

**DOCKETED**

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# Updating the California Vehicle-Grid Integration (VGI) Roadmap

Noel S. Crisostomo

Fuels and Transportation Division | Integrated Energy Policy Report Workshop - June 22, 2020

# Outline

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- Motivations for Vehicle-Grid Integration
- Activities that Parallel and Inform the VGI Roadmap Update
- Progress upon Four Tracks: Policy, Economics, Technology, Customers
- Rising to the Opportunities of Vehicle-Grid Integration
- Accelerating Forward



# Motivations for Vehicle-Grid Integration (VGI): Widespread Transportation Electrification Requires VGI

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## Overarching VGI goals

- Reduce barriers to EV adoption:
  - saving drivers operational costs
  - reducing grid impacts to electricity users and utilities
  - creating opportunities for innovators to provide new customer services
- Hasten decarbonization and clean air benefits:
  - reducing electric sector GHGs by integrating renewable energy
  - Cutting harmful air pollution, especially in disadvantaged communities

## Timeline of State Actions

- 2012: Executive Order B-16-2012 states “By 2020 EV charging will be integrated with the electricity grid”
- 2014: California Independent System Operator (CAISO) publishes *California VGI Roadmap: Enabling Vehicle-based Grid Services*
- 2018: CEC initiates process to update roadmap



# Activities that Parallel and Inform Roadmap: Inter-Agency Activities

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## Utility Interconnection Rule 21



V2G – DC (Stationary Inverter)

V2G – AC (Mobile Inverter)

## Research & Analysis



Electric Program Investment Charge (EPIC) Program



Distributed Energy Resources (DER) Research Roadmap



Working Group on Value



# Activities that Parallel and Inform Roadmap: Inter-Agency Activities

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## Rulemakings



Mobile Source Strategy + Regulations



Transportation Electrification Framework



Load Management Rulemaking



Energy Storage & DER (ESDER) Initiatives

## Investment



CALeVIP



Utility Programs



# The Four Tracks: Policy, Economics, Technology, Customers

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## **2014 Roadmap identified 3 tracks**

Policy – Interactions, barriers, and gaps in planning and determine interventions needed

Economics – Compare benefits of charge management to facilitate business models

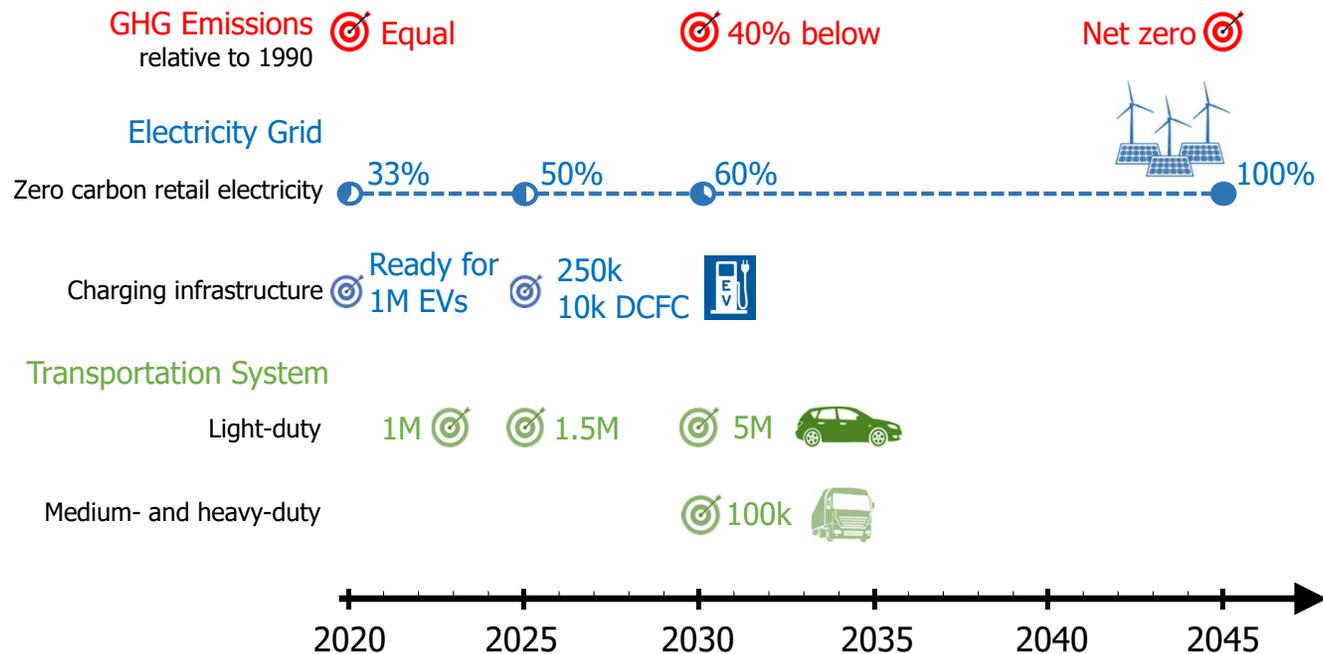
Technology – Identify needs, delineating areas of commercialization vs. research

## **2020 Roadmap adds a new track**

Customers – Expand equitable access to VGI, simplifying smart charging “for all”



# Progress upon Track 1: Policy

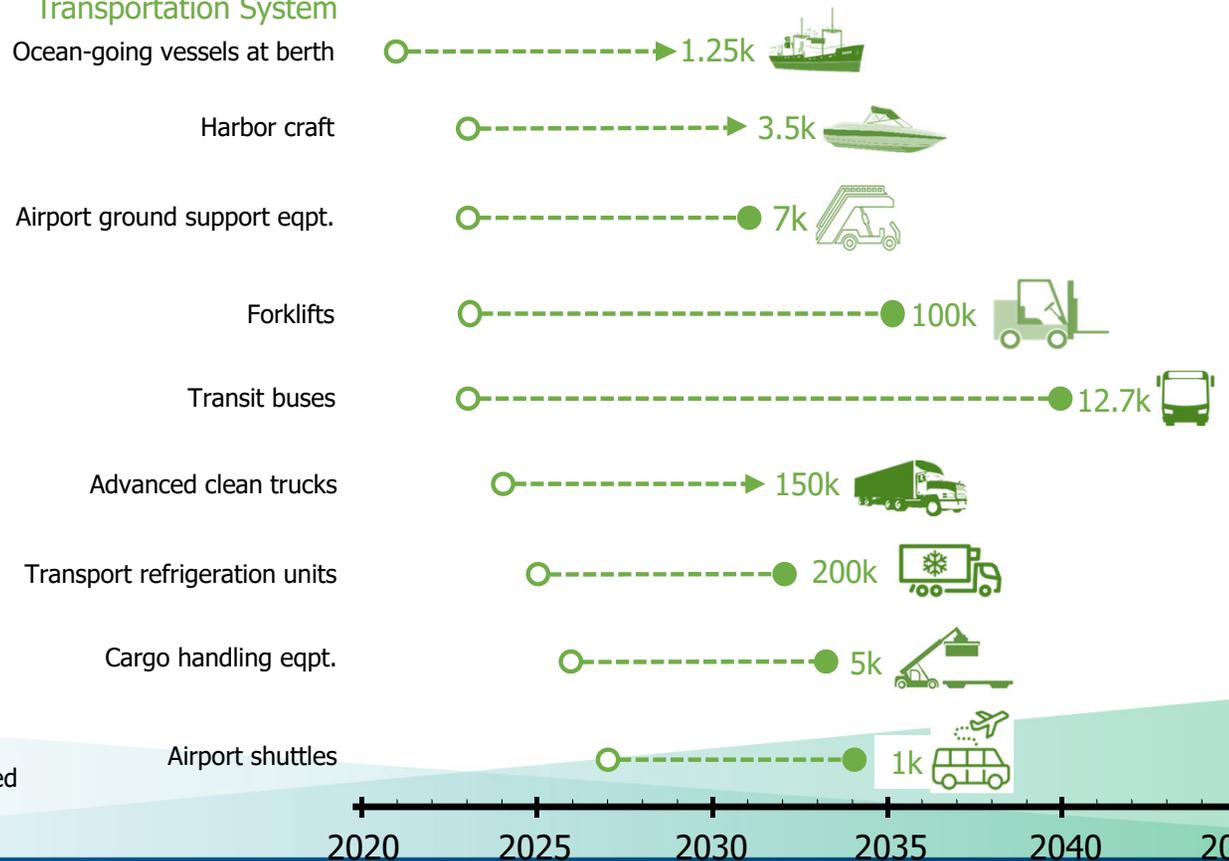


- CARB Regulation Begins Phase-In
- Transition to Full ZEVs Required
- ▶ Partial transition to ZEVs Envisioned
- ⊙ Executive or Legal Target



# Progress upon Track 1: Policy

## Transportation System

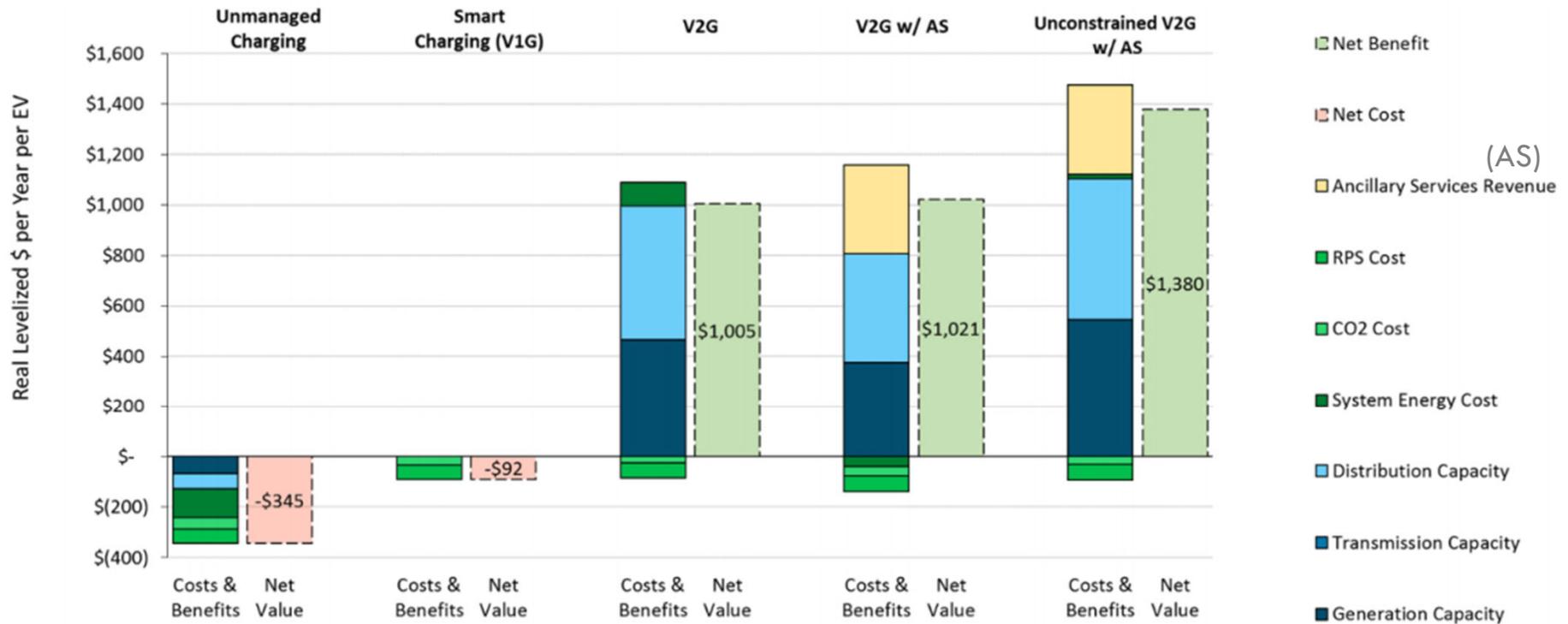


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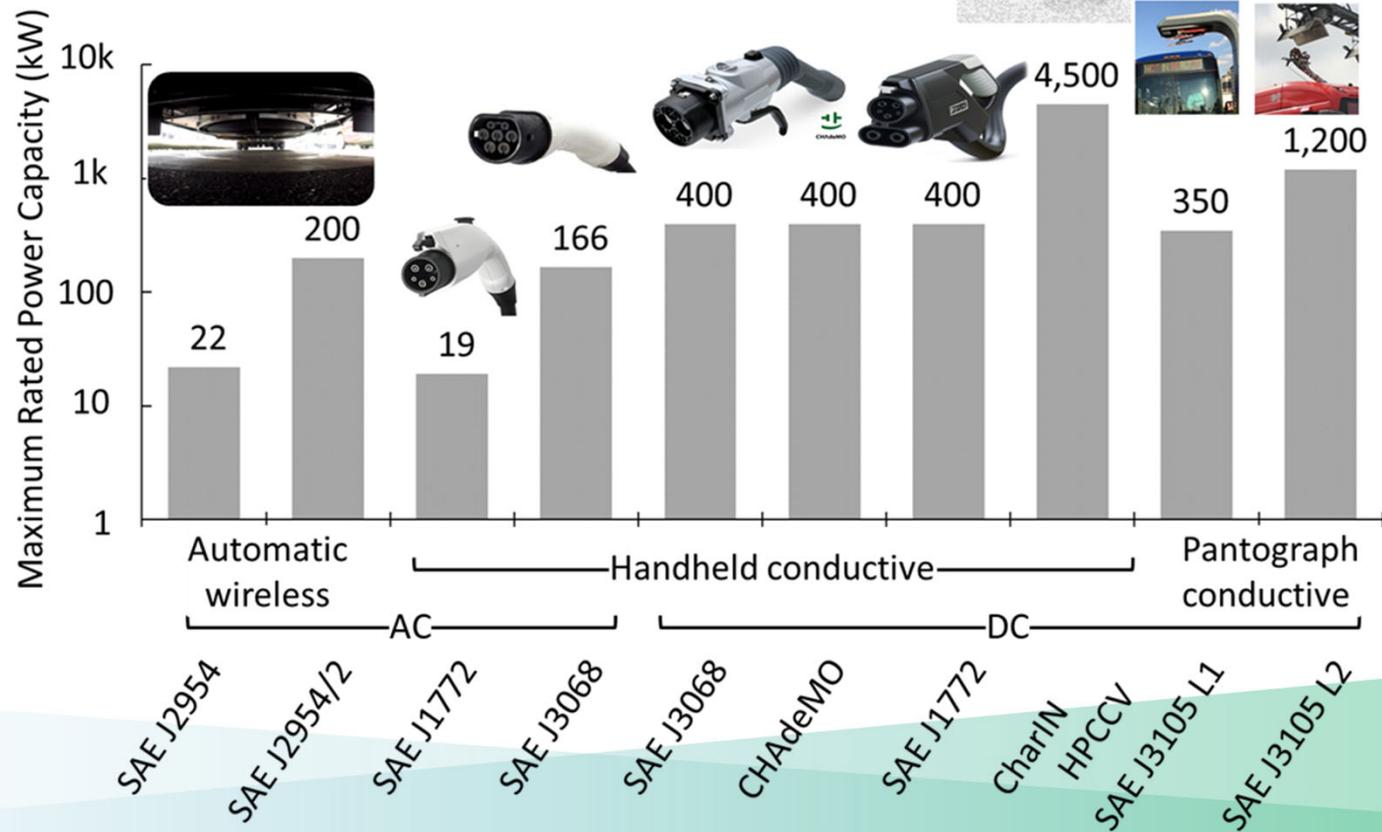


# Progress on Track 2: Economic Potential

Figure 5. Levelized Costs and Benefits for High Value Scenario Under Utility Control



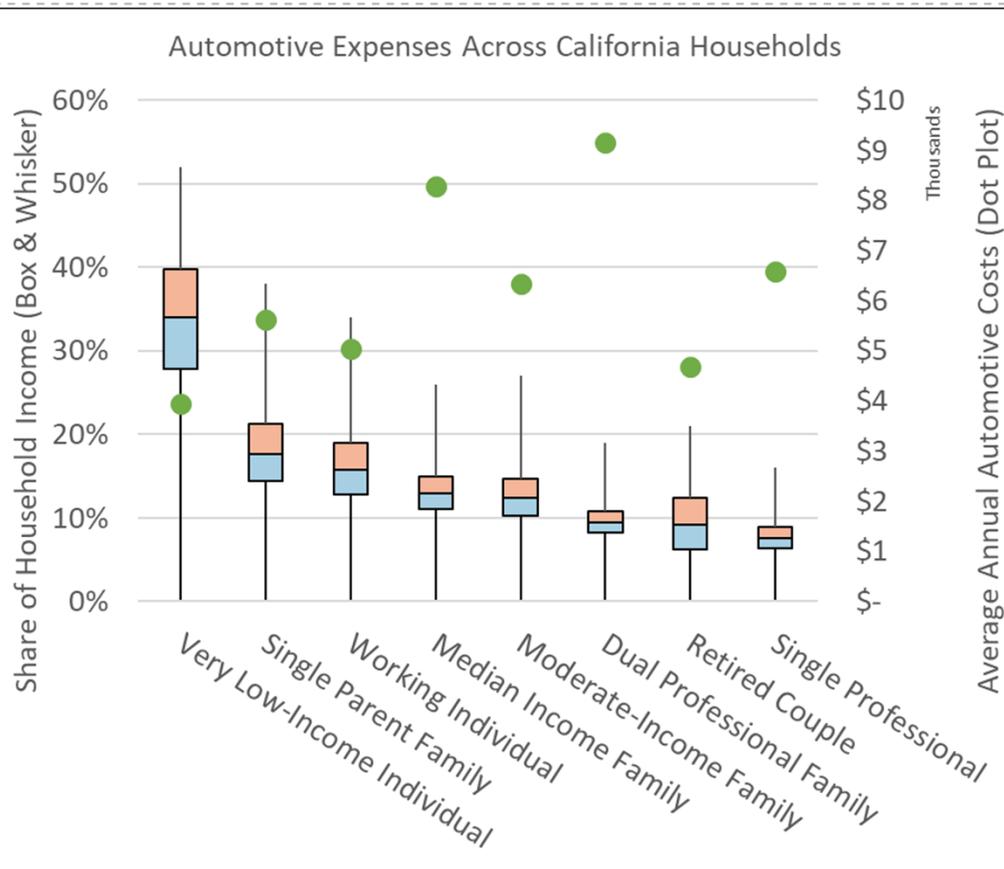
# Progress on Track 3: Technology Development



Source: WAVE, Phoenix Contact, CHAdeMO, Tesla/Daimler/CharIN, EPRI



# Progress on Track 4: Customer Behavior

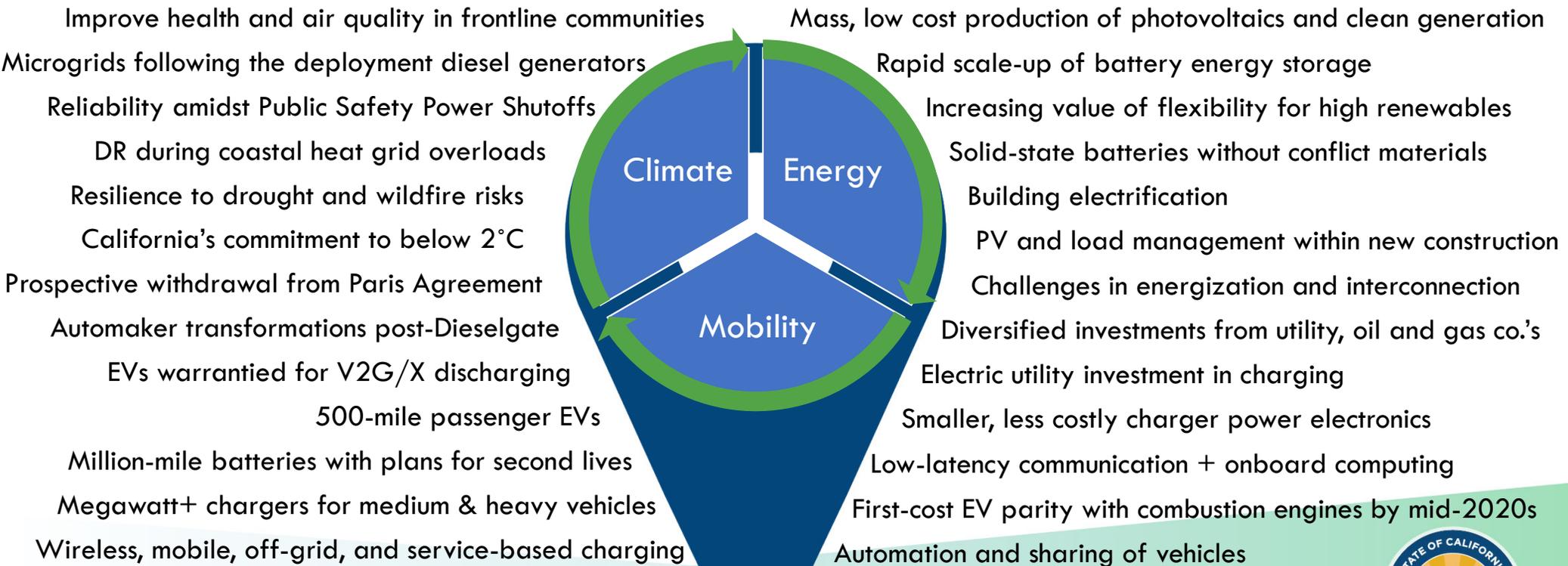


## Transportation cost burdens

- **Very low-income drivers in rural areas can spend 40-50% of their income on automobiles (left).**
- **The most burdened of very low-income transit riders in urban areas can spend over 10% of their income on transit (not shown).**
- **Cost savings from VGI could help these Californians the most.**



# Rising to the Opportunities of Vehicle-Grid Integration



# Accelerating VGI Forward: Today's IEPR workshop

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## **Objective: *Widespread Transportation Electrification***

- Learning from recent charging infrastructure programs (Panel 2)

## **Enabler: *Technology Capabilities and Dispersion***

- Facilitating advanced functions (Panel 1) and scaling to more drivers (Panel 3)

## **Enabler: *Diverse Market Opportunities***

- Encouraging new business models for infrastructure investments (Panel 4)



# Accelerating VGI forward: Timeline to complete Roadmap Update

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- Comments on workshop  
(July 15)
- Revisions incorporating related activities
- Draft Roadmap: Workshop + Stakeholder Comments  
(September TBD)
- Final Roadmap: Publication and Business Meeting Consideration  
(Anticipated November)



# Thank You!

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Questions?

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