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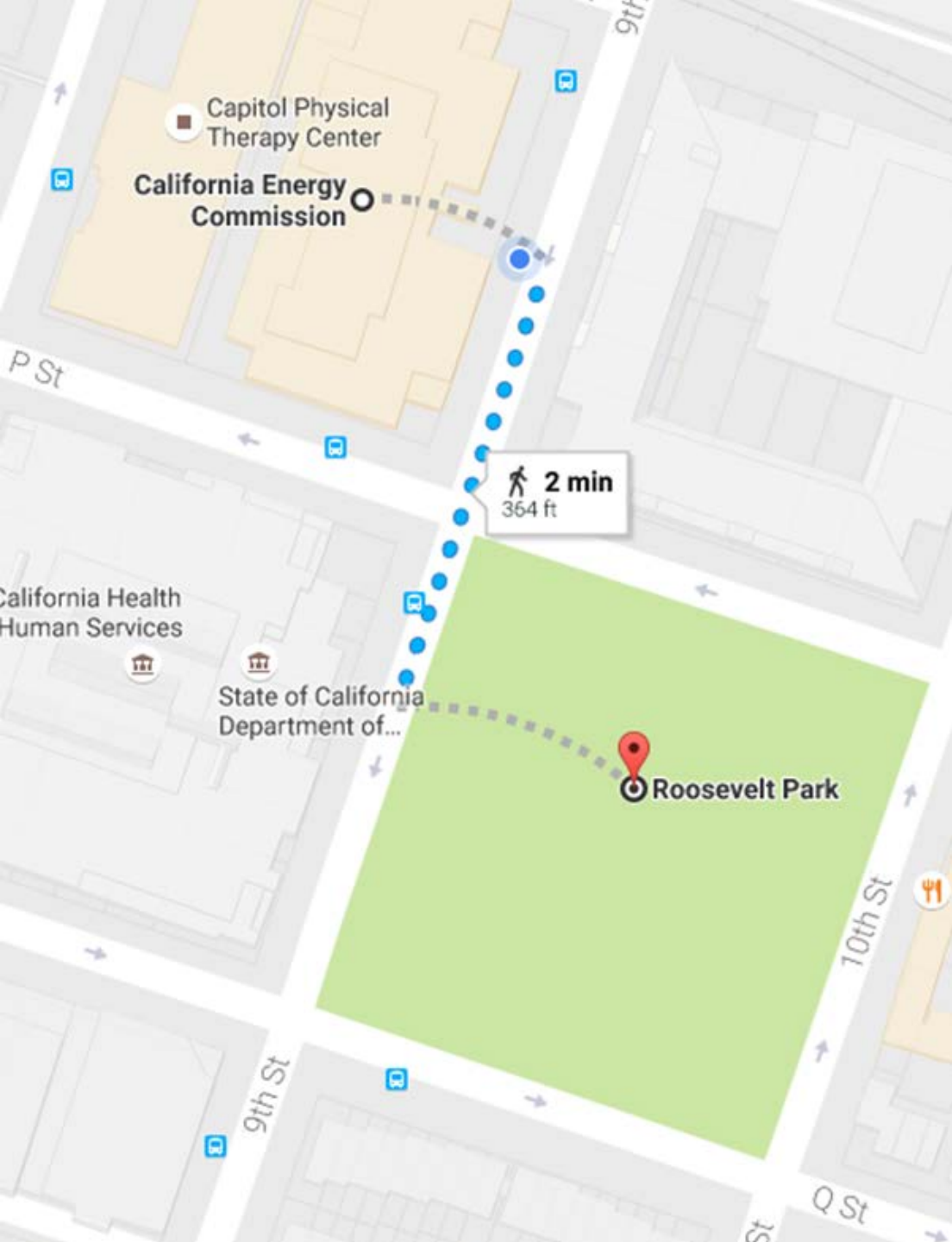
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<b>Docketed Date:</b>	10/29/2018

# California Vehicle-Grid Integration Roadmap Update

## Public Workshop

Art Rosenfeld Hearing Room  
California Energy Commission  
October 29-30, 2018





# In Case of Emergency



# Workshop Schedule

Monday, October 29, 2018

- Technology Showcase
- Welcome
- Roadmap Update Overview
- Policy and Planning Panel
- Economic Potential Panel

Tuesday, October 30, 2018

- Welcome
- Technology Needs Panel
- Customer Experience Panel
- Public Comments
- Closing Remarks and Next Steps



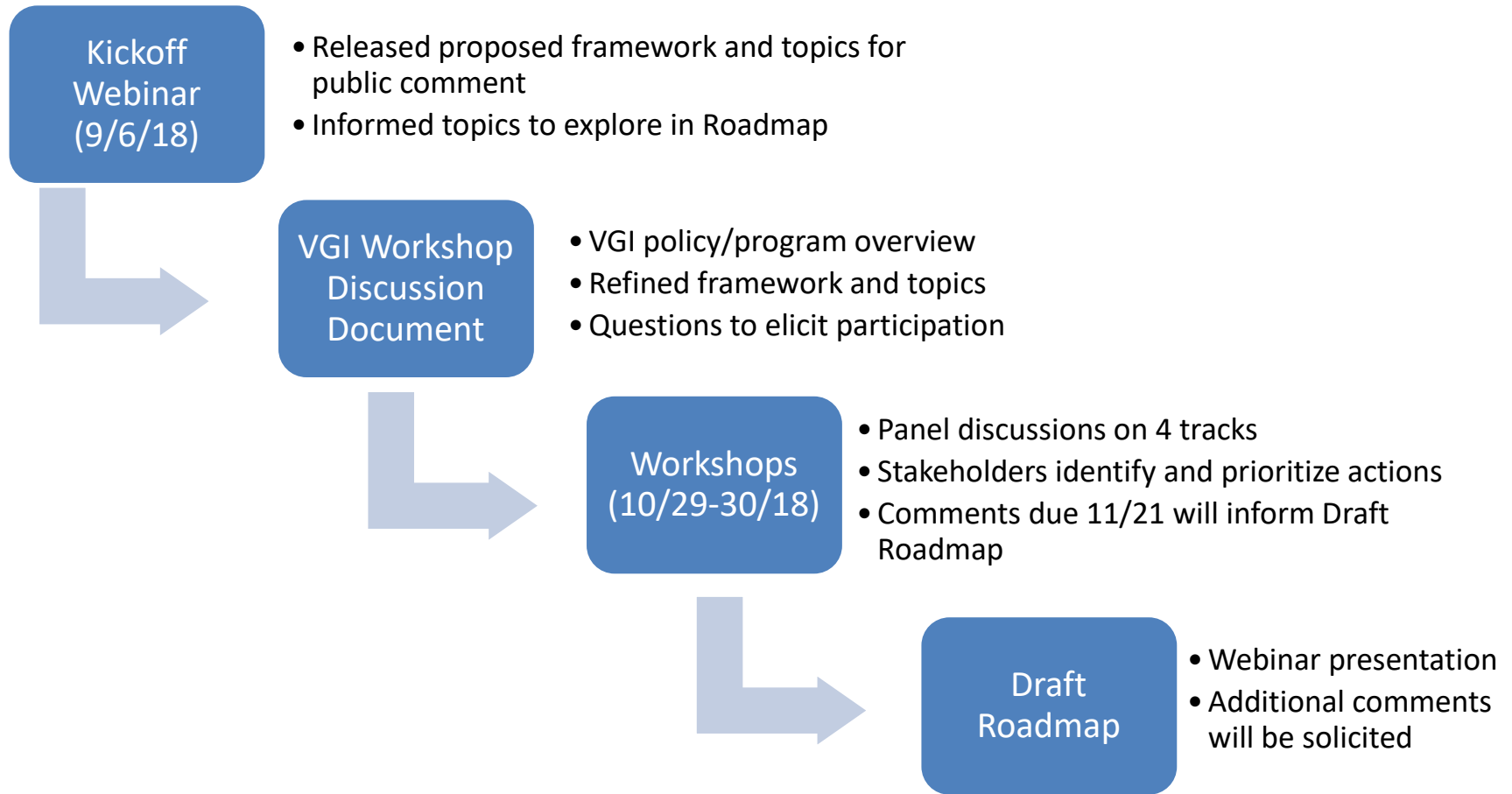


# Workshop Objectives

- Updating the Vehicle-Grid Integration (VGI) Roadmap Matrix
- Identify solutions to the Problems/Issues documented in the Matrix
- Solicit public and stakeholder input on proposed Actions, Responsible Organizations, Prioritization, and Sequences.
  - Expert Panels
  - Audience Participation/Public Comments



# Roadmap Schedule & Approach







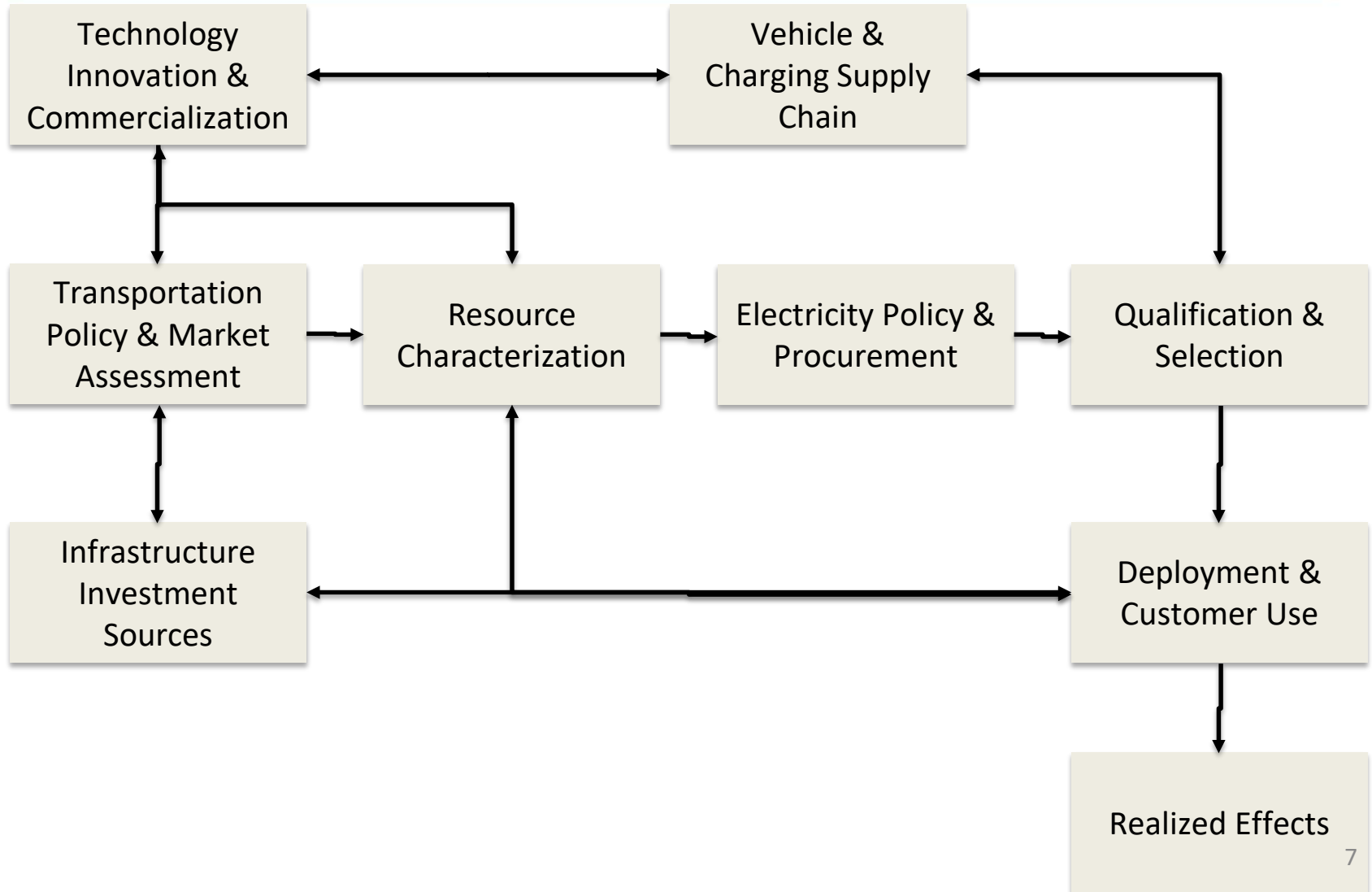
# Power ZEVs with clean energy to help achieve carbon-neutrality by 2045

- Address increases in transportation emissions
- Accelerate deployment of 5 million ZEVs by 2030
- Transition to a 60% renewable portfolio by 2030 and 100% clean electricity by 2045
- Assess infrastructure needs and enable installation





# Policy, Planning & Market Interaction Framework







# How do we create and foster the use of ZEV technology?

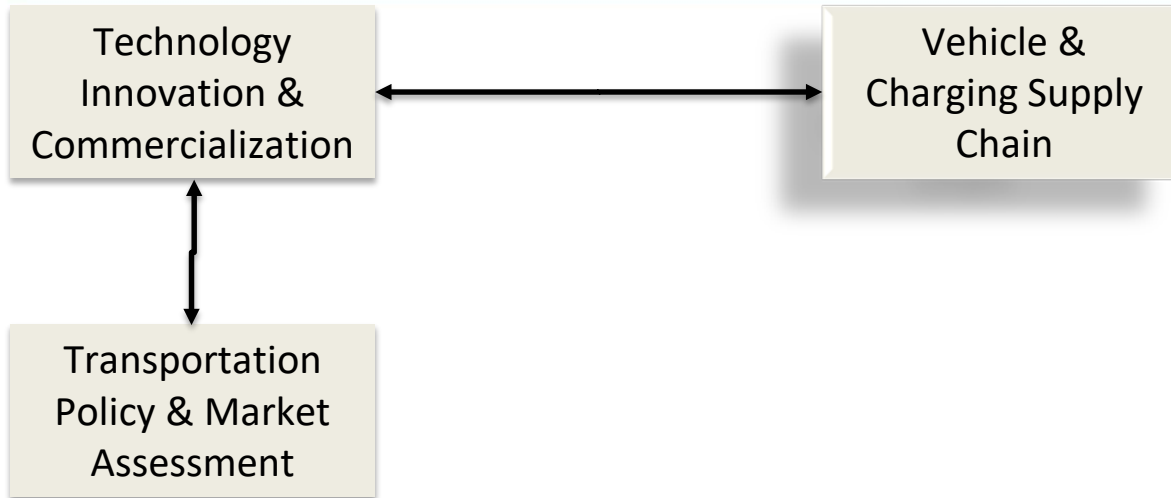
Technology  
Innovation &  
Commercialization



Transportation  
Policy & Market  
Assessment

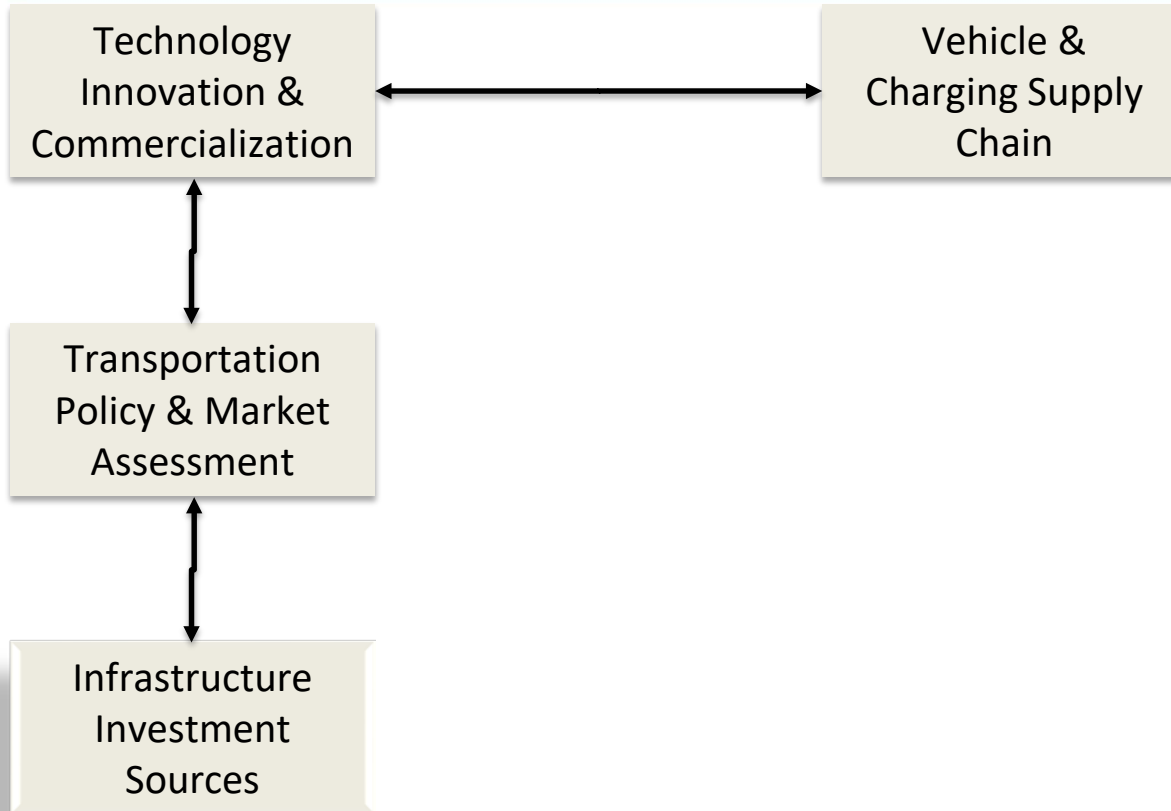


# How will markets support rapid, competitive scaling?



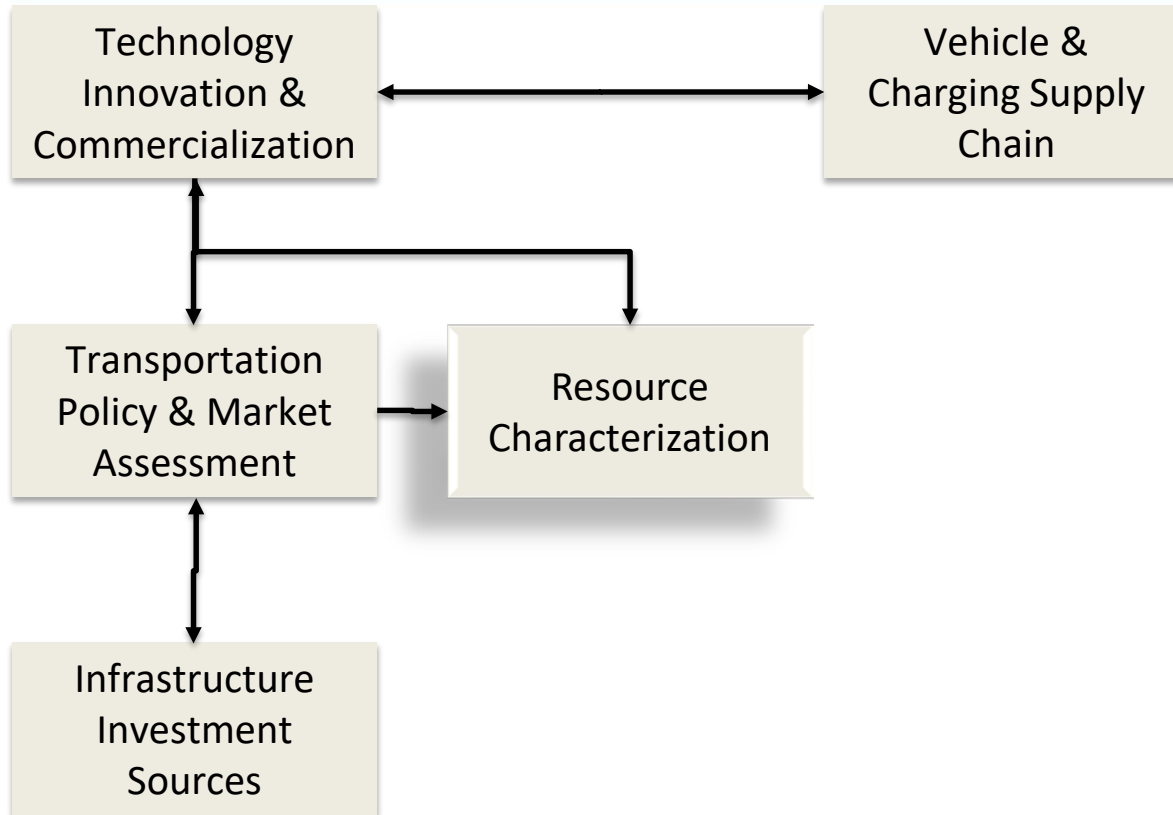


# What investments could improve market success?



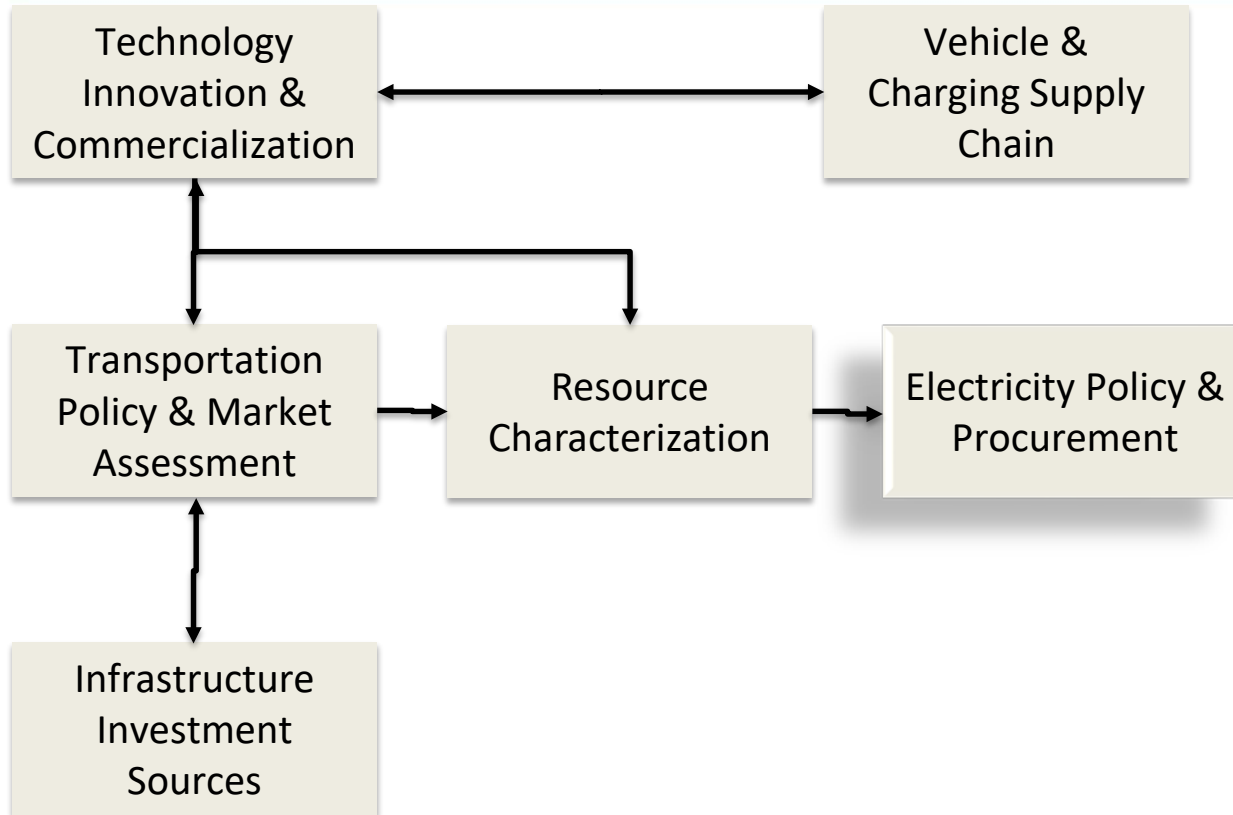


# How are VGI capabilities and user behaviors estimated?



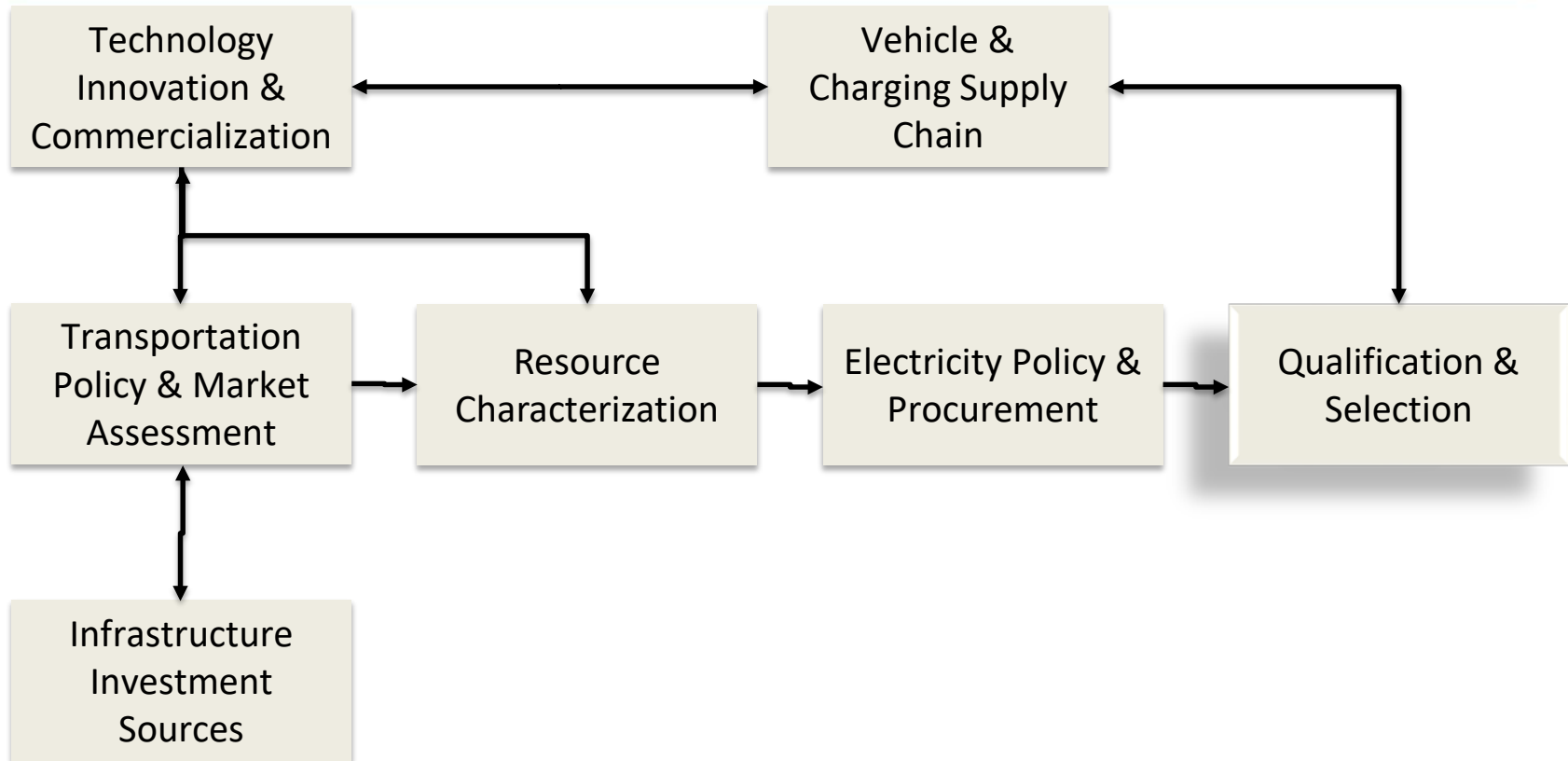


# How does VGI assist other decarbonization initiatives?



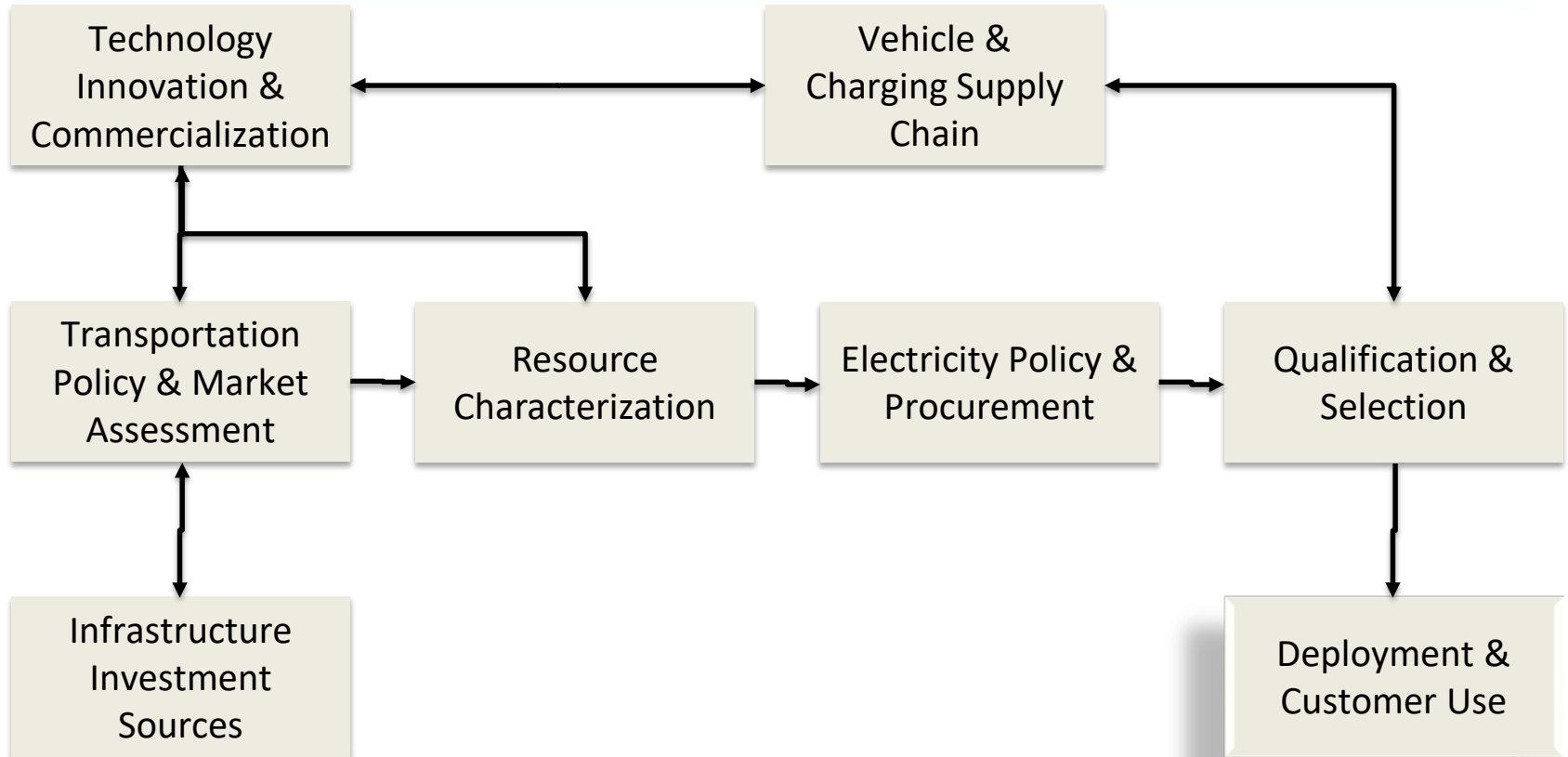


# How are VGI technologies procured into programs?





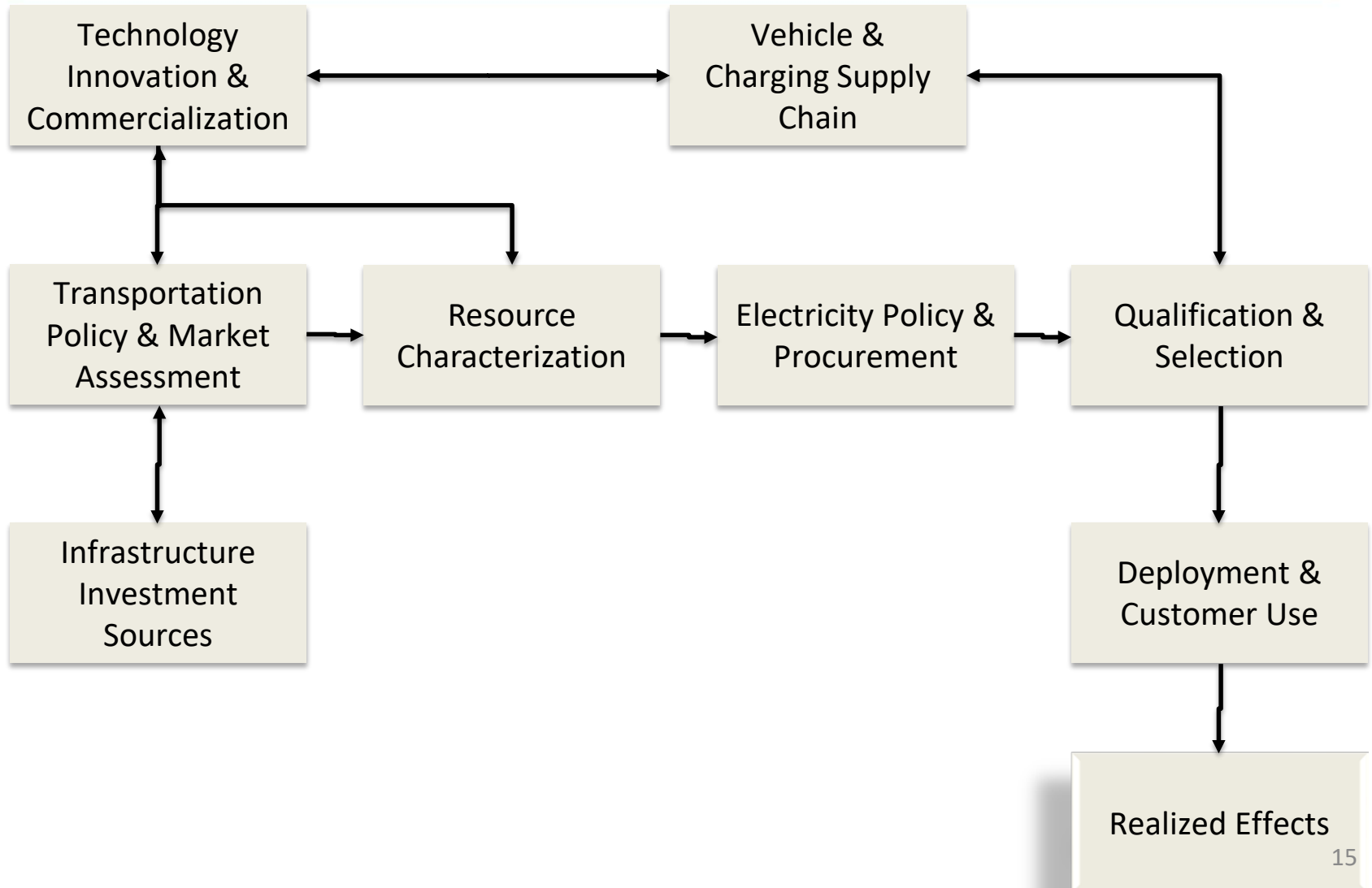
# How do users adopt and install enabled EV & EVSE?





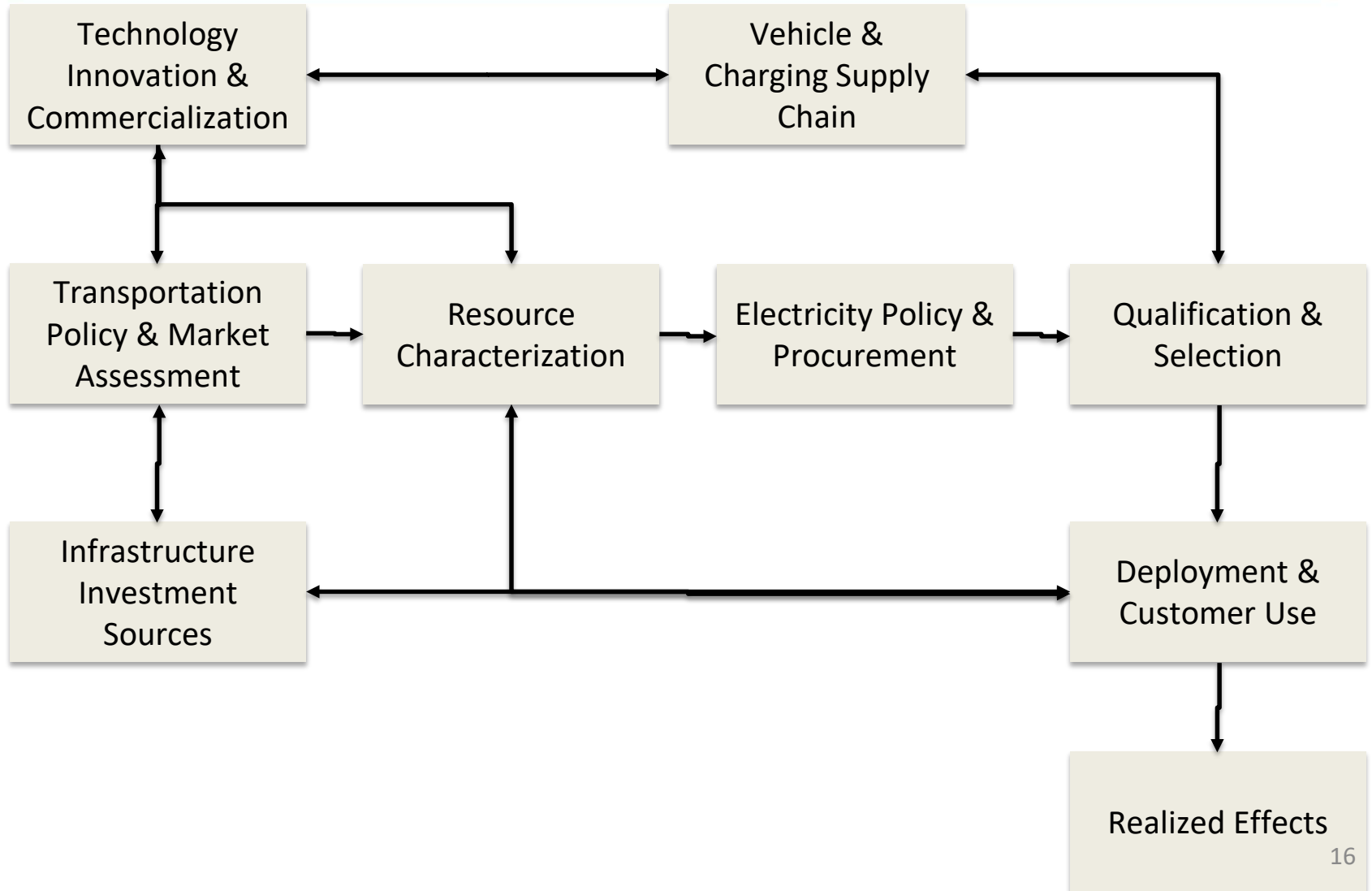


# How are driver costs, GHGs, and grid impacts reduced?





# Learning grows investment potential and maximizes savings.





# Policy & Planning

***What are key policy actions, gaps, and interfaces needed to achieve widespread transportation electrification that is integrated with the grid?***

***How can government work more effectively with stakeholders to manage deployments of vehicles and infrastructure to maximize benefits to customers and the environment?***



# Policy & Planning

Noel Crisostomo  
California Energy  
Commission  
(Moderator)

Jeremy Whaling  
American Honda  
Motor

Matt Stanberry  
Advanced Energy  
Economy

Hannah Goldsmith  
California Electric  
Transportation  
Coalition

Jamie Fine  
Environmental  
Defense Fund

David Schlosberg  
eMotorWerks



# Policy & Planning

1. What solutions or strategies can create a more cohesive policy framework for integrating transportation electrification with the grid?
2. How should policymakers characterize and leverage VGI as a distributed energy resource that travels across charging networks, utilities, and balancing areas?
3. How can the state develop more consistent procurement and program requirements that leverage technology standards where appropriate to create a robust, competitive market for VGI solutions?
4. What changes to energy and transportation planning or utility business models are necessary to realize the full potential of VGI at the scale of at least 5 million vehicles by 2030?



# Economic Potential

***What will the utility system, vehicles, equipment, and customers need to invest to achieve California's goals for 5 million ZEVs powered by 60% renewable electricity by 2030 (and beyond)?***

***How can the state maximize the benefits of managed charging and discharging of vehicles as distributed energy resources?***



# Economic Potential

Carolyn Sisto  
California Public  
Utilities Commission  
(Moderator)

Cynthia Fang  
San Diego Gas &  
Electric

Dean Taylor  
Southern California  
Edison

Eric Cutter  
Energy &  
Environmental  
Economics

Jason MacDonald  
Lawrence Berkeley  
National Laboratory

Pamela MacDougall  
Natural Resources  
Defense Council





# Economic Potential

1. How can utility programs provide economic incentives for drivers and charging network operators to manage charging?
  - How can programs – ranging from rates, incentives, and procurements – account for circuit-level and system conditions to avoid overloading and integrate renewables?
  - How will advanced technology facilitate customers' participation in one or multiple programs?
2. What information collected from transportation electrification investments from the [CPUC](#) or [CEC](#) can be used to understand the costs and benefits of smart charging?
  - How do these costs and benefits change under different scales or program designs?



# Economic Potential

3. How can VGI resources be better represented in utility and state planning efforts?
  - What near-term improvements to distribution upgrade methodologies and operational systems are possible?
  - How can VGI be incorporated into long-term, integrated resource planning efforts?
4. Given the rapid pace of transportation electrification across many segments, how can policymakers, researchers, utilities, and industry cooperate to identify and harness the benefits of VGI?
  - What research areas will be most effective to understand the needs and opportunities to achieve maximum feasible transportation electrification by 2045 or sooner?



# Day 1 Wrap-Up

- Closing Remarks
  - Siva Gunda, Deputy Director, Energy Assessments Division
- Day 2 begins at 9 a.m. tomorrow



# Technology Needs

***What are the key automotive and electric technologies necessary to create seamlessly integrated, secure, and customer-friendly electric transportation solutions?***

***How can California continue to lead the commercialization of ZEVs and infrastructure and accelerate electrification globally?***



# Technology Needs

Matt Fung  
California Energy  
Commission  
(Moderator)

Celia Dayagi  
Siemens

Jacqueline Piero  
Nuvve

Barton Sidles  
Hubeject

Sunil Chhaya  
Electric Power  
Research Institute

Oleg Logvinov  
Charging Interface  
Initiative

Joshua Eichman  
National Renewable  
Energy Laboratory

Kenneth Rohde  
Idaho National  
Laboratory



# Technology Needs

1. What types of analytical models are needed to link charging demand with grids operating at high penetrations of renewable electricity, against the backdrop of changing consumer mobility needs and the electrification of larger vehicle classes and additional modes of transportation?
2. Which new technologies should be incorporated into electric vehicles and equipment to improve cybersecurity?
  - What are the technical barriers or requirements to advancing low-cost cybersecurity measures?



# Technology Needs

3. What standards and methods of communication need to be considered in VGI programs (e.g. involving unidirectional, bidirectional, high-powered, inductive, or pantograph charging, and potentially involving automated connections)?
4. Which charging use cases would most benefit from EVSE-embedded metering?
  - What can be learned and commercialized from the utilities' submetering pilots?
  - How can the state and network developers balance metering records-keeping requirements with the need for cost-effective solutions? Does NIST Handbook 44 provide the solution or a starting point?
5. How can policymakers, researchers, and industry foster advanced technologies into to a global, vibrant e-mobility market to save customer costs and minimize emissions?





# Customer Experience

***How can California ensure that transportation electrification is accessible for all relevant mobility uses and to all Californians, especially residents of low-income and disadvantaged communities?***

***What policies and technologies can simplify the charging experience for the mass market, minimize operating costs, and maximize emissions savings for California?***



# Customer Experience

Eli Harland  
California Energy  
Commission  
(Moderator)

Byron Washom  
University of  
California San Diego

Doug Black  
Lawrence Berkeley  
National Laboratory

Samveg Saxena  
Lawrence Berkeley  
National Laboratory

Carlo De La Cruz  
Sierra Club

Eric Borden  
The Utility Reform  
Network

Rick Kubin  
Grid Democracy



# Customer Experience

1. What are the most robust ways to account for consumer behavior within utility grid planning forecasts and technical analyses?
2. How effective are VGI-related consumer outreach and education efforts? What information and framing is needed to expand cost-effective transportation electrification opportunities to all types of vehicle customers and disadvantaged communities?
3. To what extent can VGI technologies improve air quality and criteria pollutant emissions in specific disadvantaged communities, particularly from expanded use of renewable energy or reductions in the dispatch of local conventional power plants?
4. How can technologies solve customer barriers to participating in smart charging rates, maximize driver cost savings, and reduce overall impacts on ratepayers?

# Public Comment

Provide feedback or questions on issues that require additional attention.





# Closing Remarks

- Peter Klauer, CAISO
- Carolyn Sisto, CPUC
- Stephanie Palmer, CARB
- Rey Gonzalez, CEC



# Roadmap Matrix Next Steps

After today's workshop, comment upon:

The revised VGI Roadmap Matrix, and identify

- Actions
- Responsible Organizations (government, industry, etc.)
- Prioritization
- Sequences

The Matrix spreadsheet is designed to allow stakeholders to directly input their suggested inline revisions within the appropriate cells. Please send an email with an XLS file to the contacts listed at the end of the presentation.

Additional feedback or ideas on questions listed on the agenda/prompts.

## **Policy, Planning, and Market Interaction Framework**

- Will notify the list servers



# Draft Roadmap Next Steps

- Public comments are due on 11/21/18 at 5pm to <https://efiling.energy.ca.gov/Ecomment/Ecomment.aspx?docketnumber=18-MISC-04>
- Agencies:
  - Receive comments and incorporate into the Draft Roadmap.
  - Be available for one-on-one discussions about specific Problems/Issues or Actions.
  - Notice the service list on the timing for publication, logistics for the webinar presenting the Draft Roadmap, and requests for comments.



## VGI Roadmap Update Contacts:

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Peter Klauer, California Independent System Operator

([pklauer@caiso.com](mailto:pklauer@caiso.com))

For more information and to subscribe to the “vgi\_communications” list, visit:

<http://www.energy.ca.gov/transportation/vehicle-grid-integration/>

