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 provided, 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)

- Bargersville, Indiana Police Department
  - Tesla Model 3 vs Dodge Chargers
  - Annual Operation and Maintenance Cost
    - $825 (EV) vs $7,580 (ICE)