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# Introduction

- The Maricopa County Air Quality Department is committed to developing and implementing voluntary programs that can improve air quality.
- 2018 Community Greenhouse Gas (GHG) Emissions Inventory began to quantify GHG emissions on a county-wide scale.
- 2020 update provides a more current assessment of emissions and an emission trends analysis.
- A comprehensive understanding GHG emissions in Maricopa County can help us drive initiatives aimed at reducing criteria air pollutants.
- Emissions profiles for each municipality can inform local programs and policies.



# Source Categories

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- Mobile Sources
- Electricity Use
- Stationary Fuel Combustion
- Wastewater
- Livestock (Cattle)
- Manufacturing Gases
- Solid Waste
- Imported Water (Electricity Use)
- Fertilizer Use

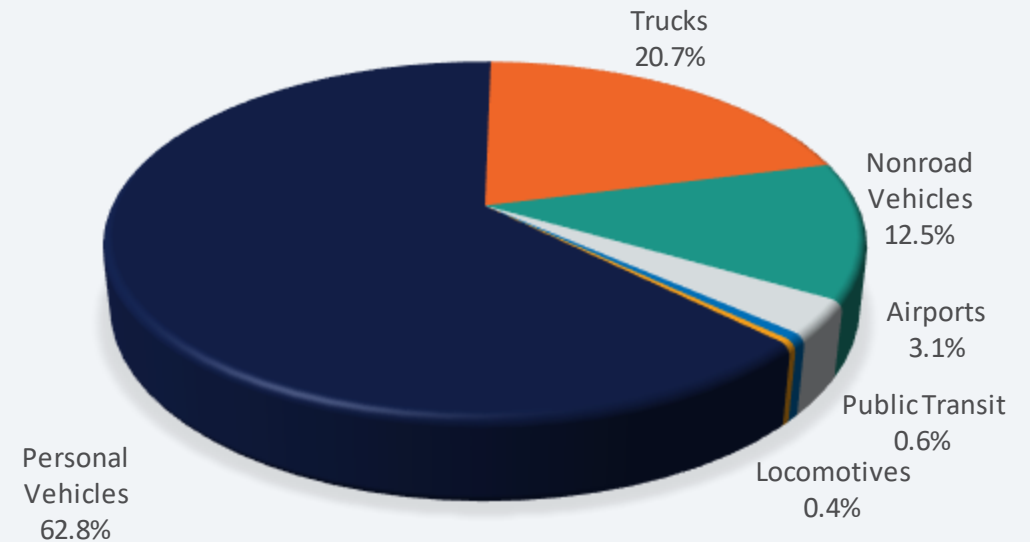
# Mobile Sources

## METHODS

- Maricopa Association of Governments (MAG) provided MOVES3 and AEDT modeling data.
  - Motor vehicle emissions simulator
  - Aviation environmental design tool
- EPA calculated county level locomotive emissions data for the 2020 National Emissions Inventory (NEI).
- Emissions allocated to municipalities and unincorporated areas according to population proportion.

## RESULTS

**Maricopa County Mobile Source GHG Emissions**



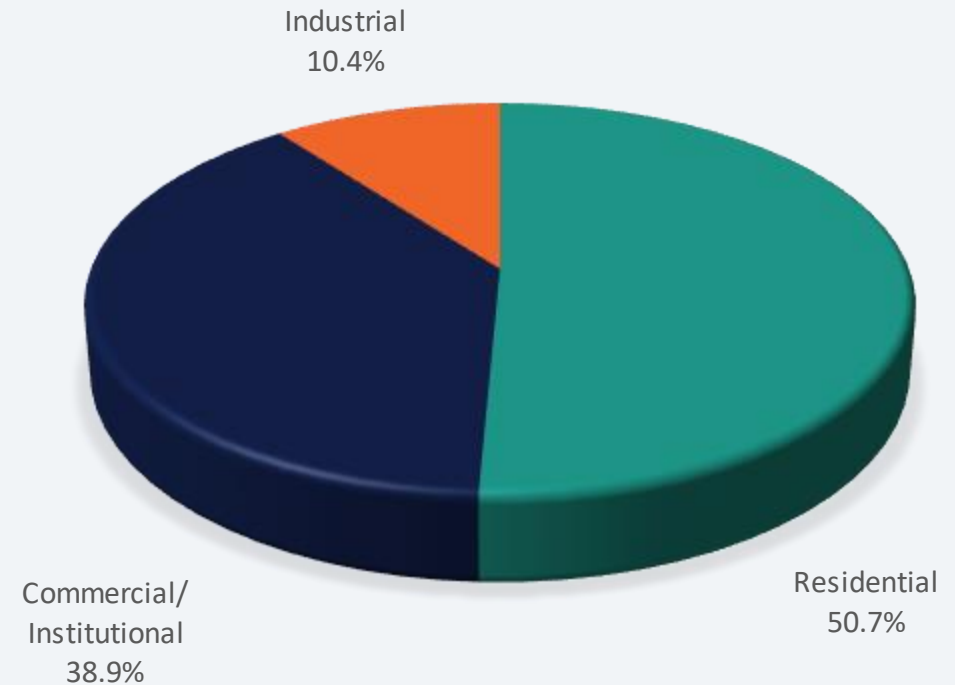


# Electricity

## METHODS

- Arizona Public Service Company (APS) and Salt River Project (SRP) provided electricity use data for each municipality by economic sector and sulfur hexafluoride (SF<sub>6</sub>) usage records.
- Local GHG emission factors for electricity use were obtained from the EPA 2020 eGRID summary table.
- SF<sub>6</sub> emissions were allocated to municipalities and unincorporated areas according to relative electricity use.

## EMISSIONS BY ECONOMIC SECTOR



# Stationary Fuel Combustion

## METHODS

- Fuel use data was obtained from the EPA Institutional, Commercial, and Industrial (ICI) Combustion tool and the EPA Residential Heating tool, both developed for the 2020 NEI.
- Quality assurance verification was conducted using the Energy Information Administration (EIA) State Energy Data System (SEDS)
- Emissions were calculated based on fuel usage using the EPA Local Greenhouse Gas Inventory Tool.
- Emissions were allocated to municipalities and unincorporated areas according to population proportion.

## RESULTS

Category	MTCO <sub>2</sub> e*	%
Industrial	563,944	20.2
Commercial	1,042,597	37.3
Residential	1,189,766	42.5
<b>Total</b>	<b>2,796,307</b>	<b>100.0</b>

\* Metric tons of carbon dioxide equivalents.

# Wastewater

## METHODS

- Wastewater facilities in Maricopa County were surveyed to understand treatment processes at each facility and number of households served.
- Population served by septic estimated.
- Emissions calculated using EPA LGGIT based on treatment process data and septic population estimate.
- Emissions were allocated to municipalities and unincorporated areas according to population proportion.

## RESULTS

Category	MTCO <sub>2</sub> e	%
Wastewater Treatment	903,329	87.2
Septic	132,494	12.8
<b>Total</b>	<b>1,035,823</b>	<b>100.0</b>



# Livestock (Cattle)

## METHODS

- Cattle data obtained from the National Agricultural Statistics Service 2017 Livestock Census.
- Updated methods from the International Panel on Climate Change Guidelines for National Greenhouse Gas Inventories were used to calculate beef and dairy cattle emissions.
- Emissions were allocated to municipalities and unincorporated areas according to relative proportion of land zoned for cattle production.

## RESULTS

Category	MTCO <sub>2</sub> e	%
Beef Cattle	5,202	0.6
Dairy Cattle	851,257	99.4
<b>Total</b>	<b>856,459</b>	<b>100.0</b>

# Manufacturing (Fluorinated Gas Use)

## METHODS

- Emissions data obtained using EPA Facility Level Information on GHG Tool (FLIGHT).
- Emissions were allocated to municipalities and unincorporated areas according to population proportion.

## RESULTS

Gas	MTCO <sub>2</sub> e
CH <sub>4</sub>	0
N <sub>2</sub> O	53,595
SF <sub>6</sub>	90,019
NF <sub>3</sub>	83,762
HFCs	64,929
PFCs	276,213
HFES	9
OFF	11,229
<b>Total</b>	<b>579,756</b>

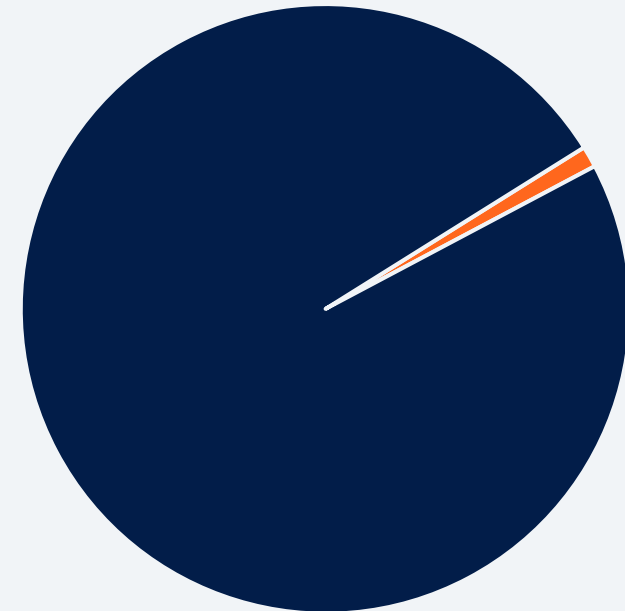
# Solid Waste

## METHODS

- Emissions data obtained from City of Chandler Landfill and EPA FLIGHT.
- Emissions were allocated to municipalities and unincorporated areas according to population proportion.

## RESULTS

Emission Total: 526,354 MTCO<sub>2</sub>e



■ Solid Waste   ■ Other GHG Emissions Source Categories

# Imported Water (Electricity Used)



- Central Arizona Project provided data on electricity used to pump water into and through Maricopa County and the emissions factor for electricity used.
- Emissions were allocated according to population proportion.
- 274,346 MTCO<sub>2</sub>e

Image obtained from the CAP Fact Sheet Power Portfolio. <https://library.cap-az.com/documents/factsheets/cap-fact-sheet-power-portfolio.pdf>

# Fertilizer Use

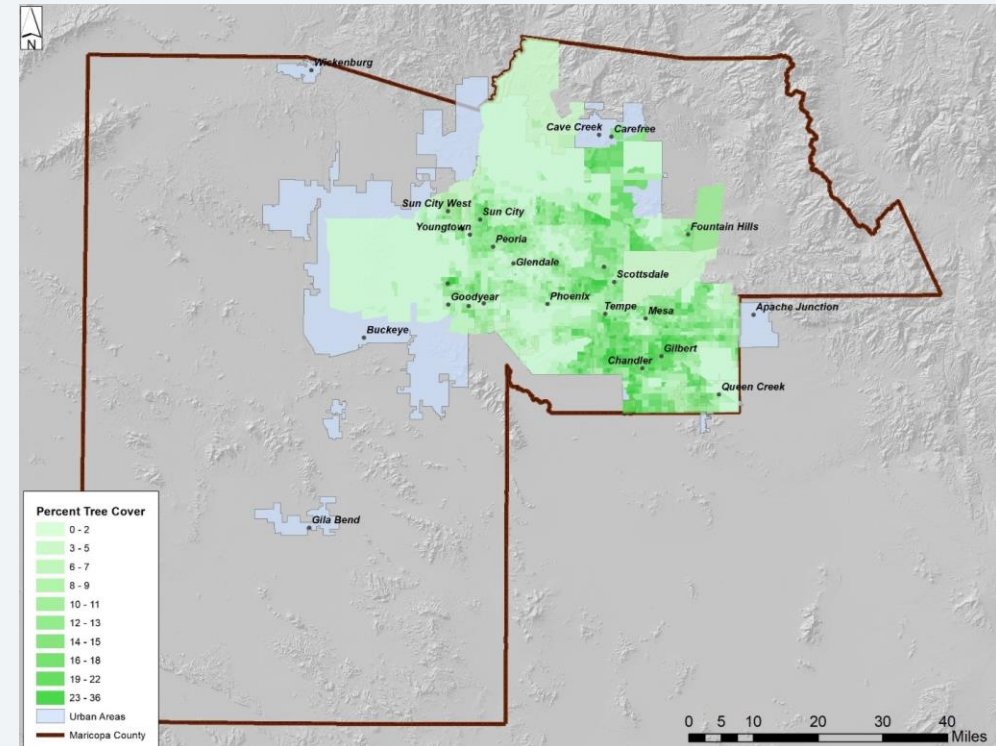
- County level nitrogen fertilizer use data (1950-2017) from the U.S. Geological Survey was used to extrapolate nitrogen fertilizer use in 2020.
- GIS land use data for parcels in Maricopa County was used to determine quantity of land available for fertilizer application.
  - Residential parcels and parks - 33% land available
  - Golf courses - 100% land available
- Weighted factor of 1.1 was used for golf courses to account for the additional fertilizer that is applied to this land type compared to residential and park land.
- Emissions were allocated according to proportion of land area zoned for residential, parks, and golf courses.
- 149,736 MTCO<sub>2</sub>e

# Urban Forestry GHG Reductions

## METHODS AND RESULT

- Tree cover data obtained from EPA EnviroAtlas.
- Used LGGIT to estimate carbon sequestration based on tree cover data.
- Allocated using GIS based on the percent tree cover for each municipality and economic sector
- - 274,963 MTCO<sub>2</sub>e

## TREE COVER MAP



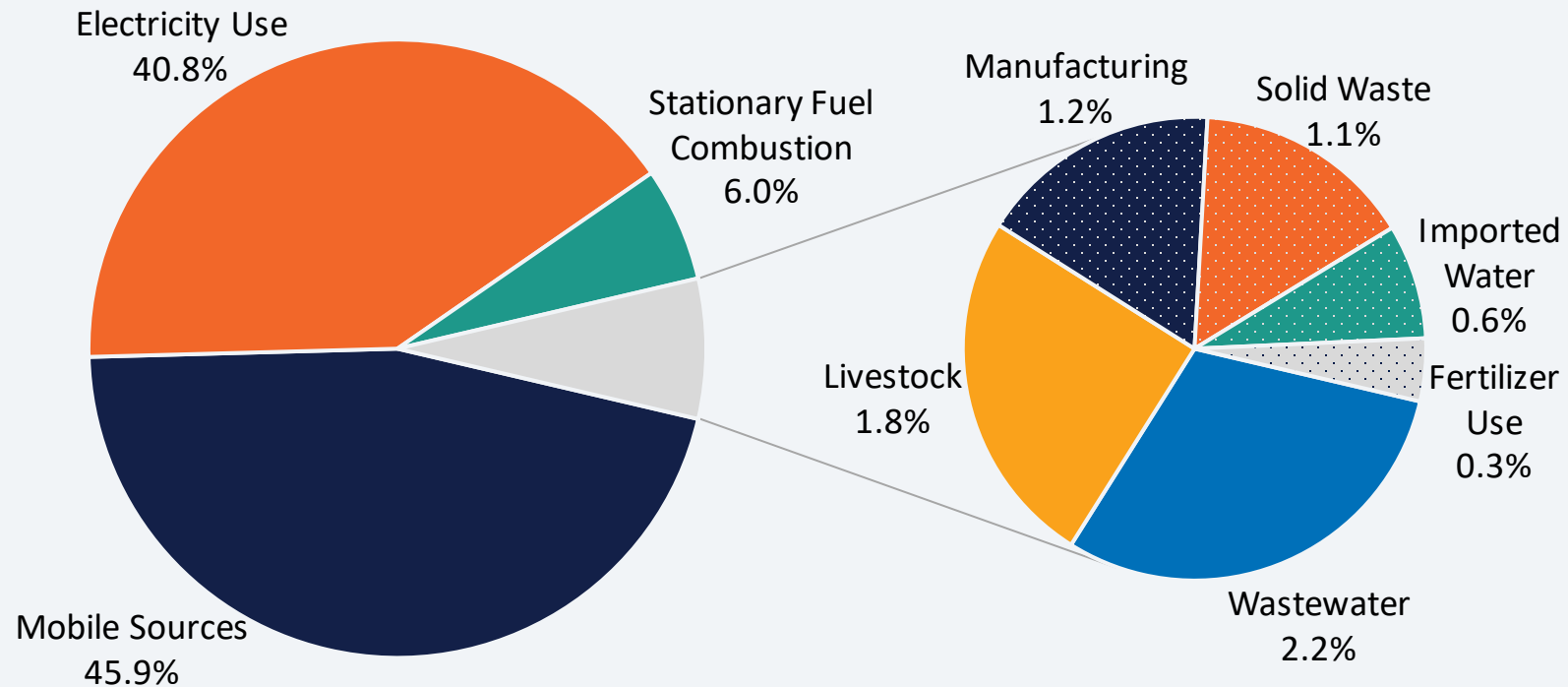




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# Results

# Maricopa County 2020 Community Greenhouse Gas (GHG) Emissions Profile



**Gross GHG Emissions**  
46,827,538 MTCO<sub>2</sub>e

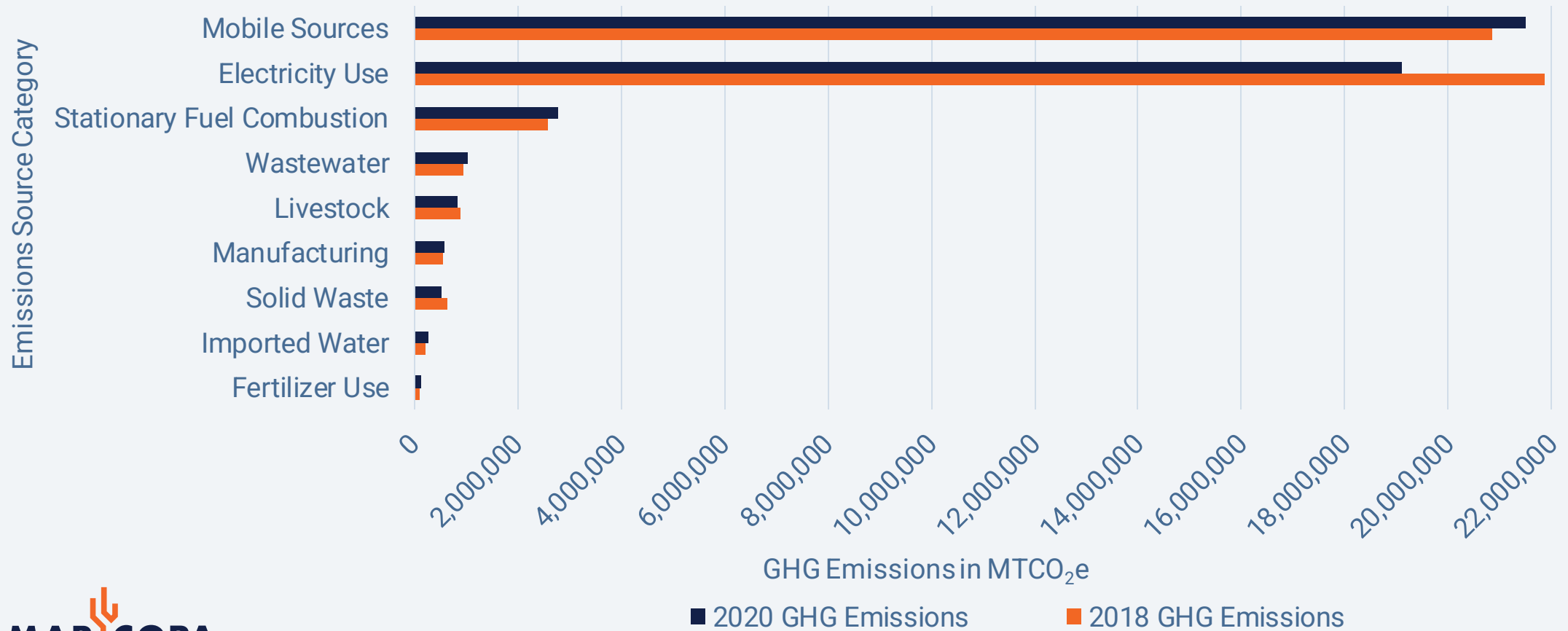
**GHG Reductions  
(Urban Forestry)**  
-274,963 MTCO<sub>2</sub>e

**2020 Net GHG Emissions**  
46,552,576 MTCO<sub>2</sub>e

**Per Capita Net GHG  
Emissions**  
10.5 MTCO<sub>2</sub>e

# Emissions Changes from 2018 to 2020

Maricopa County Community GHG Emissions 2018 and 2020 by Source Category



# Municipal Profiles

- Source Category emissions allocations
- Gross, Net, and Per Capita GHG emissions
- Source Category emissions graphic
- Electricity emissions by economic sector
- Phoenix Mobile Source emissions by mobile source type

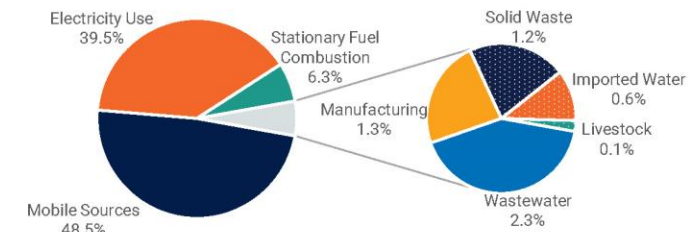
## Phoenix 2020 Community Greenhouse Gas (GHG) Emissions Profile

GHG Emissions by Source Category	GHG Emissions MTCO <sub>2</sub> e*	GHG Emissions Percentage	
Mobile Sources	7,808,835	48.5%	<b>Gross GHG Emissions</b> 16,089,664 MTCO <sub>2</sub> e <b>GHG Reductions (Urban Forestry)</b> -44,733 MTCO <sub>2</sub> e <b>Net GHG Emissions</b> 16,044,931 MTCO <sub>2</sub> e <b>Per Capita Net GHG Emissions</b> 10.0 MTCO <sub>2</sub> e <b>2018 Net GHG Emissions**</b> 16,989,565 MTCO <sub>2</sub> e
Electricity Use	6,363,263	39.5%	
Stationary Fuel Combustion	1,015,462	6.3%	
Wastewater	376,572	2.3%	
Livestock (Cattle)	20,979	0.1%	
Manufacturing (Fluorinated Gas Use)	210,535	1.3%	
Solid Waste	191,142	1.2%	
Imported Water (Electricity Used)	99,627	0.6%	
Fertilizer Use	3,248	0.0%	

\*Metric tons of carbon dioxide equivalent

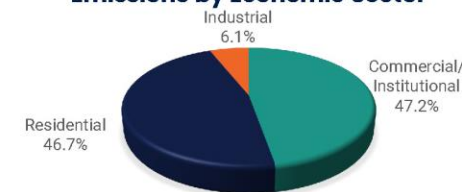
\*\*Corrected value.

### Phoenix GHG Emissions by Source Category

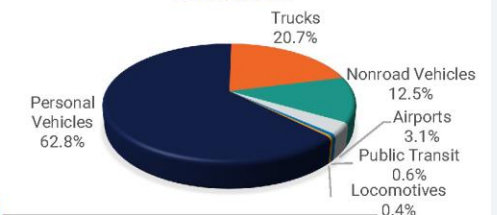


\*\*\*Fertilizer use not included.

### Phoenix Electricity Use GHG Emissions by Economic Sector



### Phoenix Mobile Source GHG Emissions



# Full Report Available Now

- Full Maricopa County 2020 Community Greenhouse Gas Emissions Inventory report, data file, and additional resources are available at the site below.
- Individual profiles are available for each municipality and unincorporated areas.
- <https://www.maricopa.gov/5593>



# Contact Information

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**Thank You**