Affordability Benefits of Bidirectional Electric School Buses

July 24, 2025

EVs represent **untapped potential** beyond mobility as distributed energy resources to support an affordable and just energy transition

Vehicle-Grid Integration Council focuses on unlocking the value of flexible charging and "vehicle-to-everything" bidirectional charging

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Utility Collaboration Forum

Best Practices for Vehicle-Grid Integration Program and Pilot Development

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V2X BIDIRECTIONAL CHARGING SYSTEMS

Best Practices for Service Connection or Interconnection

Accelerating Transportation Electrification

- Charge Energy Management led to 25% - 53% savings in annual charging costs in recent analysis for Stockton Unified School District

Table 1: Summary of Charging Analysis Results by Scenario

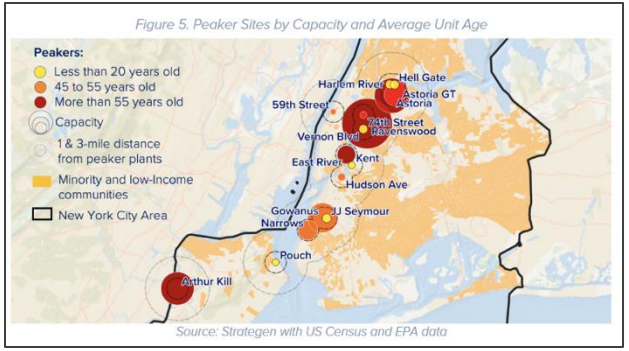
Scenario	AC Only	DC Only	AC + DC	AC + PV
Annual Energy Cost Without CEM	$405K	$399K	$406K	$287K
Annual Energy Cost With CEM	$244K	$237K	$298K	$134K
Energy Cost Savings With CEM	39.7%	40.6%	26.6%	53%

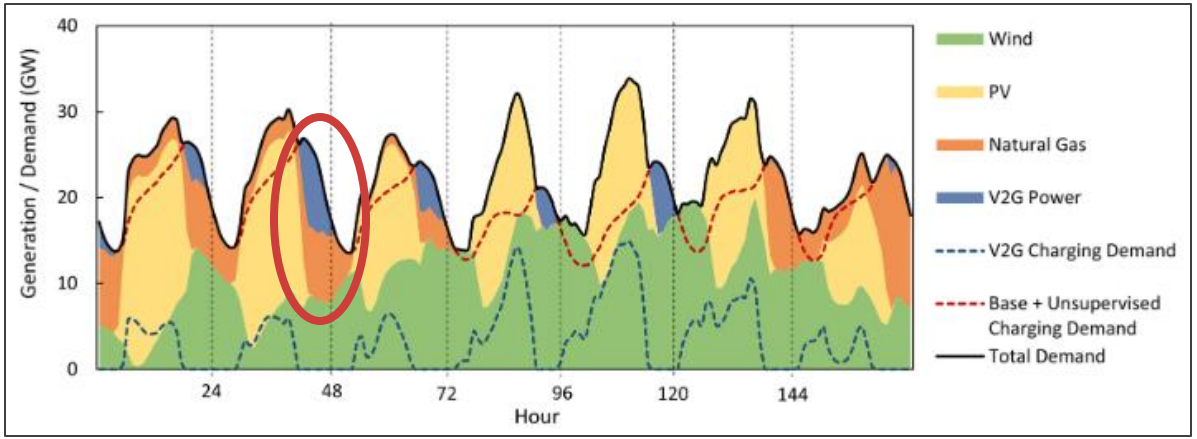
- In Summer 2023, a school district in San Diego was paid over $1,500 through V2G exports

Source: https://www.energy.ca.gov/sites/default/files/2023-03/CEC-600-2023-028_0.pdf
https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M502/K977/502977248.PDF

Support the Decarbonizing Power Sector

Managed charging and V2X discharging can help offset the use of old, polluting "peakers"

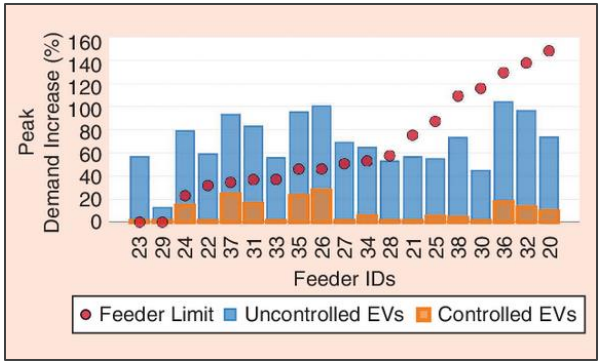




Source: https://pubs.rsc.org/en/content/articlepdf/2022/ya/d2ya00204c
https://www.cleanegroup.org/wp-content/uploads/Fossil-Fuel-End-Game.pdf

Increase Affordability of Electricity for All

Uncontrolled EV charging can lead to significant infrastructure investments

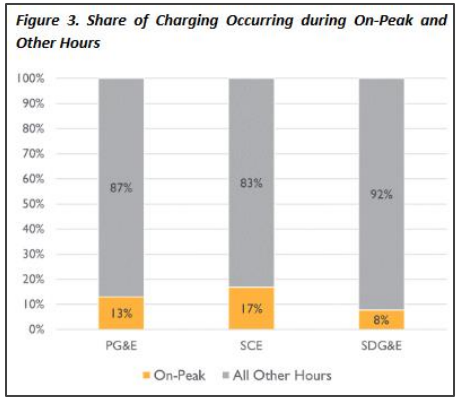


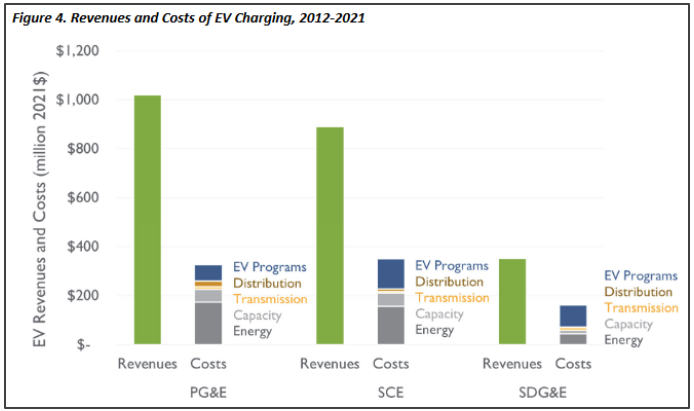
Revenue Requirement / **kWh (total electric demand)** = **Rates**

Source: https://ieeexplore.ieee.org/document/8732007

Increase Affordability of Electricity for All (continued)

Smart charging rates/programs can shift charging away from On-Peak hours and accelerate EV adoption, increasing kWh consumption





Revenue Requirement / **kWh (total electric demand)** = **Rates**

Source: https://www.synapse-energy.com/sites/default/files/EV-Impacts-December-2022-21-032.pdf

“Four Pillars” of the Bidirectional Charging Market

Who Can Overcome Key Barriers?

- **State Funding:** State energy offices/commissions can help by:
  - Establishing a clear deployment target for bidirectional charging
  - Administering "virtual power plant" programs that leverage EVs as grid assets
  - Offsetting the cost of bidirectional charging equipment (to cover the higher cost relative to traditional chargers)
  - Directly supporting the emerging bidirectional charging solution providers and startups
- **Utilities:** Different utilities face different pressures, which can influence their motivations to support or be reluctant toward these solutions
- **Utility Regulators:** The Public Utilities Commissions (PUCs) set the "rules of the road" for regulated utilities, including the utilities' return on investment, fines, and penalties. PUCs can encourage utility engagement in bidirectional charging by:
  - **Directing utilities to (1) compensate bidirectional charging customers for their discharged energy, (2) streamline the connection of bidirectional chargers to the grid, and (3) help pay for bidirectional charging equipment installation**
  - Tie return on investment to bidirectional charging customer deployment or related *performance incentive metrics*
  - Consider allowing utilities to earn a return on initiatives and platforms needed to enable bidirectional charging

Thank you!

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

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