Metropolitan ENERGY CENTER

Mid-America Green Fleets Analysis Lawrence, Kansas

GOVERNING BODY PRESENTATION
JULY 10, 2024

Metropolitan Energy Center

In the past five years alone, MEC has effectively managed $25 million in federal grants to disperse training, resources, and new technology across Kansas and Missouri.

Metropolitan ENERGY CENTER

Kansas City area nonprofit since 1983

- 40 years of energy efficiency

Building Performance

- Commercial and residential buildings
- Project Living Proof demo home in heart of KC

Sustainable Transportation

- Kansas City Regional Clean Cities - 1998
- Central Kansas Clean Cities - 2013

Energy Code Training Provided to the Kansas City Region

Beam Solar EV Charger – Olathe, KS

Deployment of all-electric shuttle buses – KCI

EV Streetlight Chargers – KCMO

Deployment of all-electric yard trucks – KS & MO

EVs for Water Services, General Services, and Neighborhood and Housing Services – KCMO

Purpose of Fleet Analysis

City Ordinance No. 9744

- City of Lawrence committed to transition their entire fleet sector to renewable energy by 2035.
- Established municipal and community-wide renewable energy goals for the City, aiming to reduce transportation emissions and go carbon neutral.

Consulting with Technology Experts

- MEC & Energetics worked together to create a transition plan for Lawrence.
  - MEC conducts fleet analyses through our Mid America Green Fleets Program with the goal of improving the environmental performance of local govt vehicles across the region.
  - Energetics is a clean energy consultancy that collaboratively works with state and local entities to help smartly, and cost effectively integrate clean energy technologies and strategies into real world fleets.

Transition Plan Timeline

- Originally intended to go into effect in budget year 2025, but due to scheduling concerns and issues with data and recommendations, the City and MEC decided to push the deployment date to 2026.

Scope of Analysis

Total fleet size: 578 vehicles

- Light Duty Vehicles (LD) - 235 vehicles
  - Sedans, Compact Utility Vehicles (CUVs), Sport Utility Vehicles (SUVs), pickup trucks and vans
- Medium-Heavy Duty Vehicles (MD/HD) - 343 vehicles
  - Larger pickup trucks, larger vans and a single medium duty bus operated by the City
  - Dump trucks, snowplows, loaders, excavators, tractors, etc.

- Analyzing the current fleet usage and emissions allowed MEC & Energetics to develop lists of replacement vehicles for each category.
  - In some cases, fully electric vehicles are not realistic because there are limited models available.
- Analyzing vehicle storage locations and their electrical capacity to develop lists of charging stations to be installed and where they should be located.

Fleet Breakdown

According to data provided for the analysis:

- 129 vehicles are currently operating beyond their planned lifecycle
- 168 vehicles are in the last 5 years of their lifecycle
- 146 vehicles have between 5-10 years left in their lifecycle
- 135 vehicles have 10+ years left in their lifecycle

Lifecycle Analysis	
Vehicle Class	**Lifecycle Assumption (Years)**
Light-Duty	10
Medium-Duty	15
Heavy-Duty	20
Non-Road	15

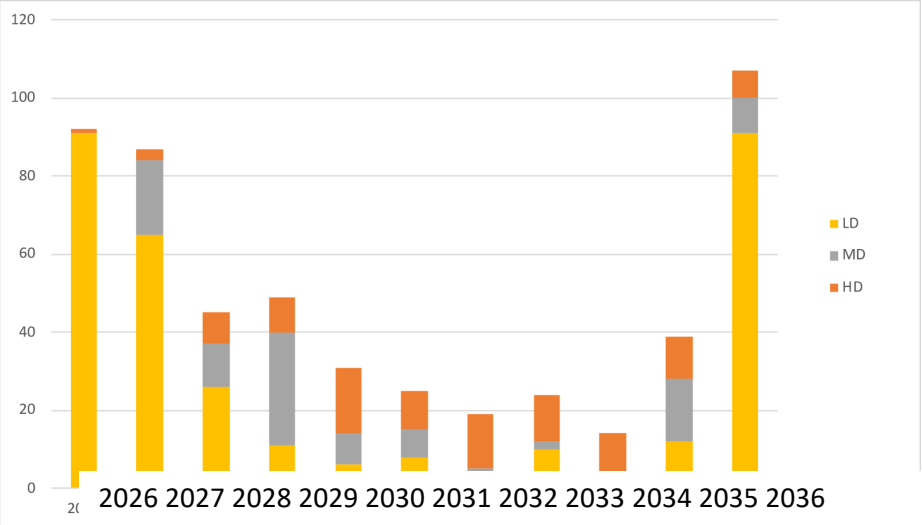
**]Police Department Light-Duty Vehicle Lifecycles are typically 3-4 years for pursuit vehicles and 10 years for admin vehicles. However, pursuit vehicles are retired to other departments when possible after the lifecycle period.*

Vehicle Replacement Scenario Evaluation

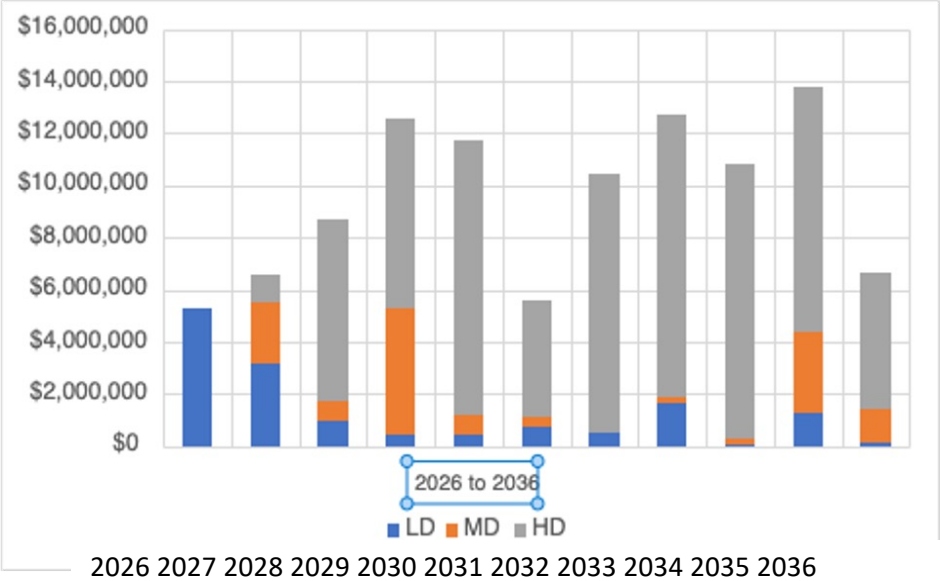
Two scenarios determined the most logical approach to transitioning the fleet by 2036:

- **Balanced Vehicle Replacement Scenario:** Focused on replacing equal numbers of vehicles annually, large fluctuations in annual expenditures. Costs estimated to be between $4.3 million and $13 million

- **Balanced Annual Expenditure Scenario:** The number of vehicles recommended for replacement is calculated based on the cost of each group to balance the annual capital expenditure for vehicle purchases. There is less variability in this scenario, with all years ranging from $4.5 million to $12 million



Annual vehicle replacements, 2026-2036



Estimated Costs and Comparison

B

- Roughly $9 million annually to replace vehicles from 2026-2036
  - Total = $102,184,164.00
- Some MD and HD vehicles require separate body expenses
  - Total = $18,192,000
- Total infrastructure costs
  - Total = $2,618,075.00

- Grand Total: $122,994,239

Vehicle Class/Type	Vehicle Count	Average of GHG Savings (Metric Tons)	Sum of EV Replacement Cost	Average of Annual EV Maintenance Savings	Average of Annual EV Fuel Savings	Average of Total Annual EV Cost Savings
LD	**7**	**0.12**	**$464,746**	**$636.15**	**$108.11**	**$744.26**
Pickup	2	1.72	$149,177	$454.01	$562.19	$1,016.20
SUV	1	1.23	$63,114	$136.08	$414.89	$550.97
SUV - Pursuit	4	-1.00	$252,455	$1,341.24	-$143.10	$1,198.14
MD	**29**	**5.07**	**$4,790,907**	**$1,485.06**	**$1,353.64**	**$2,838.70**
MD Pickup	10	4.00	$1,147,523	$1,022.14	$930.08	$1,952.22
MD Truck	15	9.72	$3,270,440	$3,652.95	$2,757.09	$6,410.05
MD Van	4	3.85	$372,944	$649.13	$1,259.50	$1,908.63
HD	**9**	**14.25**	**$7,298,246**	**$8,131.32**	**$687.07**	**$8,818.39**
HD Truck	6	7.47	$3,167,163	$4,740.26	$400.29	$5,140.55
HD Firetruck	2	8.98	$3,442,569	$6,252.30	$536.53	$6,788.84
HD Refuse	1	18.77	$688,514	$9,936.95	$834.74	$10,771.69
Grand Total	**45**	**5.64**	**$12,553,899**	**$2,514.02**	**$950.70**	**$3,464.72**

Table 20 & 21. Summary of vehicle replacement recommendations (20), estimated body cost (21), 2029

Vehicle Type	Body Cost	Vehicle Cost (with body)
LD	$0	$464,746
MD	$2,085,000	$6,875,907
HD	$703,000	$8,001,246
Grand Total	$2,788,000	$15,341,902

Light Duty Vehicles – Currently in Use

- 235 LD vehicles
  - Compact cars
  - Sedans
  - Compact Utility Vehicles (Ford Escapes)
  - Sport Utility Vehicles
  - Pickup trucks (Ford F150s)
  - Vans

- 34% of LD vehicles are pursuit vehicles (81), most commonly police interceptors

LD Vehicles – Possible Replacements

Vehicle Type	EV Option	EV Cost *	EV Availability
Sedan	Chevrolet Equinox EV	$35,000	2024
CUV	Chevrolet Equinox EV	$35,000	2024

* Other EV options in this classification include the Hyundai Kona EV and the Volkswagen ID.4

Vehicle Type	EV Option	EV Cost *	EV Availability
SUV	Ford Mustang Mach-E	$43,000	2024
SUV – Pursuit	Chevrolet Blazer EV PPV	$57,000 **	2024

* Other non-pursuit EV options in this classification include the Chevrolet Blazer EV, and the Volkswagen ID.4.
** Vehicle cost only.

Vehicle Type	EV Option	EV Cost *	EV Availability
LD Pickup Truck	Ford F-150 Lightning	$65,000	2023

* Other options in classification include the Chevrolet Silverado EV, and the Rivian R1T.

Vehicle Type	EV Option	EV Cost	EV Availability
Cargo Van	Ford E-Transit	$60,000	2023

* Other EV options in this classification include the Chrysler Pacifica PHEV and Lightning eMotors Transit EV.

Medium Duty Vehicles – Currently in Use

- 98 MD vehicles
  - Larger pickup trucks
  - Vans
  - Straight trucks
  - Box trucks
  - Special Use vehicles

MD Vehicles – Possible Replacements

- Currently a limited amount of electric models are available for vehicles in this class, but there are still options:
  - Ford E-Transit Cutaway
  - Hino M5e
  - GreenPower EV Star Cab & Chassis
  - Other options also available

Heavy Duty Vehicles – Currently in Use

- 109 heavy duty vehicles
  - Larger pickup trucks
  - Vans
  - Straight trucks
  - Box trucks
  - Special Use vehicles

HD Vehicles – Possible Replacements

- Currently a limited amount of electric models are available for vehicles in this class, but there are still options:
  - Volvo VNR Electric
  - Mack MD Electric
  - Mack LR Electric
  - Pierce Volterra

Other Options for MD/HD

- Alternative options for MD and HD vehicles
  - Operating the vehicles with Biodiesel (B20, B50), CNG, or Propane
  - In the case where no feasible zero emissions vehicles exist, GHG reduction efforts can be focused on to meet near term emissions reductions goals

Examples of Alternative Options

Vehicle Class/Type	Vehicle Count	Alternative Fuel Vehicle Replacement	Average Cost	Fuel Type
LD				
Pickup	5	Chevrolet Silverado 1500	$56,466	Biodiesel
Sedan	1	Toyota Mirai XLE	$49,500	Hydrogen
MD				
MD Pickup	4	Ford F-150/250/350 Truck	$50,000	RNG/CNG
MD Truck	7	Peterbilt Model 536	$125,000	CNG
MD Van	1	Ford Transit Van and Cutaway	$42,000	Propane Hydrogen
HD				
HD Truck	27	Freightliner Cascadia Natural Gas	$153,000	LNG/CNG
HD Refuse Truck	14	Heil Environmental Side Loader: Durapack Python	$150,000	CNG

Table 37. Alternative Vehicle Options to EVs

Other Vehicles in the Fleet

- Assortment of non-road vehicles including:
  - Utility task vehicles (UTVs)
  - Golf carts
  - Tractors
  - Larger mowers

- The city also operates:
  - 5 alternative fuel vehicles
  - 9 electrified vehicles

Charging Stations

- Level 1
  - 120 volts (V) providing up to 2.4 kilowatts (kW) of charging per hour (roughly 2-5 miles)
  - Typical for consumer level vehicles, standard set comes with most vehicles
- Level 2
  - 240 volts (V) providing maximum output of 2.8-19.2 kW (average 6.6 kWs per hour, or 10-80 miles per hour)
  - Typical for at home charging stations at the consumer level, and many public charging stations
- DCFC
  - 480 VAC converted to DC to power EV batteries, power level ranges from 25 kW to 350 kW
  - Most suitable for larger fleets that can afford the high price barriers of DCFC technology

Fleet Vehicle Charging Locations

- The City of Lawrence determined approximately 30 locations for EVSE technology
- 14 of the 30 locations were used to estimate the anticipated EV charging infrastructure needs
- The infrastructure needs are presented in a manner that distinguishes the demand for charging resulting from the electrification of LD (Light duty) vehicles independent from the electrification of MHD (Medium/Heavy duty) vehicles

Building and Structures Maintenance, 2215 Kresge Road, one of the 30 locations selected for Lawrence

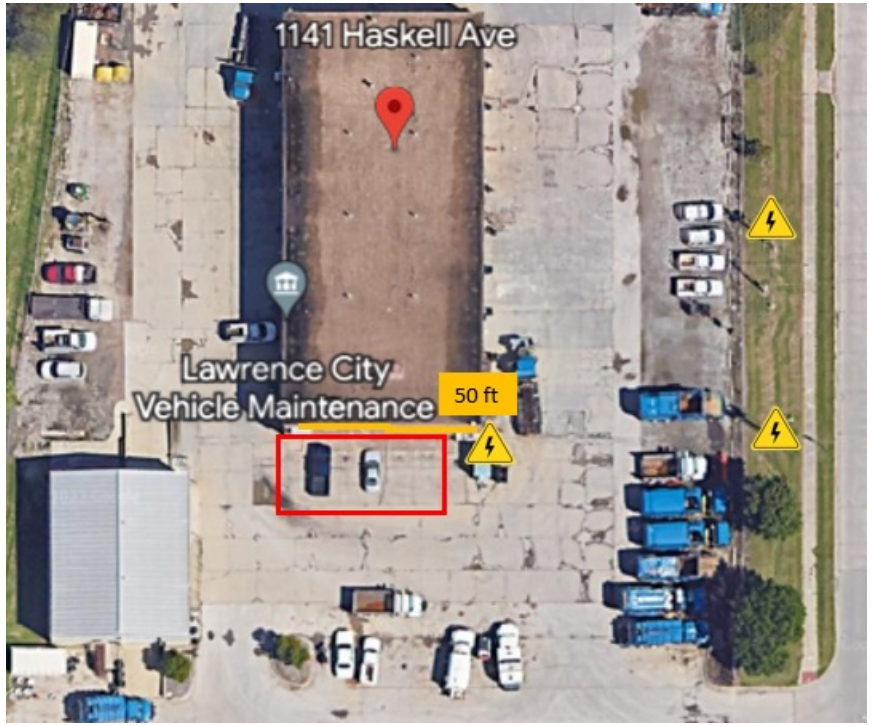
Site Examples

Existing Power Access

New/Added Power Access

Conduit / Wiring

EV Parking



Central Maintenance Garage, 1141 Haskell Avenue

Site Examples

Existing Power Access

New/Added Power Access

Conduit / Wiring

EV Parking

Fire Station #1, 746 Kentucky Street

Site Examples

Existing Power Access

New/Added Power Access

Conduit / Wiring

EV Parking

Traffic Administration, 455 Mississippi Street

Policy Change Recommendations

- Although EV adoption is increasing rapidly, there are still barriers to come. By implementing transportation electrification policies, the city can streamline the deployment process.
  - Develop a DEI plan (Diversity, Equity, and Inclusion) to ensure a diversity of experience and expertise, making sure to include/represent all residents impacted most by transportation pollution.
  - Contact Evergy to identify existing electricity capacity at potential charging sites
  - Develop a strategy and funding mechanism to purchase EVs and address upfront costs
  - Review local floodplain rules and regulations along with zoning polivies
  - Stadardize permitting processes so contractors and City staff know what information and documentation is needed to install EVSE
  - Ensure training program is in place for fleet drivers, vehicle technicians, maintenance staff and first responders
  - Implement EV ready requirements in building codes for city-owned buildings and facilities

Identified Funding Opportunities

- DERA (Diesel Emissions Reduction Act)
  - Diesel fleet vehicles of class Medium and Heavy Duty (Class 5 and above) are scrapped for cleaner alternative fuel vehicles, purchased through federal funding
- CFI
  - $700 million offered to strategically deploy EV charging infrastructure
- Evergy Rebate Program
  - Qualifying fleets/consumers can receive funding to offset charging station installation costs (Level 2 and DCFC)

Risk Analysis

- Electric:
  - Market Supplier - Evergy is the sole electric distribution supplier for the City of Lawrence and all the City's facilities, supplier redundancy is not possible
  - Weather - Destructive weather events could interrupt power flow to the City's properties, Kansas is number 3 in the nation for annual tornados per square mile.
    - Even in cases where power outages occur, most vehicles should be fully charged based on expected outage times (winter storms, summer storms, heat waves)
  - Vehicle Availability - The availability of EVs, ZEVs, and BEVs is rapidly expanding and the prices are projected to decrease significantly as production prices drop over time, but currently supply can be hard to come by, and prices can be high
- Alternative Fuels:
  - Market Supplier - Fuel supplier's ability to reliably supply fuel types and volumes of fuel required by the City
  - Weather - Similar to electric, destructive weather events could interrupt power flow to the City's properties
  - Technological - Renewable fuels should meet industry-standard fuel specifications to ensure fuel quality and to meet engine manufacturers' requirements

MEC's energy efficient demo-home, Project Living Proof.

Questions?

Taylor Corn, Program Coordinator

Sr. Public Relations Coordinator

taylor.corn@metroenergy.org