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# Electric Vehicle Procurement in San Francisco's Municipal Fleet

November 17, 2016

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# Agenda

- Policy Review – Local, State, Federal
- Alternative Fuel Vehicles & Charging
- Electric Vehicle Progress - 2016
- City Fleet Overview
- Current City Fleet Initiatives
- Next steps

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# Policy Review

SF Greenhouse Gas (GHG) reduction goals:

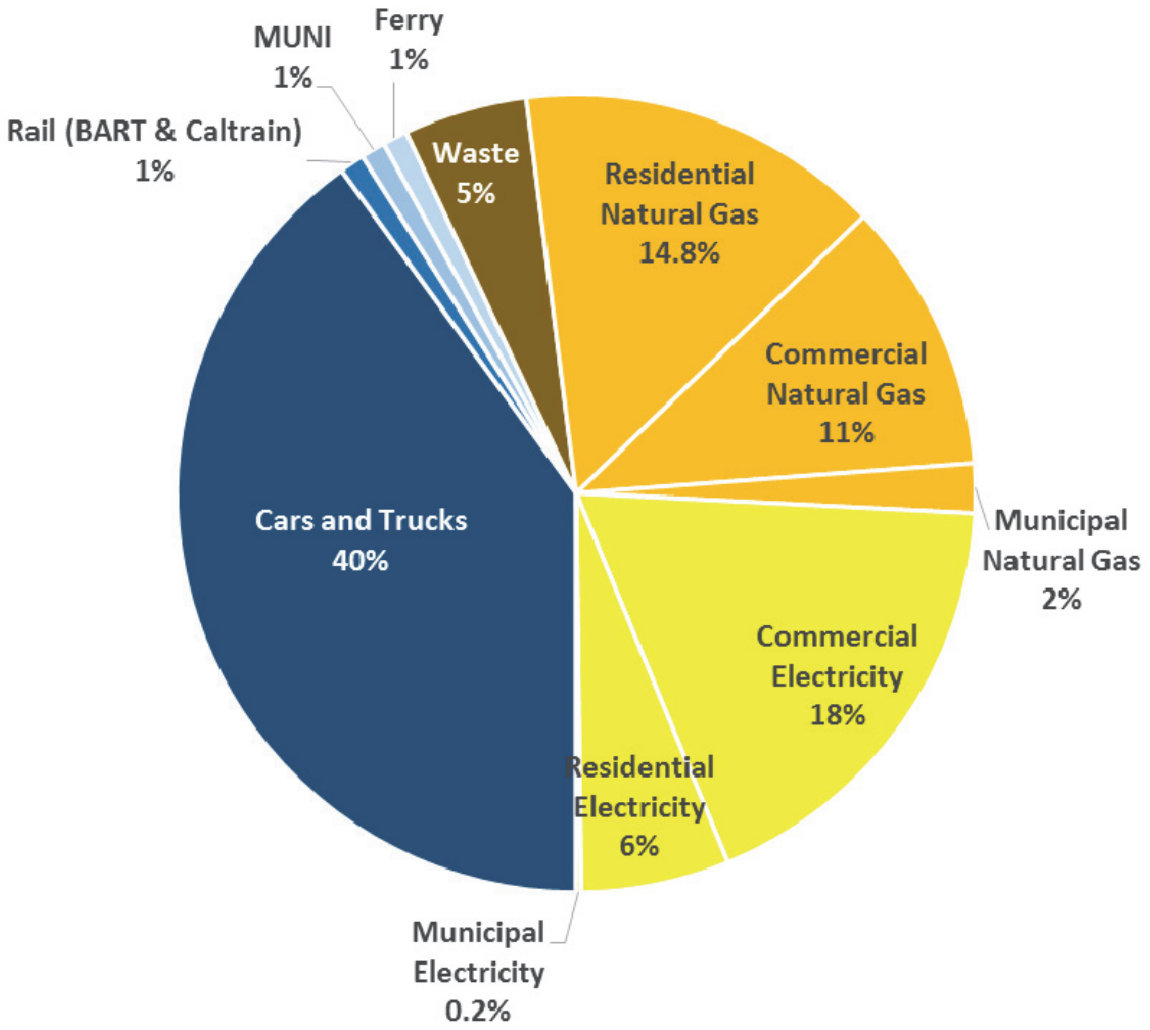
- 40% by 2025
- 80% by 2050

SF Renewable Energy (electrical supply) goal:

- 100% by 2030

SF Municipal Fleet Procurement goal:

- 10% EV purchasing commitment



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# Revised HACTO Legislation

- Applies to sedans and light duty trucks (under 8,500 lbs.) with exceptions for safety and enterprise departments vehicles
- Fleet management, vehicle selection, and overall HACTO implementation management transferred to Administrator's Office from SFE
- Mandatory fleet reduction requirements replaced with policies to optimize size and use of vehicle fleet; integrate technology to promote safe and environmentally friendly use of vehicles
- Aligned City's GHG reduction goals with Federal Executive Order 13693, Planning for Federal Sustainability in the Next Decade
  - 4% reduction by end FY2017
  - 15% reduction by end FY2021
- Authorized a master agreement for car share services
- SFE continues to facilitate development of alternative fuel vehicle infrastructure, seek funding for pilot programs, and encourage residents, businesses and private fleet operators to procure alternative fuel vehicles.

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# Policy Review

## California

- EO (Mar 2012) – 1.5M Zero Emission Vehicles (ZEV;) by 2025
    - ZEV = Fuel Cell Electric Vehicles, Plug-in Hybrid Electric Vehicles and Battery Electric Vehicles
- SB350 (Oct 2015) – Statewide 50% renewable energy (electricity supply) by 2030
- SB32 (Aug 2016) – Statewide 40% GHG reduction below 1990 levels by 2030 and 80% by 2050
- ZEV Action Plan (2016) – 50% of state's annual light duty purchases will be ZEV by 2025

## Federal

- Executive Order (Mar 2015) – "Planning for Federal Sustainability in the Next Decade" requires 20% of federal fleet passenger vehicle acquisitions to be electric vehicles by 2020 and 50% by 2025

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# Alternative Fuel Vehicles

## Electric

- **Battery Electric Vehicle (BEV)** –uses an electric motor powered by a rechargeable battery
- **Plug-in Hybrid Electric Vehicle (PHEV)** – uses an electric motor for a short range miles and hybrid engine powered by gasoline for distance
- **Hydrogen Fuel Cell Electric Vehicle (FCEV)** – uses hydrogen as fuel to power an electric engine through fuel cells

## Non-electric

- **CNG*** – runs on internal combustion engine powered by compressed natural gas, which is cleaner and safer than standard gas
- **Hybrid*** (HEV) – combines combustion engine with electric system that improves fuel economy

* Consensus moving away from CNG and Hybrid as true alternative fuel vehicle due to new technologies

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# Present and Future EV's

**Battery Electric Vehicle (BEV)**
- 80–115 mile range on single charge

Possible options:
- Ford Focus Elec. (76 miles)
- Kia Soul EV (93)
- Nissan Leaf (107)
- Smart Electric Drive (68)

**Plug-in Hybrid Electric Vehicle (PHEV)**
- 20-50 mile electric range
- 300+ miles extended range

Possible options:
- Chevy Volt (53)
- Ford C-Max Energi (19)
- Hyundai Sonata PHEV (27)
- Toyota Prius Prime (22)

**Long Range Electric Vehicle (LREV)**
- 200+ mile range on single charge

Possible Options:
- Chevy Bolt (238)
- Tesla Model 3 (200)
- Tesla Model S (315)

**Hydrogen Fuel Cell EV**
- Fueling station near SFO

Possible Options:
- Honda Clarity (240)
- Hyundai Tucson (265)
- Toyota Mirai (312)

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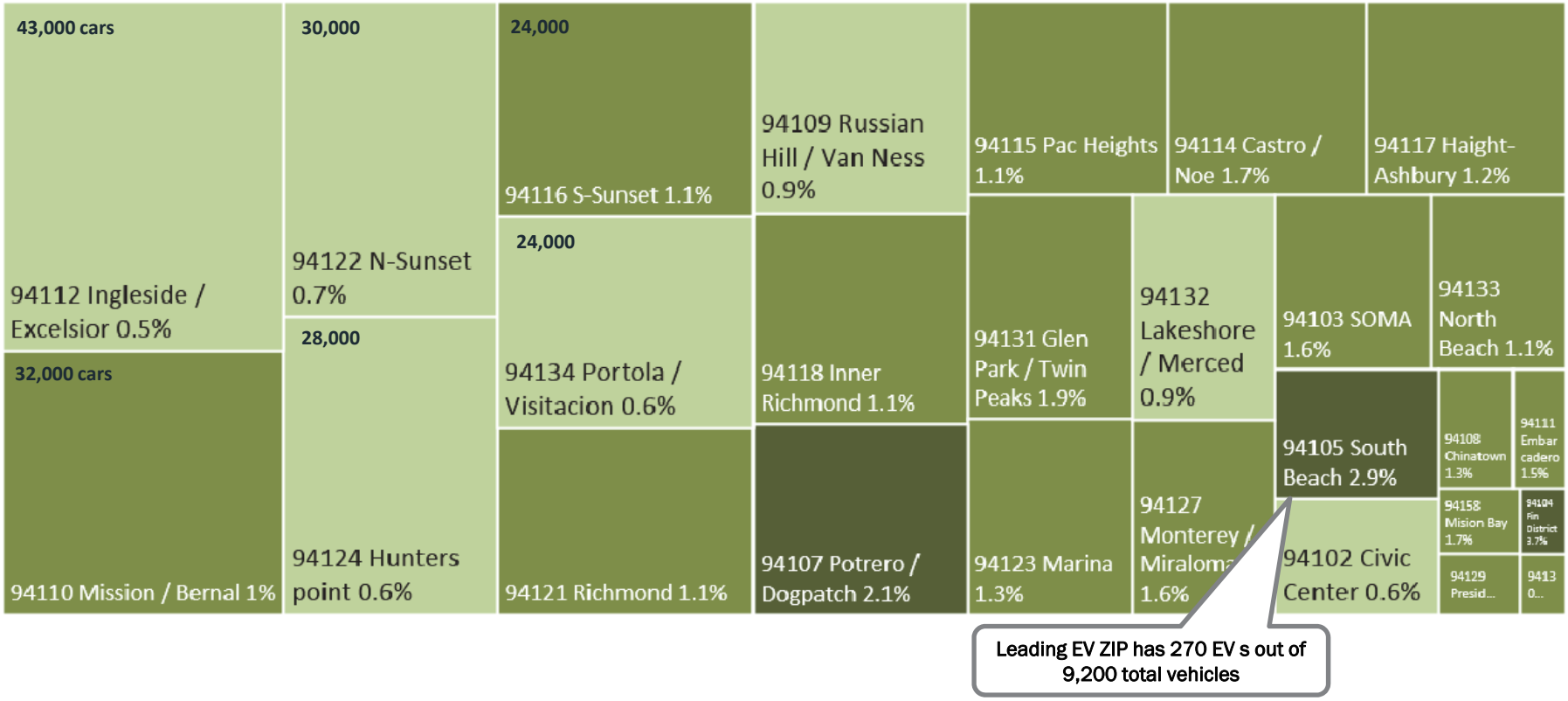
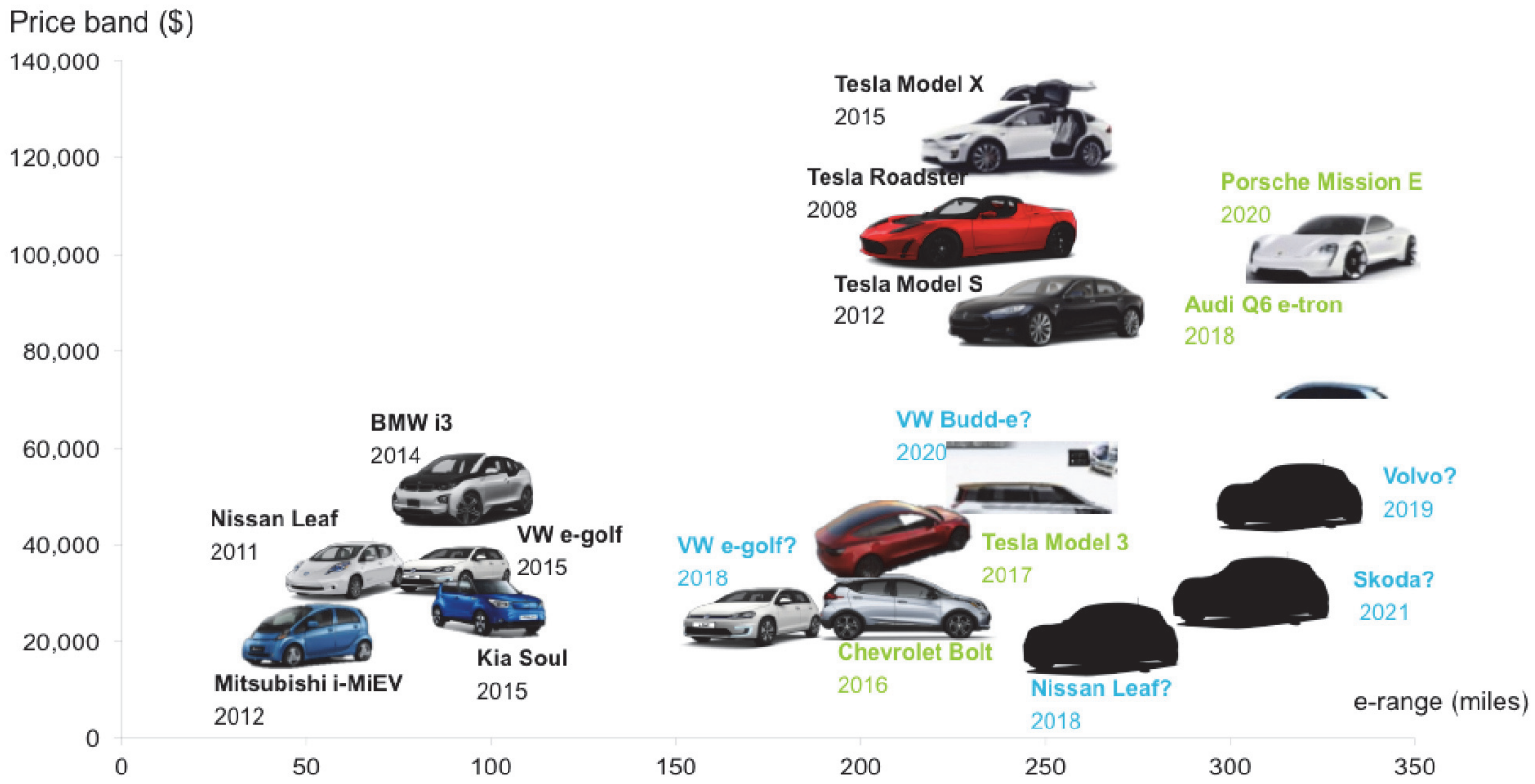
# SF / Bay Area lead nation in EV adoption

Nearly 5,000 registered EVs out of 425,000 passenger car fleet; up to 2-3% of total vehicles in parts of City



# Coming soon: better range and pricing



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# EV Charging 101


**Level 1:**

- 1kW - 4 miles per hour
- Use case: 40 miles/day, recharging overnight
- Hardware: 110v socket + onboard charging cable
- Costs*
  - Units: $300 - $1,500 per parking space
  - Installation: $200 - $3,000 per space

**Level 2:**

- 6.6kW - 25 miles per hour
- Hardware: 240v 'dryer' socket + onboard cable or wall mounted fleet solution
- Costs
  - $400 - $6,500 per space
  - Installation: $600 – $12,000+ per space
  - Managed charging

**DC Fast Charge:**

- 50kW+ = full charge in 15 – 30 min.
- Use case: 'On the road' charging / range extension for higher Vehicle Miles Traveled (VMT>100 Miles)
- Costs
  - Units: $10k - $40k per space
  - Installation: $4k - $51k per space



*Source: Costs Associated with Non-Residential Electric Vehicle Supply Equipment, U.S. Department of Energy (Nov. 2015).

# EV Charging: Municipal Facilities

## City owned/operated: 217 public and 25 fleet

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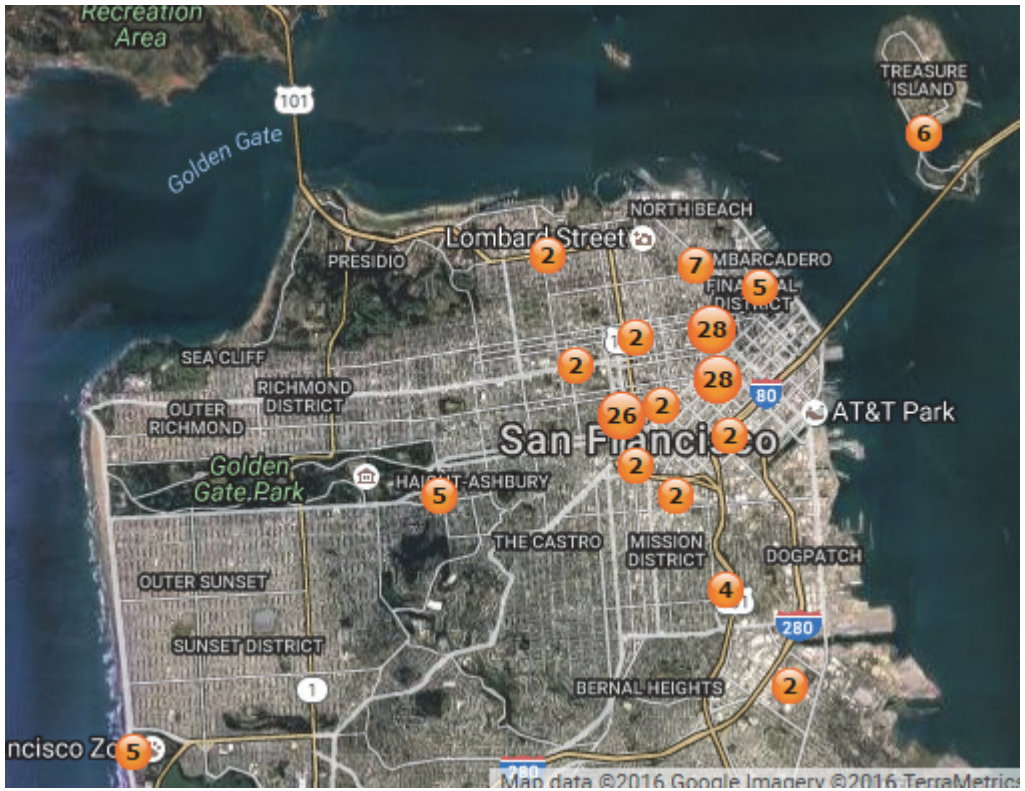
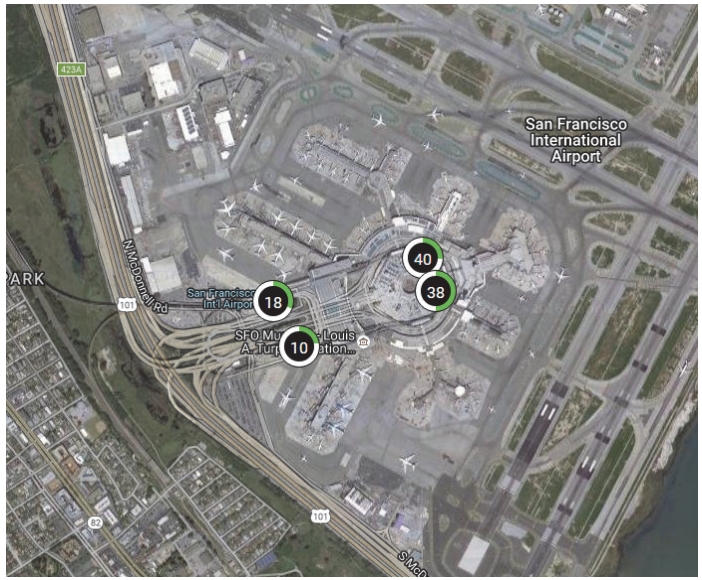
111 free public charging ports




106 free public charging points at SFO (20+ planned)




**September stats:**

- **52,600 kWh = 2,200 full Leaf charges**
- **6,600 gallons of gasoline saved**
- **6,281 sessions**
- **2,020 unique drivers**

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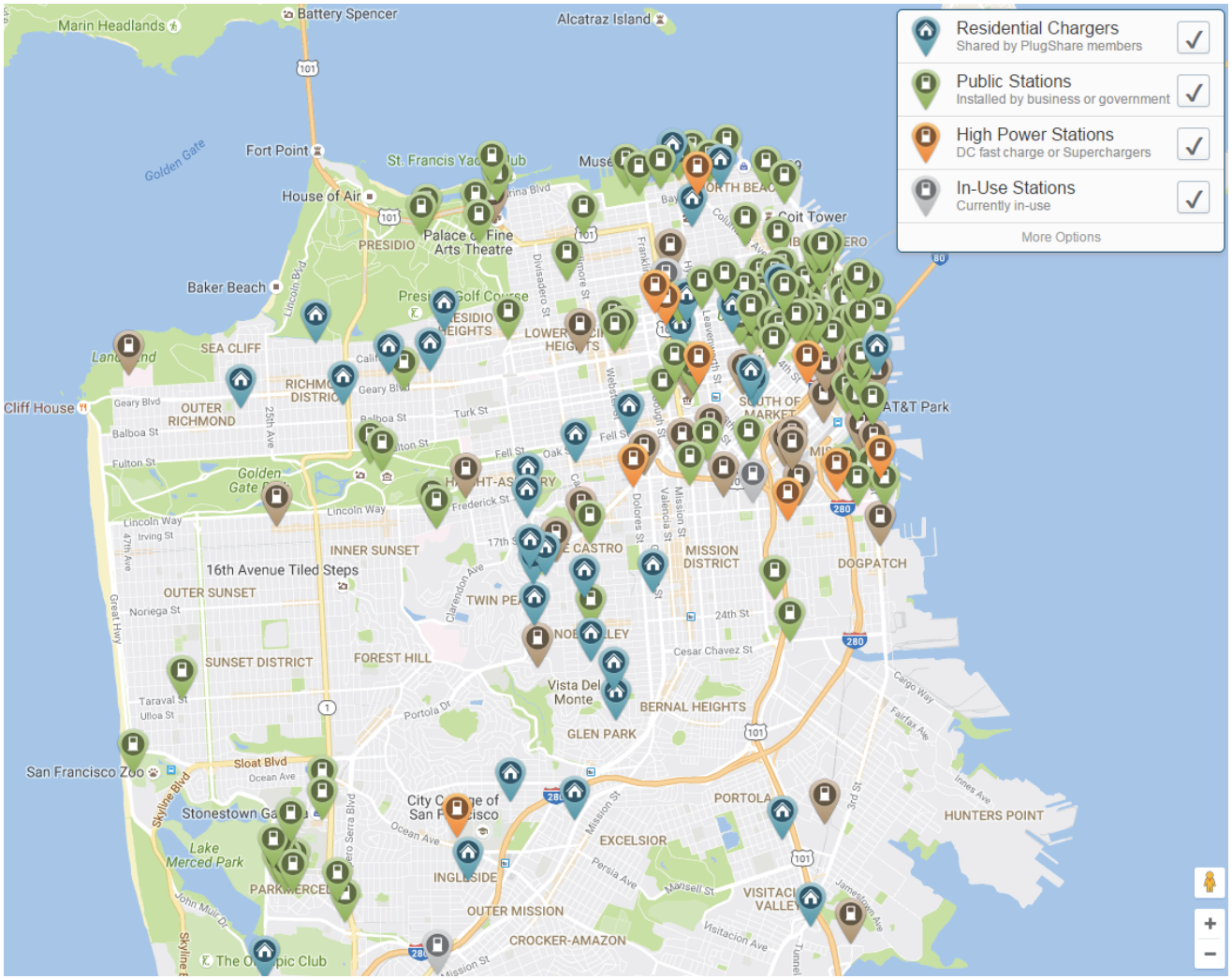
# EV Charging: Citywide

## 600+ level 2 stations; 24 fast chargers






Source: Plugshare map, DOE August 2016

# EV Progress 2016

## Grants / Updates

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- US Department of Transportation Smart City Challenge
- US Department of Energy
- California Energy Commission
- Carbon Neutral Cities Alliance
- Fee for charging: SFE/SFMTA
- West Coast Fleet Initiative: Request for Information

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# 2016 White House EV Challenge

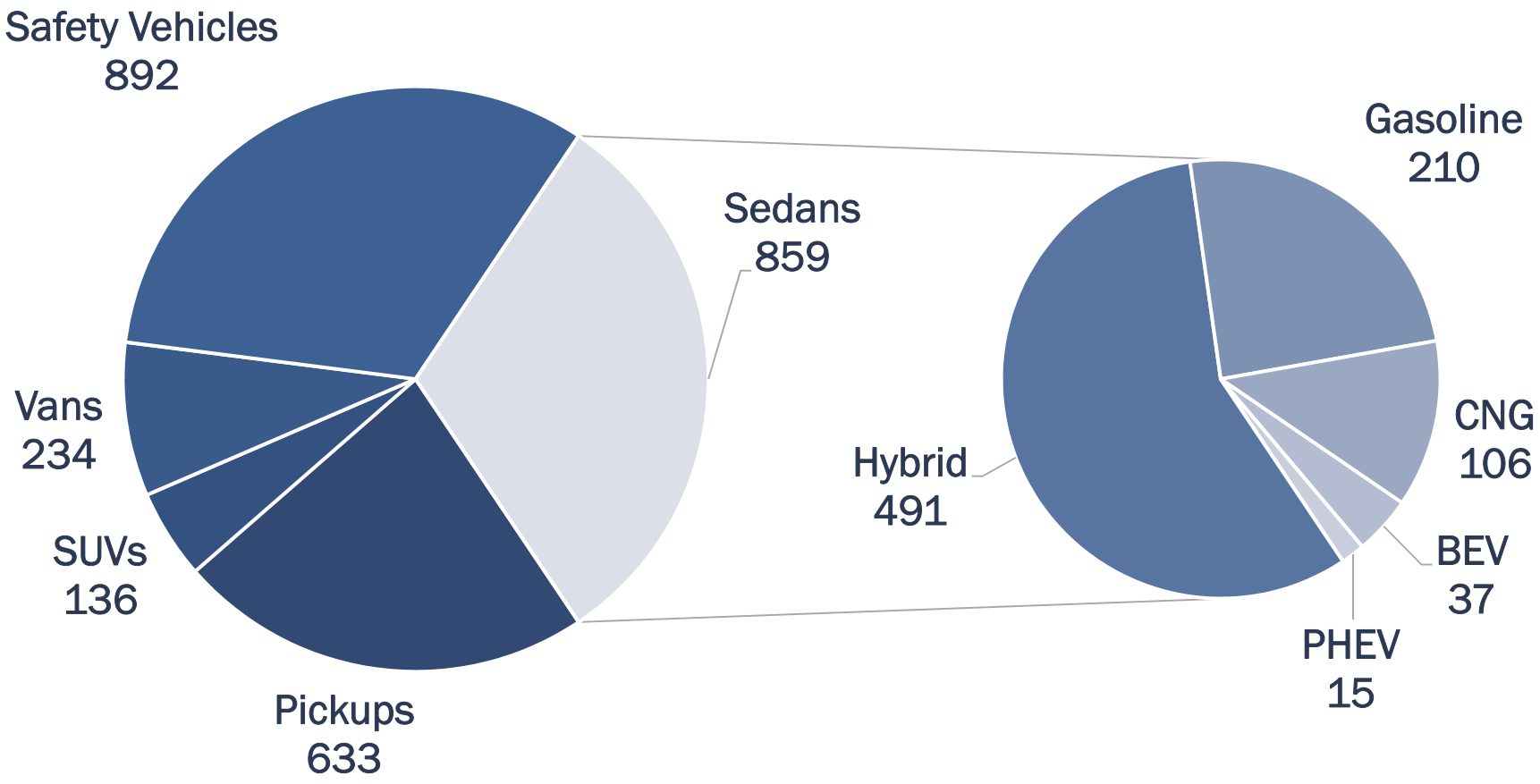
### Los Angeles
Annual procurement of light duty vehicles
50% BEVs by 2020; 80% of municipal fleet by 2025

### Portland, OR
30% of sedan fleet will be BEV/PHEV by 2020

### Austin, TX
Adding 330 BEV/PHEV by 2020

### Columbus, OH
Will procure 200 BEV/PHEV by 2019

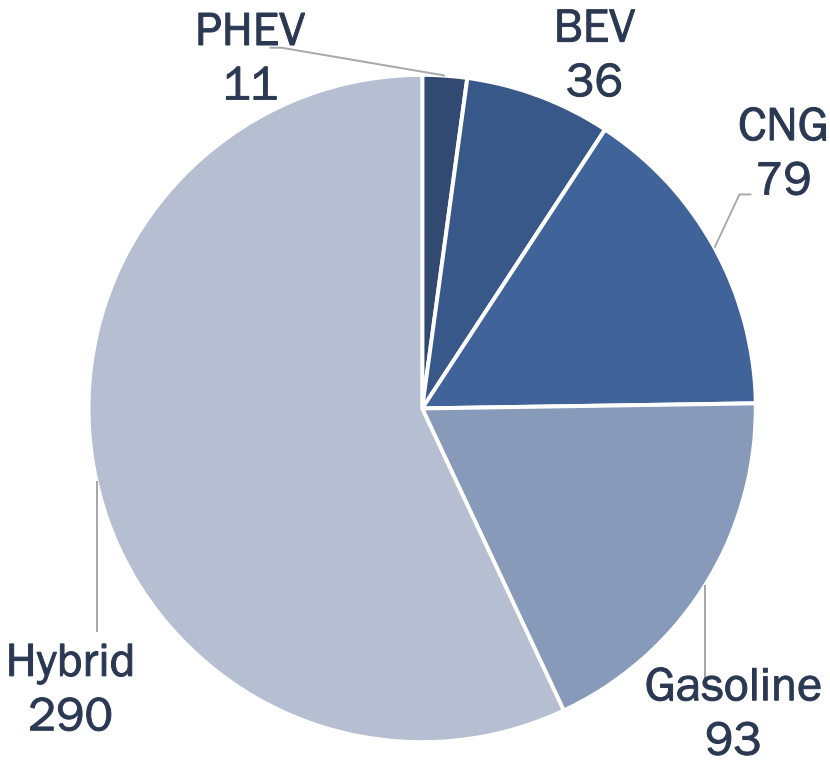
# Fleet Overview: Light Duty Vehicles




N = 2,754 vehicles

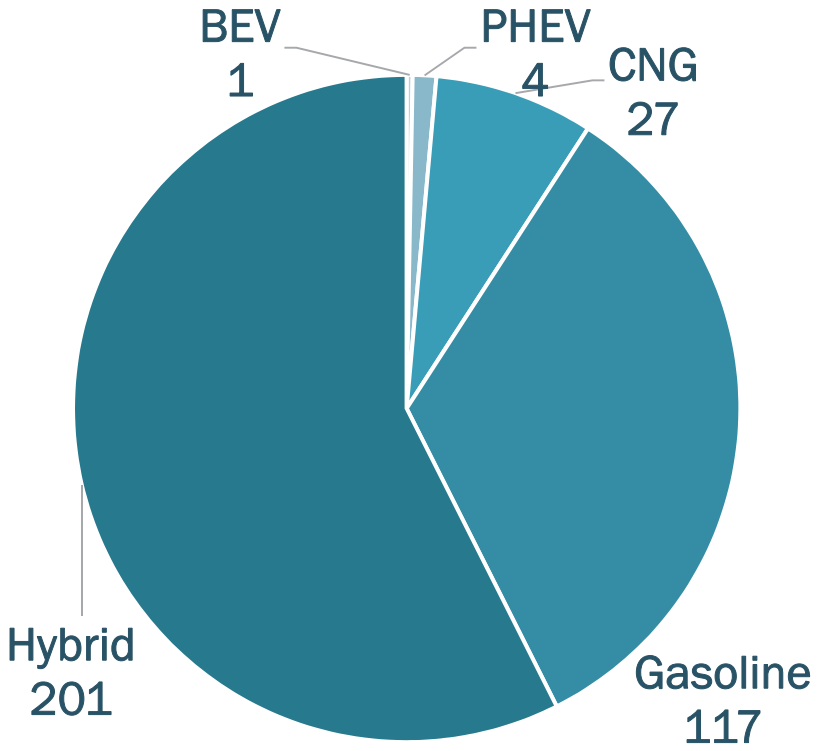
# Fleet Overview: Sedans

## General Government




N = 509 vehicles

## Enterprise




N = 350 vehicles

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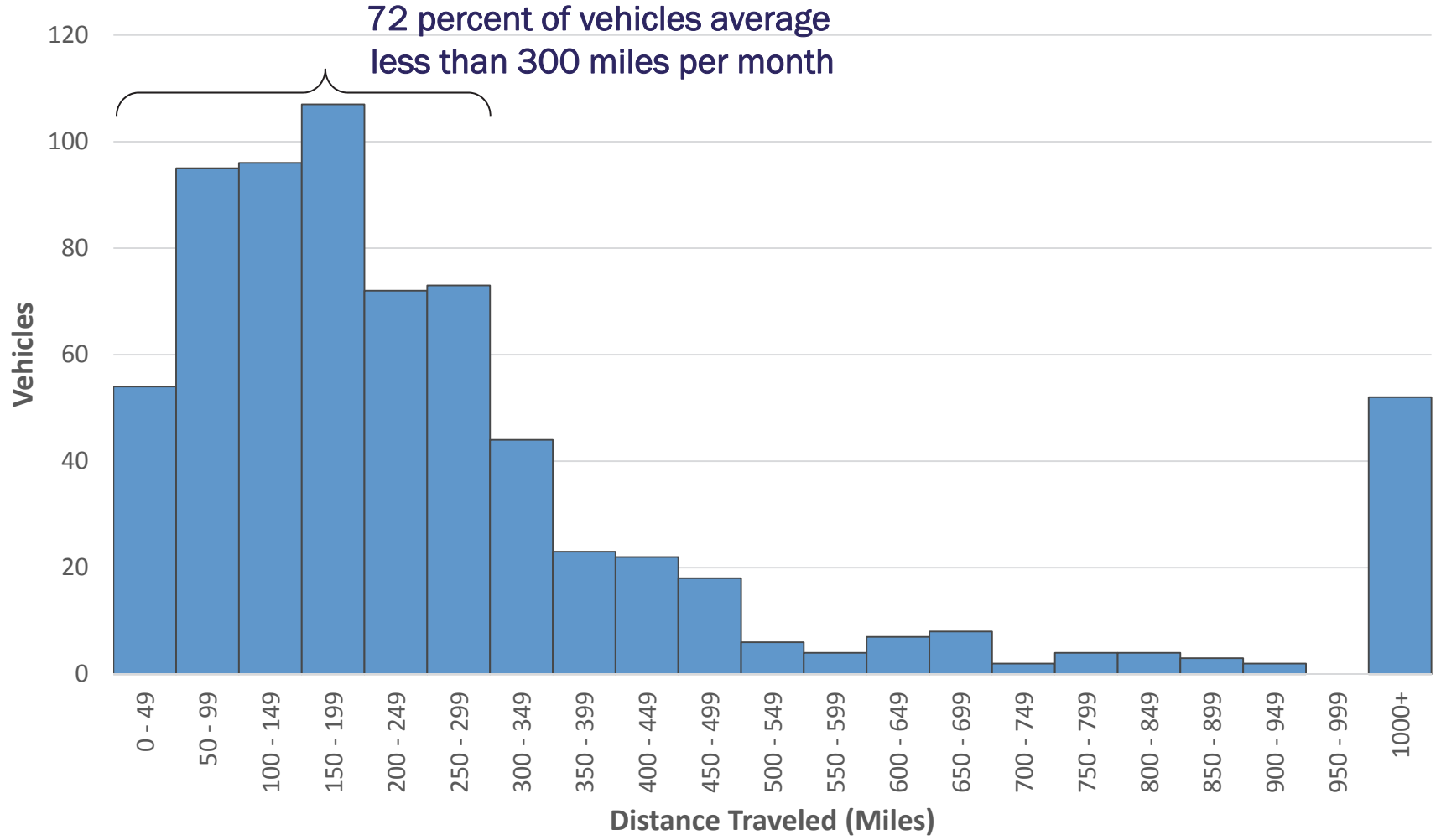
# Sedan Utilization: Avg. Monthly Miles




*Sedans only from March – Sept. 2016

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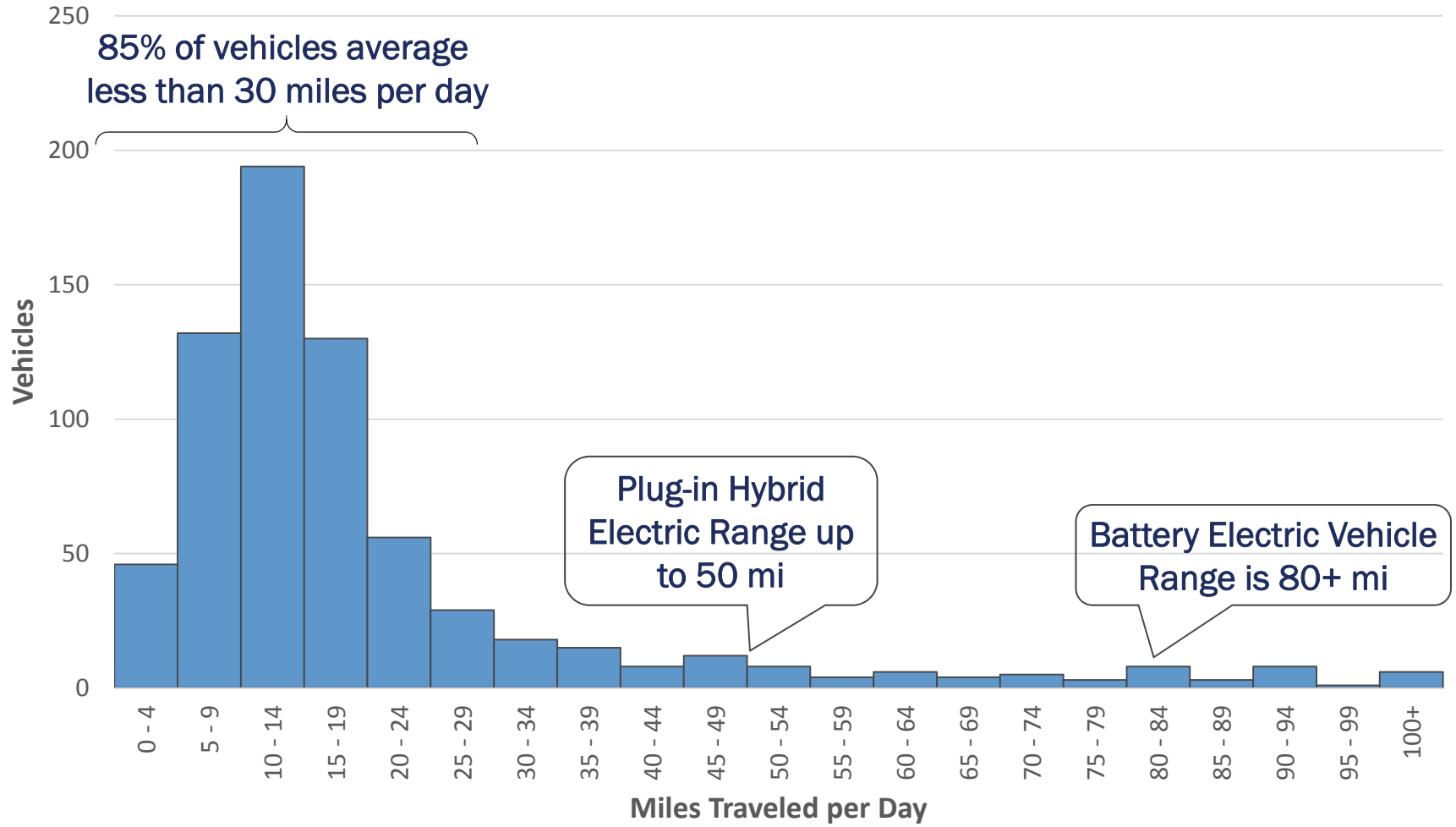
# Sedan Utilization: Avg. Daily Miles



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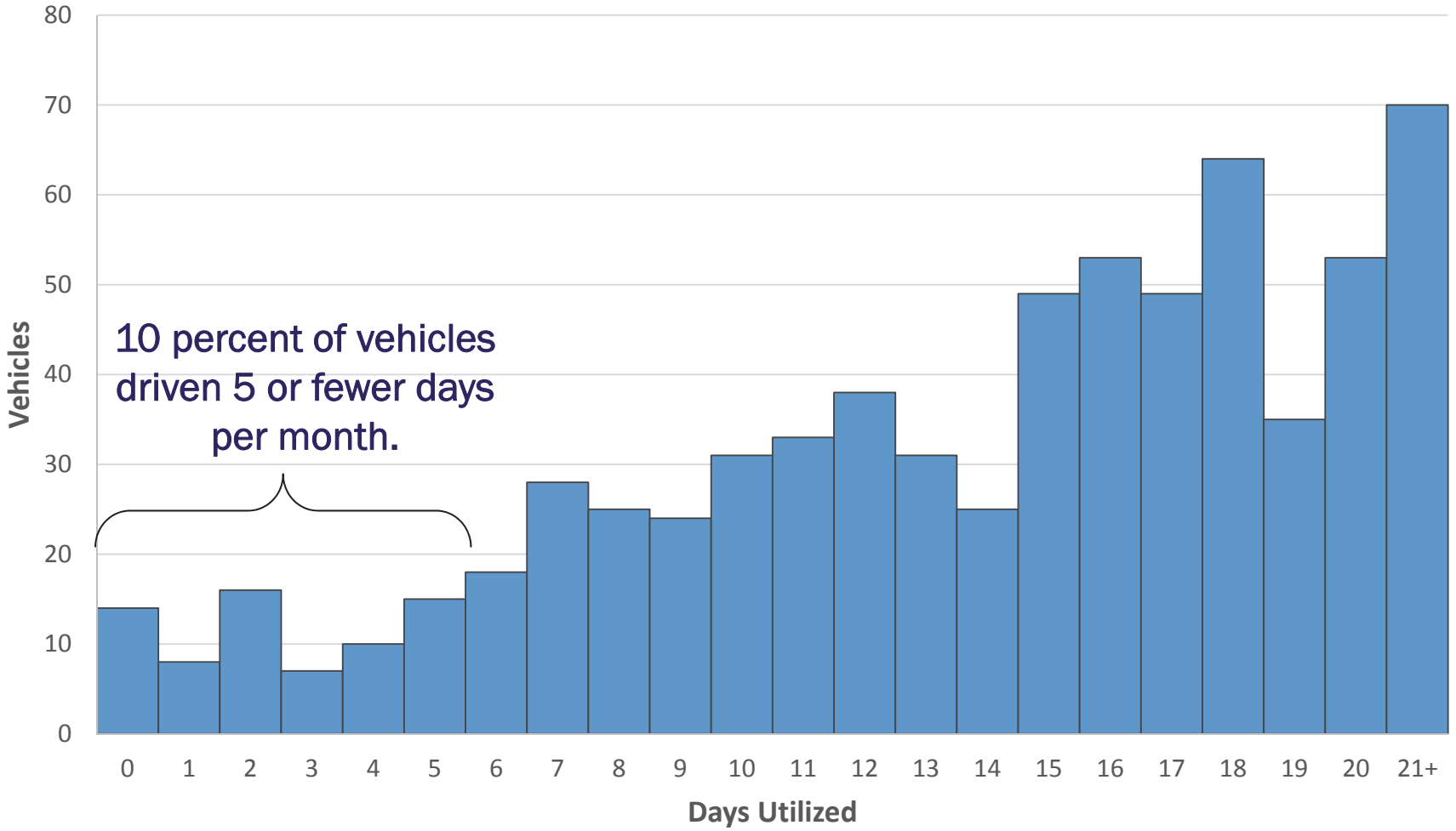
# Sedan Utilization: Avg. Days Utilized



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# Current City Fleet Initiatives

- Telematics 97% installed
- Vehicle on Demand System (VoDS)
- Vehicle pools
- Renewable diesel

# Expanding and future vehicle technologies



- Ridesharing services
- Autonomous Vehicles
- Technologies to reduce greenhouse gas emissions

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# Looking Forward

- Planned analyses
  - Transit First options
  - Fleet utilization patterns and right-sizing
  - Economic analyses (vehicle cost, maintenance, fuel, etc.)
  - Charging infrastructure (locations, type, quantity, funding, ownership, maintenance, renewals, billing models)
  - Electricity sources and costs
  - Lease vs. Purchase
  - GHG emissions analysis
  - Autonomous vehicles and ride-sharing services
  - Disaster response
- Recommendations for policymakers

# Questions or comments?