ENERGY-EFFICIENT CARS

OVERVIEW OF A HIGH-IMPACT DRAWDOWN SOLUTION

A range of cost-effective technologies are available to reduce or replace petroleum fuel use in light duty vehicles, including cars and pickups. Among these, hybrid cars deliver the most substantial reductions, by pairing an electric motor and battery with an internal combustion engine. The combination enables the vehicle to regenerate braking loss, and operate both engine and motor at greater efficiency, improving fuel economy and lowering emissions.

TECHNOLOGY AND MARKET READINESS

Hybrid cars and fuel-efficient light duty vehicles (LDVs: cars, SUVs, pickups) are readily available and have secured a strong presence in the market (EPA, 2019). All vehicle manufacturers are currently developing technologies to improve fuel economy [1]. CO_2 emissions from cars and light duty trucks have been steadily declining, reaching record lows nearly every year since 2004. Fuel economy has likewise improved drastically over the same time period and is projected to continue to increase into the future. The U.S. Environmental Protection Agency's (EPA) GHG regulations and corporate average fuel economy (CAFE) standards have encouraged innovation and continue to stimulate the market for increased efficiency [2]. Many advanced technologies are now standard equipment on new LDVs (EPA, 2019).

LOCAL EXPERIENCE AND DATA AVAILABILITY

Currently, approximately 3.6% of all vehicles in the United States are registered in Georgia [3]. About 6,225,000 passenger vehicles are registered in the state. There is readily available data on fuel efficiency and emissions for light-duty and energy efficient hybrids [4]. The Georgia dealer network and marketplace are very familiar with fuel saving and alternate vehicle technologies.

TECHNICALLY ACHIEVABLE CO_2 POTENTIAL

Given the high number of single-occupancy trips, potential reductions in car emissions derived from efficiency improvements will prove significant. Aggressive GHG regulations such as CAFE standards have reduced the amount of CO_2 emitted per mile by the average light duty vehicle by about 14% from 395 grams per mile in 2009 to 348 grams per mile in 2018 [2]. (EPA, 2019). Assuming the next decade of GHG regulations are only half as effective, then the average light duty vehicle in 2030 would emit around 323 grams per mile. It is estimated that there will be approximately 556,000 new light duty vehicle sales in Georgia in 2030 [5]. The average vehicle travels 13,000 miles per year,[6] thus new vehicles sold in 2030 that follow this trend in compliance with efficiency standards will avoid CO_2 emissions by 180,700 metric tons in 2030 alone compared to 2018 levels. If it is assumed that the impacts of new vehicle sales in model years that precede 2030 are also added, then the cumulative CO_2 reductions of these new technologies in the fleet will exceed 1 MMTCO_2/year.

COST COMPETITIVENESS

Many fuel saving technologies are available at attractive paybacks. Since a vast majority of Georgia's fleet operates on the traditional internal combustion engine (ICE), a focus on steady increases in average fuel economy from ICEs and hybrids (as quantitatively described above) will make significant contributions to drawdown goals and demonstrate economic viability. Depending on miles travelled and fuel prices, the cost of fuel economy technologies can be offset by operational cost savings on a net present value basis (Simmons, et al., 2015). Compared to other means of mitigating CO_2 in transportation, cars and the suite of fuel efficiency technologies pose a relatively low-cost solution for a significant impact.

BEYOND CARBON ATTRIBUTES

Co-benefits: This solution offers benefits to the environment and public health from the improvement in air quality [7]. Additional benefits include the creation of jobs associated with selling, installing, and maintaining hybrid vehicles and improved fuel economy [8]. Co-costs: In terms of potential adverse impacts, there are some concerns regarding the disposition of end-of-life of batteries (Ai, et al., 2019). There are also concerns regarding upward pressure on electricity rates to fund the investment in infrastructure required to charge hybrid batteries, because some (not all) hybrids require electric charging. Also, there are some accessibility challenges as lower income drivers are often not able to afford the latest or most energy efficient vehicle options [9].

References:

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Endnotes:

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