NARUC Electric Vehicles State Working Group

MANAGED CHARGING

APRIL 21, 3:00 - 4:30 PM ET

Welcome

EV SWG Chair

Commissioner Staci Rubin, Massachusetts Department of Public Utilities

EV SWG Vice Chair

Commissioner Milt Doumit, Washington Utilities and Transportation Commission

EV Commission Staff Leads

Benjamin Baker, Maryland Public Service Commission

Steve Olea, Arizona Corporate Commission

NARUC Staff

Margerie Snider

Danielle Sass Byrnett

Agenda

Feel free to enter questions into chat at any time

3:00 PM	**Welcome and Announcements: Commissioner Rubin** • Agenda review
3:10 PM	**Speakers:** • **Myles Collins**, Lawrence Berkeley National Lab • **Kerry Skemp**, ev.energy
4:10 PM	**Member Discussion**
4:30 PM	**Adjourn**

NEW NARUC Article:
Top Ten Actions Commissions Can Take to Enable Affordability through Flexibility

Next EV SWG Meeting:
May 12, 3:00-4:30 pm ET
EV-related Load Growth Projections

Today's Speakers

- **Myles Collins**, Lawrence Berkeley National Lab
- **Kerry Skemp**, ev.energy

Energy Markets & Planning
BERKELEY LAB

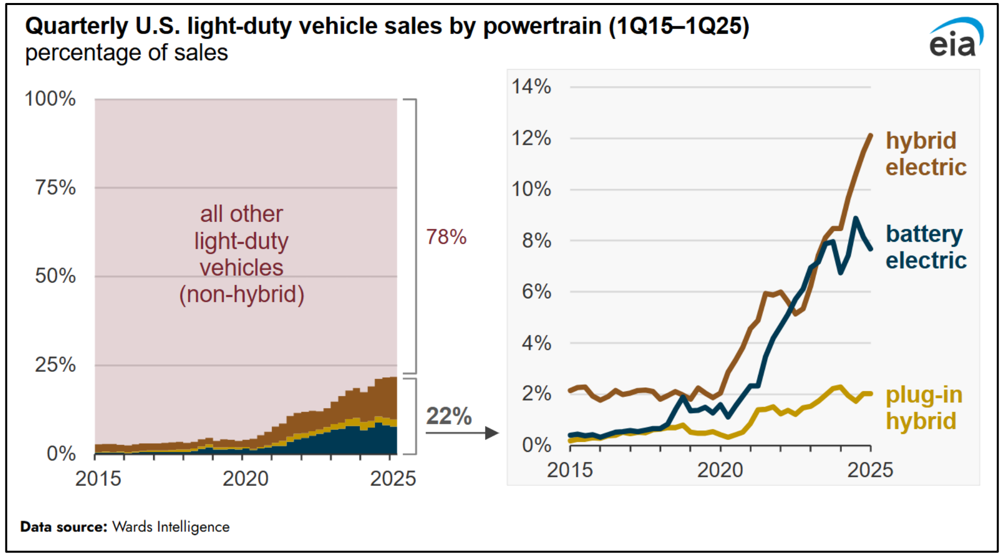
Benefit-Cost Analysis for Managed Electric Vehicle Charging: Best Practices Guide

Myles Collins
NARUC EV State Working Group
April 21, 2026

This work was funded by the U.S. Department of Energy, Vehicle Technologies Office and Office of Electricity, under Contract No. DE-AC02-05CH11231.

Background and objectives

- With significant growth in electricity demand from customer adoption of electric vehicles (EVs) and other loads, charge management strategies are increasingly important.
  - To reduce system peaks and energy costs and defer or avoid grid investments
  - To provide grid flexibility services to help speed connection of new residential or commercial loads in the face of supply chain constraints for electrical equipment
- Utilities conduct BCA to justify using customer funds for managed charging strategies.



Source: EIA

- Objectives for Lawrence Berkeley National Laboratory study
  - Support utility and regulatory decision-making
  - Provide a typology of benefits and costs applicable to managed charging programs and rates
  - Review BCA approaches to date
  - Identify emerging best practices
  - Identify gaps in data, methods, and processes
- Key challenges for conducting BCA of managed charging
  - Projecting enrollment for full-scale programs and TVRs
  - Determining EV charging baselines
  - Estimating program or rate impacts
  - Quantifying avoided costs for the distribution system

BCA principles and cost-effectiveness tests

- Principles
  - This study applies the 8 fundamental BCA principles in the National Standard Practice Manual (NSPM) to managed charging.
  - Principles assist in review of existing cost-effectiveness tests and guide the development of new, customized cost-effectiveness tests.
- Cost-effectiveness tests
  - Regulators, utilities, and independent evaluators generally rely on 5 traditional BCA tests for determining the cost-effectiveness of utility investments.
  - Each of the tests considers the question of cost-effectiveness from a different perspective and includes costs and benefits associated with that perspective.
  - Some states have begun to develop jurisdiction-specific cost tests in accordance with the regulatory perspective—reflecting jurisdiction goals and objectives.

Fundamental BCA Principles	
1	Treat grid-edge resources as a utility system resource
2	Align with policy goals
3	Ensure symmetry
4	Account for relevant, material impacts
5	Conduct forward-looking, long-term, incremental analyses
6	Avoid double-counting impacts
7	Ensure transparency
8	Conduct BCAs separately from rate impact analyses

Source: Adapted from NSPM

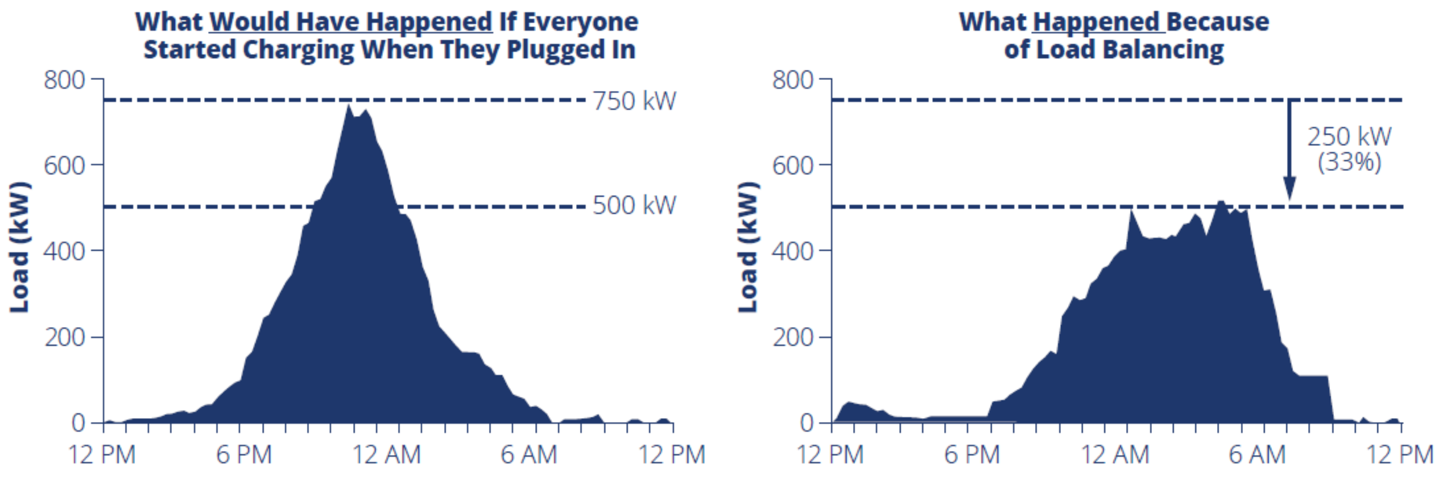
Impacts included in cost-effectiveness tests

Impact Categories	Utility Cost Test	Total Resource Cost Test	Societal Cost Test	Participant Cost Test	Rate Impact Measure Test	Jurisdiction-Specific Test
Utility System Impacts	✓	✓	✓	-	✓	✓
EV Customer Impacts	-	✓	✓	✓	-	Depends
Societal Impacts	-	-	✓	-	-	Depends

What is managed EV charging?

- Optimizing EV charging to reduce peak demand and respond to local and systemwide grid conditions
  - Through program incentives and time-varying pricing
- While total energy consumption (kilowatt-hours — kW) is the same as unmanaged charging, changing the timing:
  - Lowers energy costs for customers by reducing consumption on-peak (and potentially discharging on-peak)
  - In some cases, can defer or avoid capacity upgrades for generation, transmission and distribution
  - Takes advantage of lower cost energy resources, both onsite and utility-scale

Effect of Distribution-Level Optimization of EV Charging on Non-Coincident Peaks



Source: WeaveGrid. (2024). Recreated by SEPA.

Managed charging typology

- The literature generally categorizes two types of managed charging, though in practice there is more of a spectrum of strategies and new approaches are emerging.
  - Passive managed charging, or behavioral load control, relies on the customer changing their charging behavior—often in response to a time-varying price signal or event-based incentive.
  - Active managed charging, or direct load control, involves the utility or third party directly controlling when and to what extent an EV charges, often with the customer being able to opt out of some events under the tariff or agreement.

Category	Type	Description
Time-Varying Rates	Whole-premise TVRs	Standard opt-in or opt-out TVRs,* not specific to customers with EVs
	Electrification rates	Whole-premise TVRs with larger price differentiation between on-peak and off-peak than standard TVRs, designed for customers electrifying end uses such as transportation (EVs), heat pumps, and water heaters
	EV-only rates	TVRs for EV charging load only
Passive Managed Charging Programs	Off-peak incentives	Includes behavioral DR events and incentive programs to encourage off-peak charging
Active Managed Charging Programs	Demand response	Controls load during a limited number of events in a given time period (season or annually).
	Continuous (dynamic)	Considers real-time or near real-time grid conditions to continuously adjust the EV load to maximize value or minimize costs; can include conditions at both the bulk power system and distribution system.
	Multi-layer optimization	Manages EV charging by considering both bulk power system and distribution system constraints, grid benefits like using local generating resources, and the driver's charging preferences.
	Bidirectional charging	Involves discharging an EV battery to a load, a building, another vehicle, or the grid.

* Opt-in TVRs require the customer to actively enroll in the rate. Utilities using opt-out (default) TVRs enroll customers in the rate unless the customer unenrolls.

Adapted from SEPA (2024)

Study Methodology

- Technical Advisory Group
- Reviewed literature and regulatory proceedings
  - Managed charging programs
    - Identified 81 managed EV charging programs across 28 states and a program in Nova Scotia*
    - Focused review on 16 managed charging programs with either a standalone BCA for the program or a BCA for the program combined with TVR
  - TVR
    - Reviewed 22 utility and regulatory documents related to TVR for EVs such as plans, applications, testimony, workpapers, and decisions*
    - Eight of the documents included a BCA that clearly identified specific cost-effectiveness tests
- Interviewed stakeholders

* See Extra Slides

Source: LBNL

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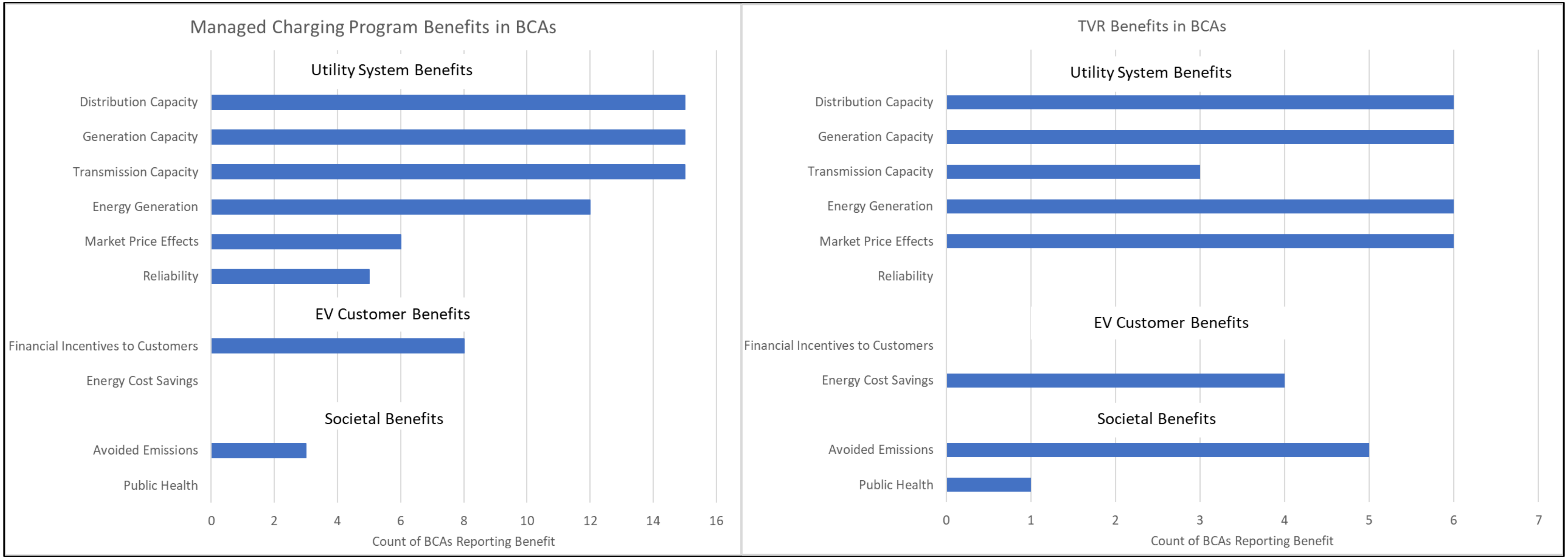
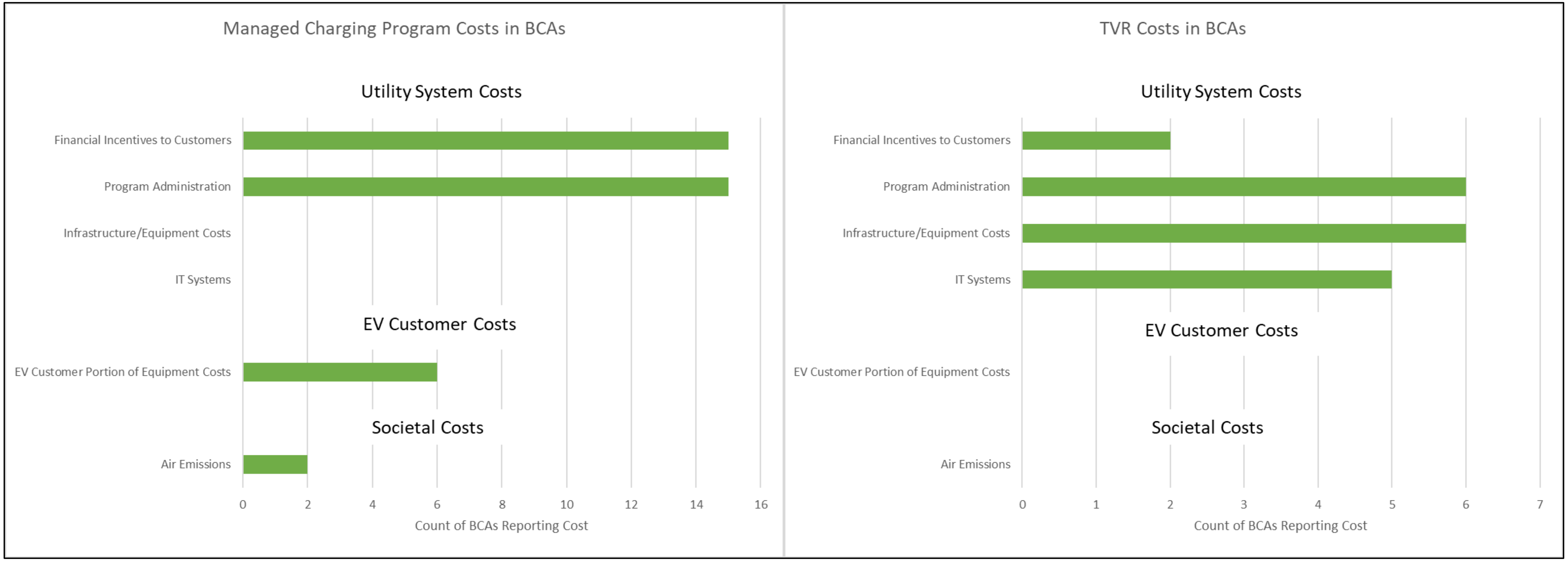
Benefits and Costs Included in Program and TVR BCAs

Monetized benefits in managed charging programs and TVR BCAs



Source: LBNL

Costs included in managed charging programs and TVR BCAs



Source: LBNL

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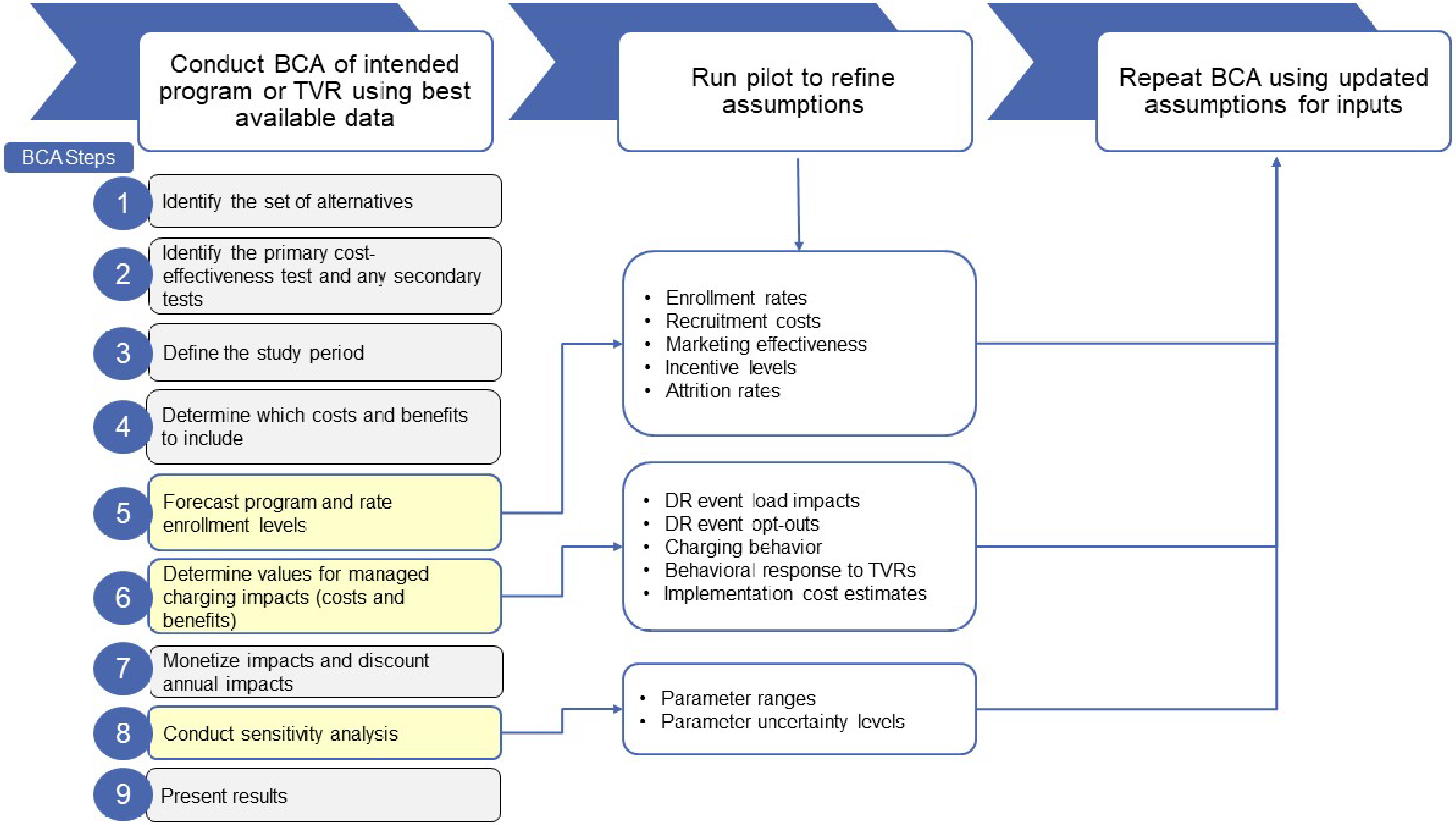
BCA Steps and Best Practices

Steps for conducting BCA for managed EV charging

1. Identify the set of alternatives
2. Identify the primary cost-effectiveness test and any secondary tests
3. Define the study period
4. Determine which costs and benefits to include
5. Forecast program and rate enrollment levels
6. Determine values for managed charging impacts (costs and benefits)
7. Monetize impacts and discount annual impacts
8. Conduct sensitivity analysis
9. Present results

Source: LBNL

Illustrative example: moving from a pilot to a full-scale program



Emerging best practices by BCA step

BCA Step	Best Practices
1. Identify the set of alternatives	• Clearly state utility and state objective(s) for the program, rate, or portfolio. • Identify one or more options to realize the objective(s). • Use an assessment level(s) that meets jurisdictional requirements and provides a useful level of granularity.
2. Identify the primary cost-effectiveness test and any secondary tests	• Apply the same primary cost-effectiveness test for managed EV charging consistent with other GERs in the jurisdiction. • Use secondary cost-effectiveness tests to inform program design and improve understanding of overall impacts.
3. Define the study period	• Ensure the analysis period is long enough to capture the term of the program or rate, changes in customer charging behavior, and the life of any equipment provided or incentivized.
4. Determine which costs and benefits to include	• Include the full range of utility system impacts in the primary cost-effectiveness test. • Account for applicable goals and objectives in the primary cost-effectiveness test. • Treat benefits and costs symmetrically in terms of what is included and what assumptions to use.
5. Forecast program and rate enrollment levels	• Estimate the location-specific enrollment level for each program or rate for the analysis duration. • Account for program and rate attrition over time. • Clearly state sources of input data and document assumptions. • Account for impacts of planned or expected federal, state, and local EV regulations and programs.
6. Determine values for managed charging impacts (costs and benefits)	• Develop hourly load baselines, for different groups of customers, in the absence of the program, rate, or portfolio. • Estimate hourly impacts of each program or rate using reasonable and clearly articulated assumptions. • Estimate hourly impacts for each subset of customers with major underlying differences that would impact charging behavior. • For bidirectional charging (V2X), account for energy discharged to the grid, premise, or other load. • Account for impacts which could result in additional costs, such as secondary peaks. • Do not include sunk costs, such as for AMI or Supervisory Control and Data Acquisition (SCADA) that is already deployed (or which would require a own separate analysis due to the size of the investment and diverse set of benefit streams). • Account for potential impacts of other programs or rates.
7. Monetize impacts and discount annual impacts	• Include all impacts expected to be of sufficient magnitude to affect the result of the BCA. • Note any immaterial benefits not expected to affect the result of the BCA. • Apply the same discount rate to benefits as to costs. • Use location-specific avoided distribution capacity costs, if possible, rather than average system-wide distribution costs.
8. Conduct sensitivity analysis	• Perform sensitivity analysis to assess impacts of key parameters and uncertainties on BCA results.
9. Present results	• Present results at the program/rate, customer class, and portfolio level. • Include qualitative descriptions of any benefits whose quantification is too complex. • In the case of a low Ratepayer Impact Measure (RIM) test result, provide a supplemental analysis that examines the magnitude of rate impacts for all customers and bill impacts separately, for both participants and nonparticipants.

Best Practices Guide for Benefit-Cost Analysis of Managed EV Charging

will be posted at: https://emp.lbl.gov/publications/best-practices-guide-benefit-cost

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For more information

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Acknowledgements

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Extra Slides

Managed charging programs identified in regulatory proceedings review

Highlighted cells indicate programs with a BCA

Utility	Program Name
Ameren Illinois	Residential Managed Charging
Arizona Public Service	EV Charging Demand Management Pilot
Arizona Public Service	APS SmartCharge
Baltimore Gas & Electric	Smart Charge Management
Central Hudson Gas & Elec Corp	NWA Program "Peak Perks"
Central Hudson Gas & Elec Corp	NYSERDA Charge Smart
Commonwealth Edison	Residential Optimized Charging Pilot
Connecticut Light & Power	Managed Charging (Baseline & Advanced)
Consolidated Edison	Smart Charge NY (Passive)
Consolidated Edison	Commercial Managed Charging
Dayton Power & Light Co	C&I Managed Charging
Dayton Power & Light Co	Residential Managed Charging
Dayton Power & Light Co	Residential Off-Peak Incentive
DTE Electric Company	Smart Charge
DTE Electric Company	Charging Forward Phase 2: Fleet Advisory Services
DTE Electric Company	DTE BYOC Charger Pilot (Passive)
Duke Energy Carolinas (NC)	EV Load Control Service Pilot
Duke Energy Carolinas (SC)	Residential EV Charging Program
Duquesne Light Co	Managed Charging Pilot
El Paso Electric Co	EV Smart Rewards NM Program
Eversource (CT)	Residential EV Charging Program
Eversource (MA)	Residential Connected Solutions
Georgia Power	evPulse
Hawaiian Electric	EV Telematics Pilot/Smart Charge Hawaii
Indiana Michigan Power	Managed Charging Pilot/Smart EV Charging Pilot
Indianapolis Power & Light	EV Managed Charging Program
Indianapolis Power & Light	EVX Rate (Off Peak Incentive)

Utility	Program Name
Jersey Central Power & Light	EV Driven/Residential Customer Sub Program
Jersey Central Power & Light	Load Optimization & Peak Demand Reduction
Kentucky Utilities	Optimized Charging
Madison Gas & Electric Co	Charge @ Home
Madison Gas & Electric Co	Charge Ahead Program
Madison Gas & Electric Co	Fleet Electric Vehicle Charging Experimental Pilot Rider
Massachusetts Electric	Charge Smart MA (off peak charging program)
Massachusetts Electric	ConnectedSolutions
National Grid (MA)	Residential Connected Solutions
Nevada Power	Powershift (V2G)
Nevada Power	Managed Charging Program
New York State Electric & Gas	Advanced Managed Charging "OptimizEV"
Niagara Mohawk Power	EV Smart Plan
Northern States Power	V2G Demonstration Project
Nova Scotia	Smart Grid Nova Scotia – EV Charging
NSTAR Electric Company	Eversource Managed Charging Program
NSTAR Electric Company	ConnectedSolutions
Ohio Edison	Commercial V2G
Pacific Gas & Electric	evPulse (LCFS Resilient Charging Pilot)
Pacific Gas & Electric	Emergency Load Reduction Program (ELRP)
Pacific Gas & Electric	V2X Microgrid Pilot
Pacific Gas & Electric	Residential V2X Pilot
Pacific Gas & Electric	Commercial V2X Pilot
Pacific Gas & Electric	BMW ChargeForward
PacifiCorp	Residential Managed Charging Pilot
PacifiCorp	Power Balance and Demand Response to Optimize Charging at Intermodal Hub Project
Portland General Electric	Test Bed EV Charging Study
Portland General Electric	Schedule 8 - Residential Electric Vehicle Charging Pilot

Utility	Program Name
Portland General Electric	evPulse
Portland General Electric	Test Bed V2X Study
Potomac Edison Company	Electric School Bus Pilot
Potomac Electric Power	Smart Charge Management
Potomac Electric Power	Smart Charge Management
Public Service Company of Colorado (PSCo)	Optimize Your Charge
Public Service Company of Colorado (PSCo)	Charging Perks
Public Service Company of New Hampshire	Alternative Metering Pilot
Public Service Company of New Mexico	Managed Charging Program
Public Service Company of New Mexico	Peak Saver Program
Puget Sound Energy	Flex Smart
Puget Sound Energy	Residential Charging & Off-Peak Pilot Program
Rhode Island Energy	Connected Solutions Electric Vehicle Demand Response (EVDR)
Rochester Gas & Electric Corp	Advanced Managed Charging "OptimizEV"
SMUD	Managed EV Charging
San Diego Gas & Electric	EV Demand Response
San Diego Gas & Electric	Power Your Drive Extension
San Diego Gas & Electric	Emergency Load Reduction Program (ELRP)
Southern California Edison	Charge Ready Program
Southern California Edison	Emergency Load Reduction Program (ELRP)
Southwestern Public Service	Charging Perks
United Illuminating (CT)	Managed Charging (Baseline & Advanced)
Vermont Electric Cooperative	Managed Charger Program, Scheduled Charging Program, Flex Charging Telematics
Virginia Electric & Power (Dominion)	EV Telematics Pilot

Documents reviewed for BCAs specific to TVRs for managed charging

Highlighted cells indicate documents with a BCA that clearly identified specific cost-effectiveness tests

State	Entity	Document Name	Docket or Filing
CA	PG&E	Electric Vehicle Automated Demand Response Study Report	N/A
CT	Statewide	PURA AMI Order - 17-12-03RE02	DOCKET NO. 17-12-03RE02
DC	Pepco DC	Pepco's Climate Solutions 5-Year Action Plan: Benefits and Costs	Case No. 1167
FL	Duke Energy Florida	DEF Off-Peak Credit	Docket No. 20210016-EI
MD	BGE	BGE Smart Charge Management Program Proposal	Case No. 9478
Multi-State	Multi-Utility	Advanced Metering Infrastructure: Utility Trends and Cost-Benefit Analyses in the NEEP Region	N/A
N/A	Lawrence Berkeley National Lab (LBNL)	A Snapshot of EV-Specific Rate Designs Among U.S. Investor-Owned Electric Utilities	N/A
N/A	LBNL	American Recovery and Reinvestment Act of 2009: Final Report on Customer Acceptance, Retention, and Response to Time-Based Rates from Consumer Behavior Studies	N/A
N/A	Electric Power Research Institute (EPRI)	Distribution System Scenario Planning: Case Study and Guidance on Considering Scenarios and Investment Approaches in Distribution Planning	N/A
N/A	Synapse Energy Economics	Best Practices for Commercial and Industrial EV Rates	N/A
NH	Eversource	Eversource Proposal for Electric Vehicle Managed Charging Initiative	DE 20-171
NH	Eversource	Separately-Metered Electric Vehicle Time-Of-Use Rate And Load Management Proposals	DE 20-170
NY	ConEd	ConEd Advanced Metering Infrastructure Business Plan	Case 15-E-0050
NY	ConEd	ConEd Reply Comments June 4, 2021	Case 18-E-0138
NY	Department of Public Service	Staff Whitepaper Regarding Electric Vehicle Supply Equipment and Infrastructure Deployment	Case 18-E-0138
NY	Synapse Energy Economics	Driving Transportation Electrification Forward in New York	Case 18-E-0206
NY	New York State Energy Research and Development Authority (NYSERDA)	Benefit-Cost Analysis of Electric Vehicle Deployment in New York State	N/A
OK	Oklahoma Gas & Electric (OG&E)	Smart Hours Program	CAUSE NO. PUD 201200134
RI	Rhode Island Energy	Advanced Metering Functionality Business Case and Attachments	Rhode Island PUC Docket No. 22-49-EL
RI	Rhode Island Energy	Updated Advanced Metering Functionality Business Case	Rhode Island PUC Docket No. 5113
VT	VT PUC	2022 Report on Electric Rates for Electric Vehicles	N/A
WA	Puget Sound Energy	Puget Sound Energy's February 24' AMI Benefits Progress Report	Filing UE - 220066

Quantifying benefits and costs: determining program/TVR impacts

- Enrollment and attrition
  - Estimates in BCAs were generally a function of projected EV adoption.
  - Sources of estimates included other programs, peer utilities, and third-party vendors.
- Load baselines and impacts →
  - Requires comparison of status quo (unmanaged charging) with each managed charging alternative (program, rate, or both)
  - Approach depends on whether program or TVR is new, or if existing program performance data are available

Methods for establishing load baselines and estimating program impacts

Method	Description	When to Use	Limitations
Vendor data	Program vendor provides baseline load profile and impact estimates using data from program or model	Planning assumptions for new pilot or program; limited existing utility data	Uncertainty regarding external validity
Simulation model	Models and online tools that estimate EV charging load profiles based on vehicle parameters and charging assumptions*	Planning assumptions for new pilot or program; limited existing utility data	Estimates not based on observed, empirical data
Randomized Controlled Trial (RCT)	Gold standard methodology; uses control group of customers who signed up and did not receive treatment	New programs with sufficient sample sizes and customer acceptance	• Higher cost • May face customer acceptance issues • Not always feasible for operational programs
A/B testing	Random assignment to A and B groups that alternate between treatment and control across events	When RCT is not feasible and events are discrete, not continuous	• Withholding events from half of customers diminishes program impacts • Cannot use for TVRs
Matched control group (quasi-experimental)	Control group matching based on customer characteristics	• When random assignment is not possible • Existing pilots or programs	• Limited EV telematics for nonparticipants • Matching quality depends on observable characteristics
Within-subjects/ regression-based	No control group; pre-post comparison with weather normalization	When experimental/ quasi-experimental designs are not possible; last resort methodology	• Model assumptions may not hold • Cannot control for external factors • Potential for incorrect results • Most vulnerable to bias • May face customer experience issues

* Publicly available sources include NREL's EVI-Pro Lite and TEMPO

Source: LBNL

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Speaker Q & A

- **Myles Collins**, Lawrence Berkeley National Lab

Orchestrating EV Load: Real-World Lessons in Advanced Managed Charging

NARUC EV Working Group

April 2026

ABOUT US

DER orchestration platform

35+

US Utility, Retailer & CCA Programs

20+

Additional Global Utility Programs

>300,000

EVs under management

>75

People, with 66% in Product and Engineering

33+

90%+ vehicle OEMs supported via telematics
EVSE make/models

25+

AMI integrations
Solar inverters
Batteries

Comprehensive orchestration

Multifamily Dwellings
EV + solar
EV + solar + batteries
Commercial & fleet
V2X AC & DC

We're Facing a Real Affordability Crisis

40%

average utility bill increase since 2021

62%

of Americans have seen their bills rise over the past year

73%

of Americans are concerned about bills rising in the next year

$31B

utility rate increases in 2025

$1.4T

planned utility CapEx spending through 2030

https://powerlines.org/utilities-are-planning-to-spend-1-4-trillion-on-capital-expenditures-through-2030-as-utility-bills-rise-study-finds/

There Are a Variety of Solutions

Better Use of the Grid

Using existing grid assets more efficiently can reduce the need for new distribution spending and help keep rates down.

DER Coordination

Coordinating solar, storage, and EVs helps get more value from the current system without adding new resources.

Managed Charging ($30B)

Timing EV charging to match grid needs can add major capacity and energy value.

7M

electric vehicles sold

5M+

residential solar installations

9 GWh

residential battery storage installed

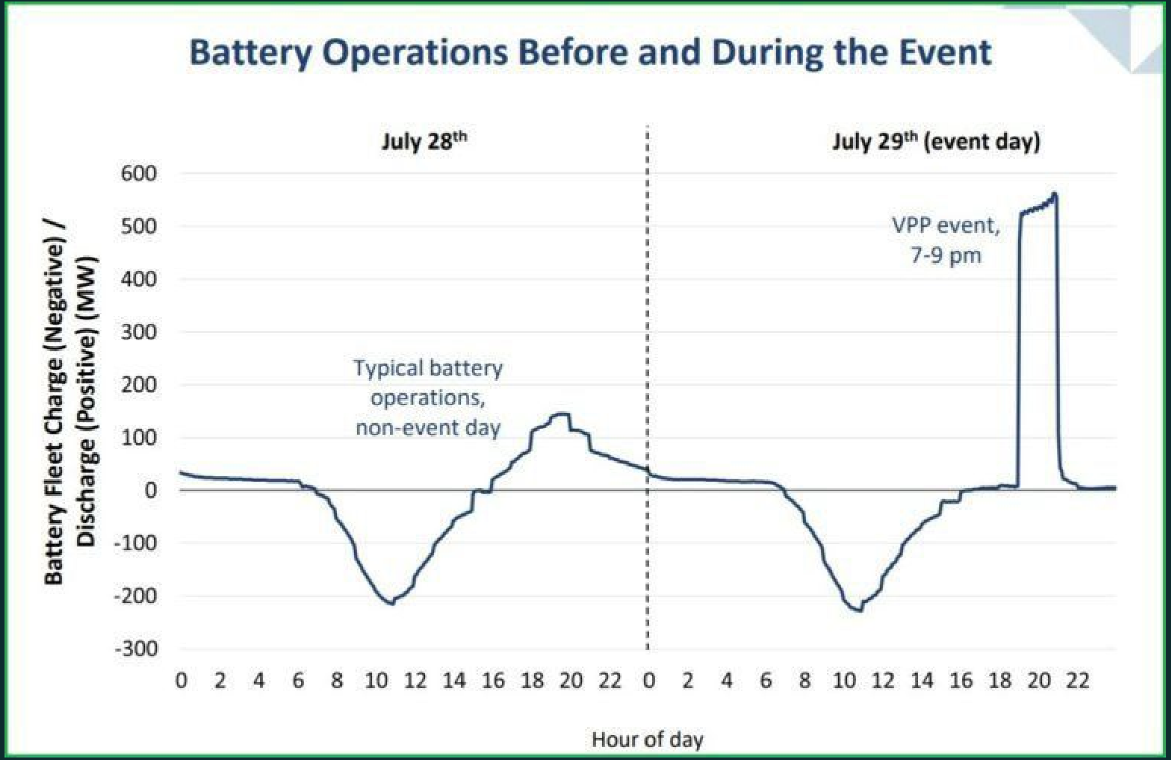
Not All Flexibility Is Equal

DER TYPE	NAMEPLATE (KW)	AVAILABILITY	DISPATCH FREQUENCY	DAILY SHIFTABLE (KWH)	MONTHLY SHIFTABLE (KWH)
EV L2 Managed Charging	**7.2–11.5 kW** ~21 kW in some markets	~16%	30x / month Daily	~8 – 12	~240 – 300
RESIDENTIAL BESS	5 – 11.5	~90 – 100%	30x / month Daily	~26.9 Gross	~790 Gross
SMART THERMOSTAT AC	3 – 5	~30%	~1 – 2 events / month	~0.18 Amortised daily avg	~2 – 8
SOLAR CURTAILMENT	5 – 10	~70 – 80% Peak sun hours	*Seasonal*	*0*	*0*

https://www.ev.energy/en-us/blog/the-gw-illusion-not-all-flexibility-is-created-equal

From Events to Every Day: Daily Load Flexibility Matters

Traditional demand response focuses on calling events — a few peak days when utilities call on resources to help the grid. A **500 MW response on one day** (as from DSGS in July 2025) may make headlines. But affordability is a daily issue, not just a seasonal one. The real opportunity is managing load **every day**, not only when the grid is under stress.



EVs can help the grid every day, not just on peak days. Daily managed charging is a key part of a low-cost, reliable grid.

OPTIMIZATION

Platform built to deliver every optimization & VPP modes

0 — Unmanaged

When EVs are plugged in there is no management of electricity usage and charging starts straight away.

1 — Behavioral (Passive)

Customers manage charging manually, setting timers to shift their demand to off-peak times. (TOU rates)

2 — Smart Active

Active managed charging uses software to optimize EV charging times, responding to grid, price and carbon signals (V1G).

3 — Smart Coordinated

Active managed charging + coordinated optimization with other home energy assets, e.g. solar PV, battery, heat pump (V1H + V1G).

4 — Bidirectional Non-Exporting

EVs store and send power to the home, enabling off-peak energy to be used at peak times (V2H + V1G).

5 — Bidirectional Exporting

EVs store and send power to the grid, enabling drivers to earn money for exporting energy on top of savings (V2H + V2G).

Virtual Power Plant (modes 2–5)

The Value Proposition for Utilities

Up to $575 Per EV Per Year in Avoided Costs from Active Management

Research with The Brattle Group quantifies what's at stake:

> *"Virtual Power Plants can deliver reliable power at costs up to 60% lower than traditional generators."*
>
> — Ryan Hledik, Principal, The Brattle Group

Layer	Value/EV	What It Avoids
Generation Capacity	$60–$140	Peaker plants
Transmission System	$20–$55	High-voltage upgrades
Distribution System	$5–$300	Feeder/transformer upgrades
Energy Procurement	$100–$180	High wholesale energy costs
Ancillary Services	$0–$80	Grid balancing costs
Customer Operations	$7–$10	Service call costs

Total annual opportunity by 2035: $30 billion for U.S. utilities = 10% bill reduction for every US household. Source

Key Principles for Managed Charging Success

30%
enrollment

98%
load shift

$40
monthly earnings

Open to All Participants

Programs should be available to every customer, whether through telematics, EVSE hardware, or AMI. Fair access matters. Leaving out MFH residents or people without smart chargers means missing a lot of load and compromising equity. Consider including non-customers, too.

Use Signals, Not Rates

Dynamic rates may look attractive, but they can be hard to explain and may work against equity principles for some customers. A better approach is to let aggregators turn grid signals into automatic charging control that customers do not have to manage.

Easy Participation and Transparent Compensation

Signing up should be simple, no matter how the customer found the program or what kind of charger they use. Our systems provide transparent incentives to drivers.

Types of Residential V1G Programs

Make Ready Rebate

Rebates customers for the purchase of an EVSE, and/or wiring upgrade. Often paired with a managed charging program.

For Avangrid, ev.energy unified rebate applications and program enrollment into a single session, eliminating the gap between rebate and managed charging enrollment.

Example:

Avangrid

$500 cash rebate for EVSE, $500 for new wiring installation

Behavioral V1G

Customers are incentivized to manage their EV charging by manually plugging in or setting a vehicle timer according to program goals. ev.energy reads charging data, calculates and administers incentives, and reports data to the utility.

Example: Smart Charge NY

conEdison

$0.10 / kWh charging off peak. $35 enrollment and other bonuses available.

Active V1G

Vehicles (through telematics) and EVSEs (OCPP or API) receive start/stop charging commands according to schedules calculated by ev.energy based on driver preferences, energy price, and utility / grid requirements.

Example: MCE Sync (California)

MCE

$0–$40/month based on hourly prices

Multifamily

Taps the previously “hidden load” of EV charging done at multifamily sites. Works with telematics and shared chargers on site, when integrated.

Incentivizes building / site admins to provide access to shared charger data. Incentivizes EV drivers to shift EV charging to off peak hours or avoid peak events.

Connecticut Program

$10 / month for charging at least 80% off peak

Program types are stackable. Rebates, Behavioral V1G, Active V1G, and MultiFamily programs can be combined into multiple tier programs.

The Managed Charging Value Stack and Participation

Managed charging works best as a layered stack. Each layer adds more grid value while keeping access broad and fair.

Time-of-Use (TOU) Rates

- 60–70% compliance rates
- Creates "timer peak" spikes
- May increase fossil fuel generation

Behavioral Programs

- 80–90% compliance
- Useful for multifamily residents

Active Managed Charging

- Price, carbon, and local grid signals
- Unlock the full **$575 per-EV** avoided cost

"Active automation delivers superior grid results while providing a better financial outcome for the driver."

Orchestrating Assets: The VPP Evolution

The best programs coordinate all available DERs using bulk signals and local grid limits. Customer engagement and retention are the keys to keeping the system working at scale.

Layering Signals

Deliver incremental, circuit-level load flexibility by layering prescriptive turn-up and turn-down signals.

Foundation:
Existing off-peak managed charging programs.

DER Orchestration

Coordinating EVs, batteries, and smart thermostats with wholesale prices and carbon intensity.

Outcome:
The real Virtual Power Plant (VPP) experience.

Engagement That Sticks

Off-bill incentives like cash rewards or gift cards, plus grid-friendly charging by default.

Key Result:
Customer engagement and retention at scale.

What Good Looks Like: Sub-second dispatch, no timer peaks, local feeder limit adherence, and audit-ready logging.

DYNAMIC SIGNALS

Dynamic Dispatch Is the True VPP Experience

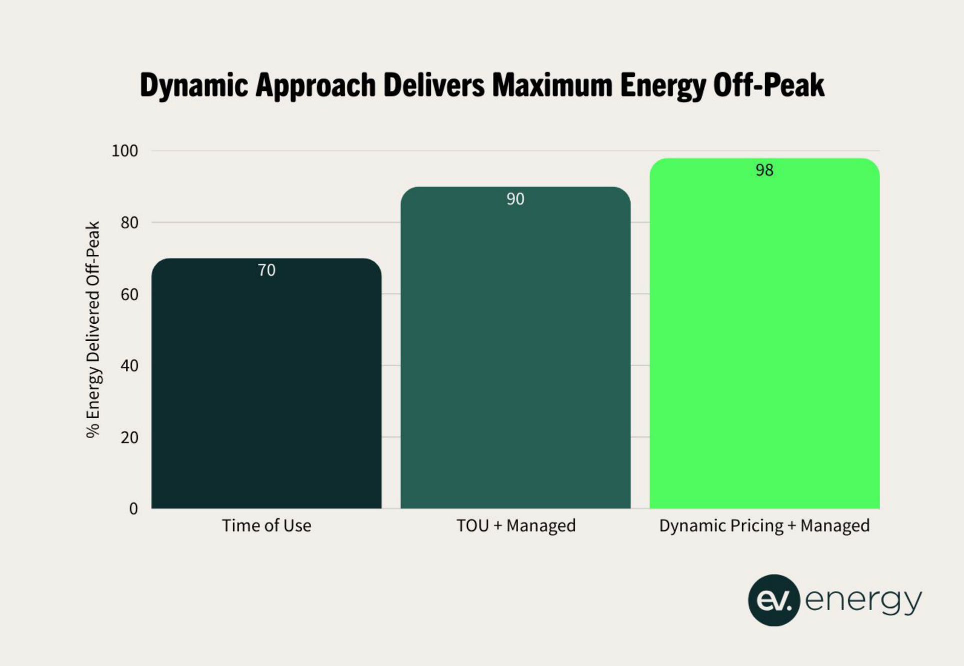
ChargeWise California — Proven Results

98%

Energy delivered off-peak

30%

Charging shifted to midday solar



Technologies Used

Signal-Based Dispatch

Responds to utility signals in seconds. No timer peaks.

Utilize Excess Solar

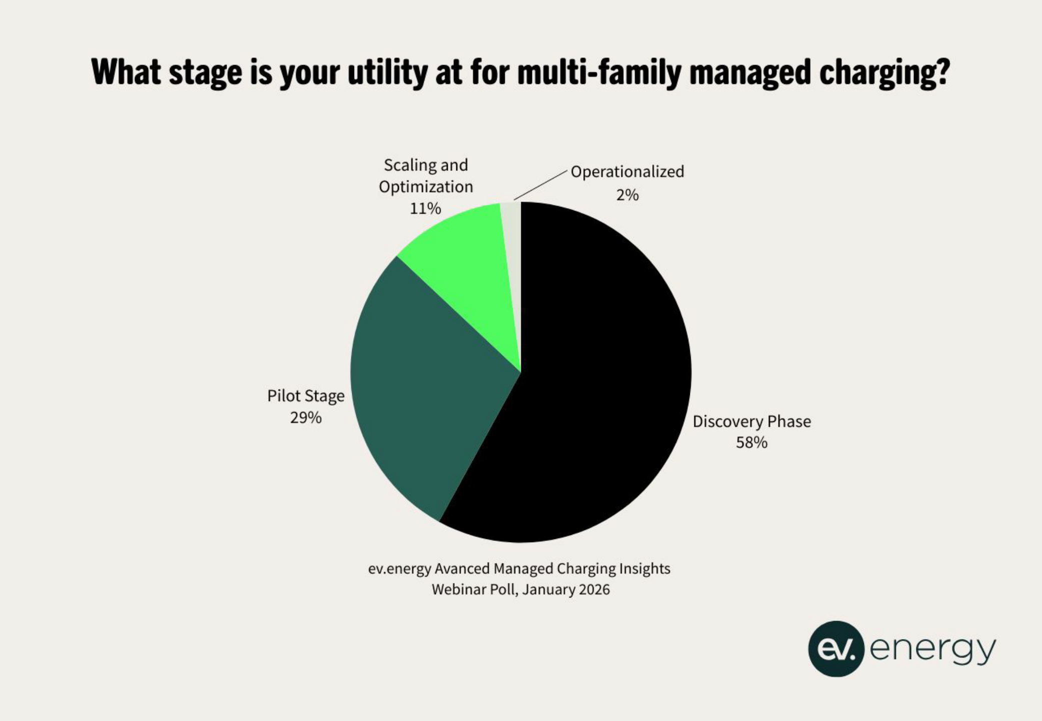
30% of charging shifted to midday solar organically.

Audit-Ready M&V

Every event logged, validated, CEC-audited.

** ChargeWise California results from CEC REDWDS pilot with MCE and SVCE, published June 2025.*

Achieving Scale & Equity: Avangrid's Multi-Family Strategy



True scale is impossible if utilities cannot reach residents in high-density neighborhoods. Avangrid is tackling the challenge of bringing managed charging to apartment buildings and multi-family housing, where residents face technical barriers like shared charging infrastructure and complex metering.

Key approach: Telematics-First

By connecting directly to the vehicle's onboard modem, Avangrid can manage load and provide incentives regardless of the hardware at the site.

> "If we're getting data directly through the vehicle itself, it becomes a very easy problem solved."
>
> — Charles Spence, Vehicle-Grid Integration Programs Manager, Avangrid

Poll result callout: 58% of utilities are still in the Discovery Phase for multi-family managed charging. Only 2% have fully operationalized it.

Learn More

Key Lessons from Industry Leaders

MCE and Avangrid are setting the standard for how utilities can scale managed charging programs effectively. Here are the top takeaways from their real-world deployments and a recent industry report.

Dynamic Signals Beat Static Rates

Real-time price signals from wholesale markets (like CAISO) dramatically outperform TOU rates — achieving 98% compliance vs. 60–70%.

Incentivize the Right Behavior

Customers on dynamic tiers earned up to $40/month — 4× the standard incentive — driving higher engagement and better grid outcomes.

Go Hardware-Agnostic for Scale

Telematics-first approaches (connecting via the vehicle's modem) unlock multi-family and shared-charger sites that hardware-dependent programs can't reach.

Equity Is a Grid Imperative

Reaching apartment dwellers and underserved communities isn't just good policy — it's essential for achieving the scale needed to build a rate-case-ready VPP.

Technology-agnostic, multiple participation pathways

The report clearly acknowledges the need for both customer-authorized and OEM-direct integrations, as well as telematics, EVSE, or AMI participation. More pathways grow participation, while a technology neutral approach is required to meet diverse customer needs and changing market conditions.

Flexible program design and incentives Technologies and market needs evolve over time, and differ by service territory. Programs should build in flexible participation options, including both passive and active charging, as well as incentive design that can accommodate technology and usage changes. Start with the objective, not the design. Within a program framework, there should be changes allowed without approval or in consultation with regulators, without initiating a full filing process.

Join Us on the Path Forward

Utilities, regulators, and policymakers have a once-in-a-generation opportunity to shape how Americans interact with the electric grid. The decisions made today — on data access, program design, compensation structures, and equity — will determine whether the grid edge becomes a tool for broad public benefit or a source of new inequities. When customers trust the programs, enrollment rises. When enrollment rises, grid benefits multiply. When benefits are visible and fairly distributed, the policy foundation strengthens — creating a virtuous cycle that keeps electricity affordable, the grid reliable, and communities thriving.

For Regulators	For Utilities	For Advocates
Establish clear, technology-neutral frameworks that require transparency, protect customer data, and mandate public benefit reporting.	Invest in open, interoperable program design and prioritize customer engagement to drive inclusive enrollment at scale.	Hold programs accountable through quarterly dashboards, independent audits, and active engagement in rate proceedings and program design.

Join us! Discover more about these principles at the open charge movement: https://www.ev.energy/en-us/partners/open-charge.

Speaker Q & A

- **Myles Collins**, Lawrence Berkeley National Lab
- **Kerry Skemp**, ev.energy

Member Discussion Questions

1. Are you exploring managed charging opportunities in your state?
2. Has your state conducted a benefit-cost analysis test for managed charging? If so, how was the test established and were any of the best practices from LBNL used?

Steps for conducting BCA for managed EV charging

1. Identify the set of alternatives
2. Identify the primary cost-effectiveness test and any secondary tests
3. Define the study period
4. Determine which costs and benefits to include
5. Forecast program and rate enrollment levels
6. Determine values for managed charging impacts (costs and benefits)
7. Monetize impacts and discount annual impacts
8. Conduct sensitivity analysis
9. Present results

Source: LBNL

Next EV SWG Meetings & Events

EV-Related Load Growth Projections:
May 12, 3:00-4:30 pm ET

EV Rate Design:
June 16, 3:00-4:30 pm ET

FIND ALL PAST RECORDINGS AND PRESENTATIONS:

WWW.NARUC.ORG/CORE-SECTORS/ENERGY-RESOURCES-AND-THE-ENVIRONMENT/ELECTRIC-VEHICLES/

NEW NARUC Professional Development Course: Electric Vehicle Grid Integration and Grid Impacts for State Regulators
May 19-21, 2:00-4:00 pm ET daily.
Discounted for NARUC members.