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a Distribution of the GBET from 2012 to 2018. b Distribution of the GBET from 2012 to 2015. c Distribution of the GBET from 2016 to 2018. According to the official battery warranty periods, five-year warranty was required in 2014²⁵, and eight-year warranty was required in 2016²⁶. A five-year threshold was used for 2012 and 2013 based on the 2014 requirement. The error bars indicate a 95% confidence interval. Source data are provided as a Source Data file.

The GBET estimation in this study alerts policy-makers that BEVs' climate benefits do not come for free but are conditional upon the time needed to pay back their GHG debt incurred in the vehicle production stage. This circumstance also brings the understanding of the delayed climate benefits of China's BEVs from an abstract level to a concrete threshold. Such findings have enormous implications for the real world.

Third, we have not considered the effect of battery recycling, the degradation process, or the vintage effect on EV energy consumption and GHG emissions. EVs that use secondary-use and recycled batteries have a much lower GHG debt than initially produced EVs⁵⁸. Considering battery degradation⁵⁹, the GBET of BEVs could be longer than the estimations. It is also worth mentioning that additional delays stem from older, less efficient vehicle stocks remaining in the car fleet for a long time⁶⁰.



Abkhazia battery electric vehicles bevs

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