NAUPD Ford F-150 Lightning Impact Report

Green Fund Mission Statement: “The NAU Green Fund promotes student participation in and provides funding for projects that reduce NAU’s negative impact on the environment and create a culture of sustainability on-campus.”

Contact Information

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Approval Date:	December 2024
Project Cost:	$33,062.66

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Department:	NAU Police Department
Project Category:	Transportation

Problem Statement

The NAU Police Department is facing staffing challenges and has created a full-time Police Aide position to help relieve pressure on existing officers. The Police Department originally repurposed a 2009 Ford Explorer for this position, but the vehicle broke down shortly after entering service. The police department then decided a hybrid or electric vehicle would fill this position's vehicle requirements well and narrowed the search to either the hybrid Ford Maverick or the fully electric Ford F-150 Lightning.

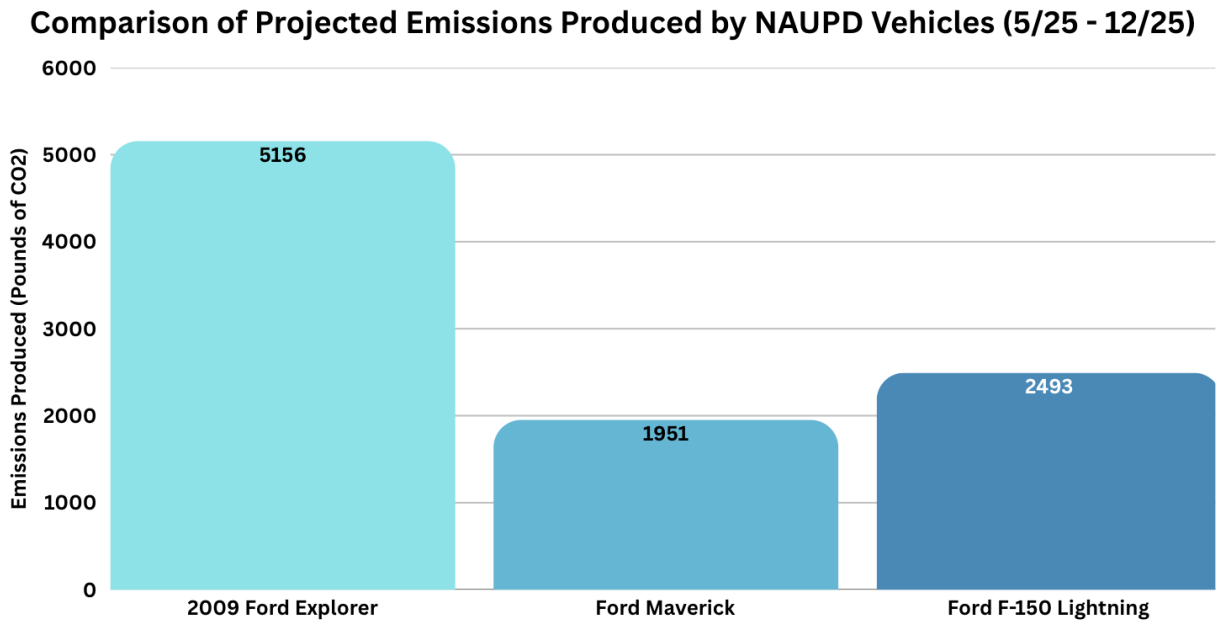
Project Overview

This project was submitted to upgrade the vehicle purchase from a Ford Maverick to a Ford F-150 Lightning. The Green Fund provided the difference in cost between the Maverick and the F-150 Lightning, allowing for the more expensive and sustainable option to be purchased. The Green Fund also provided funding for the installation of a new EV charging station, which ensures the ability for further electrification of the NAU PD fleet vehicles in the future.

Quantitative Impact

Environmental Impact: Emissions Comparison

1. The following data compares the actual carbon footprint of the purchased Ford F-150 Lightning during the first 7 months of operation (May 23rd - December 9th, 2025) to the theoretical carbon footprint of the other two vehicles over the same 3,729.8-mile distance.
2. The Ford F-150 Lightning emitted 2,493.7 pounds of CO2 during this period, charging from the grid. While this is higher than the projected 1,951 pounds from the hybrid Ford Maverick, it represents a 51 percent reduction in emissions compared to the 2009 Ford Explorer, which would have emitted approximately 5,159.9 pounds. The current emissions of the Ford F-150 Lightning are tied to the regional energy grid's reliance on non-carbon-neutral energy sources, an issue that NAU is actively addressing through its Climate Action Plan.



Fuel Cost Savings: Over the distance of 3,729.8 miles, the F-150 Lightning incurred a total electrical cost of $142. In comparison, the 2009 Ford Explorer would have required $830.98 in gasoline to cover the same distance, while the Maverick would have cost approximately, $313. By choosing the fully electric model, the department saved $692.03 in direct fuel costs in just seven months, outperforming even the Mavericks' fuel costs by

$175.

Operational Savings: The 2009 Ford Explorer cost the university $22,160.79 over its operational life; its maintenance cost accelerated significantly in its last year, totaling $5,477.92. In contrast, both the Ford Maverick and Ford F-150 Lightning offer much lower maintenance costs over the lifetime of both vehicles.

Vehicle Model	Seven Month Fuel/Energy Cost	Projected Annual Fuel/Energy Costs	Projected Annual Maintenance (First/Next Year)	Total Projected Annual Cost
2009 Ford Explorer	$830.98	$1,424.54	$5,477.92	$6,902.46
2025 Ford Maverick	$313.50	$537.43	$426	$963.43
2025 Ford F-150 Lightning	$142.00	$243.43	$0	$243.42

1. Compared to the 2009 Ford Explorer, the Lightning generates $6,659.03 in annual savings, representing a 96.5% reduction in total operational costs by removing $5,477.92 in maintenance costs and reducing energy costs by $1,181.11.
2. When compared to the Ford Maverick, the Lightning saves an additional $720.00 annually, which is a 74.7% cost reduction over the hybrid model; this includes $426.00 saved in the first year by avoiding the mandatory routine engine maintenance—such as oil and filter changes—required by the Maverick's hybrid system, alongside $294.00 in superior energy efficiency. While these figures are maximized during the initial 3-year warranty period, the Lightning maintains a long-term fiscal advantage with a 12-year average maintenance cost of $710.42 per year compared to the Maverick’s $1,196.33.
3. Ford F-150 Lightning projected savings per year over 2009 Ford Explorer: $6,659.03
4. Ford F-150 Lightning projected savings per year over 2025 Ford Maverick: $720.00

Qualitative Improvements

The F-150 Lightning improves the campus environment by operating as a fully electric vehicle, reducing noise pollution throughout the Flagstaff Mountain campus. It also provides a new mobile power capability, allowing the NAUPD to power electric equipment or lighting without relying on portable generators. Replacing an internal combustion engine on campus reduces the tailpipe emissions throughout the campus, contributing to a healthier campus environment by removing harmful exhaust from areas where students and faculty live and work.

Future Outlook

By aligning with the Green Fund's mission to transition away from internal combustion engines, this project positions NAU as a leader in higher education sustainability. It lays the foundation for the further electrification of the NAUPD and other university fleets by providing essential charging infrastructure that removes cost barriers for future electric vehicle procurement. Furthermore, with a projected twelve-year average maintenance cost significantly lower than other alternatives, this project demonstrates that environmental sustainability and fiscal responsibility are mutually inclusive goals for both the Green Fund and the university as a whole.

Methodology

The figures presented in this report were calculated based on the recorded distance traveled by the Ford F-150 Lightning over its first seven months of operation (May 23, 2025, to December 11, 2025). This distance of 3,729.8 miles serves as the baseline for all comparative calculations.

1. Ford F-150 Lightning Calculations

- Efficiency & Consumption: Based on an EPA-estimated range of 320 miles on a 131 kWh battery, efficiency is 131 kWh/320 miles=0.4094 kWh/mile. Total energy

used: 0.4094 kWh/mile×3,729.8 miles=1,526.89 kWh.

- Costs: Using the NAU EnergyCAP average rate of $0.093/kWh, the 7-month cost was $142.00. Annualized:$142/7 months×12 months=$243.43.
- Emissions: Produced 2,493.7 lbs of CO2. This is based on the Arizona/New Mexico eGrid measurement of 740.8 kg CO2/MWh (1.527 MWh×740.8 kg/MWh=1,131.1 kg).

2. 2009 Ford Explorer Calculations

- Efficiency & Consumption: Based on an EPA-rated 14 MPG, the vehicle would have required 266.41 gallons to cover the same distance.
- Costs: Using the EIA average price of $3.11/gallon from May to November 2025, the 7-month cost would be $830.98. Annualized: $830.98/7 months×12 months=$1,424.54.
- Emissions: Produced 5,156.9 lbs of CO2 based on the standard 8.78 kg CO2/gallon of gasoline (266.414 gal×8.78 kg/gal=2,339.1 kg)

3. Ford Maverick Calculations

- Efficiency & Consumption: Based on an EPA-estimated 37 MPG, this hybrid would have used 100.81 gallons to cover the same distance.
- Costs: At $3.11/gallon, the 7-month cost would be $313.50. Annualized: $313.50/7 months×12 months=$537.43.
- Emissions: Produced 1,951.2 lbs of CO2 based on the 8.78 kg CO2/gallon standard (100.81 gal×8.78 kg/gal=885.1 kg)

Car Edge Maintenance Source:

https://caredge.com/ford/f-150-lightning/maintenance

https://caredge.com/ford/maverick/maintenance

Note: The 2009 Ford Explorer Maintenance costs were taken from existing Fleet Services data. The 2025 Ford F-150 Lightning maintenance costs were taken from Fleet services as well; the Car Edge Maintenance cost values were only used for the twelve-year average on these two vehicles. Whereas the Car Edge Maintenance numbers were

used for all 2025 Ford Maverick calculations.