MI POWER GRID

Making the Most of Michigan's Energy Future

New Technologies and Business Models

Stakeholder Meeting 8: Alternative Business & Ownership Models

The meeting will begin promptly at 1:00 pm.

May 19, 2021

1PM – 5 PM

MPSC

Michigan Public Service Commission

New Technologies and Business Models: Welcome and Overview

Joy Wang
WangJ3@Michigan.gov
Smart Grid Section
Michigan Public Service Commission

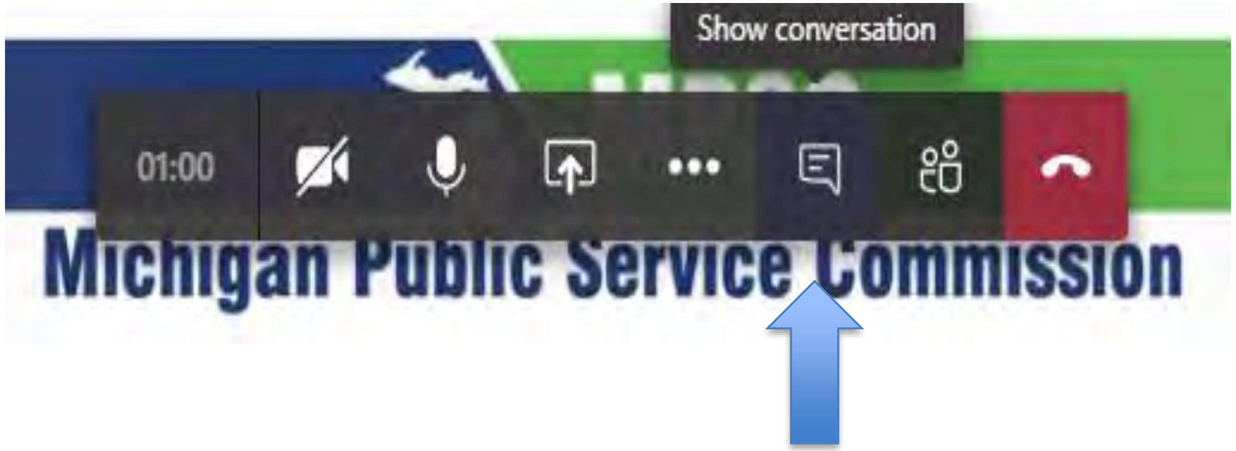
Michigan Public Service Commission

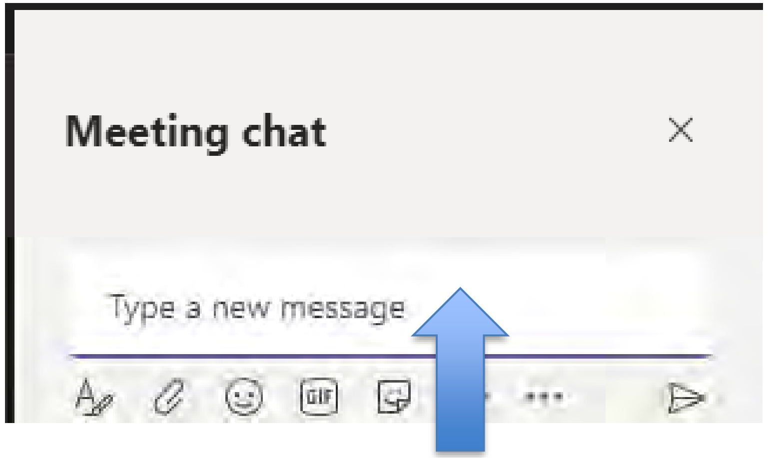
Agenda: Alternative Business & Ownership Models

1:00 pm	Welcome & Opening Comments	Joy Wang, MPSC Staff, and Mike Byrne, Chief Operating Officer, MPSC
1:05 pm	FERC Order No. 2222 and Maximizing the Benefits of DERs to Consumers and the Grid	Jeff Dennis, AEE
1:25 pm	Reimagining Energy: Innovating the Utility Business Model	Greg Bolino, DG Reimagined
1:45 pm	Introducing the Demand Flexibility Marketplace	Carmen Best, Recurve
2:00 pm	Looking to the Edge: Connecting Platforms and Markets to Benefit Climate and Customers	Michael Jung, Utilidata
2:15 pm	Break	
2:25 pm	*Panel: Perspectives on Alternative Business & Ownership Models* Michael Delaney, Consumers Energy Neal Foley, DTE Energy Jess Melanson, Utilidata Erika Myers, World Resource Institute Josh Wong, Opus One Solutions	Moderated: Greg Bolino, DG Reimagined
3:20 pm	Break	
3:25 pm	Inclusive Utility Investments at the Grid Edge: Business Models for Making Building Energy Upgrades and Vehicle-Grid Integration Accessible to All	Holmes Hummel, Clean Energy Works
3:40 pm	Advanced Regulatory Frameworks to Support Energy Innovation	Matthew McDonnell, Strategen
3:55 pm	EVs as Distributed Energy Resources: New Business Models for a Changing Energy Ecosystem	Jackie Piero, NUVVE
4:10 pm	The Nexus Between Energy Storage Ownership Models and Policy Goals	Jeremy Twitchell, Pacific Northwest National Laboratory
4:25 pm	Building an Efficient, Resilient Grid	Amy Heart, Sunrun
4:40 pm	Alternative Community Solar Models and Community Benefits	Jackson Koeppel, Soulardarity
4:55 pm	Closing Statements	Joy Wang, MPSC Staff
5:00 pm	Adjourn	

Housekeeping

- This meeting is being recorded
- Slides available and recording will be posted on workgroup website within a week
- All audience members will be muted
- Please type questions into the chat box
  - To access chat box:





- Staff will ask chat box questions during Q&A

Housekeeping, cont.

- During the meeting, if clarification of your question is needed, we will ask you to unmute.
  - To unmute:
    - Phone: Press *6
    - Teams: Click mic button
  - Please mute yourself again after your clarification.
- Chat box may note when audience members enter/exit.
  - These notices are automatic:

- If you are not a session speaker, please turn off your video.
- If Teams via web browser is not working, try a different web browser.
- Please share your thoughts on the meeting with us by filling out the survey.

MI POWER GRID

Making the Most of Michigan's Energy Future

Opening Remarks

Mike Byrne
Chief Operating Officer
Michigan Public Service Commission

Stakeholder Meeting 8: Alternative Business & Ownership Models
May 19, 2021

FERC Order No. 2222 and Maximizing the Benefits of DERs to Consumers and the Grid

Jeff Dennis

General Counsel and Managing Director

Advanced Energy Economy

About Advanced Energy Economy (AEE)

- AEE is a national association of businesses that are making the energy we use secure, clean, and affordable.
- AEE is the only industry association in the United States that represents the full range of advanced energy technologies and services, both grid-scale and distributed. Advanced energy includes energy efficiency, demand response, energy storage, wind, solar, hydro, nuclear, electric vehicles, and more.
- AEE also supports the work of the Advanced Energy Buyers Group (”AEBG”), a coalition of large buyers of advanced energy technologies to meet sustainability goals.
- AEE pursues policy transformation in the states and in wholesale power markets that expand market opportunities for advanced energy technologies and lay the foundation for a 100 percent clean advanced energy future.

Order No. 2222 Overview: Basic Framework

What it does: Order No. 2222 requires market operators to ensure that aggregations of distributed energy resources (DERs) have one or more pathways to provide all the wholesale services they are technically capable of providing.

- FERC found this was necessary to improve competition and ensure “just and reasonable” rates.

Technologies covered: FERC defines DERs broadly to include “any resource located on the distribution system, any subsystem thereof or behind a customer meter,” and says that such resources may include (but are not limited to) electric storage resources, distributed generation, demand response, energy efficiency, thermal storage, and electric vehicles and their supply equipment.

Who it applies to: All RTOs/ISOs under FERC jurisdiction must amend existing participation models or create new ones to enable participation by DER aggregations.

Order No. 2222 Overview: Key Compliance Requirements

Parameter(s)	Key Requirement(s)
Eligibility of DER aggregators/DER types	DER aggregators must be an eligible market participant; RTOs/ISOs must allow all technology types and multi-technology combinations; rules must prevent “double counting” of services; no state “opt-out” allowed; small utilities are exempt
Geographic scope of aggregation	Encourages broad geographic scope of aggregation, but allows RTOs/ISOs to propose to limit aggregations to a single pricing node
Distribution factors and bidding parameters	Must account for physical and operational characteristics of DER aggregations and ensure they are able to fully offer their aggregations into RTO/ISO markets
Information and data requirements	RTOs/ISOs are required to transparently state the information and data that DER aggregators must provide them about the performance, physical parameters, and components of their aggregations
Metering and telemetry requirements	RTOs/ISOs have flexibility to set these requirements, including whether to require metering and telemetry of individual DERs; must justify why they are necessary and explain why they do not result in undue barriers to participation
Coordination	Requires RTOs/ISOs to establish procedures for coordination between RTOs/ISOs, DER aggregators, distribution utilities, and state and local regulators

Federal and State Regulation of DER Participation in Markets after Order No. 2222

FERC	State / Local Regulators
• Terms and conditions of participation in wholesale markets, including who can participate • Rates for some (but not all) wholesale sales from DERs • Rates, terms, and conditions of any transmission or wholesale services provided by DERs	• Terms and conditions of retail market service provided by DERs and retail DER programs • Distribution interconnection • Distribution system operations (including reliability and safety) • Distribution system cost recovery • Siting of DERs (in some cases)

- State and local regulators retain significant authority to address reliability, safety, and cost impacts on distribution systems of DER participation in wholesale markets, and terms and conditions of retail DER programs (including who participates in those retail programs)
  - Cannot, however, regulate *who* can participate in wholesale markets, or *how*
  - Requires active coordination of wholesale and retail operations

Benefits of Increased DER Participation in Wholesale Markets

Directly from Order 2222:

- ✓ Enhanced resilience to infrastructure threats (e.g., weather) through reliance on local DERs
- ✓ Improved competition and lower wholesale rates, benefitting all ratepayers
- ✓ Additional supply of services vital for cost-effective decarbonization
- ✓ Unlocking new revenue streams, lowering costs for developers and customers

Future Opportunities with State Support:

- ✓ Increased visibility of DERs for transmission and distribution grid operators
- ✓ Enhanced resilience to infrastructure threats (e.g., weather) through reliance on local DERs
- ✓ Accelerated achievement of state policy goals

Order 2222 in Action: Frequent Dispatch DERs, e.g., Electric School Buses

- ✔ As battery costs continue to decline, a growing number of school districts are replacing older fossil fuel school buses with electric models.
- ✔ School buses are seldom used at night and sit idle during much of the day and the summer months.
- ✔ During these times, the batteries in school buses can become a flexible resource that can provide many grid services.

The Opportunity: Frequent Dispatch DERs, e.g., Electric School Buses

Potential Retail Services:

- Transportation/Electric Vehicle Charging
- Demand Response

Potential Wholesale Services:

- Energy
- Capacity
- Ancillary services such as frequency regulation, voltage support, and reactive power

The Barriers: Frequent Dispatch DERs, e.g., Electric School Buses

- Currently, there are fleet operators, school districts, and DER aggregators looking to aggregate these resources and participate in wholesale markets. To do that, several barriers to integration must be addressed:
  - These resources currently have no pathway to both export onto the grid and be compensated for the load they reduce on-site
  - These DERs need the ability to update energy offers in real-time to reflect their operational needs
  - To receive fair compensation, these DERs will require properly designed “baselines”

Benefits of Frequent Dispatch DER Participation

Benefits for All: If grid operators and other actors work to remove these barriers, participation by these DERs can create benefits for all participants in the electricity sector:

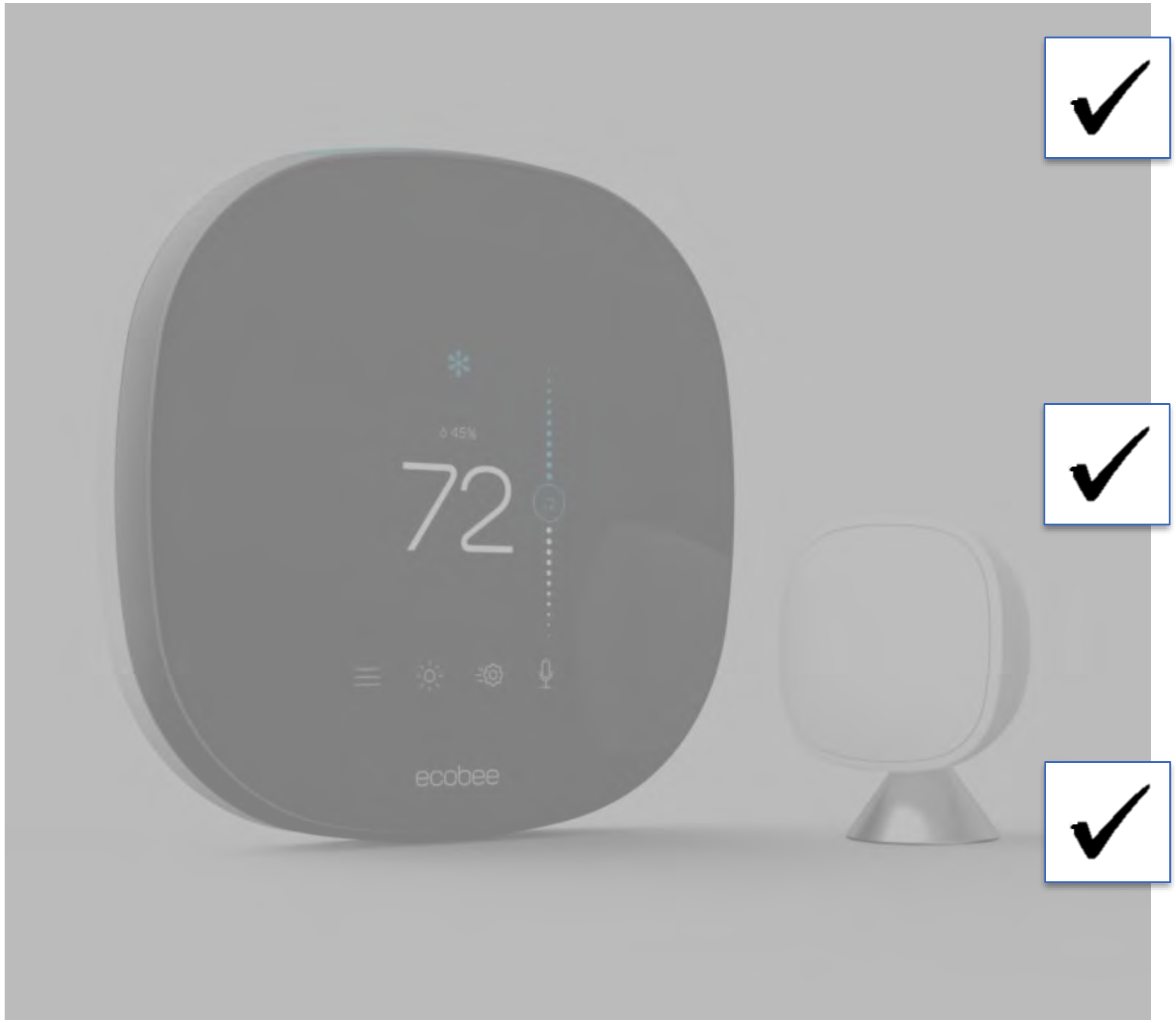
Wholesale market operators gain the ability to utilize these assets to meet the needs of the larger grid

Distribution utilities gain local resilience on the distribution grid

DER aggregators are provided a new revenue stream, helping them make DERs and new services available to more customers

Consumers benefit from cost savings passed on by DER aggregators while also receiving a desired service (pollution-free transportation or workplace charging)

Order 2222 in Action: Residential Demand Response, e.g., Smart Thermostats



- Order 2222 allows residential customers and their homes to play a part in the power grid also.
- Residential devices such as smart thermostats and water heaters control the largest energy uses in homes.
- Enabling wholesale market participation for smart thermostats alone has the potential to contribute 40 GW of load reductions through residential customers.

The Opportunity: Residential Demand Response, e.g., Smart Thermostats

Potential Retail Services:

- Enhanced home comfort and cost savings
- Energy efficiency
- Demand response
- Peak load shaving

Potential Wholesale Services:

- Energy
- Capacity
- Ancillary services

The Barriers: Residential Demand Response, e.g., Smart Thermostats

- Data Availability and Quality
  - Aggregators need to be able to submit data on their performance to the RTO/ISO, which either requires access to customer retail meter data or the option to directly submeter residential DR devices.
  - Allowing direct metering of residential DR resources would help resolve these barriers.
  - In addition, the definition of "revenue grade" data requirements should focus on defining data quality requirements that meet a reasonable threshold calibrated to the needs of the service being provided.

Next Steps

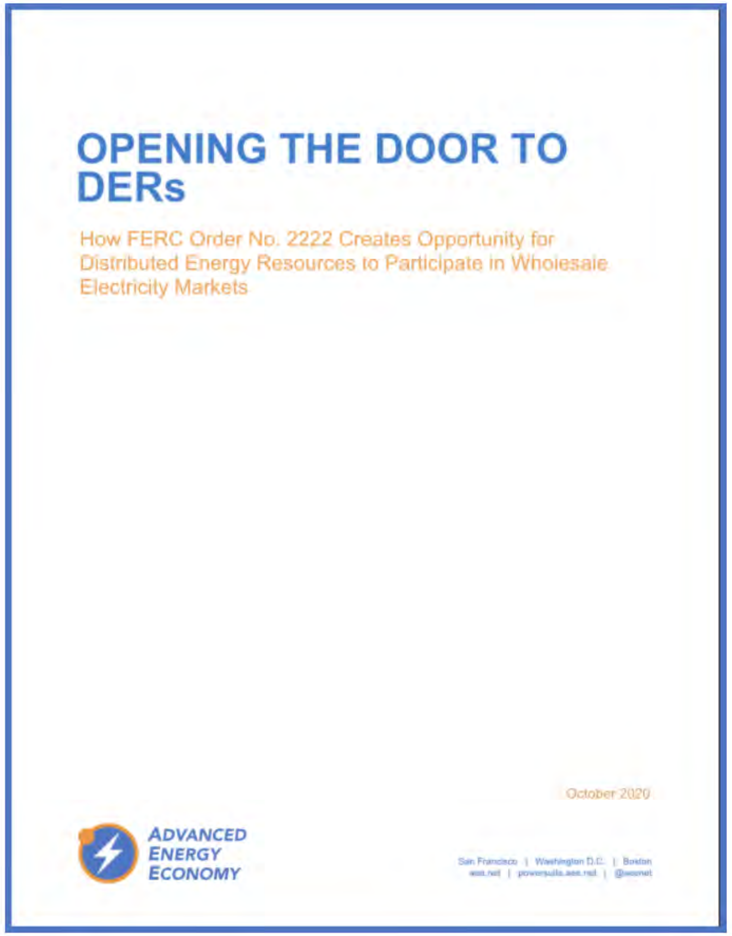
- **Compliance Process:**
  - RTOs/ISOs must make compliance filings with FERC. Stakeholder processes to develop compliance plans are underway
  - MISO filing due in April 2022; PJM filing due in February 2022
  - FERC will accept comments from all interested parties, then issue decisions on compliance plans, which may require RTOs/ISOs to make additional filings
- **Implementation:**
  - Implementation dates will likely vary by RTO/ISO, and will depend on a number of factors, including alignment with existing markets and needed software upgrades
- **Additional Proceedings:**
  - Additional clarification and rehearing requests on application of opt out for demand response and other issues now pending
  - New rulemaking proceeding will consider whether to eliminate the demand response opt out allowed by Order Nos. 719/745

October AEE policy brief explains Order No. 2222

Opening the Door to DERs

How FERC Order No. 2222 Creates Opportunity for Distributed Energy Resources to Participate in Wholesale Electricity Markets

Available at: https://info.aee.net/opening-the-door-to-ders


OPENING THE DOOR TO DERs

How FERC Order No. 2222 Creates Opportunity for Distributed Energy Resources to Participate in Wholesale Electricity Markets

October 2020

ADVANCED ENERGY ECONOMY

THANK YOU!

Jeff Dennis
jdennis@aee.net
Twitter: @EnergyLawJeff

Reimagining Energy: Innovating the Utility Business Model

Greg Bolino

Founder & CEO

DG Reimagined LLC

MI Power Grid

Innovating the Utility Business Model

For Michigan Public Service Commission

19 May 2021

Presented by: Gregory Bolino, gbolino@dgreimagined.com

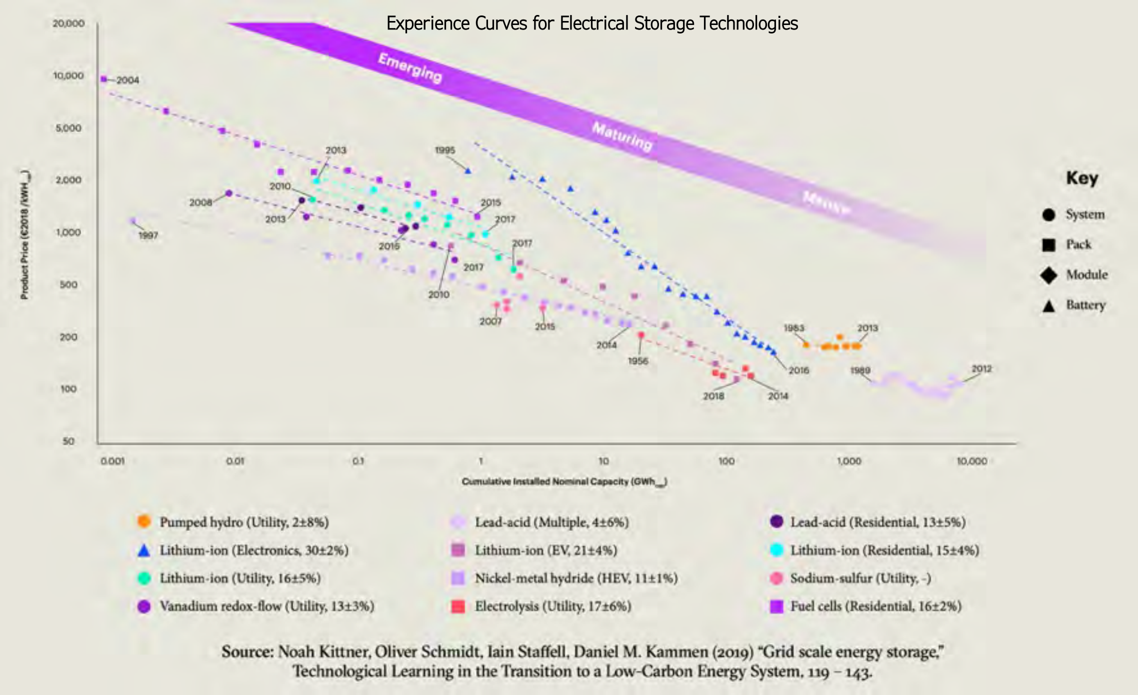
Busting "Immutable" Truths

Kristine Krause

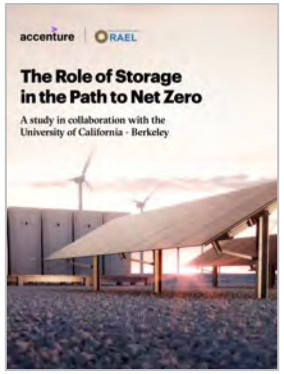
VP, Fossil Operations, Wisconsin Energy
—1992

"You can't store electricity"

"You can't predict or influence when it might be needed"



"The Digital Transformation of Electricity"
— WEF, 2017



"The Role of Storage in the Path to Net Zero,'"
— Accenture & RAEL / Berkeley, 2021

Illustration of New Business Models

Telecom – Dial tone to digital telephony

Driver: *1996 Telecom Act* (with "Driver" underlined)

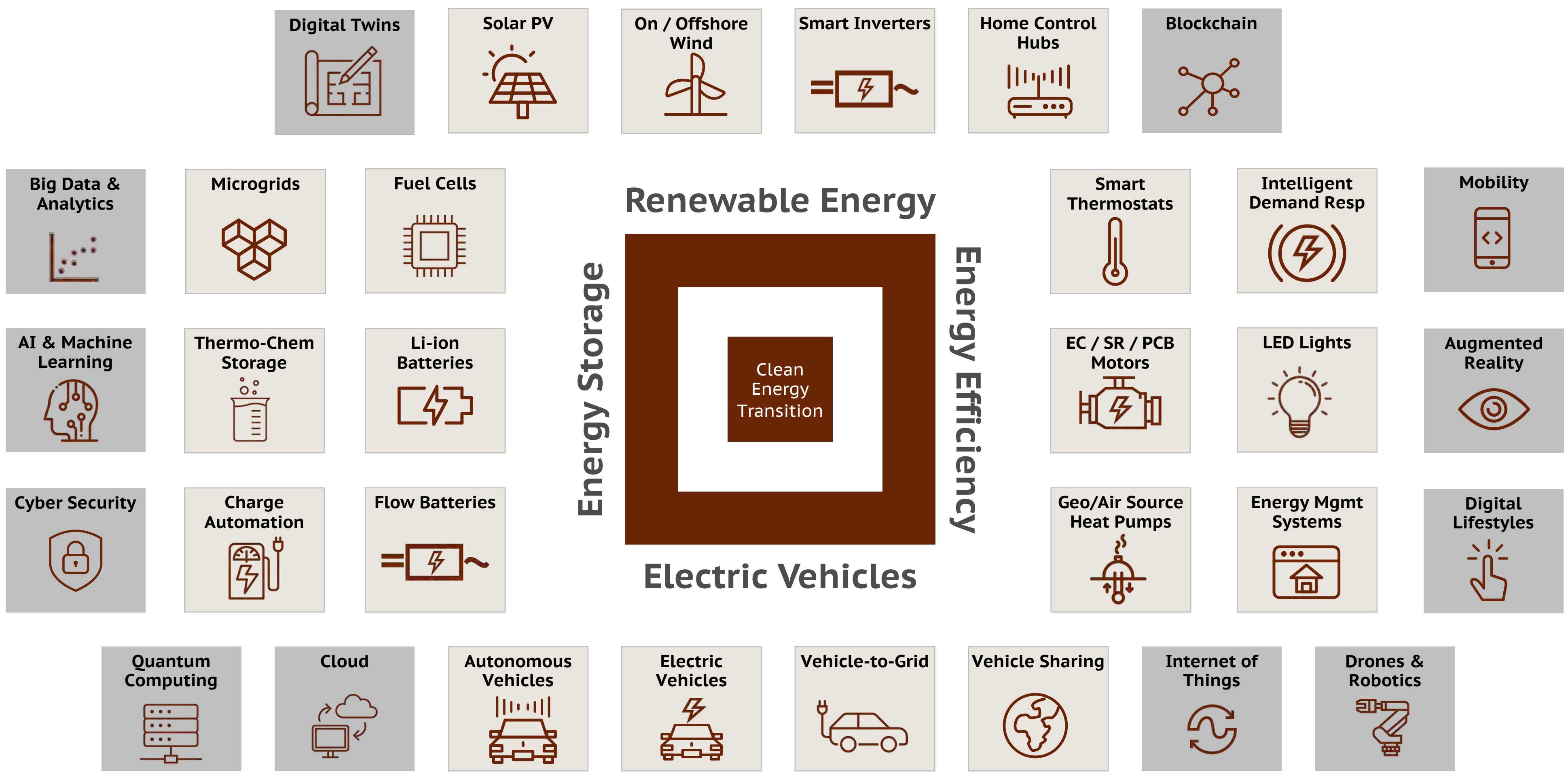
Media – CD/DVD to streaming media

Driver: bandwidth, DRM, cloud, and compression (with "Driver" underlined)

Insurance – underwriting to driver monitoring

Driver: GPW, mobile app, cloud and analytic capabilities (with "Driver" underlined)

Drivers of Changes to the Energy System



Partnership Examples to Consider

Vistra & PG&E

Vistra Energy began operating a 300-MW/1,200-MWh lithium-ion storage system on its combined cycle gas turbine Moss Landing power plant site in California. It is the largest of its kind in the world.

Alphastruxure & Montgomery County, MD

The county partnered with Alphastruxure to manage 40 "***Ride On***" county buses. The effort includes a micro-grid to support electric bus charging at the Silver Spring Station.

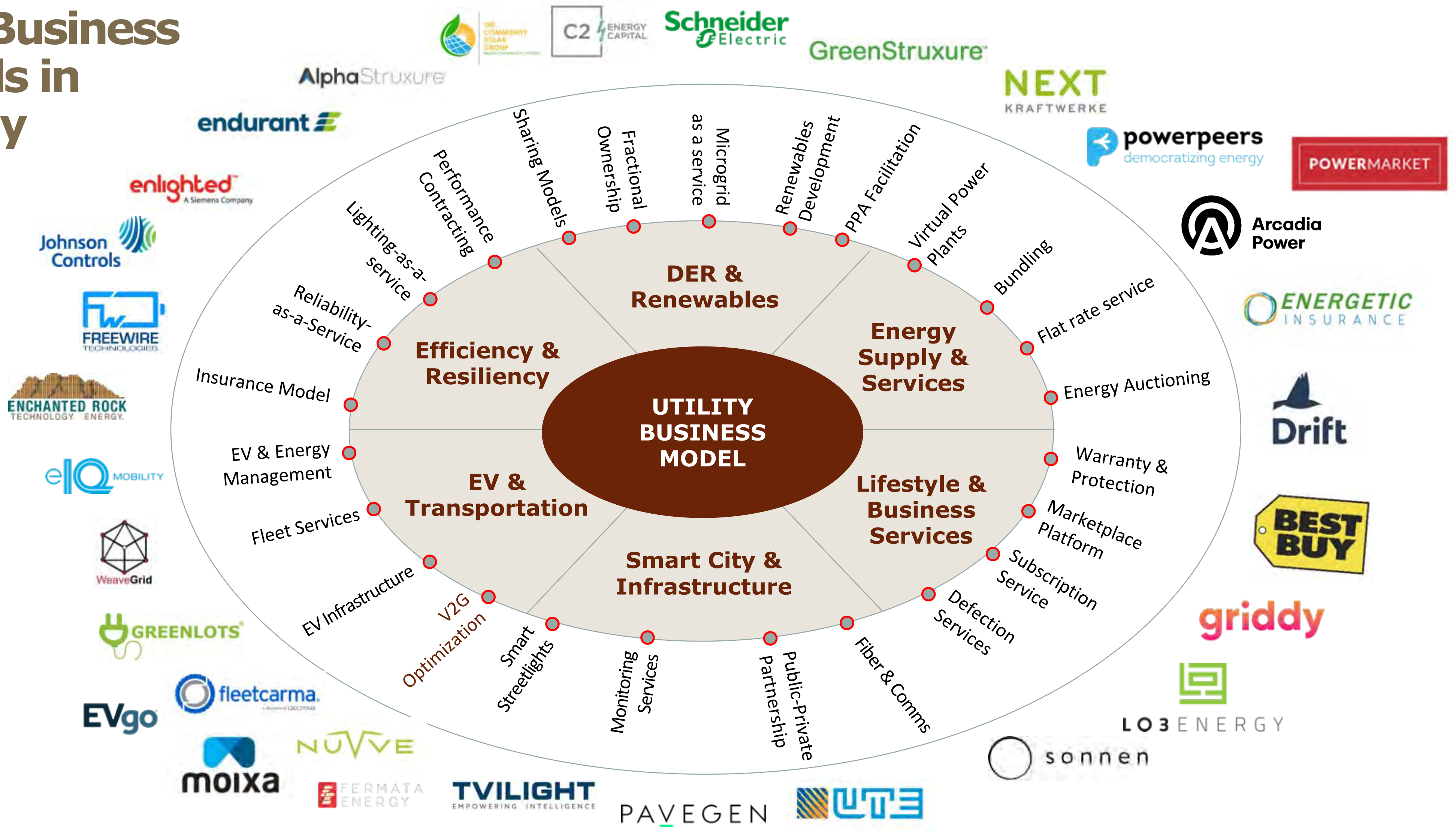
Veridian & DTE

Veridian is a net zero development on the property of Country Farm Park in Washtenaw, Ann Arbor. DTE and Veridian are collaborating to design an optimal footprint of solar and storage on homes and in the community.

ConEd and Endurant Energy

ConEd and Endurant Energy have commissioned a 1MW storage facility as part of NY REV demonstration project.

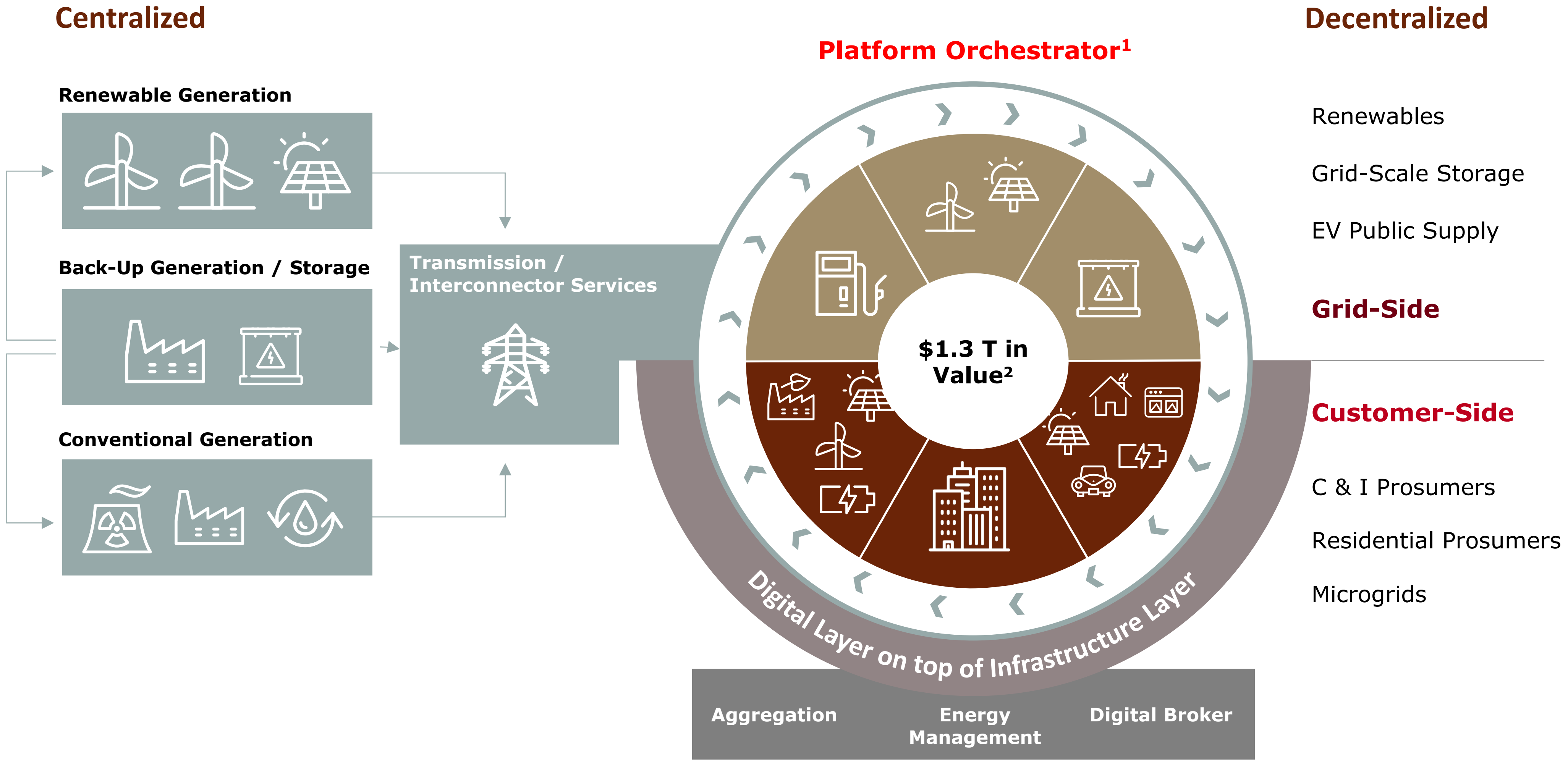
New Business Models in Energy



Transforming the Role of Utilities

What if we could change the rules?

Transforming the Role of Utilities



Sources: 1. *Positively Charged: Creating a future of value and growth for utilities in a multifaceted energy system*, Accenture, 2019
2. *Digital Disruption of Industries: Electricity*, World Economic Forum, 2017

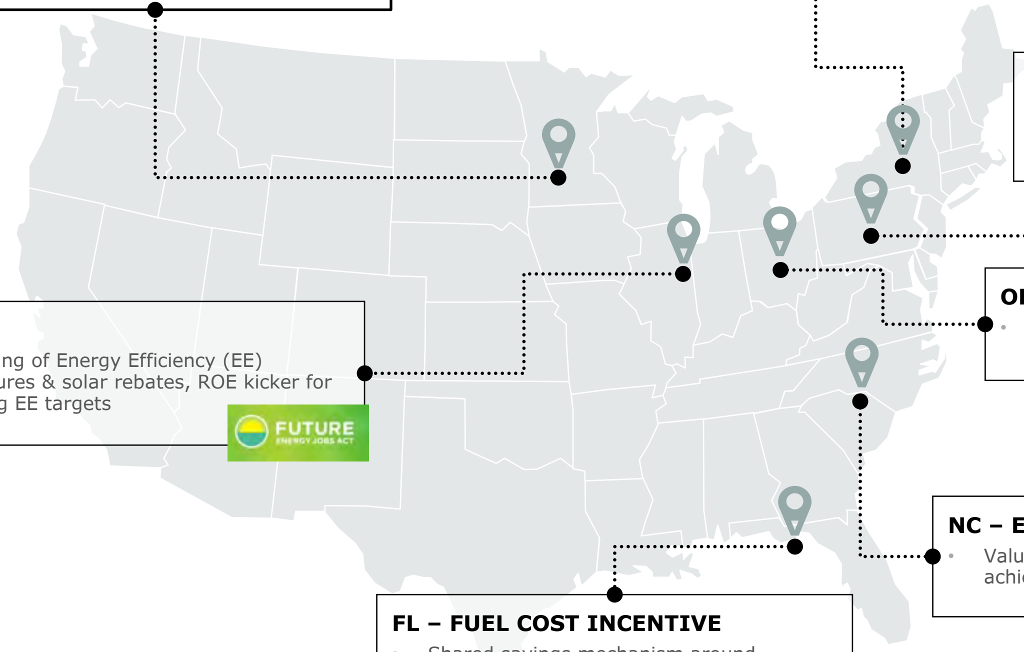
Regulatory Innovations to Emulate?

> *"Utilities are facing demand destruction, but the rate mechanisms in the law … can be tools with which utilities change the way they do business"*
> - Andrew Place, Vice Chair PPUC

MN – E21
- Proposed customer-centric framework focusing on integrated system planning, grid modernization & performance-based returns

NY – REV
- Transform utilities into DSPs creating new distribution markets; Utilities file DSIPs; TOTEX rate based model, ROE kicker for performance targets, shared savings; Event-based pricing

PA – ALT INCENTIVE FRAMEWORK (ACT 58)
- Ratemaking flexibility including multiyear rate plans, revenue decoupling, performance-based rates and formula rates.



IL – FEJA
- Rate basing of Energy Efficiency (EE) expenditures & solar rebates, ROE kicker for exceeding EE targets

OH – POWER FORWARD
- Grid Modernization for 21st century utility regulation & incentives

UK – RIIO
- Performance regulatory approach; TOTEX regime, ROE based on performance scorecard; strategic innovation fund.

NC – EE GAINSHARE
- Value gainshare based on energy savings achieved through rebated customer upgrades

FL – FUEL COST INCENTIVE
- Shared savings mechanism around optimizing fuel spend, developed with regulators

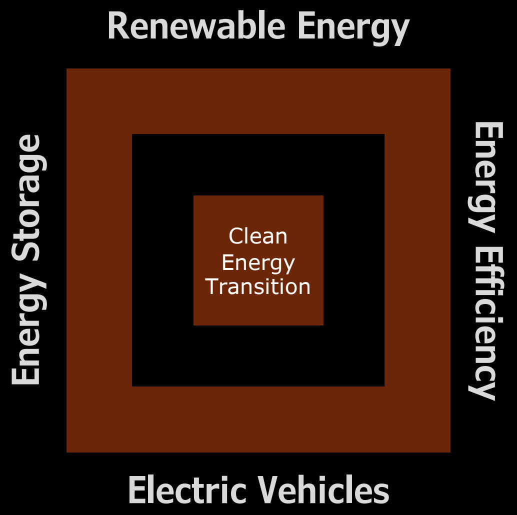
A"Playbook" for A Utility Business Model in Michigan

P	Partnerships	Shape role of utilities to orchestrate and to enable 3rd parties through partnerships	**Co-Investments:** *Code of conduct for Utility Partnerships*; *Co-funding mechanisms for Utility / Public / 3rd Party Collaboration*	**New Rules** ➢ Allow utilities to **orchestrate** through customers and 3rd parties ➢ Clarify utility role in
O	Outcomes	Give utilities investible *incentive* for system-level improvements – efficiency, utilization, carbon	**Incentives:** *Total Energy Used / Total Energy Expended*; *Avg Load at Night / Peak Load*	➢ Create **funding mechanism** from improvements in efficiency and utilization ➢ Fund utility **incentives** and **innovation** fund
W	Waste	Funnel value from improved grid outcomes to *innovation fund* to driver further investments and partnership in improving grid performance	Strategic Innovation Fund for innovative performance improvements, through customers and partnerships	➢ Independent **panel** determines best projects to fund
E	Efficiency	Attack efficiency with greater scope and through behavioral approaches including better *rate design*	Customer efficiency encouraged by transforming rate design	➢ **Decouple** utility revenues ➢ Create joint task force to **redesign rates** across MI with proper incentives
R	Returns	*Reassert & reinforce stable returns on asset investments*	Core Utility Earnings	➢ Use **formula** rates

$$ $$

DG Reimagined

Reimagining the Energy System...



Helping people and businesses realize value from the four pillars of the clean energy transition

www.dgreimagined.com

DG Reimagined

Greg Bolino

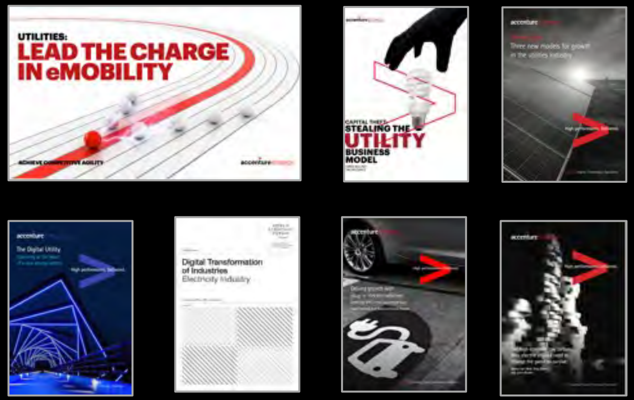
+1 (847) 331-9039

gbolino@dgreimagined.com

Greg is a seasoned strategist and business leader with over 35 years of consulting and management experience. For 17 years, he was Managing Director at Accenture and led the Utilities Strategy practice in North America and in the UK & Ireland. He served as thought leader and advisor to executives in multiple industries including utilities, telecommunications, media and cable, and retail. His extensive work with utilities focused on the evolving utility business model, including utility of future strategies, energy services, grid investment and regulatory strategies. He also held leadership roles at multiple consulting companies and two venture-backed startups.

Greg is a thought leader on the energy transition and has published numerous perspectives on the changing energy landscape. He has shared his visionary perspective with Boards of Directors of numerous utilities and has spoken at numerous conferences and industry gatherings. He is a strategic thinker, a compelling presenter, a collaborative advisor, and a skilled facilitator.

Greg is passionate about the Clean Energy Transition. He founded DG Reimagined to help companies who see opportunities for growth in the clean energy transition including utilities, real estate, and transportation.



Greg is helping leaders reinvent their strategies to enable growth through innovation, new business and operating models. He is advising executives, boards, policy makers, and investors on navigating the changing landscape in renewable energy, energy storage, electric vehicles, and energy efficiency.

www.dgreimagined.com/about

Introducing the Demand Flexibility Marketplace

Carmen Best

VP of Policy & Emerging Markets

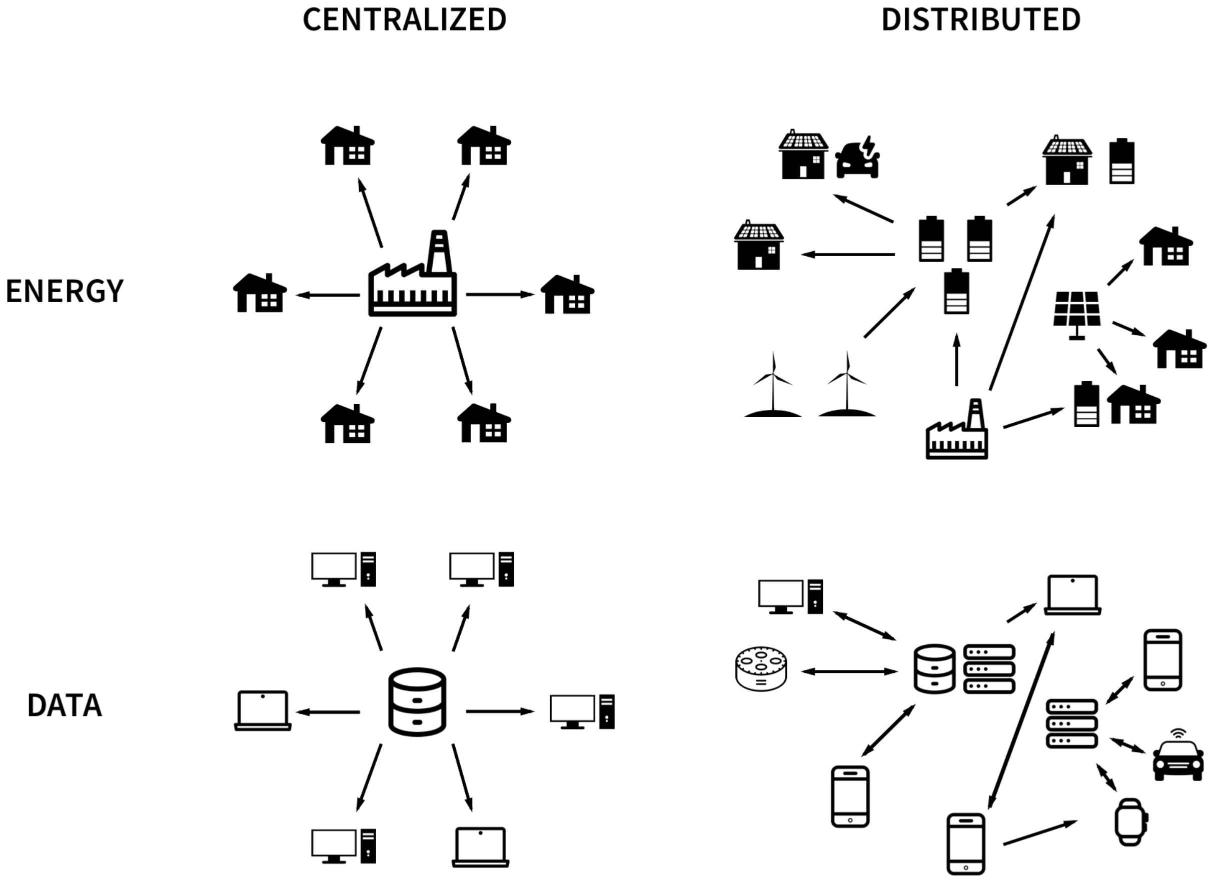
Recurve

RECURVE

SHAPE THE FUTURE OF ENERGY

MI POWER FORWARD MAY 19, 2021

The Grid is Transforming from Centralized Power Plants to Distributed Grid Edge Resources



RECURVE

There are Many Solutions In the Market

lime
A Willdan Company

Power TakeOff

GreenSync

SUNVERGE

Innowatts
energy at hand

enervee®

Nest

kW ENGINEERING

CLEAResult®

TESLA

opus one
solutions

ohmconnect

DNV·GL

leap.

TROVE
PREDICTIVE DATA SCIENCE

EnergyHub®

ecobee

AutoGrid

uplight™

IA

sunrun®

WILLDAN

bidgely

ICF

CPower

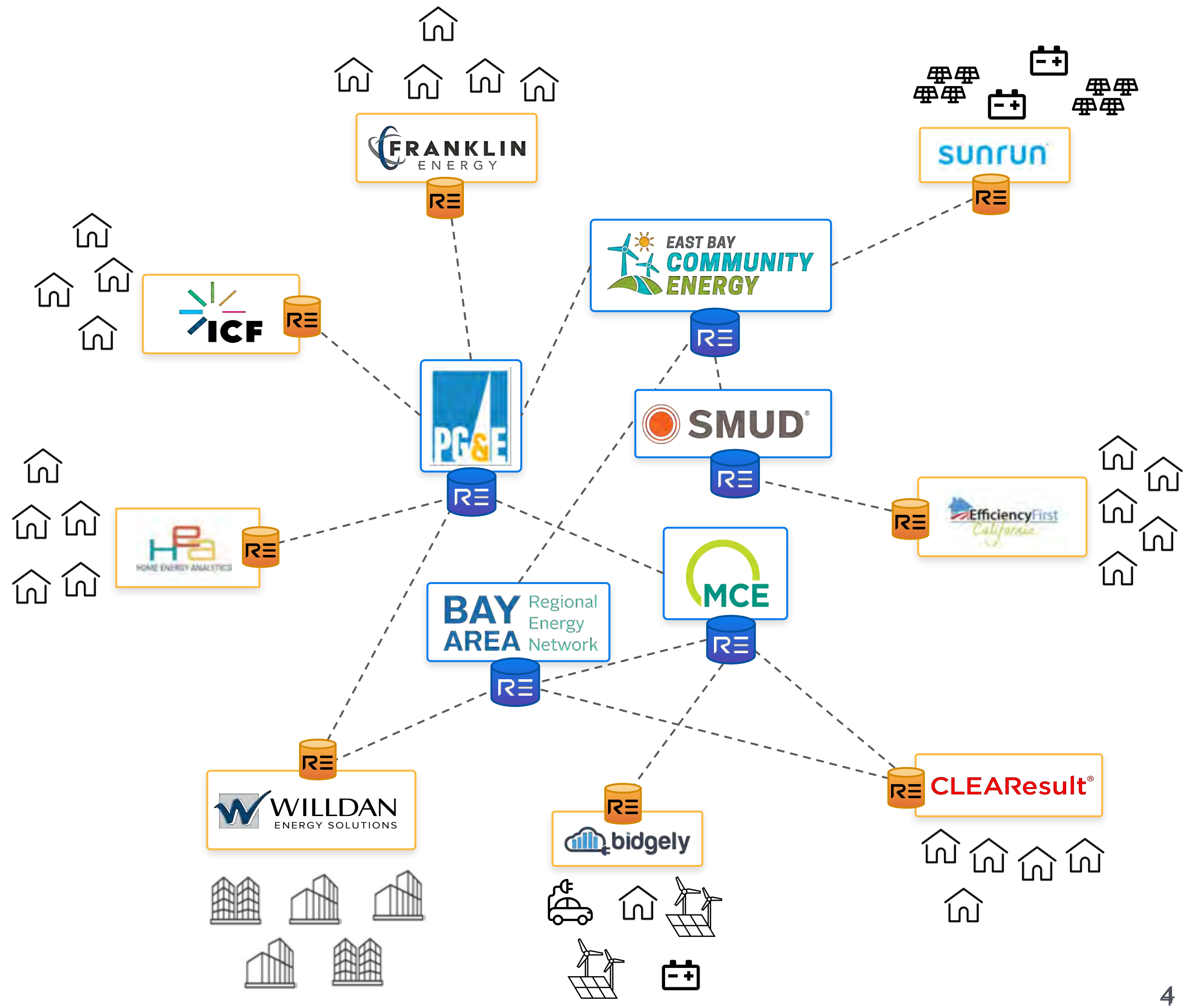
PACKETIZED ENERGY

piclo®

enel x

Recurve Platform:

Architected for the Distributed Grid Edge



RECURVE

STANDARD
WEIGHTS & MEASURES

The Foundation of Market-Based Solutions

RECURVE


10 000008
TYPE C2SODL2 CL200 FM2S 1.0Kh
240V 3W CA 0.5 TA 30 60Hz

Open-Source: Revenue-Grade Demand Flexibility

- **Revenue-Grade**: open-source, auditable, reproducible
- **Verifiable** Standard for demand flexibility calculations
- **Scalable** to every meter on the grid
- **Automated** from smart meter data to settlement-quality transaction

CALTRACK

LF ENERGY OPENEEMETER

OPEN GRID METER

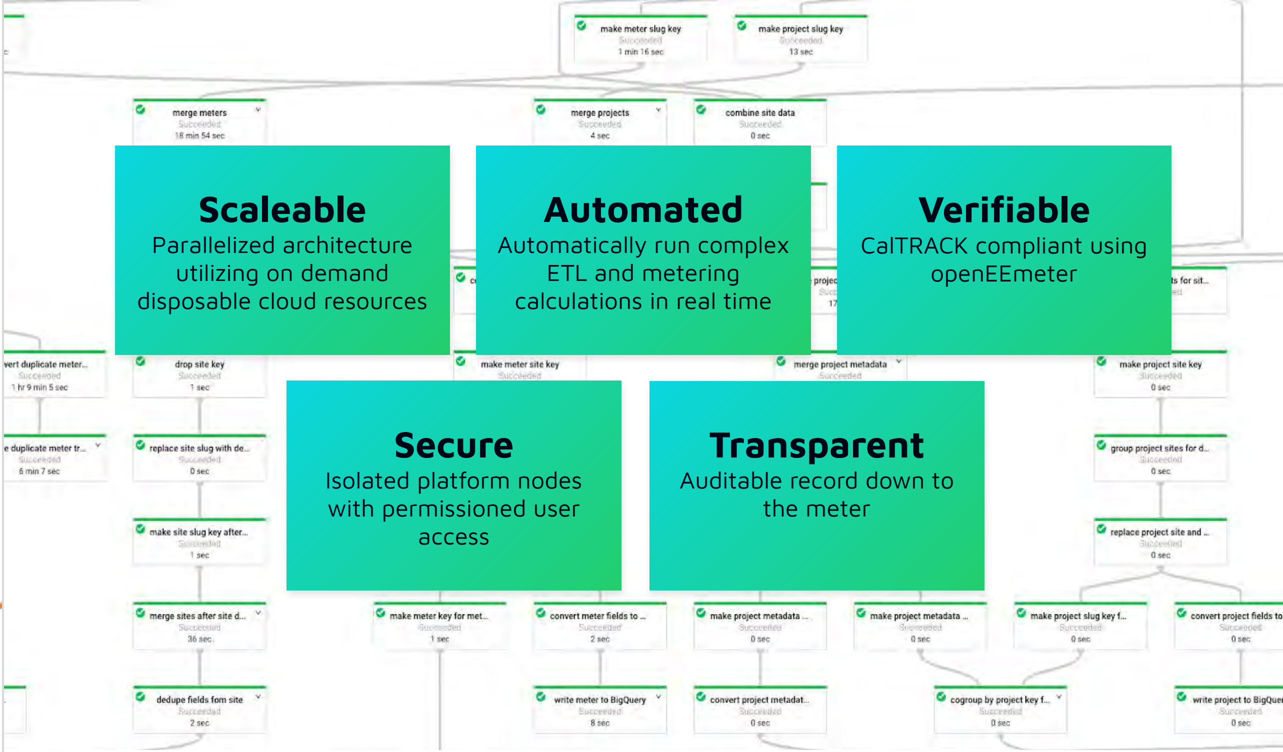
ENERGY DIFFERENTIAL PRIVACY

FLEXVALUE™

RECURVE

Recurve Platform:

Execution of meter-based calculations at scale



Scaleable
Parallelized architecture utilizing on demand disposable cloud resources

Automated
Automatically run complex ETL and metering calculations in real time

Verifiable
CalTRACK compliant using openEEmeter

Secure
Isolated platform nodes with permissioned user access

Transparent
Auditable record down to the meter

Computing savings once for 1,000,000 meters…

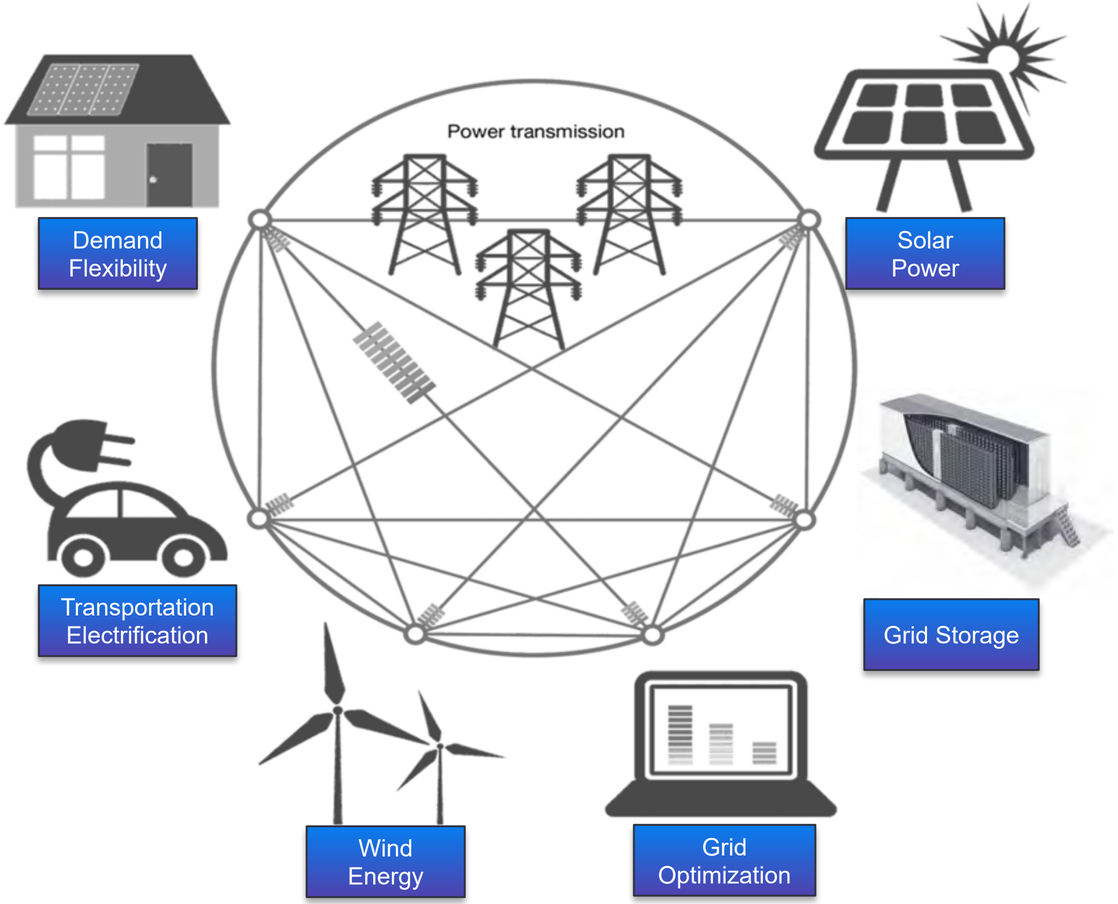
≈ 3,472 Days	≈ 1/2 Hour
Using a local computer	Using Recurve Flex Platform parallel cloud architecture

RECURVE

Recurve Enables Markets for Demand Flexibility

- Load Shifting
  (e.g., Storage, DR)
- Load Shaping
  (e.g., EE, Solar)
- Load Balancing
  (e.g., EVs, Heat Pumps)

RECURVE

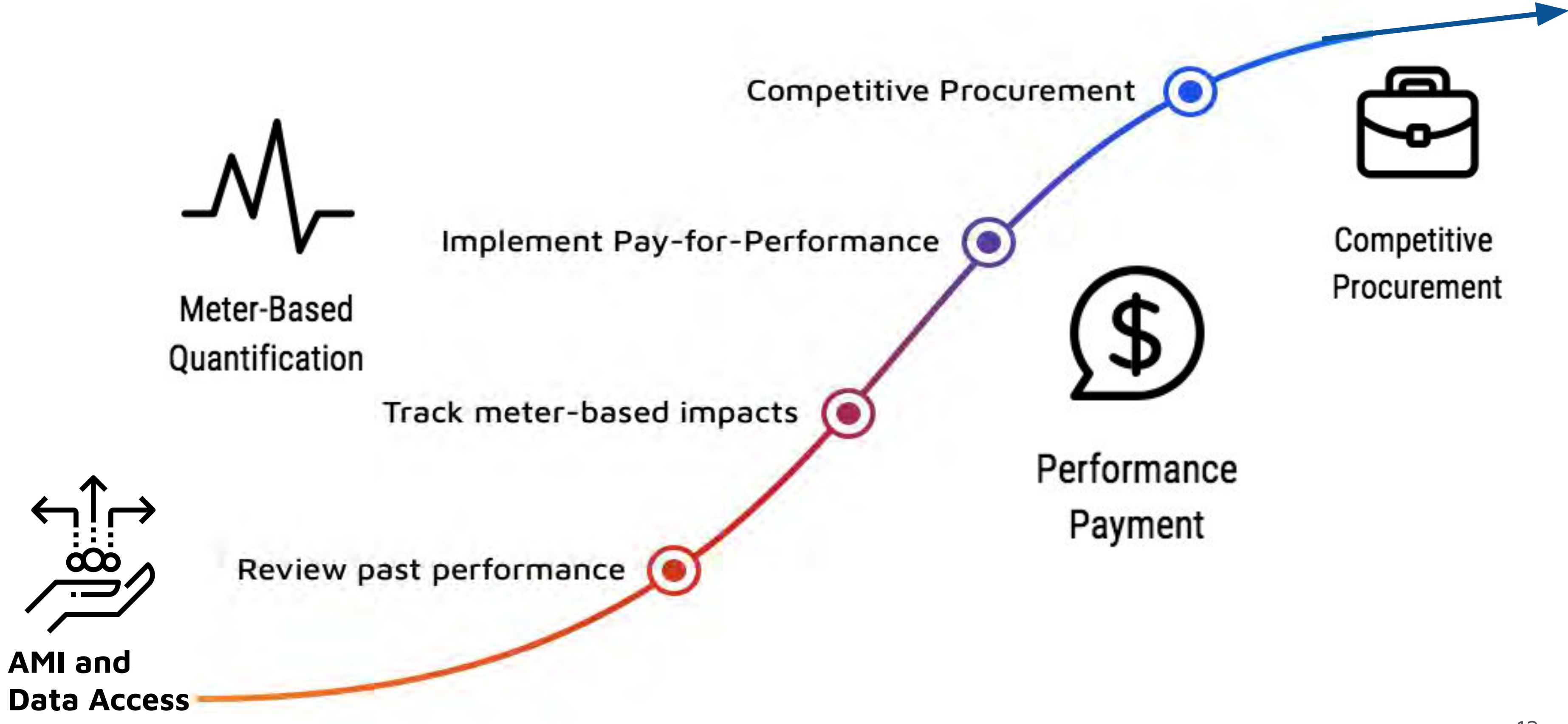


SCALE FOR THE FUTURE

Getting Started on Meter-based Solutions

RECURVE

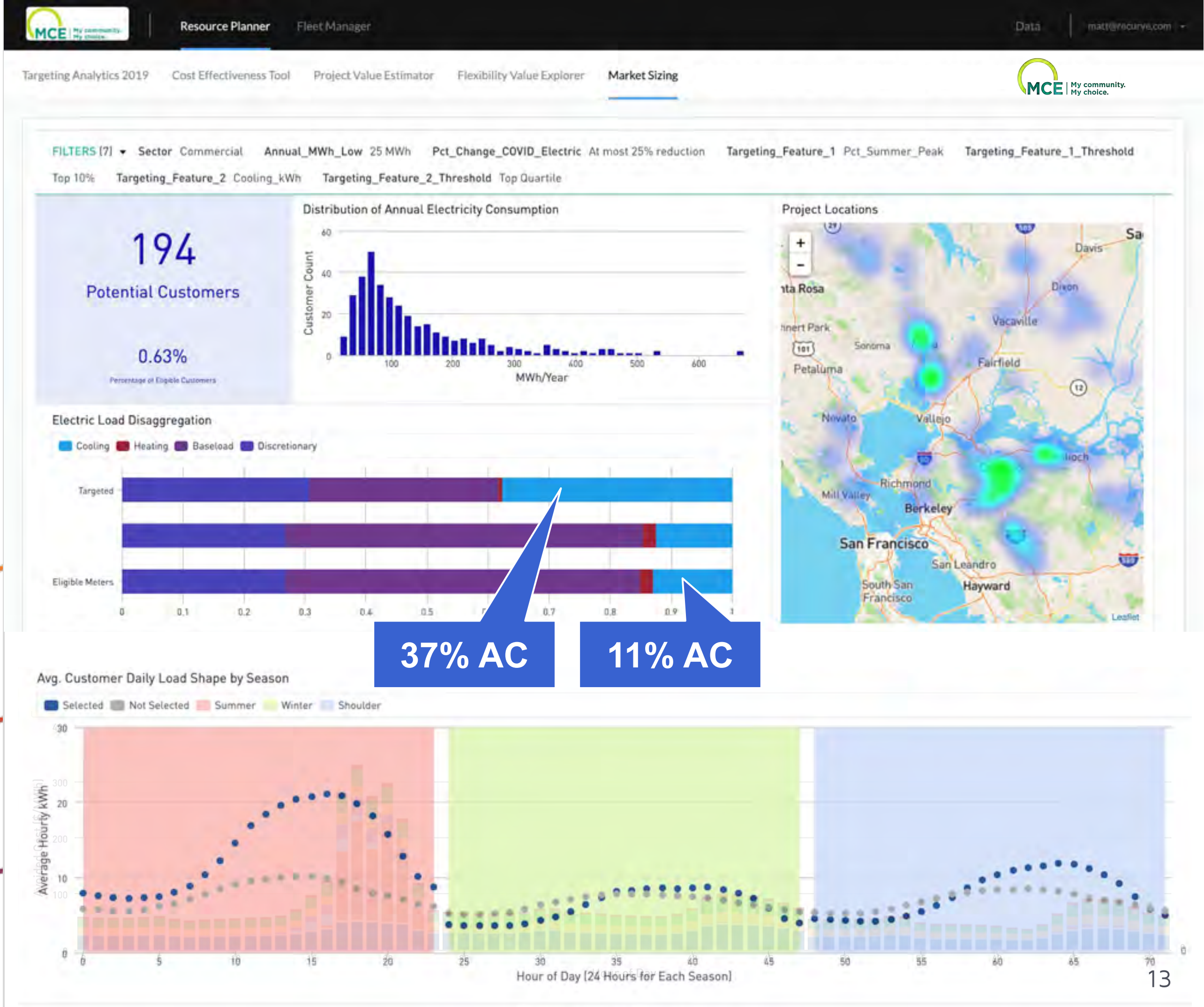
A Policy Path to Scaling Demand Flexibility



No Regret Policy:

TARGETING

Find customers with the greatest potential and worth the most to the grid



RECURVE

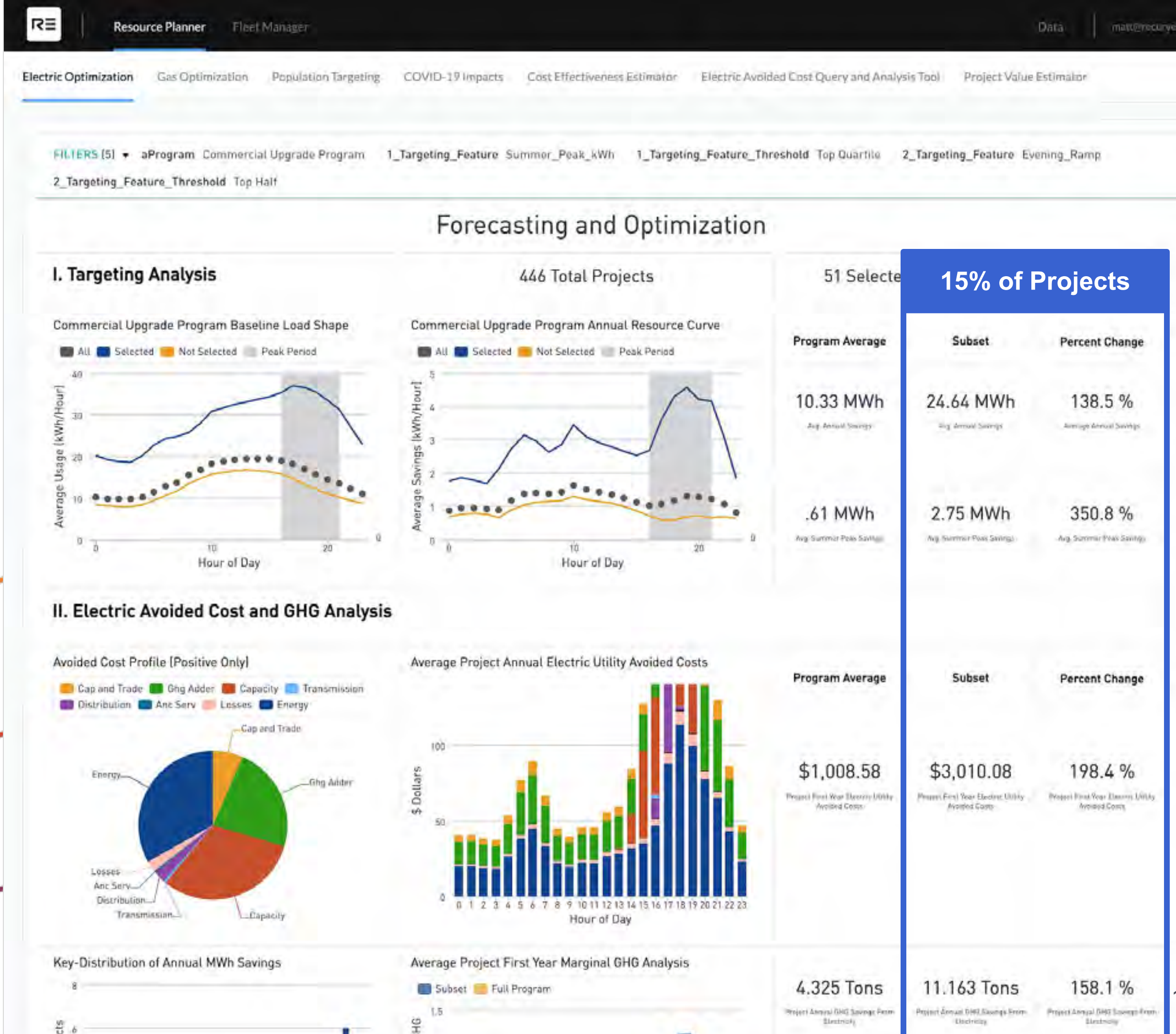
Targeted Top 15%

2.5x Energy Savings

4.5x Peak Reductions

3x Grid Value

2.5x GHG Savings



RECURVE

MAKING VALUE VISIBLE

Accessibility of Cost Effectiveness

RECURVE

FLEXVALUE ~ Purpose

Cost-effectiveness doesn't have to be a black box inside an EE bubble

- Simplify and bring transparency to valuation

- Expand functionality: metered or custom load shapes enable meter-based and innovative program design
    - Integrated programs
    - Plan and optimize
    - Pay on measured value

- Open governance model = Tools to foster smart policy instead of lagging behind

What Do I Need to Know to Calculate TRC or PAC?

Costs

- Admin Costs
- Measure Costs
- Incentive

Program

- Electric Savings
- Electric Load Shape
- Gas Savings
- Gas Savings Profile
- Net to Gross
- EUL

Benefits

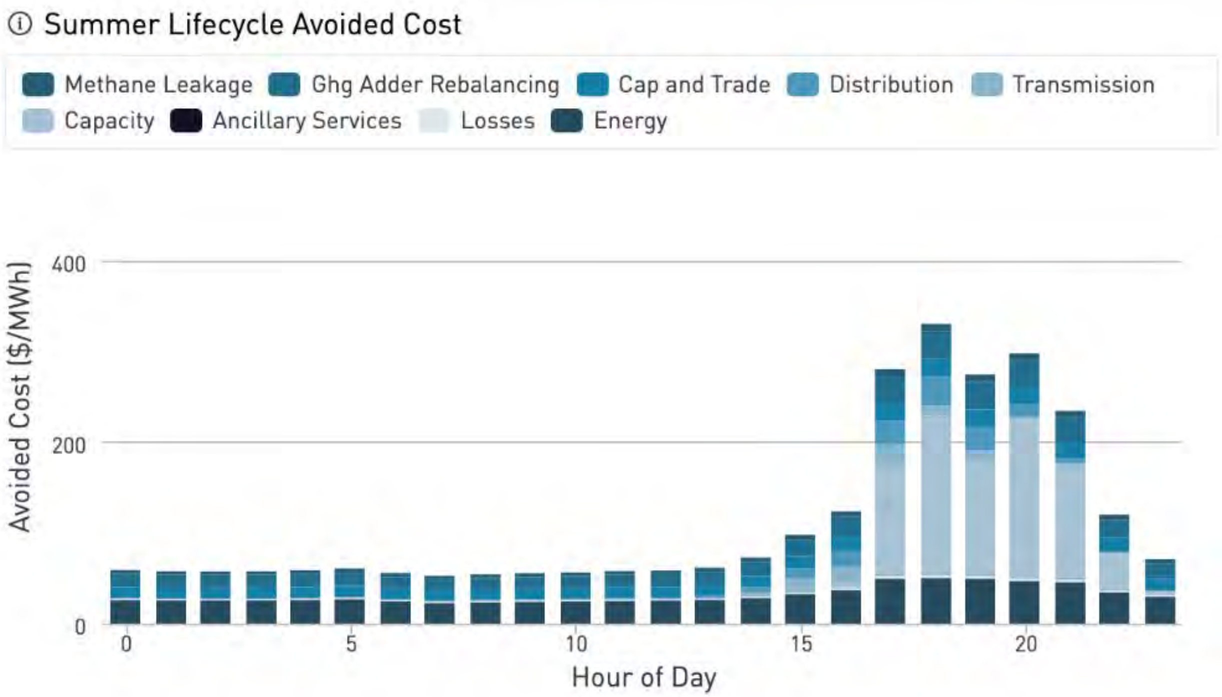
- Hourly electric avoided costs for duration of EUL
- Monthly gas avoided costs for duration of EUL
- Discount Rate

nesp

National Standard Practice Manual (NSPM) for DERs

RECURVE

Commission Approved: Electric Avoided Costs by Component



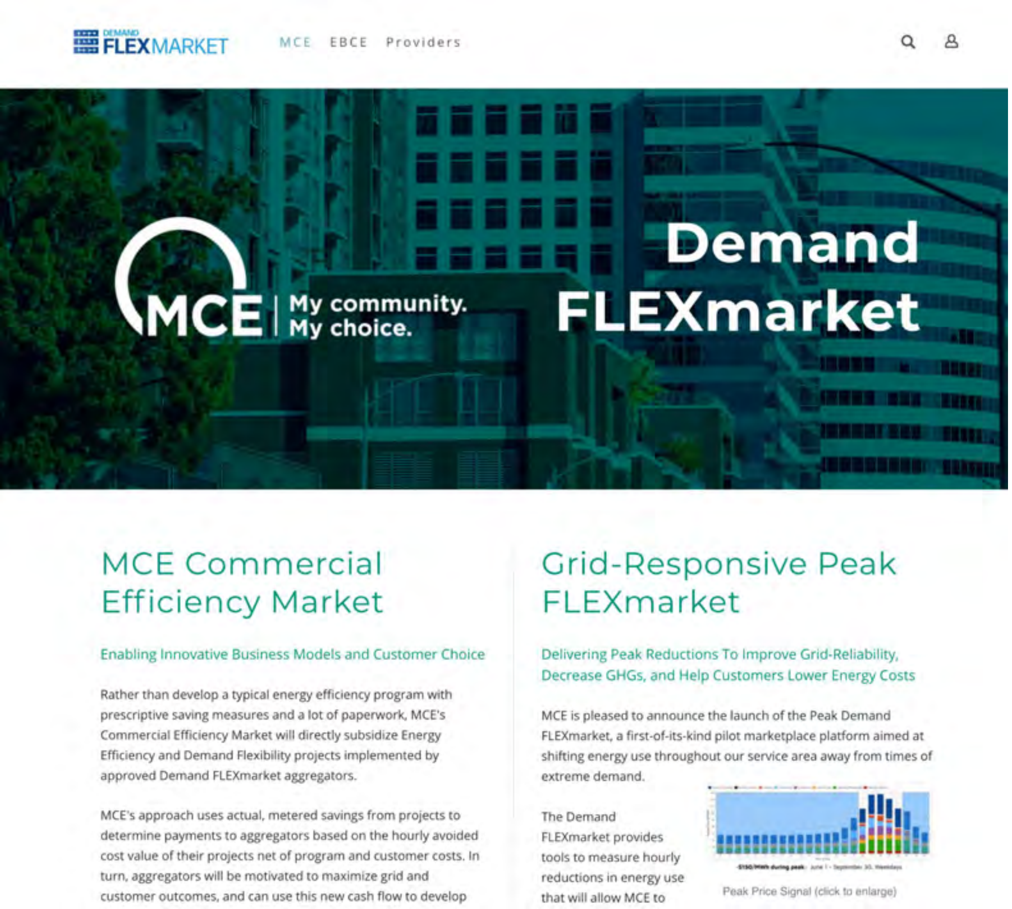
RECURVE

BUILDING MARKET OPPORTUNITIES

Keeping Value Front and Center

RECURVE

DEMAND FLEXMARKET


DEMAND FLEXMARKET

MCE EBCE Providers

MCE | My community. My choice.

Demand FLEXmarket

MCE Commercial Efficiency Market

Enabling Innovative Business Models and Customer Choice

Rather than develop a typical energy efficiency program with prescriptive saving measures and a lot of paperwork, MCE's Commercial Efficiency Market will directly subsidize Energy Efficiency and Demand Flexibility projects implemented by approved Demand FLEXmarket aggregators.

MCE's approach uses actual, metered savings from projects to determine payments to aggregators based on the hourly avoided cost value of their projects net of program and customer costs. In turn, aggregators will be motivated to maximize grid and customer outcomes, and can use this new cash flow to develop

Grid-Responsive Peak FLEXmarket

Delivering Peak Reductions To Improve Grid-Reliability, Decrease GHGs, and Help Customers Lower Energy Costs

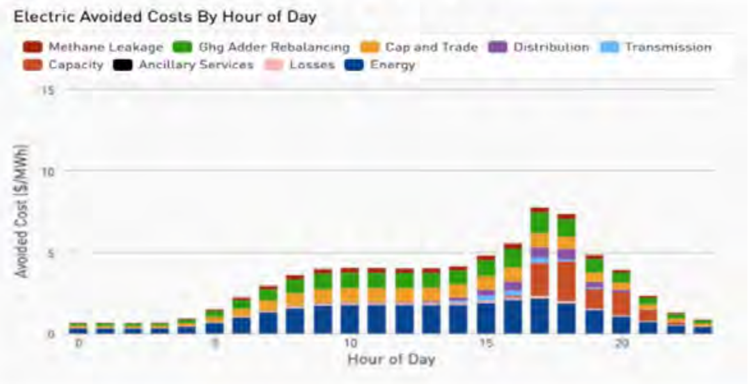
MCE is pleased to announce the launch of the Peak Demand FLEXmarket, a first-of-its-kind pilot marketplace platform aimed at shifting energy use throughout our service area away from times of extreme demand.

The Demand FLEXmarket provides tools to measure hourly reductions in energy use that will allow MCE to

Peak Price Signal (click to enlarge)

Commercial Lighting Value

1 MWh = $76.25



Designed to Bridge Customer & Grid Value

DEMAND FLEXMARKET

Utility		Recurve		Aggregators
Procures Cost Effective Avoided Cost	⟷ Marketplace Contract	Provides Neutral Market Platform	⟷ Flexibility Purchase Agreements	Paid for cost effective hourly grid value based on metered performance

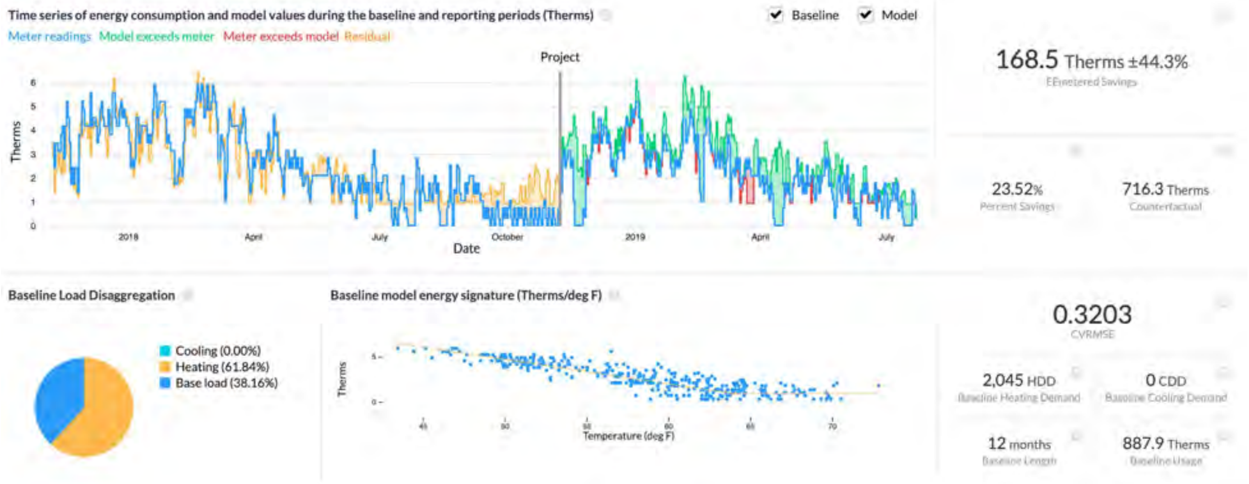
Platform as a Service: Providing Utilities With Cost-Effective Load Shaping Via VPP Aggregators

Fleet Management

Track, Manage, and Integrate Behind the Meter Demand Flexibility

Track and Optimize Virtual Power Plants

Automated Site Level Hourly M&V



A Platform for Market Innovation

BlocPower Increase your building's profitability with a modern heating and cooling system.	**Bright Power** Bright Power is the premier provider of energy and water management services.	**Carbon Lighthouse** Cut Energy at a Portfolio Scale. Because one building at a time doesn't cut it.	**Elevation Home Energy Solutions** We are on a mission to Elevate the Home Energy Experience.	**EverWatt** Stop wasting money on old lighting.	**Halco** Halco is a leading residential and commercial energy services provider in NY
CH Energy CH Energy is an expert in providing a turnkey energy solution.	**CLEAResult** We make energy efficiency smarter, faster, and more accessible for everyone.	**Conectric IoT** Operational Asset Risk Management.	**Joule Smart** Joule Smart will save you time, money, and give you peace-of-mind.	**Leap** Leap is a marketplace for grid services, to help balance the grid.	**National Resource Management** If your business relies on refrigeration systems, NRM has a way to help you.
Dividend Finance A smarter, faster way to finance home improvements and commercial upgrades	**ecobee** A smart home technology helping customers maintain comfort and cost savings	**EcoGreen Solutions** We help companies save energy and cut costs.	**Northern Pacific Power Systems** Premier Energy Solutions for the North Bay Area in California	**OhmConnect** Use energy when it's cleanest and earn rewards for saving when it's dirty.	**Packetized Energy** Packetized Energy makes electricity flexible.
Ecology Action Ecology Action is creating a thriving environment and low-carbon economy	**Edgewise Energy** Helping property owners to improve resiliency, sustainability, and profit.	**Electrum** Electrum provides a home electrification concierge marketplace	**Sealed** Stress-free home upgrades? With Sealed, they're not just a fantasy.	**Swell Energy** Swell Energy is an energy and smart grid solutions provider.	**Voltus** Better Energy, More Cash.

Accountability

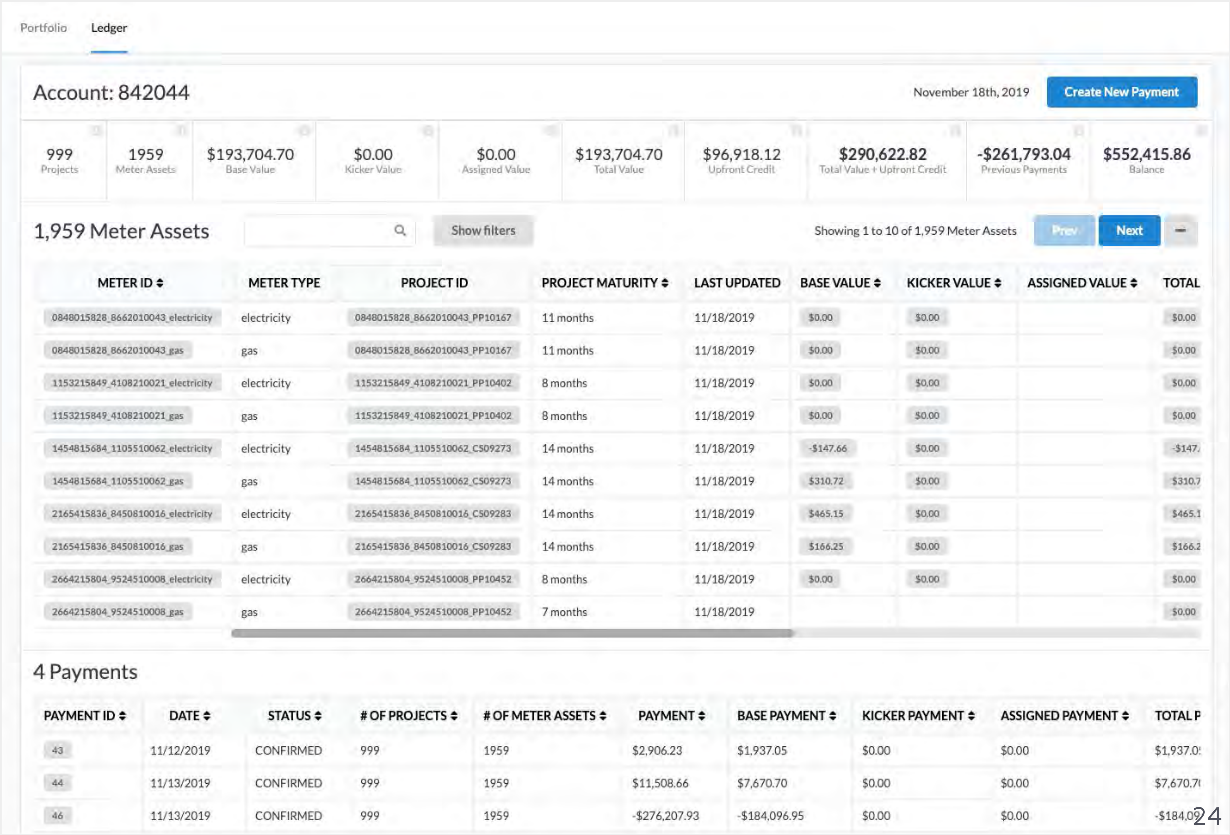
Flex Ledger:

System of Record for Demand Flexibility Transactions

RECURVE

Demand Flexibility System of Record for:

BAY AREA Regional Energy Network · SoCalGas · PG&E · EnergyTrust of Oregon · MCE · nyserda Energy. Innovation. Solutions.



Portfolio | Ledger

Account: 842044

November 18th, 2019

Create New Payment

999	1959	$193,704.70	$0.00	$0.00	$193,704.70	$96,918.12	$290,622.82	-$261,793.04	$552,415.86
Projects	Meter Assets	Base Value	Kicker Value	Assigned Value	Total Value	Upfront Credit	Total Value + Upfront Credit	Previous Payments	Balance

1,959 Meter Assets

Show filters

Showing 1 to 10 of 1,959 Meter Assets

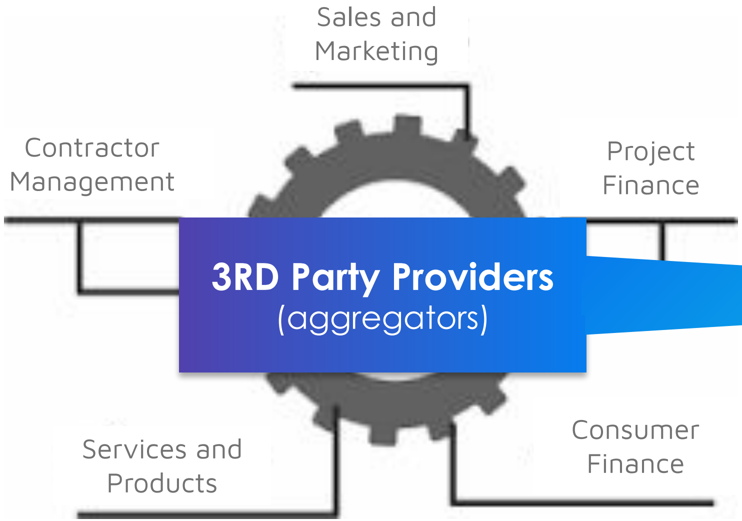
Prev | Next

METER ID	METER TYPE	PROJECT ID	PROJECT MATURITY	LAST UPDATED	BASE VALUE	KICKER VALUE	ASSIGNED VALUE	TOTAL
0848015828_8662010043_electricity	electricity	0848015828_8662010043_PP10167	11 months	11/18/2019	$0.00	$0.00		$0.00
0848015828_8662010043_gas	gas	0848015828_8662010043_PP10167	11 months	11/18/2019	$0.00	$0.00		$0.00
1153215849_4108210021_electricity	electricity	1153215849_4108210021_PP10402	8 months	11/18/2019	$0.00	$0.00		$0.00
1153215849_4108210021_gas	gas	1153215849_4108210021_PP10402	8 months	11/18/2019	$0.00	$0.00		$0.00
1454815684_1105510062_electricity	electricity	1454815684_1105510062_CS09273	14 months	11/18/2019	-$147.66	$0.00		-$147.
1454815684_1105510062_gas	gas	1454815684_1105510062_CS09273	14 months	11/18/2019	$310.72	$0.00		$310.7
2165415836_8450810016_electricity	electricity	2165415836_8450810016_CS09283	14 months	11/18/2019	$465.15	$0.00		$465.1
2165415836_8450810016_gas	gas	2165415836_8450810016_CS09283	14 months	11/18/2019	$166.25	$0.00		$166.2
2664215804_9524510008_electricity	electricity	2664215804_9524510008_PP10452	8 months	11/18/2019	$0.00	$0.00		$0.00
2664215804_9524510008_gas	gas	2664215804_9524510008_PP10452	7 months	11/18/2019				$0.00

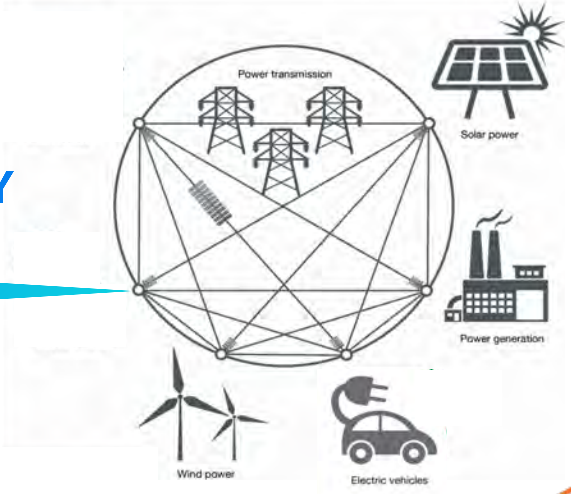
4 Payments

PAYMENT ID	DATE	STATUS	# OF PROJECTS	# OF METER ASSETS	PAYMENT	BASE PAYMENT	KICKER PAYMENT	ASSIGNED PAYMENT	TOTAL P
43	11/12/2019	CONFIRMED	999	1959	$2,906.23	$1,937.05	$0.00	$0.00	$1,937.0
44	11/13/2019	CONFIRMED	999	1959	$11,508.66	$7,670.70	$0.00	$0.00	$7,670.7
46	11/13/2019	CONFIRMED	999	1959	-$276,207.93	-$184,096.95	$0.00	$0.00	-$184,0

Key policy changes today . . .



DEMAND FLEXIBILITY



. . . enable a future of grid integration.

BUSINESS MODELS

Savings Comfort Health

RECURVE

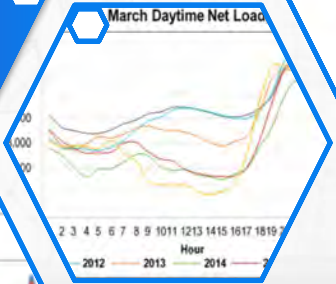
SHAPE THE FUTURE OF ENERGY

Pay for Performance

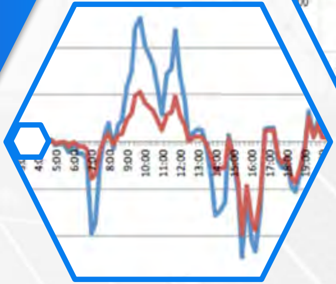
Procurement

Demand Flexibility

Resource Curve



Metered Flexiwatt



Carmen Best

carmen@recurve.com

Looking to the Edge: Connecting Platforms and Markets to Benefit Climate and Customers

Michael Jung

Market Development

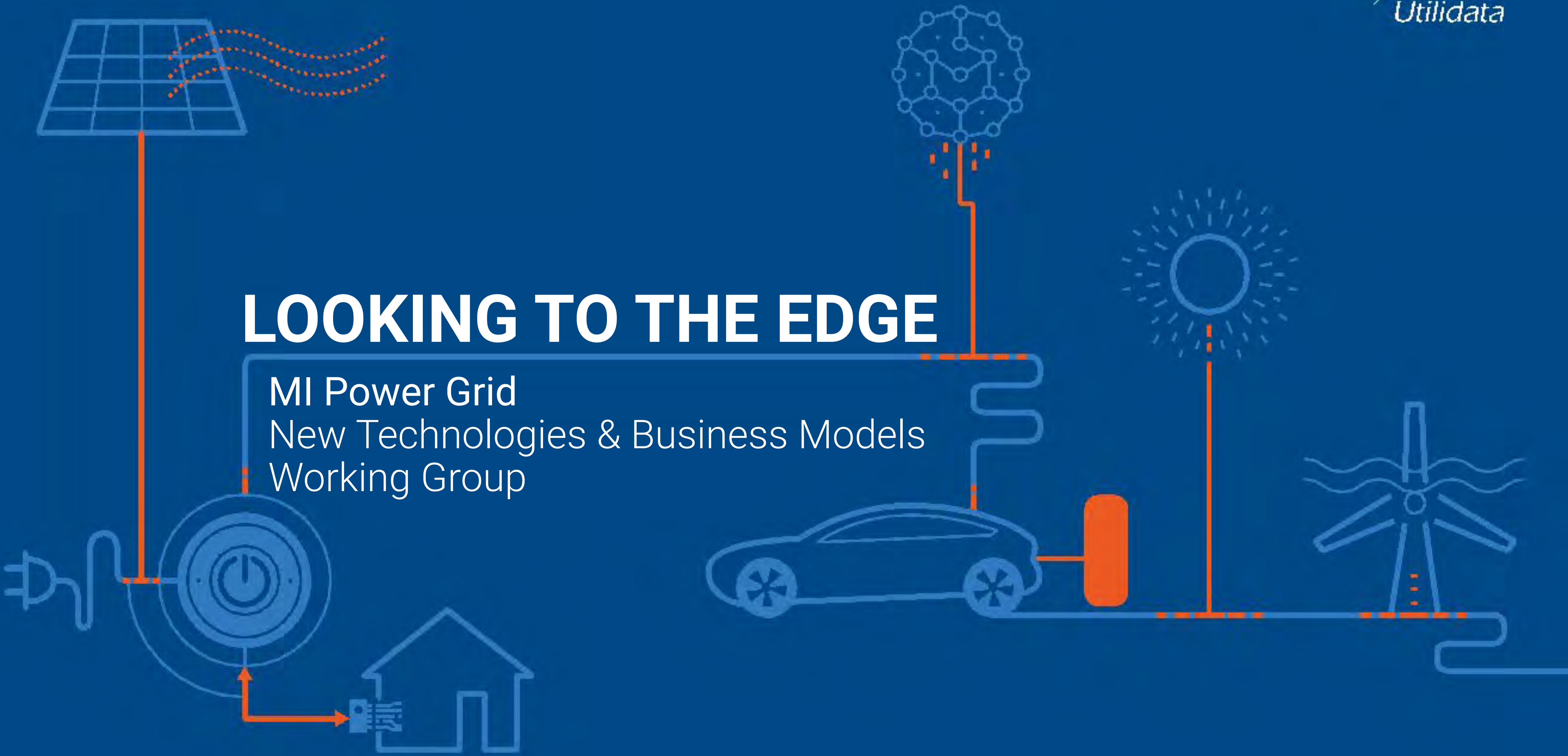
Utilidata

Utilidata

LOOKING TO THE EDGE

MI Power Grid

New Technologies & Business Models Working Group



May 19, 2021

ABOUT UTILIDATA

We are an industry leading grid-edge technology company with:

- A decade of experience operating and optimizing distribution grid assets
- Groundbreaking software that unlocks greater value from smart meters
- A diverse team of experts working to align commercial, technical, and regulatory outcomes

We are digitizing the grid edge to unleash the full potential of clean energy.

The edge of the distribution grid is about to become **the most important part of the energy ecosystem.**

TRADITIONAL GRID EDGE

Until now, the grid edge has been little more than the final stop for one-way power flow.

TODAY'S GRID EDGE

The grid edge is now where clean energy investments meet the utility system.

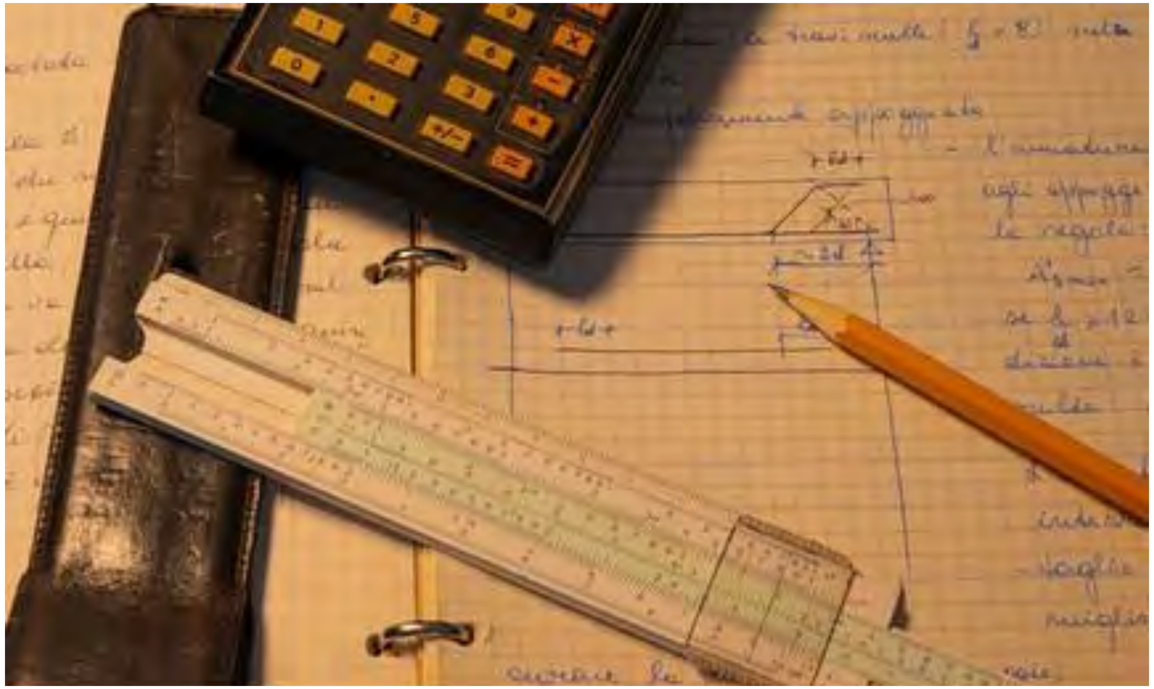
We need visibility and control at the grid edge to integrate dynamic distributed resources.

OPERATING BLIND AT THE EDGE

Utilities still rely on outdated and incomplete physical models to operate the grid edge.

This limits the potential of clean energy:

- Slow interconnection
- Limited hosting capacity
- Lack of flexible demand



What you see happening on the grid depends on who's looking and from what vantage point.

Everyone who manages, builds, regulates and provides electricity to our power system — from utilities to system operators — uses their own sets of tools and models of the system...

This is becoming a huge hindrance as operators are now orchestrating novel and unpredictable flows of power from billions of new devices both contributing to and drawing from the grid.

- X, the moonshot factory

UTILITIES NEED NEW SOFTWARE SOLUTIONS

Traditional Utility Systems	Modern Software Systems
Estimated data based on models	Real-time data
Static models	Iteratively built machine-learning models
Custom-built for each utility	Scalable and adaptable with the flexibility to deploy on any grid system
Server-based	Server- or cloud-based
Require hardware deployment	Leverages existing utility assets
Operates on primary circuits	Extends all the way to the grid-edge

DATA IS POWER

Utilities need to leverage data from every investment, especially smart meters.

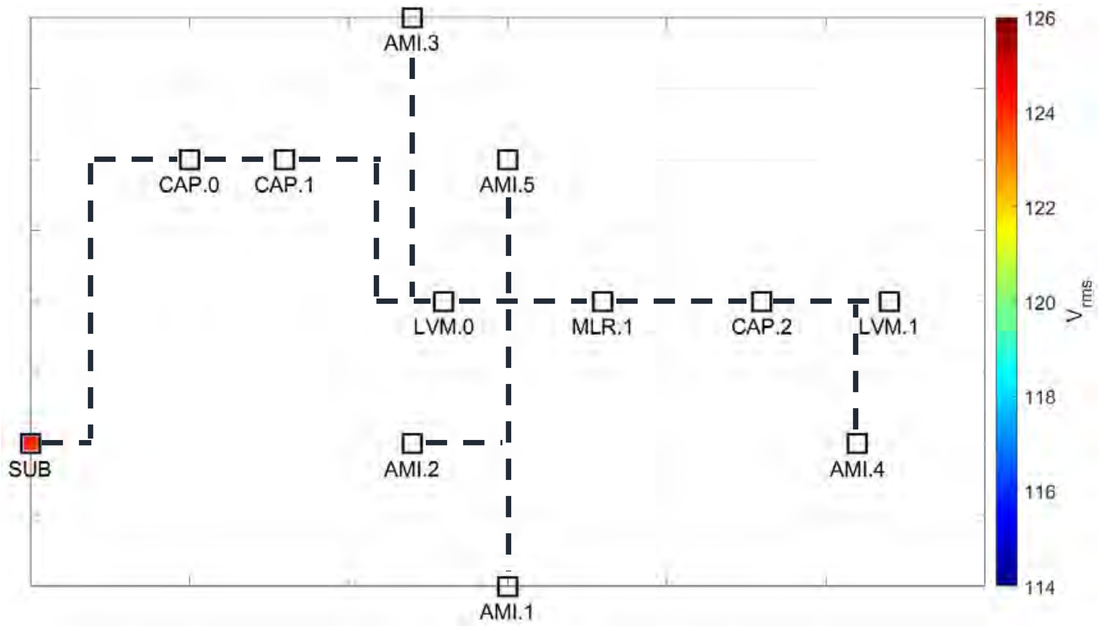
Utilidata's platform works with limited data from the primary system.

The platform improves as more data sources, like smart meters, are added.

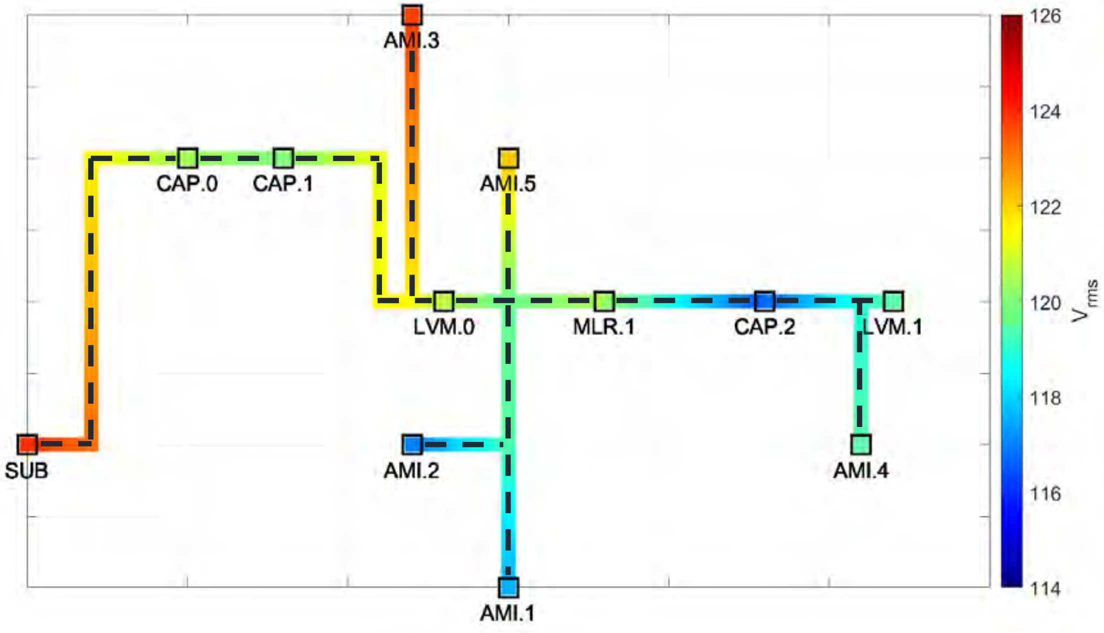
The value is even greater when meters have distributed computing capabilities.

SOFTWARE SOLVES COMPLEXITY

Typical Grid Visibility



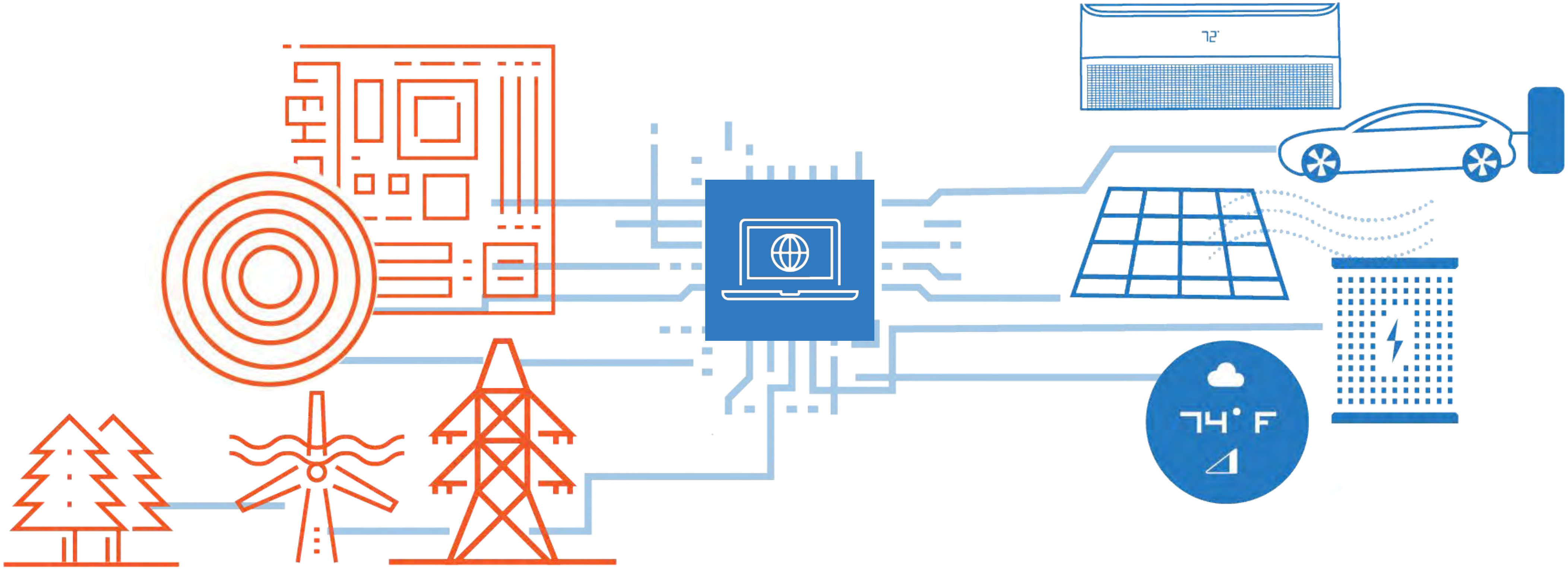
Utilidata Grid Visibility



Utilidata's software leverages AI and machine learning to establish electrical relationships, build topology from the substation to the meter, and deliver **real-time visibility and control at the grid-edge**.

INCENTIVIZING THE RIGHT SOLUTIONS

Utilities must be incentivized to invest not only in hardware, but also in software and communications, and all investments should be expected to support clean energy outcomes.



Thank you.

Michael Jung
mjung@utilidata.com
+1.503.360.3881

utilidata.com @Utilidata company/utilidata

MI POWER GRID

Making the Most of Michigan's Energy Future

New Technologies and Business Models

Break: 2:15 – 2:25 PM

Stakeholder Meeting 8: Alternative Business & Ownership Models

May 19, 2021

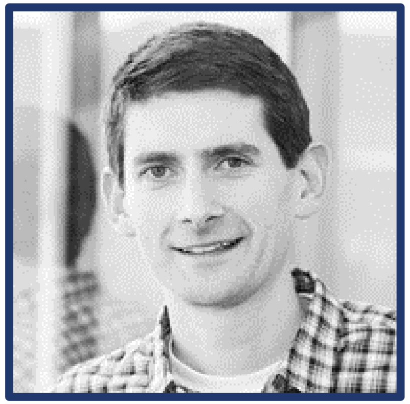
Perspectives on Alternative Business & Ownership Models

Moderator

Greg Bolino
Founder & CEO
DG Reimagined LLC

Michael Delaney
Executive Director, Policy, Cost, & Pricing
Consumers Energy

Neal Foley
Director, Regulatory Affairs
DTE Energy



Jess Melanson
President & COO
Utilidata, Inc.

Erika Myers
Global Senior Manager, EVs
World Resource Institute

Josh Wong
President & CEO
Opus One Solutions Energy Corp.

MI Power Grid: New Technologies and Business Models Workgroup Meeting #8:

Perspectives on Alternative Business & Ownership Models

Name	Role	Profile
 Neal Foley	Director of Regulatory Affairs, DTE Energy	Neal is a Director of Regulatory Affairs at DTE where he focuses mainly on advanced pricing and rate design, load research, and bringing the "regulatory lens" to a variety of topics, including the emergence and growth of Distributed Energy Resources (DERs) and their associated business models. Prior to his current role Neal worked within DTE's Corporate Strategy team, and prior to DTE Neal spent the majority of his professional career in consulting – first at Booz Allen Hamilton and Deloitte in the Washington, DC area, and more recently at McKinsey in Detroit. Neal holds dual bachelor's degrees in Aerospace Engineering and Mechanical Engineering from the University of Michigan, and an MBA from Georgetown University
 Mike Delaney	Executive Director of Policy, Cost and Pricing, **Consumers Energy**	Mike's career obsession is to deliver clean energy solutions at scale. Prior to his current role, Mike formed Consumers Energy's Corporate Strategy group. He has 15 years of experience in the utility industry and has served in a variety of roles at both of Michigan's largest utilities. Mike holds a Bachelor's of Engineering Physics and a Master's of Public Policy from the University of Michigan as well as a Master's of Nuclear Engineering from M.I.T.
 Jess Melanson	President & COO, **Utilidata, Inc**.	Jess is President and COO at Utilidata, an industry leading energy technology company that is digitizing the grid edge to unleash the full potential of clean energy. The company's real-time machine learning software leverages data from every point on the distribution grid to create visibility to the edge of the system and optimize operations. Jess has 20 years of experience in leadership positions in energy and public policy. Before coming to Utilidata, he led the Product team at Tendril, and held executive positions in operations, business development and corporate strategy at PSEG, New Jersey's largest energy company. Jess also held influential policymaking positions in New Jersey state government, including energy policy advisor to both the Governor and President of the Board of Public Utilities.
 Erika Myers	Global Senior Manager, Electric Vehicles, **World Resources Institute**	Erika Myers is an EV expert at WRI. She leads the global electric mobility team and works with cities to identify opportunities to electrify transportation, including infrastructure deployment and vehicle-grid integration methods, for public transit and other municipal fleets. Erika has worked for nearly two decades on clean energy, alternative transportation fuels, and distributed energy resources in government, for-profit, and non-profit roles. Her background gives her a unique perspective on the opportunity to leverage renewable energy and EV charging to reduce emissions through deployment of vehicle-grid integration. She 'walks the talk' by owning two battery electric vehicles powered by 100% renewable energy. She publishes about her experiences with her personal blog, EV Love. She was recently named a Top Woman in EV 2021 by Electric Drive UK and received the 2019 Public Utility Fortnightly's "Fortnightly Under 40" award for her vehicle-grid integration research.
 Josh Wong	President & CEO, OpusOne Solutions	Joshua is the founder and CEO of Opus One Solutions. Prior to Opus One, Joshua was the head of smart grid at Toronto Hydro Electric System Limited, where he led the policy, strategy, regulatory, business, and engineering development of Toronto's smart grid infrastructure, including Toronto's 25-year smart grid roadmap. Joshua is a licensed Professional Engineer. He holds a degree in Electrical Engineering from the University of Toronto, Masters of Electric Power Engineering from the University of Waterloo, and completed executive programs from MIT Sloan, IMD Business School and Harvard Business School.
 Greg Bolino	Founder, DG Reimagined	Greg is a strategist and business leader with over 35 years of consulting and management experience. For 17 years, he was Managing Director at Accenture and led the Utilities Strategy practice in North America and in the UK & Ireland. Greg is passionate about the Clean Energy Transition. He founded DG Reimagined to help companies who see opportunities for growth in the energy transition including utilities, real estate, and transportation. He advises executives, boards, policy makers, and investors on navigating the changing landscape in renewable energy, energy storage, electric vehicles, and energy efficiency.

Making the Most of Michigan's Energy Future

New Technologies and Business Models

Break: 3:20 – 3:25 PM

Stakeholder Meeting 8: Alternative Business & Ownership Models

May 19, 2021

Inclusive Utility Investments at the Grid Edge: Business Models for Making Building Energy Upgrades and Vehicle-Grid Integration Accessible to All

Holmes Hummel

Founder & Executive Director

Clean Energy Works

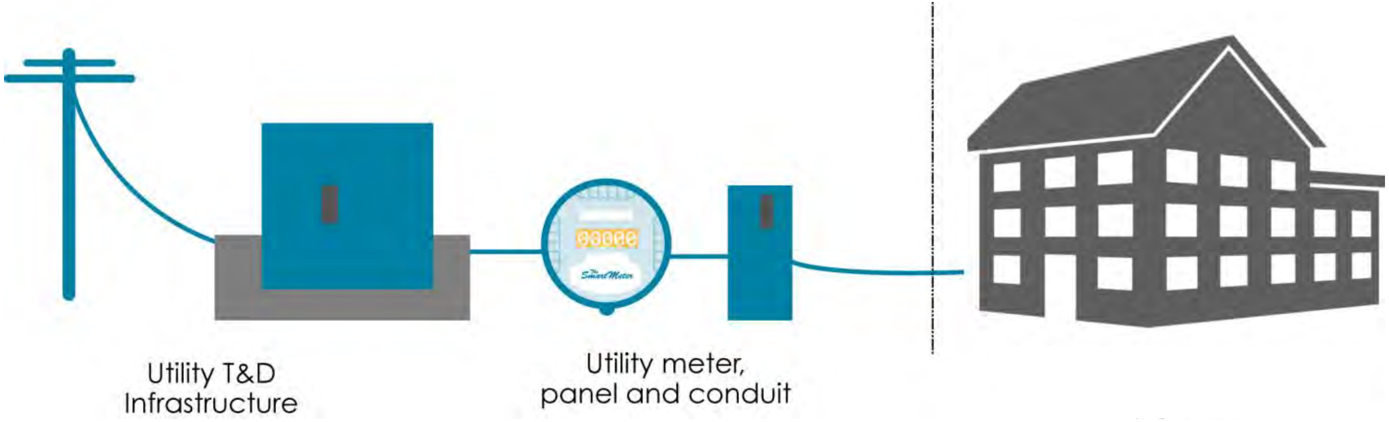
Business & ownership models for essential technologies at the grid-edge

Prepared for the
MI Power Grid New Technologies & Business Models Working Group
May 19, 2020

Clean Energy WORKS

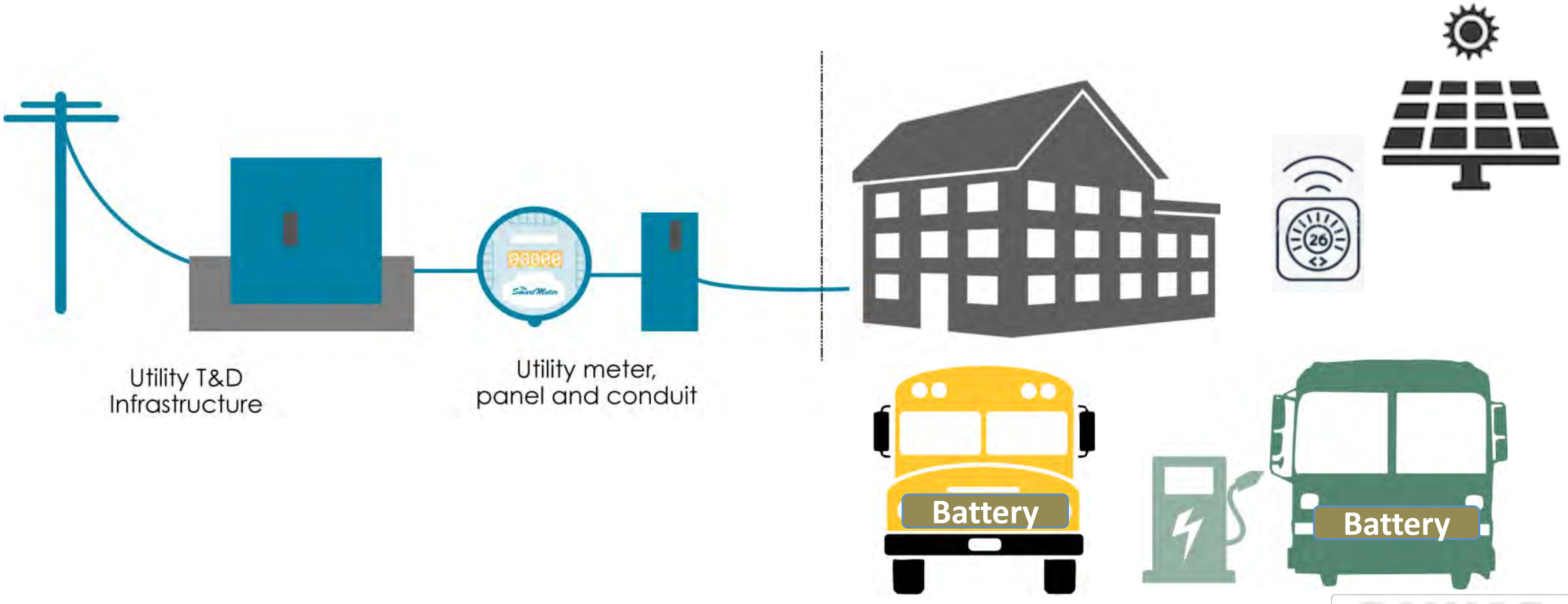
Holmes Hummel, PhD - Founder and Principal
Holmes.Hummel@cleanenergyworks.org

Inclusive financing can capitalize many solutions at the grid edge



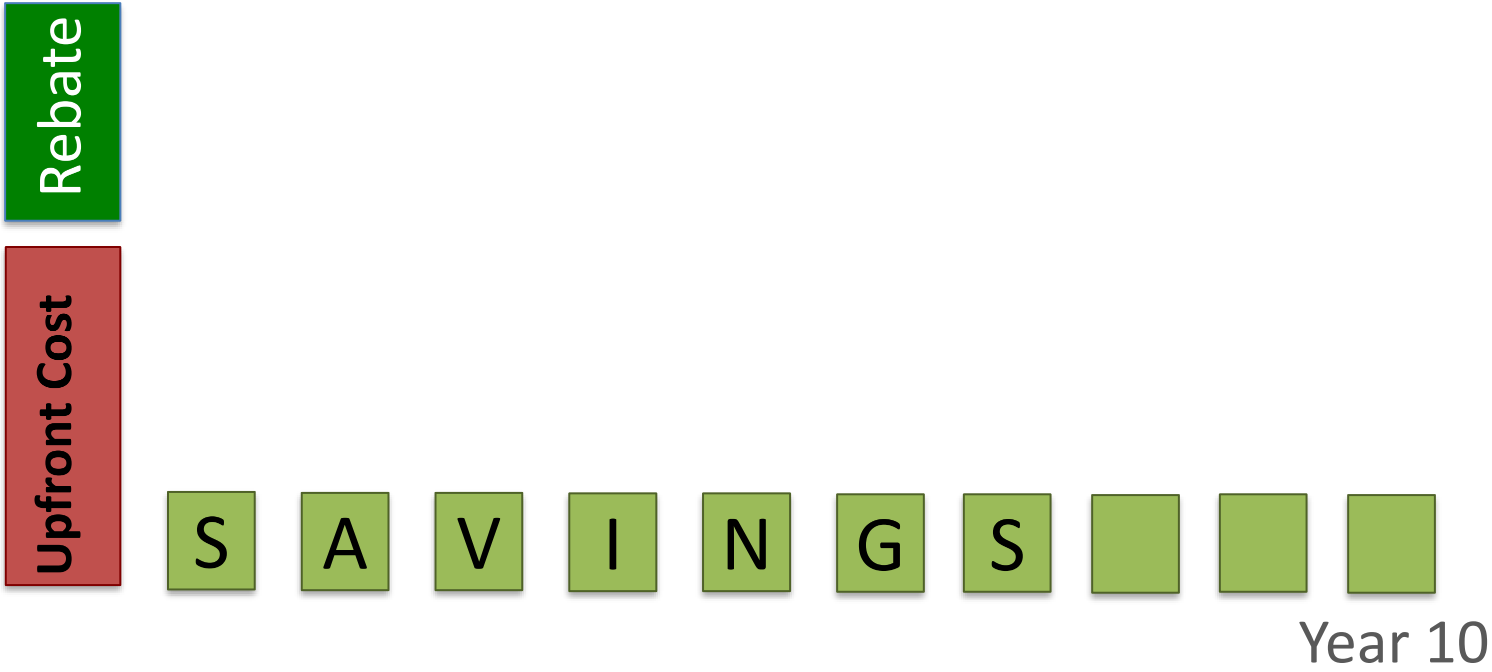
Clean Energy WORKS

Inclusive financing can capitalize many solutions at the grid edge



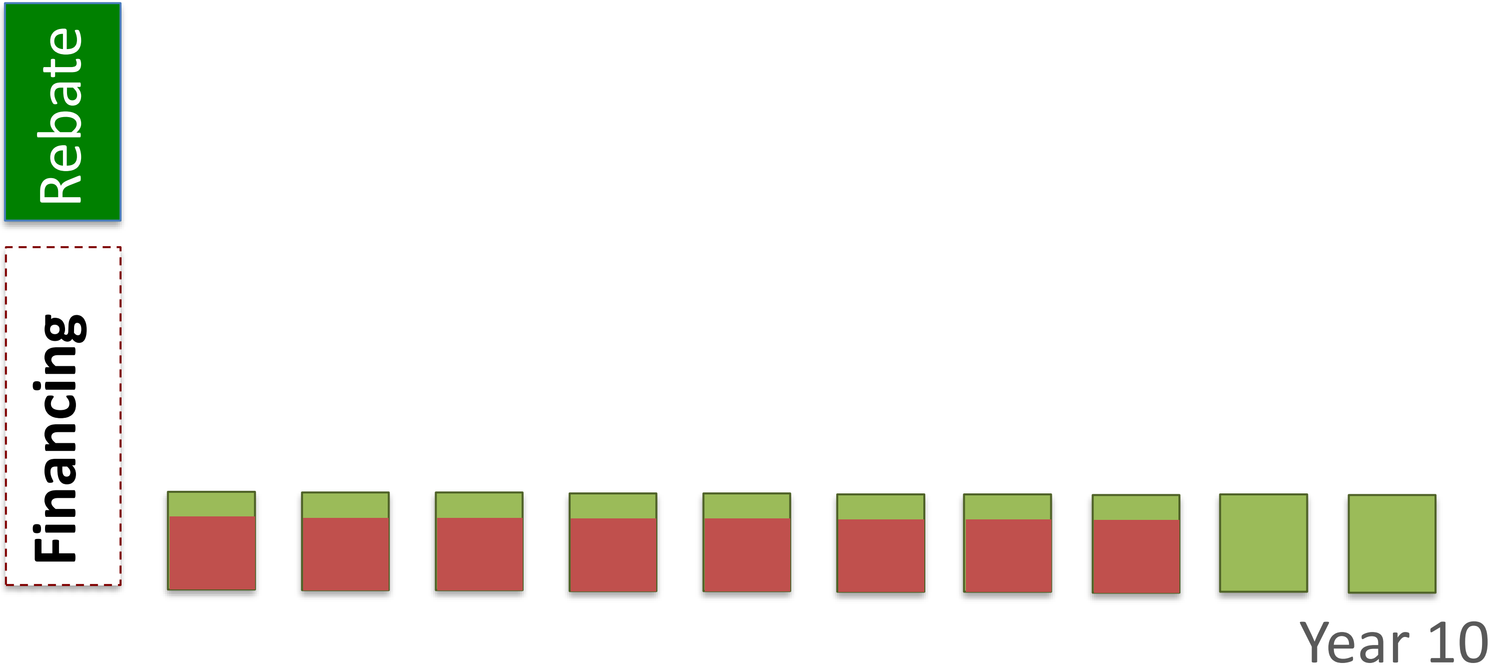
Clean Energy WORKS

Addressing first cost barriers with funding and financing



Clean Energy
WORKS

Addressing first-cost barriers with funding and financing



Funding for initial deployments has been critical to getting started

Instrument	Sustainable	Scalable	Customer Balance Sheet Treatment
Taxpayer funding			
Polluter funding (carbon price)			
Ratepayer funding			

Highly sought grants

Covering the incremental upfront cost with grants is not scalable or sustainable.

Clean Energy WORKS

Financing options can extend the impact of funding available for the incremental upfront cost

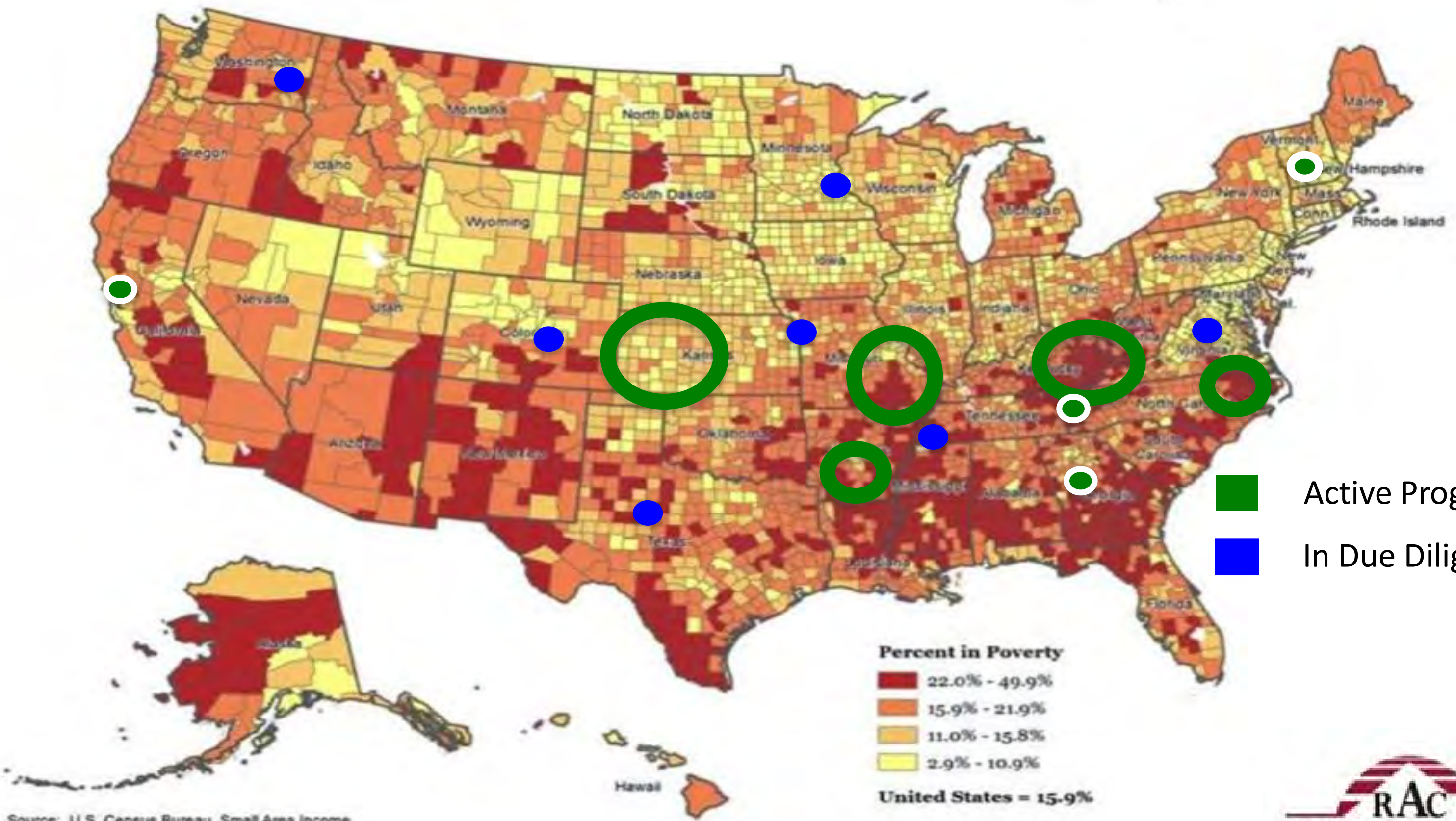
Instrument	Sustainable	Scalable	Customer Balance Sheet Treatment
Taxpayer funding			
Polluter funding (carbon price)			
Ratepayer funding			
Debt financing (bonds)			Balance sheet liability
Operating leases / fleet services			Balance sheet liability
Utility tariffed on-bill investment			

Highly sought grants

Financing

Clean Energy WORKS

Inclusive utility investments for energy efficiency are creating a path to ownership for clean energy upgrades



Active Programs

In Due Diligence

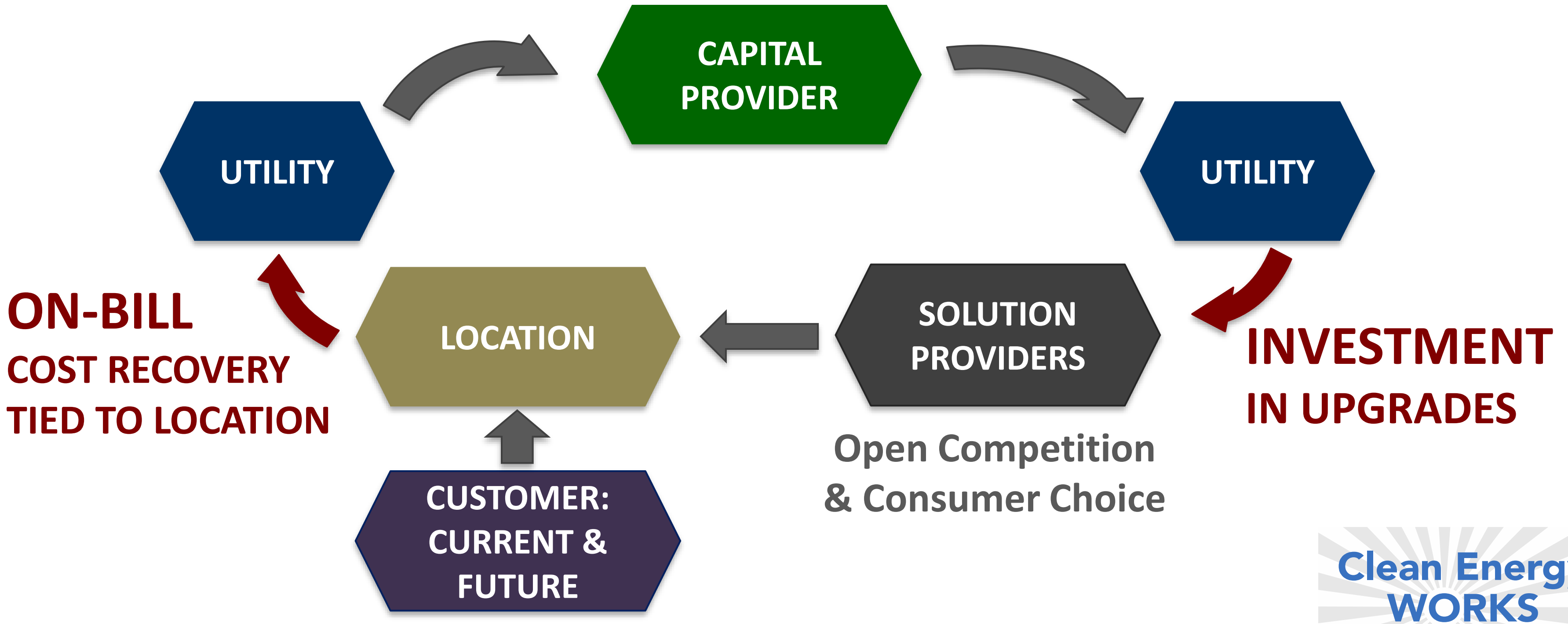
Source: U.S. Census Bureau, Small Area Income & Poverty Estimates (SAIPE), 2011.

Note: Alaska and Hawaii not shown to scale.

RAC Rural Assistance Center

Tariffed On-Bill Investments
deploy and recover capital for <u>site specific</u> upgrades

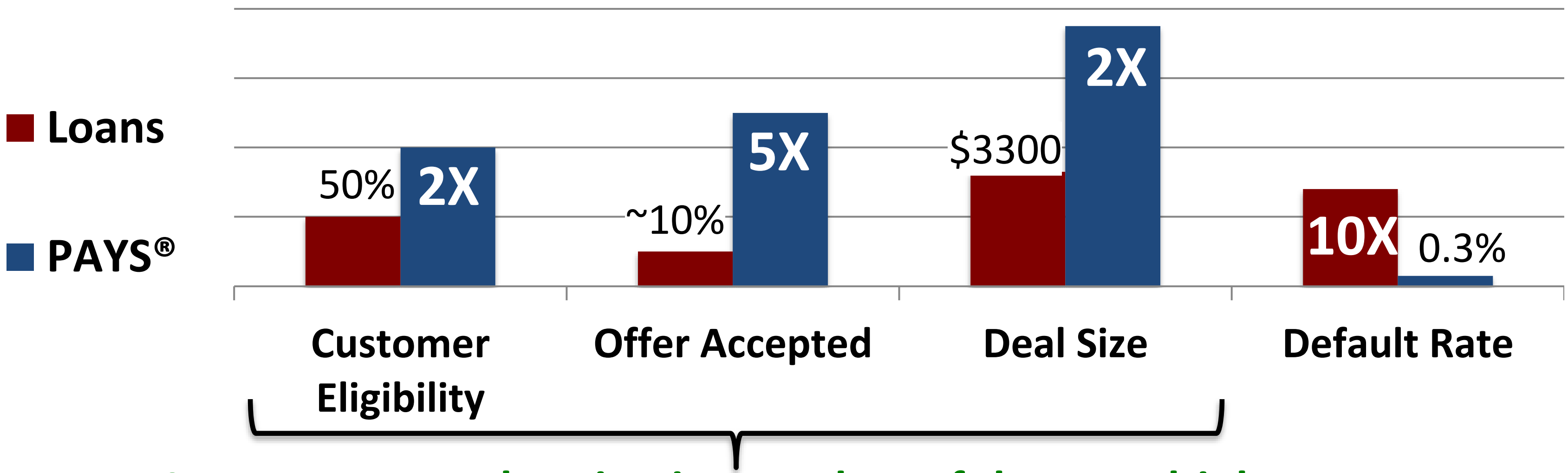
Tariffed on-bill programs offer all utility customers the option to access cost effective energy upgrades using a proven investment and cost recovery model that benefits both the customer and utility.



Clean Energy WORKS

Inclusive financing with tariffed on-bill terms powerfully expands economic opportunity

Comparison for building efficiency upgrades



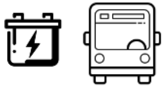
Investment acceleration is a product of these multiples.

- ✓ No consumer loan, lien, or debt
- ✓ Reaches renters and low-income
- ✓ Deeper energy & carbon savings
- ✓ Higher uptake rates

Clean Energy WORKS

Attributes	On-Bill Loan	PAYS® Tariff
• No upfront participant cost for cost effective upgrades	✔	✔
• No credit or income qualification required		✔
• Renters are eligible		✔
• Estimated savings must exceed cost recovery charges		✔
• Participant accepts terms of a utility tariff tied to the location		✔
• Cost recovery is through a fixed charge on the utility bill	✔	✔
• Participant agrees to disconnection for not paying utility bills		✔
• Payments end if upgrade fails and is not repaired		✔
• Cost recovery runs with the location and remains in effect for subsequent customers at that site until cost recovery is complete		✔

Business Models for Electric School Buses

Models	Bus Operators/ Cities	Utilities	Other agents / Investors - SVP
Classic Model			
Bus Leasing Model			
Utility Capitalizes Charging Equipment			
Utility Capitalizes Charging Equipment and On-Board Storage			

Clean Energy WORKS

Clean Energy WORKS

Thank you

www.cleanenergyworks.org

@cleanenergywrks

Better Buildings®
U.S. DEPARTMENT OF ENERGY

Figure 1: Key Differences Between On-bill Loan Model and On-bill Tariff Model

	On-bill Loan	On-bill Tariff
What is the charge on the monthly utility bill?	Debt payment	Cost recovery fee
What does a successor homeowner or occupant pay?	Some programs allow voluntary loan transfers but not automatic	Cost recovery automatically applies to successor occupants
Is utility disconnection possible for non-payment?	Yes, depending on legislative or gubernatorial policy and/or regulatory approval	Yes, depending on restrictions due to time of year
Consumer credit underwriting criteria	Necessary for many loan programs	Not applicable
Renters allowed to participate	Yes, but few do[6]	Yes

Better Buildings

Issue Brief: Low-income Energy Efficiency Financing through On-Bill Tariff Programs

CLEAN ENERGY FOR LOW INCOME COMMUNITIES ACCELERATOR

Decreasing the energy burden faced by low-income populations is a priority for many state and local governments. Traditional residential financing programs and incentives are often inaccessible for low-income and moderate-income families who may be credit-challenged and unlikely to have sufficient savings to provide the required upfront payment. Programs often are particularly inaccessible to those living in rental units, further reducing access for low-income households that live in such units. Partners in the Clean Energy for Low Income Communities Accelerator (CELICA) were interested in the tariffed on-bill model (on-bill tariff) as a means to provide energy efficiency and renewable energy benefits to customers regardless of income level. There was particular interest given on-bill tariffs do not depend on consumer credit and do not require building owner investment, removing a well-known barrier to rental home improvements. Instead, on-bill tariffs directly benefit the tenant that repays the project costs on their utility bill.

This issue brief explores how the on-bill tariff model works to finance energy upgrades while also eliminating loan default risk for both the resident and the utility because the transaction does not involve making a consumer loan.[1] Although on-bill tariffs are not a loan, there may still be consequences for non-payment, like disconnection from power, if that is allowed. On-bill tariffs, while not designed solely for low-income households, have been used to provide energy efficiency improvements in Kansas, Kentucky, Hawaii, Arkansas, Tennessee, North Carolina, South Carolina, and California as well as other states where the programs are accessible to households of all income levels.

After providing a concise overview of various forms of utility on-bill financing for home energy
issue brief explains how on-bill tariffs differ from on-bill financing, and what the benefits
me households. Strategies for state and local governments that want to support on-bill
then described with examples and resources to further explore.

Financing?
utilities across the country, including publicly-owned utilities (i.e., municipal and rural
s) and investor-owned utilities, offer some form of on-bill financing.[2] Utilities vary greatly
re their programs, such as what financing terms are offered and what energy measures
tariffed forms of on-bill financing offer loans to customers who may be required to pass
sts from the lender, be it either the utility or a third party. On-bill loans give consumers a
the up-front cost of the energy upgrade while providing a mechanism to pay off the
crementally over time on their utility bill.[3] Upon sale of the home, the borrower usually
an, although some programs allow transfer to the next occupant if they are able and
he debt. Unfortunately, credit requirements and debt burden of on-bill financing programs
clude many low-income households from participating.

ctures (on-bill loans, on-bill repayment, and on-bill tariffs), utility customers are able to
energy improvements like efficiency, storage and solar photovoltaic generation to their
es and repay the project costs over time on their monthly utility bill. Repayment refers

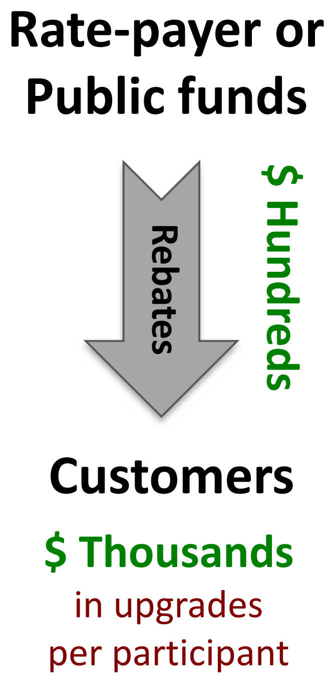
t of bills for utility services occurs for any reason, the utility's protocols for unpaid bills apply. See section on Differences in
r further discussion.
al and Energy Study Institute. Interactive Map of Utilities with On-Bill Financing Programs. Retrieved from
eesi.org/obf/map
v.energy.gov/eere/slsc/bill-financing-and-repayment-programs

Clean Energy WORKS

Ratepayer funds and other polluter pays funds can buy down upfront cost barriers

<u>After</u> all rebates and public funds are applied, the remaining balance yields these options:

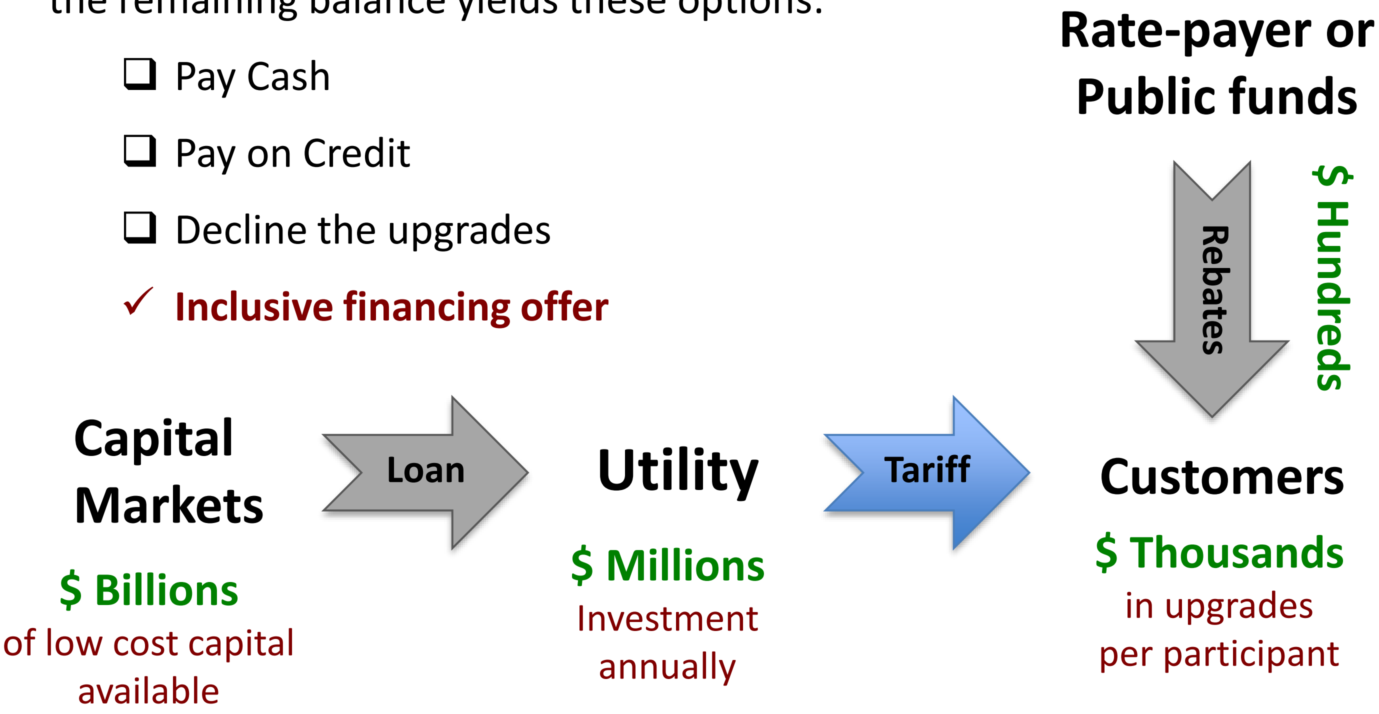
- ❑ Pay Cash
- ❑ Pay on Credit
- ❑ Decline the upgrades



Leveraging funding to mobilize much more capital with inclusive financing via tariffed on-bill investment

After all rebates and public funds are applied, the remaining balance yields these options:

- ❑ Pay Cash
- ❑ Pay on Credit
- ❑ Decline the upgrades
- ✓ **Inclusive financing offer**



Advanced Regulatory Frameworks to Support Energy Innovation

Matthew McDonnell

Managing Director, US Consulting

Strategen

Advanced Regulatory Frameworks to Support Innovation

Michigan Public Service Commission | May 19, 2021

New Technologies and Business Models Workgroup

Agenda

1. Key Takeaways
2. Regulatory Sandboxes
3. Alternative Regulatory Mechanisms (CAPEX/OPEX Equalization)

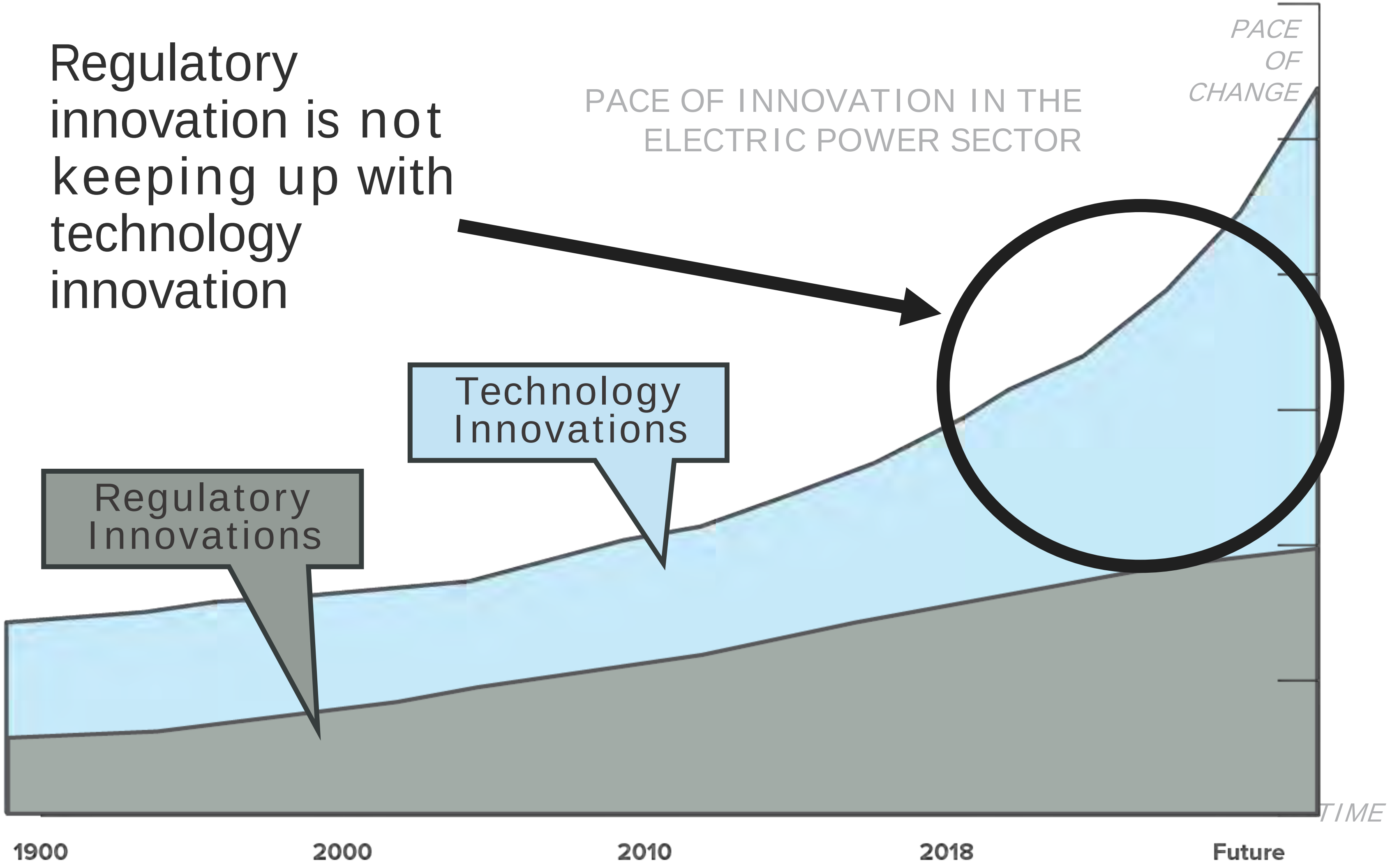
01

Key Takeaways

Key Takeaways

Regulatory Innovation is the Key

Regulatory innovation is not keeping up with technology innovation



Key Takeaways

- New regulatory frameworks and mechanisms are necessary to create sufficient space for innovation and to unlock opportunities for new business models
- Innovation Platforms or Regulatory Sandboxes can help facilitate rapid pilot deployment and scaling to test new ideas in a customer-centric manner
- Alternative regulatory mechanisms can help enable new customer and third-party business models by better aligning utility financial incentives

02

Regulatory Sandboxes

Creating Space for Innovation

What are Regulatory Sandboxes?

They are a concept developed to address regulatory uncertainty

They give companies leeway from normal regulations and licensing requirements for a limited period

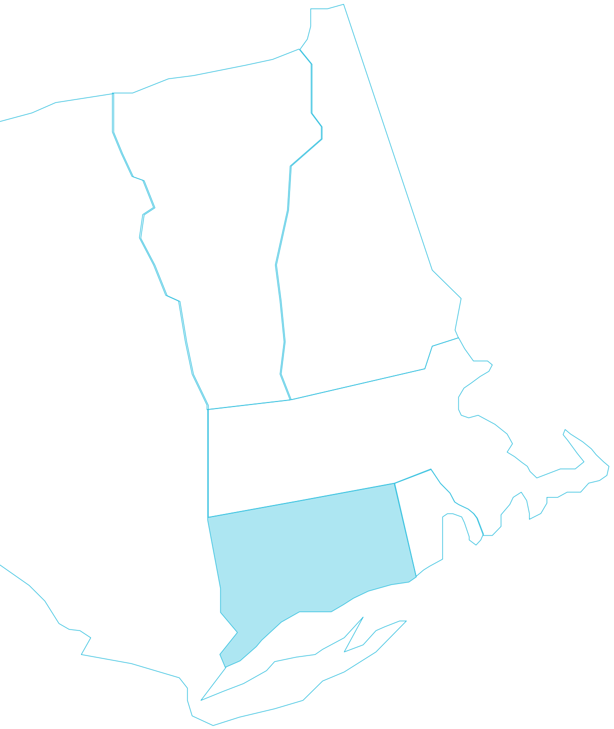
They allow new products and services to be rolled out in a limited environment as clarity is gained about regulatory implications

Innovation Platforms

	Test Beds	Expedited Pilot Frameworks	Regulatory Sandboxes
Purpose	Explore impacts from increased deployment of specific technology-focused projects	Expedite pilots by facilitating 'fast track' regulatory approval	Rapidly demonstrate new customer offerings and accelerate their integration into market
Regulatory Mechanisms	Traditional pilot mechanisms	Specific deployment and collaboration pathways	Bounded scope of potential waivers or exemptions, opening opportunity for new business models
Participation Pathways	Usually led and operated by EDCs	Led and operated by EDCs, often with third-party partnerships	Open to EDCs and third parties

Regulators have a spectrum of tools in their toolbox to foster an ecosystem of innovation

Connecticut: Innovation Pilots Framework



Purpose	Support the Public Utilities Regulatory Authority's framework for an Equitable Modern Grid
	Deploy high-value project solutions that might not otherwise be possible or expedient within the current regulatory environment
Participation Pathways	EDC-led
	Third-party developer-led
	Partnerships between EDCs and third parties
Program Structure	4 phases over a 2-year cycle
	New cohort of projects each year

Connecticut is currently designing a first-of-its-kind approach to regulatory innovation

Docket 17-12-03RE05

Connecticut: Innovation Pilots Framework

Phase 1: Ideation & Screening

- Solicit ideas from innovators that could be suitable for the Innovative Pilots Framework program
- Screen out projects that are not suitable for the program and send to an alternate program, as appropriate

Phase 2: Prioritization & Selection

- Evaluate potential projects based on criteria such as value delivery, customer impact, potential to scale, alignment with EMG objectives, etc.
- Select portfolio of projects that can test various unique elements of design

Phase 3: Project Deployment

- Establish scope, scale, and duration of projects
- Establish tracking and performance metrics to be used through implementation

Phase 4: Assessment & Scale

- Review performance from projects
- Identify projects to potentially scale and retire projects that have served their purpose
- Identify opportunities for improvement and/or goals for next program cycle

Core design element is to break away from traditional ‘pilotitis’ and affirmatively accelerate successful pilots to full-scale deployment

Docket 17-12-03RE05

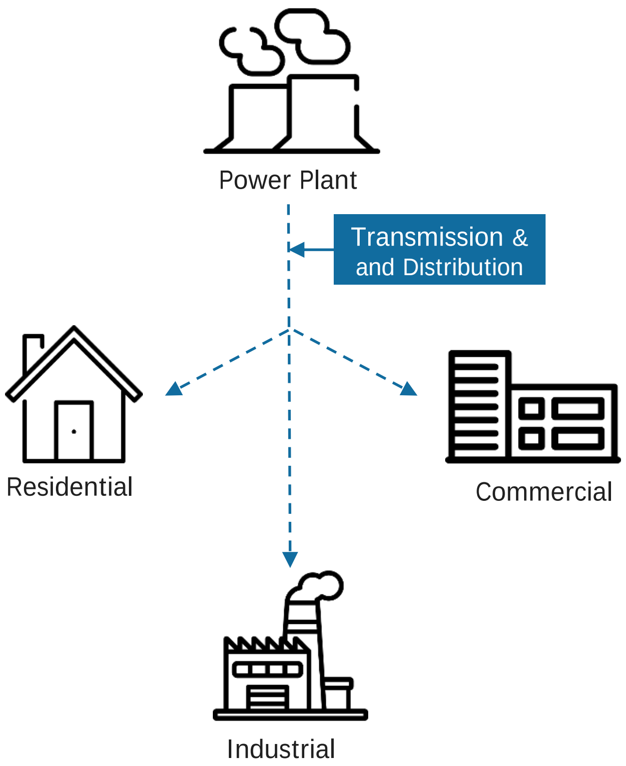
03

Alternative Regulatory Mechanisms

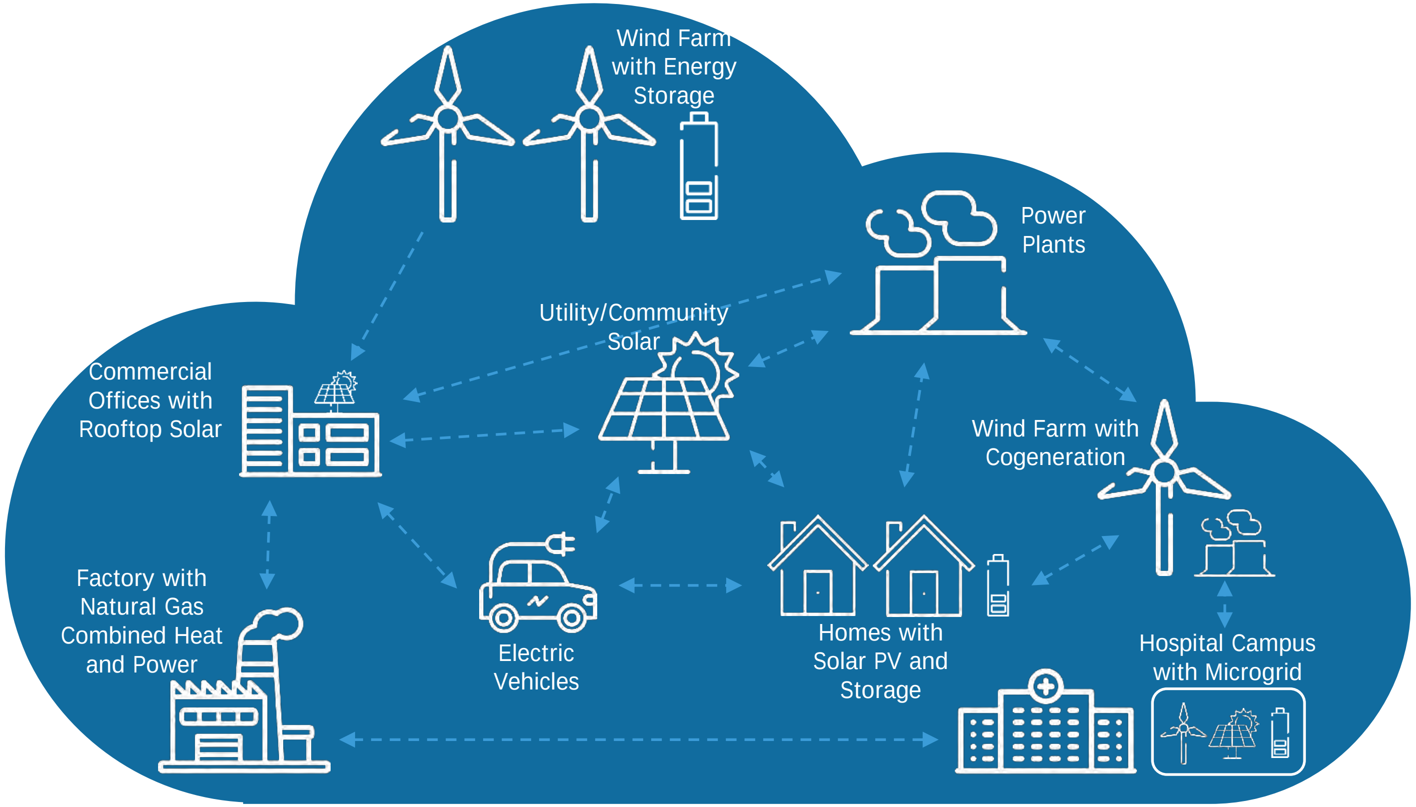
Unlocking opportunities for new business and ownership models

The Energy Transition: Toward a Clean, Decentralized, & Intelligent Grid

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



TODAY: The Energy Transition
Distributed, Cleaner, Two-Way Power Flows



The Rise of Customer-Centric Thinking

+ Customers are coming to expect higher levels of service from their utilities

+ This comes in part from a shift in consumer expectations in other industries, whether it be media services (Netflix), lodging (Airbnb), or retail (Amazon)

+ The common thread in these industry shifts is digital disruption, with customer-centric thinking winning out in the end

+ These revolutionary business models have used technological innovation at the offerings – and platform – level to provide seamless, fast, and convenient service to customers

Music	Telecommunications	Car/Taxi Service
• 1989 – WWW invented • 1999 – Napster released • 2001 – Napster's decline begins • 2014 – Digital music (Spotify, iTunes) sales take lead	• 2004 – landline subscriptions exceeded 92% in U.S. households • 2014 – telephone companies lose estimated 60% of access line • 2015 – smartphone convenience drives the tipping point in landline vs. mobile subscriptions	• 2009 – Uber founded to offer a black car service via smartphone platform • 2012+ - App-based ride services mainstream, often preferred due to convenience and better experience • 2015 – Taxi stock price down nearly 50% since 2010

CAPEX and OPEX: Treating Expenditures More Equitably

+ Return on Service-based Solutions
  - Software-as-a-service (SaaS)
    - E.g., cloud computing
+ Capitalization of a Prepaid Contract
  - Treats an expense (such as payments for a service) like a capital investment by placing it into the rate base amortizing it, and recovering costs over time
  - NY PSC Example
    - REV Track 2 order: electric companies could capitalize pre-paid SaaS contracts
      - New York Public Service Commission, Order Adopting a Ratemaking and Utility Revenue Model Policy Framework, Docket No. 14-M0101, May 9, 2016, at 104

Questions?

Thank you

Contact Us

Matthew McDonnell

Managing Director, US Consulting

mmcdonnell@strategen.com

(313) 657-8982

www.strategen.com

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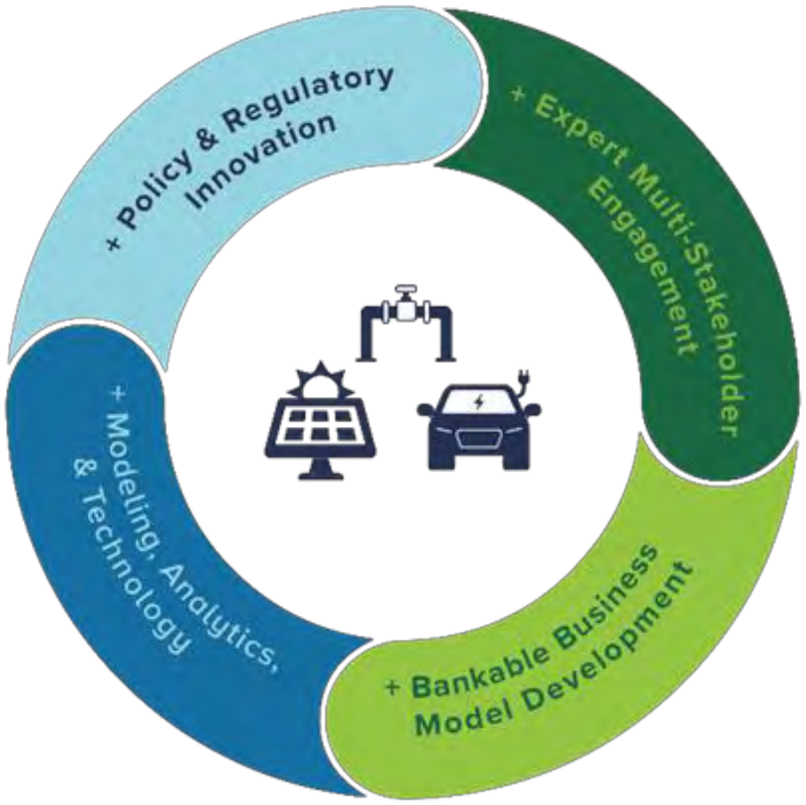


We bring an innovative approach to energy sector transformation

Strategen helps our clients achieve energy system transformation through a unique combination of capabilities.

- + Policy & Regulatory Innovation
- + Expert Multi-Stakeholder Engagement
- + Bankable Business Model Development
- + Modeling, Analytics, & Technology

Appendix

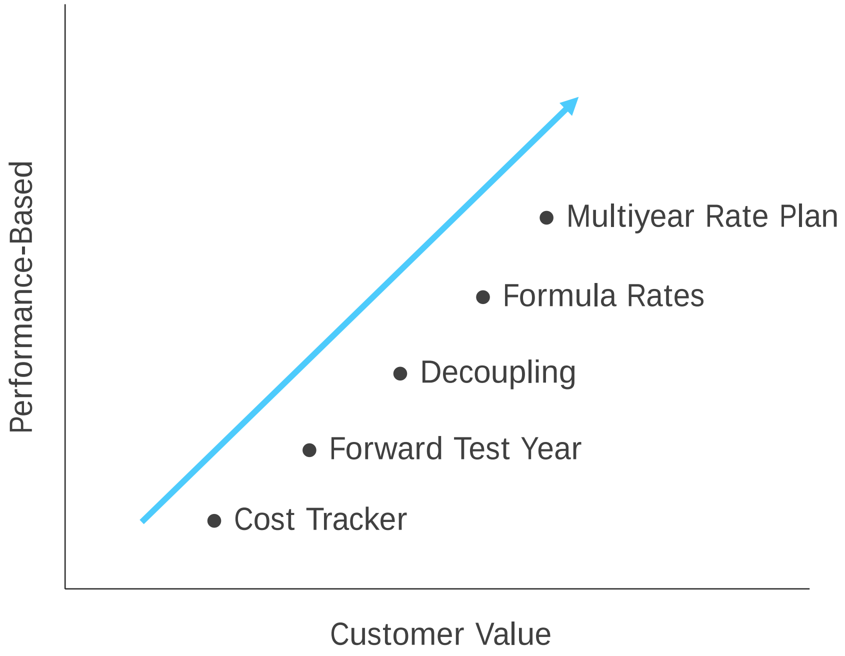
Overview of Core Alternative Mechanisms

Category	Description	Mechanism	Benefits
Revenue Adjustment Mechanisms	Focus on how target revenues are determined, collected, and adjusted, and shifting regulation to incentivize cost control and reward utility performance.	Revenue Decoupling	Reduces utility interest in growing energy sales, removing barriers to energy efficiency and customer-sited generation
		Multiyear Rate Plans	Improves cost containment and reduces administrative burden
		Formula Rates	Ensures the authorized rate of return on agreed-upon investments
		Earning Sharing Mechanisms	Safeguards that performance-based mechanisms will not harm a utility's financial integrity, nor negatively impact customers
Performance Mechanisms	Provide incentives to reach performance targets aligned with policy and customer priorities	Reported Metrics	Informs the development of revenue adjustment mechanisms; tracks the efficacy of regulatory mechanisms
		Scorecards	Encourages better achievement of regulatory outcomes with clear visuals
		Performance Incentive Mechanisms	Financially motivates utilities to improve performance toward established outcomes
Other Regulatory Mechanisms	Help level the field across resource classifications and provide utilities opportunity to earn revenues from procurement of third-party solutions.	Shared Savings	Incentivizes utilities to seek more cost-effective solutions without compromising shareholder interests
		Regulatory Sandbox	Create regulatory space to test innovative products and services
		CAPEX/OPEX Equalization	Financially rewards a utility for pursuing the least-cost, highest value solution

Revenue Adjustment Mechanisms

+ Revenue adjustment mechanisms focus on how a utilities' target revenues are determined, collected and adjusted over time, and include policy tools that shift regulation away from a backward-looking focus on costs and sales to a more forward- looking approach that incentivizes cost control and rewards utility performance

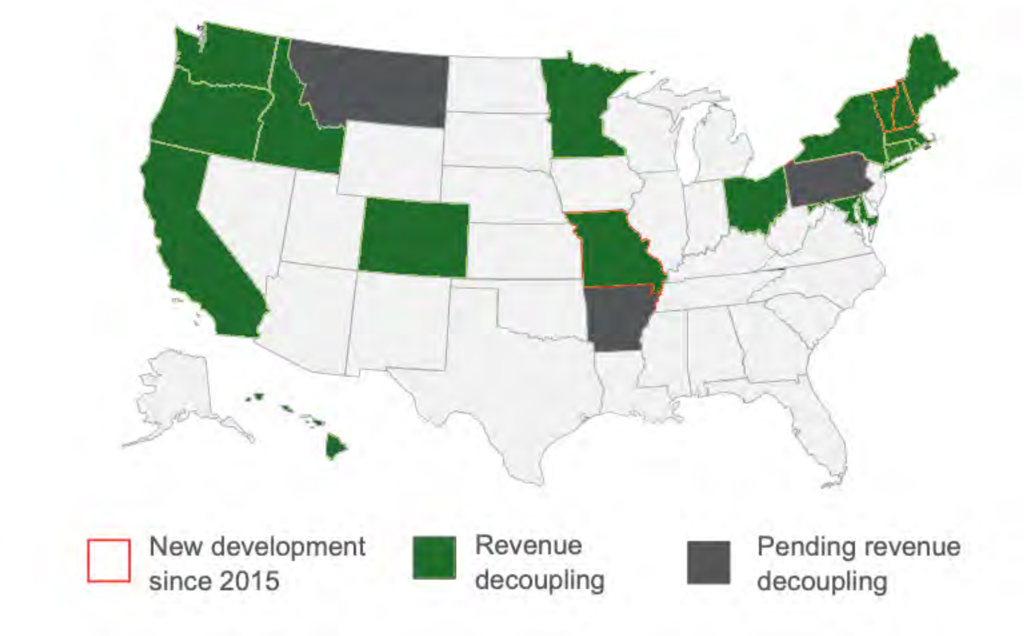
Characterization of Revenue Adjustment Mechanisms



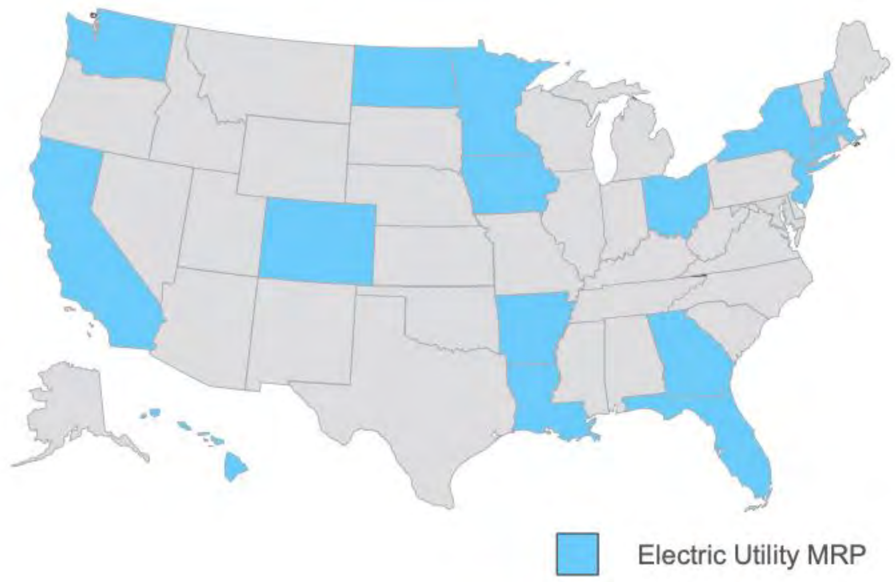
Revenue adjustment mechanisms, which are increasingly adopted in the U.S., can be used to transition a utility towards a performance-based and customer value-centric regulatory model.

Revenue Adjustment Mechanisms

U.S. Revenue Decoupling Precedents



U.S. Multi-year Rate Plan Precedents

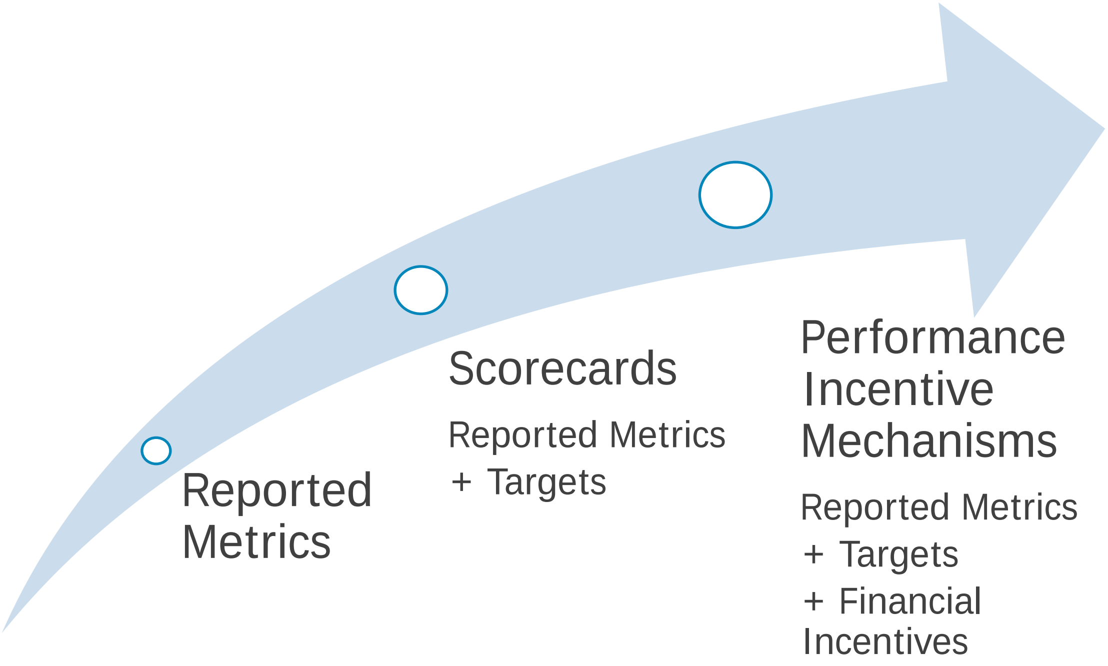


Revenue adjustment mechanisms, which are increasingly adopted in the U.S., can be used to transition a utility towards a performance-based and customer value-centric regulatory model.

Performance Mechanisms

+ Performance mechanisms can be used to assess diverse areas of the utility's performance, such as safety and reliability, customer satisfaction, and adoption of energy efficiency programs

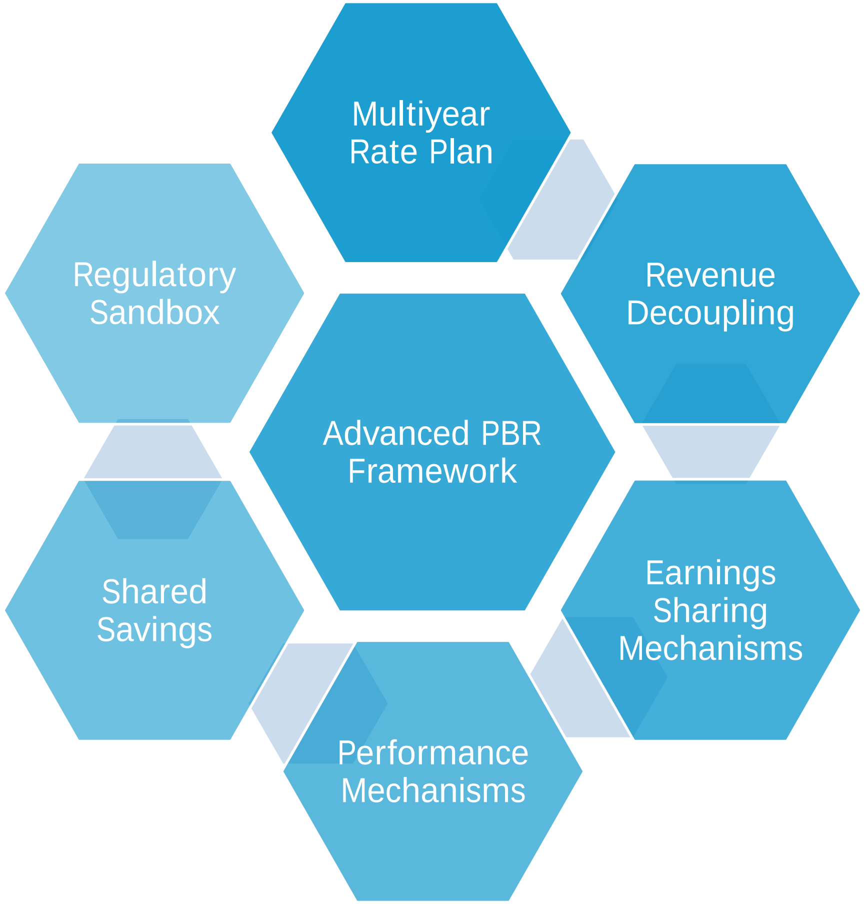
+ The reported metrics and scorecards can also be used as building blocks for a utility, helping it to build metric-tracking capabilities and gather historic and peer-compared performance trends to ultimately pursue a PIM



Performance mechanisms provide incentives to reach performance targets through the public display of metrics or benchmarking, or through financial reward for achieving certain performance

Core Elements of an Advanced PBR Framework

+ To create sufficient space for innovation, enhance customer satisfaction, lower overall costs, and facilitate the transition to a platform utility model, policymakers should explore an advanced PBR framework that includes critical, core elements



Core Elements of an Advanced PBR Framework

Revenue Adjustment Mechanisms	
Multi-Year Rate Plan (MRP) and Indexed Revenue Cap	3-5-Year Control Period with Externally-Indexed Revenue Cap allowing interim adjustments to both capital and operating expenditures pursuant to a revenue cap to an externally indexed formula (e.g., inflation less productivity). A 3-5-year plan period will help to incentivize cost containment over the duration and will free up resources previously spent on annual rate cases to focus on grid modernization and adding customer value.
Revenue Decoupling	Revenue decoupling mechanism to true up revenues to an annual revenue target, which ensures the utility receives the target revenue, regardless of increases or decreases in energy sales. Revenue decoupling smooths out volatility that would occur over a 3-5-year MRP period and removes an incentive barrier to energy efficiency and DER adoption.
Earnings Sharing Mechanism (ESM)	Symmetrical ESM that provides both "upside" and "downside" sharing of earnings between the utility and customers when earnings fall outside a Commission-approved range. A symmetrical ESM can act as a "safety valve" around earnings, allowing for a meaningful percentage of overall earnings to be tied to performance-based incentives while protecting the utility's financial integrity and the customers' interests.

Core Elements of an Advanced PBR Framework

Performance Mechanisms	
Performance Incentive Mechanisms (PIMs)	Set of PIMs designed to help drive achievement of the following regulatory and policy outcomes: Reliability; Interconnection Experience; Customer Engagement; and DER Asset Effectiveness.
Scorecards	Scorecards with targeted performance levels to track progress against emergent regulatory outcomes, such as: Interconnection Experience; Customer Engagement; Cost Control; and GHG Reduction.
Reported Metrics	Portfolio of Reported Metrics to highlight activities under the following regulatory outcomes such as: Affordability; Customer Equity; Electrification of Transportation; and Resilience.

Core Elements of an Advanced PBR Framework

Other Regulatory Mechanisms	
CAPEX/OPEX Equalization	One or more shared savings mechanisms to incentivize the cost-effective pursuit of non-wires solutions and revise regulatory provisions so utilities can earn a rate of return on third-party service solutions.
Innovation	Regulatory sandbox to create space for the development of innovative products and services and experiment with subscription pricing to facilitate enhanced customer access to new products and services.
Platform Service Revenues	Examine how platform service revenues can be incorporated into the regulatory framework to diversify utility revenues in the near-term and facilitate a utility platform business model in the longer term.

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EVs as Distributed Energy Resources: New Business Models for a Changing Energy Ecosystem

Jackie Piero

Vice President, Policy

NUVVE

EVs as DERs:

New business models for a changing energy ecosystem

NUVVE

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EVs as Distributed Energy Resources

1. Savings from optimizing energy flow to buildings and EVs. *Savings depend on local site setup and metering*
2. Revenues from Energy Markets (Ancillary, Spot, Demand Resp. etc.) *These markets require qualifications and aggregation for access.*
   1. Traditional demand curtailment now has export potential

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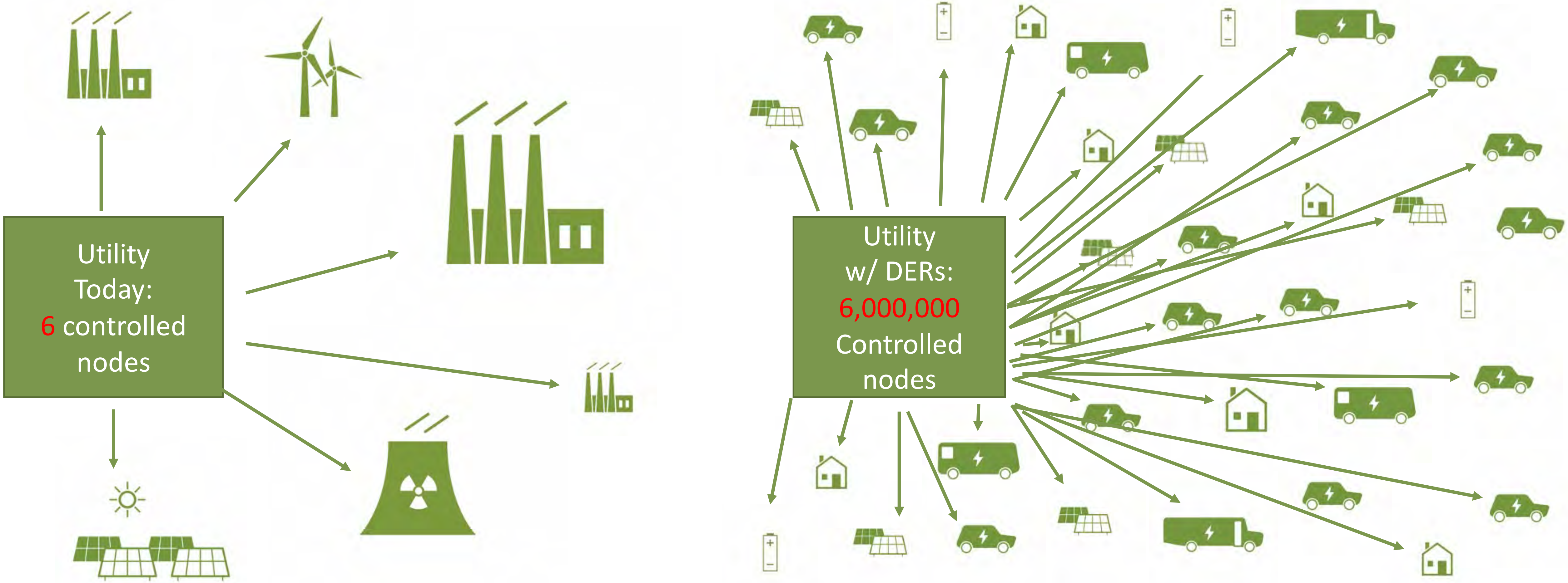
EVs are not air conditioners

- Potential storage resource is difficult to conceive of:
  - 480,000 school buses with US @130 kWh each: 62.4 GWh
- EVs cannot be throttled or cycled without regard for customer
- Control must
  - Take into account the driving patterns and charging needs of the driver
  - Coordinate charging to fill customer needs while minimizing electric bill
  - Increase utilization of existing infrastructure
  - Increase access to charging for all user segments

Utilities needs will change:



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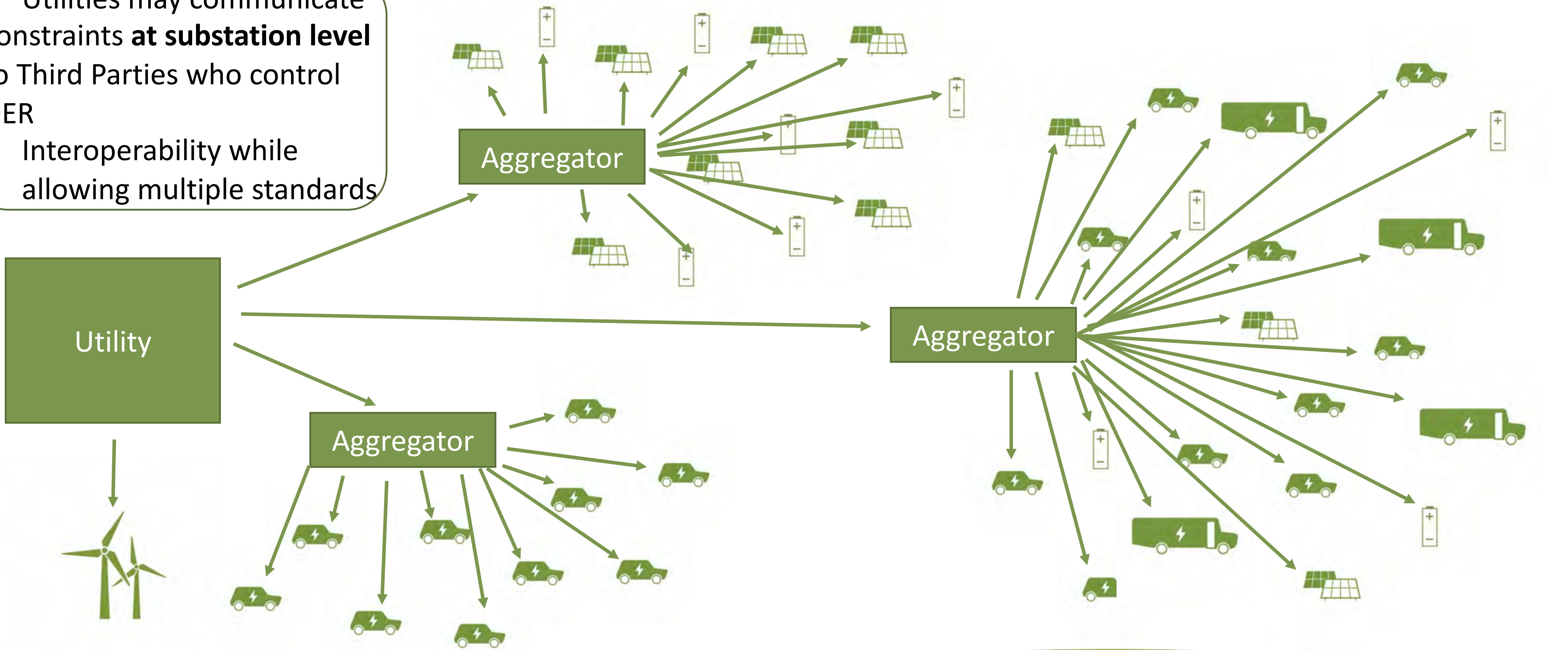
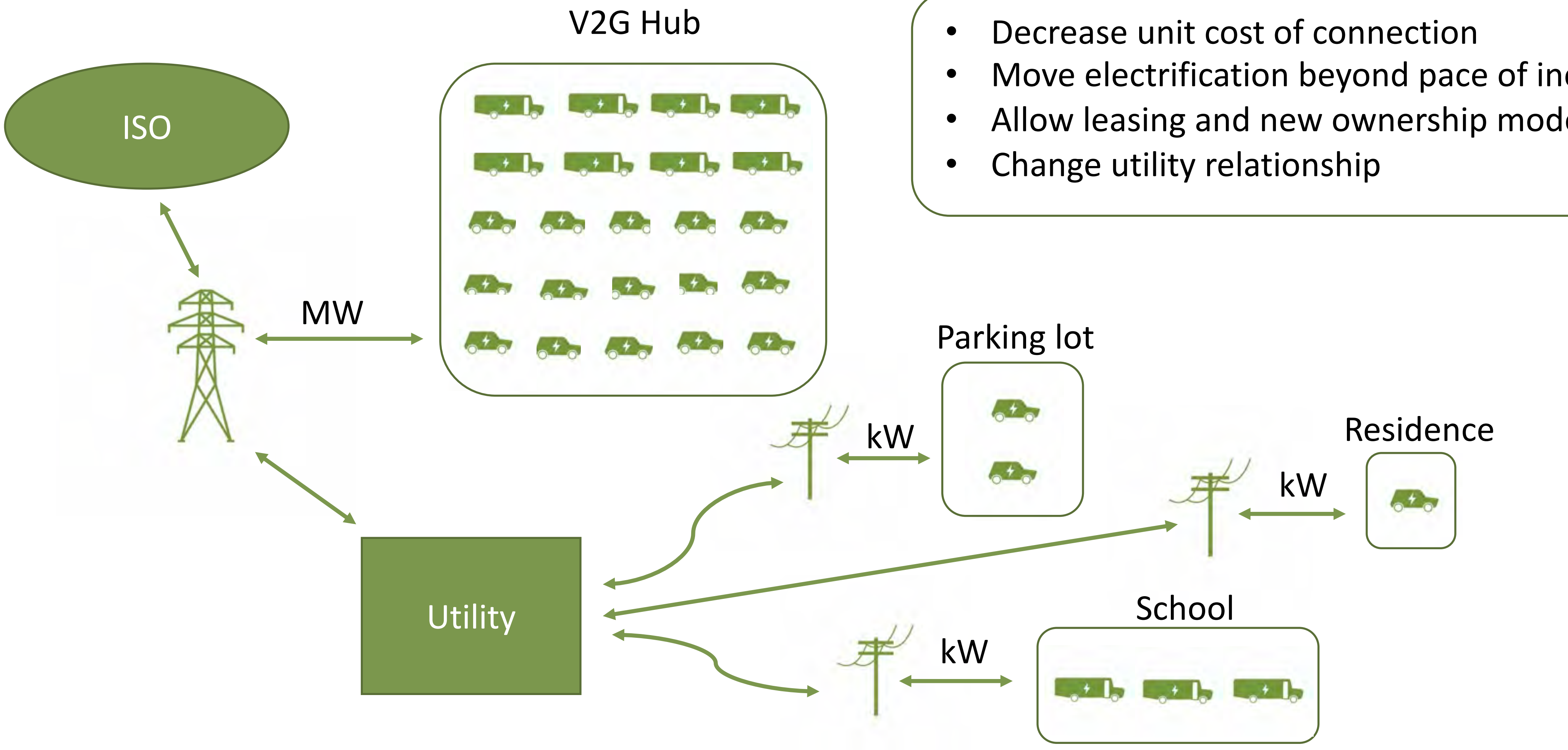
Third Parties can help: Aggregation

- Utilities may communicate constraints **at substation level** to Third Parties who control DER
- Interoperability while allowing multiple standards



Third Parties can help: Mobility Hubs

- Decrease unit cost of connection
- Move electrification beyond pace of incentives
- Allow leasing and new ownership models
- Change utility relationship



Combining two models

- Mobility/Transportation as a Service:
  - It's not just ridesharing! Allow entities and people to lease or subscribe to EVs and their associated infrastructure
- Energy as a Service:
  - Access to energy without upfront capital cost, often at consistent rates with managed demand
- Both are not new. Combining them allows:
  - Decrease perceived risk and unknowns of going electric
  - Financing cost of EV and infrastructure up front
  - Leasing or mobility subscription instead of ownership
  - Predictable electric bills, or energy subscription model
  - Increase access to chargers
  - Increase utilization of chargers
  - Introduce EVs as non-wires solutions
- New models like this can apply to schools, fleets, individuals, businesses in different ways

Both require regulatory innovation

- Transportation electrification programs must coordinate with DER programs
  - Take into account what EVs can do when designing metering and rate requirements
- Demand response will increase in significance
  - DR resource should be allowed to, and compensated for, export
- Third parties should be able to resell energy to customers
- Consider impacts of transmission-connected resources and loads with distribution rates and rules
- Real coordination between transmission and distribution is necessary

Thank You

Contact: Jacqueline Piero
Jackie@nuvve.com

The Nexus Between Energy Storage Ownership Models and Policy Goals

Jeremy Twitchell

Energy Research Analyst

Pacific Northwest National Laboratory

Pacific Northwest
NATIONAL LABORATORY

The Nexus Between Energy Storage Ownership Models and Policy Goals

May 19, 2021

Jeremy Twitchell

MI Power Grid: New Technologies and Business Models Workgroup Meeting

U.S. DEPARTMENT OF ENERGY BATTELLE

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Agenda

- What makes energy storage unique
- Storage ownership models
- Policy nexus

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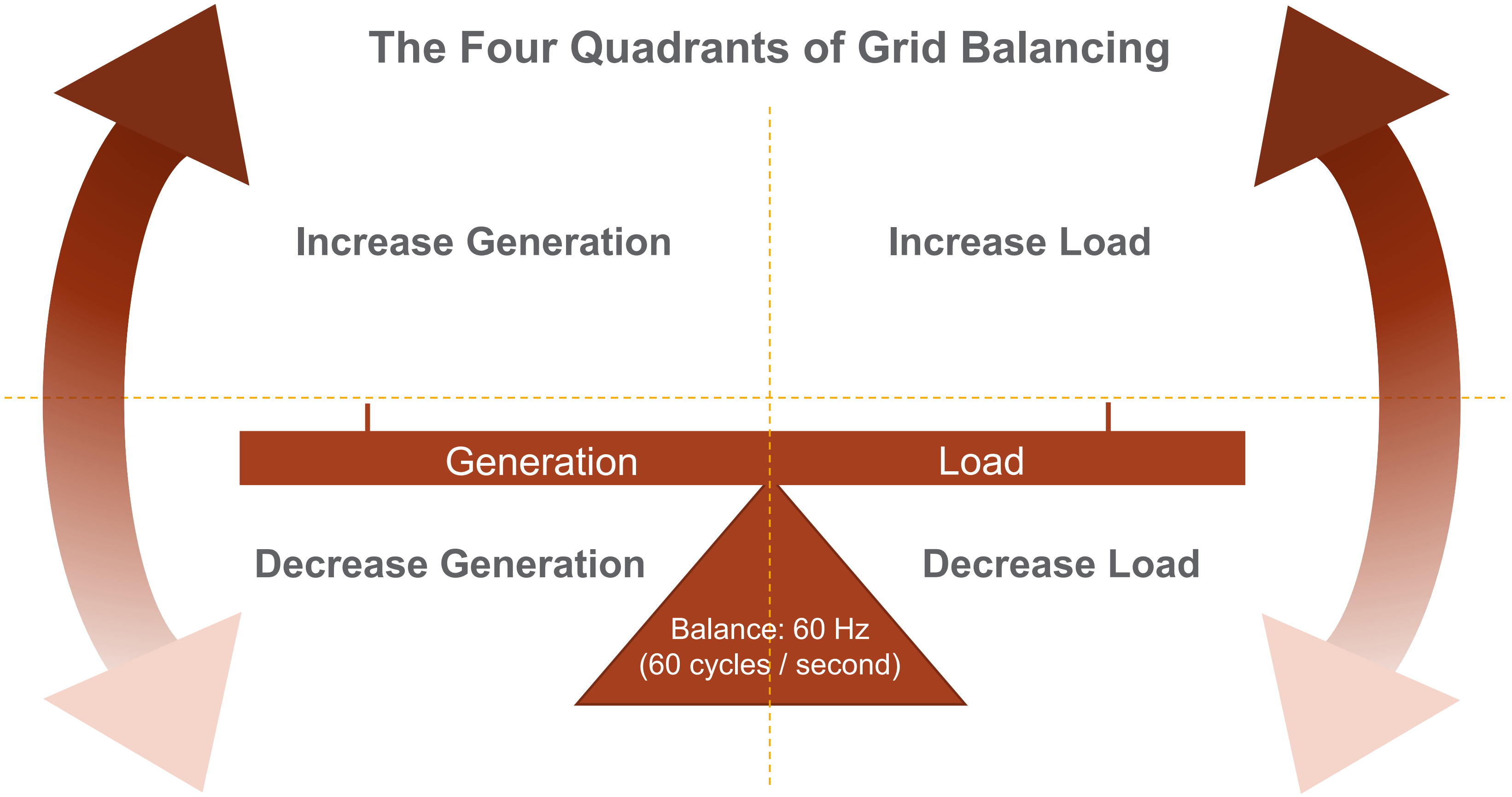
What makes storage unique

Two defining characteristics make storage unique

First, it is **flexible:**



Two defining characteristics make storage unique

Second, it is **scalable:**

InsideEVs

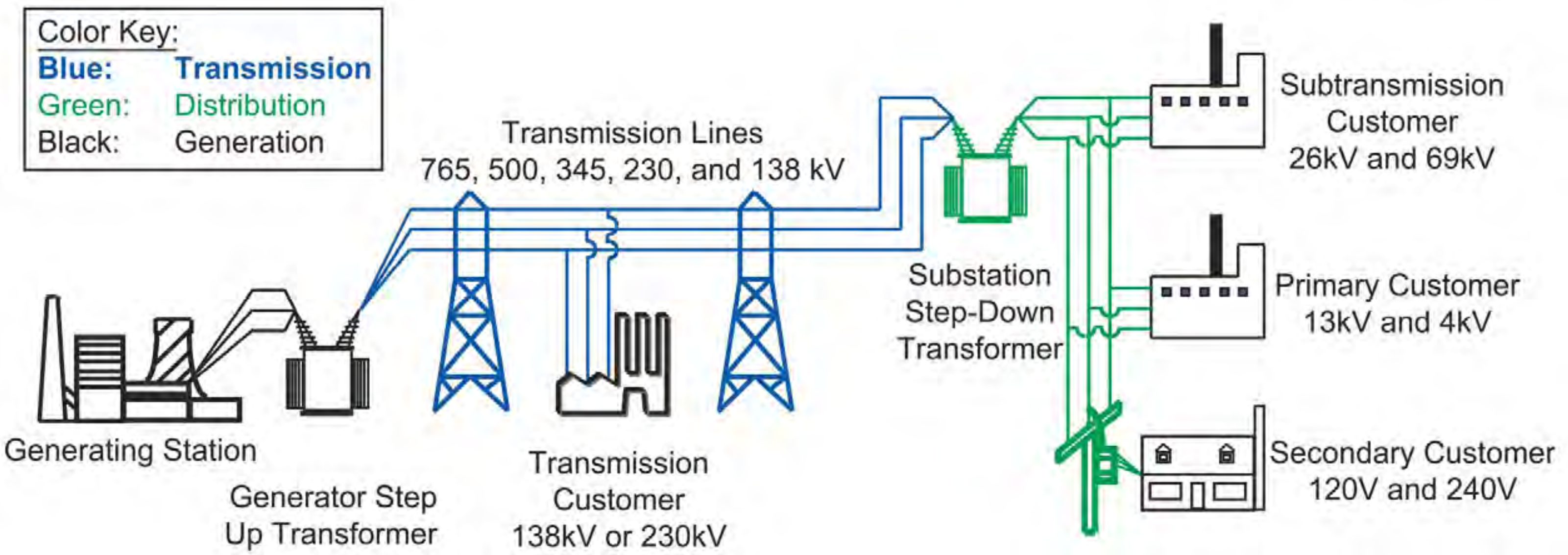
At 300 MW/1200 MWh, the Moss Landing energy storage project (Monterey County, CA) is the largest battery storage facility in the world.

And anything in between

Tesla

At 5 kW/13.5 kWh, a Tesla Powerwall can power an average home for a few hours and is small enough to be mounted on a wall.

Because storage is flexible and scalable, it can provide services throughout the grid



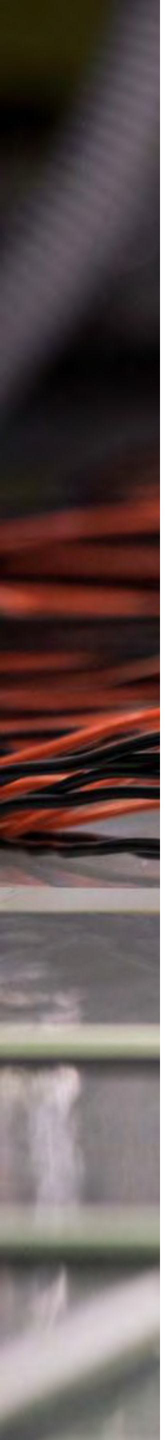
Generation
- Capacity
- Energy
- Ancillary services
  - Regulation
  - Frequency response
  - Spin/non-spin reserve
  - Etc. …

Transmission
- Thermal management
- Congestion relief
- Infrastructure deferral

Distribution
- Voltage support
- Conservation voltage reduction
- DG integration/hosting capacity
- Thermal management
- Infrastructure deferral

Customer
- Time-of-use rate management
- Demand charge reduction
- Backup power

Ownership models



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Deployment options

- Storage may be deployed in front of the meter (FTM) or behind the meter (BTM)
- Both approaches have strengths and weaknesses
- Storage may be owned by utilities, customers, third parties, or some mix thereof
- Regulatory structures may prohibit some ownership models or uses

Configuration	Strengths	Weaknesses
FTM	**Control**: A single device is easier to monitor and dispatch **Visibility**: The operator of an FTM device is likely to have better awareness of grid needs **Procurement**: Centralized procurements have more certain outcomes **Scale**: A single point of interconnection and increased size create favorable economies of scale	**Cost Sharing**: All project costs will be assigned to all customers **Site Costs**: Large projects have a physical footprint, creating real estate costs
BTM	**Cost Sharing**: Investments of interested customers may be leveraged to reduce costs for remaining customers **Site Costs:** Siting devices on customer premises reduces/eliminates real estate costs	**Control**: Many devices require more robust control structures; utilities may lack ability to communicate with BTM devices **Visibility**: The owner of a BTM device is unlikely to be aware of grid needs **Procurement**: Decentralized procurement depends on customer interest and uptake, and is therefore less certain **Scale**: Smaller projects and multiple points of interconnection increase total costs

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Emerging Ownership Model Case Studies

BTM: Utility-Owned

Liberty Utilities (NH)

- Utility installs, owns, and controls device on customer premises
- Used for customer rate management and peak reduction
- Provides backup power to customers during outages

Liberty Utilities

BTM: Utility/Customer Hybrid

Green Mountain Power (VT)

Green Mountain Power

- Initial program was similar to Liberty's
- Now a bring-your-own device program
- Customer buys device with help of a utility incentive
- Utility dispatches devices for customer rate management and peak reduction
- Peak reduction saved all customers $500k in 2018

FTM: Utility/3rd Party Hybrid

Hawaiian Electric (HI)

- Hybrid project: 30 MW solar and 30 MW/120 MWh storage
- Agreement with project developer AES structured like a tolling agreement
- AES builds and owns the project; utility pays a monthly lump-sum payment and controls assets

Greentech Media

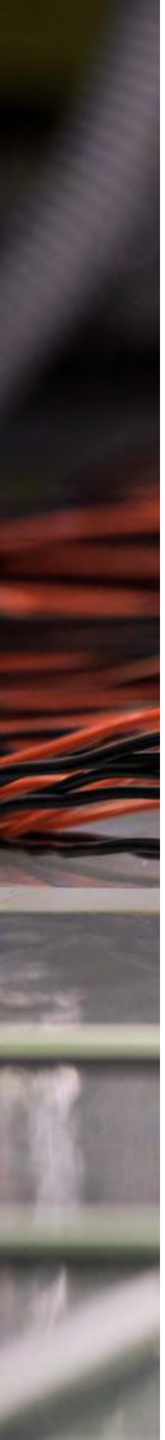
Policy Case Study: Maryland's Ownership Pilot Program

Maryland's Energy Storage Pilot Project Act (SB 573 – 2019) creates a unique pilot program designed to test not only storage technologies, but different ownership models.

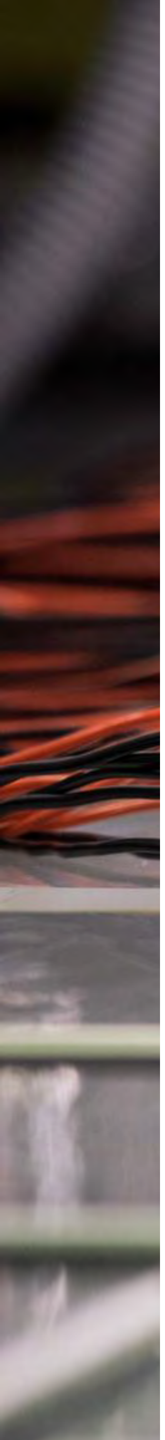
- Each of the state's four investor-owned utilities must solicit offers for at least two of four ownership models:

Utility-Owned	Utility/3rd Party Owned	3rd Party Ownership	Virtual Power Plants
• Utility owns and controls storage project for grid reliability. • Utility operates storage in wholesale markets when it is not needed for distribution reliability.	• Utility owns and controls storage for grid reliability. • 3rd Party operates project in wholesale markets.	• Utility contracts with a storage project that is owned by a 3rd party for grid reliability. • 3rd party operates the project for wholesale markets.	• Utility aggregates, or uses a 3rd party aggregator, to receive grid services from multiple distributed storage projects owned by customers or a 3rd party.

- The total size of the pilot projects will be between 5 and 10 MW, with at least 15 MWh.



Policy nexus

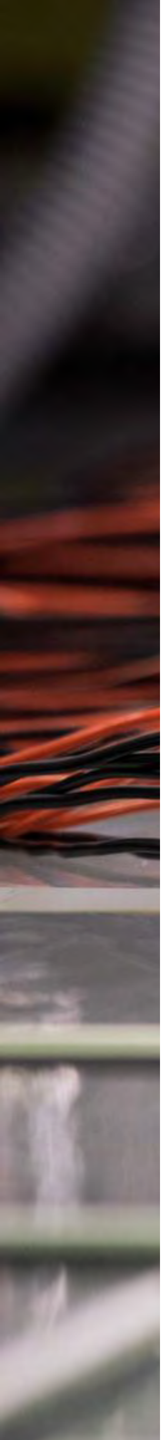


State and Federal Policies Establish Diverse Expectations for Energy Storage

Policymakers at the state and federal level have identified several roles for energy storage:

- Resource adequacy
- Peak reduction
- Ancillary services
- Renewables integration
- Customer rate management
- Transmission/distribution system services
- Transmission/distribution investment deferral
- Resilience
- Decarbonization

The ability of energy storage to provide these services is shaped by its point of interconnection and the needs of the owner. In some cases, additional infrastructure or mechanisms may be necessary to facilitate a particular use.



Ownership Models and Policy Goals: The Nexus

Front of Meter | Behind the Meter | ● Readily provided | ◐ Conditionally provided | ○ Cannot be provided

Owner	Resource Adequacy	Peak Reduction	Ancillary services	Renewables Integration	Customer Rate Management	T&D Services	T&D Deferral	Resilience	Decarbon -ization
Utility	●	●	●	●	○	●	●	●	◐
Third Party	●	●	◐	●	○	◐	●	●	◐
Utility/Third Party Hybrid	●	●	●	●	○	●	●	●	◐
Utility	●	●	◐	●	●	●	●	●	◐
Customer	◐	◐	◐	●	●	◐	◐	●	◐
Utility/ Customer Hybrid	●	●	◐	●	●	●	●	●	◐
Third Party/ Customer Hybrid	●	●	◐	●	●	◐	◐	●	◐

Key Themes

In front of the meter:

- Utility-owned assets can provide every service except customer rate management
- Third-party owned assets can readily provide most services, but may need specific contracting provisions to provide transmission service or to provide ancillary services in a vertically integrated region
- Decarbonization through storage is not guaranteed; deliberate policies and strategies must be in place to secure that outcome

Behind the meter:

- Every identified service may be provided by BTM storage systems, but many of those services are conditional on enabling communications infrastructure and tariff structures
- Tariff design is particularly important for achieving desired outcomes for customer-owned storage

Summary

Key points:

- Energy storage can be an enabling technology in support of multiple state energy policies, **but**
- How storage is used varies by where it is installed and who is using it, **so**
- To ensure that storage investments support policy objectives, policymakers may want to consider addressing ownership.

There are tradeoffs associated with different ownership models:

- Utilities have greater visibility into grid needs and can more readily site and dispatch storage to meet them (particularly in vertically integrated regions), but pass all costs onto customers
- Third-party ownership may reduce costs and provide some grid visibility, but third parties may struggle to achieve the same level of visibility
- Customer ownership can reduce the costs that are assigned to all customers and enable customers to control energy usage, but requires additional mechanisms to enable/incent grid benefits
- Hybrid models may combine strengths of different models while minimizing weaknesses

Pacific Northwest
NATIONAL LABORATORY

Thank you

Jeremy Twitchell
jeremy.twitchell@pnnl.gov
971-940-7104

Building an Efficient, Resilient Grid

Amy Heart

Senior Director, Public Policy

Sunrun

sunrun

Building a Resilient, Efficient Grid

MAY 2021 | Amy Heart, Sr. Director, Policy

Market-Driven Local Solar+Storage Costs Less

sunrun

Decarbonize by Electrifying Everything

Rewiring America

- US can cut 70-80% of emissions by 2035 if we deploy existing technologies at scale. What will get us there? rooftop solar, batteries, EV, wind and solar, heat pumps
- A fully electrified average household would save nearly $2,000 per year.
- An electric future requires a massive buildout of clean generation. *But , if we electrified entire economy and ran every appliance, machine, and vehicle on clean electricity we could power half of the economy using rooftop solar alone.*

To build more resilient grid, dynamic DERs must be better integrated in the grid via market mechanisms to ensure most efficient, quickest adoption, and lowest cost deployment.

Solar produces savings for all.
Solar powered storage produces even more.

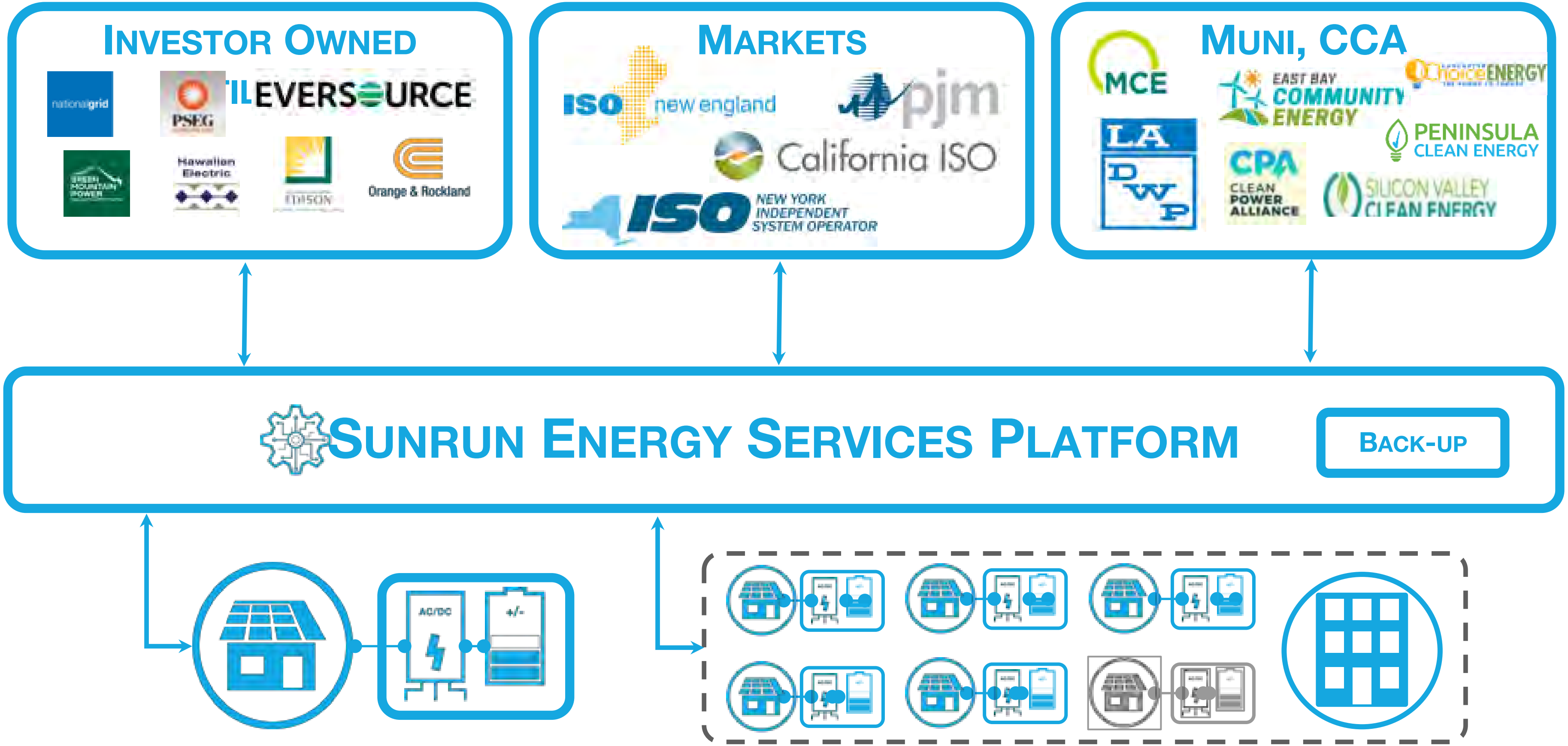
"The growing number of behind-the-meter photovoltaic (BTM PV) arrays is also having a significant impact on demand for power from the regional grid as these rooftop systems produce power for the homes and businesses upon which they're installed.

For example, the recorded peak on July 30 would have been almost 1,000 MW higher without the region's behind-the-meter PV.

As energy-efficiency measures and behind-the-meter PV resources proliferate, demand for electricity from the regional grid declines and records become more difficult to exceed; the all-time record peak of 28,130 MW was set thirteen years ago in August of 2006."

Source: ISO-NE Newswire, 10/2/19

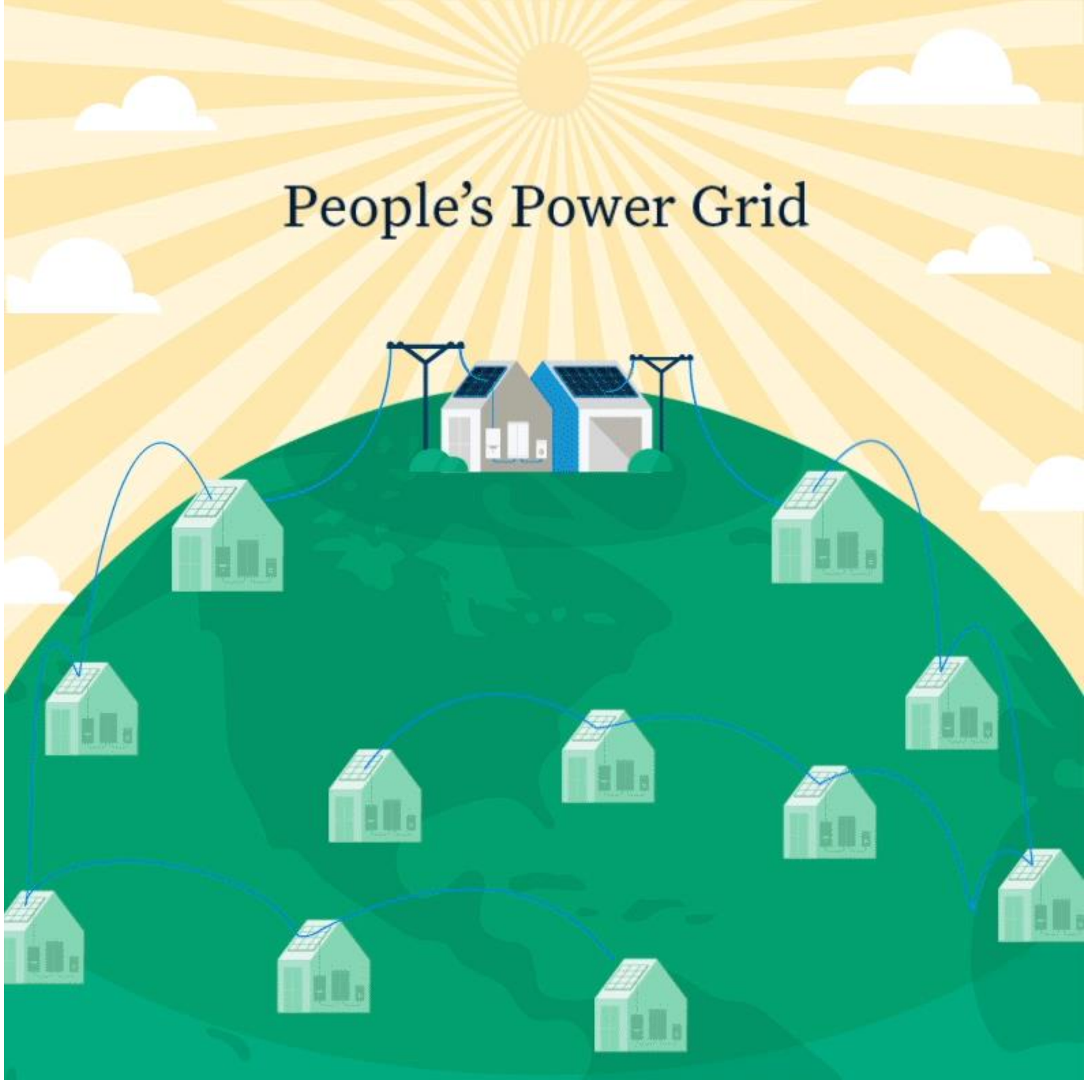
Solar+Storage Unlocks Multiple Solutions



Solution Worth Sharing
Bring Your Own Device

Utility + Competitive Market Partnership

- Utility IDs need, predicts peak/sends signal or sets discharge profile, does settlement.
- Competitive companies finance, manage, and assume all risk.
- Participating customer receives backup power and energy savings at lower cost, minimal complexity.
- ***ALL*** ratepayers receive savings without ratebase risk.
- VT, NH, MA, RI, NY
  Regulated & Deregulated



Replacing Gas-Peaker Plants with VPPs

Communities most impacted by Oakland Power Plant will benefit from clean energy transition.

- Sunrun will install rooftop solar/ battery systems on more than 500 low-income housing units.
- Community residents gain bill savings, resilience, lower pollution. True environmental justice


sunrun
PowerThrough
with the power of Sunrun

Alternative Community Solar Models and Community Benefits

Jackson Koeppel

Executive Director and Co-Founder

Soulardarity

Meera Gorjala

J.D. Candidate

University of Chicago Law School

Alternative Community Solar Models and Community Benefits

Jackson Koeppel, Soulardarity
Meera Gorjala, Abrams Environmental Law Clinic
May 19, 2021

Soulardarity

- Home: Highland-Park, MI
- Origin: DTE repossession of more than 1,000 streetlights in Highland Park
- Goals: improve access to affordable, clean energy for low-income communities and communities of color
- Focus: **energy democracy**
- One Approach: participation in past MPSC proceedings and workgroups with the Abrams Environmental Law Clinic

Community Goals for Community Solar

In the words of Soulardarity member **KIAVA STEWART:**

"Community solar offers a means for low-income customers to **lift the enormous burden that high energy costs** place on our communities. Low-income and people-of-color communities are interested in community solar because it gives us an opportunity to have **greater control over the sources** of our energy, to **reduce dependence on fossil-fueled generation**, to provide us with **greater price stability**, and to bring **economic opportunity** to our neighborhoods. Community solar would also ensure that any economic **benefits that are generated are kept within the community**."

U-20713 and U-20851, Direct Testimony of Kiava Stewart (Dec. 23, 2020), at 20–21.

Benefits of Community Solar

- System-Wide Energy Benefits
  1. Capacity Benefits
  2. Distribution & Reliability Benefits
  3. Financial Benefits/Cost Savings
- Local Benefits
  1. Financial Benefits
  2. Environmental Benefits
  3. Community Benefits

Benefits of Community Solar with Community Ownership

- Grid Benefits
  1. Capacity Benefits
  2. Distribution System Benefits
  3. Financial Benefits/Cost Savings
     - **Leveraging New Forms of Capital**
- Local Benefits
  1. Financial Benefits
     - **Community Wealth Generation**
  2. Environmental Benefits
  3. Community Benefits
     - **Energy Democracy**

Distinct Benefits from Projects with Community Ownership

Community Solar Models

Administered By:	Utility	Special Purpose Entity (SPE)	Non-Profit/Public
Owned By:	Utility or 3rd party	SPE members	Non-profit or government
Examples:	Cherryland Electric Cooperative- MI	Hope Village Revitalization- MI	Solar for Sakai- AK
Hosted By:	Utility or 3rd party	3rd party	Non-profit or local government
Subscriber Profile:	Electric ratepayers of the utility	Community investors	Community members
Financed By:	Utility, grants, ratepayer subscriptions	Member investments, grants, incentives, project finance	Donor, grants, local government revenue
Subscriber Motive:	Offset personal electricity use	Return on investment; offset personal electricity use	Offset electricity use; participate in community
Long-Term Strategy of Sponsor:	Offer solar options; add solar generation	Sell system to host; retain for electricity production for life of system	Retain for electricity production for life of system

Jason Coughlin et al., A Guide to Community Solar: Utility, Private and Non-profit Project Development (2010)

Advantages of Non-Utility Models

- Financial Advantages
  - Tax Credit Availability
  - Project Finance
  - Diverse Funding Streams
- Advantages in Mobilizing Community Resources: Example- Cooperative Energy Futures
  - Generation of Community Relationships and Community Wealth
  - Reduction of Perceived Credit Risks of Serving Low-Income Customers

COOPERATIVE ENERGY FUTURES
COMMUNITY POWERED ENERGY

Approaches to Increasing Low-Income and BIPOC Access

- Program-Level Approaches
  - Guaranteed Allocation
  - Financial Flexibility
  - Net Crediting
- Project-Level Approaches
  - Transportability for Renters
  - Local Job Training & Contracting

Addressing Barriers to an Equitable and Accessible CS Program in MI

- At the MPSC
  - Correct Under-Compensation of Distributed Generation Resources by Establishing Broad Value of Solar
- By Utility Positions
- In Statutory Law
  - Pass Enabling Legislation for Community Solar
  - Fix Conflicts with Public Utility Status Laws to Allow Transferring Electricity Offsite

Questions?

Contact Us

- Soulardarity
  - Jackson Koeppel, Executive Director, director@soulardarity.com
  - Shimekia Nichols, Deputy Director and Incoming Executive Director, communications@soulardarity.com

- Abrams Environmental Law Clinic, The University of Chicago Law School
  - Mark Templeton, Clinic Director, templeton@uchicago.edu
  - Rob Weinstock, Assistant Clinical Professor, rweinstock@uchicago.edu

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  - Kayla Soren, *A Minnesota Cooperative Shares the Wealth While Advancing a Clean Energy Future*, Institute for Policy Studies (Nov. 30, 2020), https://ips-dc.org/a-minnesota-cooperative-shares-the-wealth-while-advancing-a-clean-energy-future/.

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  - Karlee Weinmann, Unlocking Universal Access to Community Solar, Inst. for Loc. Self-Reliance (Mar. 23, 2017), https://ilsr.org/unlockinguniversal-access-to-community-solar/.
  - Mark Muro et. al., Advancing Inclusion Through Clean Energy Jobs, Metropolitan Policy Program at Brookings (Apr. 2019), https://www.brookings.edu/wp-content/uploads/2019/04/2019.04_metro_Clean-Energy-Jobs_Report_Muro-Tomer-Shivaran-Kane_updated.pdf.

- **Addressing Barriers to an Equitable and Accessible CS Program in MI**
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See Past MPSC Proceedings For More Information

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MI POWER GRID

Making the Most of Michigan's Energy Future

New Technologies and Business Models

Closing Comments

Stakeholder Meeting 8: Alternative Business & Ownership Models

May 19, 2021

Thank You and Please Stay Engaged!

- Thank you for your participation
  - Share your thoughts through:
    - Meeting survey
    - Meeting chat
      - Remains open for comments or discussions after meeting.
      - Easier to access with the Teams App
    - Stakeholder comment section of workgroup website
      - Send a document to be posted to the comment section via email to Joy Wang at WangJ3@Michigan.gov
- Please stay engaged
  - Sign up for the listserv if you have not already
    - Go to MI Power Grid New Technologies and Business Models workgroup page
    - Scroll to bottom to add email
  - Attend future meeting
    - Last meeting on June 16 from 1 – 5 PM
    - Topic: Summary, Discussion, & Closing
  - Comment on Staff's technology summary outlines & draft report
    - Technology summary draft outline discussions in June 16 meeting
    - Comments on both by email to wangj3@michigan.gov

Thank you!