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ABSTRACT

DOE Initiative to Reduce Heavy Vehicle Mass with Polymer Composites

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Fiber reinforced polymers (FRPs) are promising materials for lightweighting vehicles, thereby improving energy efficiency and US energy security. Presently, the cost of using FRPs, especially with carbon fiber reinforcement, is quite high in comparison to conventional materials, and the lack of market incentives prevents their widespread use in passenger automotive structures. Furthermore, the material demand from even a small passenger automotive carbon fiber reinforcement application would overwhelm the carbon fiber supply chain. The commercial vehicle market offers modest financial incentives for vehicle mass reduction in some sectors, and vehicle build rates are low enough that the composites industry can satisfy demand without making step changes in capacity.

This suggests that a rational strategy for realizing the energy efficiency benefits of low mass composite materials in the transportation market is to develop and initially demonstrate new technology in the commercial vehicle market, with migration into the passenger automotive market as the technology matures. The US Department of Energy's FreedomCAR and Vehicle Technologies Program is therefore funding a significant research and development effort focused on commercial vehicle applications of polymer composites. The overall goals include realizing appreciable vehicle mass reduction, while reducing the cost of composite structures and increasing composites demand at a rational pace, with emphasis on carbon fiber reinforcement. The polymer composites project portfolio includes industry-led projects, with commercialization as a key objective, and enabling technology development at the national laboratories. Herein is presented an overview of the DOE-funded commercial vehicle polymer composites project portfolio.