2024 Joint IOU Annual EPIC Workshop

Monday, August 5, 2024
11 AM to 4 PM
555 W. Fifth Street, Los Angeles, CA 90013 and Virtual (MS Teams)

This program is funded by California utility customers under the auspices of the CPUC.

Safety and Housekeeping Messages

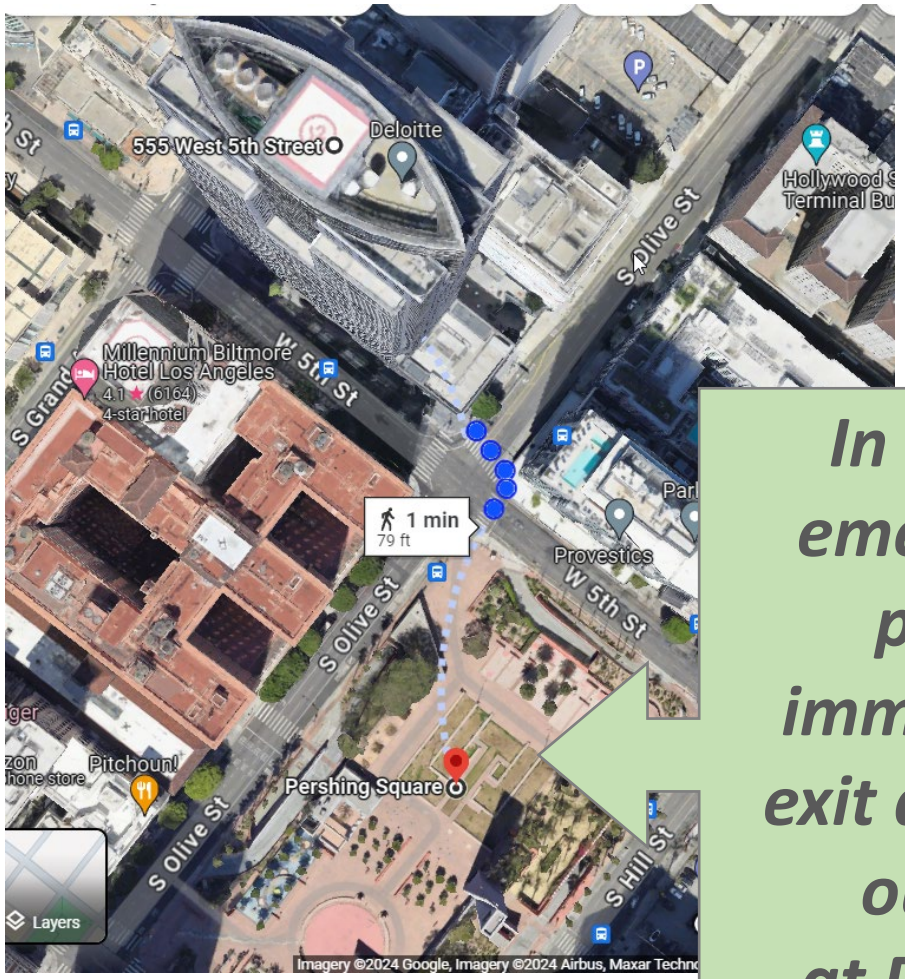
- Emergency Procedures
  - Call 911/Get AED – Aileen Santos(Lobby Security)
  - CPR Volunteer – Stephanie Lomeli
- Cafeteria
- Restrooms

Questions during the day:
Cynthia Carter
EPIC Program Manager
San Diego Gas & Electric Company
ccarter5@sdge.com

Emergency Evacuation

In case of emergency, please immediately exit and meet outside at Pershing Square

Emergency Evacuation



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Agenda

Introduction and Opening Remarks (11:00 – 11:25)
PG&E EPIC-4 Project (11:25-11:35)
Panel 1 Affordability (11:25 – 12:15)
Panel 1 Stakeholder Q&A (12:15 – 12:35)
Intermission (12:35 – 1:35)
Panel 2 DVC (1:35 – 2:25)
Panel 2 Stakeholder Q&A (2:25 – 2:45)
Panel 3 Vehicle Grid Integration Coordinated Applications (2:45 – 3:35)
Panel 3 Stakeholder Q&A (3:35 – 3:55)
Wrap Up & Thank You (3:55 – 4:00)

Welcoming Remarks

Welcoming Remarks

Director Fernando Valero

Advanced Clean Technology

SDG&E

Welcoming Remarks

Karen Douglas

CPUC Commissioner

What is EPIC?

The Electric Program Investment Charge (EPIC) is a California statewide program that enables Utilities and CEC to invest in & pursue new/novel emerging energy solutions to meet California's energy goals & drive innovation in the industry

EPIC promotes building the energy network of tomorrow through innovation focused on

Increased Safety • Improved Affordability • Greater Reliability Environmental Sustainability • Equity

EPIC 4 – IOU Administrator Constraints

- Only can do "Pre-Commercial Demonstration"
- *New to EPIC 4 – 25% of the budget needs to be located within a DAC and 10% in low-income community*
- EPIC provides the IOUs with flexibility to demonstrate a wide range of emerging technologies.
- CPUC-designated constraints state that IOU EPIC projects cannot be the following:
  - Only Energy Efficiency or Only Demand Response
  - Only Power Generation
  - Only Gas
  - Paper studies (i.e., without lab or field demonstration)
  - Broad deployments of commercially available/already proven technologies
  - Unnecessarily duplicative of other technology demonstrations

New PG&E EPIC 4 Project:
4.23 Digital Substation to Support Future Smart Grid

Presented by: Scott Bricker, Sr. Manager, PG&E

4.23 Digital Substation to Support Future Smart Grid

August 5, 2024

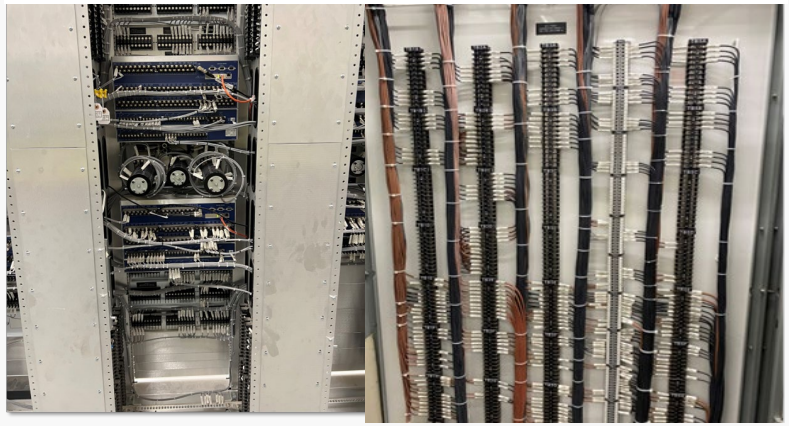
This program is funded by California utility customers under the auspices of the California Public Utilities Commission.

Digital Substation Overview

Today's Challenges (Analog System)

- Thousands of protection and control (P&C) systems are nearing their end-of-life and are at risk of failure
- Hundreds of control buildings that require significant real estate to replace
- Increasing maintenance costs

Current control panels are rapidly aging



Benefits of Digital Substations

- Cost Savings: Lower Construction Costs & Operations & Maintenance Costs
- Increases Interoperability, Flexibility, Scalability
- Continuous Monitoring (Safety, Reliability)
- Enhanced Cybersecurity

Hard wired substation

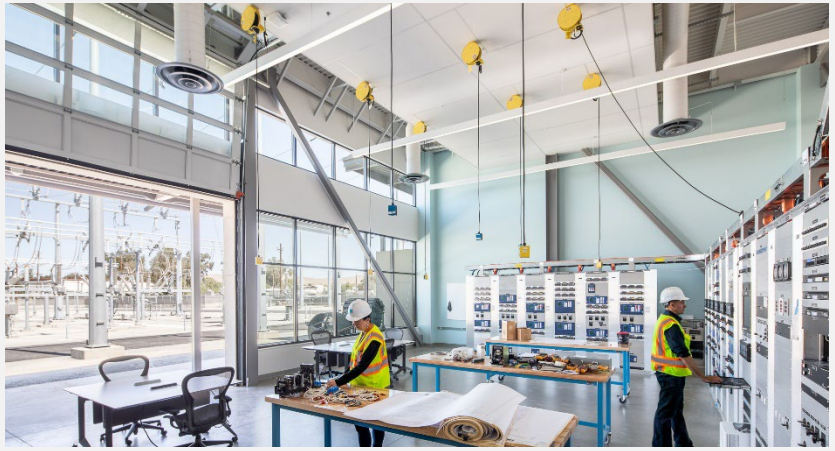
Digital substation

Phase 1: Lab Demonstration (EPIC Project, $2M)

PHASE 1: Lab Demonstration | **PHASE 2:** Proof of Concept Implement | **PHASE 3:** Data Collection and Evolution

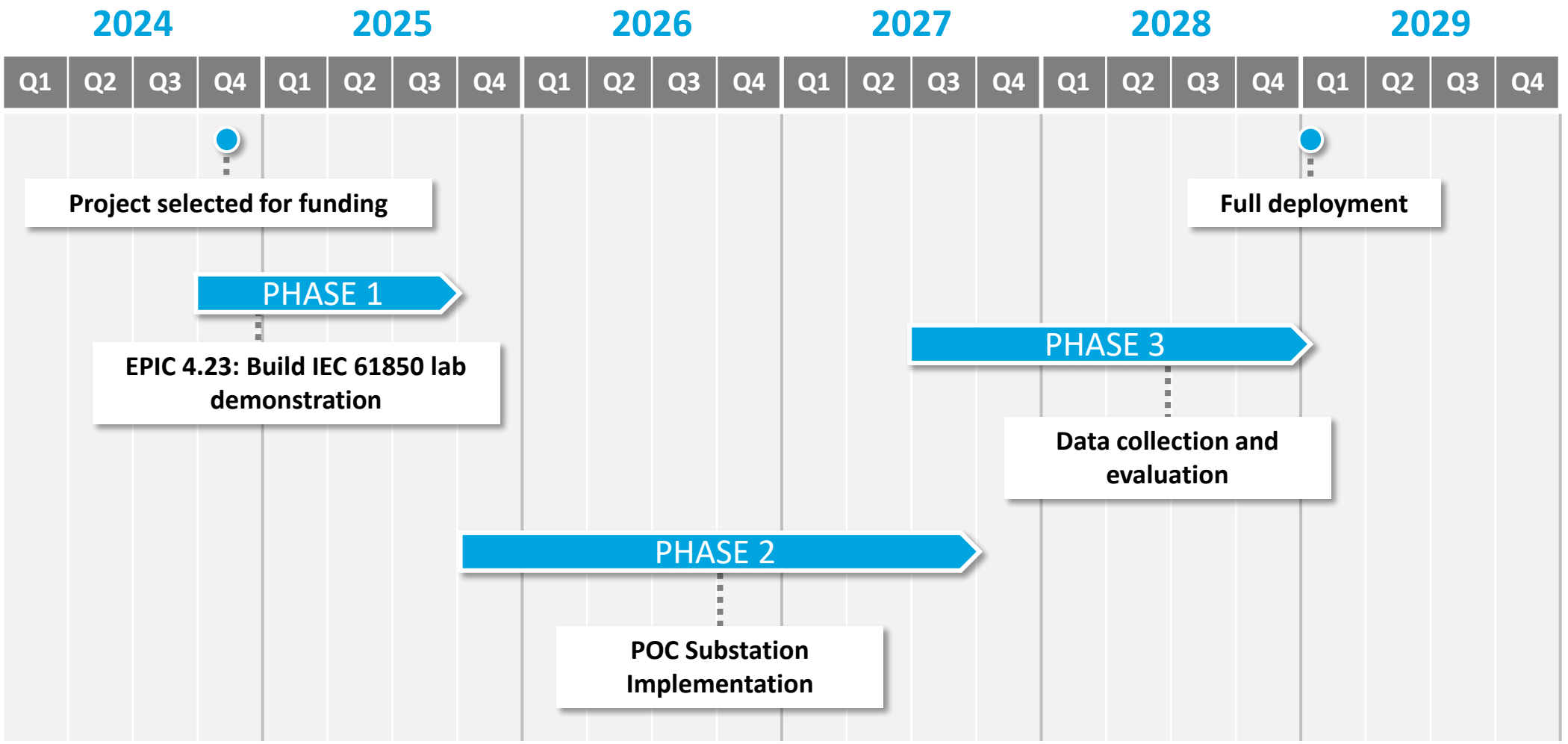
Lab demonstration will be located at Livermore Training Center

- Replaces copper cables with fiber optic to create a digital substation
- Features design that includes full redundancy, implementing dual merging units and relays, HMI, and interoperability
- Demonstrates potential of digital substation and trains PG&E engineers, technicians and maintenance coworkers
- Develops testing approach for digital substation solutions
- Reduces risk to customers, coworkers and assets
- Informs plan for future development and potential launches



Lab environment allows for optimization testing with core team before wider deployment

Project Timeline



Close & Questions

Thank you!

For additional questions/comments about this project, please email **Epic_Info@pge.com** or **Scott.Bricker@pge.com**.

Deck will be uploaded to **pge.com/epic**.

Appendix

This program is funded by California utility customers under the auspices of the California Public Utilities Commission.

Phase 2: Proof of Concept (POC) Implementation

PHASE 1: Lab Demonstration | **PHASE 2:** Proof of Concept Implement | **PHASE 3:** Data Collection and Evolution

Identify POC location by considering customer impact, system risk, reliability and resilience

- Implements IEC 61850 standard for full digitalization of an electric substation
- Reduces control building footprint by 30% to 50%
- Allows for continuous self-monitoring which improves reliability and decreases maintenance costs
- Features a possible 40% total reduction in costs compared to copper wires.
- Increases cybersecurity, reliability, and safety
- Facilitates interoperability essential for a future smart grid

Hard wired substation | Digital substation

Phase 3: Data Collection and Evaluation

PHASE 1: Lab Demonstration | **PHASE 2:** Proof of Concept Implement | **PHASE 3:** Data Collection and Evolution

Utilize Lean problem-solving to develop scalable long-term program

- Evaluate progress and updates Road Map
- Review organizational alignment to deploy at full scale
- Review maintenance practices
- Establish appropriate design standards
- Train workforce on operations process
- Collaborate with other utilities to drive greatest value for customers

EPIC 4.23 Process Bus Standardization for Electric Substations Summary

TOPIC	DESCRIPTION
Concern / Gap Addressed	PG&E currently has hundreds of substation control buildings that house thousands of transmission protection and control assets that are at risk for failure. In addition, as the condition of major assets, such as transformers, continue to decline the protection standard often determines the need for a new control building resulting in cost escalations. Approximately 82% of all devices on the network are protection and control assets, which increases costs approximately 2% annually. PG&E is required to maintain both Critical Infrastructure Protection (CIP) and Public Resource Code (PRC) regulatory compliance standards and PG&E compliance policies resulting in increase expense costs. PG&E is delivering for our hometowns by exploring technologies to help reduce capital and expense costs to provide affordable energy to our customers.
Description of Technology	Digital substation utilizes the IEC 61850 standard as a method of modeling substation primary and secondary equipment using standard engineering process and methodology that is modular and allows for easy expansion. The key to the standard is that it defines the communication between devices in the substation and the related system requirements. The standard also promotes interoperability between suppliers increasing grid flexibility. The advantage of a digital substation is a reduction of copper cables, interoperability and standardization. The standardized approach allows for extensive troubleshooting and continuous performance monitoring that will result in improvements in reliability and decrease maintenance costs. This technology creates a digital process bus of the PT, CT and all control circuits between the outdoor switchyard equipment using a merging unit (MU) and the protective relays inside a control building. All communications between relays and MUs are over fiber optic cable reducing the hundreds of labor hours to hardwire devices between switchboards and termination cabinets.
Objective	The lab demonstrates the potential of digital substation and provides a safe environment to train PG&E engineers, technicians and maintenance coworkers. This location allows for testing and training to occur in a non-energized environment reducing risk to customers, coworkers and equipment. This also provides a safe environment to provide training to substation personnel such as but not limited to engineering, test technicians, IT, and maintenance coworkers. The Digital Substation aligns with PG&E's Engineering, Planning and Strategy team's core mission of implementing standard work and resource plans including execution and engineering.
Project Description / Scope of EPIC Demonstration	PG&E is working with a strategic partner to implement a digital lab located at Livermore Training Center. The lab use case will demonstrate several transmission level protection and control schemes including but not limited to protection and bus differential protections schemes. The lab demonstration will also include a station bus to collect critical operating data to present on a local human machine interface (HMI). The lab design will include full redundancy implementing dual MU per breaker, dual Satellite PTP clocks, isolated parallel redundant (PRP) process bus network, integrated test equipment, and interoperability enabled. The lab demonstration will allow PG&E to document roles and responsibilities of key stakeholder and plans for future development and proof of concept.
Estimated Cost	**EPIC Project Costs: $2,000,000 (Lab Demonstration only)**
How PG&E can scale to full deployment (Path to Production)	The lab demonstration at the Livermore Training Center is planned for completion by year end 2025. PG&E does have plans continue to implement a digital substation proof of concept that will allow for data collection and evaluation to develop a path towards production at full scale by 2029.
New / Novel	Developing engineering, commissioning, and maintenance practices and processes within PG&E that align with industry and regulatory (North American Electric Reliability Corporation, Public Resource Code and Transmission Planning) standards.
Urgency	Digital Substation will benefit customers with long-term cost savings, future system flexibility, and increase safety.
Benefits	We hypothesize that digitizing substations can reduce overall asset management costs by approximately 40% compared to today's solution due to less copper wiring and reducing control building footprint by 30%-50%. The solution is also predicted to lower testing and maintenance costs over its life cycle.

Panel 1: Empowering Affordability through EPIC

Moderated By: Agatha Kazdan, EPRI

Moderator

Agatha Kazdan
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Panelists

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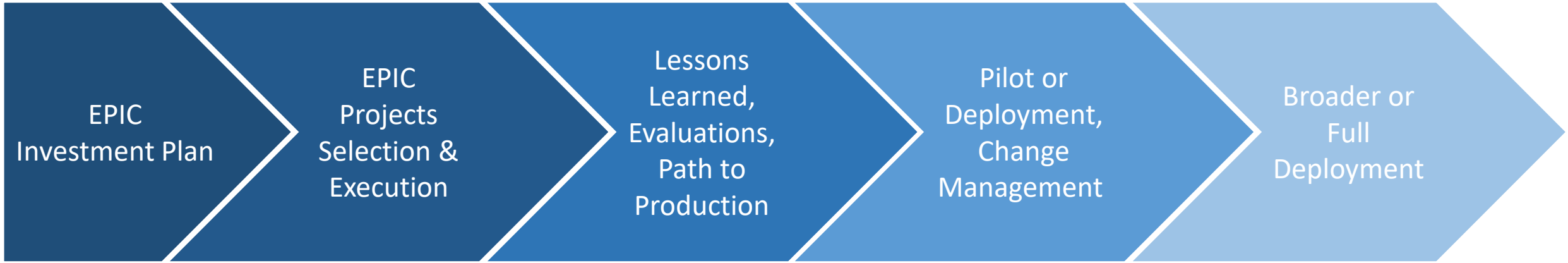
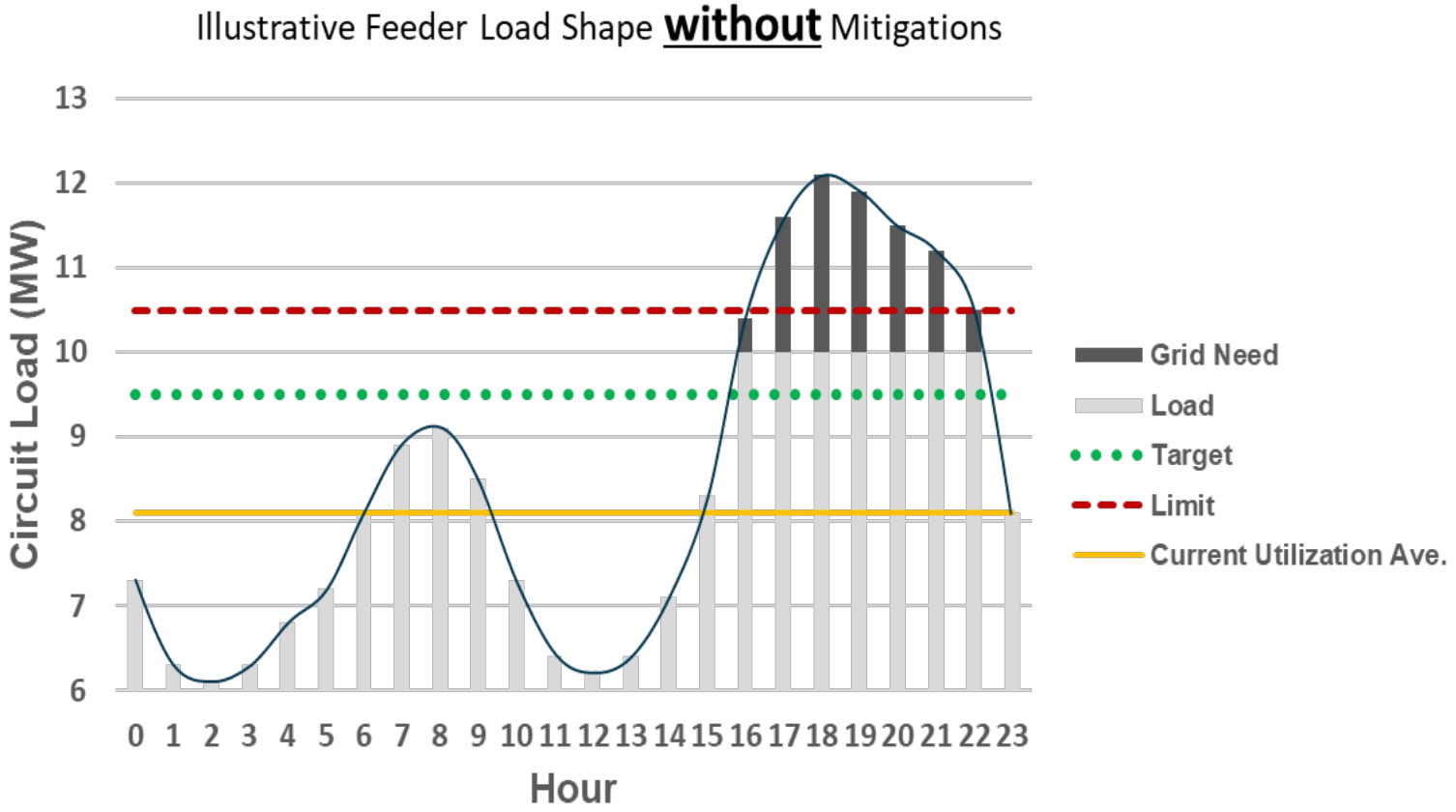
Electric Program Investment Charge (EPIC)

Increased Safety • Improved Affordability • Greater Reliability
Environmental Sustainability • Equity



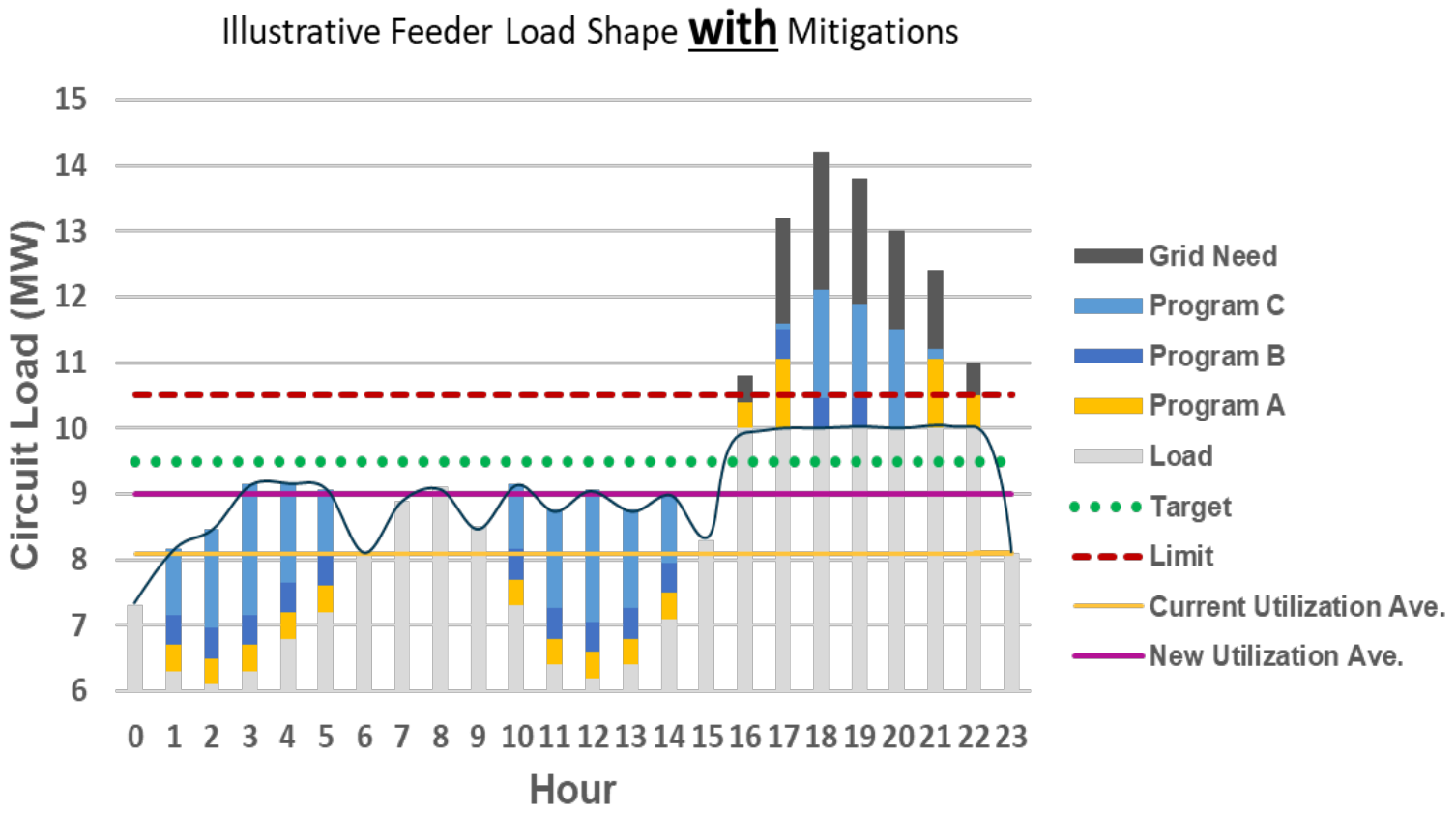
Where we are: New Tools Needed for a Changing Grid

- **Barriers to electrification** and EV adoption
- Unprecedented **load growth**
- Modeling, Planning & Building Grid to meet **Peak Loads**
- **Passive coordination** with Distributed Energy Resources (Electric Vehicles, Batteries, etc)



Where we are going: Flexible, Smart Grid

- **Enable widespread electrification** and EV adoption
- Avoid load peaks and enable **flexible, manageable loads** through “smart” technologies
- **Maximizing utilization** of existing grid elements
- Modeling, Planning & Building Grid for **flexible, dynamic loads**



EPIC 4 Portfolio Highlights

EPIC 4 Project	Objective	Supports Customer Electrification	Advances Flexible Load Mgmt & Planning	Maximizes Utilization
Socket of the Future & Residential Single-Family Housing (SFH) EV	Remove barriers to electrification and EV adoption	✓	✓	✓
Managed Charging Demo	Develops managed charging orchestrated with grid need	✓	✓	✓
Non-Wires Alternatives (NWA) Integration into Distribution Planning	DER and Non-Wires modeling tools for infrastructure forecasting and planning		✓	✓
Local DER Orchestration	Manage local grid constraints through DER coordination	✓	✓	✓
EV Solutions for Parking Constrained Residences	Explore effective pathways to best support customers with appropriate EV charging solutions	✓		

CEC: EPIC and Affordability

IOU Annual EPIC Workshop

Cammy Peterson
Deputy Director of Energy Systems, Innovation, and Strategy
Energy Research and Development Division

August 5, 2024

Empowering Affordability in…
Better, Healthier, Decarbonized Buildings and Building Systems

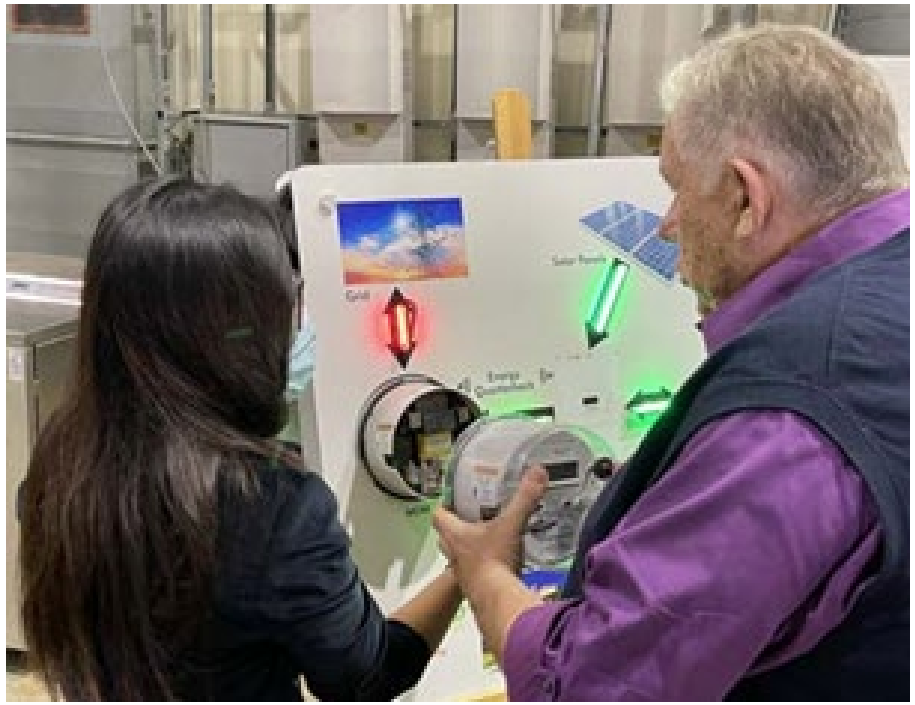
Breakthrough Innovation: Modular HP

Source: Gradient

Sources (clockwise from top-left): Innovative Housing Opportunities, Mutual Housing, National Community Renaissance, Electric Program Research Institute

Next EPIC Challenge: Build Phase

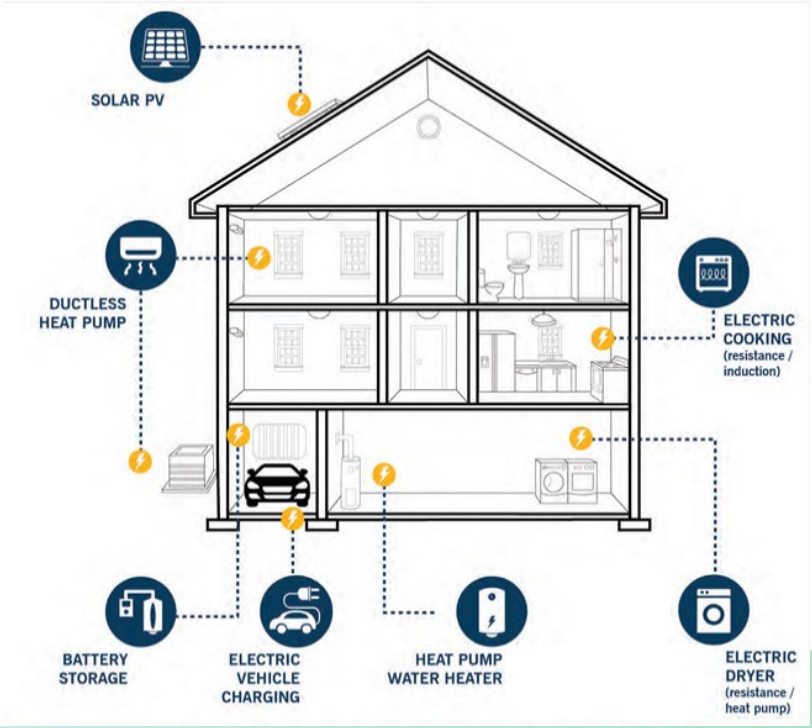
Advancing Affordability by…
Using Tech and Tools to Avoid Upgrades and Bolster Resilience



Source: NeWorld Energy

Power Electronics for Zero-Emission Residential Resilience

Decision Tool for Electrifying Homes with Limited Panel Capacity



Source: CEC, California Electric Homes Program

SDG&E® EPIC-3 Project 7: Demonstration of a Multipurpose Mobile Battery

Objective:

- Pre-commercial demonstration project evaluating the effectiveness of mobile batteries when rotated between applications & identify preferred applications & strategy for the rotation.
- Mobile batteries are a clean energy solution that could replace fossil fuel generators.

Mobile Battery Energy Storage Systems (MBESS)

362kW/1500kWh

480V 3Phase

100kW/500kWh

120/240V Single Phase

Accomplishments

- Hybrid deployment of the MBESS and diesel generators islanded 12 customers for 24 hours
- Connected MBESS in front of customer meter and demonstrated several use cases, including demand response.
- Provided two community resource centers with back-up power, running MBESS for 24 hours.
- Provided back up power for two consecutive planned outages. The MBESS was the primary source of power.
- Demonstrated increased operational flexibility when MBESS is connected in parallel with grid.

Affordability and Benefits

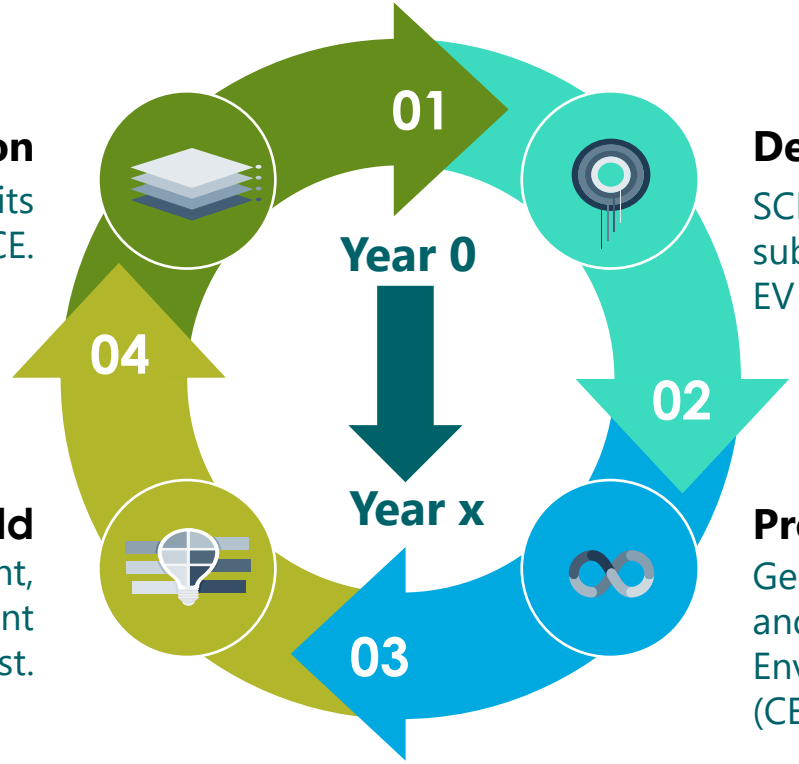
Lower Operating Costs	• Savings on fuel • Reduced maintenance costs • Can charge during low-cost off peak hours
Safety	• Decreased chance of fuel spill • Noise pollution reduction
Improved Performance of the Power System	• Helps decrease circuit current seen at the substation • Increased lifespan for grid equipment
Improved Reliability	• Successful ability to blackstart load • Ability to peak shave & load smooth
Lower GHG Emissions	• Less reliance on diesel generators • Reduced amount of fuel needed
Disadvantaged Communities	• Increased ability to support clean air in DACs • Can offset temporary load increase due to electrification.

Next Steps – Success of EPIC Project

- Continuing using MBESS as a standard SDG&E Business Practice.
- Utilize hybrid deployment of mobile battery and generators during Public Safety Power Shutoff events.
- Utilize MBESS as resources in our microgrids.
- Charge and discharge cycle for during periods that support the grid the most

Typical Grid Infrastructure Origination

Application
Fleet customer submits application for service to SCE.



Determination
SCE determines that a new sub is required for the large EV demand.

Process
General Order (GO) 131-D and the California Environmental Quality Act (CEQA) process.

Build
Engineering, Procurement, Construction incur a significant cost.

Requires New Strategies and Processes to Meet Customer Demand

Problem Identification

1 Growth

The pace of electrification in the transportation sector is expected to ramp up over the next decade.

2 Interconnection

Utilities are facing challenges when it comes to interconnecting loads of more than 1 MW to meet customer needs.

3 Outage

Electric vehicle customers are particularly susceptible to power outages that hinder charging and affect business operations.

4 Technology

Promising technologies may help to address customer concerns need field demonstrations to enable deployment in the near future.

Project: Swift Electrification of Transit [SET]

Objectives

Expediate Deployment

- By utilizing energy storage, charging management, and grid optimization to maximize the capacity of existing circuits. Standardized designs to minimize engineering time and cost.

Minimize Land Acquisition

- By optimizing the service point(s) based on loads, dynamic grid constraints, and energy storage capabilities to maximize land acquisition affordability.

Optimum Resiliency

- By implementing an affordable microgrid solution with dynamic charge management and VGI capabilities.

Workforce of the Future

- By partnering with local educational institutions to promote affordable energy storage and electrified transportation solutions.

Advance Technical Knowledge

- By evaluating affordable non-lithium energy storage for an optimal microgrid infrastructure with innovative technologies.

Project: Swift Electrification of Transit [SET]

Outcomes

Non-Lithium Storage
Affordable and safe non-lithium-ion energy storage operational characteristics.

Microgrid
Cost-effective advanced microgrid architecture.

Scalability
Modular and scalable charging infrastructure to reduce time and cost.

Charge Management Controller
Low budget charge management controller with multiple functions.

Panel Discussion

Q&A

Intermission

Return by: 1:35 pm

Panel 2: Innovating Tomorrow – Inclusive Solutions for Disadvantaged Communities with EPIC

Moderated by:
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Panelists

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Rachel Salazar
Outreach & Engagement
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EPIC and DVC Engagement

- Regulatory Context: Changes to EPIC 4. This is a new area of growth for IOU Administrators. IOUS can only use EPIC funds for pre-commercial demonstration projects
- Panel will focus on:
  - Workforce Development
  - Community Engagement
  - Barriers and Solutions
  - Health and Environment
  - Collaboration and Partnerships

Susan Wheeler
Jobs For the Future Energy Consultant

- Recently retired from SMUD
  - Managed Regional Workforce Development
  - Created strong community partnerships
  - Developed career programs for community members
  - Launched high school and college internship programs
  - Engaged employees across the company
- Jobs For the Future
  - Provide subject matter expertise to Dept. of Labor grantees
  - Team member developing Infrastructure Learning Community portal

Key elements to support a clean energy workforce:

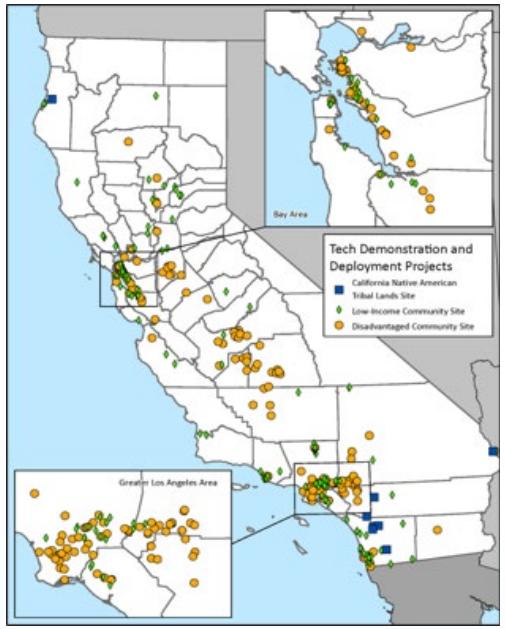
- Strong partnerships among educators, employers, CBOs
- Clear roles, responsibilities and communications
- Systematic data collection and tracking
- Shared trust, responsibilities and decision-making

Outreach and Engagement with Environmental Justice Communities

August 5, 2024, Joint Utilities' EPIC Workshop

Rachel Salazar, Equity Liaison
Energy Research and Development Division

Equity Requirements & Guiding Principles



Source: CEC 2024 EPIC Annual Report

- **Required minimum funding allocations and benefits** for Technology Demonstration and Deployment projects located in disadvantaged communities (25%) and low-income communities (10%)*
- CPUC Environmental Social Justice Action Plan
- Disadvantaged Community Advisory Group (DACAG) Equity Framework
- CEC Justice Access Equity Diversity and Inclusion Equity Framework

*Established by Assembly Bill 523 (Statutes of 2017) which defined disadvantaged communities using the CalEnviroScreen and low-income communities as at or below 80% of the state median income levels. Extended permanently by CPUC D. 23-04-042

Outreach and Engagement Efforts

- Neighborhood walk-throughs
- Existing community meetings
- Targeted outreach
- DACAG meeting and newsletter announcements
- Collaboration with other state agencies
- Proposal evaluation criteria
- Project requirements

Key Best Practices

Partner	• Collaborate with a **trusted** local or tribal organization that serves the community • Compensate for time and activities in projects
Meet people where they're at	• Engage at a time and location that is **convenient** for the community • Provide equitable communications
Compensation & Incentives	• Offer food/beverages, travel stipends, daycare for meetings • Gift cards for surveys or interviews
Community Support	• Require **community buy-in** before project development
Plan	• Develop an **engagement plan** with a bi-directional communication process

Thank You!

Upcoming

- CEC Equity Listening Sessions, September
- Joint EPIC Symposium, October 28

Contact:

Rachel.Salazar@energy.ca.gov

Workforce Development:
Apprenticeship Training Program for Linemen, Electricians, and Electric Meter Testers

Joint IOU EPIC Annual Workshop
Los Angeles, CA

August 5, 2024

Apprenticeship Training Program

San Diego Gas and Electric, in partnership with the San Diego Community College District, have, for decades, cooperated to offer college-level academic training as an integral part of the development for:

1. Employees formally indentured as apprentices in the trade (mandatory)

2. Employees who aspire to enter the trade as apprentices

3. Employees who want to learn more about the electric trade, not necessarily aspiring to enter the trade

4. Non-employee Community College students who desire to learn more about the electric trade

Apprenticeship Training Program

What is the program?

To be considered for promotion to Journeyman status, apprentice candidates for Lineman and Substation Electrician must successfully complete six semesters of the class series, with a “C” or better.

Each class carries academic credit of five units. Students achieve 30 units of college credit just by completing the series.

This academic portion of the formal training program compliments the daytime “OJT” and formal practical training the apprentices receive.

Training for EPIC and the Real World

How can this program help EPIC Projects? What is being taught to prepare these students for the workforce of the future?

Answer: The grid is evolving in ways not anticipated during the earlier decades of the industry. For example, daily bi-directional power flows are common, at all distribution and secondary voltage levels. The program includes material on contemporary issues like this, to ensure the students understand how to ***safely*** interact with these elements of the system, over the course of a career, itself lasting 30 to 40 years. In the context of the role the IOU's are allowed to participate, pre-commercial demonstrations, an educated workforce in the trade is valuable in the execution of some of the projects.

How can this program help DVC's?

Answer: Individuals from DVC's benefit from entering the electrical trade in two ways:

1. Achieving Journeyman status provides an income that is considered "middle class", even in relatively high cost of living areas.
2. It is realistic to complete the program while avoiding student loan debts.
3. A technically better educated workforce can help address the root-causes that make some communities disadvantaged and/or vulnerable.

Grid Alternatives

EcoBlock

Panel Discussion

Q&A

Panel 3: Vehicle Grid Integration Coordinated Applications

Moderated by:
Ben Clarin, Principal Manager, EPRI
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Panelists

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EPIC Vehicle Grid Integration Applications

Focus on SIDER Stability Improvement with DERs

EPIC IOU Workshop
August 5, 2024

Jordan Smith
Grid Edge Innovation

What is Vehicle Grid Integration (VGI)?

*…any method of **altering the time, charging level, or location** at which grid-connected electric vehicles charge or discharge, in a manner that optimizes plug-in electric vehicle interaction with the electrical grid and provides net benefits to ratepayers by doing any of the following:*

*(A) **Increasing** electrical grid asset **utilization**.*

*(B) **Avoiding** otherwise necessary distribution infrastructure **upgrades**.*

*(C) **Integrating renewable** energy resources.*

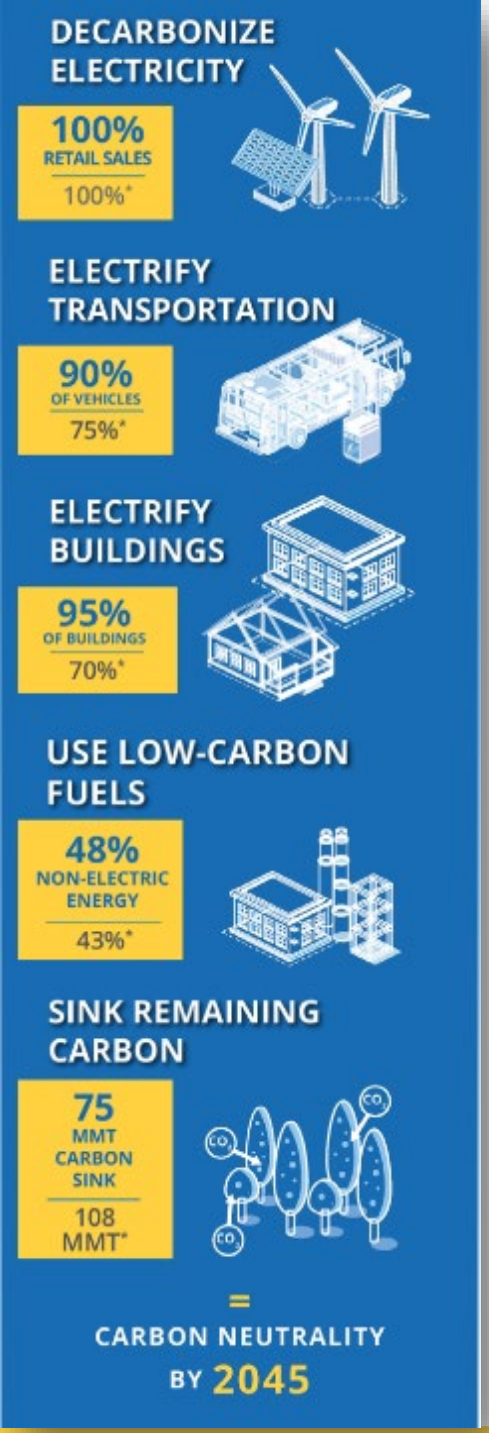
*(D) **Reducing** the **cost** of electricity supply.*

*(E) Offering **reliability** services consistent with Section 380 or the Independent System Operator tariff.*

…

(3) Electric vehicle grid integration may be achieved using multiple strategies, including, but not limited to, the adoption of an electrical rate design, a technology, or a customer service, if that adoption helps provide net benefits to ratepayers pursuant to paragraph (1).

California Public Utilities Code: Div. 1, PART 1, CHAPTER 4, ARTICLE 2, Section 740.16



VGI Plays a Key Role to Meet California's 2045 Goals

Challenge

By 2045 California will have three times more utility-scale energy generation than today. 90% of vehicles will run on electricity, and electricity demand will rise by 80%. The grid will need new transmission four times faster and distribution 10 times faster their historical rates. With this massive increase, there will need to be more reliance on load and source management.

Vision

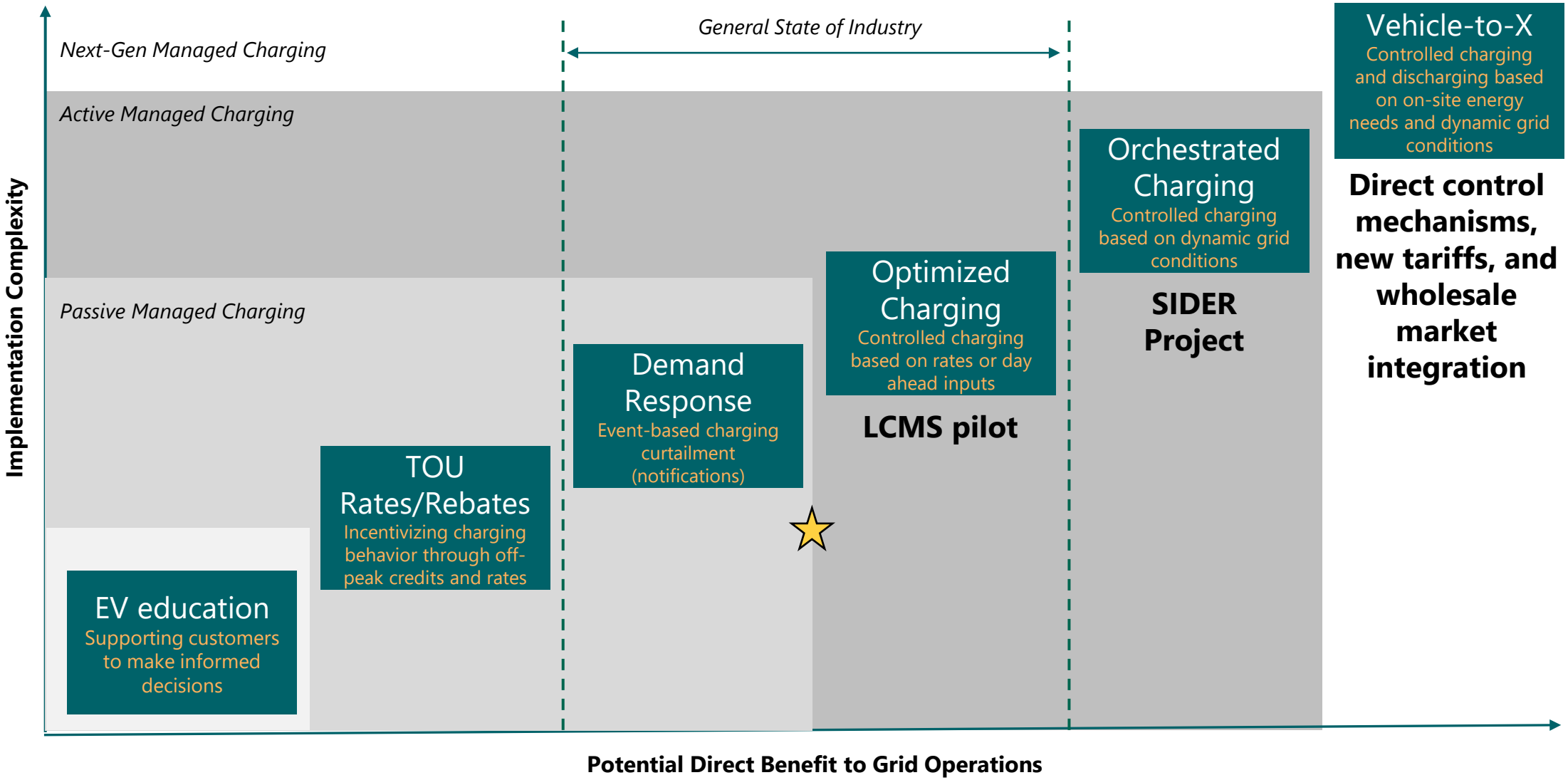
EVs will become the largest source of load flexibility. Actions will be taken now to enable VGI as a reliable resource for the future. Establish systems and methods for customers to leverage the battery capabilities within their electric vehicles to provide their own mobility and energy choices while ensuring grid reliability and resiliency. Integrate technical VGI capabilities and grid planning to ensure the best outcome for customers and the grid.

Goals

1. **Increase grid and customer resiliency**
2. **Increase grid resources at the edge**: 2 GW V2G, 2 GW of load shed (including VGI), and 65% managed charging by 2045; subcircuit dispatch of VGI resources by 2030
3. **Maintain affordability**
4. **Maximize clean energy utilization**

SCE *Countdown to 2045* https://www.edison.com/clean-energy/countdown-to-2045

SCE's VGI Roadmap



Current SCE EPIC Projects Involving VGI

Projects	Main Elements	Funding
Service Center of the Future	SCE Fleet Depot, EV charge management, microgrid, DERMS	EPIC 3
Vehicle to Grid Integration	V2G interconnection methods, AC and DC, DERMS connectivity and controls	EPIC 3
Distributed Plug-In Resources	SCE owned battery connected to customer EV charger	EPIC 3
SIDER – Stability Improvement with DERs	DERMS connectivity with DER aggregations, multiple OEMs, subtrans support, grid edge automation, scheduling	EPIC 4
SET – Swift Electrification of Transit	Large EV transit depot, customer substation, long duration storage, SST	EPIC 4
Innovative Curbside EV Charging	Increased utilization of infrastructure, demand management at the edge	CEC EPIC
eTRUC - California's Research Hub for Electric Technologies in Truck Applications	Heavy truck charging infrastructure – siting, load shapes, megawatt charging, DER integration	CEC EPIC

Other SCE Projects and Actions in VGI

- **LCMS Pilot** – Load Control Management Systems
  - Run by Distribution Engineering
  - Focused on EV charging load control in temporary application while grid upgrades are in progress
- **Dynamic Rate Pilot**
  - Run by Customer Service
  - Focus on provision of real time price to customer, with customer making decisions on actions to take (homes, appliances, EVs)
- **SCE Charge Ready Programs**
  - TOU EV charging tariffs implemented and evaluated
  - Demand response events
- **EV Charging Tariffs in Effect** – TOU, Demand Charges
- **Proposed EV Generation Pilot (VGRP)**
  - Proposed in GRC Phase 2 filing
  - Designed to incent V2G export to grid with compensation based on season and time

SIDER - Stability Improvement with DERs

Strategic Initiative: Energy Management Foundational Technologies

Research Topics: Inertia Substitution, Customer Load Flexibility

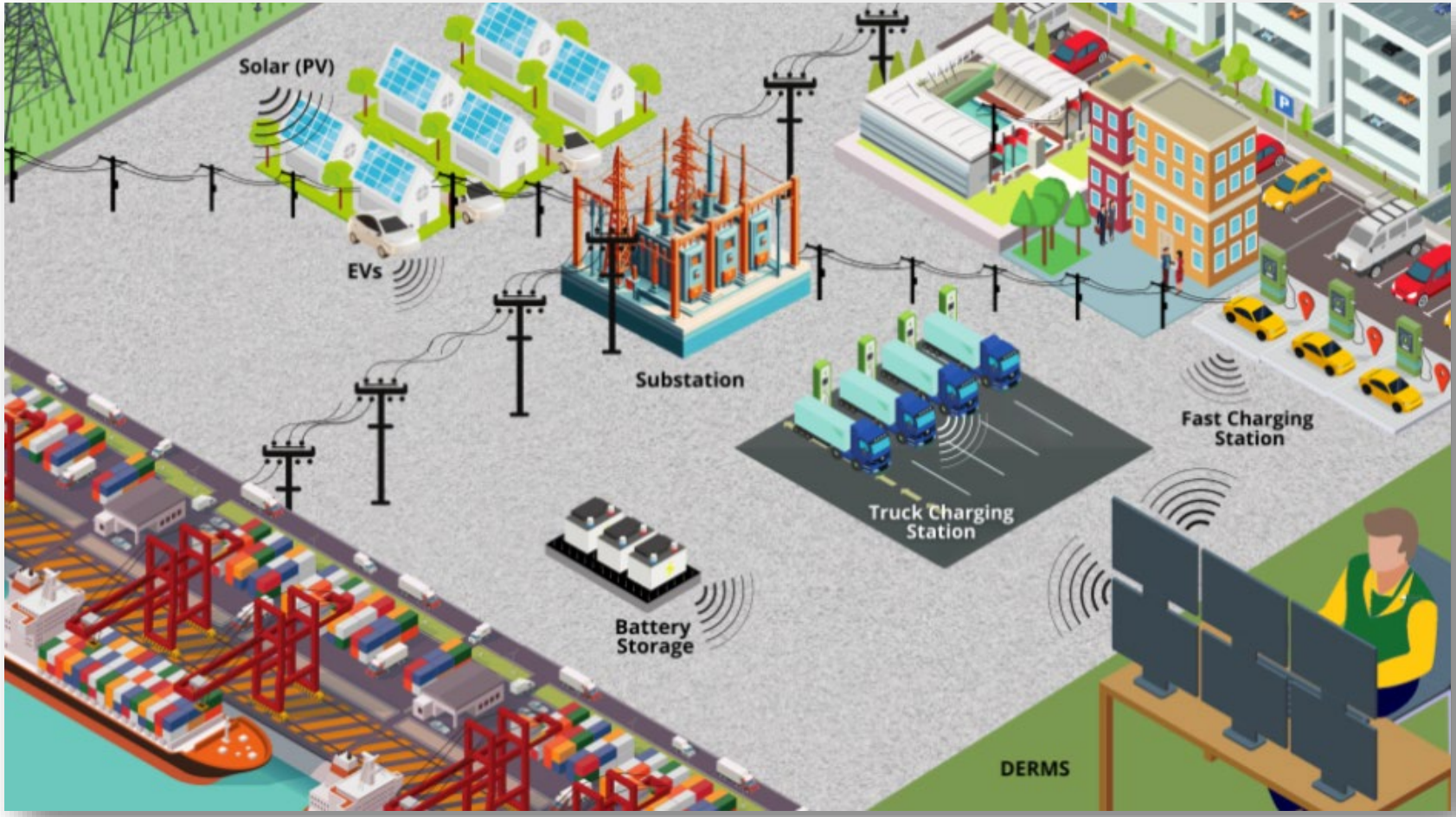
DER Integration
SIDER DERs include EV chargers, DC fast chargers, truck charging stations, business campus energy management systems, and stationary energy storage. All are directly integrated with the grid, DERMS, and through VPP aggregations

VGI
Vehicle Grid Integration (VGI) focuses on enabling customers to own and operate EVs, while also supporting the effective utilization of the grid.

Grid Inertia & Stability
As rotating synchronous generation retires, advanced equipment and applications must be implemented for DER generation, inertia substitution, and demand side management to maintain grid control parameters.

DERMS
SCE's DER Management System is leveraged to coordinate DERs such as EVs and storage with real-time grid operations to maintain grid performance as the generation mix evolves.

Community Electrification
SCE's customers are moving to electrify transportation and buildings. SIDER demonstrates tools and abilities to ease customer adoption while maintaining affordability and reliability.

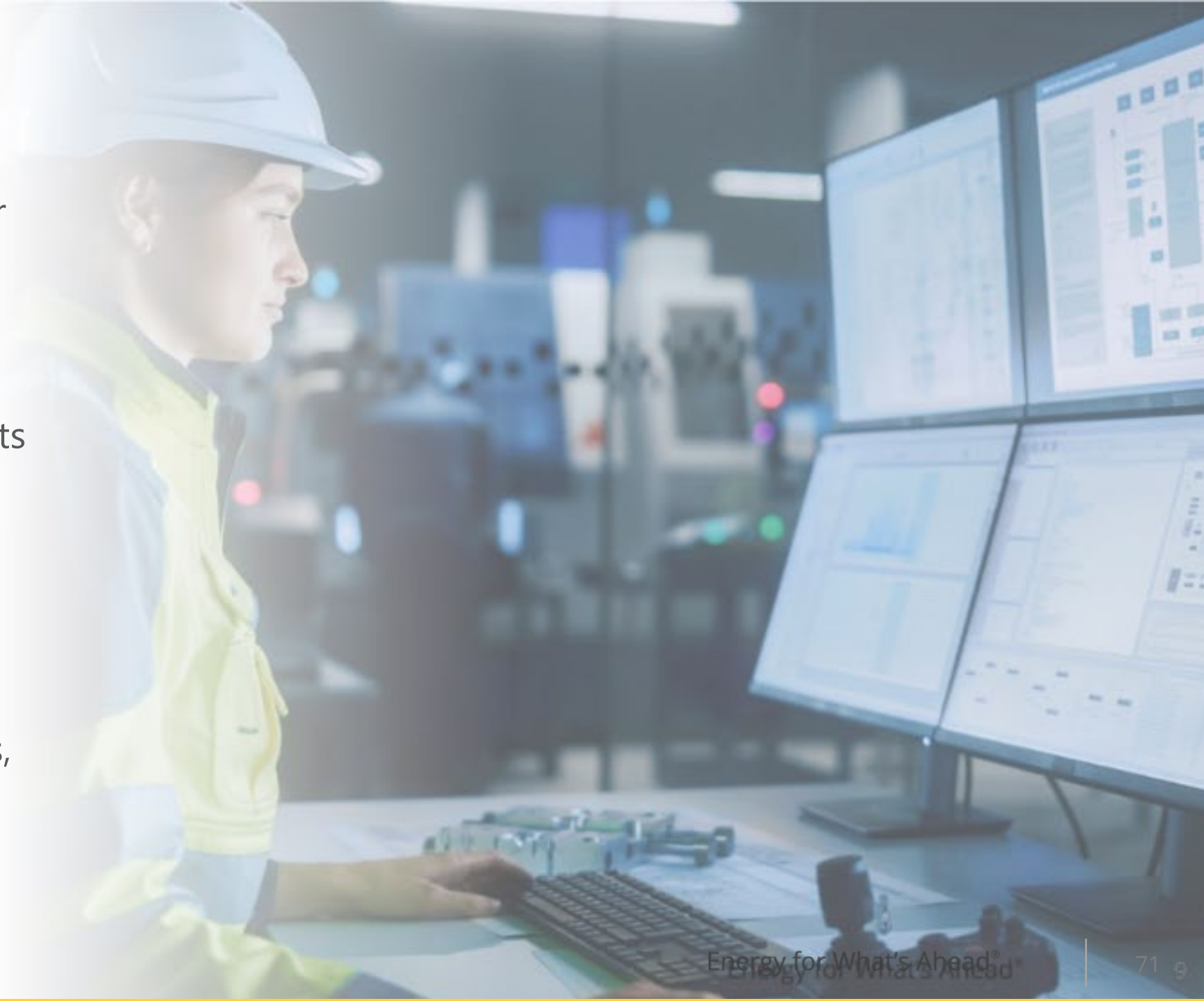


SIDER Objectives

I. **Identify the grid's current and future stability** needs under a locational basis, and test and simulate grid stabilizing technologies to meet the future's new dynamics
II. **Improve DER Monitoring and Control** by implementing a reliable communication platform with aggregators to register DERs, as well as communicate grid-related controls with SCE's DER management system to leverage load and source flexibility
III. **Partner with local community and educational institutions** to pilot technologies, analyze coordinated data, and to improve VGI capabilities and advance grid interactive technologies.
IV. **Industry Advancement**
    I. Demonstrate advanced grid stabilizing technologies and methods to support inertia dynamics
    II. Demonstrate communications platforms with SCE DERMS to monitor, control and optimize DER resources
    III. Demonstrate coordinated community/area support with DERs, including V2G and load flexibility
V. **Customer Benefits**
    I. Maintain community and enhance reliability and resilience with existing and planned community resources
    II. Increase the potential use of DERs including customer EVs to provide grid services.
    III. Enable further electrification, including EV ownership and value, consistent with VGI principles.

Conclusion

- VGI enables California and our customers to move into an **electrified future**
- EPIC enables further **VGI advancement** through projects like SIDER, SET & SCOF – demonstrating advanced VGI use cases
- We must **continue to collaborate**, working with automakers, EVSPs, customers, and our communities to advance EPIC objectives



CEC EPIC Vehicle-Grid Integration

IOU Annual EPIC Workshop

Peter Chen, Supervisor
Transportation Unit
Energy Research and Development Division

August 5, 2024

CEC VGI Efforts

Tech Funding

- EPIC RD&D funding
- Charger deployment via block grants and solicitations
- Charging related and load flex funding

Regs / Programs

- Load Management Standards (marginal cost rates)
- Demand Side Grid Support (DSGS) Program

Analysis / Reports

- Integrated Energy Policy Report
- AB 2127 Statewide Charging Infrastructure Assessment

Standards Support

- Minimum standards for CEC funding
- Needs analysis
- V2G Equipment List

This slide uses images from Flaticon.com

EPC-22-004 Gridtractor On-Farm Mobile Microgrids Project

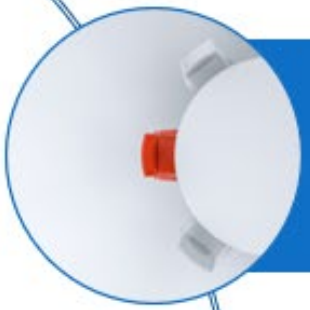
- Support transition to electric farm vehicles while providing customer resilience and value to the grid.
- Leverage existing electrical infrastructure and operational flexibility of the agricultural sector.
- Enable DC and AC bidirectional charging pathways with an electric agricultural tractor.
- Demonstrate bidirectional charging and agricultural load coordination in PG&E territory for backup power, demand response, and price signal response.

Bidi EVSE at PG&E facility for testing

Monarch MK-V electric tractor

IOU Coordination

Technical Advisory Committee (TAC)



PG&E and SCE subject matter experts participated in the project's TAC and advised on topics including submetering and AC V2G.

Testing Support

Tested bidirectional charging using Gridtractor's load management system and BorgWarner EVSE at PG&E's ATS center.

Utility Programs and Processes

Completed Rule 21 non-export DC V2B interconnection with PG&E. Planning to participate in PG&E's AC V2G pilot (pending extension), PG&E's Expanded Dynamic Rate pilot, and submetering.

Follow-on REDWDS Grant

- Gridtractor was awarded a follow-on grant under the CEC's REDWDS solicitation for up to $28M of non-ratepayer funding to further scale deployment following the EPIC project, demonstrate response to dynamic grid signals, and achieve a path to market.
- The follow-on project will:
  - Deploy up to 30 chargers (including bidirectional) for electric farm vehicles with load management capabilities.
  - Integrate load management software into up to 69 existing chargers in agricultural settings across California.
  - Possibly deploy up to 600 additional chargers in a Phase 2.

Looking Ahead in EPIC

- GFO-23-306: Grid-Supportive Transportation Electrification
  Notice of Proposed Awards in process.

- Next EPIC 4 solicitation will have a focus on enabling EVs as DERs.

- EPIC 5 PICG process has included discussion of VGI in the context of transportation electrification and DER integration.

Fermata Energy

IOU EPIC VGI Panel

August 5, 2024

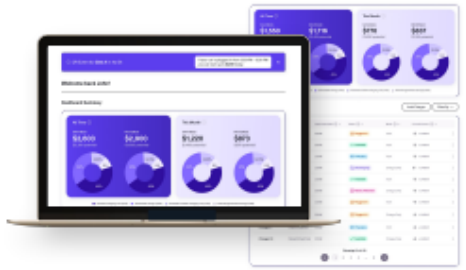
Anna Bella Korbatov
Director of Regulatory Affairs

Fermata Energy V2X Ecosystem

Fermata Energy

Fermata Energy V2X Platform

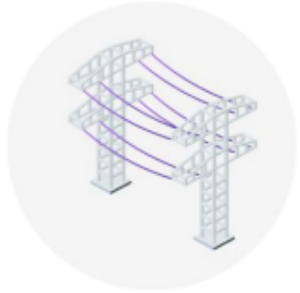
- V2G data science, forecasting and optimization
- V2G event notification
- Charge scheduling
- Site + building load monitoring
- Charger + EV data analytics



API Integrations

- Fleet/Charge Management Software
- Telematics
- Microgrids and addtl. energy resources (Solar, BESS, generators, etc)

heliox BORGWARNER



EV

- Manage + Preserve Battery Warranty
- Lower Total Cost of Ownership

Charger Integration

- FE-20 20kW bidirectional charger developed with Heliox
- Integrating with others

FE- Link

- Site Controller
- IoT Gateway
- Building Meter

Site Load Integration

- Load Management
- Site Resilience Support

Utility

- DERMS integration
- Demand Response
- Interconnection
- Aggregation
- Grid Resiliency Support
- Use Case Development

CEC Grant 22-612: ESB Bidirectional Infrastructure

When: **Q1 2025 launch - 3 years of DR performance**

What: 2.5 MW V2G deployment

$3 million grant to deploy 21 BorgWarner 125 kW bidirectional chargers + 20 LionD electric school buses + Fermata energy V2X software

Where: Long Beach & Thousand Oaks High School

Programs: ELRP, SCE Dynamic Rate Pilot

BORGWARNER

LION ELECTRIC

Fermata Energy

AMERICAN TRANSPORTATION

"With this new technology, electric school buses are not only delivering **cleaner air to our children and cost savings to our school districts, but also providing extra power to the grid when we need it most**," said **Patty Monahan, California Energy Commission's Lead Commissioner for Transportation.**

Project Locations

- **Site One:** Thousand Oaks High School, 2323 N. Moorpark Rd., Thousand Oaks, CA 91360
- **Site Two:** American Transportation Systems depot/parking lot, 3133 South St., Long Beach, CA 9085

Thousand Oaks High School, 2323 N. Moorpark Rd., Thousand Oaks, CA 91360

American Transport Systems depot/parking lot, 3133 South St, Long Beach, CA 90805

Project Objectives

- Install 21 BorgWarner bidirectional 125 kW chargers paired with a 20 LionD electric school buses
- Quantify financial benefits from participation in V2G pilots and programs
- Assess the project's performance and impacts on grid reliability and resilience by measuring the V2X discharge and response times of the electric buses
- Develop a VGI blueprint to help other school districts adopt bidirectional charging solutions

SOUTHERN CALIFORNIA EDISON®
Energy for What's Ahead®

olivine
ClimateResponse

VGI Value: Opportunities

Recent Developments

- Programmatic Interconnection Exemptions to Enable V2G Participation in VGI Programs and Pilots
  - CPUC and CEC have approved several programmatic waivers of the UL1741-SB certification requirement for bidirectional charging stations
  - ELRP Sub-Group A.5 – EV & VGI Aggregators
  - DSGS Program Option 3
  - Select SCE & PG&E dynamic rate pilots

- DSGS Option 3: new program option that compensates for V2G export and allows V2X services providers to serve as aggregators

VGI Value: Challenges

- V2G industry still needs market transformation to scale
  - Compensation levels not high enough for all industry participants (aggregators, V2G service providers, etc.) to cultivate sustainable business models
  - Limited number of programs that compensate for grid export
  - Value stacking opportunities are limited over concerns about double compensation
- Potential indefinite pause to TE Rebate Program
- High interconnection fees - $800/application
- Need improved interconnection forms for V2G to streamline interconnection process

Opportunities to Scale Bidirectional Charging

Parity with Stationary Storage

- incentive programs comparable to those for stationary storage (e.g. SGIP-like); upfront and performance-based incentives
- integrate V2X in utility planning processes
- allow V2X to value stack and dual participate in rates/programs

Make-Ready and EV Charging Infrastructure Funding Access

- access for bidirectional chargers to utility make-ready funding opportunities on par with V1G EVSE
- technology-neutral rebates for V2G chargers and associated equipment

Conclusions

For V2X to Scale in CA:

- Recognize V2X as BOTH a DER and a TE solution - rates and programs should compensate for the full value of V2X
- V2X needs to be fundamental to TE planning, not an afterthought
- Need to ensure interconnection is not a barrier
- V2X ALSO needs supportive policies to scale
  - Access to upfront incentives and performance-based incentives on par with stationary storage
  - Ensure access to infrastructure funding on par with V1G

Fermata Energy

Thank you.

Anna Bella Korbatov
Director of Regulatory Affairs
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HONDA

The Power of Dreams

Our Carbon-Neutral Electrified Future

American Honda Motor Co., Inc.

August 5, 2024

Carbon Neutrality by 2050

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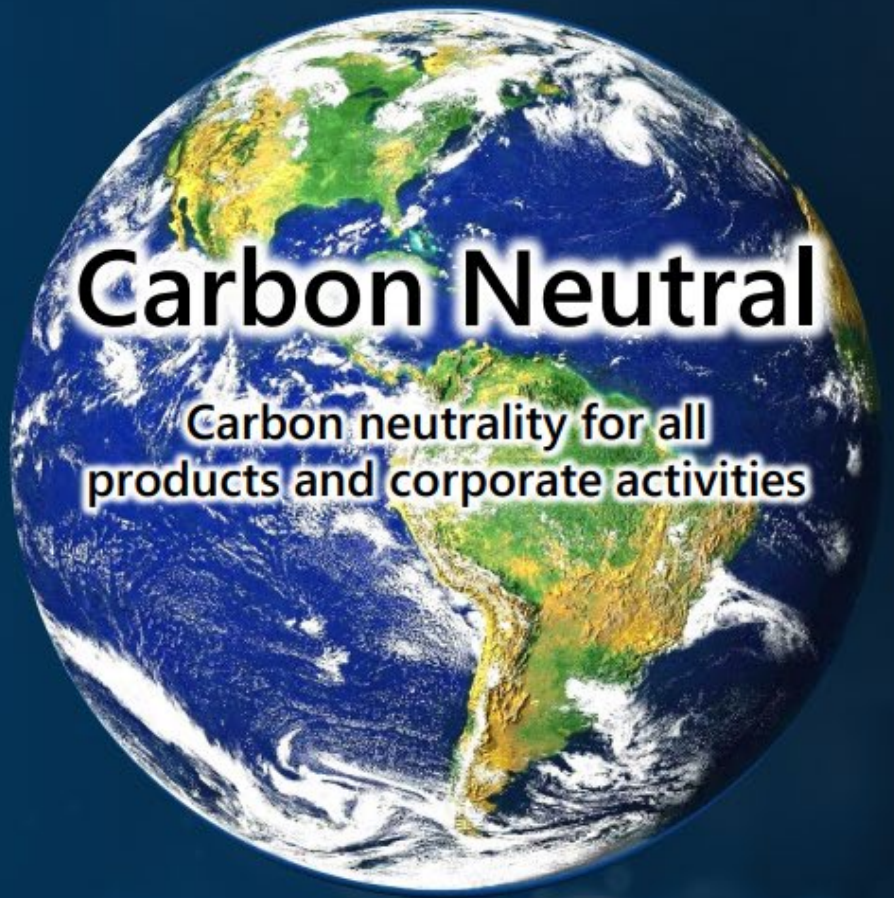
Achieve net-zero CO2 emissions by reducing, eliminating, or offsetting CO2 from products and operations.



Triple Action to Zero

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The Power of Dreams

Carbon Neutrality

Achieve net-zero CO_2 emissions by reducing, eliminating or offsetting CO_2 from products and operations*

Clean Energy

100% utilization of renewable, carbon-free energy sources, for our company activities and our products in-use

Resource Circulation

Using 100% sustainable/recyclable materials by reprocessing vehicles back to raw materials to create new products

*Previous goal was 50% reduction in CO2 by 2050 compared to 2000 baseline.

Electric Vehicles:

Targeting 100% EV Sales by 2040

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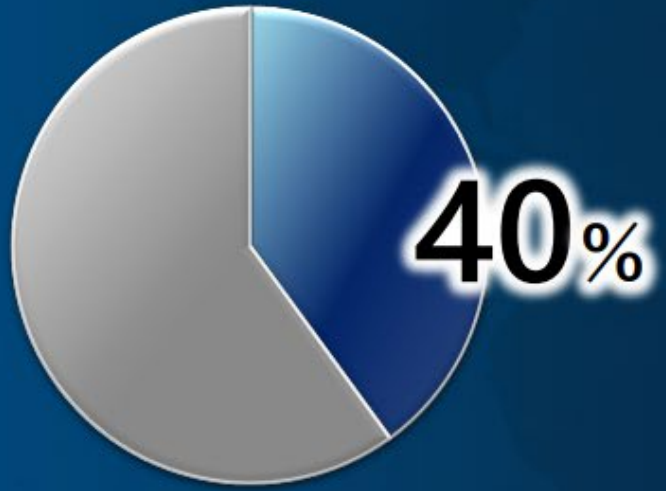
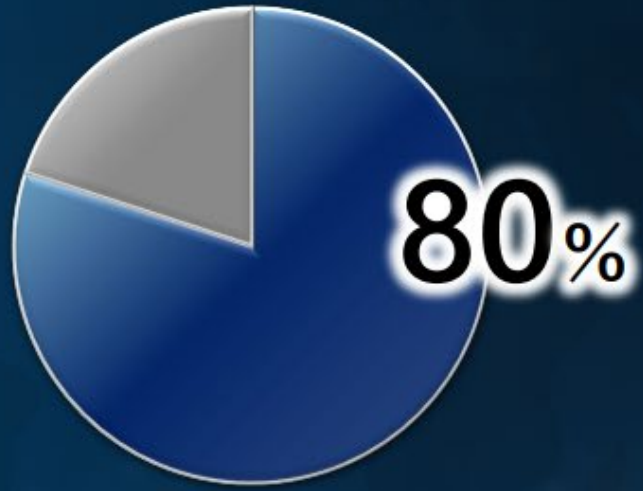
Electrification of Automobiles

All major markets combined

2030



2035



Global

2040

EV & FCEV

Honda “0” Series

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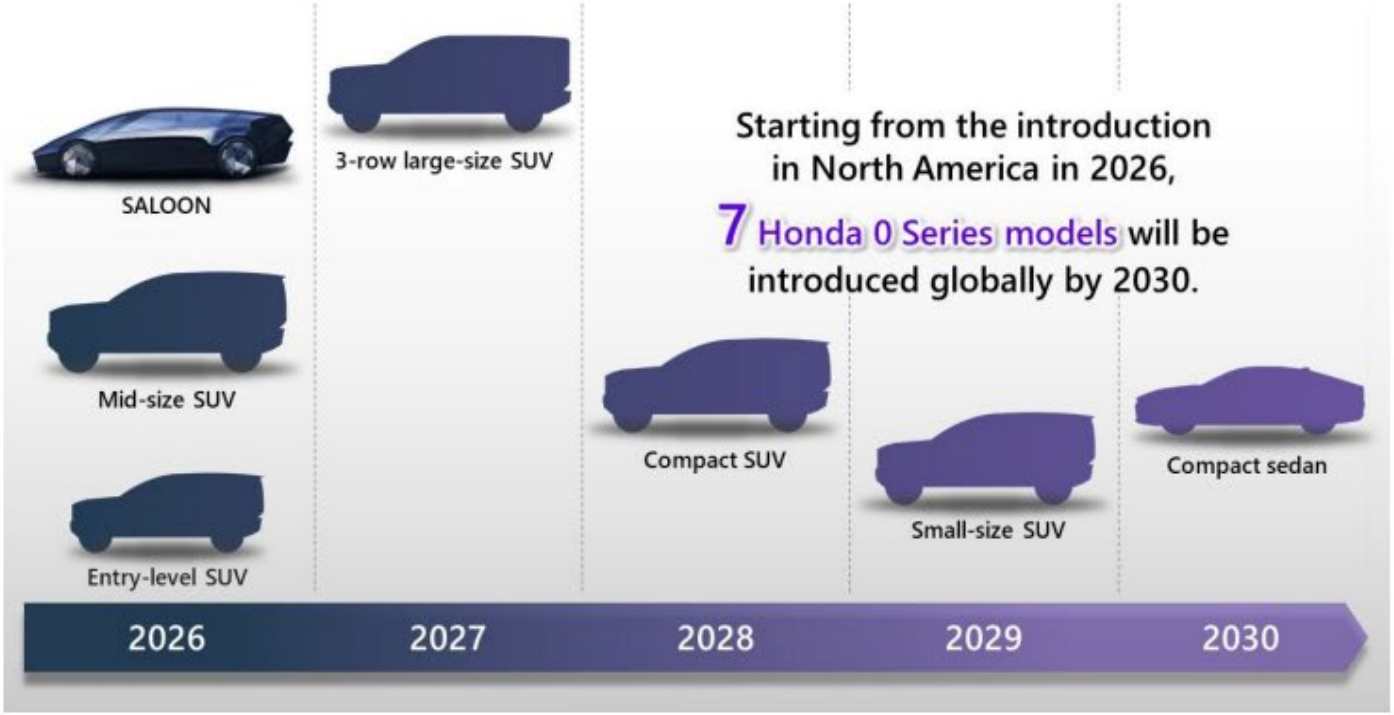
Honda 0 Series Model Lineup



Honda Energy Services in US

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2014

OVGIP Projects with EPRI

Univ of Delaware V2G demo

2015

SAE Tech. Paper - V2G

2018

Honda Smart Home Integrated Energy Management including V2H

HSHus
Honda Smart Home US

CES

Honda SMART CHARGE

2018

SmartCharge™ Pilot Program

1st vehicle telematic-based participation in CA wholesale market

2019

Wireless V2G Concept at CES

Honda, Kitu Systems and NUVVE Corporation Collaboration to Demonstrate the Benefits of Vehicle Grid Integration (CEC EPIC 2)

2019

CEC - EPRI UC San Diego V2G Grid Services

Honda SMART CHARGE

2021

Honda Assoc. Alpha Program

2021

Tier 1
Mass Prod.

Tier 2
National Grid Pilot

Xcel Pilot

CAISO SCE

Sunset Feb 2024

Future

Next Gen SmartCharge

As denoted by SEPA
Tier 1 - Passive Managed Charging (rates)
Tier 2 - Active Managed Charging (control)

VGI Rates Whitepaper

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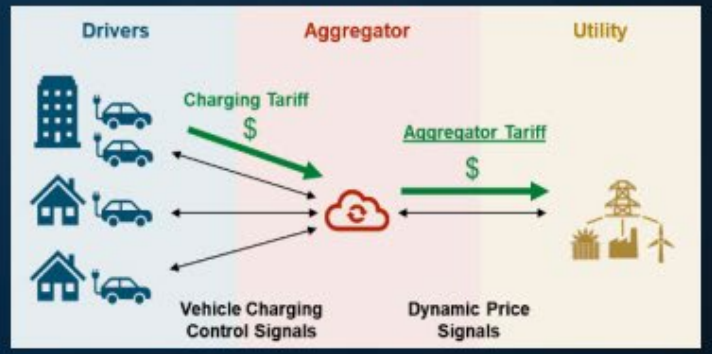
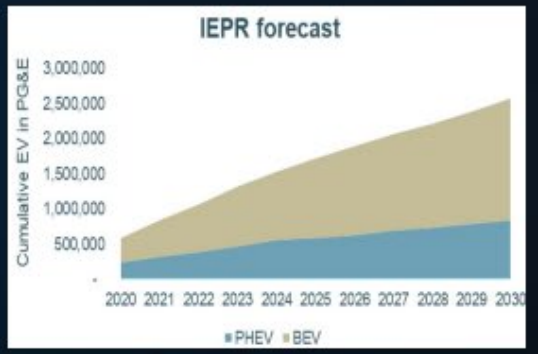
Rate Designs Harnessing Vehicle Grid Integration Technology

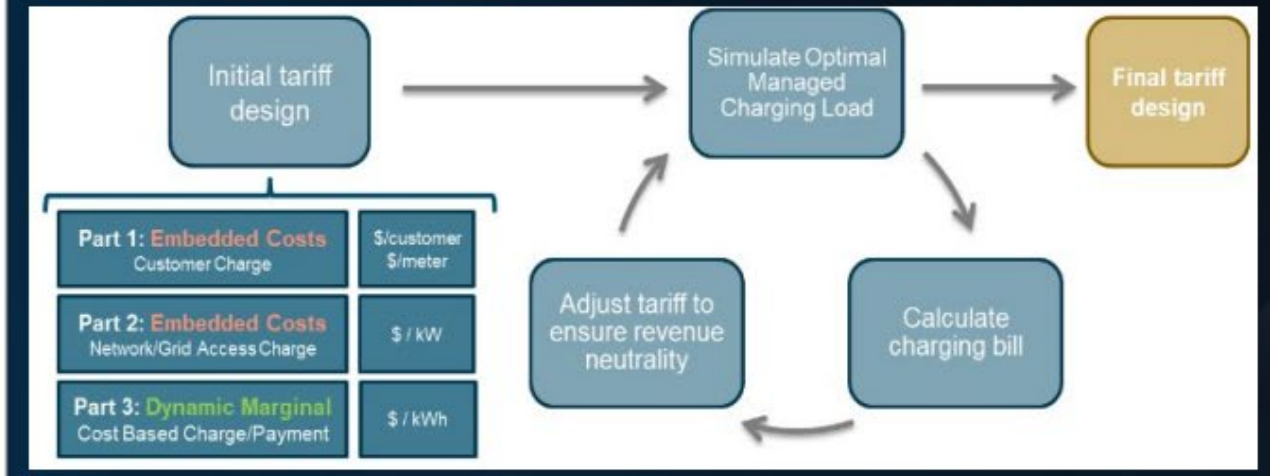
May 2021

Novel Rate Designs for Aggregator Enabled Smart Charging

https://www.greenbiz.com/whitepaper/advanced-rate-designs-harnessing-vehicle-grid-integration-technology







The aggregator tariff represents a potential win-win-win for utilities customer and aggregators compared to traditional tariffs:

1. Utilities can design more complex and dynamic tariffs than typical residential tariffs which more accurately reflect grid costs. They can also outsource the capability to manage individual EV loads if needed.
2. Drivers have access to simple low-cost charging without having to worry about peak periods or charging timers.
3. Aggregators are rewarded for enrolling drivers on more dynamic tariffs and dynamically managing charging loads to benefit the grid.

Vehicle-Grid Integration

Honda SmartCharge™

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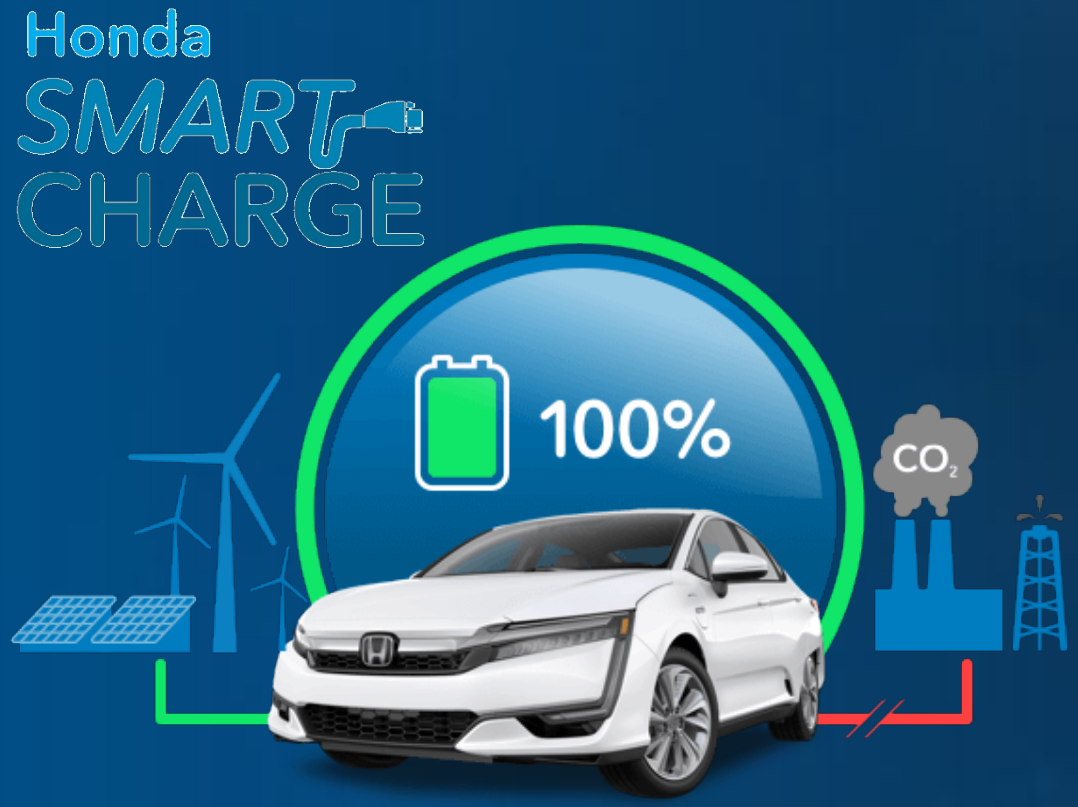

Honda SmartCharge™

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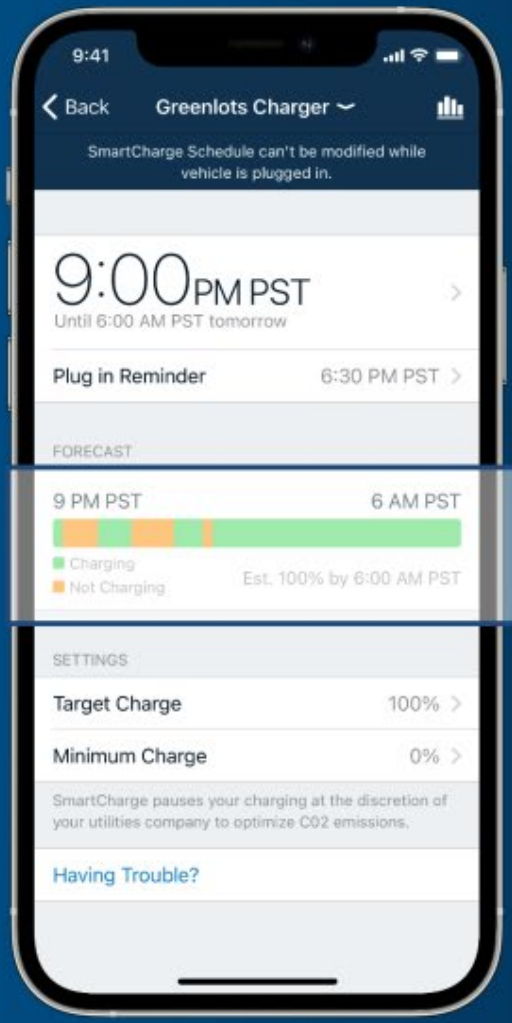
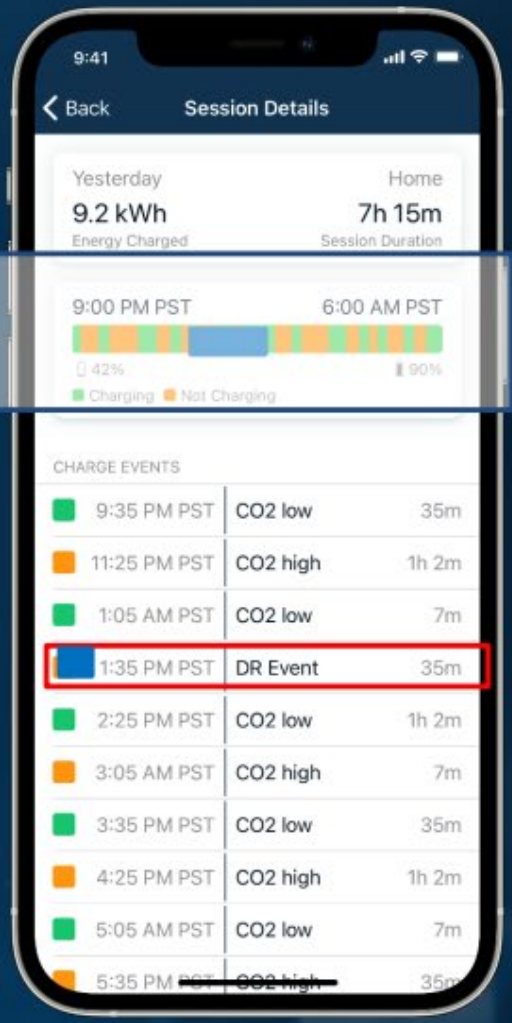
Honda SmartCharge™ was created to bring value to our customers by connecting them with grid services available to them. All while promoting environmentally responsible charging of their electric vehicle.



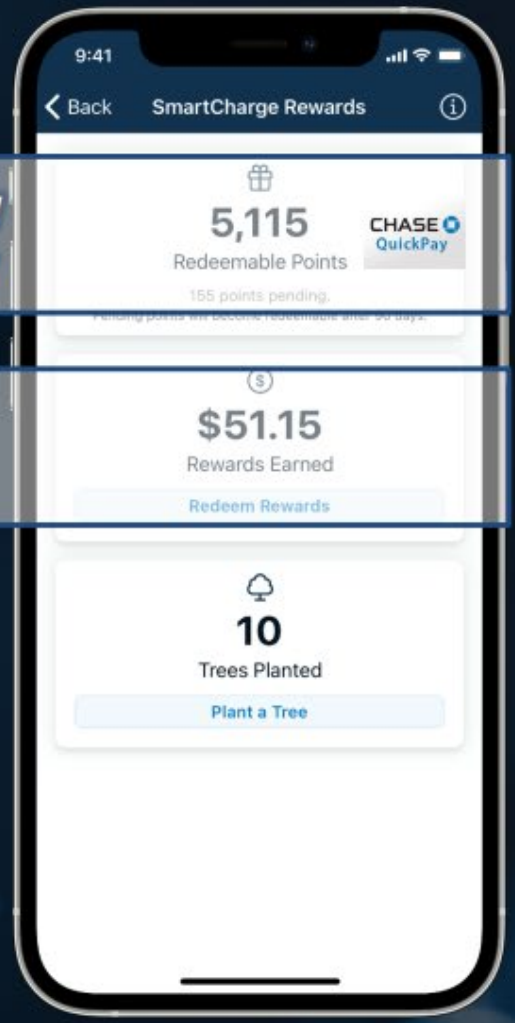
Charge forecast



Actual charge

Direct deposit w/ Chase Quickpay

Plant a tree for $1.50



IONNA Charging Network

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July 2023: JV announced
Feb. 2024: CEO announced
Jun. 2024: HQ announced

ChargeScape

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- *Conveniently managed energy services – benefiting Electric Utilities, Customers, and Automakers.*
- *Single platform which seamlessly connects Electric Utilities and Customers to manage energy capacity of a broad pool of EVs.*
- *ChargeScape aims to enable EV customers financial benefits through EV-enabled grid services.*

EV Charging and Managed Charging Business Opportunities

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Carbon Markets (LCFS, eRIN)

CALIFORNIA AIR RESOURCES BOARD

Wholesale Electricity Markets

California ISO

Demand Response Directly with Utilities

Xcel Energy

nationalgrid

Data Sharing and Visualization for Utilities

conEdison

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Prepare your home for a sustainable future

To get started visit HomeElectric.Honda.com

Whitepapers: EV Energy Services (VGI)

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Vehicle Grid Integration
The Convergence of The Automotive and Electric Power Industries
AFAI

https://www.autosinnovate.org/posts/papers-reports/VGI%20White%20Paper_2024.pdf

The Future of Vehicle Grid Integration:
Harnessing the Flexibility of EV Charging
VTO, DOE

https://www.energy.gov/sites/default/files/2024-07/future-of-vehicle-grid-integration.pdf

2024 Business Briefing

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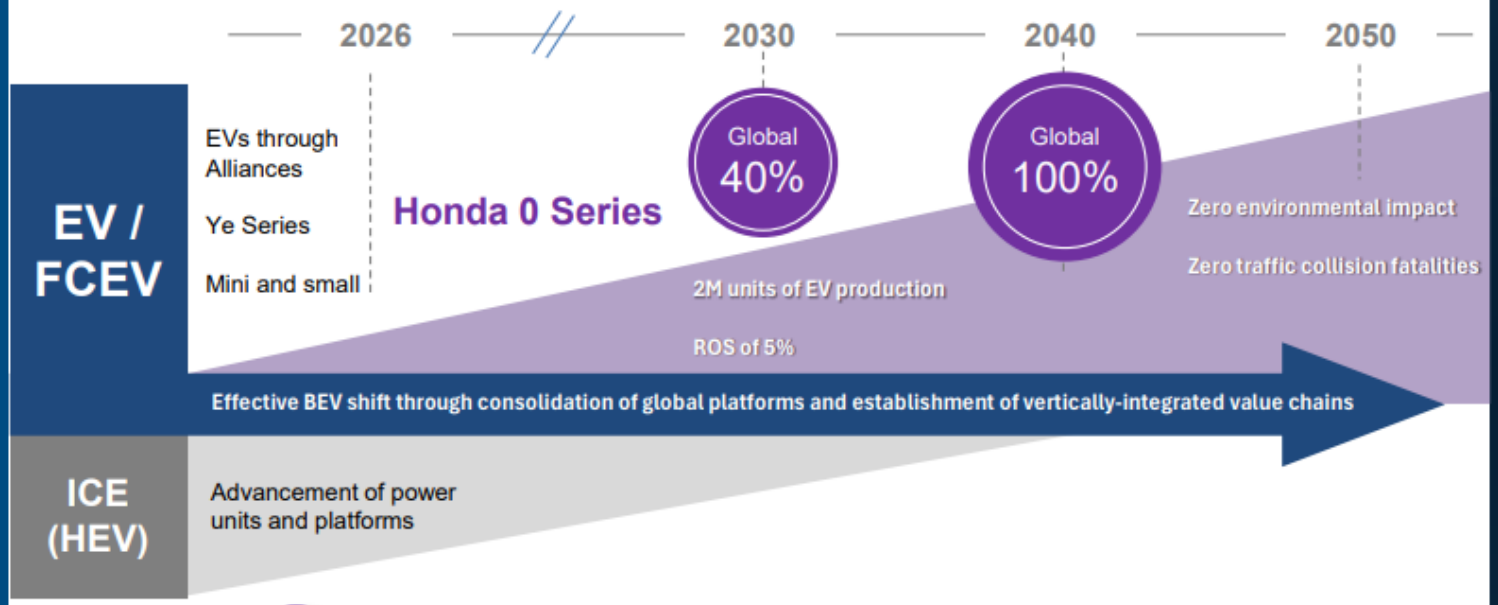
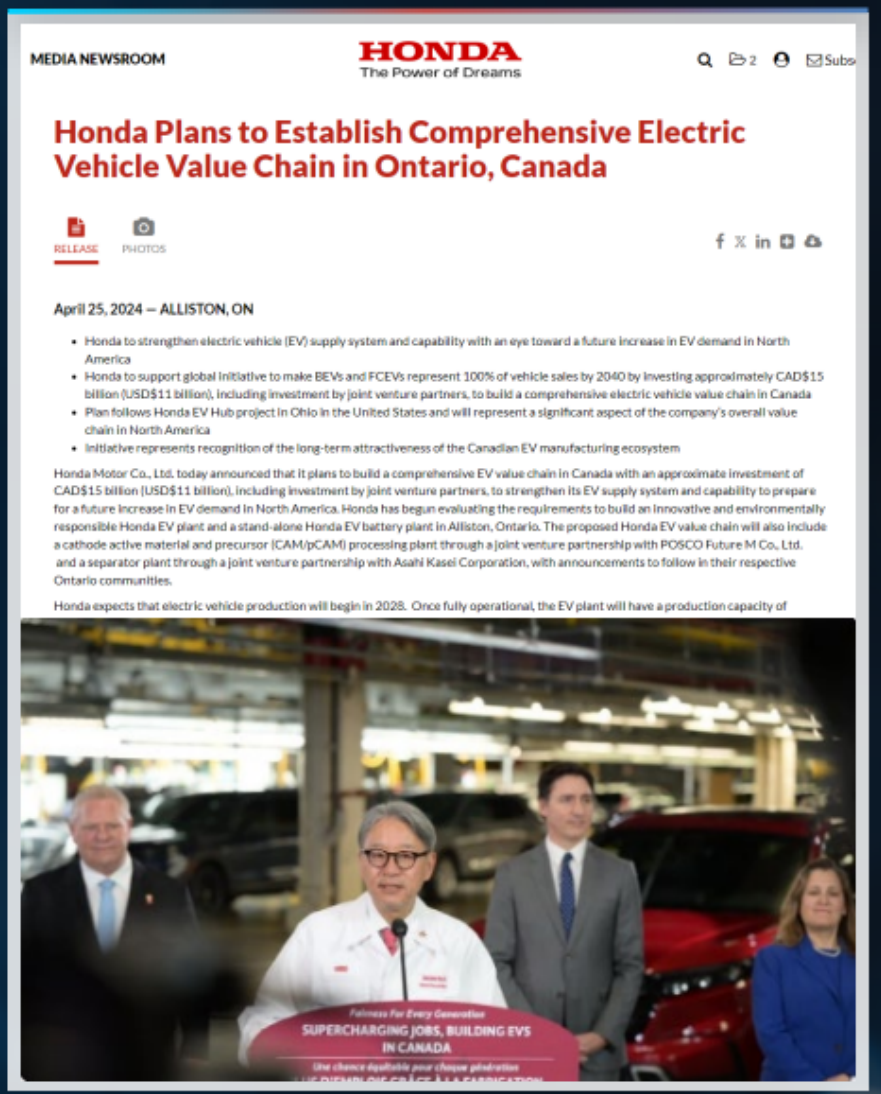
Electrifying Honda Vehicles

Direction of the electrification of Honda automobile business



1. **Introduction of attractive EVs only Honda can offer**
2. **Establishment of a comprehensive EV value chain with a central focus on batteries**
3. **Advancement of EV production technologies and facilities**

Investments in North America



MEDIA NEWSROOM

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Honda Plans to Establish Comprehensive Electric Vehicle Value Chain in Ontario, Canada

RELEASE PHOTOS

April 25, 2024 – ALLISTON, ON

- Honda to strengthen electric vehicle (EV) supply system and capability with an eye toward a future increase in EV demand in North America
- Honda to support global initiative to make BEVs and FCEVs represent 100% of vehicle sales by 2040 by investing approximately CAD$15 billion (USD$11 billion), including investment by joint venture partners, to build a comprehensive electric vehicle value chain in Canada
- Plan follows Honda EV Hub project in Ohio in the United States and will represent a significant aspect of the company's overall value chain in North America
- Initiative represents recognition of the long-term attractiveness of the Canadian EV manufacturing ecosystem

Honda Motor Co., Ltd. today announced that it plans to build a comprehensive EV value chain in Canada with an approximate investment of CAD$15 billion (USD$11 billion), including investment by joint venture partners, to strengthen its EV supply system and capability to prepare for a future increase in EV demand in North America. Honda has begun evaluating the requirements to build an innovative and environmentally responsible Honda EV plant and a stand-alone Honda EV battery plant in Alliston, Ontario. The proposed Honda EV value chain will also include a cathode active material and precursor (CAM/pCAM) processing plant through a joint venture partnership with POSCO Future M Co., Ltd. and a separator plant through a joint venture partnership with Asahi Kasei Corporation, with announcements to follow in their respective Ontario communities.

Honda expects that electric vehicle production will begin in 2028. Once fully operational, the EV plant will have a production capacity of

Ford's Vehicle-Grid Integration (VGI) Vision and Current Activities

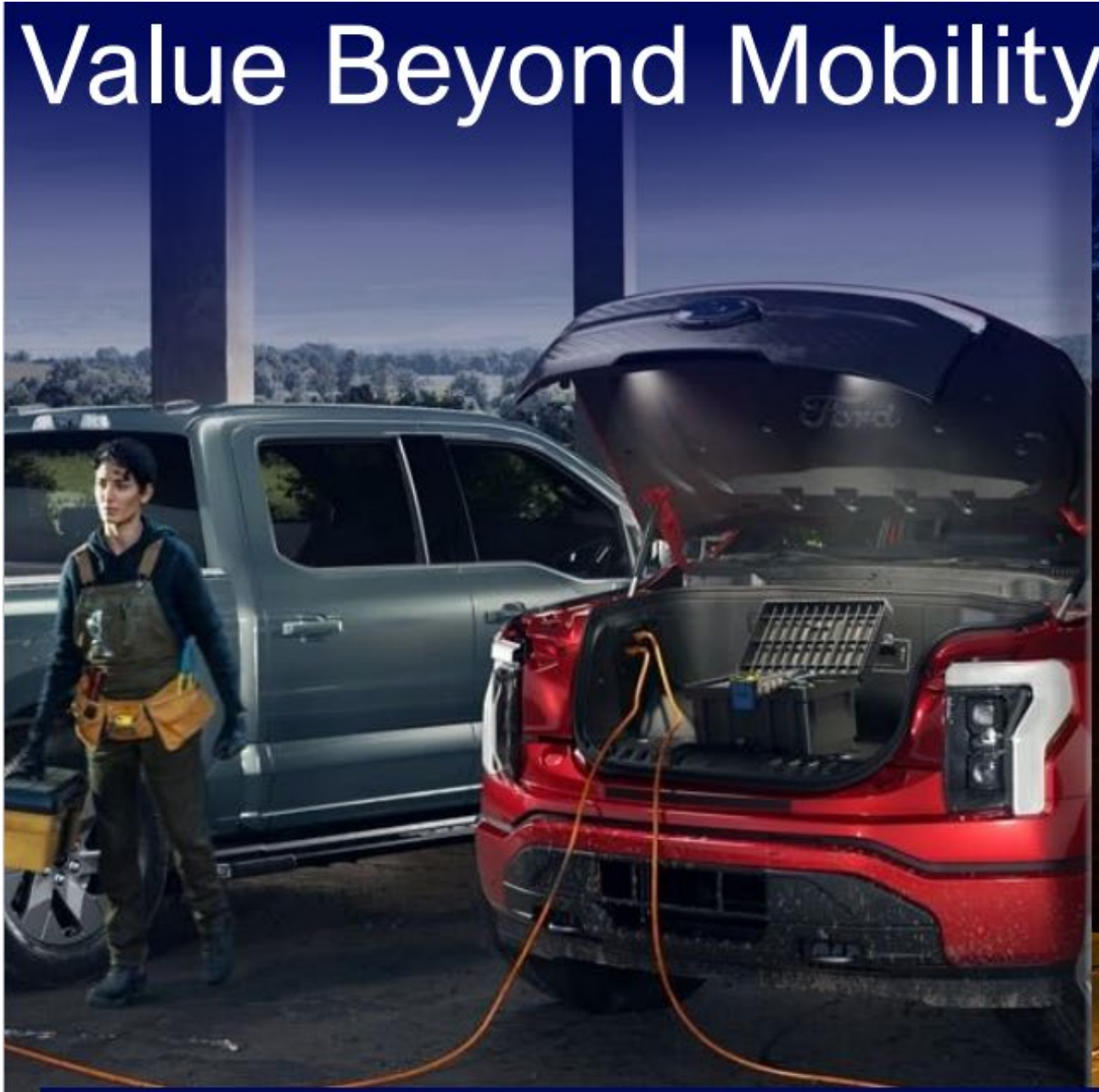
Joint IOU EPIC Workshop

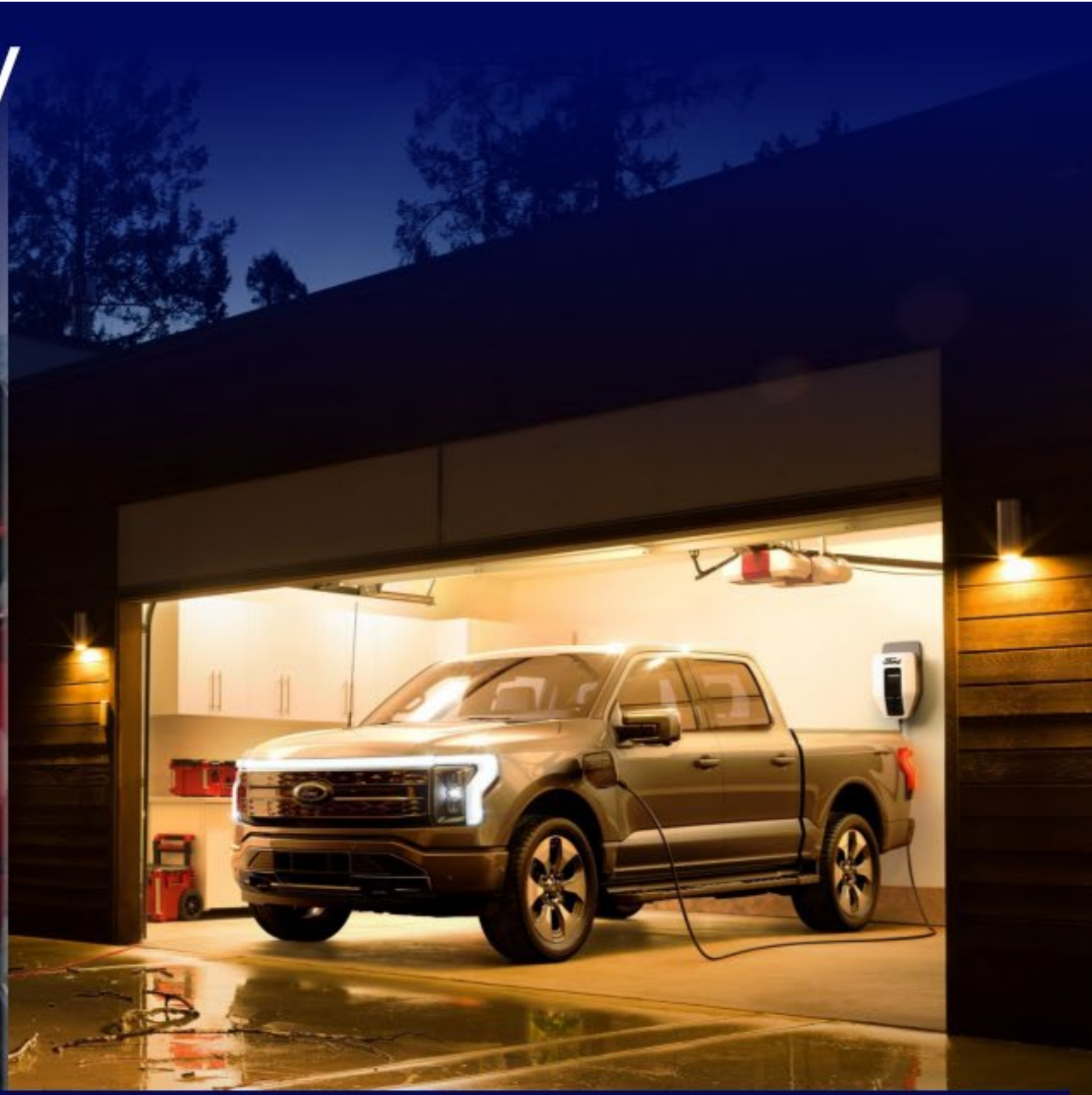
August 5, 2024

Michelle Bogen

Project Manager, Grid Services

Value Beyond Mobility





We believe EVs should be part of the solution and not the problem.

ChargeScape: Efficiently & Easily Brings VGI Services to Utilities and EV Automakers

Current Use Cases:
- Demand Response
- Dynamic Price Managed Charging
- Automated Time-of-Use

Additional V2X use cases coming soon!

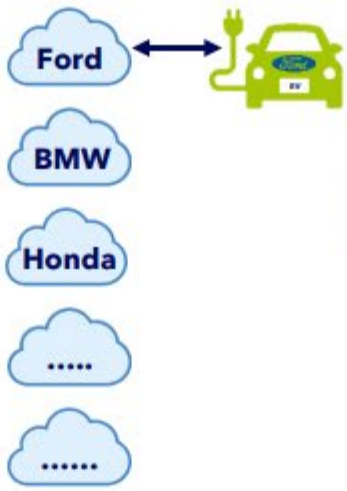
Utilities

Get *Data* and *Energy* services for load management, resource planning, renewable integration

ChargeScape
(SaaS model)

ChargeScape
EV-Grid Services Platform

Single interface point for Utilities to gain access to widest base of EVs as grid resources



Automakers

Enroll EV drivers, manage charging schedules

EV Driver

Earns financial rewards by Utility; no impact to daily mobility needs

- ✔ Solves the many-to-many problem
- ✔ Enables business efficiency for Automakers and Utilities
- ✔ Unlocks customer value from plugged-in vehicles

Ford's Current VGI Pilots & Programs

- Demand Response
- Day-Ahead Hourly Pricing
- Automated Time-of-Use

Xcel Energy announces new electric vehicle smart charging pilot with automakers

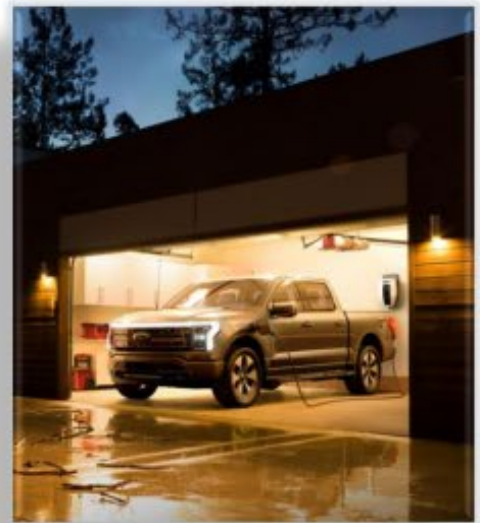
PG&E and Ford Accelerating Vehicle-to-Home Technology in California

FORD LAUNCHES HOME CHARGING PILOT PROGRAM WITH DUKE ENERGY FOR EV CUSTOMERS TO SAVE MONEY AND SUPPORT GRID SUSTAINABILITY

…d Ford Motor Company today announced that the all-
Ford F-150 Lightning (model years 2022 or 2023) paired
…d Charge Station Pro & Home Integration System has
proved as the first equipment set eligible for
…tion in PG&E's residential Vehicle-to-Everything pilot.

DEARBORN, Mich., August 28, 2023 – Today, Ford announced a pilot program with Duke Energy to provide electric vehicle (EV) customers in their service area with a chance to save money, increase the use of renewable energy and support electric grid resiliency while charging at home. The EV Complete Home Charging Plan pilot aims to bring more certainty to the cost of EV home charging by providing a low, fixed monthly rate for electricity used in exchange for allowing Ford and Duke Energy to manage charging times to best support the electric grid.

Progression From V1G to V2X



Home Backup Power (islanded) → **Vehicle-to-Home, grid-connected (zero net export)** → **Vehicle-to-Grid, grid-connected (net export)**

Piloting V1G programs since 2019 across 5 states.

Collaboration with PG&E

Lessons Learned

- **Installation complexity**
- **High-variability in costs**
- **Need for more customer education, and**
- **Incentive programs that consider high-variability in existing home conditions.**

PG&E and Ford Accelerating Vehicle-to-Home Technology in California

PG&E and Ford Motor Company today announced that the all-electric Ford F-150 Lightning (model years 2022 or 2023) paired with Ford Charge Station Pro & Home Integration System has been approved as the first equipment set eligible for participation in PG&E's residential Vehicle-to-Everything pilot.

Intelligent Backup Power Early Install Project

- 2 PG&E employees
- Goals: run through end-to-end installation process with Ford, PG&E and Sunrun teams
- Witness testing/demonstration with PG&E's interconnection engineers

Participation in PG&E's Residential V2X Pilot

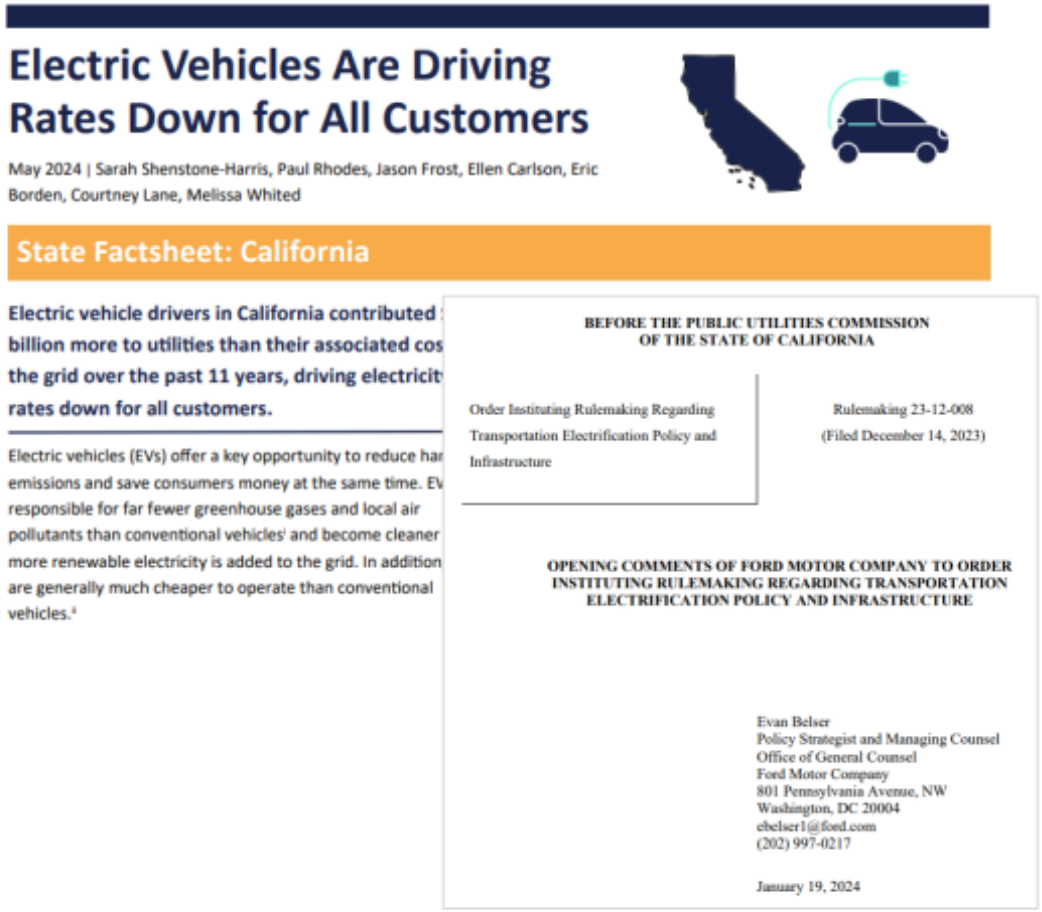
- Ford F-150 Lightning was 1st eligible vehicle
- Phase 1 – backup power testing (currently, a few enrolled customers)
- Phase 2 – grid-connected, bidirectional charging that follows real-time, day-ahead signals

Collaboration between utilities, Automakers and installers is key to learning how to improve processes and make bidirectional EV technologies simple for customers to adopt.

Ford's Thought-Leadership in California And Beyond

Participation in Current Regulatory Proceedings Across the U.S.

- **CPUC's New Transportation Electrification OIR (R.23-12-008)**
  - V2G interconnection costs & procedures,
  - Submetering via EV telematics,
  - CPUC and CAISO coordination on dual-participation,
  - Critical role third-party aggregators play in supporting customer adoption,
  - VGI's role in bringing down ratepayer costs,
  - Time-limited, transitional market support for V2X systems.
- **Other Recent Examples**
  - Michigan's (MPSC) Case U-21117 (For the Development of Electric Utility Interconnection Procedures)
  - Maryland's DRIVE Act Implementation
  - DOE's RFI for Grid Resilience and Innovation Partnerships (GRIP)



Electric Vehicles Are Driving Rates Down for All Customers

May 2024 | Sarah Shenstone-Harris, Paul Rhodes, Jason Frost, Ellen Carlson, Eric Borden, Courtney Lane, Melissa Whited

State Factsheet: California

Electric vehicle drivers in California contributed billion more to utilities than their associated cos the grid over the past 11 years, driving electricit rates down for all customers.

Electric vehicles (EVs) offer a key opportunity to reduce har emissions and save consumers money at the same time. EV responsible for far fewer greenhouse gases and local air pollutants than conventional vehicles[3] and become cleaner more renewable electricity is added to the grid. In addition are generally much cheaper to operate than conventional vehicles.[4]

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking Regarding Transportation Electrification Policy and Infrastructure

Rulemaking 23-12-008
(Filed December 14, 2023)

OPENING COMMENTS OF FORD MOTOR COMPANY TO ORDER INSTITUTING RULEMAKING REGARDING TRANSPORTATION ELECTRIFICATION POLICY AND INFRASTRUCTURE

Evan Belser
Policy Strategist and Managing Counsel
Office of General Counsel
Ford Motor Company
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Washington, DC 20004
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January 19, 2024

Collaborating with stakeholders across the industry is key to achieving California's clean energy and EV goals.

Scaling EVs as a Grid Resource

Lessons Learned from Past Pilots:

1. **Simplified program design** that's easy for the customer to understand.
2. **Increase customer enrollment:** employ multiple channels outreach and ensure high enough value incentives to drive customer interest.
3. **Uniformity in grid signals across utilities**: Simple, user-friendly dispatch interface tool for calling events or sharing pricing signals.
4. **Uniformity in data exchange methods across utilities**: Transitioning to API-based platforms can enable seamless and real-time data interactions.
5. **Broader L2 charging infrastructure coverage**: make-ready, MUD, low income/disadvantaged communities, & workplace charging will support greater access to VGI.
6. **Electricity tariffs** that reflect grid conditions (TOU, dynamic rates, export rates, etc.) and maximize the value of owning an EV.
7. Specifically, for V2X:
    1. **Streamlined, clear generation interconnection rules** that put V2X EVs on a level playing field with battery stationary storage.
    2. **Pilots are needed** to better understand customer behavior (range anxiety) and V2X resource performance.

Simplification, standardization and uniformity can help make EV-grid integration more seamless and easier for everyone (EV drivers, Automakers, and Utilities).


Ford

Panel Discussion

Q&A

Wrap Up and Thank you

All slides will be emailed to registered attendees and uploaded to each IOUs' EPIC Webpage

Appendix - Bios

Welcoming Presenters' Bios

Name	Biography
Cynthia Carter	Cynthia is the EPIC Program Manager for San Diego Gas & Electric Company in the Advanced Clean Technology Team. She oversees the research and development on modernizing and upgrading the electric grid. Cynthia joined SoCalGas as an Environmental Field Lead in Goleta Operations. Prior to joining the Sempra companies, Cynthia worked at the South Coast Air Quality Management District in their Rules and Planning Department and Refinery Air Permitting Department. At Los Angeles County Sanitation District, she was in their Air Quality Department and Energy Recovery/Solid Waste Department as a Project Engineer. She received her BS in Mechanical Engineering from University of California, Riverside and her MS in Mechanical Engineering from California Polytechnic University, Pomona.
Fernando Valero	Fernando is the Director of the Advanced Clean Technology group at SDG&E. Fernando's group is responsible for the deployment of clean technologies such as energy storage, hydrogen, microgrids and other integration tools and technologies. Prior to his current position, Fernando was the Commercial Development Manager in Growth and Technologies, as well as the Partnerships and Programs Manager in Electric and Fuel procurement at SDG&E. Fernando joined Sempra Energy in 2008 as a regulatory attorney, and joined SDG&E in 2010. Prior to this time, Fernando worked in the Biotech industry. Fernando holds a BS in Biology from the University of Arkansas, a JD from Thomas Jefferson School of Law, and an MBA from San Diego State University. Fernando is a member of the State Bar of California.
Karen Douglas	Commissioner Douglas was previously Senior Advisor for Energy in the Office of Governor Newsom since 2022. She was a California Energy Commission Member from 2008 to 2022. She was Director of the California Climate Initiative for the Environmental Defense Fund from 2005 to 2008. She held several positions at the Planning and Conservation League from 2001 to 2005, including Acting Executive Director and General Counsel. Commissioner Douglas earned a Juris Doctor degree from Stanford Law School and a Master of Public Policy degree in Environmental Policy from the University of Colorado Boulder.

PG&E EPIC-4 Project Speaker's Bio

Name	Biography
Scott Bricker	Scott Bricker is a Sr. Manager leading the System Automation department at Pacific Gas and Electric. He has 25 years of engineering and leadership experience focused on automating the bulk electric grid. He received his Bachelor of Science degree in Electrical Engineering from Cal Poly, San Luis Obispo, and a Master of Science degree in Electrical and Electric Engineering from Sacramento State University. He is a licensed professional Electrical Engineer in California, yellow belt Lean Six Sigma certified, and IEEE Senior Member.

Moderator and Presenters' Bios: Panel 1

Name	Biography
Md Arifujjaman	Md Arifujjaman earned a B.S. degree in electrical and electronics engineering from Khulna University of Engineering and Technology (KUET), Khulna, Bangladesh, in 2002, and then completed his M.Eng. and Ph.D. in electrical and computer engineering from Memorial University of Newfoundland, St. John's, NL, Canada, in 2006 and 2010, respectively. Currently, he is employed as a Senior Engineer at Southern California Edison (SCE) in Westminster, CA, USA. Additionally, from 2010 to 2011, he served as a Post-Doctoral Fellow in electrical and computer engineering at the University of New Brunswick, NB, Canada. His research interests encompass power electronics, energy storage, distributed energy resources, and the critical assessment of new technologies for the SCE grid. Mr. Arifujjaman holds the distinction of being a Senior Member of IEEE. He has received various accolades, including the Graduate Fellowship (Memorial University of Newfoundland), the Best Presentation award (IEEE Conference), and numerous industrial awards through his workplaces.
Agatha Kazdan	Agatha Kazdan is a Principal Technical Leader at the Electric Power Research Institute based out of Los Angeles with over 17 years of experience developing and managing utility and government clean energy and sustainable building programs. In her current role as part of the Advanced Buildings and Communities Program, she leads technology scouting, emerging technology evaluations, including EPIC projects, and customer programs research targeting solutions that enable building decarbonization. She is a graduate of Middlebury College and the Architectural Association School of Architecture.
Cammy Peterson	Cammy Peterson is the Deputy Director of Energy Systems, Innovation, and Strategy at the California Energy Commission (CEC). Since joining the CEC in September 2023, she has helped lead the Research and Development Division to deploy over $300 million annually in building decarbonization, advanced grid technologies, energy storage, transportation electrification, and early-stage scientific approaches and technology innovations to meet the state's ambitious clean energy and climate change goals. Prior to the CEC, Ms. Peterson directed the Clean Energy Department at the Metropolitan Area Planning Council (MAPC), a regional government agency in Boston, for nearly a decade. In Massachusetts, she was appointed by Governor Baker to the statewide Commission on Clean Heat and served for five years on the state's Energy Efficiency Advisory Council. Prior to MAPC, Ms. Peterson managed the energy, environmental, and transportation policy and legislative portfolios for New York State Assemblymember Brian Kavanagh. She holds a Master's degree from Tufts University and Bachelor's degree, cum laude, from Harvard University. Ms. Peterson lives in San Diego with her family.
Jon Stallman	Jon started work with Pacific Gas and Electric Company in 2010 and currently holds the role of Chief, Strategic Projects and Programs within Engineering, Planning, and Strategy. He has built a career around engineering design, research and development, architecture of energy systems, and technical education. Jon was a founding member of PG&E's research and development organization focused on strategic projects for new technologies and developing them into programs. Jon thrives to dive into complex challenges, seek out the opportunities of emerging solutions, and collaborate across multiple functional work areas addressing new business needs keeping the customer and community at the center of our work. Jon has a master's degree in Emerging Technology Management and Technical Education from California State University, Chico. He lives in Chico, Ca with his wife Annie and has two adult daughters Robyn and Piper.
Stephanie Lomeli	Stephanie Lomeli is an Engineer in the Distributed Energy Resources (DER) group at San Diego Gas & Electric. She has 5 years of electric utility experience including district operations and engineering, QA/QC for T&D projects, and microgrid and energy storage engineering. She received her B.S.E degree in Electrical Engineering with an emphasis in Energy and Power Systems from Arizona State University, and is a licensed Professional Engineer in the state of California.

Moderator and Presenters' Bios: Panel 2

Name	Biography
Kristen Bush	Kristen Bush is an Engineer/Scientist II in Electric Transportation (P18) who conducts research on electric vehicle market growth, infrastructure design, transportation equity and mobility justice. Among her projects, Kristen currently supports the equity workstream of EPRI's EVs2Scale2030 initiative as well as the community engagement and workforce development efforts of the Electric Truck Research and Utilization Center (eTRUC) project. She also supports EPRI's Equitable Decarbonization Interest Group and sits on the Internal Steering Committee. Prior to joining EPRI, Kristen completed her M.S. in Energy Systems at UC Davis. There she conducted research on improving heavy-duty transportation electrification project implementation and outcomes for environmental justice communities.
Mike Colburn	Mike Colburn is a Construction Operations Manager – Major Projects, within the Electrical Engineering Department of San Diego Gas & Electric. Mike has worked in various management and engineering roles at SDG&E for 42 years, including Research & Development, field and staff engineering, and in the distribution control center. He earned his Bachelor's Degree in Electrical Engineering at Cal Poly - SLO, is a Senior-Life member of IEEE, and a registered professional engineer in California. Mike teaches Electrician and Lineman Apprentice night school classes through San Diego City College and is a proponent of electric transportation. Mike is a licensed pilot, certified/endorsed for single engine high performance aircraft, and is a PADI-certified rescue diver. A San Diego native, Mike and his spouse, Marissa, live in the Mission Bay area of San Diego, and have three college-graduate adult children.
Stella Ursua	Stella Ursua, Director of Community Engagement & Partnerships at GRID Alternatives Greater Los Angeles, has worked over 25+ years managing global Organizational Development/ Training functions at Fortune 500 companies and leading several nonprofit organizations in designing transformative engagement strategies and educational curriculum to promote environmental health/sustainability-related programs in underserved communities. Stella has spent countless hours cultivating long-term relationships and partnering with community-based organizations, businesses and local government agencies to promote and create more sustainable, equitable neighborhoods and to connect under-resourced residents to clean energy/mobility programs and to workforce and training opportunities. In her role at GRID Greater LA, Stella has effectively engaged and collaborated with local, regional, and state agencies, community-based organizations and nonprofits in pursuing grants and project opportunities relating to workforce development and clean energy /transportation opportunities. Recently, Stella was instrumental in organizing partner organizations for both Transformative Climate Communities Implementation and Planning grants, engaging over 20 community based and nonprofit organizations, as well as local government departments, to bring in millions in funding to underserved, vulnerable communities that are addressing climate change, sustainability and clean energy/transportation needs. Stella currently serves on the Sustainable Supply Chain Advisory Committee for the San Pedro Ports and on the CA. Interagency Transportation Equity Advisory Committee. Stella is also a Vice Chair and Sustainability Affinity Hub Lead for the CA Jobs First initiative for the entire Los Angeles County region.

Moderator and Presenters' Bios: Panel 2

Name	Biography
Cathy Leonard	Cathy Leonard is the Principal of Oakland Neighborhoods for Equity where she utilizes her 35 years of experience in robust community outreach and engagement in contracts with local municipalities, charter schools, and several local community organizations and nonprofits. Currently, Ms. Leonard is engaged with the University of California, Berkeley on the Oakland EcoBlock research project. My EcoBlock charge was twofold, to locate a group of neighbors who were interested in participating as the first EcoBlock in Oakland. The second was to strengthen the livability of those neighbors by enabling better communication among them to transform their existing block of older residential and commercial units with shared energy- and water-efficient technologies.
Susan Wheeler	Susan Wheeler recently retired from SMUD where she was the Regional Workforce Development Program Manager. In her role, Susan set the company's direction for workforce development efforts in the Sacramento Region and helped residents in our community gain the skills and confidence to obtain rewarding careers to provide economic mobility. Susan worked in large multinational corporations (AT&T, Chevron and General Electric) as well as start-up and public sector organizations. She is currently an adjunct faculty member at American River College where she teaches entrepreneurship courses. Susan is passionate about working with community members to help them identify and prepare for thriving wage careers. She is currently on the Board of Juma, an organization that provides workplace skills for former foster youth. Susan is also an Advisory Board member for the College of Engineering and Computer Science at Sacramento State University.
Rachel Salazar	Rachel Salazar is an Electric Generation System Specialist and a lead on equity for the Research Division at the California Energy Commission (CEC). She currently works in the Outreach and Engagement Unit providing support for multiple research programs and serves as a liaison for the Disadvantaged Community Advisory Committee. Ms. Salazar began her career at the CEC in 2000 and has worked doing outreach in a variety of capacities since implementation of the first Electric Program Investment Charge (EPIC) funding cycle in 2014. She helped develop scoring criteria and project requirements that aligned with Assembly Bill 523 equity mandates and serves as a co-lead for the division's equity team. As a former agreement manager for EPIC, she oversaw projects working to overcome non-technical barriers and accelerate commercialization of the most promising clean energy technologies. Ms. Salazar is a native of northern California where she lives with her husband, three adult children, and grandson.

Moderator and Presenters' Bios: Panel 3

Name	Biography
Jordan Smith	Jordan W. Smith is SCE internal Consulting Engineer for Grid Edge Innovation in SCE's Grid Technology Innovation organization. He has been evaluating advanced technology vehicles, energy storage, and charging infrastructure starting in 1996 in the founding and growth of SCE's EV Technical Center. In 2011, California adopted battery charger efficiency standards in its appliance code, based in part on prior work by Smith at SCE, work which later led to him to chair the SAE J2894 task force on EV charger power quality. In 2013 he developed and executed the SCE test plan which enabled interconnection of the first vehicle to grid systems in the L.A. Air Force Base V2G pilot – the first V2G aggregation to engage in the California ISO ancillary services market. Mr. Smith represents SCE in U.S. DRIVE, *Driving Research and Innovation for Vehicle efficiency and Energy* sustainability, Grid Integration Technical Team, the U.S. collaboration with the automobile industry, federal government, and electric utilities on vehicle-grid integration. Mr. Smith received a B.S. degree in mechanical engineering and an M.S. degree in engineering management from California State Polytechnic University and is a licensed professional engineer in California.
Michelle Bogen	Michelle is a Project Manager on the Grid Services team at Ford Motor Company. In her role, she leads several of Ford's key partnerships with electric utilities to provide grid services via managed and bidirectional charging using Ford EVs. In addition, Michelle works closely with Ford's Policy and Government Affairs organizations to support the advancement of vehicle-grid integration (VGI) policies and programs. Prior to Ford, Michelle worked at the intersection of transportation and energy, researching and piloting VGI and stationary battery storage at some of the industry's leading automotive and utility organizations, including BMW and PG&E. Michelle holds a Bachelor of Science degree in Environmental Engineering from UC San Diego.
Peter Chen	Peter Chen is the Supervisor of the Transportation unit in the California Energy Commission's Energy Research and Development Division. He and his team oversee a portfolio of R&D projects focused on transportation electrification and vehicle-grid integration funded through CEC's EPIC Program. He also supports coordination efforts for the CEC with the IOU EPIC administrators. He holds a B.S. degree in mechanical and aerospace engineering from UC Davis and is a licensed professional engineer in California.
John Holmes	Mr. Holmes has worked for the past 5 years as an Energy Advisor in Honda's Sustainability Business Development Division. Presently serving as Chair, he is in his third BOD term on the Vehicle Grid Integration Council, which Honda helped to found. His involvement in VGI spans three decades with tenures at AeroVironment, Vetronix, San Diego Gas & Electric and UC San Diego. He is an active Member of UL's Energy Council, served two BOD terms on the Energy Storage Association, several years as an Advisor to EPRI Utility Programs, contributed as a Peer Reviewer to DOE's Energy Storge Research, and as a member of SEIA/SEPA Education Committee. He maintains a fleet of recreational motorcycles and is elated, along with his wife of 22 years, to have two adorable adult children in European Universities.
Anna Bella Korbatov	Anna Bella Korbatov currently serves as Fermata Energy's Director of Regulatory Affairs. She has led the site prep, development, and deployment of nearly all Fermata Energy projects, as well as negotiated resource interconnection with over 25 utilities across North America. Anna Bella has leveraged her expertise with utility coordination and project delivery to support Fermata Energy's regulatory affairs strategy and business development efforts. In her current role, she manages Fermata Energy's policy and regulatory affairs strategy in California, and leads the company's collaboration with state agencies, utilities, and local jurisdictions on the design of Vehicle Grid Integration (VGI) rates and programs, make ready funding, interconnection policies, and grant-funded opportunities. Anna Bella holds a Bachelor's Degree in Political Science from UC Berkeley and a Master's Degree in International Relations & Economics from the Johns Hopkins School of Advanced International Studies (SAIS)

Moderator and Presenters' Bios: Panel 3

Name	Biography
Ben Clarin	Ben is a principal manager now leading the Electric Power Research Institute's (EPRI) Transportation Program's strategic efforts around vehicle grid integration. His responsibilities are for defining the industry strategies needed to apply approaches to enable vehicle technologies in a manner that leads to an affordable, resilient energy systems - with an urgent focus on identifying the critical gaps that need to be addressed to achieve 2030 climate-aligned goals. Ben has been at EPRI for over 10 years and has led several advanced technology demonstration and deployment projects focused on various topics including building electrification, demand flexibility, microgrids, and demand response. He has been responsible for scouting, facilitating, and advising advancements in the general area of enabling advanced customer technologies and their application as grid resources, representing EPRI in various national and international conferences and workshops. Prior to EPRI, he worked in various engineering roles in the public and private sectors focused on capital projects, infrastructure deployment, and advanced clean energy technologies. He has a BS in Electrical Engineering from the University of Michigan and a Masters in Sustainable Engineering from Santa Clara University.