NARUC Electric Vehicles and Performance-Based Regulation State Working Groups

DECEMBER MEETING

DECEMBER 15, 2020

Welcome

Moderator: Commissioner Bocanegra, Illinois

Panelists

- Megan Anderson, Regulatory Assistance Project
- Ed Burgess, Vehicle Grid Integration Council
- Raghusimha Sudhakara, Con Edison

AGENDA (Eastern Time)

3:00 PM	**Welcome and Introductions (5 minutes)** • Agenda review • Roll call, by state
3:05 PM	**Presentation and Q&A: Regulatory Assistance Project (15 minutes)** • Megan Anderson, from the Regulatory Assistance Project will provide an overview of opportunities for PBR in transportation electrification, and discuss RAP's *Metrics to Measure Effectiveness of Electric Vehicle Grid Integration* report.
3:20 PM	**Presentation and Q&A: Vehicle Grid Integration Council (15 minutes)** • Ed Burgess, Policy Director of the Vehicle Grid Integration Council, will discuss a case study from National Grid and lessons from California.
3:35 PM	**Presentation and Q&A: ConEdison (15 minutes)** • Raghudimha Sudhakara, Director of Demonstration Projects and Energy Efficiency Strategic Channel Engagement at Con Edison will discuss the utility's experiences and lessons with PIMs for EVs in New York.
3:50 PM	**Q&A (10 minutes)** • Speakers will take additional questions from working group members
4:00 PM	**Closed Door Discussion (28 minutes)** • Working group members will discuss their own views and the actions their states have taken to date.
4:28 PM	**Next Steps and Announcements (2 minutes)**
4:30 PM	**Adjourn**

Roll Call – Read from Webinar

EV and PBR Working Group Members

States:

- Arizona
- California
- Colorado
- Connecticut
- Delaware
- District of Columbia
- Florida
- Georgia
- Hawaii
- Illinois
- Kentucky
- Maryland
- Massachusetts
- Michigan
- Minnesota
- Missouri
- Nevada
- New Jersey
- New York
- North Carolina
- Ohio
- Oregon
- Pennsylvania
- Puerto Rico
- Rhode Island
- South Dakota
- Texas
- Utah
- Vermont
- Washington
- Wisconsin

National/Federal Partners:

- NARUC
- NRRI
- U.S. DOE
- National Labs
- U.S. EPA

December 15, 2020

Using PBR for Electric Vehicle Grid Integration

NARUC Webinar: PBR for Transportation Electrification

Megan Anderson
Associate
Regulatory Assistance Project (RAP)®

Taos, New Mexico

+1 802 498 0736
manderson@raponline.org
raponline.org

1 EV Opportunities and Challenges

Electrifying vehicles = emissions reductions

- Transportation sector is the largest share of greenhouse gas emissions in the U.S. (28%)
- Light duty vehicles make up a large share (59%)
- Medium and heavy-duty trucks (23%)
- Total = 82%
- Electrifying vehicles could address ~ 23% of U.S. GHG emissions if aligned with clean charging opportunities

EV Charging Opportunity

- 1,000 miles/month @ 25 mph average = 40 hours
- Driven: 40 hours/month
- Charging: 40 hours/month
- Parked: 680 hours/month

Challenge: How do we align those charging hours (and maybe even parked hours) with efficient or optimized grid operations?

Aligning the EV opportunity

- EVs offer a new flexible load that can be integrated into the electric system in a way that maximizes benefits for both EV users and grid operators.
- But if not well aligned, EVs can exacerbate peak, increasing costs and emissions
- So how do we ensure that EVs are integrated to benefit the grid?

Performance-Based Regulation

Performance-Based Regulation (PBR)

- A means by which regulators can align utility incentives with policy-mandated goals (improved reliability, deployment of DERs, EE, and EVs)
- Stands in contrast to traditional cost-of-service regulation, where incentive for utility is to increase rate of return by increasing sales and investments

PBR May Help Overcome Bad Outcomes

- Good things that are not profitable for the utility that don’t get done (Non-wires Solutions, aggregated DERs)
- Bad things that are profitable to the utility that should be prevented (Gold-plating physical assets)
- Bad incentives not easily seen (Deferring expenses like tree trimming, customer care, underserved communities)

Performance-Based Regulation Steps

- Guiding goals
- Understand Current Incentives
- Develop Measurable performance criteria
- Metrics
- Outcomes

Set Guiding Goals

Examples:

- Make/keep energy affordable for customers
- Increase efficient EV charger deployment

Photo: Heidi Sandstrom

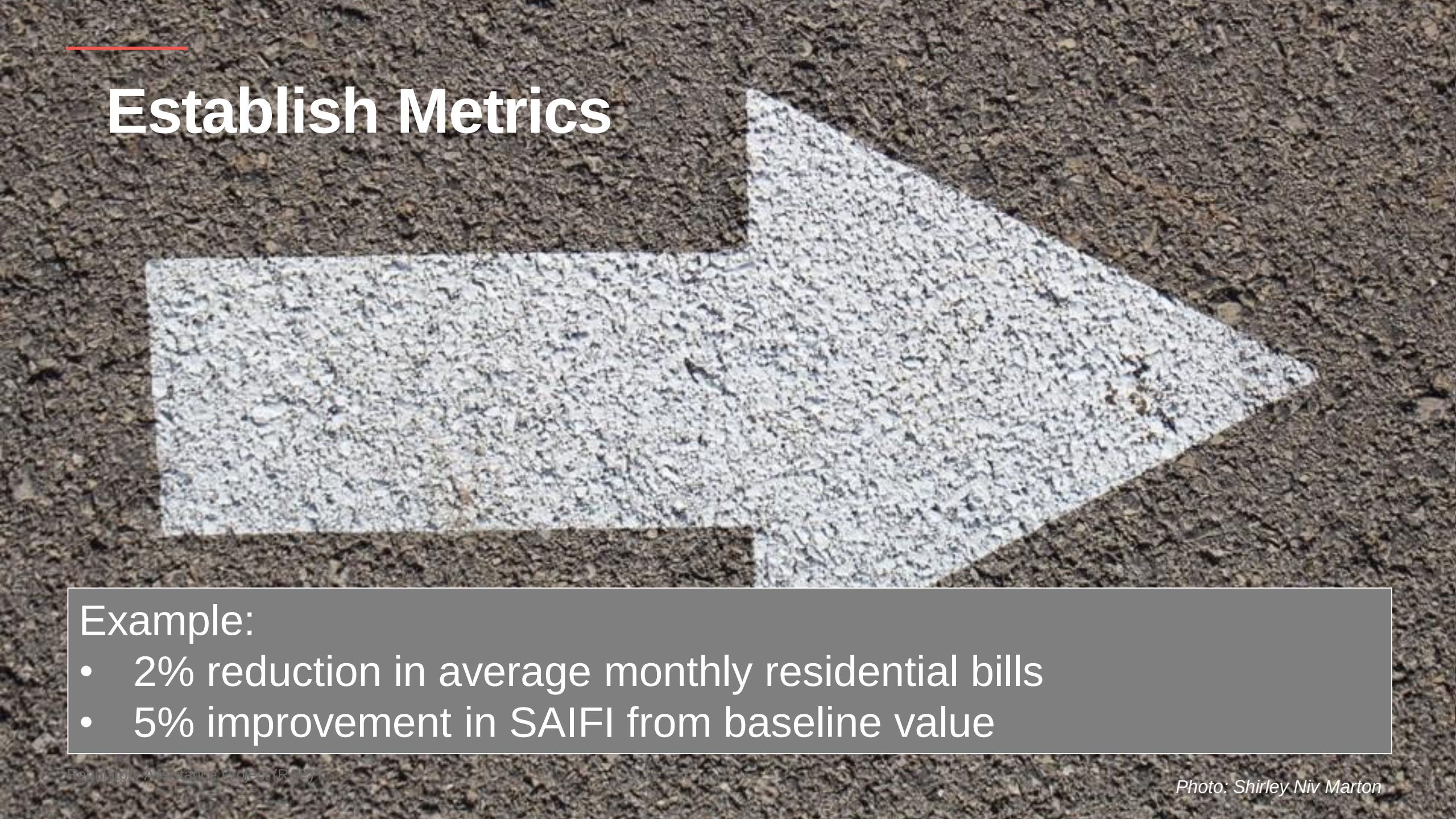
Understand Current Incentives

Develop Measurable Criteria

Examples:

- Declining customer bills

Establish Metrics



Example:

- 2% reduction in average monthly residential bills
- 5% improvement in SAIFI from baseline value

Photo: Shirley Niv Marton

3 Applying PBR to EV Integration

Questions regulators can ask when thinking about PBR and EVs

- What are the carbon and pollution reduction goals of the jurisdiction?
- What is the goal of supporting EV build-out? (to serve customers, EV opportunities in underserved communities, grid stability?)
- What education and outreach activities are most helpful for agencies, utilities, car dealerships, car manufacturers and other entities?

Useful Data

1. Circuits and feeders with excess seasonal or year-round daytime capacity to accommodate charging load at peak.
2. The elasticity of demand for on-peak charging versus off-peak charging by charger installation use (residential, commercial/retail, commercial/fleet, municipal/fleet).
3. Average and median utility/ratepayer cost for installation of charging infrastructure by charger installation use as well as by charger and charging station.
4. Utilization of chargers by charger, charging station and charger installation use.

EV PBR Goals - Examples

1. Build understanding of EV charging costs, benefits and consumer savings
2. Encourage the development of EV infrastructure while controlling costs
3. Use existing grid resources to integrate EV load to maximize net benefits to all ratepayers

Goal 1: Build understanding of EV charging costs, benefits and consumer savings

Goal	Performance criteria	Metric
Increase customer awareness of special EV charging rates	Utilities will provide customer information on available EV rates through multiple channels of communications	Percent of customers aware of special EV rates through survey
Increase customer awareness of lifetime economic and environmental benefits of EVs compared with ICEs	The utility will provide customer information on lifetime economic and environmental benefits of EVs compared with ICEs	Percent of customers aware of cost savings from EVs; percent of customers aware of environmental benefits of EVs[17]
Increase customer awareness of time-varying component of rates to save them money and reduce environmental impacts	The utility will provide customers with information on time-varying rates and how these can help customers save money and reduce environmental impacts	Percent of customers aware of time-varying rate discount; percent of customers aware that charging off-peak reduces environmental impacts

Goal 2: Encourage the development of EV infrastructure while controlling costs

Goal	Performance criteria	Metric
Encourage charging deployment that meets customer needs	Measure effectiveness of incentives for hosts of charging stations to track and encourage customer use	Track number of incentives taken; track utility requirements for charging hosts and charger usage (e.g., removal of demand cap for EV fast chargers for an introductory period of time; payment of EV service connection costs)
Ensure forward-looking behavior to accommodate EV charging infrastructure	Measure effectiveness of incentives to support charging infrastructure	Track number of sites where incentives are provided to future-proof residential and other sites; track compared with benchmark where incentives not taken
Encourage efficient buildout of EV charging infrastructure by using existing infrastructure	Measure effectiveness of incentives for use of existing infrastructure where appropriate	Track use of incentives for using existing infrastructure (e.g., light poles, telecommunications distribution poles) and other synergies with existing electrified public transport lines

Goal 3: Use existing grid resources to integrate EV load to max. net benefits to all ratepayers

Goal	Performance criteria	Metric
Decrease investment in generation; minimize distribution system upgrades	Survey to evaluate utility hosting capacity map or heat mapping for use in determining optimal charger locations	Track distribution system upgrades to accommodate EV charging infrastructure, systemwide and by circuits
Maximize existing distribution system	Develop mapping tool to determine grid locations with capacity for charging stations and how much during specific charging use cases (day for retail, nighttime for municipal fleets, etc.)	Track use of mapping tool as a reference when permitting charging stations; survey users about mapping tool usage and usefulness
Integrate new EV load to avoid exacerbating any existing load issues	Measure enrollment in time-of-use rates or specific EV rates; calculate EV charging savings when enrolled in time-of-use rates compared with what that same amount of charging would have cost on standard utility rates	Track use of incentives/enrollment in time-of-use rates; track impact on charging behavior when on a time-of-use rate compared with peak; track hours of energy used off-peak and the associated reduction in evening peak due to charging occurring off-peak; calculate new load integrated into the grid in terms of both energy and peak charging demand

RAP Resources

- Metrics to Measure the Effectiveness of Electric Vehicle Grid Integration
- Next-Generation Performance-Based Regulation: Volume 1 (Introduction—Global Lessons for Success)
- Next-Generation Performance-Based Regulation: Volume 2 (Primer—Essential Elements of Design and Implementation)
- Next-Generation Performance-Based Regulation: Volume 3 (Innovative Examples from Around the World)
- Performance Incentives for Cost-Effective Distribution System Investments
- Protecting Customers from Utility Information System and Technology Failures

About RAP

The Regulatory Assistance Project (RAP)® is an independent, non-partisan, non-governmental organization dedicated to accelerating the transition to a clean, reliable, and efficient energy future.

Learn more about our work at raponline.org

Megan Anderson
Associate
Regulatory Assistance Project (RAP)®

Taos, New Mexico

+1 802 498 0736
manderson@raponline.org
raponline.org

Level 2 EV Charging is a Lot Like… An Electric Water Heater!

Really!

Electric Vehicle

- 3.3 – 6.6 kW
- 2,000 – 4,000 kWh/year
- Can avoid morning and early evening peak charging
- Batteries likely equal a full day's supply

Water Heater

- 4.4 – 5.5 kW
- 2,000 – 4,000 kWh/year
- Can avoid morning and early evening peak charging
- Tank usually covers a full day's supply

Three “Levels” of EV Charging

Level 1: Standard household current (120 Volts)

1.5 kW Adds about 4 miles range per hour

Level 2: High capacity residential circuit (240 Volts)

6.6 kW Adds about 20 miles range per hour

Level 3: Fast commercial chargers in public areas with very large electricity connection:

Up to 350 kW Adds up to 200 miles in 15 minutes

STRATEGEN

Performance Based Regulation and Transportation Electrification

Edward Burgess
Senior Director, Strategen Consulting
December 15, 2020

STRATEGEN

Strategen is a mission-driven professional services firm dedicated to decarbonizing energy systems

ASSOCIATIONS

Strategen co-founded and manages the California Energy Storage Alliance (CESA) , the Vehicle-Grid Integration Council, and the Green Hydrogen Coalition. Through these organizations, Strategen policy work has been pivotal in transforming energy systems in California, the US, and around the world.

CONSULTING

Since 2005, Strategen Consulting provides analysis and insight to governments, utilities, NGO's, and industry to help them achieve leading-edge market development and transformational clean energy strategies.

CONVENINGS

Strategen excels in stakeholder engagement, via customized small and large events. Strategen founded Energy Storage North America (ESNA), the largest grid-connected storage conference in North America. ESNA 2021 is affiliated with Intersolar North America.

Presentation Overview

1. Case study: National Grid's proposed EV Performance Incentive Mechanisms in Massachusetts
2. Transportation Electrification in the PBR context
   - What utility incentives already exist?
   - What additional incentives may be appropriate?
3. Lessons from California: Leading edge EV issues that could warrant consideration under a PBR framework

Case Study: National Grid's proposed EV Performance Incentive Mechanisms in Massachusetts

- Background:
  - 2018 general rate case in Massachusetts NGrid proposed a new PBR framework
  - Proposal included 2 Performance Incentive Mechanisms (PIMs) tied to NGrid's Transportation Electrification (TE) efforts
- 1) Proposed EV Adoption PIM
  - Would provide an asymmetric "reward only" incentive to the Company based on achieving "higher incremental EV adoption" than a baseline level of EV adoption
- 2) Proposed EVSE Cost Containment PIM
  - Would provide an asymmetric "reward only" incentive to the Company for delivering EV infrastructure below the Company-estimated program cost projections

National Grid's proposed EV Performance Incentive Mechanisms in Massachusetts (cont.)

- Attorney General's Office Critique of EV Adoption PIM
  - "Upside only" & linked to a broad market trends (i.e., no downside if projections for EV Adoption not met)
  - Many factors outside of utility control: EV model availability, EV purchase prices, government incentive programs, etc.
  - No plans to act where the utility does have control: "The Company does not presently have a specific plan or timing for making EV-specific rate design proposals" (response to discovery request from AGO)
  - Other incentives exist for utilities to pursue EV adoption and EVSE deployment
- Attorney General's Office Critique of EVSE Cost Containment PIM
  - Baseline for costs relies on a Company-generated projection
  - Better approach would be to track real-world cost data for EVSE deployment in early program phases
- Result: DPU rejected both proposed PIMs

The NGrid MA case reflects a "cautionary tale" for EV-related incentive proposals

Transportation Electrification in the PBR Context

What utility incentives already exist for TE?

- Increased margin sales from new EV load (relative to test year)
- CapEx opportunities to deploy new charging stations
  - Utility-owned EVSE equipment,
  - Make-ready upgrades)
- CapEx opportunities to meet new system demand from EVs (e.g. distribution upgrades, new generation)

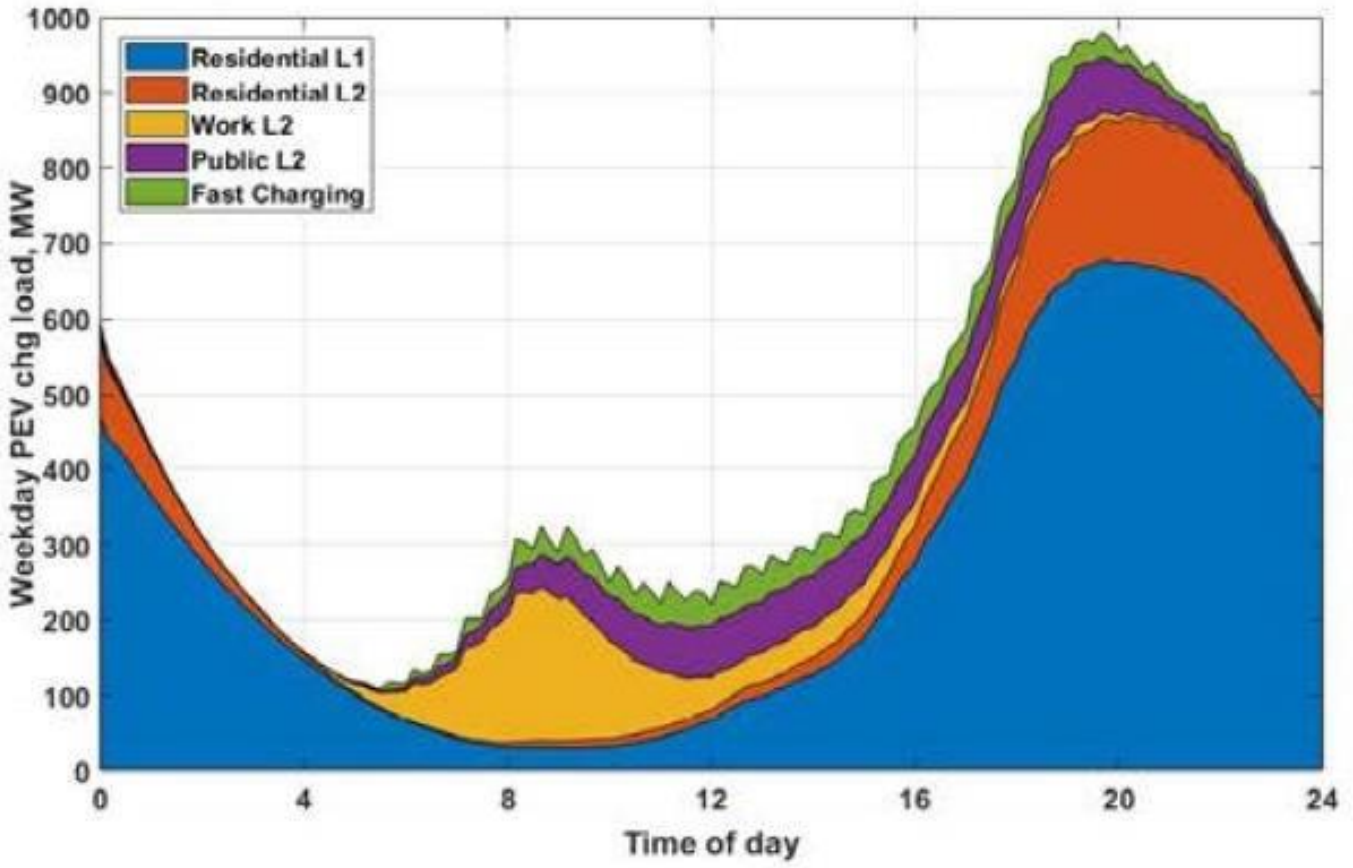
What new incentives may be appropriate in conjunction with TE?

- EVSE utilization
- Effectiveness of managed charging solutions (e.g. MW system load reduction)
- Customer participation in EV-specific rates and programs
- Shared savings from Automated Load Management (ALM) solutions that can reduce EVSE and make-ready costs
- Deployment of V2G solutions (e.g. interconnection requests)

Common theme for new incentives: How can utilities leverage EVs as grid assets to lower system costs?

Lessons from California: Projected Charging Load Profile in 2025

- Under “business as usual” EV charging load has been forecasted to coincide with times of peak demand on the power system.
- Typical system peaks are in the afternoon/evening from 3pm-10pm.

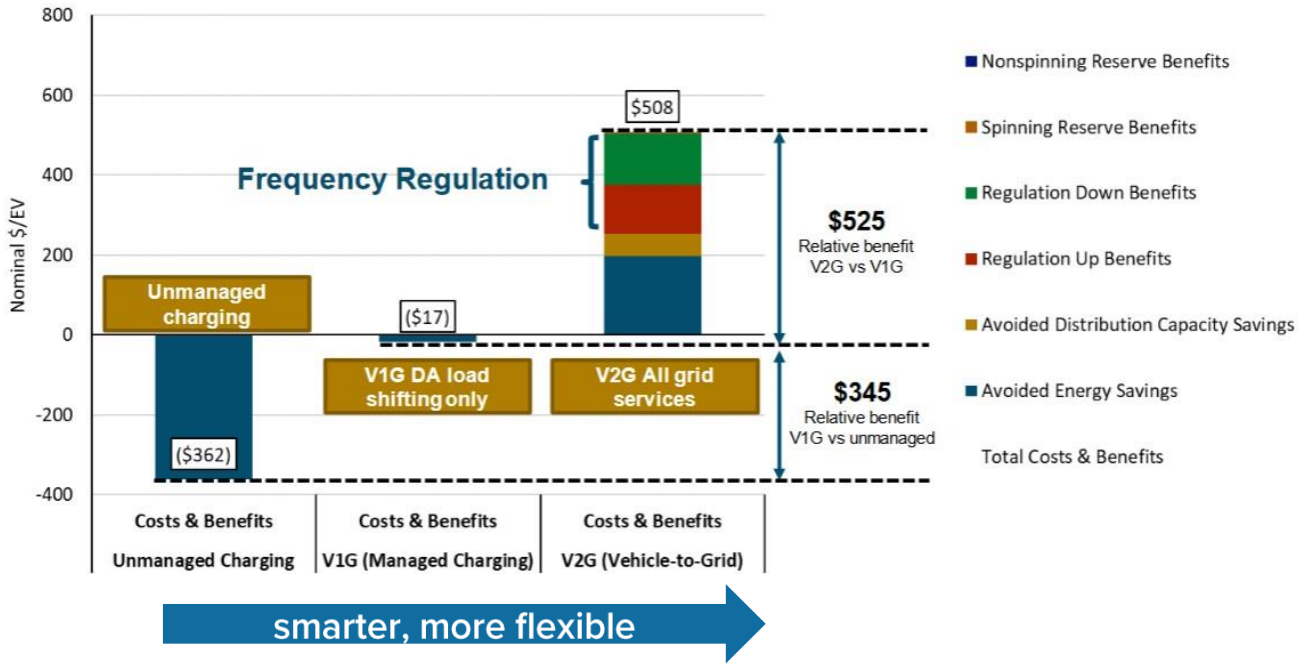


Source: California Energy Commission and NREL

Source: CEC EV charger report

Lessons from California: Potential economic benefits of Vehicle Grid Integration ("VGI") Solutions

- In California alone, unmanaged EV charging load could add an incremental 4.9 GW of peak power demand at the system level by 2030.
- Systemwide load shifting for 1 GW of V1G resources was valued at $1.45 billion - $1.75 billion, despite a small cost for providing V1G services ($150 million).
- V2G system-wide balancing capabilities increased the value to $12.8 billion-$15.4 billion with 5 GW of V2G resources, while offsetting the need for new generation resources.
- V1G resources providing load shifting services can contribute $345 annually per EV in incremental value in California, with an additional $525 per EV for full V2G services.



California's GVI Working Group Final Report: Institute performance-based ratemaking… to encourage more efficient EV-related distribution build-out." 6/30/30
https://gridworks.org/initiatives/vehicle-grid-integrationwg/

Source: Gridworks. "Evaluating California's Vehicle-Grid Integration Opportunities A Framing Document". August 2019. https://gridworks.org/wp-content/uploads/2019/08/Gridworks-VGI-Initiative-Framing-Document.pdf

A utility "VGI Portfolio" concept may be well suited to PBR frameworks and/or multi-year rate plans

VGI Program Area	4-Year Total	Target # EVs or customers
Customer Acquisition/Participation Incentives	**$X million**	
LDV OEM/Upstream		80,000
LDV Point of Sale – ME&O and Dealer Training		8,000
MHDV OEM/Upstream		10,000
EVSE Workplace Charging (permanent load shift)		2,000
Active Load Management	**$X million**	4,000
Resiliency and GHG	**$X million**	
V2B / V2G Deployment for PSPS Events		3,750
Dynamic Rate Options (real-time rate / fleet rate / avg daily demand, etc.)	**$X million**	
Customer Marketing Education & Outreach		1 million
Admin. Support		1 million
V2G Export Bill Credit Budget		12,000
LCFS Incremental Credits ME&O, Advisory Services		20,000
Capacity Programs	**$X million**	
Local Capacity RFO for EV Aggregation		400
DER Tariff		10,000
Public Charging Enhancements	**$X million**	
Ancillary Service Use Case Equipment (e.g., metering/telemetry)		1,000

From the Joint Comments of the Vehicle-Grid Integration Council, Enel X North America, Inc., Advanced Energy Economy, California Energy Storage Alliance, ChargePoint, Inc., Environmental Defense Fund, Greenlots, Natural Resources Defense Council, And Siemens On Email Ruling Seeking Party Comment On Vehicle-grid Integration Issues
https://www.vgicouncil.org/s/Joint-Comments-on-VGI-Issues-re-file-R18-12-006.pdf

STRATEGEN

Contact us for more information

Ed Burgess

eburgess@strategen.com

www.strategen.com

Berkeley, CA | Portland, OR | Brisbane, AUS

VGIC

VEHICLE-GRID INTEGRATION COUNCIL

www.vgicouncil.org

The Vehicle-Grid Integration Council (VGIC) is a national 501(c)(6) membership-based advocacy group committed to advancing the role of electric vehicles and vehicle-grid integration through policy development, education, outreach, and research.

The mission of VGIC is to support the transition to decarbonized transportation and electric sectors by ensuring the value from EV deployments and flexible EV charging and discharging is recognized and compensated in support of achieving a more reliable, affordable, and efficient electric grid.

Members Include:

- Connect California
- Enel-X
- Ford
- Fiat-Chrysler
- Fermata
- GM
- Honda
- Nissan
- Nuvve
- The Mobility House
- Toyota

STRATEGEN

Access the VGIC Overview Presentation Here

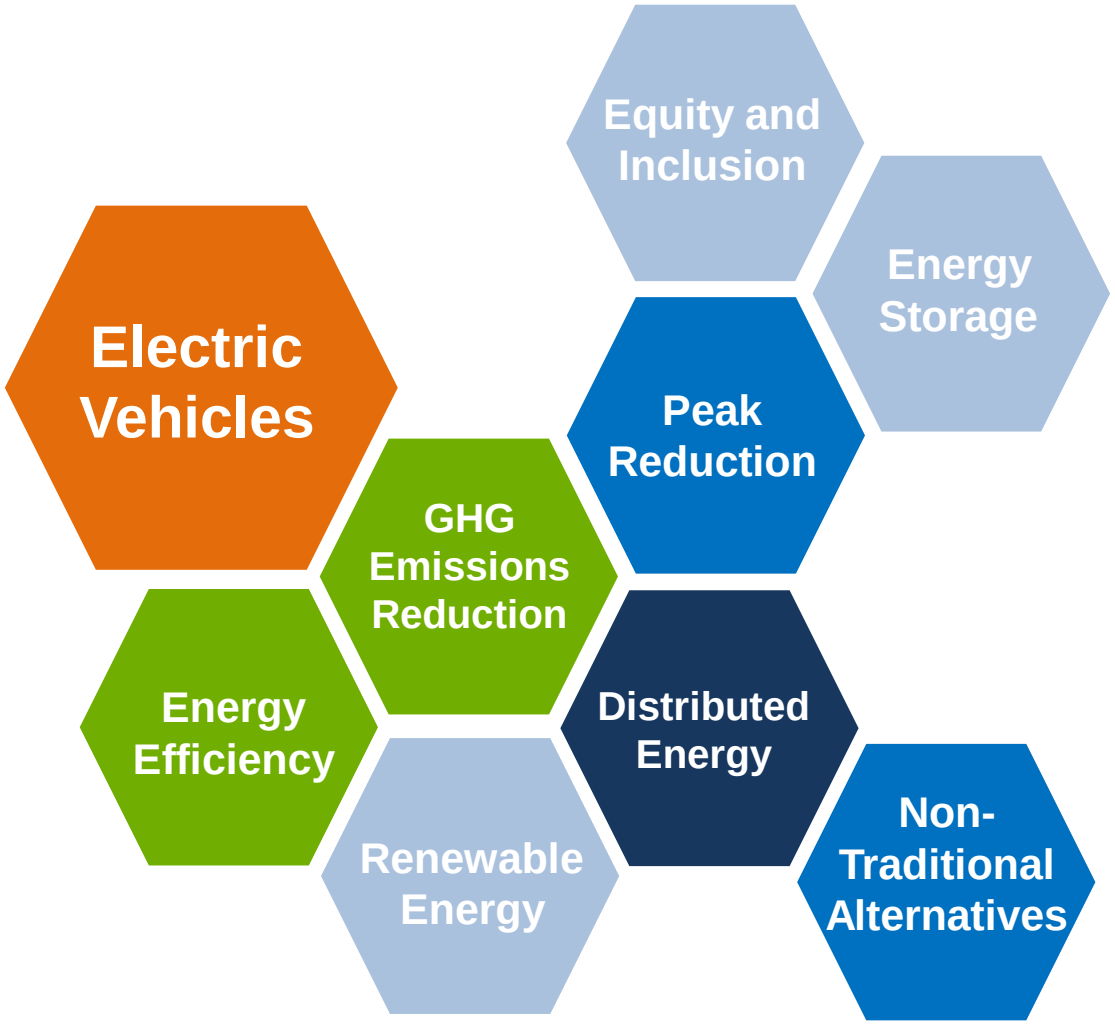
Performance-Based Regulation for Clean Transportation

December 2020

Raghu Sudhakara

Performance-Based Regulation (PBR)

- PBR can encourage:
  - Policy achievements
  - Market enablement
  - Innovation and efficiency
  - Enterprise-wide focus at utility
  - Customer benefits
- Performance incentives drive higher achievement, for example in energy efficiency*



* - See American Council for an Energy-Efficient Economy – Snapshot of Energy Efficiency Performance Incentives for Electric Utilities (December 2018)

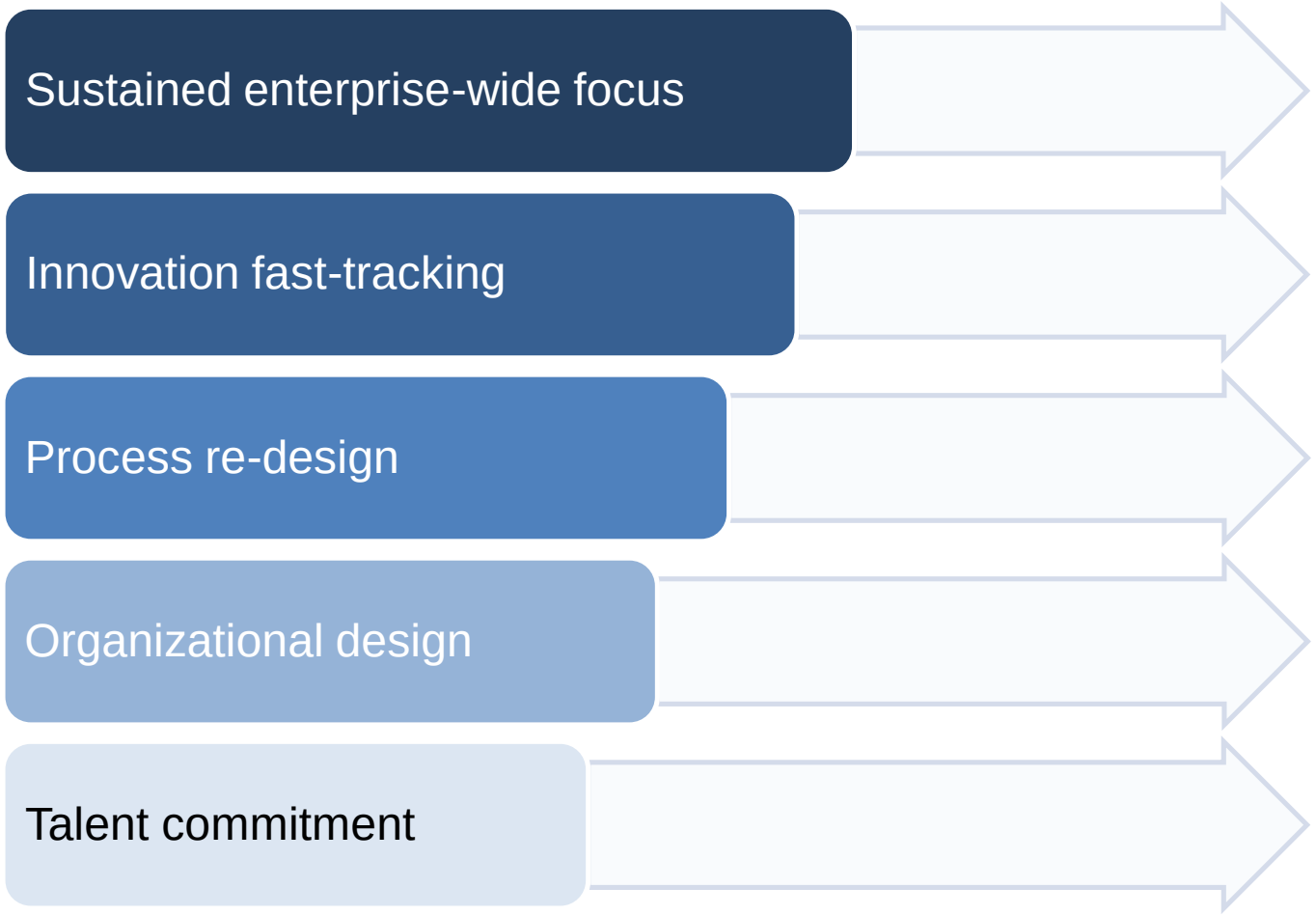
Evolution of PBR

PBR as applied through EAMs* have evolved to provide societal value and drive achievement

Societal Value for Customers	**EAMs are designed to boost societal benefits for customers above business-as-usual**
Meaningful Opportunity for Utilities	**EAMs at a level sufficient to motivate and drive utilities to achieve by changing behavior**
	EAMs' targets at a level that requires significant effort but within the realm of achievability
Policy achievement smartly	**EAMs not over-broad so that utility unable to influence result or not so narrow as to hamper innovation**
	EAMs that incent annually but accommodate multi-year goals recognizing practical execution realities
	EAMs that change incrementally so institutional ability is built for achievement

* - Earnings Adjustment Mechanisms, the New York approach to PBR that awards basis points on utility rate base for demonstrated policy focus area achievements

Con Edison Experience: EAM Fostered Utility Achievement



- Unprecedented growth in energy efficiency and related peak savings
- After EAMs* were adopted:
  - Energy efficiency achievement tripled while costs for each MWh of savings dropped ~25%
  - Peak savings quadrupled while costs for each MW of savings dropped ~35%
- >$400 million of new net benefits were created for customers

PBR To Drive Achievement in Clean Transport

EV regulation framework should be aligned with policy objectives and execution

	PROGRAM BASED	OUTCOME BASED
CURRENT EAMs	**EAM**: "Share the Savings" **Metric**: 30% of savings below budget **Incentive**: Up to 15 BPS	**EAM**: Beneficial Electrification **Metric**: GHG Redn. by EVs, Heat Pumps **Incentive**: Up to 10 BPS
ATTRIBUTES	**POLICY ALIGNMENT** Drive desirable policy outcomes Avoid conflict with other policy goals E.g. EV Rates with Peak Reduction EAM	**EXECUTION ALIGNMENT** EAM design informed by executability EAM design driving practical efficiency E.g. EV EAM recognizing trajectory

Appropriate Design:

- **Well-defined objective**
- **Measurable, avoiding counterfactuals**
- **"Stretch" but attainable**
- **Stable over time**
- **Time based but adaptable**

Questions?

Raise your hand to ask a question or type a question into the question box

Peer Discussion – Commissioners and Commission Staff Only

Facilitator

- EV Working Group Chair Maria Bocanegra and Illinois Commerce Commission Staff

Discussion Questions

1. How has/could the unique demographics of your jurisdictions (customer size, access to markets, etc.) potentially influence EVs and PBR for EVs?

Discussion Questions

1. How has/could the unique demographics of your jurisdictions (customer size, access to markets, etc.) potentially influence EVs and PBR for EVs?
2. Which stakeholders ("usual suspects" and non-traditional) have engaged in PBR? EVs?
   - Have PUCs convened stakeholders (for example, conducted a workshop) on PBR and/or EVs?
   - What have stakeholders said?

Discussion Questions

1. How has/could the unique demographics of your jurisdictions (customer size, access to markets, etc.) potentially influence EVs and PBR for EVs?
2. Which stakeholders ("usual suspects" and non-traditional) have engaged in PBR? EVs?
   - Have PUCs convened stakeholders (for example, conducted a workshop) on PBR and/or EVs?
   - What have stakeholders said?
3. What are the core expectations (minimum requirements) of utilities in EV adoption? How can you incentivize the utility to act beyond minimum requirements and penalize when it has not met minimum requirements?
   - How does the commission ensure it is not rewarding the utility for standard operations (what it is already obligated to do and meeting)?

Discussion Questions

1. How has/could the unique demographics of your jurisdictions (customer size, access to markets, etc.) potentially influence EVs and PBR for EVs?
2. Which stakeholders ("usual suspects" and non-traditional) have engaged in PBR? EVs?
   - Have PUCs convened stakeholders (for example, conducted a workshop) on PBR and/or EVs?
   - What have stakeholders said?
3. What are the core expectations (minimum requirements) of utilities in EV adoption? How can you incentivize the utility to act beyond minimum requirements and penalize when it has not met minimum requirements?
   - How does the commission ensure it is not rewarding the utility for standard operations (what it is already obligated to do and meeting)?
4. How might PBR for EVs impact the financial health of the utility (such as credit ratings, earned returned on equity, etc.)? What are the impacts of PBR for EVs on the financial health of the customer and equality and equity?
   - What modeling should a regulator look for in both cases?

Discussion Questions

1. How has/could the unique demographics of your jurisdictions (customer size, access to markets, etc.) potentially influence EVs and PBR for EVs?
2. Which stakeholders ("usual suspects" and non-traditional) have engaged in PBR? EVs?
   - Have PUCs convened stakeholders (for example, conducted a workshop) on PBR and/or EVs?
   - What have stakeholders said?
3. What are the core expectations (minimum requirements) of utilities in EV adoption? How can you incentivize the utility to act beyond minimum requirements and penalize when it has not met minimum requirements?
   - How does the commission ensure it is not rewarding the utility for standard operations (what it is already obligated to do and meeting)?
4. How might PBR for EVs impact the financial health of the utility (such as credit ratings, earned returned on equity, etc.)? What are the impacts of PBR for EVs on the financial health of the customer and equality and equity?
   - What modeling should a regulator look for in both cases?
5. What resources do your commissions use to analyze and build capacity on PBR and EVs? What experts evaluate performance metrics?

Announcements

- Registration Open for the Winter Policy Summit: **February 4,5 and 8-11, 2021**
- **Presentations and recordings of past EVSWG events**
- EVSWG Listserv: NARUC-EVSWG@lists.naruc.org
- PBRSWG Listserv: NARUC-PBRSWG@lists.naruc.org