

Effects on pollution if Utah State University converted its vehicle fleet to electric.

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Overview:

- Pollution impacts
- Cost
- USU fleet
- Type route

Hypothesis/purpose declaration:

- What impact if any will switching the vehicle fleet at USU to electric vehicles?
- How could this impact air quality?

USU vehicle fleet reductions:

- Of the 767 vehicles operated by USU 129 of them are sedans and could easily be transitioned to EVs with current available used vehicles on the market.[1]
- By switching to EV USU could produce 99.3% less PM2.5 and 53% less CO2 from vehicles.

Technology:

- Technology in regards to EVs is rapidly improving
- The performance of batteries is rapidly improving
- There is significant funding in battery technology research
- Battery charge speeds are improving rapidly

PM2.5 What is it?[2]

- PM2.5 is airborne particulate matter of a size less than 2.5 micrometers
- It is produced artificially as a byproduct of combustion
- Is commonly sulfur dioxide and nitrogen oxides

Pollution:

- EVs have a reduction of 99.3% of PM2.5 emissions due to less PM2.5 is produced proportionally to gasoline.
- Depending on the source of the power EVs, they indirectly produce much less pollutants.
- Currently EVs produce indirectly 36% less CO2 than the average gasoline vehicle.
- EVs produce indirectly 99.3% less PM2.5
- Electricity generation is the limiting factor in regards to EV pollution emissions.
- As our electricity generation becomes cleaner the emissions of EVs will be reduced

Public Perception:

- There are many biases against EV adoption mainly:
- Range
- Battery life
- Charging time

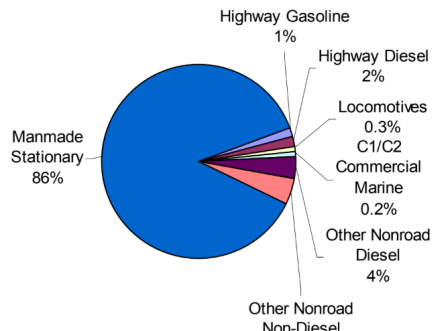
Cost:

- Due to less moving parts EVs have lower maintenance costs.
- The cost of electricity is less than gasoline
- Depending on the current gas price it costs approximately one third of the gas price to charge an EV
- EV purchase prices are reducing as technology improves and more are mass produced

Potential Impact on total PM2.5:

- Vehicle based PM2.5 emissions are only 3% of the total amount[3]

2009 Total PM25 (mobile+stationary)



Type route Logan to Vernal UT:

- Example route to show demonstrate potential pollution reduction and complications with using EVs.
- Distance 254 miles[4]
- EV chargers are readily available up to about the half way point (Heber, UT) remaining distance 127 miles[5]
- Requires an EV with over 130 mile range until additional chargers are installed between Heber and Vernal
- No DC fast chargers between Kimball Junction, UT and Vernal, UT 146 mile distance[5]

Health impact:[2]

- PM2.5 bypasses the lungs natural defenses
- It can enter the blood stream
- Affects the lungs and heart

Citations:

- [1]Utah Division of Fleet Operations; State Vehicle Report 2019
- [2]EPA; <https://www.epa.gov/pm-pollution>
- [3]Nam, Edward; Particulate Matter from Gasoline Light Duty Vehicles Based on Kansas City and Other Studies 2008
- [4]Google; Google Maps
- [5]Plug Share; <https://www.plugshare.com>

