



POTSDAM INSTITUTE FOR
CLIMATE IMPACT RESEARCH

California Transportation Electrification Policy

Landscape, key initiatives, and comparison to Germany

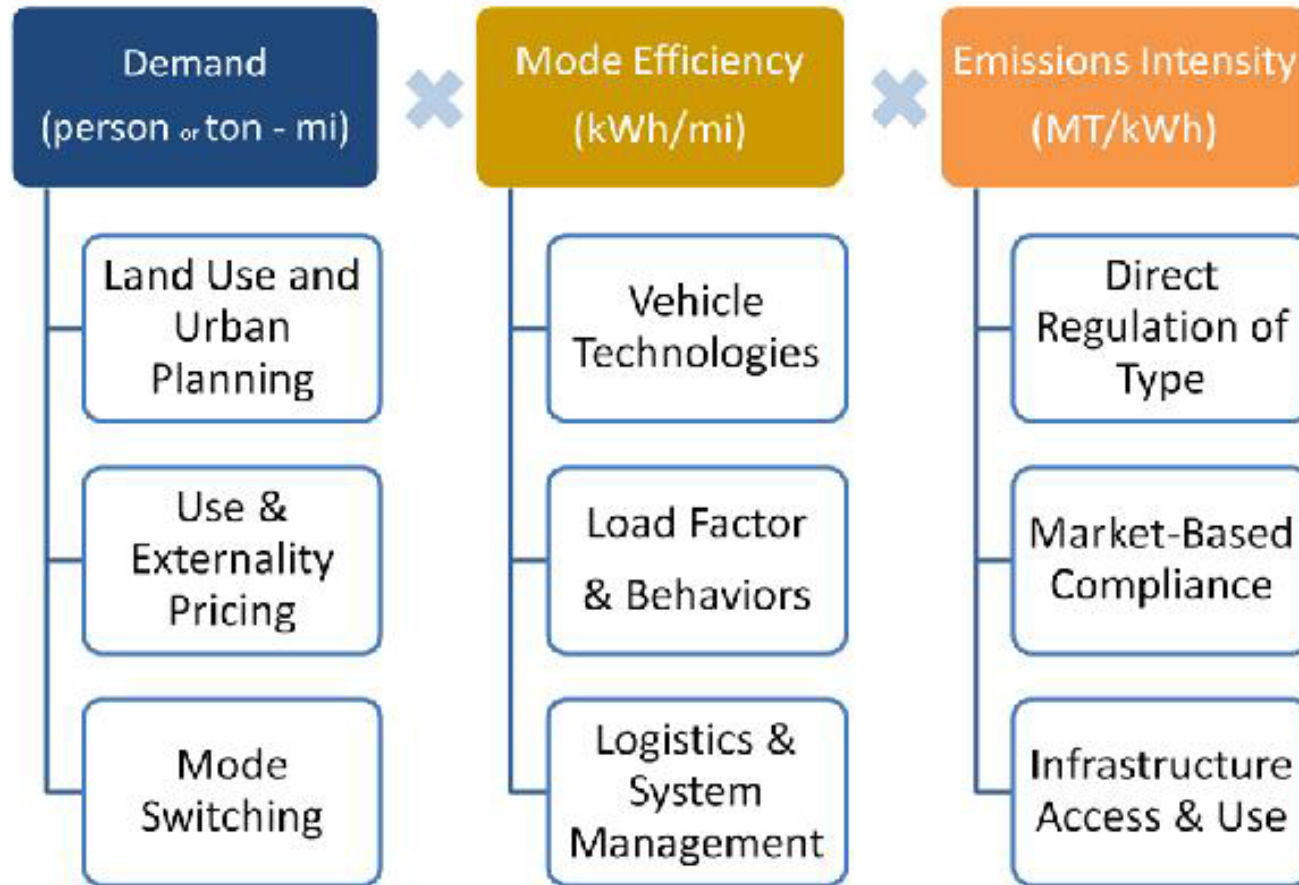
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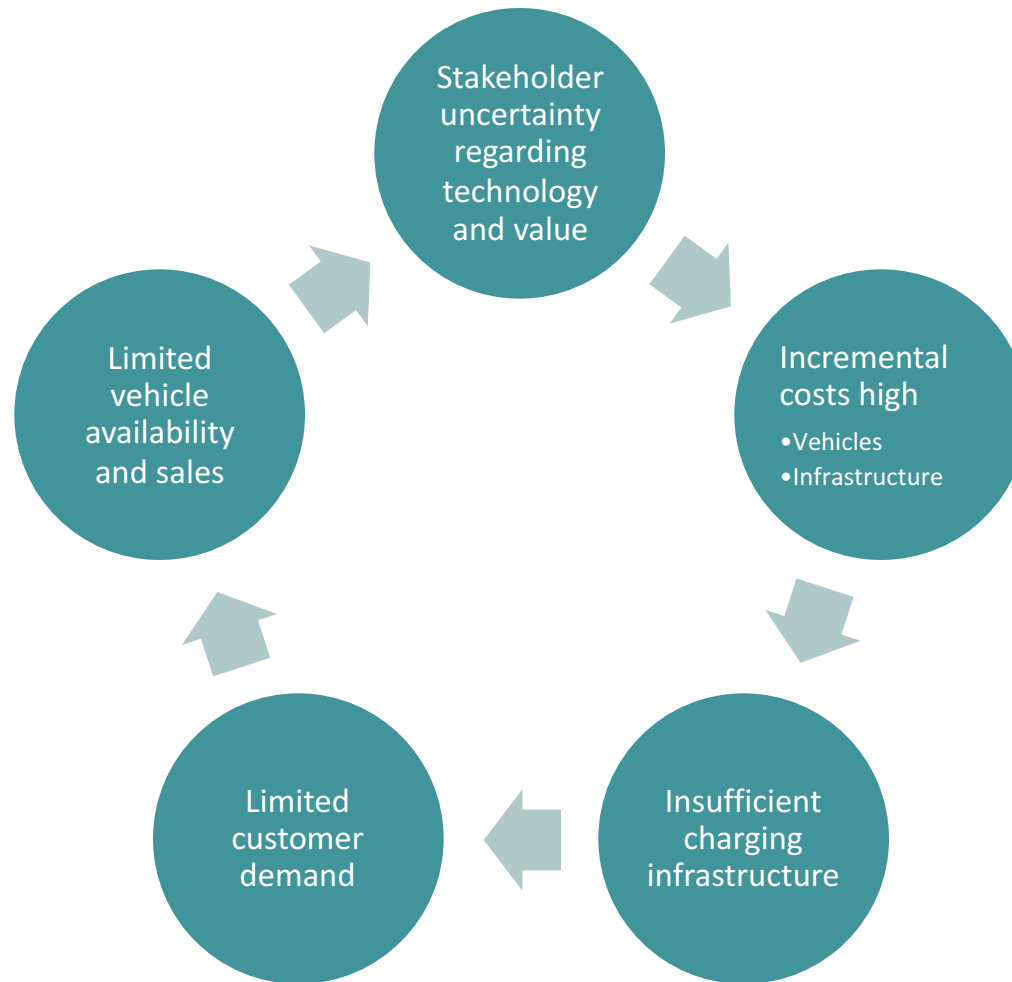


Levers to Reduce Transportation Emissions



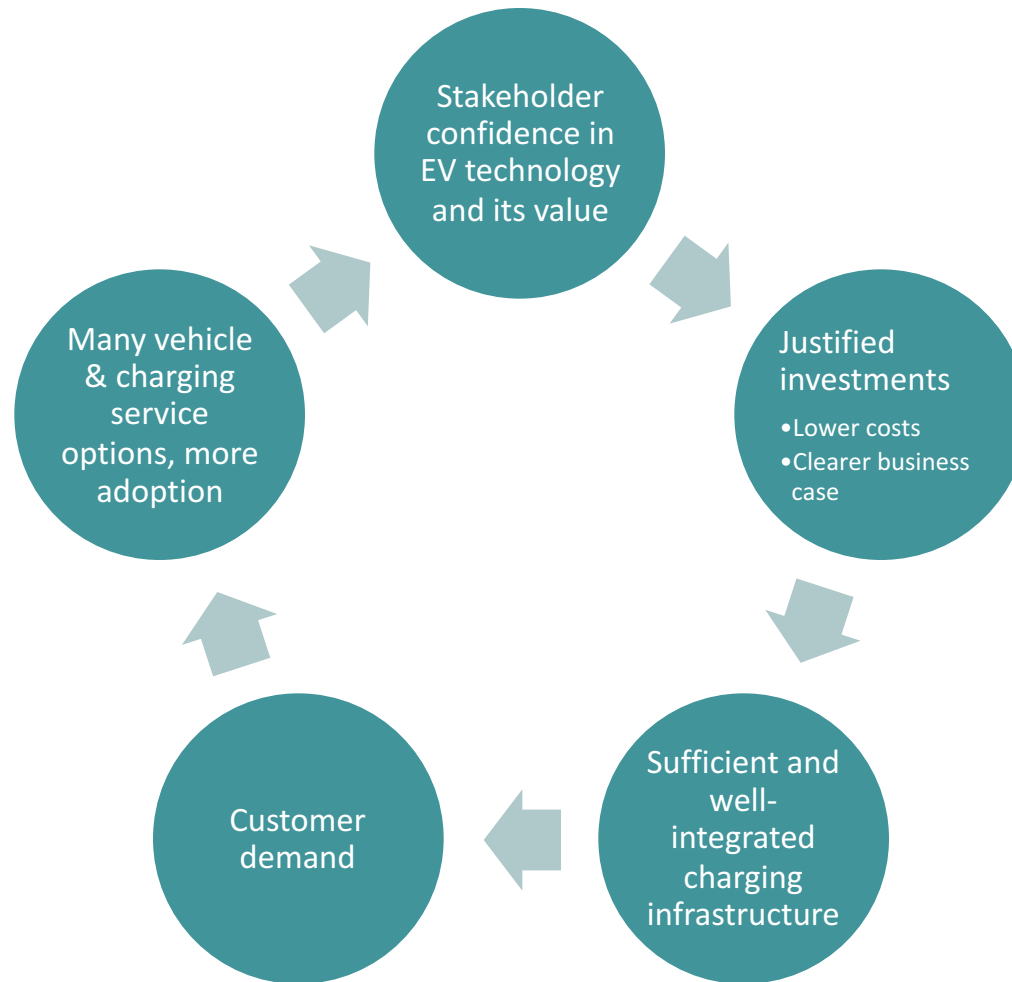
Source: CPUC, <http://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=11287>

Barriers to Adoption – A Vicious Cycle



*Thanks to my CPUC colleague Noel Crisostomo for sharing this slide with me!

How Can Policy Stimulate a Virtuous Cycle?



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Californian vs. German Electrification Landscape

- What are similarities and differences between the regions?
 - Market and regulatory structure
 - Major stakeholders
 - Infrastructure and geography
 - Culture and lifestyle
- How might these aspects be reflected in policy?

Californian vs. German Electrification Landscape

Number of vehicles

**Auto-related
companies**

Car culture?

Innovation culture

Governing parties

Grid infrastructure

**CO2 emissions from
transportation**

Air quality issues?

Electricity market

Residential Rates

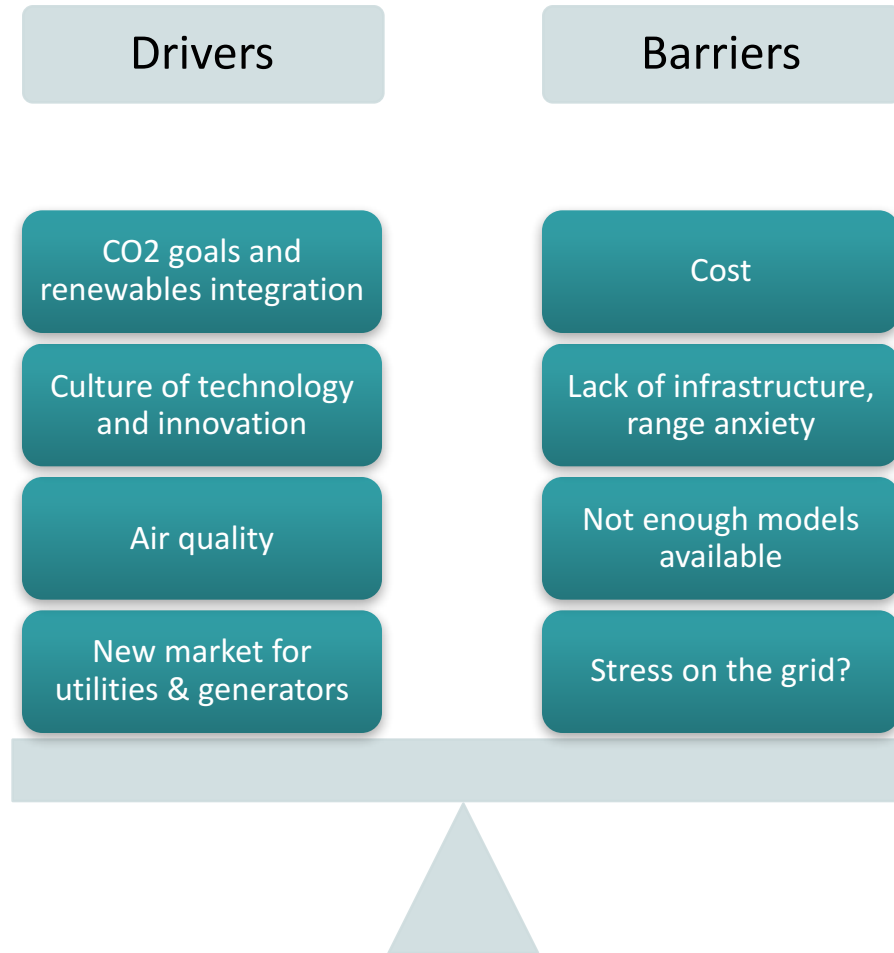
Californian vs. German Electrification Landscape

	Germany	California
Number of vehicles	61.5 MM / 0.76 per capita	34 MM / 0.88 per capita
Auto-related companies	VW, Daimler, BMW, Bosch, other parts suppliers, DHL	Tesla, Uber, Lyft, Google, Apple, other tech (IT), aerospace
Car culture?	Yes! Especially IC engines. But less in cities.	Yes! Especially SUVs. And more long distances.
Innovation culture	Incremental improvement, cautious investments, angsty	Big breakthroughs, newest gadgets, risky VC investments
Governing parties	Conservative + Labor	Democratic supermajority
Grid infrastructure	Very built out and stable	Some transmission-constrained regions and congested circuits
CO2 emissions from transportation	17% of total emissions Not included in ETS	37% of total emissions Included in ETS (\$12.73/ton)
Air quality issues?	Yes, but only in specific areas	Yes, widespread - worst in the US
Electricity market	Liberalised/deregulated, nationwide pricing, no capacity market	Monopolies + CA grid operator (except municipals), nodal prices, capacity contracts, TOU rates
Residential Rates	0.295 €/kWh average	0.177 \$/kWh <i>average</i>

Californian vs. German Policy Targets/Standards

	Germany	California
2030 electricity	50%+ renewable	50%+ renewable (excluding rooftop solar and large hydro)
EVs on the road	1 million by 2020 (26k now)	1.5 million by 2025 (224k now)
CO2 reductions (relative to 1990)	40% in 2020, 55% in 2030 <i>Largely ineffective ETS</i>	40% in 2030 <i>ETS in the process of being extended</i>
Fleet standards (grams CO2/km)	Cars, 2021: 95 Vans, 2020: 147	Cars: 107 in 2021; 89 in 2025 Trucks: 167 in 2020; 126 in 2025
Transportation fuel energy/emissions	10% reduction in total transportation energy by 2020, relative to 2005 <i>Negative progress to date</i>	Low Carbon Fuel Standard program: 10% reduction (vs 2011) in carbon intensity of transportation fuels by 2020
Air quality (NOx, ozone, particulate matter)	EU Standards: 120 µg/m ³ ozone, 25 µg/m ³ PM 2.5, 200 µg/m ³ hourly or 40 µg/m ³ yearly NOx, others. <i>Compliant except hotspots.</i>	US Standard: 75 ppb O ₃ , 12 µg/m ³ PM 2.5. <i>South Coast: 70% reduction in NOx by 2023, 80% by 2031. Regional ozone and PM 2.5 deadlines range from 2021-2031.</i>

Are we at the tipping point?



California Policies – Governor's Office

- ZEV Mandate
 - Infrastructure for 1 million ZEVs by 2020
 - 1.5 million ZEVs on the road by 2025
 - Executive Order B-16-2012
- [ZEV Action Plan](#) – interagency coordination roadmap
- Facilitate regular interagency coordination
- GHG Reduction Executive Orders: 40% by 2020, 80% by 2050
 - Relative to 1990
 - S-3-05 and B-30-15
- Petroleum Executive Order: 50% reduction in 2030
 - For cars and trucks
 - Executive Order B-32-15

California Policies – Air Resources Board (CARB)

Policy Name	Policy Type
ZEV (Zero Emission Vehicles) Mandate	Mandate/Standard
Low Carbon Fuel Standard	Mandate/Standard
Advanced Clean Transit Regulation	Mandate/Standard
Sustainable Communities Strategies (SB375)	Mandate/Standard, Regional Planning
Mobile Source Strategy	Policy Roadmap
AB32 Scoping Plan	Policy Roadmap
Sustainable Freight Plan	Policy Roadmap
Goods Movement Emission Reduction Program	Incentive Program
Low Carbon Transportation Investments and Air Quality Improvement Program: Includes Clean Vehicle Rebate Project , Hybrid & ZE Truck & Bus Vouchers , etc.	Incentive Programs (including \$6,500 EV rebates)
PEV Collaborative (includes multiple agencies)	Public-Private Partnership



California Policies – Energy Commission (CEC)

Policy Name	Policy Type
Alternative and Renewable Fuel and Vehicle Technology Program (ARFVTP) <ul style="list-style-type: none"> • Manufacturing grants, regional planning grants, infrastructure funding, RD&D • \$100MM/yr, all types of alternative fuels 	Research, Development, and Deployment Funding (RD&D Funding), Regional Planning, Regional Funding
Electric Program Investment Charge (EPIC)	RD&D Funding
Integrated Energy Policy Report (IEPR) - <i>includes transportation energy forecasting, land use planning</i>	Policy Roadmap, Scenarios
Ports Energy Collaborative	Public-Private Partnership
Department of Defense Initiative	Cross-Jurisdictional Partnership



CA Policies – Public Utilities Commission (CPUC)

- Regulates investor-owned utilities (monopolies):
 - Electric, natural gas, and water
 - Telecommunications and video franchises
 - Rail and passenger transportation
- Mission:
 - Protecting consumers and ensuring the provision of safe, reliable utility service and infrastructure at reasonable rates,
 - with a commitment to environmental enhancement and a healthy California economy
- Authority to approve/mandate:
 - Infrastructure investments
 - Utility rates
 - Utility customer rebates
 - Sanctions for non-compliance



Regulated Utility Charging Infrastructure Pilots

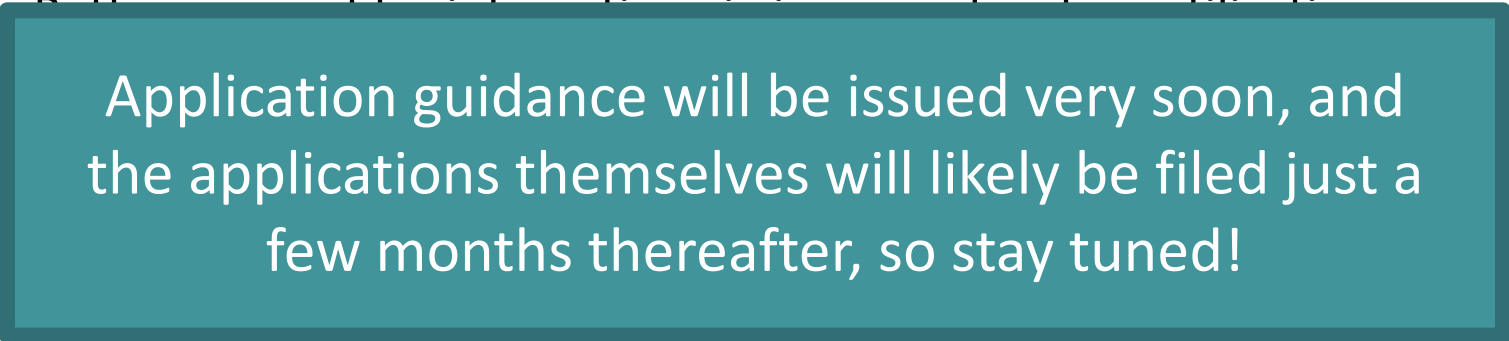
	Southern California Edison	San Diego Gas & Electric	Pacific Gas & Electric
Program status	Approved and underway	Approved and underway	PENDING CPUC may modify/deny
Budget	\$22 million	\$45 million, plus O&M	\$160 million, +O&M
Duration	1-2 years	4-5 years	3 years
Number of stations/sites	1,500 stations 150 sites	3,500 stations 350 sites	7,500 Level 2 stations (750 sites) 100 DC fast charge
Station ownership	Landowner (rebated)	Utility	Utility
Market segments	<ul style="list-style-type: none"> • Multi-family dwellings • Workplaces and fleets • Destinations 	<ul style="list-style-type: none"> • Multi-family dwellings • Workplaces 	<ul style="list-style-type: none"> • Multi-family • Workplaces • Schools, other
Grid integration	TOU Rates, demand response capability	Day-ahead hourly pricing: consider circuit conditions and generation forecasts	TOU Rates
Disadvantaged communities	Free participation 10%+ of sites	Free participation 10%+ of sites	Free participation 15%+ of sites



Latest CPUC Policies Driven by SB 350 (law)

- Transportation electricity counts as a form of basic utility service
- Investment cost-benefit considerations should include:
 - Better renewables integration via improved system utilization
 - Energy efficiency improvements in transportation
 - Air pollution reductions
 - GHG-emissions reductions
 - Alternative fuel usage increases
 - Economic benefits in disadvantaged communities
- The CPUC is required to solicit applications from the utilities to support “widespread transportation electrification”
 - Includes all mobile sources: vehicles, boats, trains, etc.
 - Applications must be either approved, or modified and approved
 - Solicitation and guidance document will be issued very soon

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