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Gasoline-powered series hybrid cars cause lower life cycle carbon emissions than battery cars CHRISTOPH MEINRENKEN, KLAUS S. LACKNER, Columbia University — Battery cars powered by grid electricity promise reduced life cycle green house gas (GHG) emissions from the automotive sector. Such scenarios usually point to the much higher emissions from conventional, internal combustion engine cars. However, today's commercially available series hybrid technology achieves the well known efficiency gains in electric drivetrains (regenerative breaking, lack of gearbox) even if the electricity is generated onboard, from conventional fuels. Here, we analyze life cycle GHG emissions for commercially available, state-of the-art plug-in battery cars (e.g. Nissan Leaf) and those of commercially available series hybrid cars (e.g., GM Volt, at same size and performance). Crucially, we find that series hybrid cars driven on (fossil) gasoline cause fewer emissions (126g CO2eq per km) than battery cars driven on current US grid electricity (142g CO2eq per km). We attribute this novel finding to the significant incremental emissions from plug-in battery cars due to losses during grid transmission and battery dis-/charging, and manufacturing larger batteries. We discuss crucial implications for strategic policy decisions towards a low carbon automotive sector as well as relative land intensity when powering cars by biofuel vs. bioelectricity.

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