

# Department of Transportation Highways Division

## MOBILITY AS A SERVICE – FLEET CONVERSION

ELECTRIC VEHICLES AND CHARGING INFRASTRUCTURE SERVICES  
Contract No. DOT-2020-044

## Description

- Electric Vehicles and Charging Infrastructure will be provided as a service. Departments/Agencies will not own any assets.
- Cost will be charged monthly as a Usage Fee based on a per mile usage. If only charging infrastructure services are provide it will be based on a kWh usage.
- All costs, including maintenance costs will be included in the Usage Fee.

## Cost Benefits

- Departments/Agencies can convert internal combustion engine (ICE) light duty fleets to electric vehicles (EV) without having the capital upfront.
  - In FY19, HDOT Highways Division procured 4 Electric Vehicles and 4 Level two charging stations for \$49,215 each. Additional cost for electrical infrastructure was also required.
  - Converting 40 ICE vehicles would require \$2,000,000 upfront.
- Departments/Agencies will realize bulk purchase savings, including pass through savings from EV tax credits and grants.

## Cost Benefits

- Maintenance Costs are at least 50% less for EVs compared to ICE vehicles.
  - Maintenance costs per mile by powertrain – Consumer Reports Study:
    - \$0.012/mile – EV
    - \$0.028/mile – ICE
  - Highways Division current maintenance costs for light duty fleet in FY20
    - Maui District – \$4,339/vehicle and \$203,937 total for light duty fleet
    - Kauai District – \$1,197/vehicle and \$44,289 total for light duty fleet
    - Hawaii District – \$2,392/vehicle and \$179,433 total for light duty fleet
    - Oahu District – \$3,111/vehicle and \$609,692 total for light duty fleet
      - \$55.25 total for 4 Chevy Bolt Electric Vehicles

## Cost Benefits

- Highways Division has an aging fleet
  - Average age of light duty fleet
    - Maui District – 14 years (47 total light duty vehicles)
    - Kauai District – 14 years (37 total light duty vehicles)
    - Hawaii District - 13 years (75 total light duty vehicles)
    - Oahu District - 13 years (196 total light duty vehicles)
  - Maintenance costs have increased an average of 8.25% every year over the last 5 years.

## Cost Benefits

- Fuel Cost and Savings
  - Average gas cost per year – \$1,185/vehicle (last 5 years)
  - Estimated electricity cost per year – \$898/vehicle
  - Estimated fuel savings per year – \$287/vehicle
- Assumptions
  - \$2.50/gallon of gas
  - 22 MPG for ICE fleet
  - 28 kWh/100 miles (Chevy Bolt)
  - Latest HECO and KIUC electricity rates

## Cost Benefits

- Estimated annualized cost of light duty vehicles
  - Ten year replacement cycle
  - Average vehicle cost - \$38,200/vehicle (existing fleet)
  - Maintenance cost - \$2,760/vehicle
  - Life Cycle cost of Vehicle
    - \$65,800/vehicle
    - \$6,580/vehicle/year

## Cost Benefits

- Usage rate will vary depending on vehicle model, miles driven per year and charging infrastructure.
- For a Nissan Leaf with Level II charger and driven 4,800 mi/year, estimate usage fee is \$1.16/mi.
  - Estimated annual cost - \$5,568/vehicle
- Estimated annual reduction in CO2 emissions
  - 8,700 lbs/vehicle
  - 348,000 lbs for converting 40 ICE vehicles to EVs.



# Pilot Projects and Studies

- City of Fremont Police Department – Electric Patrol Vehicle Pilot Program
  - Tesla Model S 85 vs Ford Utility police pursuit vehicle
  - Annual Average Operation and Maintenance Costs per Vehicle
    - \$5,901 (EV) vs \$8,048 (ICE)
  - Avg. Annual Maintenance Downtime
    - 39 days (EV) vs 66 days (ICE)
  - Avg. Annual Operational CO2 Emissions
    - 0 lbs. (EV) vs 42,198 lbs (ICE)
  - Upfront cost of vehicle
    - \$103,253 for Tesla Model S 85 (includes FPD equipment and modifications)
    - \$75,500 for Ford Utility police pursuit vehicle (includes FPD equipment and modifications)

# Pilot Projects and Studies

- New York City
  - Battery electric sedan vs Gas sedan
  - Annual Average Maintenance Costs per Vehicle
    - \$317.50 (EV) vs \$1,286.50 (ICE)
  - Total Cost of Ownership (annualized)
    - \$3,620.88 (EV) vs \$4,592.38 (ICE)
- Bargsville, Indiana Police Department
  - Tesla Model 3 vs Dodge Chargers
  - Annual Operation and Maintenance Cost
    - \$825 (EV) vs \$7,580 (ICE)