

Electrifying Arizona's Transportation Sector: Synopsis for Cities

**Sustainable Cities Network Solar & Energy Efficiency
Workgroup Meeting**

Caryn Potter, Southwest Energy Efficiency Project
(SWEET)

Tuesday, February 18th, 2020



About SWEEP

- Non-profit public interest organization founded in 2001.
- Advances policies and programs to stimulate greater energy efficiency in six western U.S. states.
- Advances energy efficiency in the buildings, transportation, industrial and utility sectors.



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Agenda

3

- 1) How Electric Vehicles Benefit Cities & the Electric Grid
- 2) Arizona's Current Transportation Electrification Policies
- 3) Lessons Learned from Arizona Transportation Electrification Forum



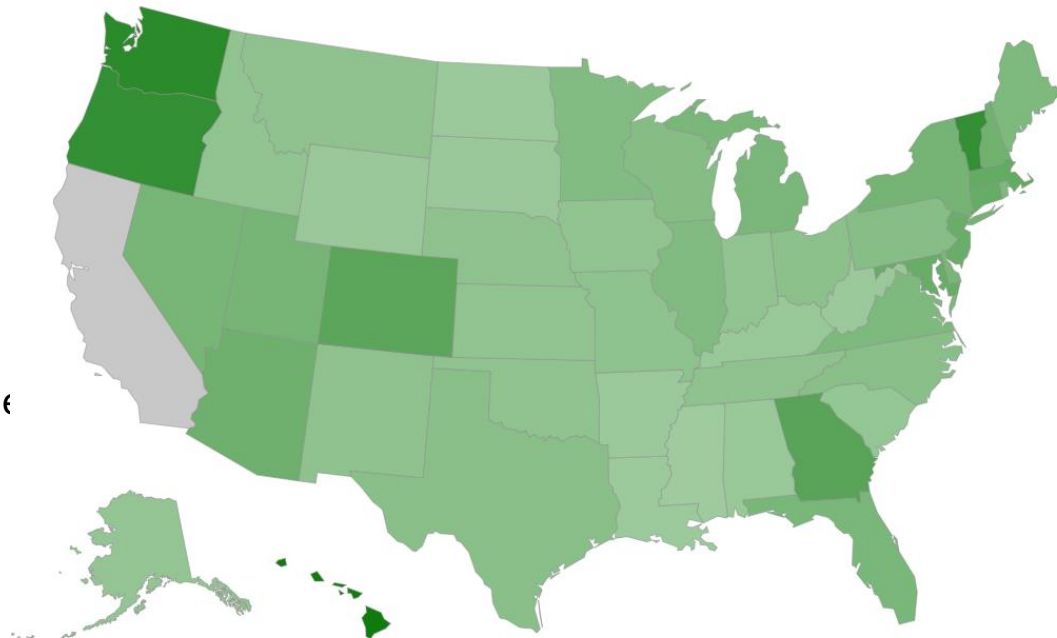
1) How Electric Vehicles Benefit Cities & The Electric Grid



Electric Vehicles (EVs) Will Grow in AZ & Nationwide

5

- As of 2018, Arizona ranked **15th** in the nation for electric vehicle sales. 14,720 EVs were registered in Arizona as of August of 2018.
- By August of 2018, **3,677 PEVs** were purchased in Arizona - a significant uptick when compared with 2,976 in all of 2017.
- There will be over 100 EV models available by 2022, and over 20 SUV models.
- Consumers in Arizona will be able to buy an EV, and ratepayers will see savings, if charging is properly addressed.

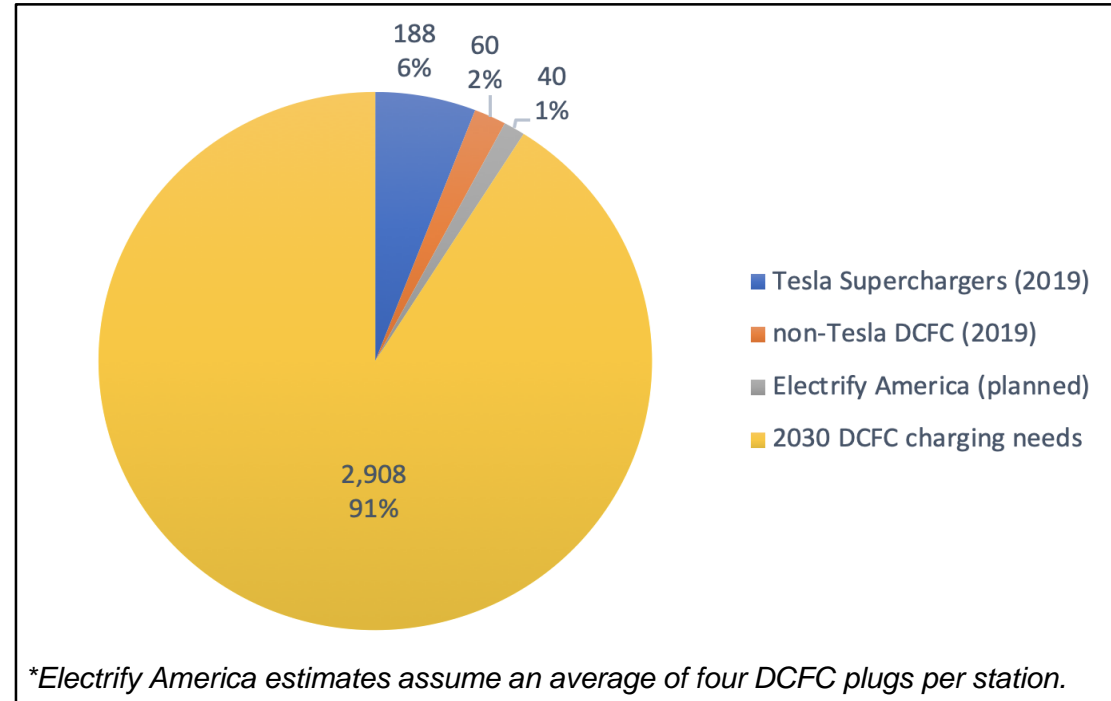


Arizona EV Charging Needs (2019-2030)

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Why Are Charging Needs Not Being Met?

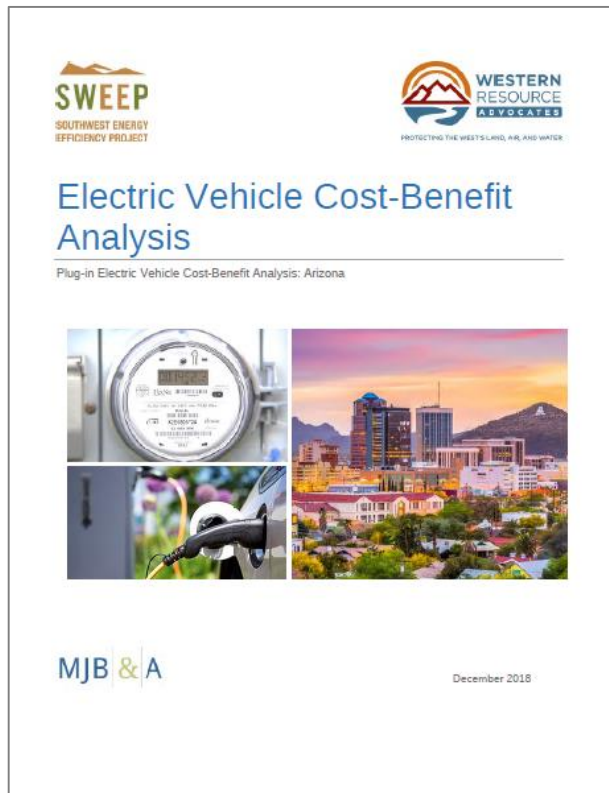
- Incremental costs compared to gasoline or diesel cars
- Lack of current charging infrastructure
- Lack of consumer awareness



*Assumes 83% of EV drivers rely primarily on home-charging

https://www.theicct.org/sites/default/files/publications/US_charging_Gap_20190124.pdf

EVs can promote innovation, increase energy efficiency, and lower Arizonans electric bills



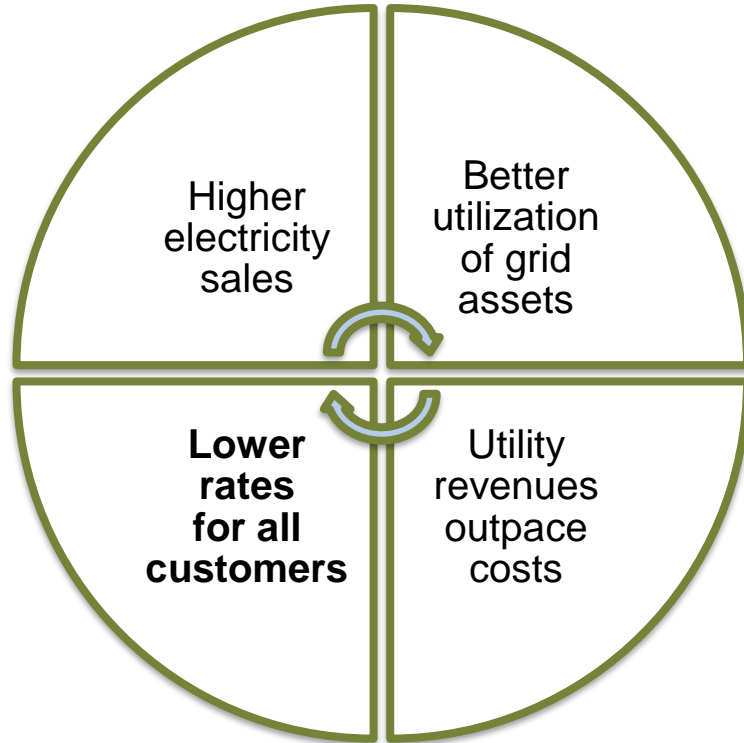
Electric vehicle benefits

- Utility bill savings for ratepayers
- EV driver savings
- Economic development benefits
- Environmental/public health benefits

Impacts on utilities

- Energy sales
- Utilization of electric system assets
- Demand for charging stations
- Peak loads

With More EVs, Charging Off-Peak, AZ Ratepayers Can Realize Major Benefits and Cost Savings



1. More EVs means more sales of electricity.
2. More sales of electricity during off-peak times means better utilization of grid assets.
3. Better utilization of grid assets (grid efficiency) means revenues outpace costs.
4. Higher utility revenues, outpacing utility costs, means lower rates for all ratepayers, even if they don't own an EV!

EVs: Scenarios Modeled in MJ Bradley Study

Moderate PEV Adoption Scenario:

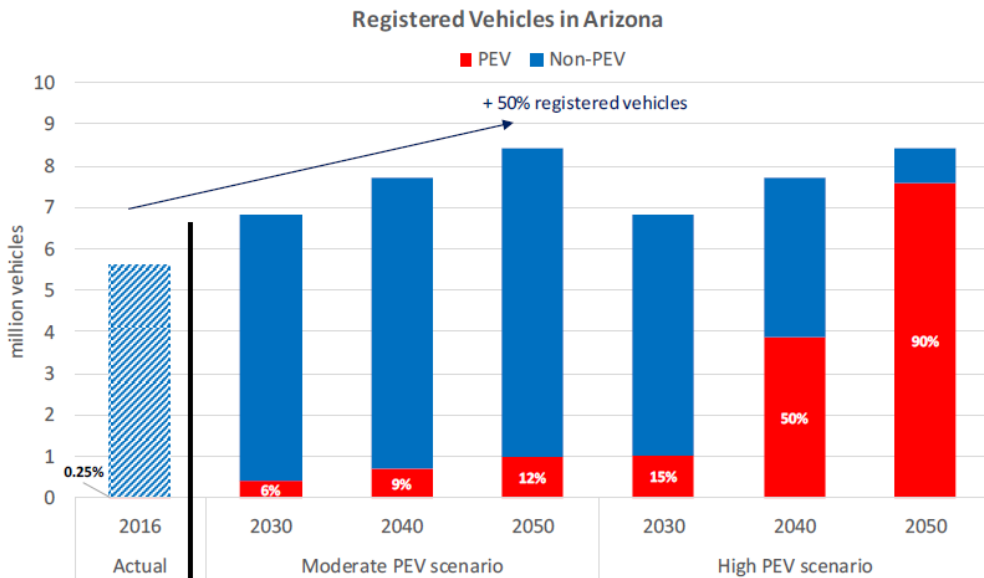
- 400,000 PEVs in Arizona by 2030, 1 million by 2050
- Consistent with the proposed Energy Modernization Plan (EMP)

High PEV Adoption Scenario:

- 1 million PEVs by 2030, 7.6 million by 2050
- 90% of light duty vehicles are PEVs in 2050
- 85% of vehicle miles traveled

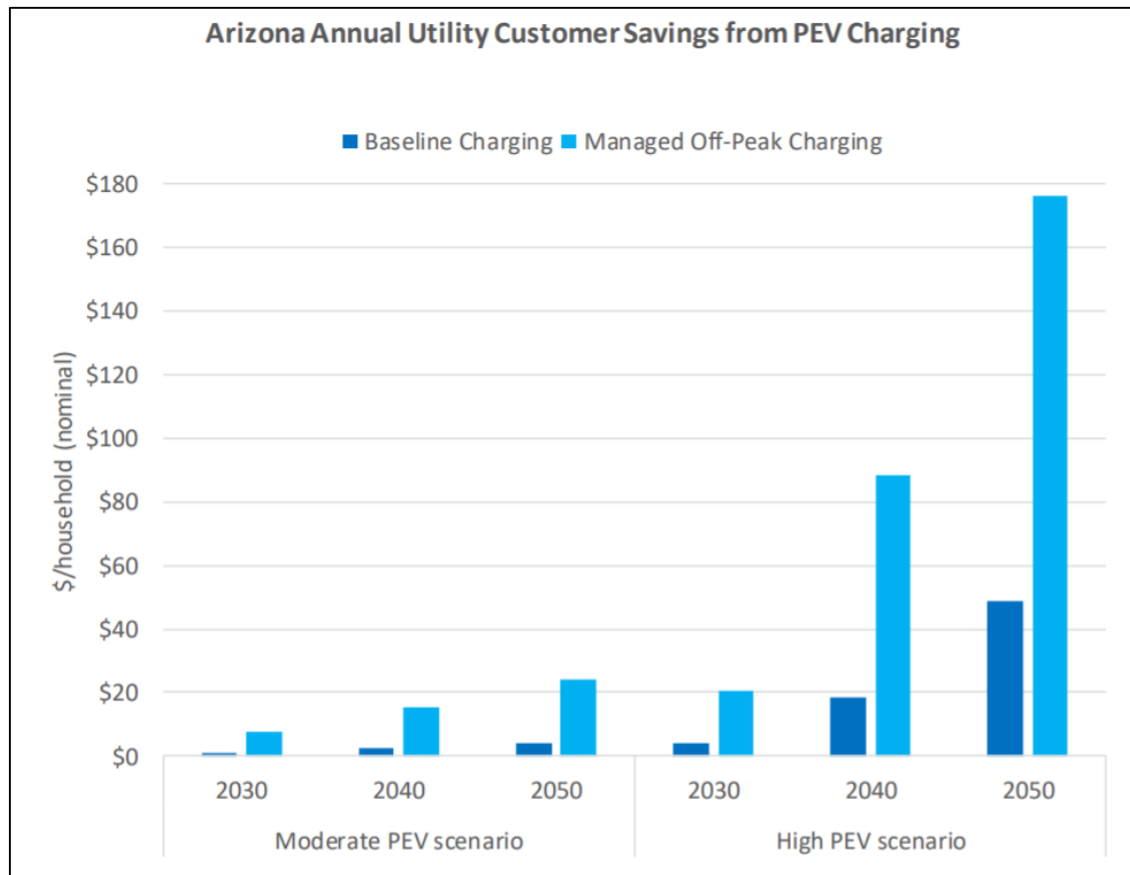
Energy Mix:

- 80% zero carbon by 2050
- Consistent with the proposed EMP



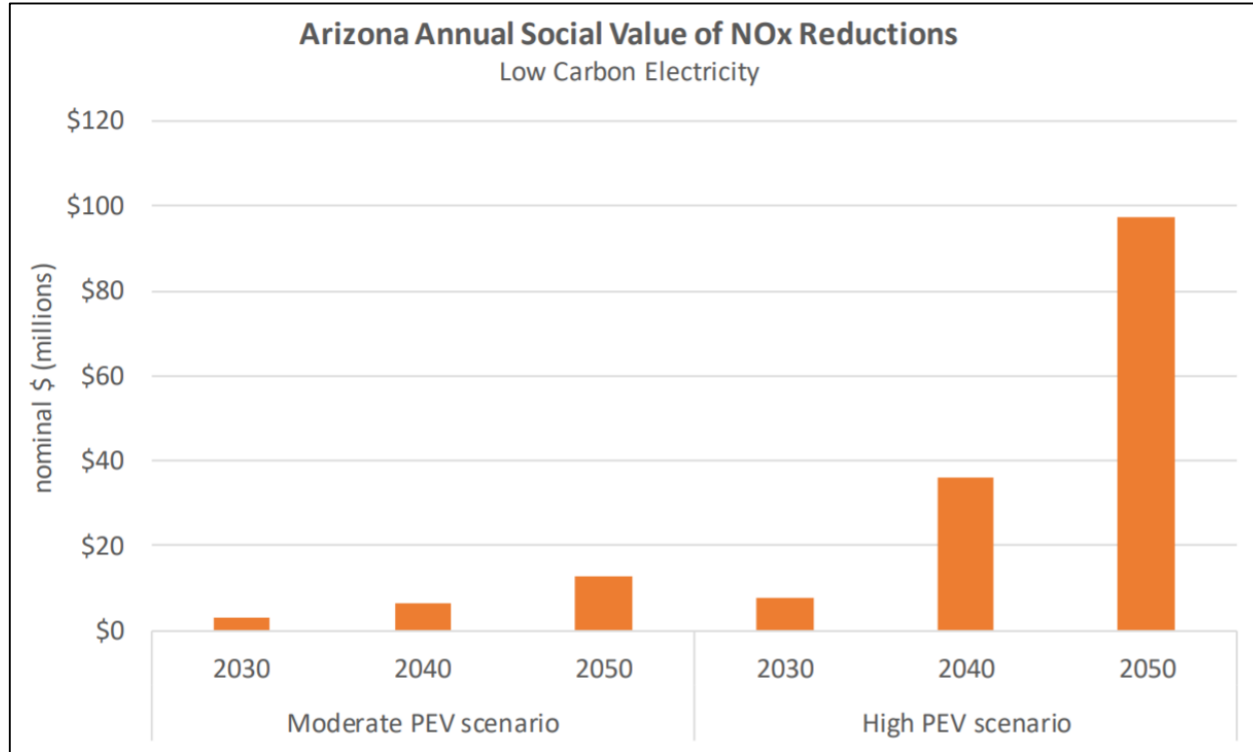
* PEVs include plug-in hybrid electric vehicles and battery electric vehicles.

Electric Bills Decrease With Managed, Off-Peak Charging 10



- EVs allow utilities to utilize existing transmission and generation infrastructure and increase revenues from plug-in electric vehicle (PEV) charging.
- This reduces rates for all customers.
- Average Arizona household will save **\$176 annually** on their utility bills in 2050.

Reduced Air Pollution From Greater EV Adoption



- Annual NOx reductions would be **356 metric tons** in 2030, rising to **2,908 metric tons** in 2050.
- NOx reductions would be **\$7.5 million** in 2030, rising to **\$97 million** in 2050.

Total Net Benefits of \$31 Billion by 2050

12

Benefits in 2050, High PEV Adoption

Environmental benefits

- Reduced NOx emissions – 2,900 tons
- Reduced CO₂ emissions – 26 million tons/yr (\$220 M in compliance costs; \$1.3B in avoided damages)

Utility customer savings

- With strategic charging (\$176/year)
- “BAU” charging (\$50/year)

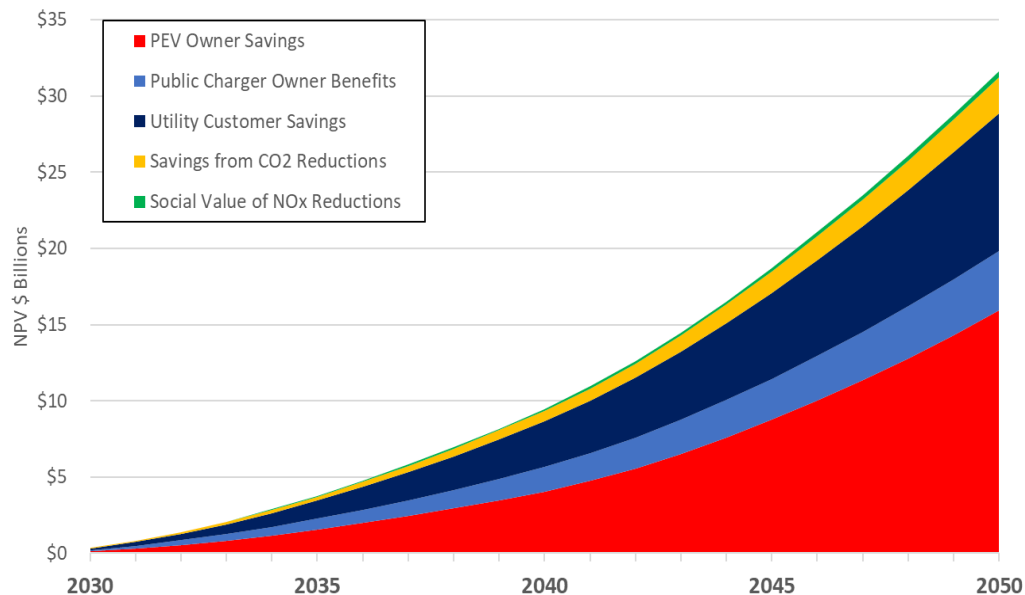
Public charger owner benefits

- 440,000 L2 Chargers; 23,000 DCFC

PEV driver savings (\$590/PEV)

- Reduced maintenance costs
- Reduced fuel costs (cumulative savings of 370 million barrels of gasoline)

NPV Cumulative Net Benefits from Plug-in Vehicles in Arizona
(High PEV Scenario- Managed Off-Peak Charging - Low Carbon Electricity)



2) Arizona's Current EV/TE Policies



Arizona Corporation Commission Activities

- The Arizona Corporation Commission (ACC), Arizona's fourth governmental branch, plays a role in adopting policies that allow utilities to be involved in making EV charging infrastructure more available.
- On December 18, 2018, the ACC voted 4-1 to approve a [high-level policy statement](#) recognizing that utilities serve a purpose in jumpstarting the EV market in Arizona, while efficiently managing the extra power demand that EVs will generate.
- Commission Staff held workshops on [March 14th](#) and [March 26th](#) to address implementation next steps for EVs.
- On July 19, 2019, the ACC voted 4-1 to approve a [secondary Electric Vehicle Policy Implementation Plan](#) which provided guidelines for all regulate utilities' programs, rate design, cost recovery, education and outreach and many other items.

Joint Utility-Led Statewide Transportation Electrification Long-Term Plan for Arizona

- This second policy statement directs Public Service Corporations (PSCs) to work with stakeholders to develop a statewide, long-term plan:
 - *“PSCs shall coordinate and jointly develop with stakeholder input a joint, long-term, comprehensive transportation electrification plan for Arizona to be filed by December 31, 2019, for Commission review and approval. This plan should include all pilot program activities and lessons learned from 2019. The comprehensive plan shall incorporate goals and metrics for evaluating success and the PSCs shall report publicly on a semi-annual and annual basis on their progress, achievements, budget, and expenditures.”*

~Page 8, Electric Vehicle Policy Implementation Plan

- This initial filing offers a “conceptual framework” to inform a second more comprehensive roadmap that the regulated utilities intend to finalize by the end of 2020.
- Roadmap will be informed by various stakeholder engagements.

3) Lessons Learned From 2019 Arizona Transportation Electrification Forum



Forum Topics

1. The status of the transportation electrification market in Arizona and the benefits of increased electric vehicle deployment for Arizonans.
2. Current and planned programs and investments by Arizona's largest electric utilities.
3. Plans and priorities for the development of a long-term transportation electrification plan for the state.



What will it take to reach 1 million electric vehicles on Arizona's roads by 2030?

Participating Organizations

19



Envisioning a Long-Term Transportation Electrification Future for Arizona: Key Takeaways

20

Arizona Business Actions

Must prepare for providing workplace charging, charging for customers, and transitioning fleets to be electric.

City & Rural Actions

Communities across the state require a long-term plan for expanding into new transportation opportunities. Also holds the governing decision on the ability to transition fleets to be electric.

Legislative Actions

Significant policies that the State Legislature could pass that would enable greater adoption of transportation electrification across Arizona.

Transit Agency Actions

Opportunity to electrify public vehicle fleets and offer electric transportation modes to support limited-income communities.

Utility Actions

Significant benefits can be gained from the extra electrical load from EVs if utilities can implement managed charging programs and appropriate EV rates for homes and businesses.



6 Challenges for City & Rural Community Actions

21

1. EV charging stations are situated at locations where people would not need to spend time charging.
2. Costs can be prohibitive to install EV charging stations around cities and towns.
3. Trouble getting buy-in from rural communities.
4. It is viewed as expensive to retrofit buildings for EV charging stations.
5. Decision-makers in cities and towns are typically not aware of the benefits of electric transportation.
6. City and town employees typically don't have the time or capacity to undertake EV charging station build-out.

Summary

- Electrifying Arizona's Transportation sector offers numerous benefits to its cities and residents.
- These benefits include lower electric bills, better utilization of grid resources, improved air quality, and greater economic development in municipalities.
- Utility activity in the EV market is very helpful in promoting off-peak charging through rates and education.
- Cities, utilities, businesses, transit agencies, and regulators must work together to ensure that accelerated adoption of Transportation Electrification happens in a way that is cost-effective.

Thank you!

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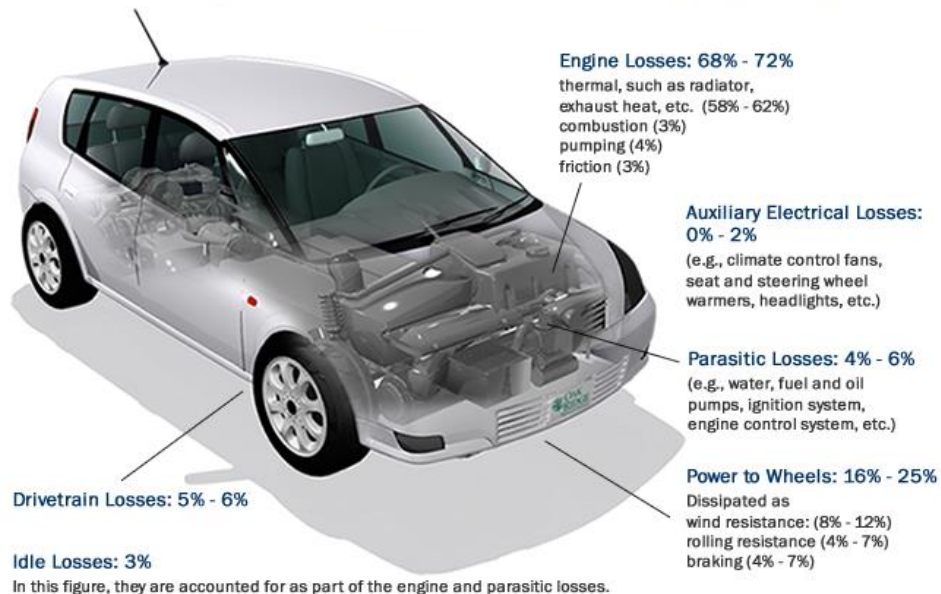
Appendix



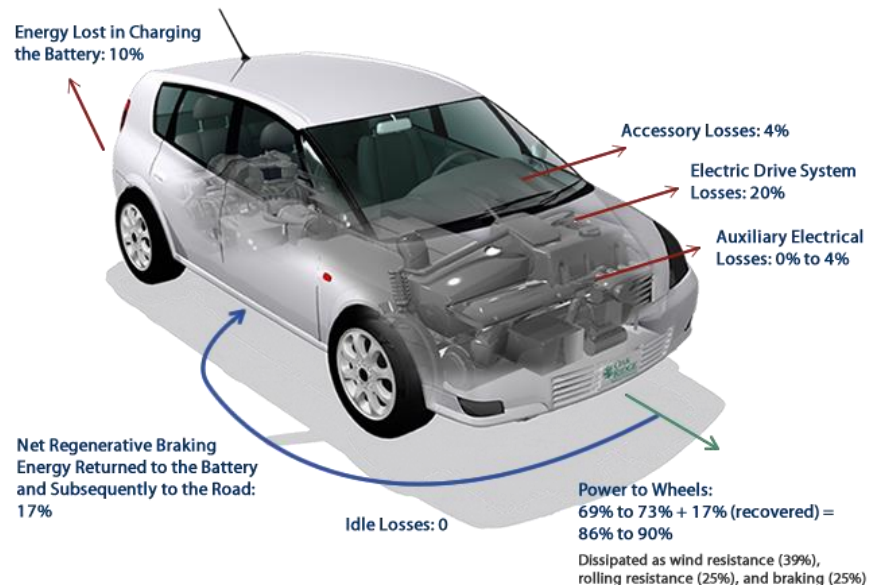
Efficiency in Gas-Powered Cars vs Electric Cars

25

Energy Requirements for Combined City/Highway Driving



Energy Requirements for Combined City/Highway Driving - Electric Vehicles

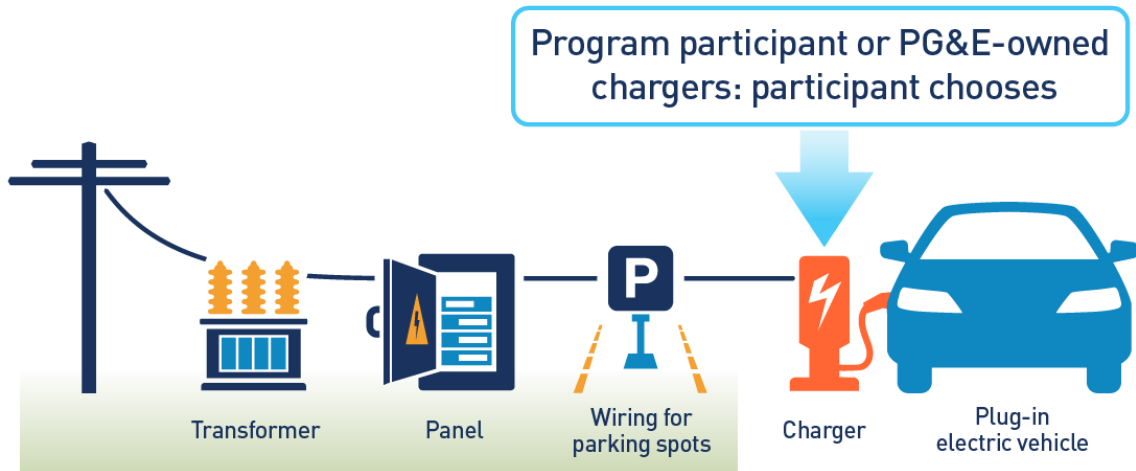


An EV electric drive system is only responsible for a 15% to 20% energy loss compared to 64% to 75% for a gasoline engine!

How can the ACC ensure low-income, fixed income, and rural Arizonans reap EV benefits?

26

- Utilities and private companies can provide charging services in many market segments, where profitable.
- Utilities may be best positioned to serve low-income, fixed income, and rural Arizonans, since these market segments are not currently profitable for the private sector.
- Also opportunities for school and public bus charging and transit electrification.



How other states are creating opportunities for further expansion of Electric Vehicles?



☆ 2011 nissan leaf - \$6900 (21 ave and camelback) 📷

image 1 of 4



Low-income Communities

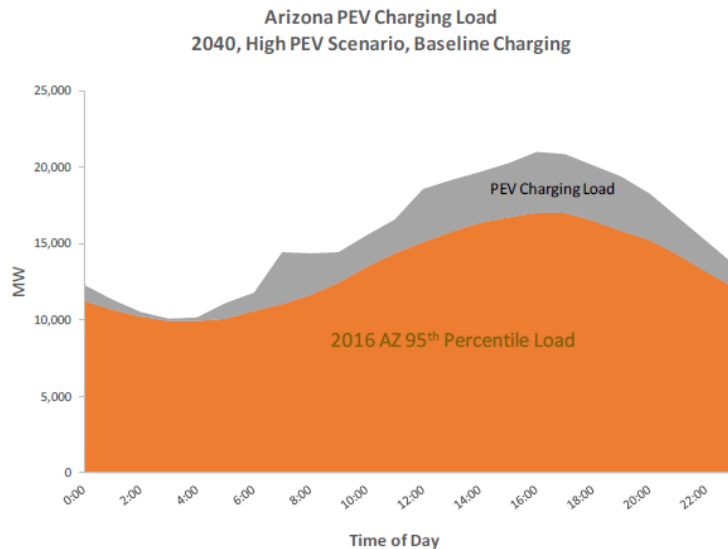
- Upfront cost of new EVs is absorbed by the first buyer and now we are seeing 1st and 2nd generation Nissan Leafs (2014-2016) for less than [\\$10,000](#). 2011 Nissan Leaf is less than \$7,000 on [Craigslist](#).
- Opportunity to get barely used EV and enjoy the maintenance cost savings over the lifetime of the vehicle.

Rural Communities

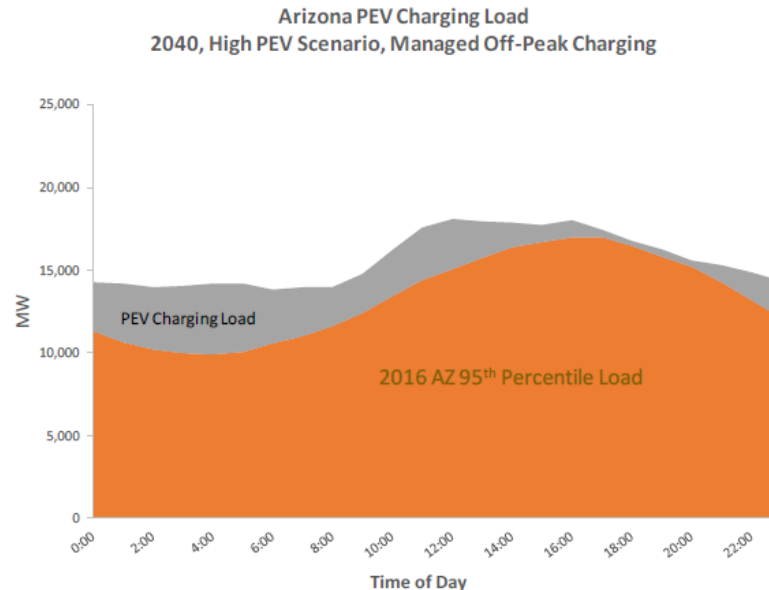
- DCFC stations and workplace charging stations are starting to grow in especially rural areas of the country.
- [Ride-sharing programs](#) for rural neighborhoods in Huron California.
 - “The Green Raiteros program” connects predominantly Latino and agricultural families in central California to EV ridesharing services designed to offer rural Valley residents on-demand transportation to and from critical services.

Example: Impacts on APS' Peak Demand

- Impacts depend on the charging profile of PEVs
- Without a “nudge” PEV charging could increase peak load demands



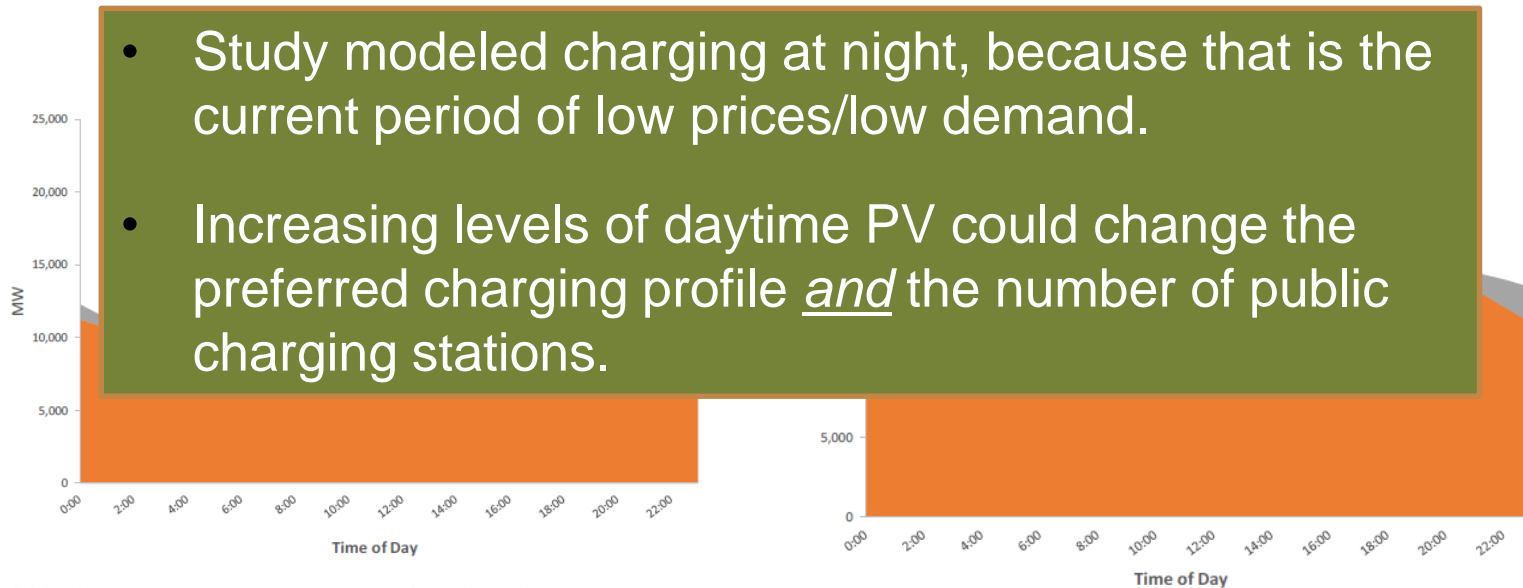
BAU: Assumes most people plug in when they arrive home after work.



Managed: Assumes people delay charging until after 9 PM.

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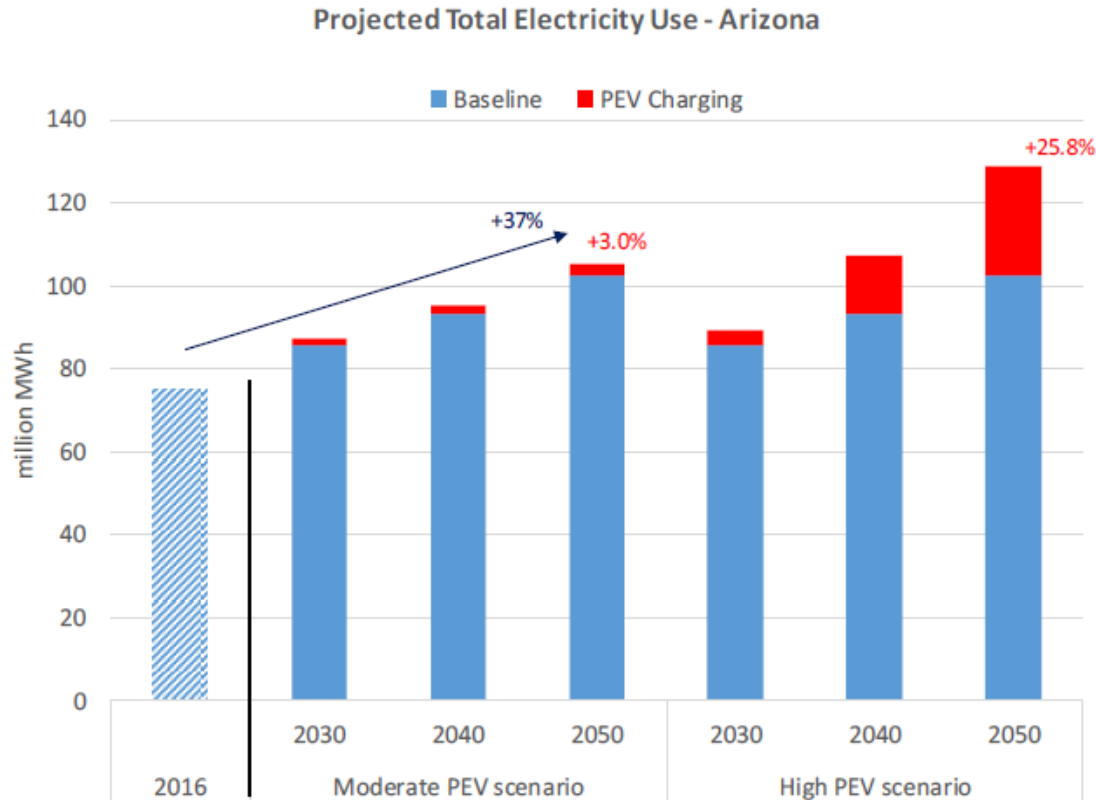


BAU: Assumes most people plug in when they arrive home after work.

Managed: Assumes people delay charging until after 9 PM.

EV's Provides Grid Efficiency With Off-Peak Charging

30



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