City of Phoenix Draft Climate Action Plan

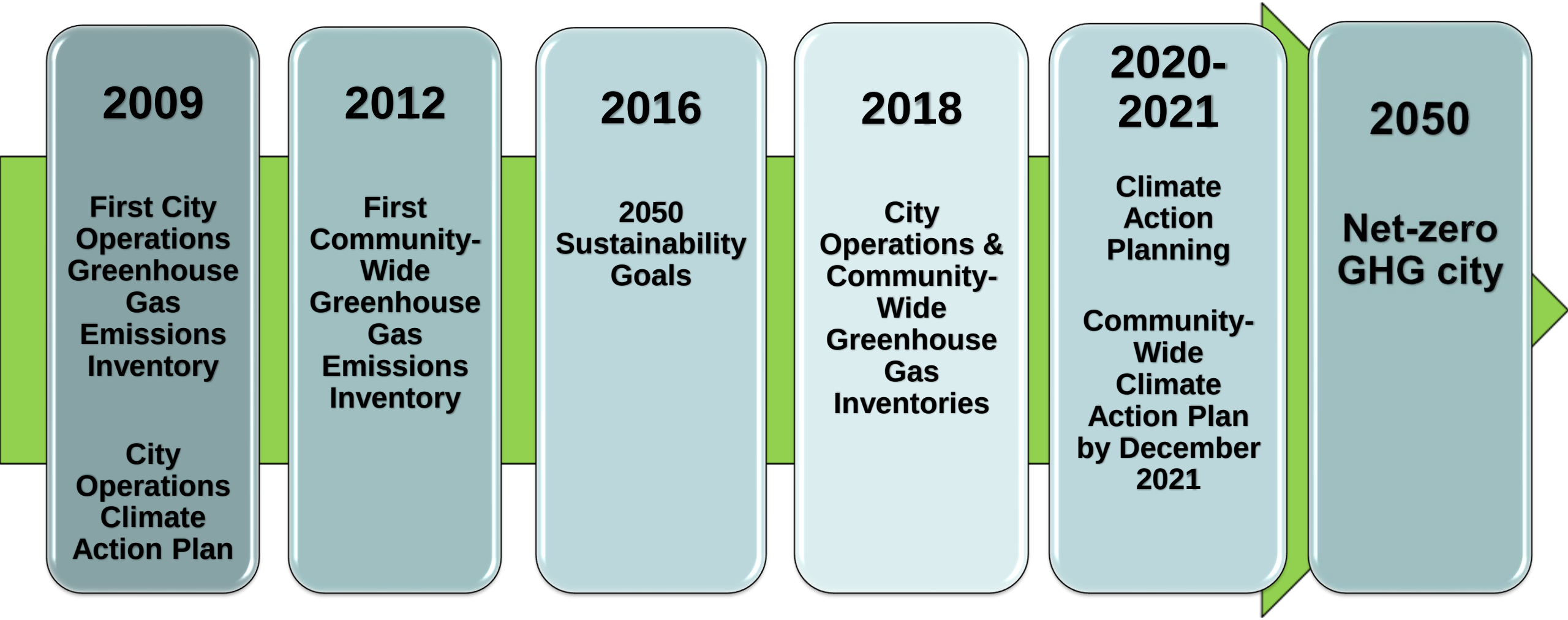
Business and Climate Workshop

June 16, 2021

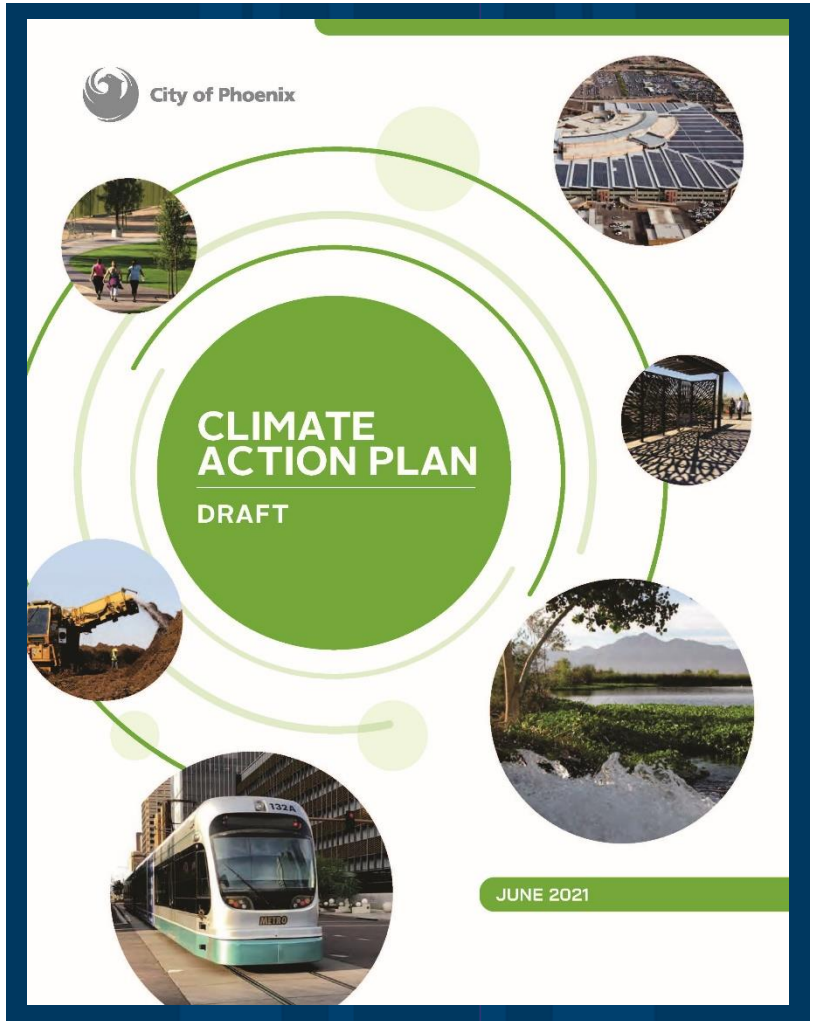
Introduction - C40 Cities

- Mayor Kate Gallego affirmed Phoenix commitment to the Paris Climate Accord – reduce GHG emissions by 2050
- Phoenix joined C40 Cities in Feb. 2020
- C40-compliant Climate Action Plan by Dec 2021
- Deadline 2020 – 67% Reduction in GHG Emissions by 2030.

Introduction – Ongoing Efforts



Climate Action Plan Draft



GHG Emissions Reduction Goals

- Stationary Energy Sector
- Transportation Sector
- Waste Sector

Resiliency Goals

- Air Quality
- Local Food Systems
- Heat
- Water

Climate Action Plan Draft 2050 Goals

GHG Emissions Reduction Goals

New buildings are **Net Positive** in energy & materials

40% of commutes by walking, biking, transit & car-share

Zero Waste through participation in the circular economy

Resiliency Goals

Clean Air Out-performing federal standards

A thriving vibrant **Food System**

25% Tree and shade canopy

100-Year Clean & reliable supply of water

Next Steps

Draft Plan Public Comment Period	**June 2021**
Public Engagement **Virtual Workshops & Survey**	**June 2021**
Final Plan to City Council	**Fall 2021**

Share your Opinions and Ideas

Climate Page, Survey, Future Workshop Information

www.phoenix.gov/climate

Submit questions to

climate@phoenix.gov

FOLLOW US ON twitter

@phxenvironment

City of Phoenix
OFFICE OF ENVIRONMENTAL PROGRAMS

Join the City of Phoenix and provide your input on addressing climate change. Share your concerns, needs, and ideas to co-create solutions. Your collaboration is needed to help the City determine priorities, needs, and opportunities to address climate change.

THE FUTURE OF PHOENIX

DRAFT CLIMATE ACTION PLAN

VIRTUAL WORKSHOP SERIES:

BUSINESS AND CLIMATE
June 16th
11:30 - 1:00PM

WATER AND CLIMATE
June 17th
5:00 - 6:30PM

HEAT AND CLIMATE
June 22nd
11:00 - 12:30PM

COUNCIL D7 AND D8
June 26th
10:00 - 11:30AM

YOUTH CLIMATE
June 26th
3:00 - 4:30PM

YOUR COMMUNITY AND CLIMATE
June 29th
5:00 - 6:30 p.m.

Help plan the Future of Phoenix

REGISTER ONLINE AT PHOENIX.GOV/CLIMATE

Business and Climate

- Christine Mackay, Director, City of Phoenix Community and Economic Development

Climate Action Plan

Business & Climate

The Future of Phoenix

Jason Blakley, Assistant Director

Stephen Dudley, Building Official

PLANNING & DEVELOPMENT

PRESERVE SHAPE BUILD

Zoning Measures/ Text Amendments

- Update Phoenix's Walkable Urban Core to include additional heat mitigation actions

- PDD's Landscape Ordinance Text Amendment will enhance the care and protection of trees and add enforcement of the ordinance to ensure trees planted as part of new development will be maintained and retained in perpetuity.

PLANNING & DEVELOPMENT
PRESERVE
SHAPE
BUILD

Current Building Code/ Permit Measures

- Adoption of the 2018 International Energy Conservation Code
- Adoption of the 2012 International Green Construction Code (voluntary basis)
- Remote Inspections Program to save inspector vehicle trips

PLANNING & DEVELOPMENT
PRESERVE
SHAPE
BUILD

Future Building Code/ Permit Steps

- Develop EV-Ready zoning ordinances and building code amendments
  - Working with Mark Hartman, Chief Sustainability Officer and Karen Apple, Electric Vehicle Program Manager and representatives from APS and SRP
- Acceptance of Solar Photovoltaic software code compliance reports in lieu of plan review to streamline solar PV permitting process
  - SolarAPP software developed by the National Renewable Energy Laboratory (NREL), a laboratory division of the U.S. Dept. of Energy

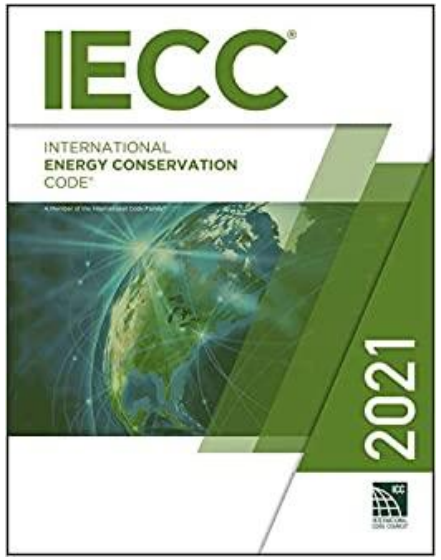
SolarAPP+

NREL
Transforming ENERGY

PLANNING & DEVELOPMENT
PRESERVE
SHAPE
BUILD

Future Building Code/ Permit Steps

- Hire additional inspectors dedicated to Solar PV installations as a “Permit By Inspection” process
- Possible adoption of the 2021 International Energy Conservation Code: stricter standards
- Possible adoption of portions of the 2021 International Plumbing Code to incorporate newer water conservation technologies
- Possible adoption of the 2021 International Green Construction
  Code: need to incentivize



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PRESERVE
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BUILD

Questions?

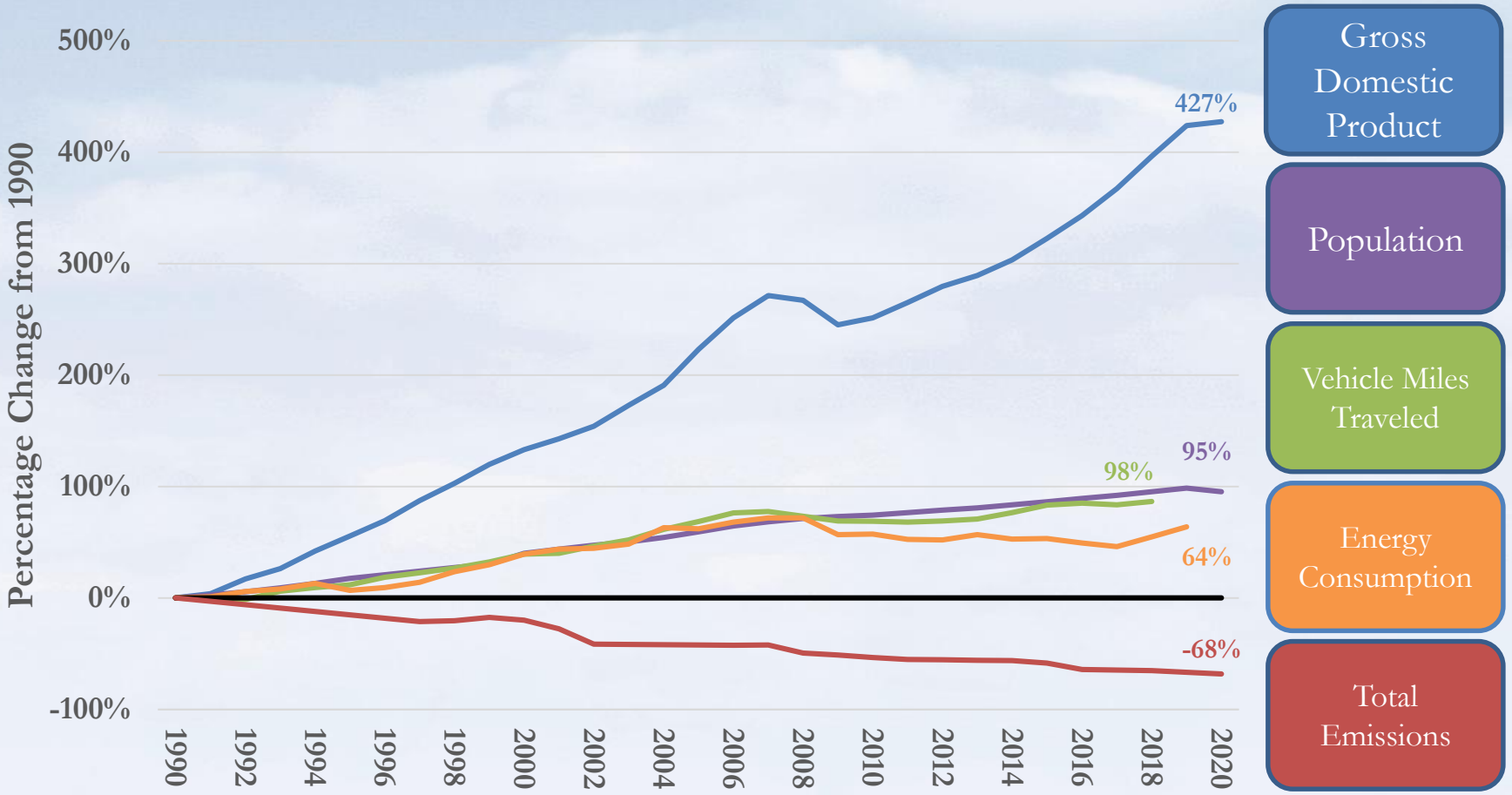
PLANNING & DEVELOPMENT
PRESERVE
SHAPE
BUILD

Air Quality Update

Philip McNeely, Director

Date: 01/09/2017

Comparison of Growth Factors with Emissions in Arizona, 1990-2020

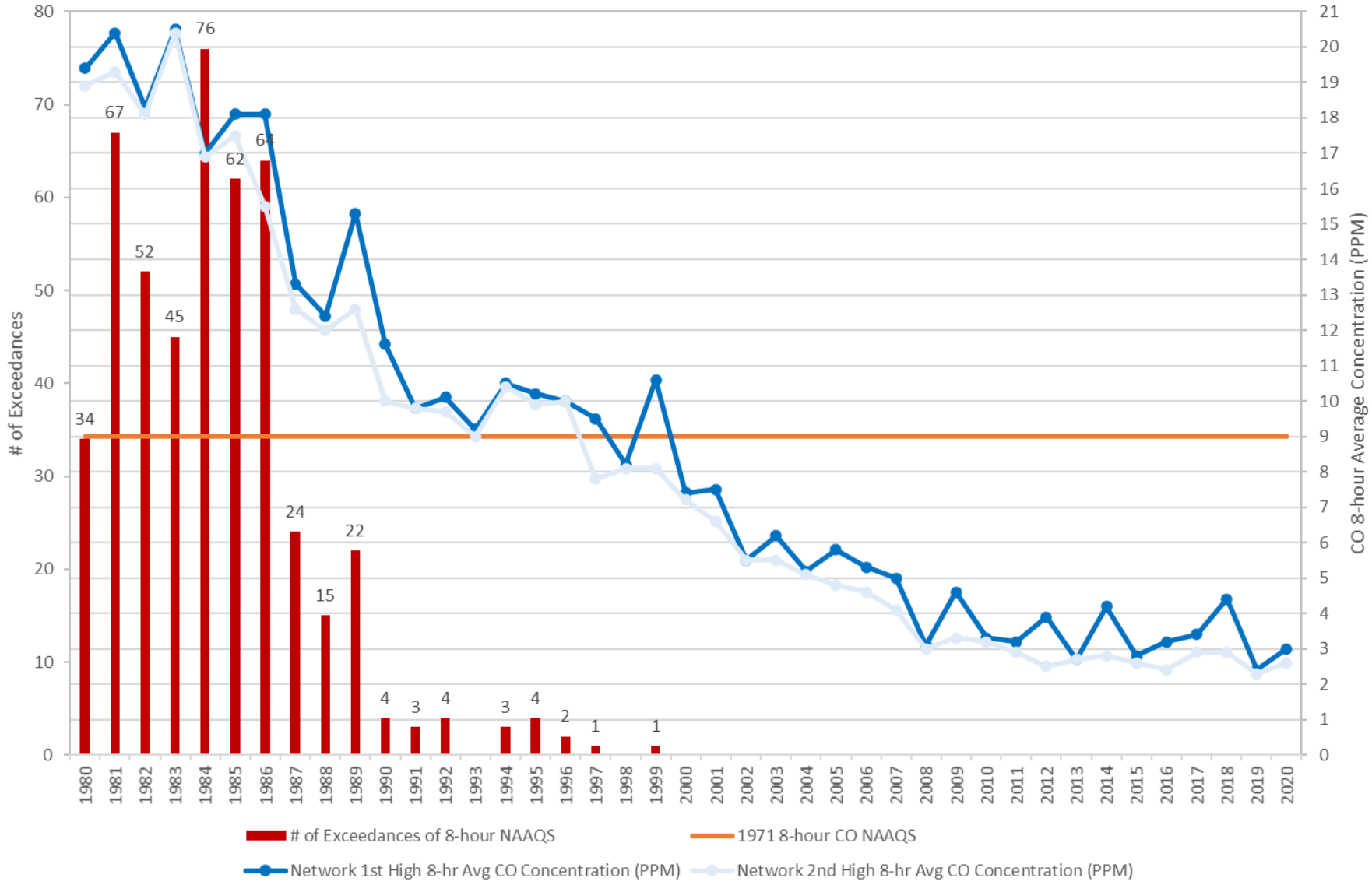


Sources

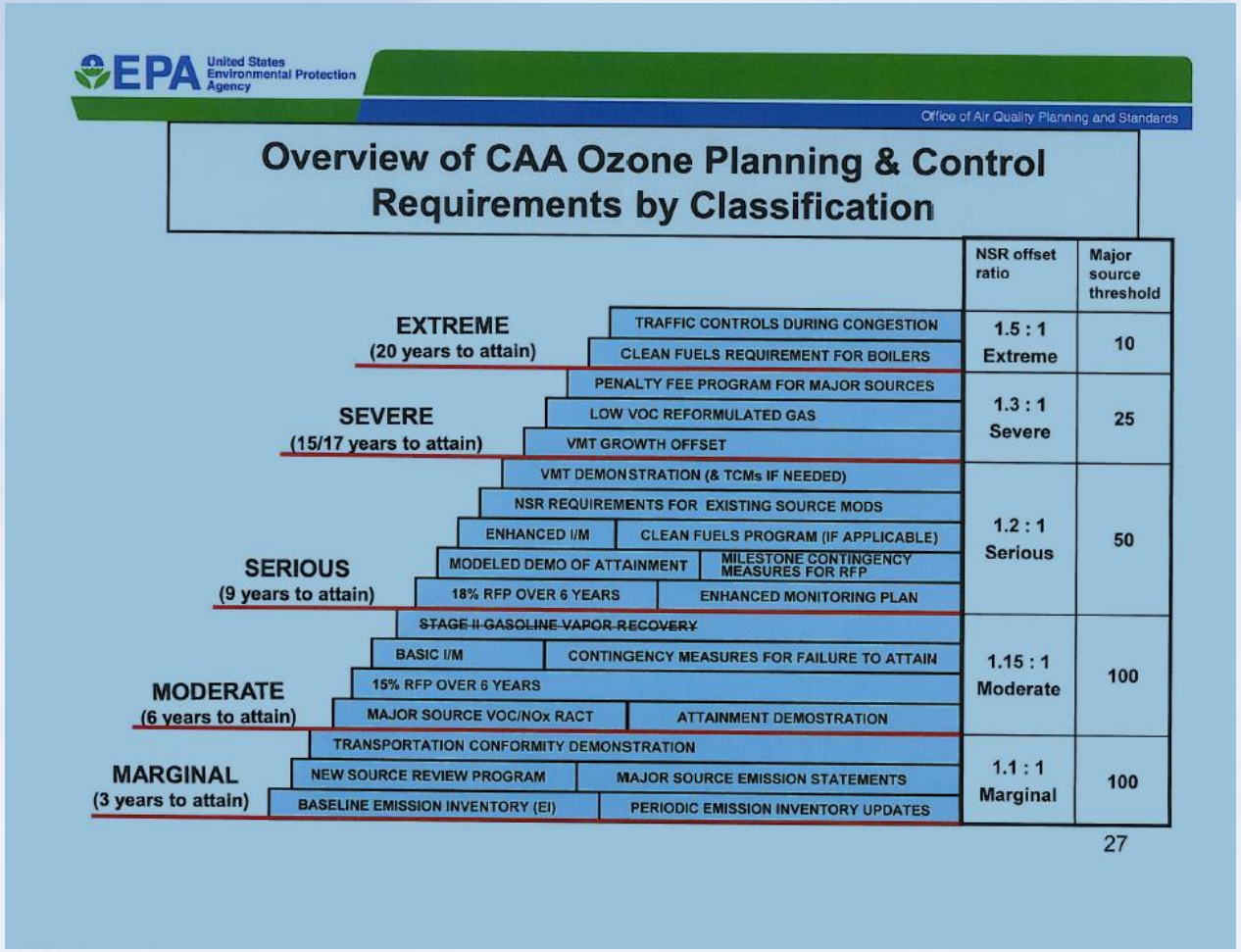
Gross Domestic Product for Arizona: U.S. Bureau of Economic Analysis
Vehicle Miles Traveled in Arizona: Arizona Department of Transportation
Population of Arizona: U.S. Census Bureau
Energy Consumption in Arizona: U.S. Energy Information Administration
National Emissions Inventory for Arizona: U.S. Environmental Protection Agency

Maricopa County AIR QUALITY DEPARTMENT

Carbon Monoxide Dynamics in Maricopa County since 1980 (8-Hour Average)



Maricopa County AIR QUALITY DEPARTMENT

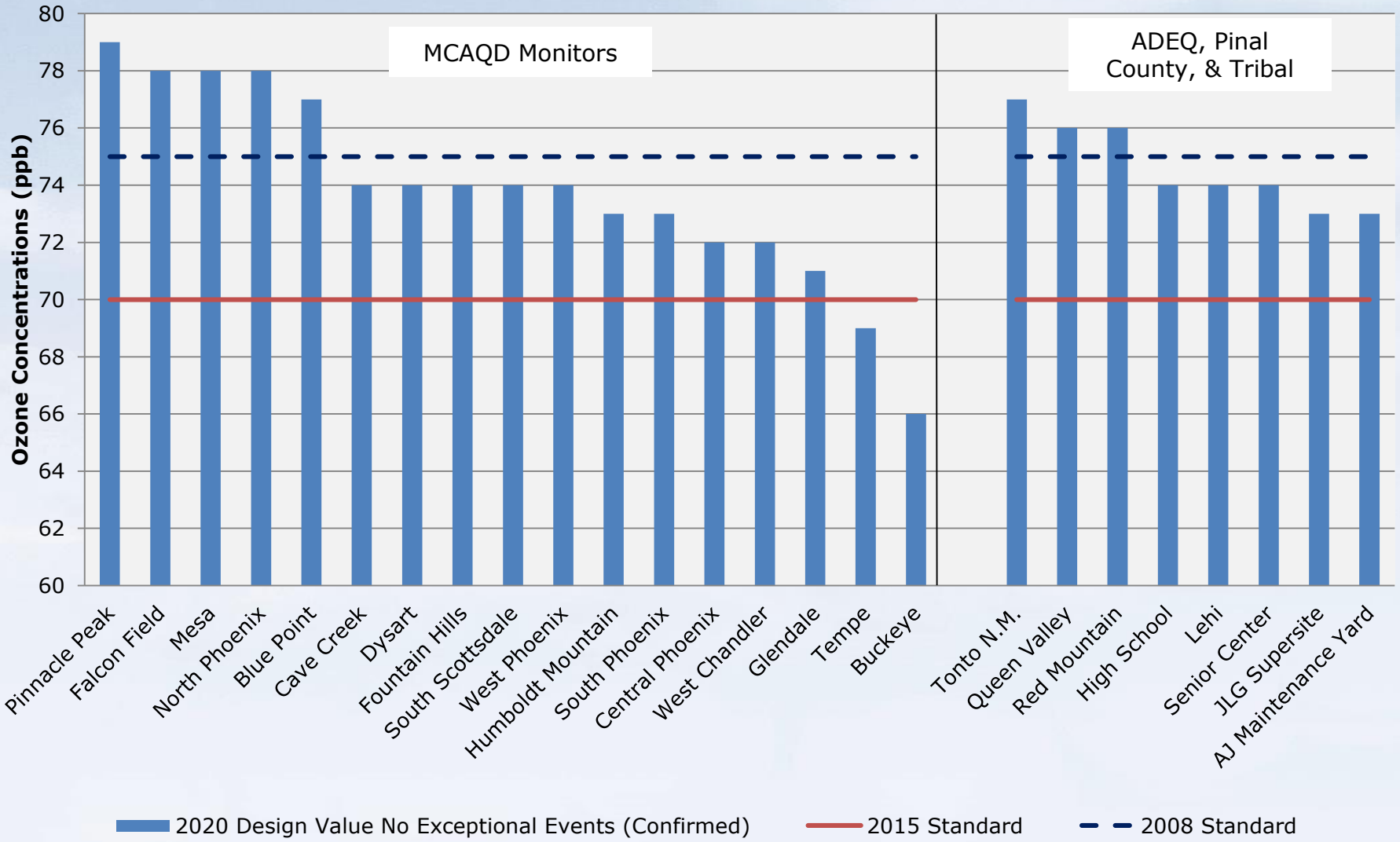


Courtesy of EPA

Maricopa County AIR QUALITY DEPARTMENT

2020 Ozone Design Values

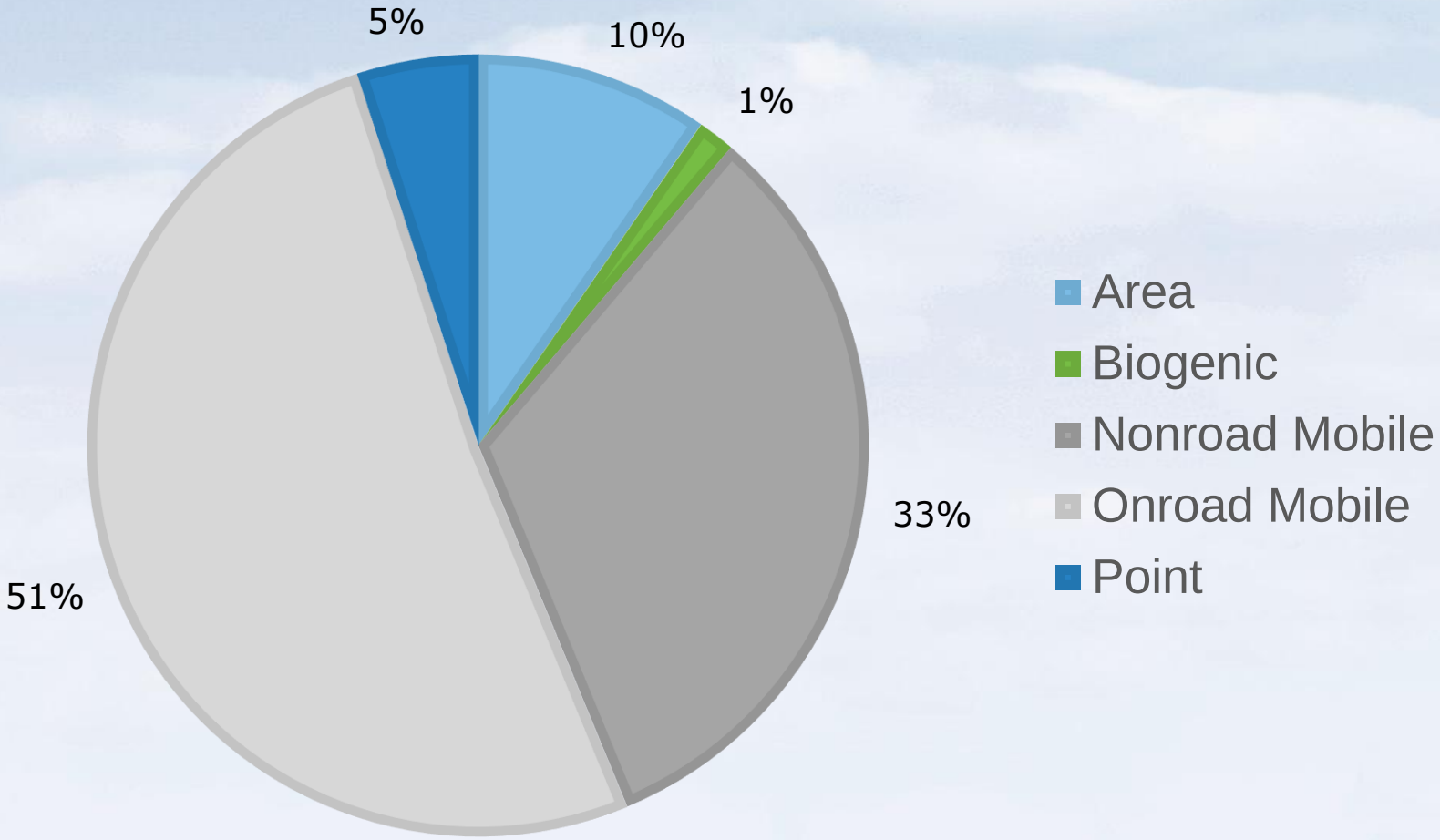
(Design value is based upon a 3-year average of the 4th highest 8-hour reading)



Maricopa County AIR QUALITY DEPARTMENT

Last updated 4/21/21

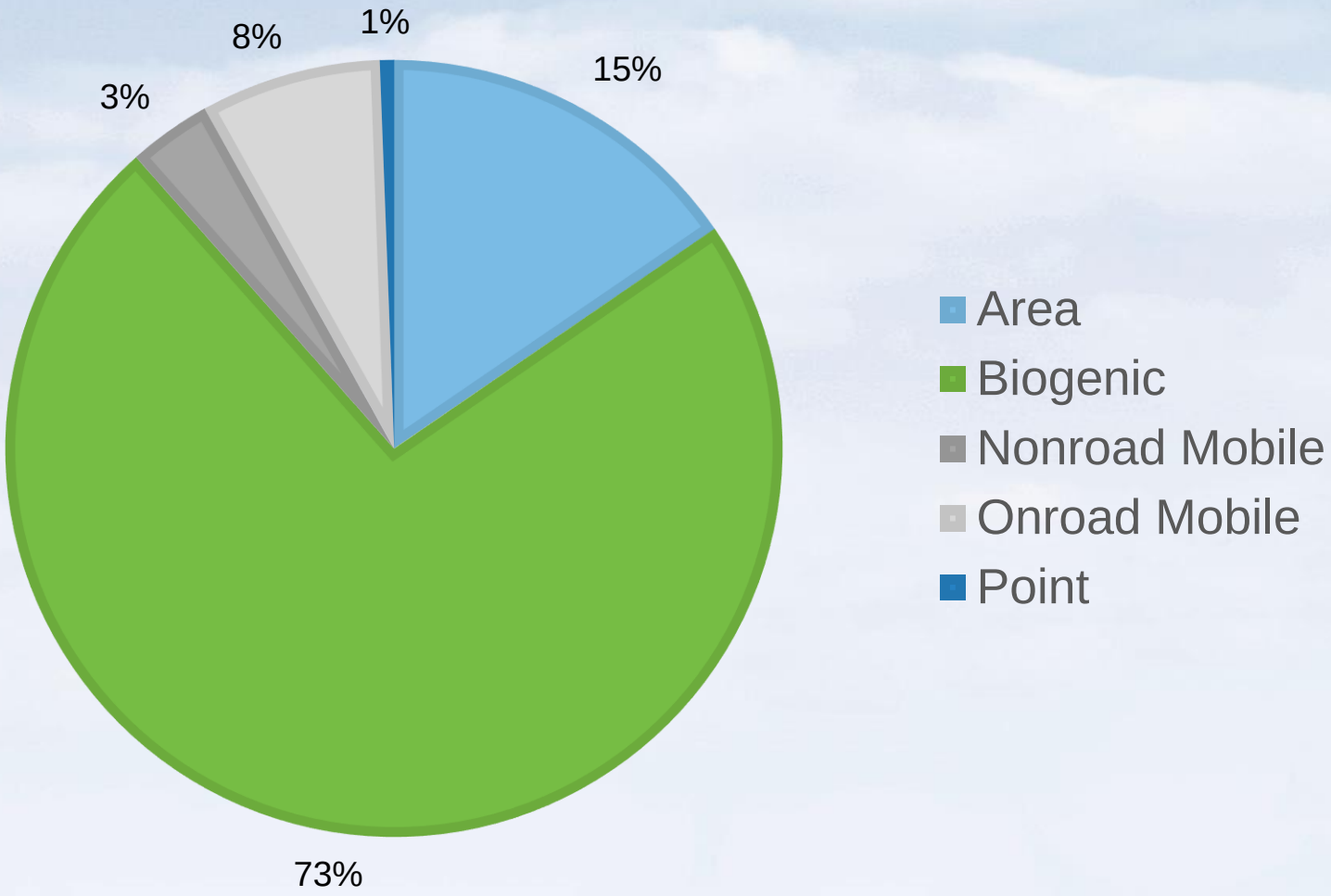
2017 NO_X Emissions by Source Category



Source: 2017 Periodic Emissions Inventory Report

Maricopa County AIR QUALITY DEPARTMENT

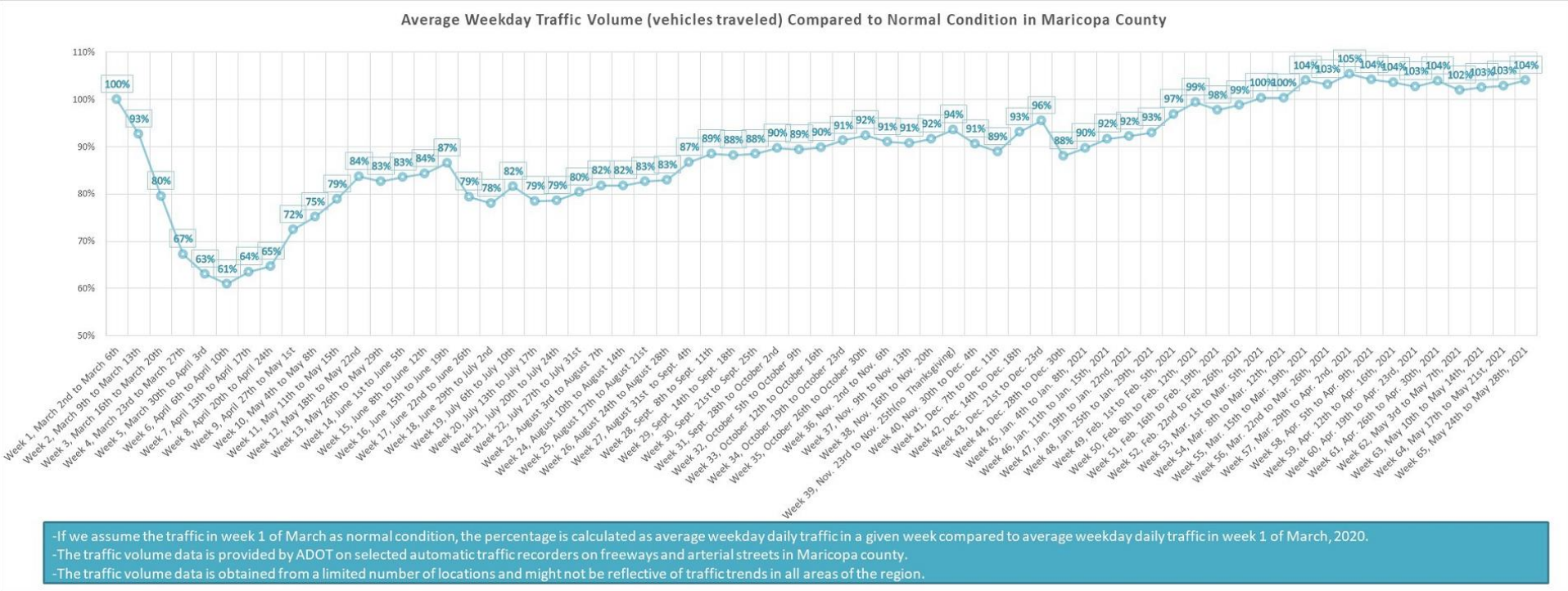
2017 VOC Emissions by Source Category



Source: 2017 Periodic Emissions Inventory Report

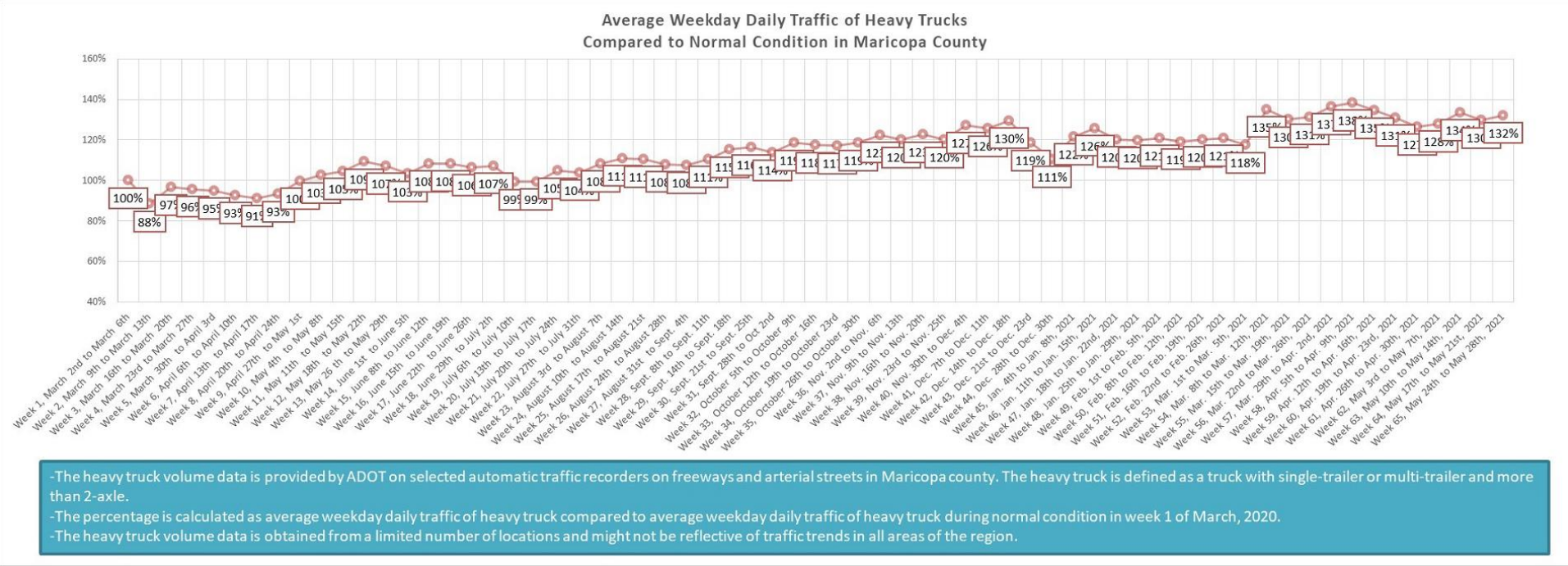
Maricopa County AIR QUALITY DEPARTMENT

March 2nd, 2020 through May 28th, 2021



Maricopa County
AIR QUALITY
DEPARTMENT

March 2nd, 2020 through May 28th, 2021



-The heavy truck volume data is provided by ADOT on selected automatic traffic recorders on freeways and arterial streets in Maricopa county. The heavy truck is defined as a truck with single-trailer or multi-trailer and more than 2-axle.
-The percentage is calculated as average weekday daily traffic of heavy truck compared to average weekday daily traffic of heavy truck during normal condition in week 1 of March, 2020.
-The heavy truck volume data is obtained from a limited number of locations and might not be reflective of traffic trends in all areas of the region.

Maricopa County AIR QUALITY DEPARTMENT

Comparing 2020-2021 with 2019-2020

Summary of Quarterly Averages for Entire Monitoring Network

NO_2:

NO_2 Network	2020-2021 Average (ppb)	2019-2020 Average (ppb)	Change
Before Shutdown	17.7	18.6	-5%
1st Quarter After Shutdown	12.2	13.5	-10%
2nd Quarter After Shutdown	10.6	11.4	-7%
3rd Quarter After Shutdown	19.7	17.2	+15%
4th Quarter After Shutdown	21.2	18.7	+13%

Ozone:

Ozone Network	2020-2021 Average (ppb)	2019-2020 Average (ppb)	Change
Before Shutdown	24.9	26.3	-5%
1st Quarter After Shutdown	38.3	40.9	-6%
2nd Quarter After Shutdown	38.3	40.0	-4%
3rd Quarter After Shutdown	32.0	31.7	+1%
4th Quarter After Shutdown	23.8	22.4	+7%

PM10:

PM10 Network	2020 Average ($\mu g/m^3$)	2019 Average ($\mu g/m^3$)	Change
Before Shutdown	23.4	20.3	+15%
1st Quarter After Shutdown	25.2	25.2	0%
2nd Quarter After Shutdown	34.9	29.7	+18%
3rd Quarter After Shutdown	45.4	31.8	+43%

PM2.5:

PM2.5 Network	2020 Average ($\mu g/m^3$)	2019 Average ($\mu g/m^3$)	Change
Before Shutdown	9.6	8.2	+16%
1st Quarter After Shutdown	5.5	5.2	+6%
2nd Quarter After Shutdown	6.9	5.5	+26%
3rd Quarter After Shutdown	10.3	7.2	+42%

Before Shutdown:
Jan 1-Mar 16

1st Quarter After Shutdown:
Mar 17-Jun 8

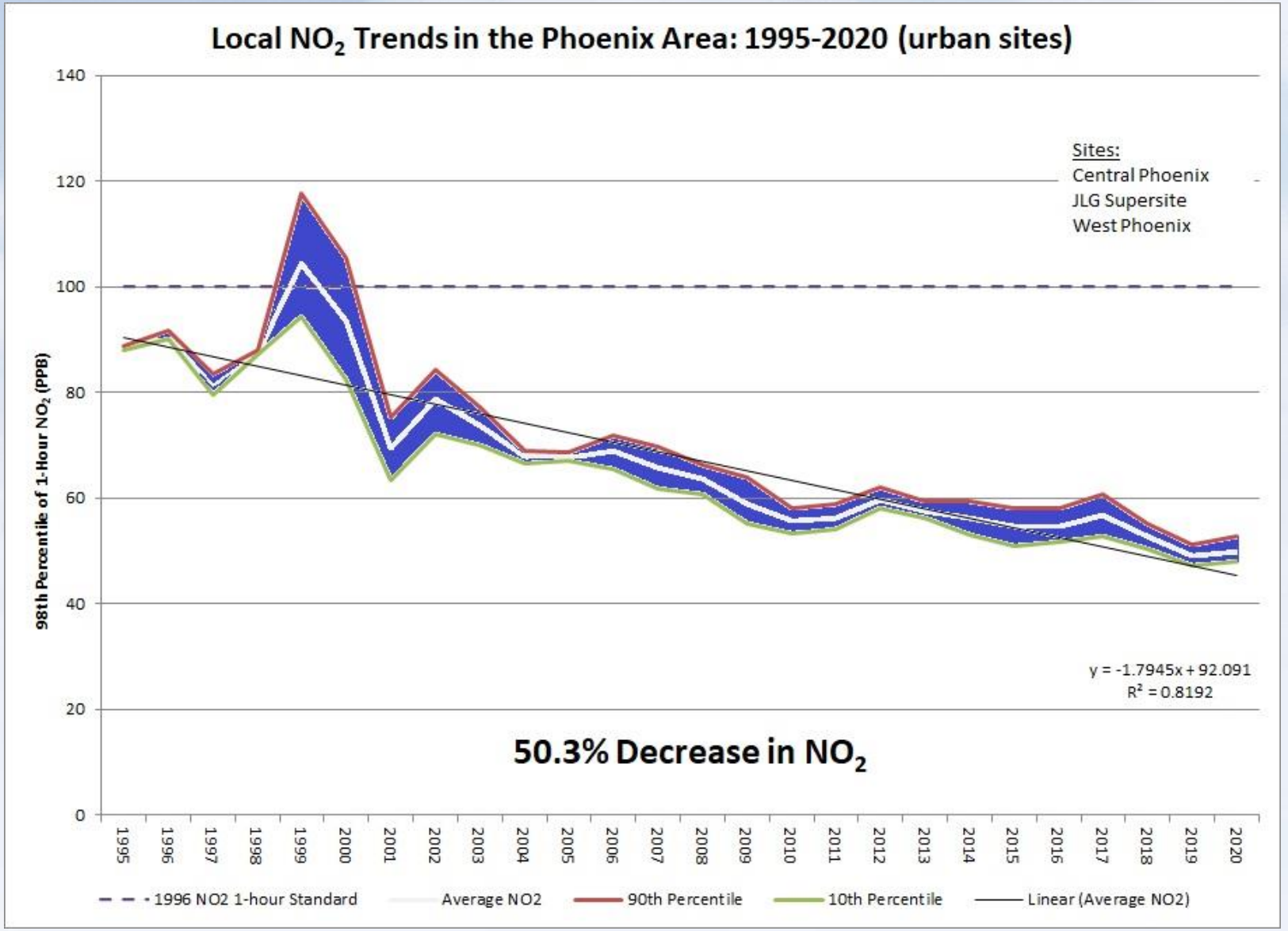
2nd Quarter After Shutdown:
Jun 9-Aug 31

3rd Quarter After Shutdown:
Sep 1-Nov 23

4th Quarter After Shutdown:
Nov 24-Feb 15

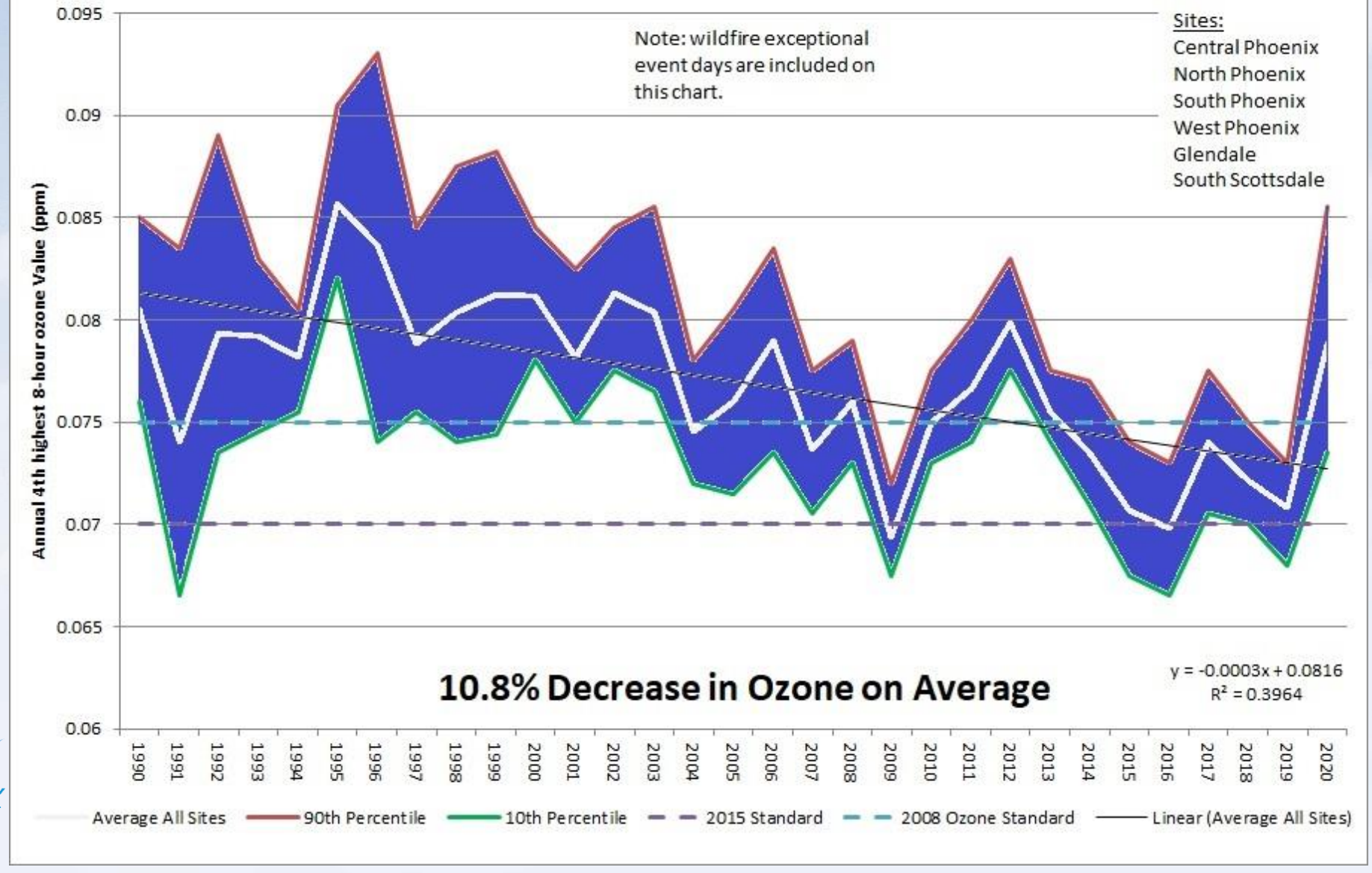
Maricopa County AIR QUALITY DEPARTMENT

Local Trends



Maricopa County AIR QUALITY DEPARTMENT

Local Ozone Trends in the Phoenix Area from the Six Longest-Running Monitoring Sites: 1990-2020



Maricopa County AIR QUALITY DEPARTMENT

Thank you

ELECTRIC **VEHICLES**

Kathy Knoop, Energy Innovation Advisor Customer to Grid Solutions

Kathy.Knoop@aps.com

aps

Typical Ranges of EVs – BEV and PHEV

Battery Electric Vehicle (BEV)

- 100% electric motor and grid charged battery – no gasoline
- Range 80 to 350 miles

Plug-in Hybrid Electric Vehicle (PHEV)

- Electric motor and grid charged battery + internal combustion engine
- Range 10 to 50 miles on battery + 300-800 miles on gasoline

3.5 kWh = 10 miles of range on average

Three Basic EV Charging Levels

Level 1

- 120 V, 1-Phase AC
- Less than 2 kW
- 2-5 miles of range per hour of charging

Level 2

- 208/240V, 1-Phase AC
- 2-19.2 kW
- 10-20 miles of range per hour of charging

Level 3 (DC Fast)

- 208/480V, 3-Phase
- 24 to 1000 kW
- 60-80 miles of range per 20 minutes of charging
- For passenger cars and commercial trucks

Charging stations = Electric Vehicle Service Equipment (EVSE)
Charging station company = Electric Vehicle Service Provider (EVSP)

Commercial electric and fleet vehicle options also expanding

BUSINESS

Amazon unveils prototype of Rivian-built electric delivery van

Robert Channick Chicago Tribune

Published 10:16 p.m. ET Oct. 9, 2020

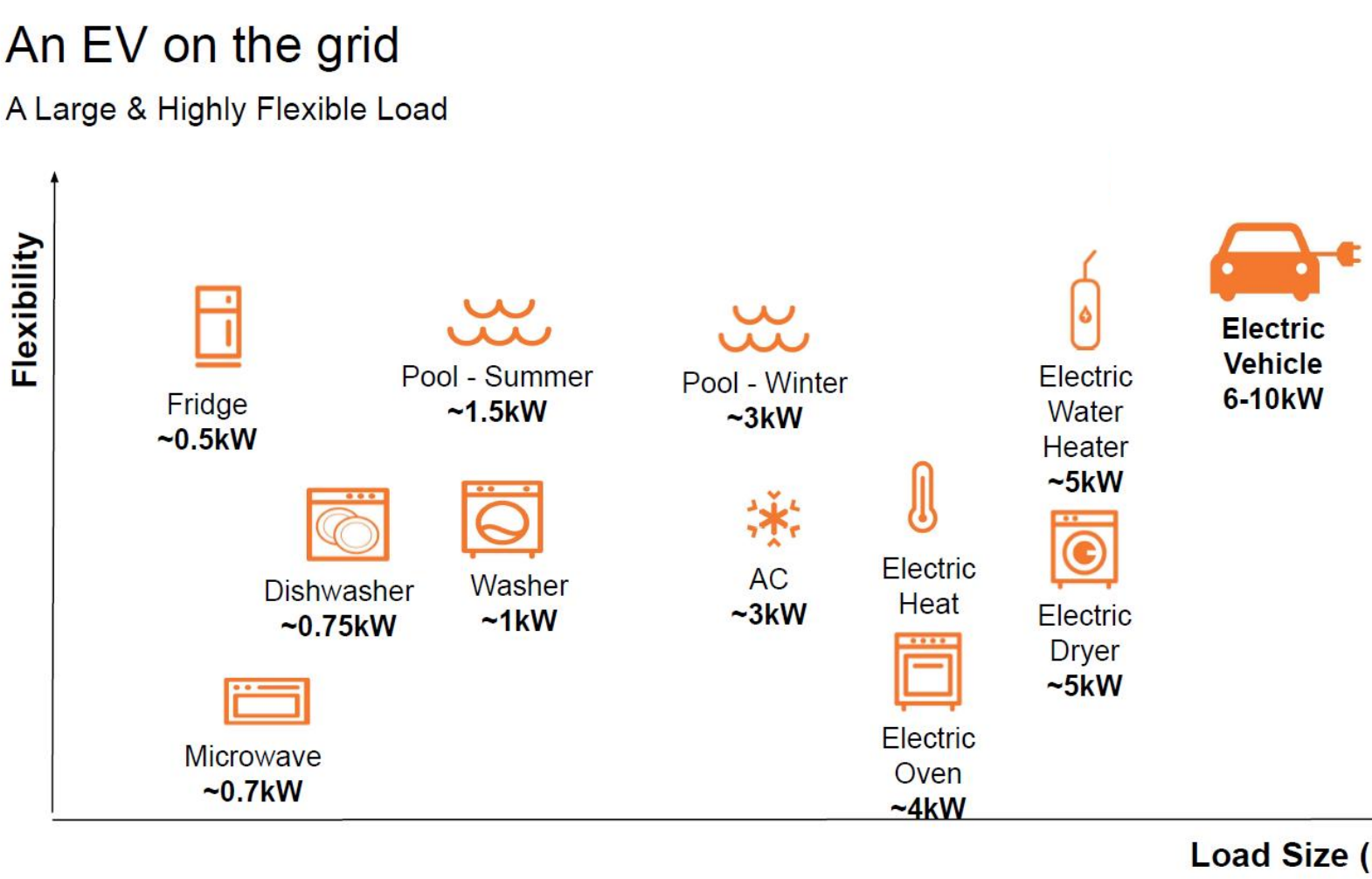
View Comments

Your Amazon package may be arriving in a custom-built Rivian electric delivery vehicle by next year.

Amazon unveiled a prototype Thursday of one of three electric vehicles being developed in partnership with Plymouth-based EV truck manufacturer Rivian. The online retail giant expects to have 10,000 of the Rivian electric delivery vans on the road worldwide by 2022, ramping up to the full 100,000 order by 2030.

Electric vans made by Rivian are expected to be making deliveries for Amazon by next year. *Amazon*

What do light duty EVs mean to the Grid?



Lessons learned charging infrastructure

The grid can handle EV charging

Tools include TOU rates, smart charging, integration into resource planning

Sufficient public infrastructure needed for a positive customer experience

Customer education is highly important

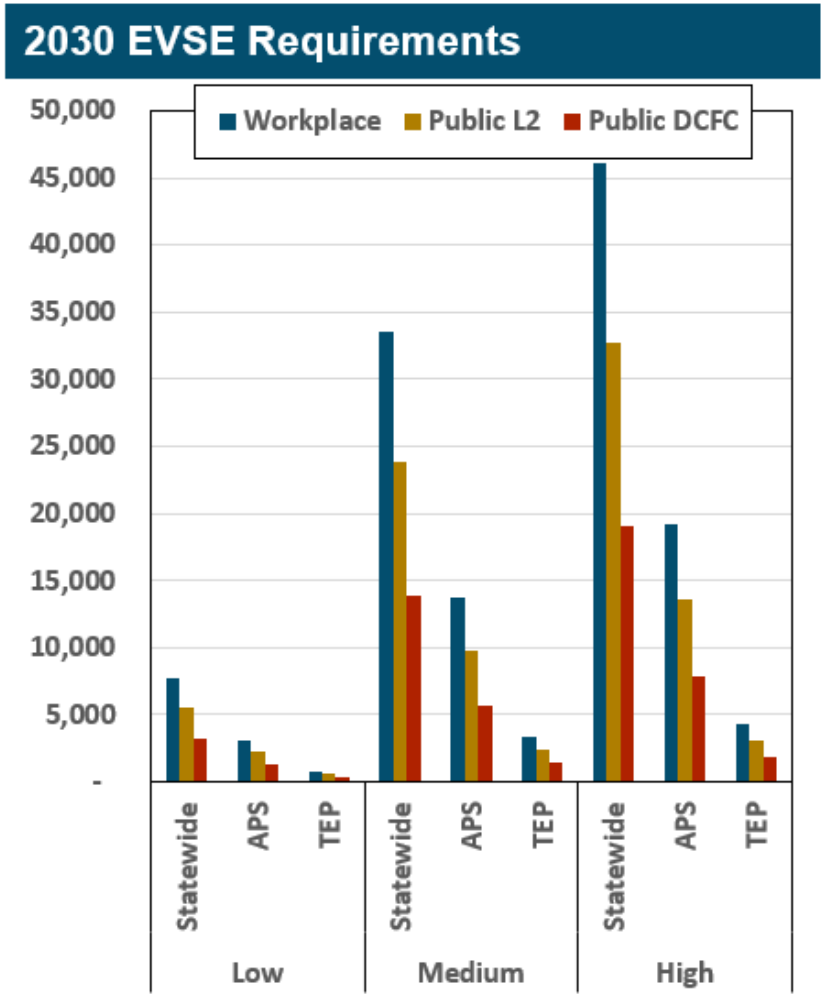
Serving multi-unit housing a challenge

Also: Interoperability, open standards, ease of use, customer-friendliness, price/billing, cybersecurity, onsite infrastructure and upgrade cost, host site arrangement, etc.

What to plan for? 2030 Statewide target from TE Plan

Vehicle Segment	2030 EV Goal (Vehicles on the Road)		
	APS	TEP	State
Electric Light Duty Vehicles	450,000	95,000	1,076,000
Electric Medium Duty Parcel Delivery Trucks	1,450	545	3,830
Electric Transit Buses	290	110	785
Electric School Buses	525	200	1,425

	Low	Medium	High
Statewide eLDVs	249,771	1,076,000	1,479,422
Statewide EVSE by Type			
Residential	<249,771	<1,076,000	<1,479,422
Workplace	7,781	33,520	46,088
Public Level 2	5.526	23,805	32,731
Public DCFC	3,219	13,866	19,065



Source: [Statewide Transportation Electrification Plan March 2021]

Benefits of Transportation Electrification For City of Phoenix

Caryn Potter, Utility Program Manger
Southwest Energy Efficiency Project
cpotter@swenergy.org

Wednesday, June 16th, 2021

SWEEP

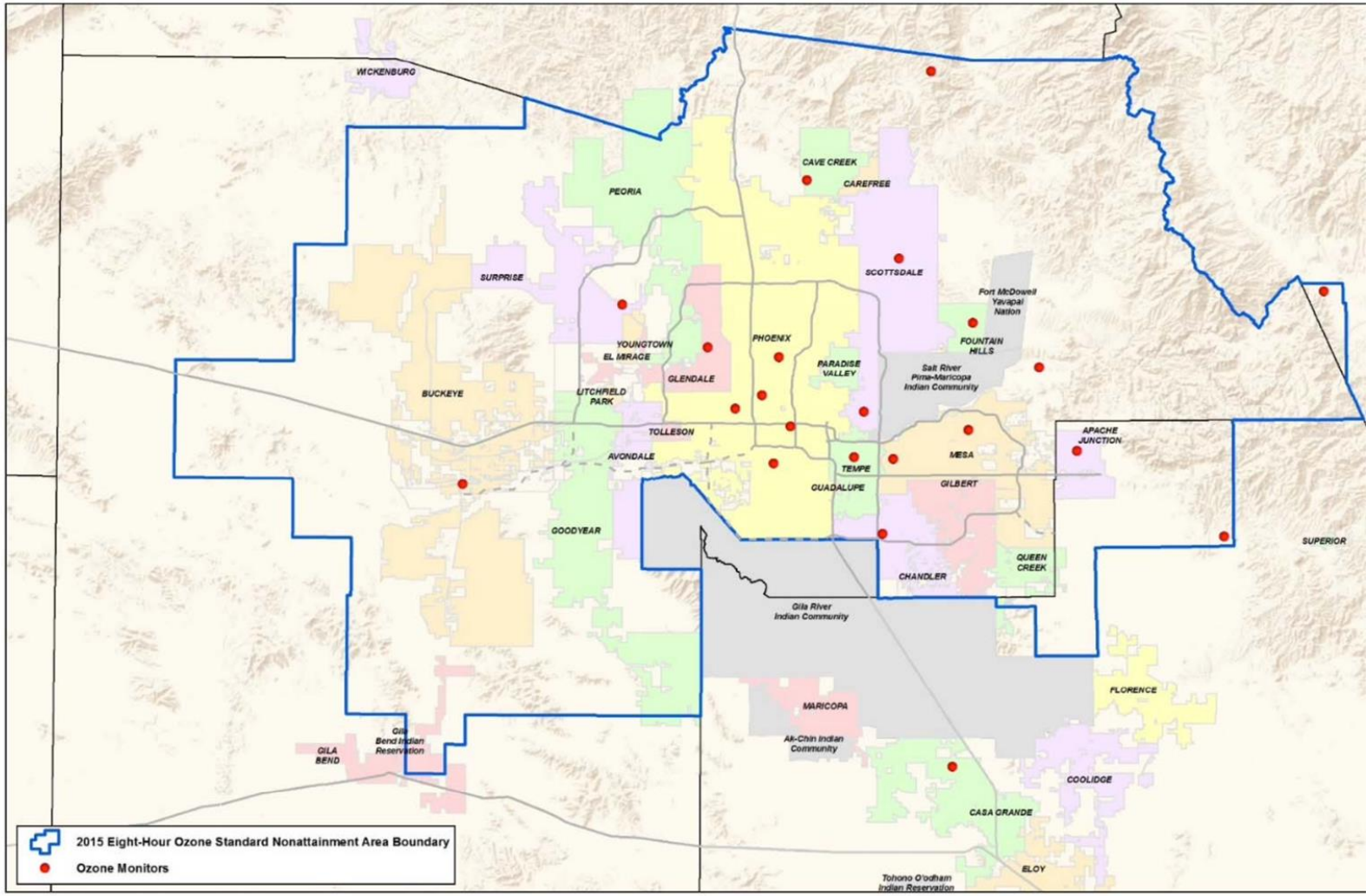
Topics

1. **Climate Mitigation and Economic Development Opportunity of Electric Vehicles**

2. **Benefits of Electric Vehicles for City Operations and Residents**

3. **City Transportation Electrification Program Options**

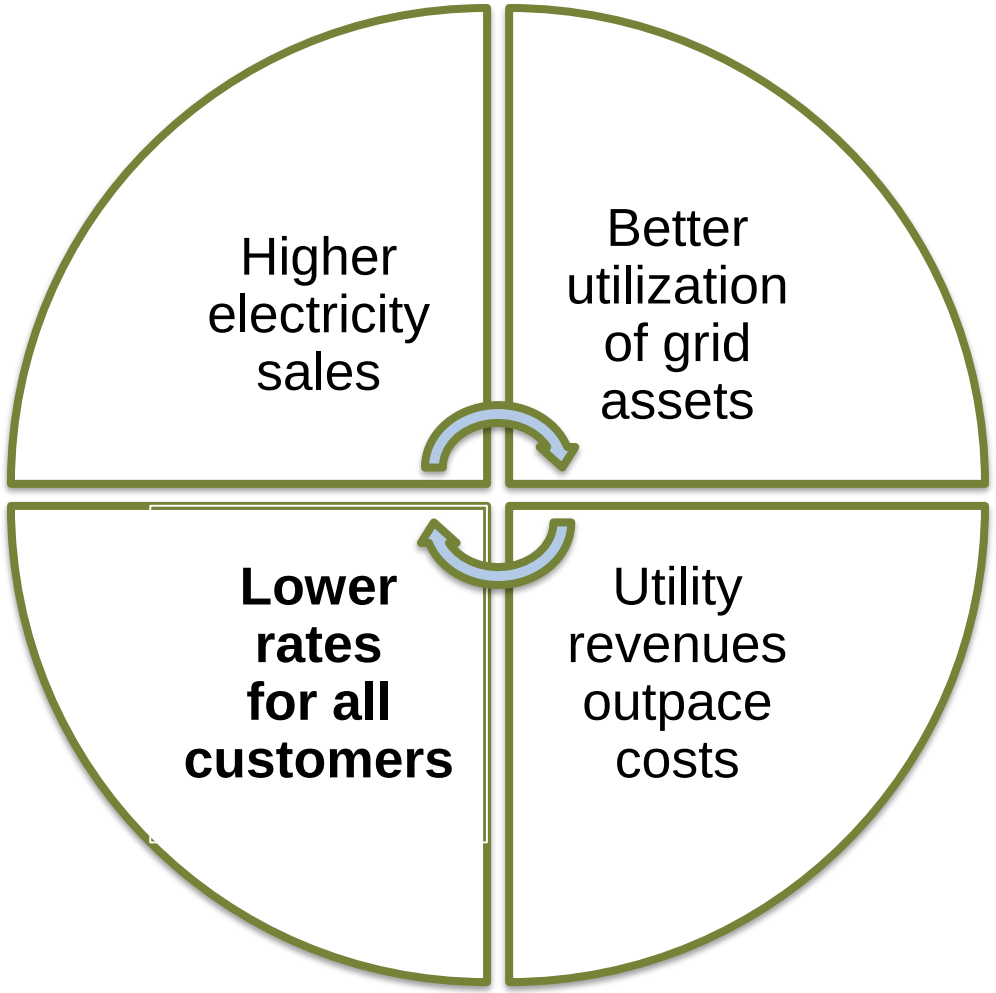
Failing To Meet Federal Regulations For Air Quality Could Have Consequences For Arizona's Economy



- **On May 5, Tucson recorded its highest ozone reading since August of 2018. On May 6 in Phoenix, ozone concentrations reached their highest levels of the year so far: 84 parts per billion.**
- **The national standard, which is the threshold set in 2015 by the EPA to protect public health, is 70 parts per billion.**

(Left) ***Maricopa Association of Governments,*** **MAG Air Quality Technical Advisory Committee May 23rd Meeting**
(Right) ***AZ Central*** **https://www.azcentral.com/story/news/local/arizona-environment/2020/06/12/despite-pandemic-traffic-reductions-ozone-still-issue/5248619002/**

With More EVs, Charging Off-Peak, The City & Taxpayers Can Realize Major Benefits



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!

7.9 Million EVs On AZ Roads Could Bring $31 Billion in Total Net Benefits of by 2050

Environmental benefits

- Reduced NOx emissions – 2,900 tons
- Reduced CO_2 emissions – 26 million tons/yr ($220 M in compliance costs; $1.3B in avoided damages)

Utility customer savings

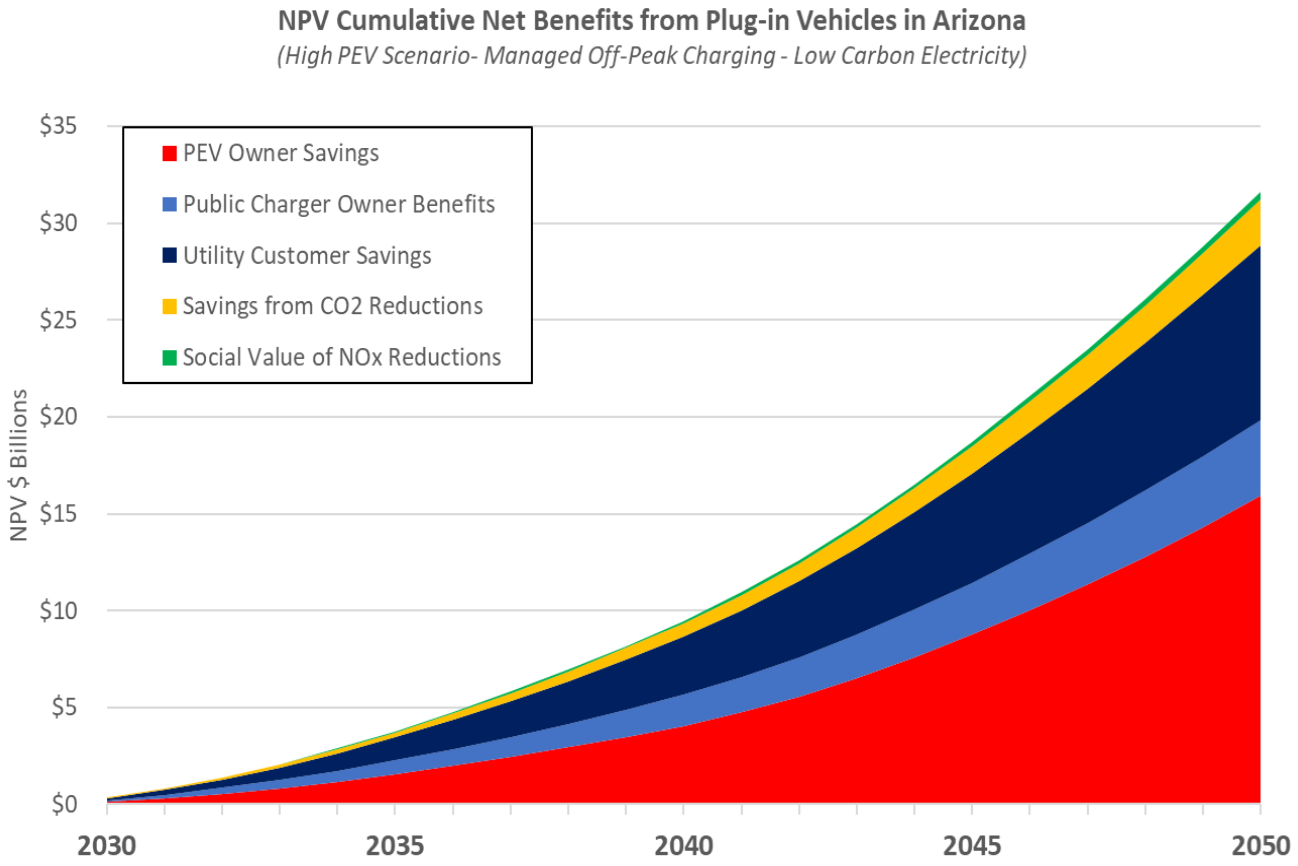
- With strategic charging ($176/year)
- "BAU" charging ($50/year)

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)

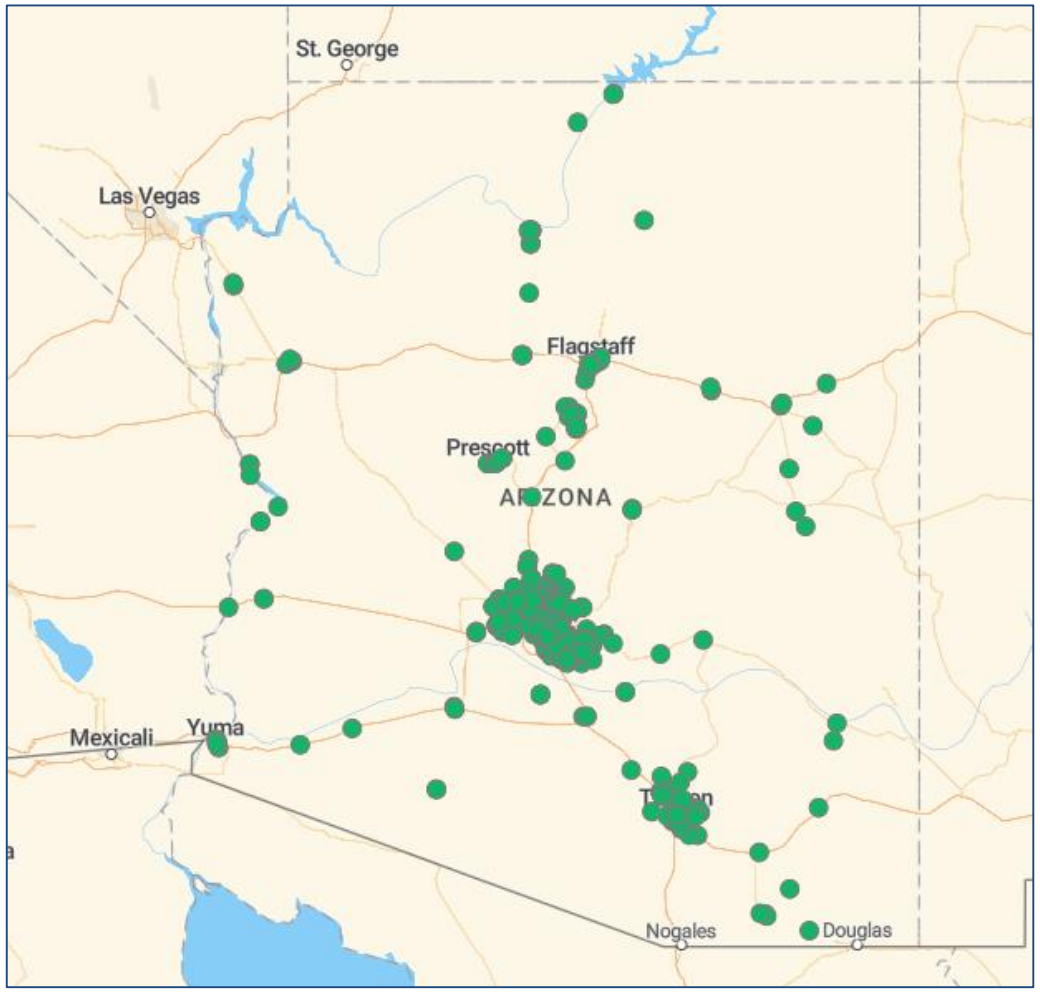


NPV Cumulative Societal Net Benefits from AZ PEVs – High PEV scenario

SWEEP and WRA, **Plug-in Electric Vehicle Cost-Benefit Analysis: Arizona**
https://swenergy.org/pubs/azevstudy

How can EV and Non-EV Drivers reap EV benefits?

By Increasing access to charging stations.



Location of DC Fast Chargers statewide

- Range anxiety is a concern nationwide, but especially in Arizona.
- There are currently *410 public DCFC plugs in Arizona*. The majority of these chargers are Tesla Superchargers with proprietary plug types.
- In order to ease range anxiety concerns, significant investments in public, workplace and public level 2, and fast charging infrastructure must be made.

[DOE Alternative Fuels Data Center]

Local Government Program Examples That Enable Transportation Electrification

Fleet Targets For City Operations That Coincide Ambitious Statewide Goal

- **A public fleet target is a local government requirement for a certain percentage of new government vehicles purchased to be electric over a specified timeframe.**

Low-Income EV Rideshare Programs

- **These programs make publicly-owned EV fleets available to qualifying low-income residents to rent on a per-mile basis. Parking is typically free for participants, and cars can be dropped off anywhere, making it easier to access transit hubs or make emergency trips.**

Streetlight and Right-of-Way Charging

- **Space for EV charging stations can be limited in urban settings. Cities can incorporate EV charging into existing infrastructure like streetlights and sidewalks.**

EV-Ready Building Codes

- **Retrofitting existing buildings to support EV charging can be difficult, time-consuming, and expensive, which prohibits widespread EV adoption. EV-ready building codes address these barriers by requiring new homes and multi-unit dwellings (MUDs) to be built with wiring ready for Level 2 (L2) charging.**

Arizona Needs More EV Charging Stations To Support The Growing Market.

- **Lack of EV charging is one of the biggest barriers to purchasing an EV.**

- **“6 in 10 Americans are unlikely to buy an EV because there are not enough places to charge (58%) or they are concerned they will run out of charge while driving (57%).”**
  - AAA survey (2019)

Summary

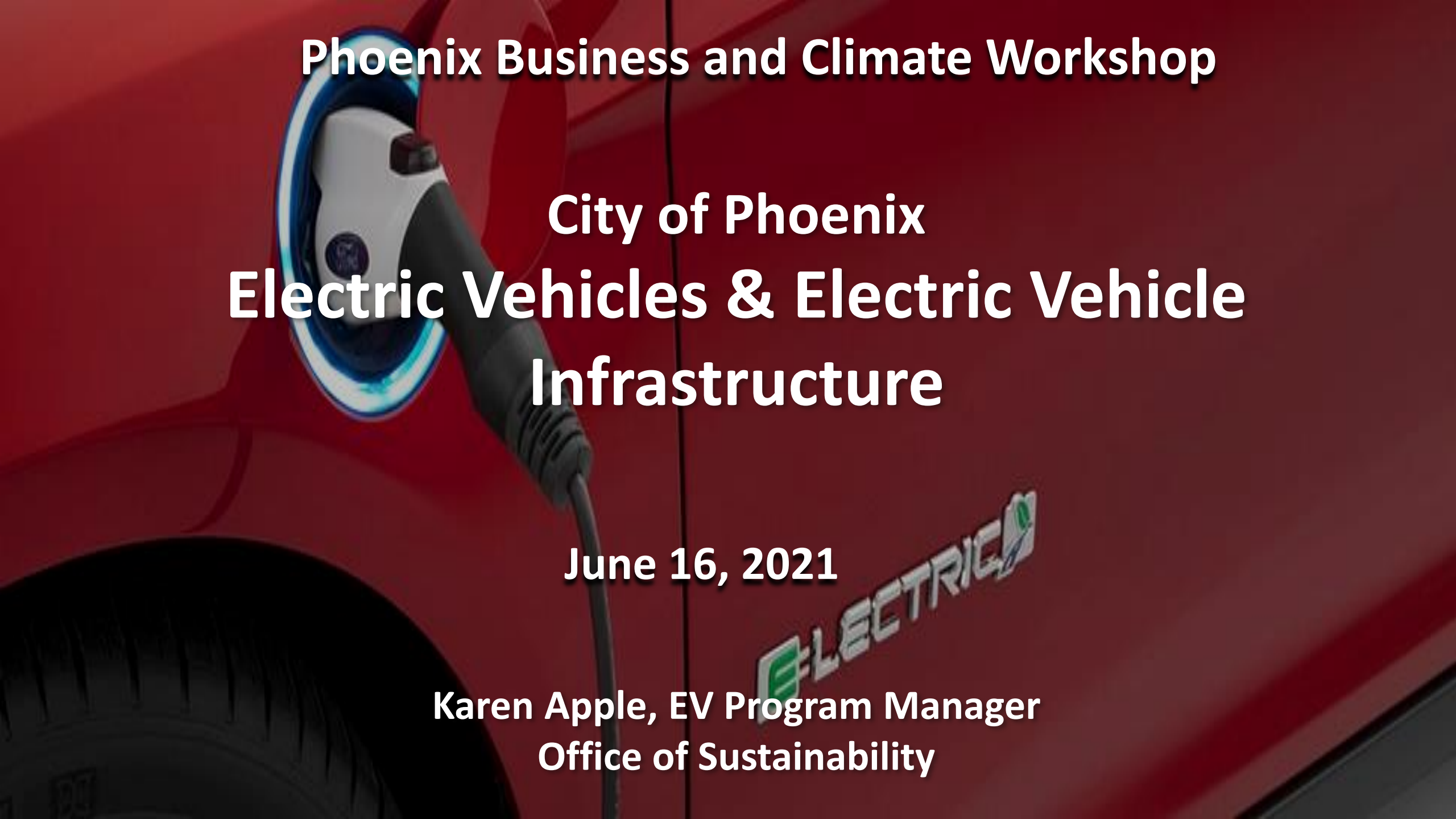
- Further adoption of EVs in the next ten years can deliver major benefits and cost savings for AZ ratepayers.
- These benefits include lower electric bills, better utilization of grid resources, improved air quality and reduced **greenhouse gas emissions**, and greater economic development.
- **The City of Phoenix has a role to play in enabling the growth of electric vehicles community-wide.**The **private market alone will not meet the charging infrastructure need.**

THANK YOU!

Caryn Potter, Utility Program Manger
Southwest Energy Efficiency Project
cpotter@swenergy.org

Wednesday, June 16th, 2021

SWEEP



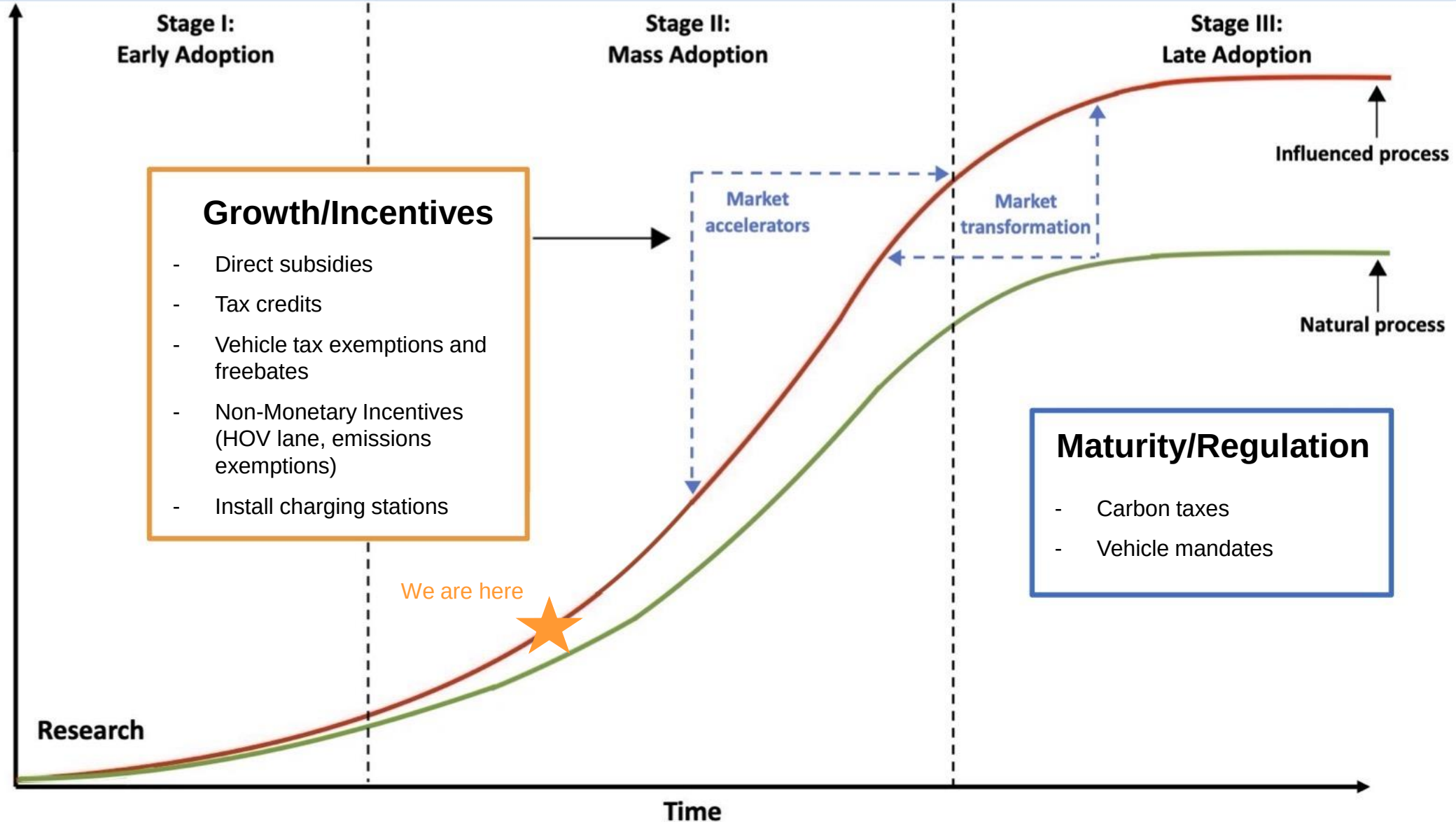
Phoenix Business and Climate Workshop

City of Phoenix
Electric Vehicles & Electric Vehicle Infrastructure

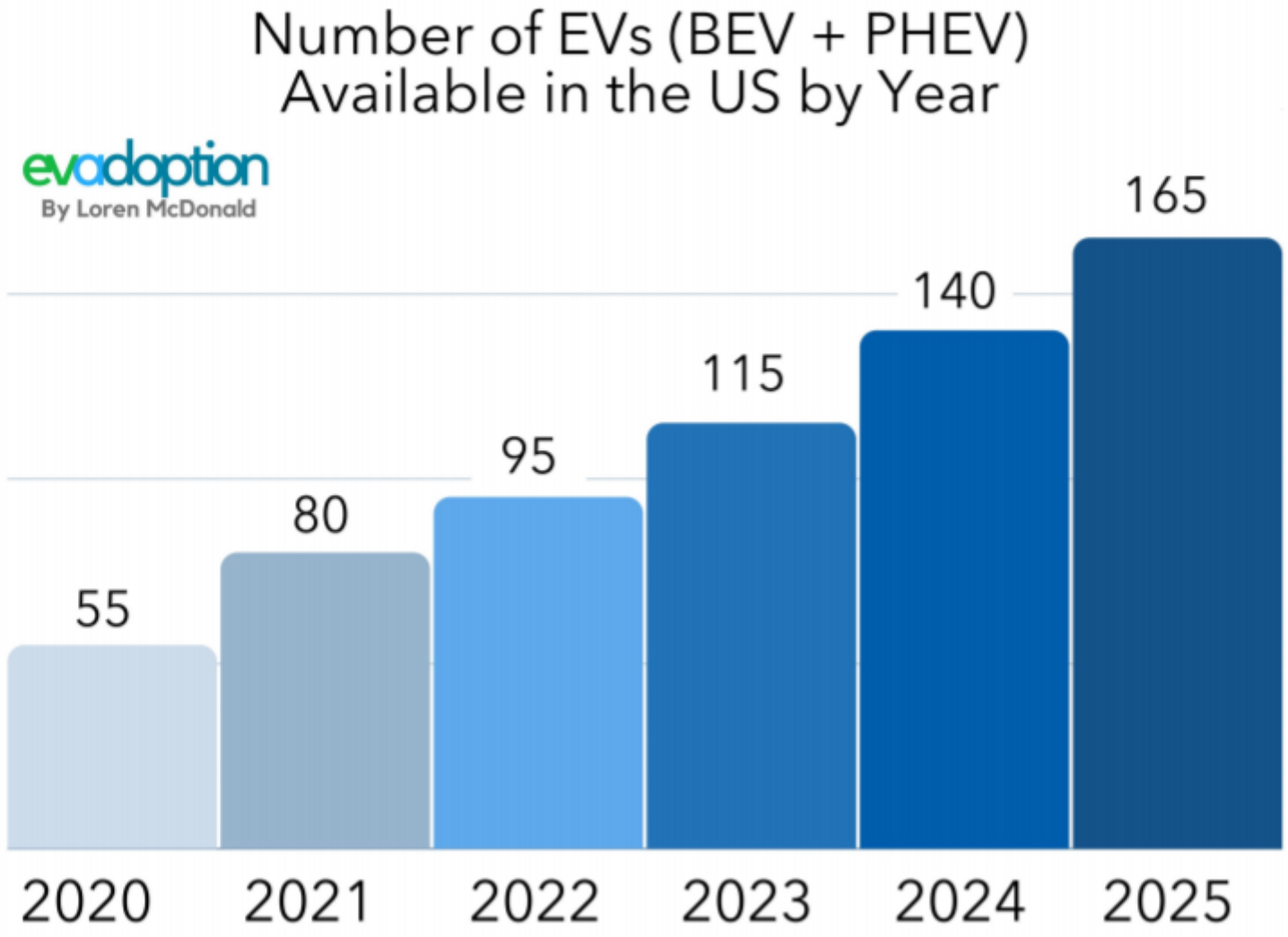
June 16, 2021

Karen Apple, EV Program Manager
Office of Sustainability

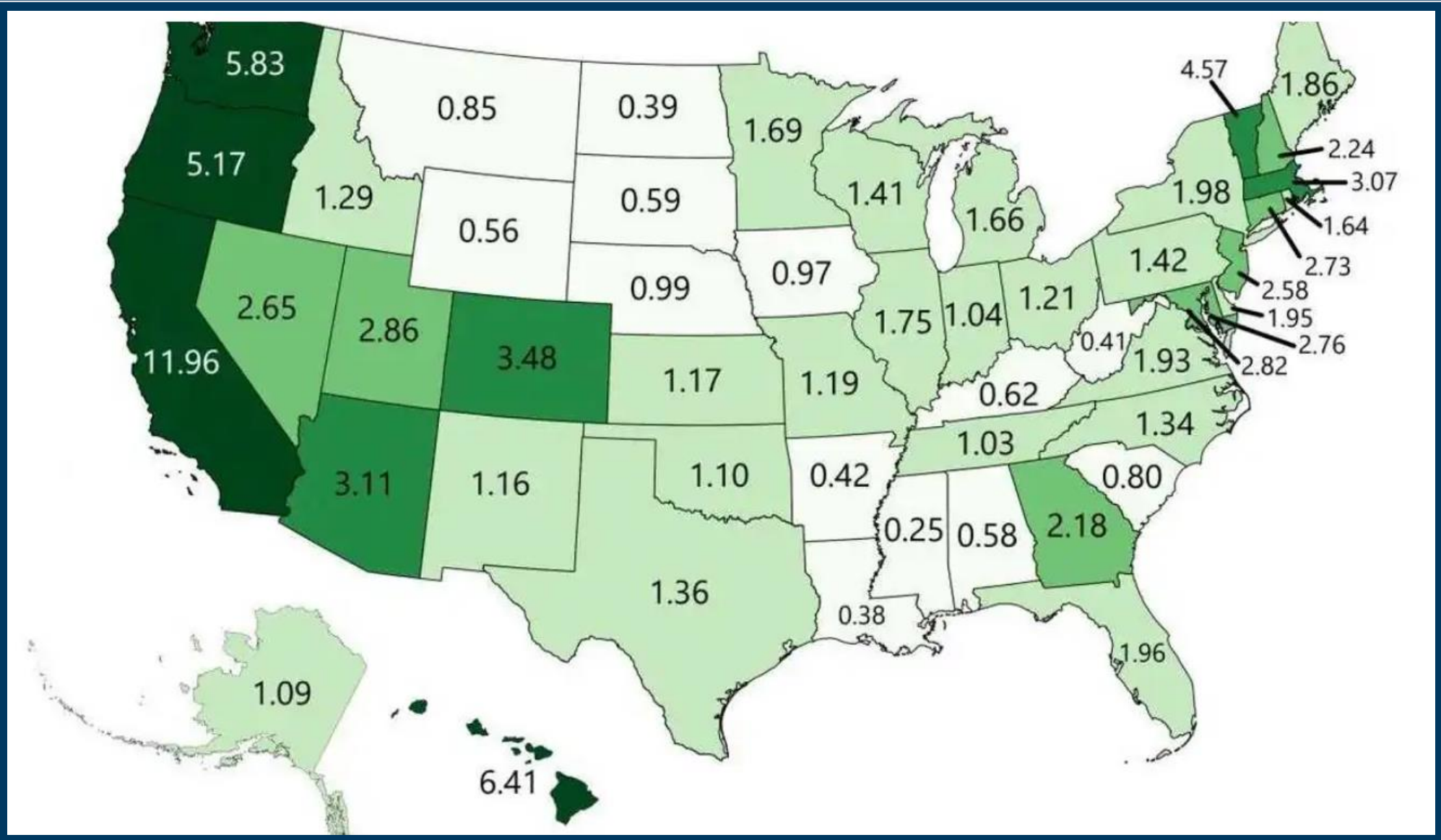
EV Market Transformation and Adoption Curve



EV Model Availability Growth

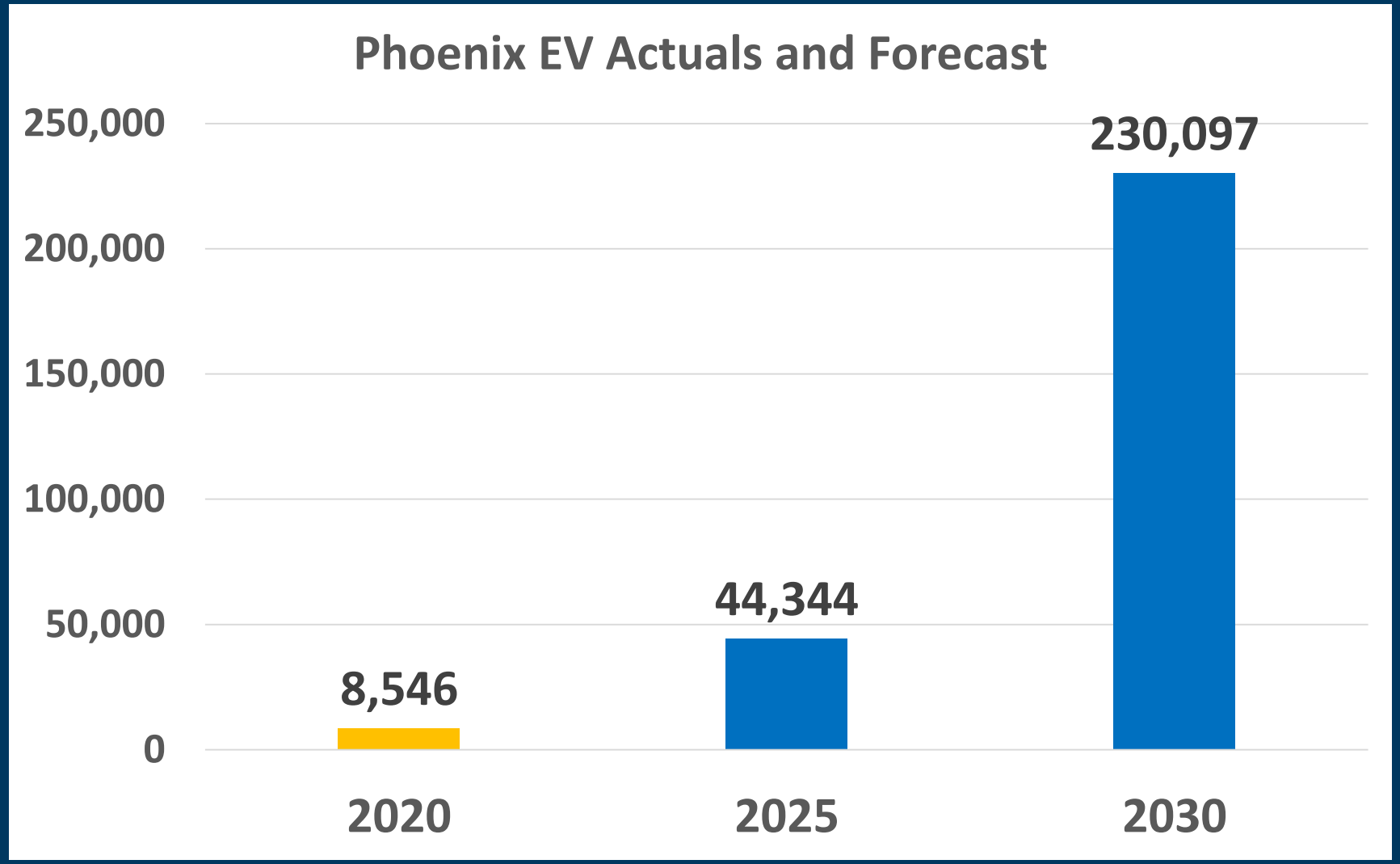


EV Sales Share: February 2021



AZ ranked 6th in EV Sales in Feb 2021

Phoenix - EV Growth



EV Chargers Needed by 2030

Level 2 – 3,031

DCFC - 359

Source: Actual 2020 data - EPRI

Overall Strategy and Vision

Proposed CAP Goal: Net-zero GHG Emissions by 2050

Proposed EV Goal: 100% Zero Carbon City Fleet by 2050

EV Objectives

Increase EV Charging Infrastructure	Explore building code updates
Increase EV Chargers on City Property	Currently 106 EV City provided charging ports
Replace light duty City ICE fleet with EV's	**Target Action:** 200 new EV sedans by 2030
Develop Community Outreach and EV Engagement Campaign	Partner with utilities and stakeholders
Implement Equity Principals into EV Policies and Programs	Identify focus areas

Working with new City Council Ad Hoc EV Working Group led by Councilwoman Ansari

City Projects – In Process and Planned

Fleet	EV Chargers	Education & Outreach	Building Codes
In Process	**In Process**	**In Process**	**In Process**
•Increase EV fleet transitions for 2030 Goal	•Installation of 35 Level 2 chargers	•Partner with APS/SRP and stakeholders	•Coordinate with builder associations
Planned	**Planned**	**Planned**	**Planned**
•Develop Green Sustainable Fleets Plan	•Develop City EV Charger Siting Study with MAG	•Develop events and EV Roadmap	•Exploring EV Ready building codes

Karen Apple

Karen.Apple@Phoenix.gov

EV-Charging Infrastructure Needs Nationally

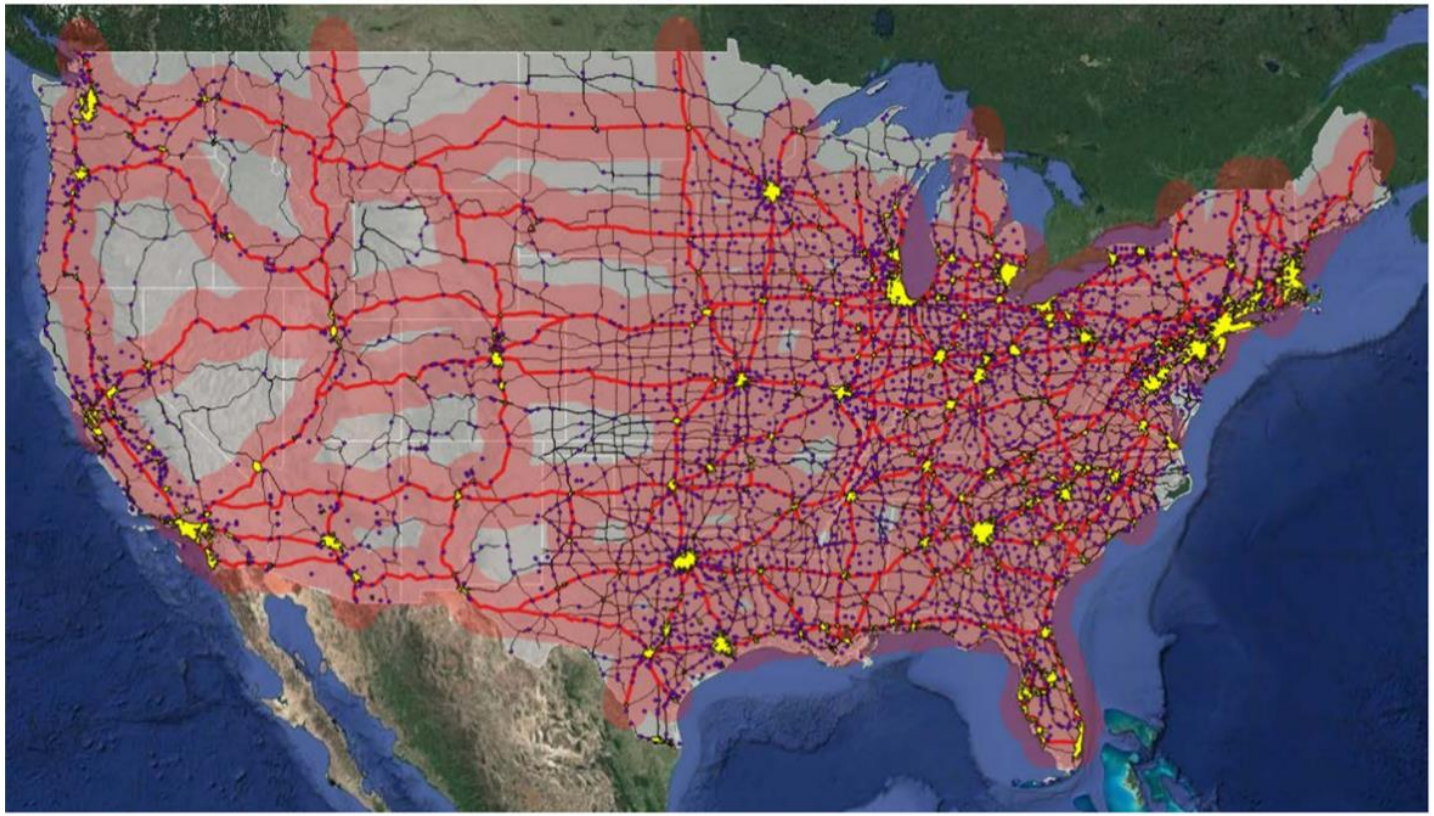


Figure ES-3. Approximate BEV driving coverage enabled by providing DCFC stations along the U.S. Interstate System.
(Satellite imagery credit: © 2017 Google, Map Data © 2017 Tele Atlas)

- Range anxiety is a concern for Arizonans, especially those in rural counties
- Recent analysis from NREL shows that 400 highway corridors in the country require DC Fast Charging Stations.
- The areas in red show a 70-mile average spacing between charging stations.

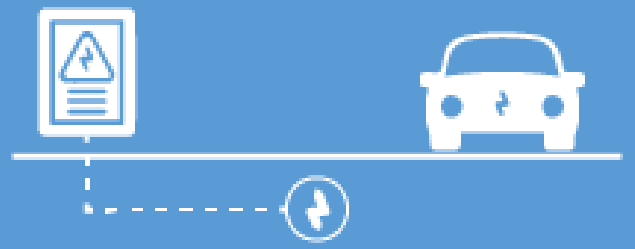
NREL; *National Plug-In Electric Vehicle Infrastructure Analysis*

EV Charging Infrastructure: Building Code Definitions

1. **“EV-Capable”**

Electrical panel capacity + branch circuit + raceway

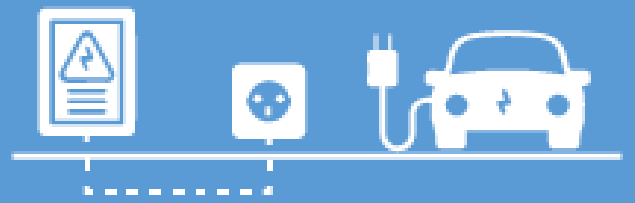
Atlanta, GA: 20% is EV-Capable (Ordinance)



2. **“EV-Ready”**

EV-Capable + 240-volt outlet

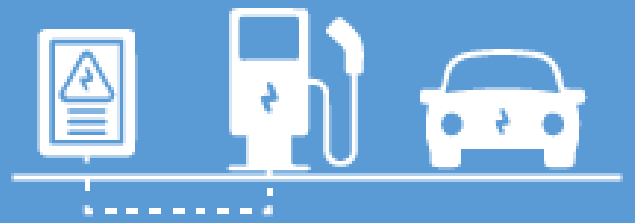
Denver, Boulder: (1) EV-Ready Space per dwelling for SFU



3. **“EV-Installed”**

Install a minimum number of Level 2 charging stations

Denver: 5% EV-Installed for MFU & Commercial

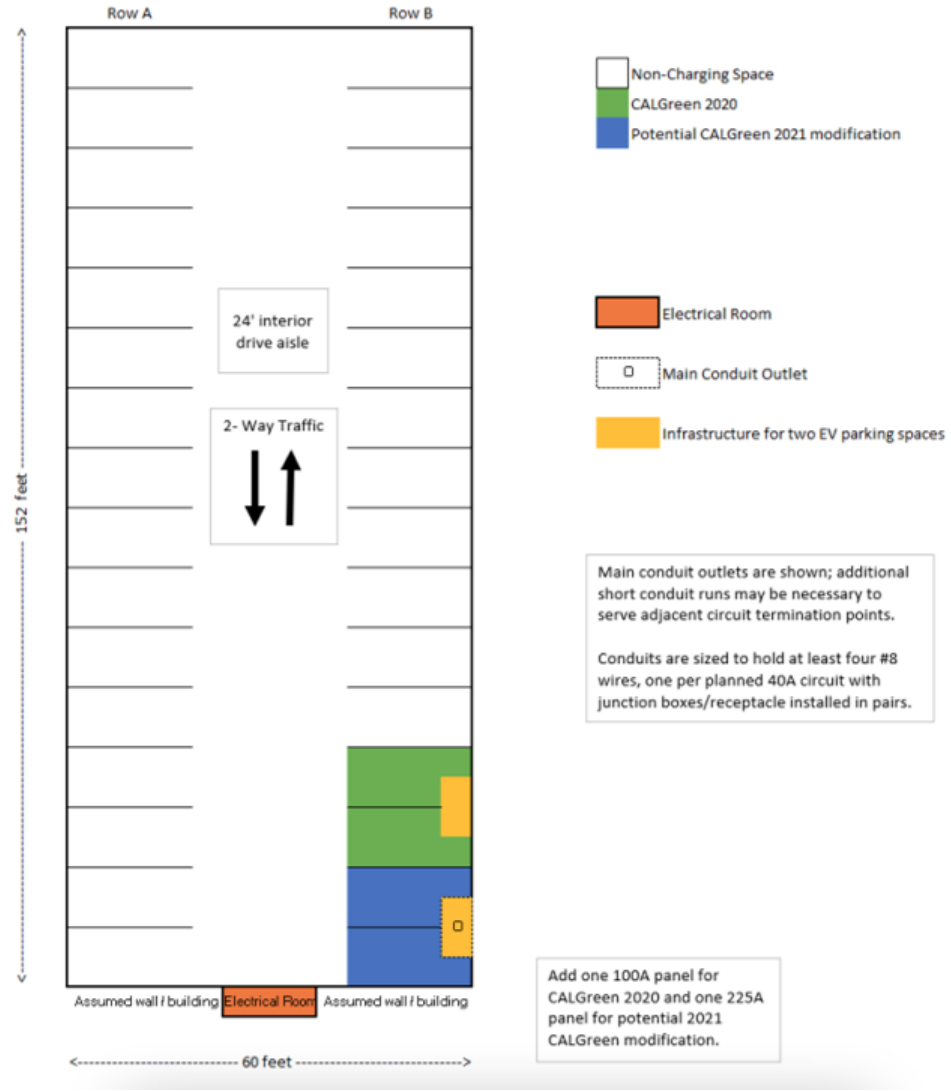


Multi-Family EV Charging Challenges

- **50% of Americans do not have access to a dedicated off-street parking space at their residence.**

- **Logistical barriers of installation:**
  - **HOA rules**
  - **Shared or non-deeded parking spaces**
  - **Split incentive for renters**

- **Nearly 50% of Californians reside in multi-unit dwellings (MUD) and about 20% of the state's light-duty vehicle fleet is located at these residences – Equity problem.**

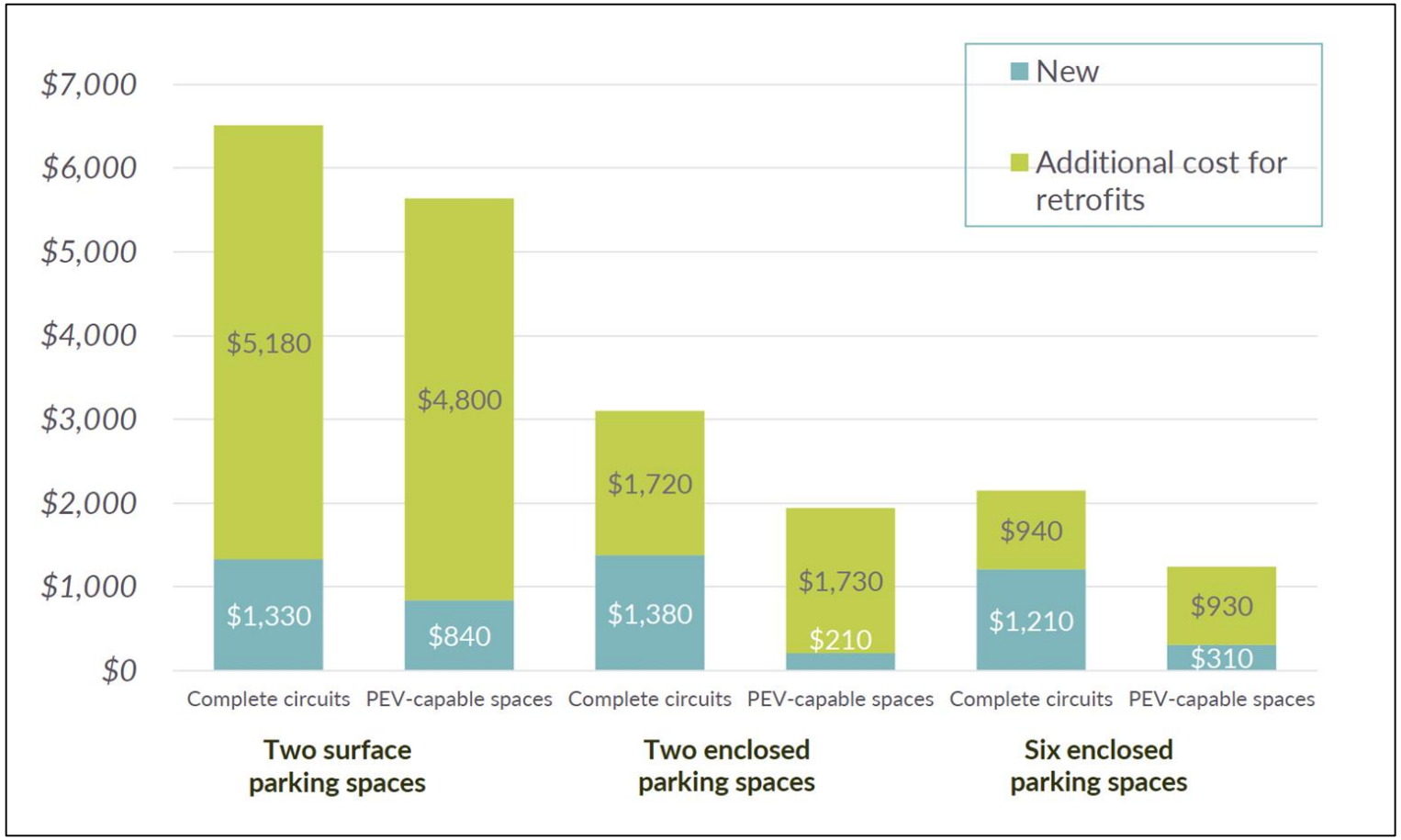


California Electric Transportation Coalition, **Plug-In Electric Vehicle Infrastructure Cost Analysis Report for CALGreen Nonresidential Update**
https://caletc.aodesignsolutions.com/assets/files/CALGreen-2019-Supplement-Cost-Analysis-Final-1.pdf

Avoid EV Charging Infrastructure Costs Skyrocket For Retrofits.

“Installing EV capable parking spaces in stand-alone retrofits is typically 4 to 6 times more expensive compared to installing EV capable parking spaces during new construction. If EV capable parking spaces are installed during new construction, $2,040 - $4,635 per parking space is saved over the retrofit scenario.”

- **Energy Solutions (2019)**



Costs modeled for the City of Oakland

Examples of Municipal Adopted EV-Ready Building Codes

Municipality	State	Year	Location	Single-family	Multi-family	Commercial
Sedona	AZ	2019	IBC / IRC	1 EV-Capable Space per dwelling Unit		5% EV-Capable
Flagstaff	AZ	2019	IBC / IRC	1 EV-Ready Space per dwelling Unit	3% EV-Ready	3% EV-Ready
Seattle	WA	2019	Ordinance	1 EV-Ready Space per dwelling Unit	100% EV-Ready up to 6 space, 20% EV-Capable for 7+ spaces	10% EV-Ready
Denver	CO	2019	IBC / IRC	1 EV-Ready Space per dwelling Unit	5% EV-Installed, 15% EV-Ready, 80% EV-Capable	5% EV-Installed, 10% EV-Ready, 10% EV-Capable
San Jose	CA	2019	Ordinance	1 EV-Ready Space per dwelling Unit	10% EV-Installed, 20% EV-Ready, 70% EV-Capable	10% EV-Installed, 40% EV-Capable
Vancouver	BC	2019	IBC / IRC	1 EV-Ready Space per dwelling Unit	100% EV-Ready	10% EV-Ready
2021 IECC	International	2021	IBC / IRC	1 EV-Ready Space per dwelling Unit	2 EV-Ready Spaces, 20% EV-Capable	2 EV-Ready Spaces, 20% EV-Capable