



About Next 10

- Founded in 2003
- Independent, nonpartisan, nonprofit
- Commissions expert research to **educate, engage and empower** Californians
- Focus areas: green economy, state budget, governance
- Online: www.next10.org

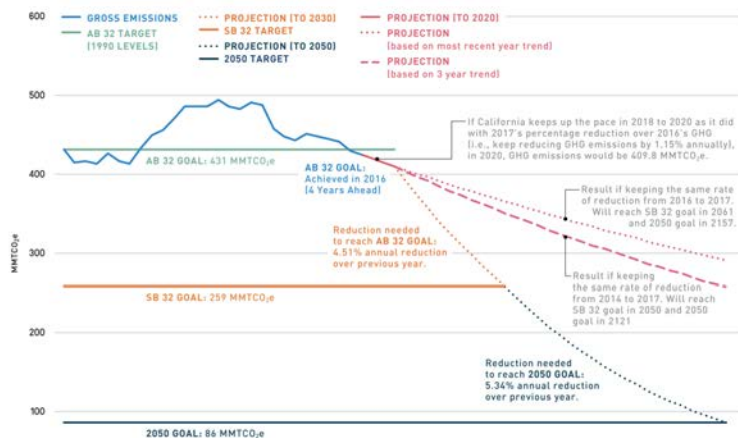


Vehicle Electrification & Climate Goals

- Motivations for report:
 - California is not on track to meet its 2030 climate goal
 - Transportation is 40 percent+ of California’s GHG emissions
 - Accelerated vehicle electrification will be critical to meeting climate goals
 - Environmental benefits clear; economic benefits less so



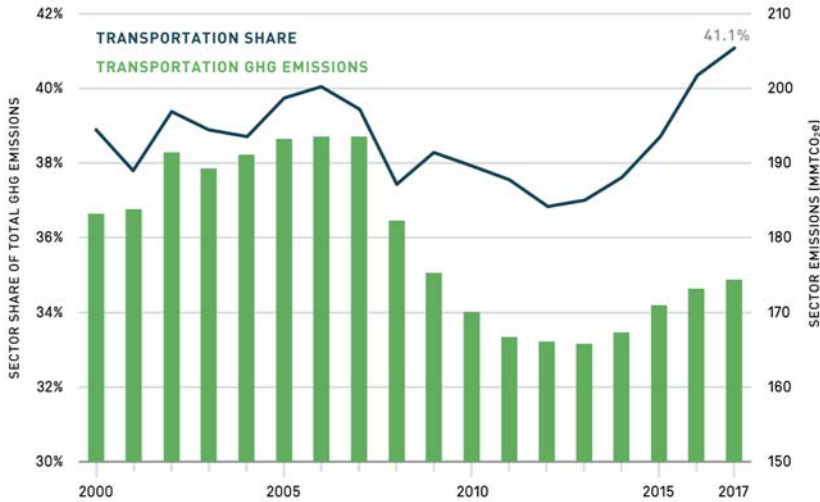
Not on Track to Meet Our Goals



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: California Air Resources Board, California Greenhouse Gas Inventory. NEXT 10 / SF - CA - USA.



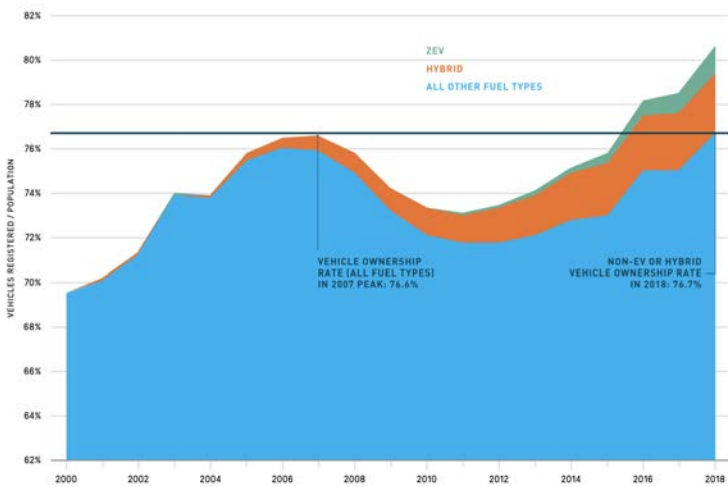
Transportation Emissions on the Rise



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: California Air Resources Board, California Greenhouse Gas Inventory by Sector. NEXT 10 / SF - CA - USA



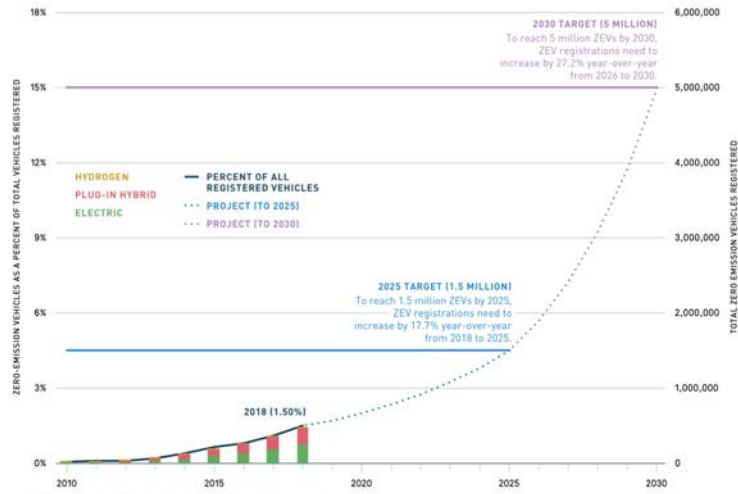
ZEV & Hybrid Adoption



NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: California Energy Commission; California Department of Finance. NEXT 10 / SF - CA - USA



Meeting our ZEV Goals



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Clean Transportation: Scope of Study

- Economic implications – including health impacts – of projected increase in EV use
- Long-term forecasting model; Four scenarios modeled
- Factors varied between models:
 - EV adoption patterns
 - Incremental Vehicle Costs (IVC)
- Analysis of impacts to disadvantaged communities



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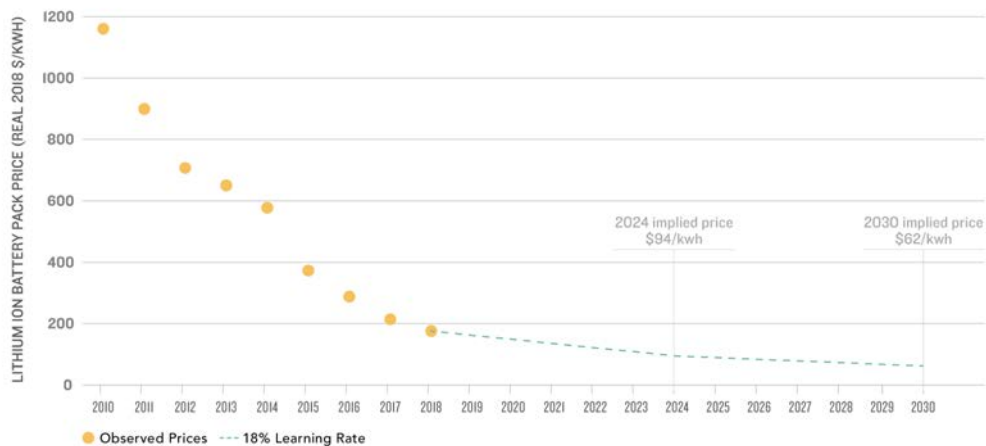


Scenarios Analyzed

SCENARIO	DESCRIPTION	ADOPTION	INCREMENTAL VEHICLE COST
1 Baseline	A reference Scenario with existing policies in force to 2050. Baseline policies are complemented by revised adoption and use cost estimates commissioned by CEC from E3. Vehicle technology costs are assumed to remain constant at current levels.	Constant adoption shares among income groups	High
2 LTES	Incorporates E3 technology cost estimates for vehicles, declining over time.	Equal shares by 2050	Medium
3 Innovation	LTES policies to 2030 and 2050, taking account of more recent vehicle technology cost estimates. ²	Equal shares by 2050	Low
4 Equity	The LTES scenario with PEV purchase shares equalizing across California income groups by 2030.	Equal shares by 2030	Low



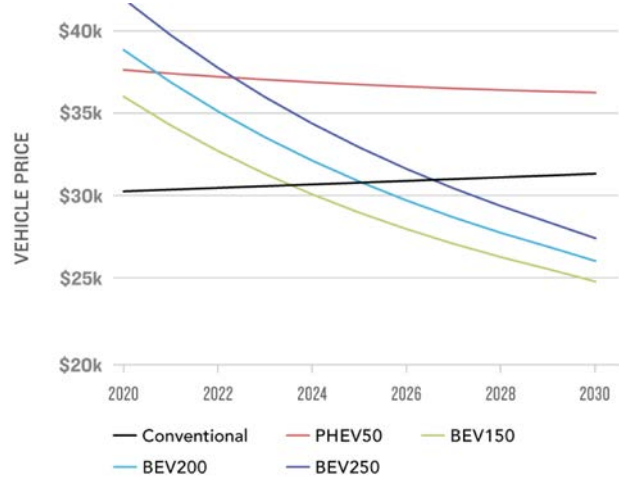
Trends in EV Innovation



Source: Bloomberg New Energy Finance



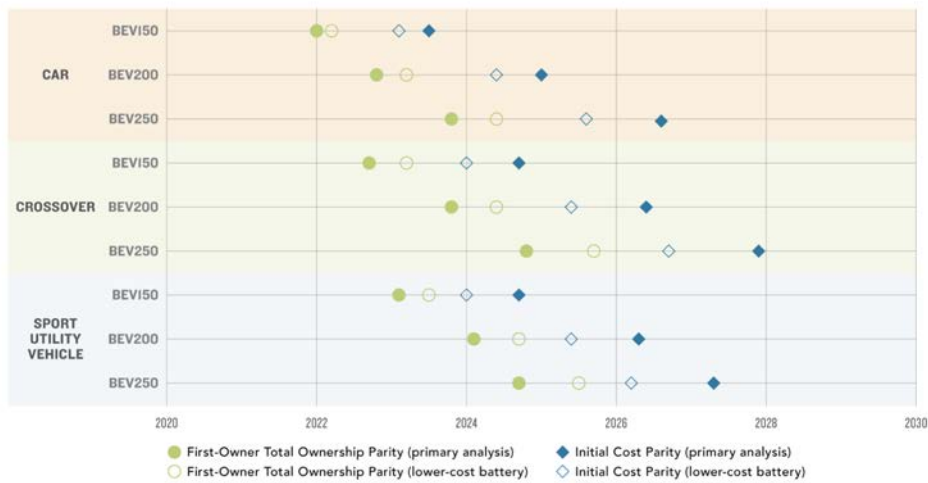
Initial Purchase Price of Conventional vs. EVs



Source: The International Council on Clean Transportation



Vehicle Cost Parity

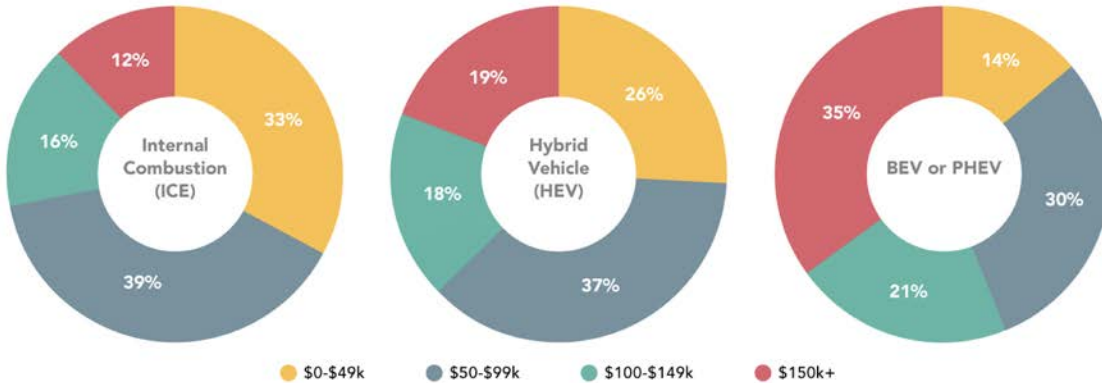


Source: The International Council on Clean Transportation



New Vehicle Adoption: Demographics

Fraction of Vehicle Sales in California by Income Bracket

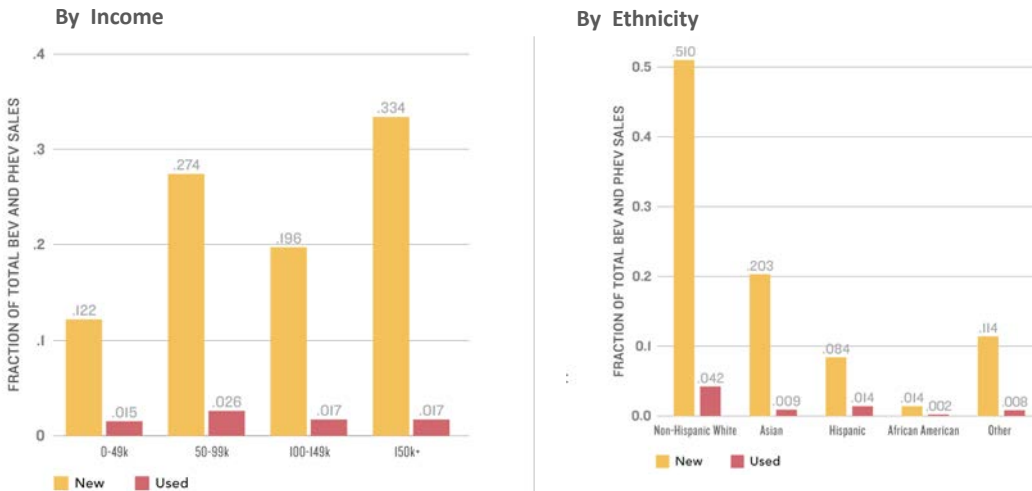


Source: National Center for Sustainable Transportation



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Fraction of New & Used BEV & PHEV Sales



Source: National Center for Sustainable Transportation



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Impact of Incentives

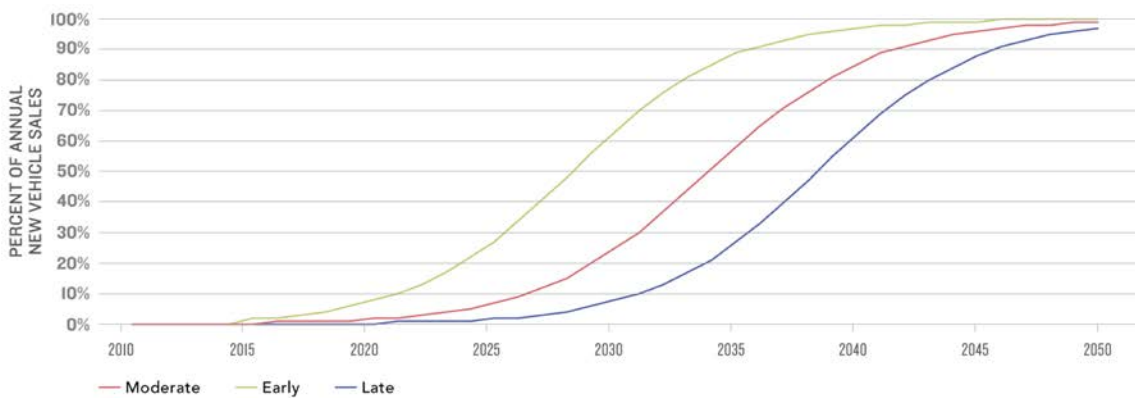
Effect of Rebate Levels on Purchase Rate, by Income by Vehicle

BY INCOME: PERCENT OF WEIGHTED SAMPLE CHOOSING HEV/PHEV/BEV BY SUBSIDY				
	\$0	\$2,500	\$5,000	\$9,500
HEV				
Below 225% FPL	25.5%	30.5%	35.8%	43.9%
Above 225% FPL	25.9%	30.2%	34.8%	41.9%
PHEV				
Below 225% FPL	3.7%	4.5%	5.2%	6.8%
Above 225% FPL	5.4%	6.3%	7.3%	9.1%
BEV				
Below 225% FPL	5.4%	6.5%	7.6%	8.3%
Above 225% FPL	5.1%	5.9%	6.8%	7.6%

Source: Source: UCLA Luskin Center for Innovation

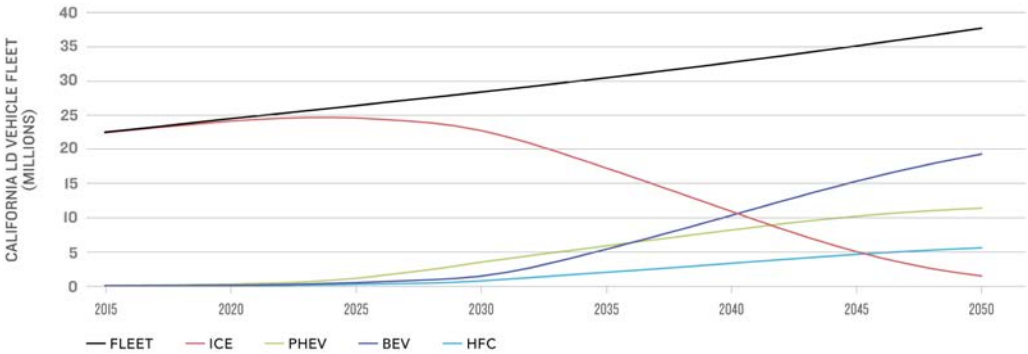


Scenarios for PEV Adoption



Adoption Pathways

California Vehicle Fleets – Moderate BEV Adoption Profile



Source: E3 estimates from the PATHWAYS model

Note: Vehicle classes are Internal Combustion Engine (ICE), Plug-in Hybrid Electric Vehicles (PHEV), 100% electric or Battery Electric Vehicles (BEV), and Hydrogen Fuel Cell (HFC).



New Vehicles & Job Creation

Direct Employment: Manufacturing of fuel-efficient vehicles

- In California: 14,776 jobs
- Nationally: 259,468, with 41,991 in production of BEVs and 198,354 in production of HEV, PHEV or BEV

Indirect Employment

- Charging Infrastructure
- Utility Load



Analyzing Macroeconomic Impacts

Current Structure of the BEAR model, 2018

- 60 production activities
- 60 commodities (includes trade and transport margins)
- 3 non-labor factors of production, Capital, Land, and Water
- 22 labor categories
- Capital
- Land
- Natural capital
- 9 Household types, defined by income tax bracket
- Enterprises
- Federal Government (7 fiscal accounts)
- State Government (27 fiscal accounts)
- Local Government (11 fiscal accounts)
- Consolidated capital account
- External trade account



Scenarios Evaluated

SCENARIO	ADOPTION	IVC
1 Baseline A reference Scenario with existing policies in force to 2050. Baseline policies are complemented by revised adoption and use cost estimates commissioned by CEC from E3. Vehicle technology costs are assumed to remain constant at current levels.	Constant adoption shares among income groups	High
2 LTES Incorporates E3 technology cost estimates for vehicles, declining over time.	Equal shares by 2050	Medium
3 Innovation LTES policies to 2030 and 2050, taking account of more recent vehicle technology cost estimates ⁶⁹	Equal shares by 2050	Low
4 Equity The LTES scenario with PEV purchase shares equalizing across California income groups by 2030.	Equal shares by 2030	Low



Macroeconomic Impacts in 2030

Absolute Levels – Difference from Baseline in 2030; 2016\$ Billions

	LTES	INNOVATION	EQUITY
Gross State Product (\$B)	82	142	141
Real Output	179	256	254
Employment	394	532	530
Real Income	311	351	357
In State Revenue	4	7	7



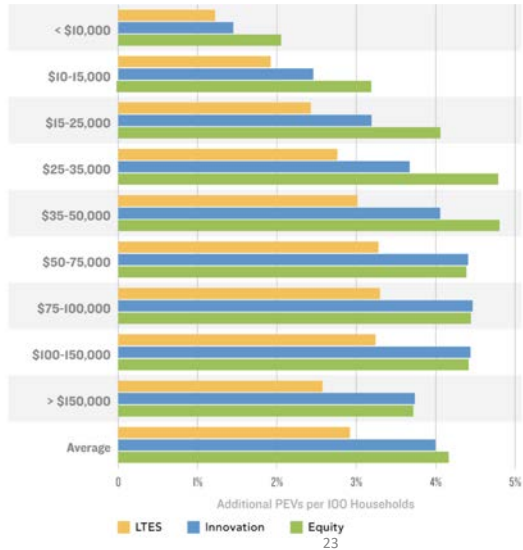
Macroeconomic Impacts in 2050

Absolute Levels – Difference from Baseline in 2050; 2016\$ Billions

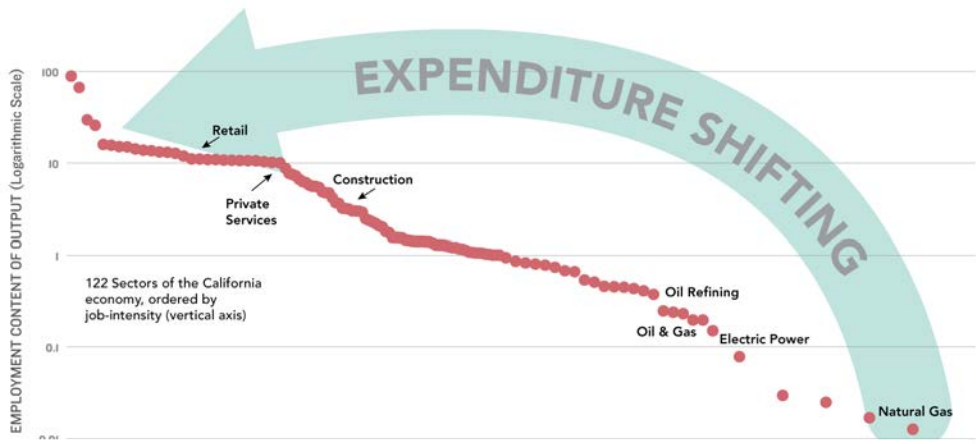
	LTES	INNOVATION	EQUITY
Gross State Product (\$B)	614	1,150	1,147
Real Output	1118	1,956	1,952
Employment (,000)	1290	1,816	1,812
Real Income	1,216	1,489	1,494
State Revenue	29	55	54



Household Real Income Changes from Baseline in 2030



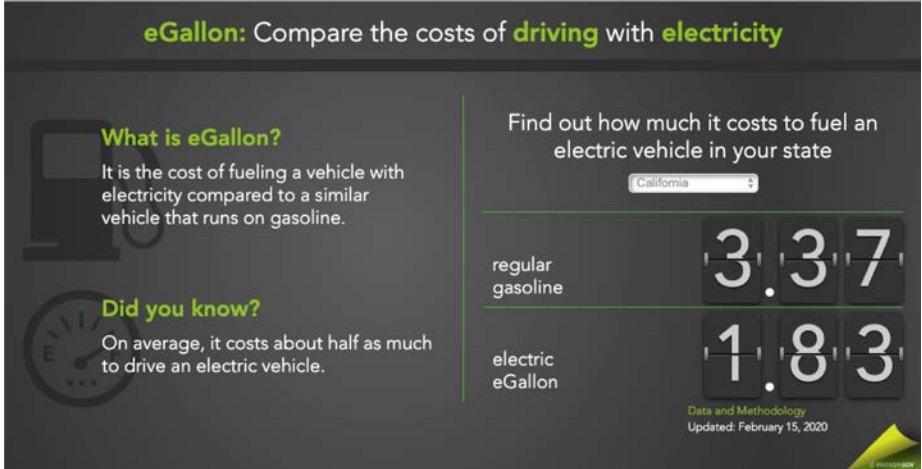
Benefits of Expenditure Shifting



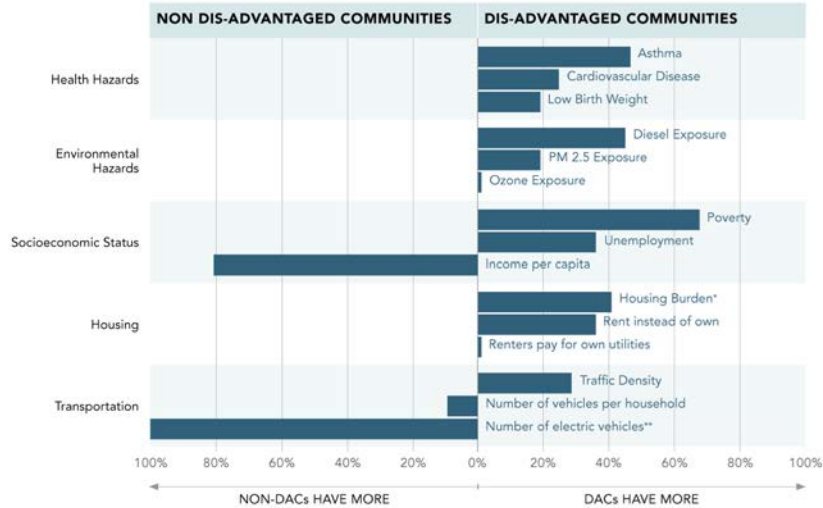
Source: Authors calculations based on data from the US Bureau of Economic Analysis, US Bureau of Labor Statistics, and California Department of Finance



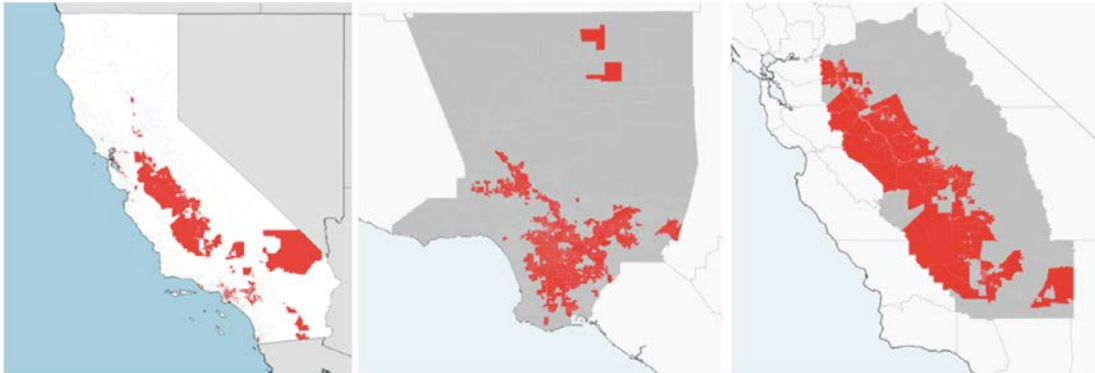
Benefits of Expenditure Shifting



Impacts Across Communities



Location of DACs, LA Co. & Central Valley



Source: Authors' Analysis

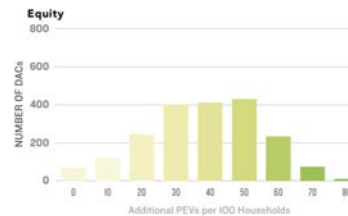
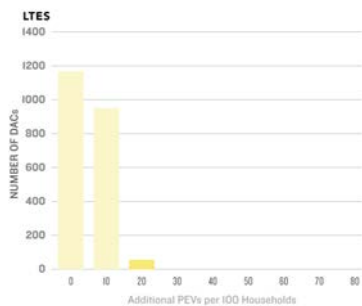
The spatial distribution of disadvantaged communities (DACs) in the state (left) Los Angeles County (middle) and the Central Valley (right). 75 percent of DACs in the state are in these two regions.



EVs Purchased by Census Tract



Source: Authors' Analysis

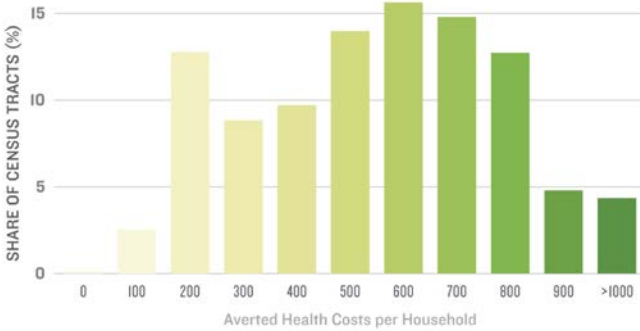


Macroeconomic Impacts in 2030

IMPACT	SCENARIO	DAC_ SHARE	NONDAC_ SHARE
Jobs	LTES	36%	64%
	Innovation	36%	64%
	Equity	36%	64%
PEVs	LTES	11%	89%
	Innovation	40%	60%
	Equity	45%	55%
Avoided Health Costs	LTES	33%	67%
	Innovation	34%	66%
	Equity	34%	66%



Estimated Health Cost Savings, Equity Scenario



Policy Considerations

- **Benefits all, no matter who adopts** – policies that accelerate adoption in DACs could deliver greater benefits
- **Clean vehicle-related job growth** – could promote job growth across state economy with broader market opportunities for technology development
- **Benefits dwarf other programs** – GSP and income increases significantly outweigh the amounts accruing to other policies
- **Expanding state incentives** – federal approach leaves uncertainty, but fiscal authority to offer economic incentives at state level is secure

