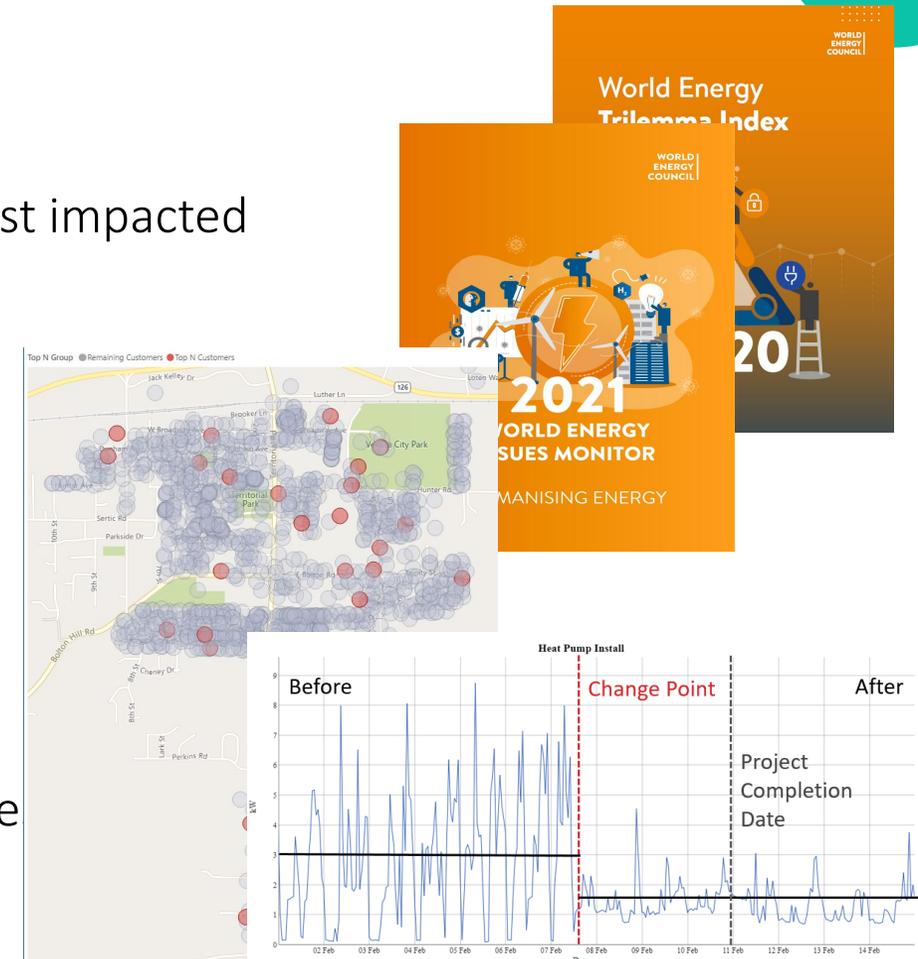


Humanizing Energy

- Migration of value creation towards the end-user
- The urgent need to plug in people and engage those most impacted by energy transition
- Addressing the non-energy needs
- Developing Energy Ambassadors

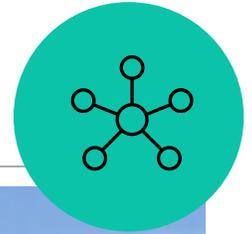
Energy Efficiency Savings Use Cases

- Near real-time feedback on energy use
- Time varying pricing options
- Targeted programs based on customer energy use profile
- Understand drivers of system peak demand



Digitalization drives the co-creation of a customer-centric and company-specific approach

Business Models

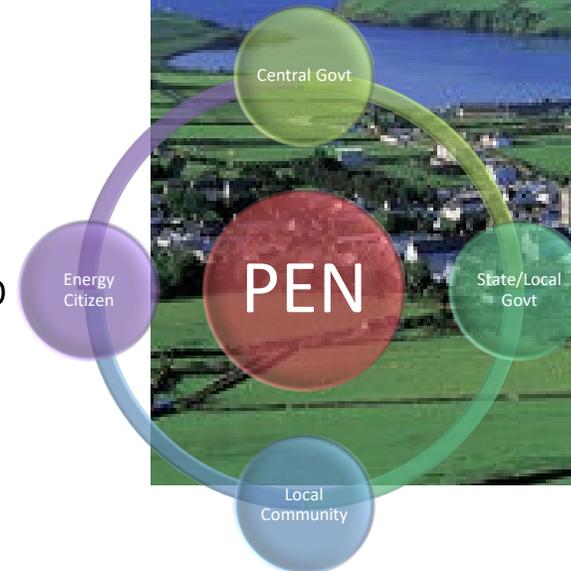


Sustainable Energy Communities

- Solar + Storage
- Aggregator Partnership

Public Engagement Networks

- Energy Education
- Trusted Energy Advisors
- Subscription Services
- Local Government / State Partnership



Successful business models meet both the customer where they are and the utility's needs

Policy & Regulation



Economic Stimulus Proposal \$35.2B for energy initiatives

- Energy Act 2020

Climate Leadership and Environmental Action for our Nation's (CLEAN) Futures Act 2021 (H.R.1512)

- National targets for 50% reduction of (GHG) emissions from 2005 levels by 2030 and a net-zero GHG economy by 2050
- Authorizes \$565 billion in federal spending over ten years to enable deep decarbonization

Energy Act of 2020
Division Z of the Consolidated Appropriations Act, 2021

March 2021
The CLEAN Future Act – Updates to Discussion Draft Based on Feedback from Stakeholders & Committee Testimony
COMMITTEE ON ENERGY & COMMERCE

The CLEAN Future Act is a comprehensive and ambitious plan to ensure the United States acts aggressively to tackle the climate crisis in the 2020s and achieves net-zero greenhouse gas (GHG) pollution by no later than 2050. At the heart of the bill is a commitment to achieving a 50 percent reduction in GHG emissions from 2005 levels by no later than 2030 and a 100 percent clean economy by no later than 2050. The legislation includes both sector-specific and economy-wide solutions to achieve these goals, authorizing \$565 billion over ten years to enable deep decarbonization. The CLEAN Future Act includes significant updates to the draft released in January 2020, reflecting more than a year's worth of feedback from stakeholders, expert testimony received in Committee hearings, and the enactment of several previous provisions into law. This fact sheet highlights key provisions and updates to the CLEAN Future Act.

Title I – National Climate Target

- **NSM** Declares an interim national goal for the United States to reduce GHG pollution by no less than 50 percent below 2005 levels by no later than 2030.
- Declares a national goal for the United States to achieve net-zero GHG emissions by no later than 2050.
- Directs the head of each federal agency to develop a plan for that agency to achieve the national goals using existing authorities and charges the Environmental Protection Agency (EPA) with reviewing those plans and monitoring the nation's progress, with input from a Clean Economy Federal Advisory Committee.

Title II – Power

- Establishes a federal Clean Electricity Standard (CES) to put the United States on a path to 100 percent clean electricity generation by 2035.
 - o **NSM** Accelerates the transition to clean electricity by requiring all retail electricity suppliers to reach 80 percent clean electricity by 2030 and 100 percent by 2035.
 - o **NSM** Phases out the ability of fossil fuel power plants to earn partial credits by lowering the carbon intensity factor from 0.82 (adjusted for upstream GHG emissions) in 2030 to 0.4 in 2035.
 - o **NSM** Allows the EPA Administrator to extend an individual retail electricity supplier's compliance obligation in the 2030s by one year at a time, if the supplier submits alternative compliance payments for more than 10 percent of its compliance obligation in the two prior consecutive years. Such extensions may be granted to an individual retail electricity supplier no more than five times.
 - o **NSM** Requires that to be eligible to receive credits prevailing wages must be paid for construction of new generating units, and all qualifying generation must remain neutral with respect to the right to organize and bargain.
 - o **NSM** Limits eligibility for waste-to-energy facilities to those that the EPA Administrator certifies every 18 months meet emission standards applicable to new such facilities and are in compliance with all applicable environmental permits.
- Enables the responsible buildout of the United States electricity transmission system to help achieve national clean energy goals.

10 is a bipartisan energy package that features consensus provisions drawn from the American Energy Innovation Act (S. 2637) and the House's Clean Economy Jobs Act (H.R. 4447).

vicki (R-Alaska) and Ranking Member Joe Manchin (D-West Virginia) of the Rural Resources Committee led the development of this bipartisan package in the House Committee on Energy and Commerce and the House Committee on Energy and Commerce.

1st comprehensive update to our nation's energy policies in 13 years, including advanced nuclear, carbon capture, utilization, and storage; renewable energy; critical minerals and materials; fusion; industrial manufacturing; and grid modernization, among other areas. It reauthorizes and expands programs like ARPA-E. The Energy Act also includes a range of measures to improve energy efficiency and brings administrative reforms to improve the Department of Energy's operations.

nsored or cosponsored provisions included in the Energy Act. All or part included, including 29 bipartisan bills.

Policy Highlights

Joby – According to the American Energy Innovation Council, innovation is key to economic growth and stability that accounts for “at least 50 percent of GDP” over the long-term. The Energy Act recognizes the importance of logical development and modernizes the Department of Energy’s authorities need to meet today’s challenges and opportunities.

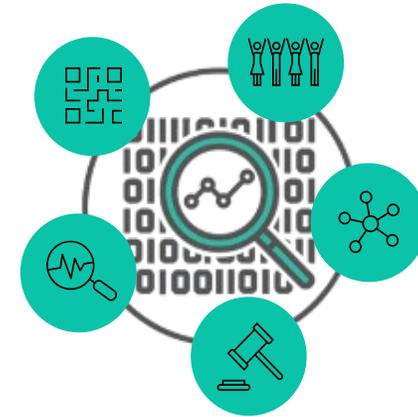
Invest – The Energy Act invests in technologies that will be necessary to that is better for human health and the environment. The Energy Act takes a technology-neutral approach that will boost energy efficiency and lead to a wide range of low and zero-emissions energy options. This will lead to a cleaner, safer, and help reduce the impacts of climate change.

Stable – Our economy grows, and American families and businesses thrive when prices are reasonable. While the pandemic has wrought low prices for many

Prepared by the Committee on Energy and Commerce

Policy needs to support Innovation

- Data is a strategic asset for Utilities
- Analytics Maturity builds Competitive Advantage
- Innovation is Key to Successful Transition



Thank you!

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30 September, 2021

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Resources

Resources

For Everyone:

Doe Advanced Grid Research Lab, 2019 Report:

https://www.smartgrid.gov/files/documents/VOEAMI_2019.pdf

DoE Smart Grid System Report, (2018):

https://www.energy.gov/sites/prod/files/2019/02/f59/Smart%20Grid%20System%20Report%20November%202018_1.pdf

Akpolat, Alper & Dursun, Erkan. (2017). Advanced Metering Infrastructure (AMI): Smart Meters and New Technologies:

https://www.researchgate.net/publication/332111353_Advanced_Metering_Infrastructure_AMI_Smart_Meters_and_New_Technologies

Cadmus Group - GRIDFWD INSIGHTS: Can grid modernization support utility core values? A case for advanced metering infrastructure (2018):

<https://cadmusgroup.com/articles/can-grid-modernization-support-utility-core-values/>

Voices of Experience – Summary Article (2019):

<https://sepapower.org/knowledge/beyond-billing-unlocking-value-with-ami/>

DoE AGR, March 2019 Report: Voices of Experience – Leveraging AMI Networks and Data:

https://www.smartgrid.gov/files/documents/VOEAMI_2019.pdf

Resources

DoE Smart Grid System Report, (2018):

https://www.energy.gov/sites/prod/files/2019/02/f59/Smart%20Grid%20System%20Report%20November%202018_1.pdf

US DoE, Office of Electricity Delivery and Energy Reliability, Advanced Metering Infrastructure and Customer Systems, Results from the Smart Grid Investment Grant Program, (2016):

https://www.energy.gov/sites/prod/files/2016/12/f34/AMI%20Summary%20Report_09-26-16.pdf

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