



National Vehicle and Fuel Emissions Laboratory



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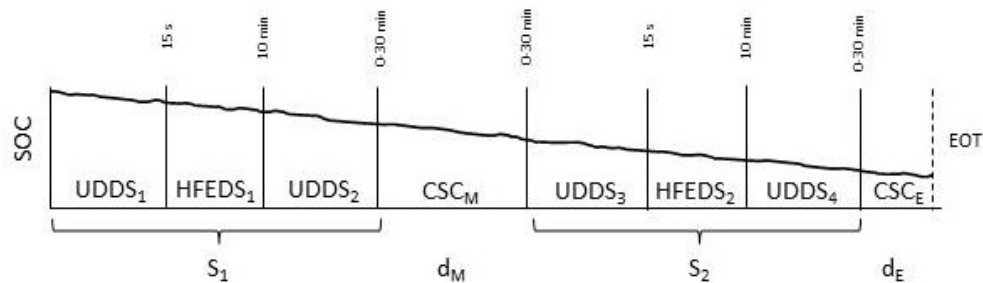
November 29, 2023



EV Test Cycles for range (miles) and efficiency (kWh/mile → MPGe)

Full Depletion City (UDDS) and Highway (HFET)
also used by CAFE
burdensome as range increased

Multi-Cycle (MCT) per SAE J1634 2017, inc. by ref. 40CFR §1066
repeat City + Highway + Steady State



still long: steady state 55 mph → 65 mph → 75 mph?

5 cycle adjustment: adds 3 more cycles: aggressive, hot, cold
analogous to gasoline 5-cycle testing
EPA Guidance Letter CD-2023-06 re: Hot Test
2027 HD Rule Making limits Cold test to 2 cycles



Studies/Possible Future Cycle Factors

New cycle?

Short Multi-Cycle Test (SMCT)

adds Aggressive Driving Test Cycle (US06)
allows battery cyclers discharge

Temperature Effects

biggest difference we see is due to HVAC

Load: higher speed

hills

trailer tow

DC Fast Charging

Autonomous Vehicles



Possible Label Implications

more than could fit!

Separate Highway Range?

Effects: Speed?
Temperature?
Trailer tow?

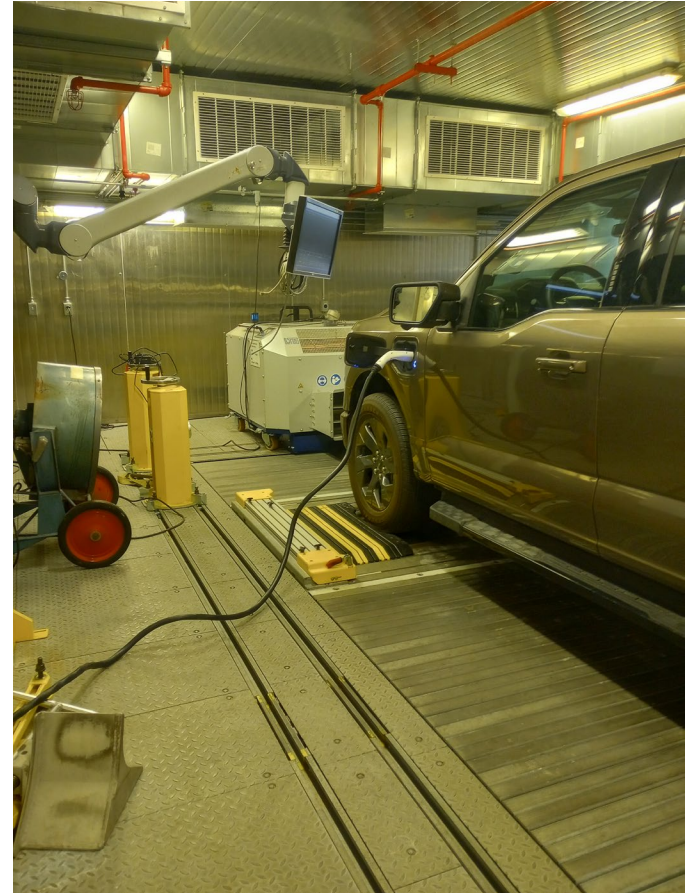
Charging time?
vs. charging rate?

Battery durability/longevity

Range estimate?
time intensive testing
long range might make a low efficiency vehicle look good
longer range always at expense of efficiency

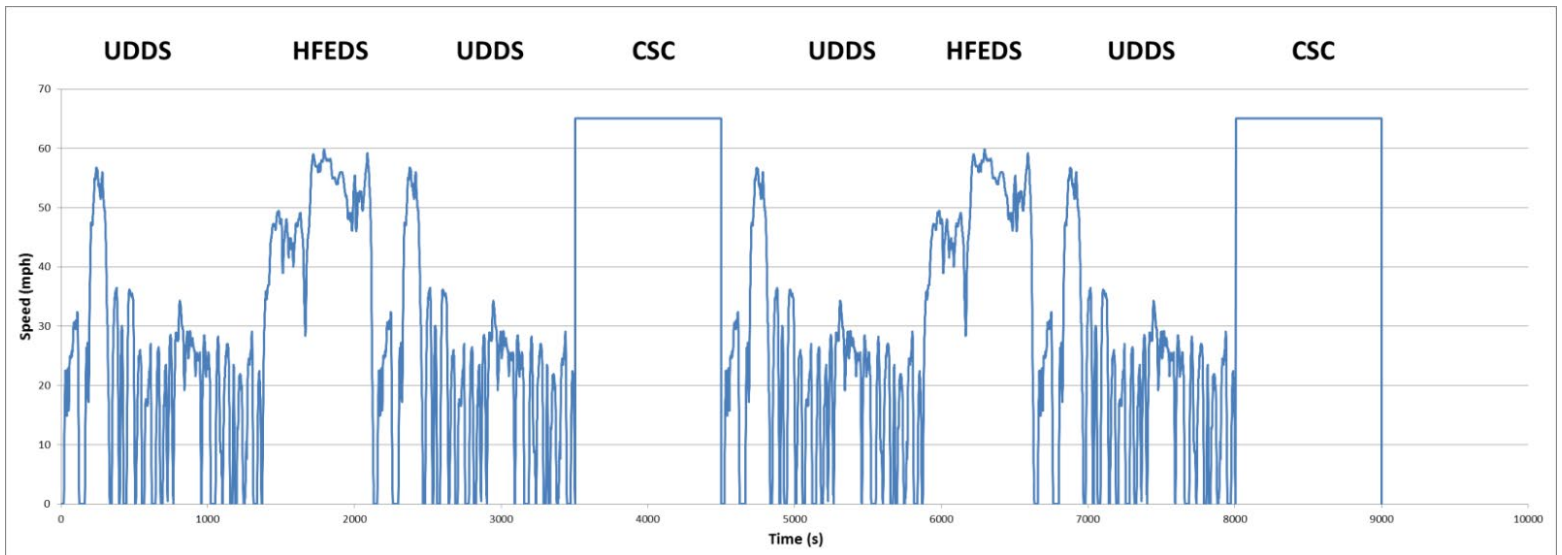
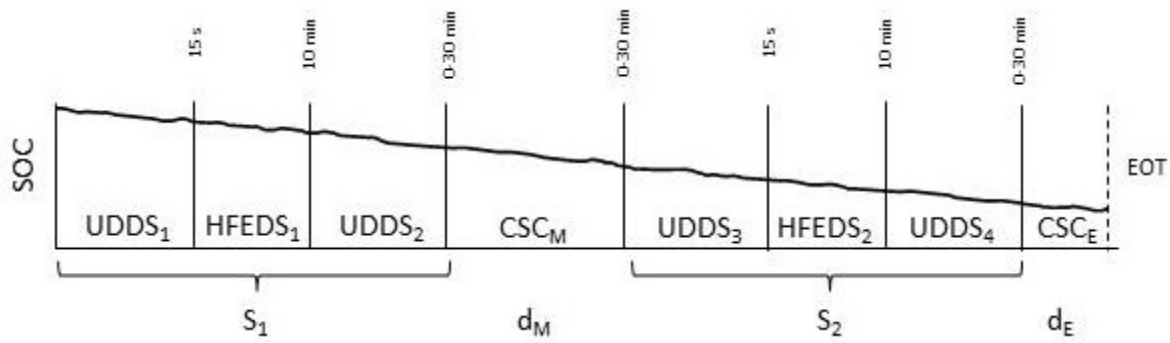


Thank you!





MCT



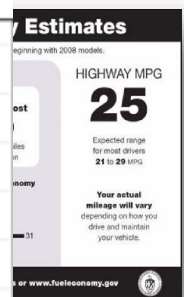
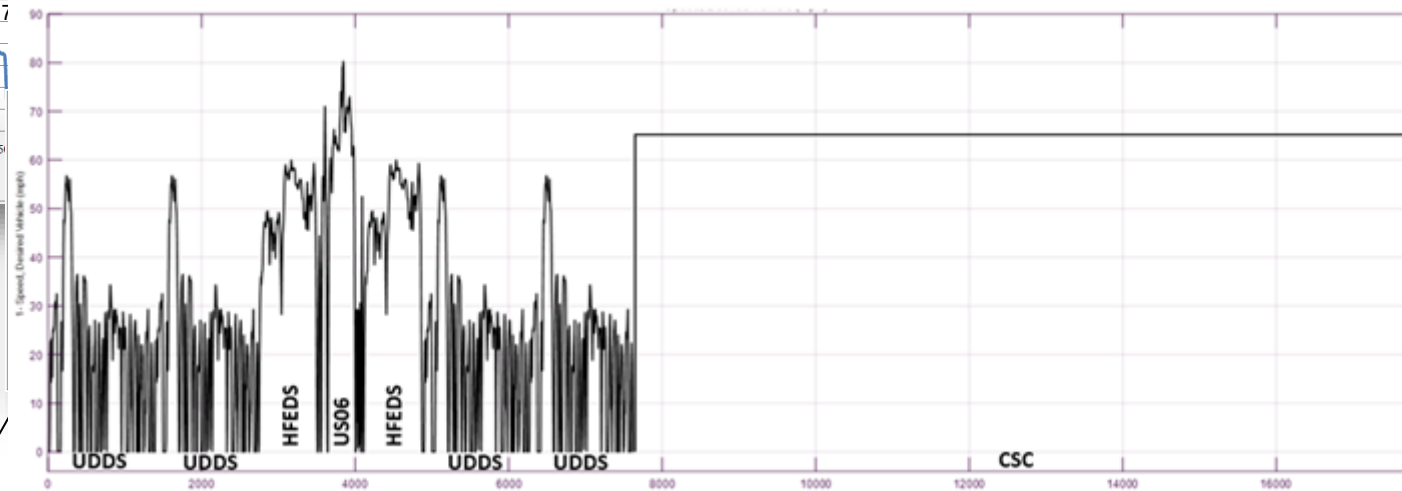
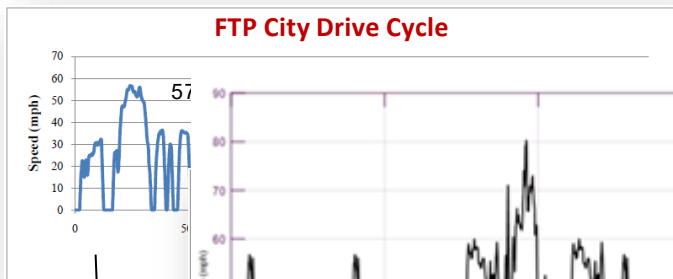


Five Test Procedures are performed on LD vehicles for criteria pollutants, GHG, & Fuel Economy

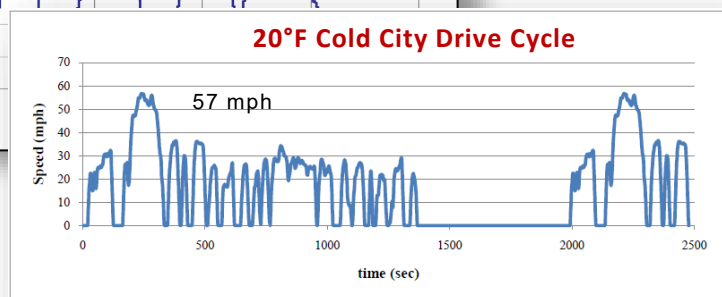
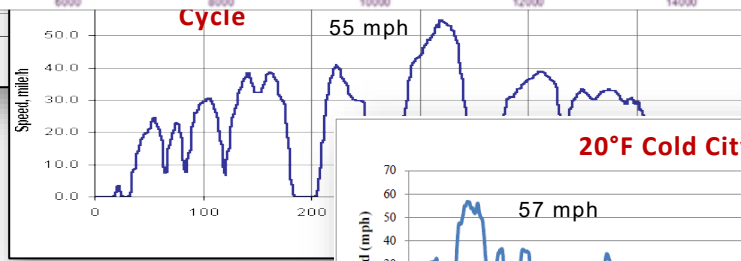
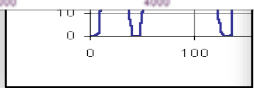
EPA City and Highway label values are calculated as weighted combinations of five key tests. The weighted values are posted

along with

1.



The results from the FTP City and HWFET test procedures are also combined into an EPA unadjusted value for use to determine Corporate Average Fuel Economy (CAFÉ) values.



Note: The city, highway and cold city cycles feature light engine loads and mostly low vehicle speeds.