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# Rapidly falling costs of battery packs for electric vehicles

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To properly evaluate the prospects for commercially competitive battery electric vehicles (BEV) one must have accurate information on current and predicted cost of battery packs. The literature reveals that costs are coming down, but with large uncertainties on past, current and future costs of the dominating Li-ion technology[1, 2, 3]. This paper presents an original systematic review, analysing over 80 different estimates reported 2007–2014 to systematically trace the costs of Li-ion battery packs for BEV manufacturers. We show that industry-wide cost estimates declined by approximately 14% annually between 2007 and 2014, from above US$1,000 per kWh to around US$410 per kWh, and that the cost of battery packs used by market-leading BEV manufacturers are even lower, at US$300 per kWh, and has declined by 8% annually. Learning rate, the cost reduction following a cumulative doubling of production, is found to be between 6 and 9%, in line with earlier studies on vehicle battery technology[2]. We reveal that the costs of Li-ion battery packs continue to decline and that the costs among market leaders are much lower than previously reported. This has significant implications for the assumptions used when modelling future energy and transport systems and permits an optimistic outlook for BEVs contributing to low-carbon transport.



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B.N. conducted the main part of data gathering, review, analysis and writing. M.N. contributed to analysis and writing.

### Competing financial interests

The authors declare no competing financial interests.

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## Supplementary information

**Excel files**

1. Supplementary Information (339KB)