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Generation and management of waste electric vehicle batteries in China

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ChengJian Xu[1], Wenxuan Zhang[1], Wenzhi He [1], Guangming Li[1], Juwen Huang[1] & Haochen Zhu[1]

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Abstract

With the increasing adoption of EVs (electric vehicles), a large number of waste EV LIBs (electric vehicle lithium-ion batteries) were generated in China. Statistics showed generation of waste EV LIBs in 2016 reached approximately 10,000 tons, and the amount of them would be growing rapidly in the future. In view of the deleterious effects of waste EV LIBs on the environment and the valuable energy storage capacity or materials that can be reused in them, China has started emphasizing the management, reuse, and recycling of them. This paper presented the generation trend of waste EV LIBs and focused on interrelated management development and experience in China. Based on the situation of waste EV LIBs management in China, existing problems were analyzed and summarized. Some recommendations were made for decision-making organs to use as valuable references to improve the management of waste EV LIBs and promote the sustainable development of EVs.

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References

BRUNP RECYCLING (2016) Recycling for waste power batteries. http://www.brunp.com.cn/about/i=39&comContentId=39.html. Accessed 17 Apr 2017

Chiang Y-H, Sean W-Y, Wu C-H, Huang C-Y (2017) Development of a converterless energy management system for reusing automotive lithium-ion battery applied in smart-grid balancing. J Clean Prod 156:750–756

China battery (2014) Research and development of reuse technology of retired power batteries by National Power Grid Corp. http://www.itdcw.com/news/hyzx/0916310962014.html. Accessed 21 Apr 2017

CPG (The Central People's Government of the People's Republic of China) (2006) Auto product recovery and usage technology policy. http://www.gov.cn/jrzg/2006-02/14/content_191122.htm. Accessed 15 Apr 2017

CPG (The Central People's Government of the People's Republic of China) (2012) Energy-saving and new energy vehicle development plan (2012~2020). http://www.gov.cn/zwgk/2012-07/09/content_2179032.htm. Accessed 16 Apr 2017

Dinger A, Martin R, Mosquet X, Rabl M, Rizoulis D, Russo M, Sticher G (2010) Batteries for electric cars: challenges, opportunities, and the outlook to 2020, vol 7:2017. The Boston Consulting Group, Boston

Environmental Protection Department of Jiangsu Province (2016) How to implement power battery recycling? http://www.jshb.gov.cn/jshbw/bjzm/201603/t20160302_342244.html. Accessed 20 Apr 2017

GEM (2016) Industrial recycling of materials from waste power batteries. http://www.gem.com.cn/gongsijianjie/. Accessed 13 Apr 2017

Hou B (2015) Research on take-back modes of power battery for electric vehicle. Dissertation, Chongqing University of Technology (in Chinese)

Jiao N, Evans S (2016) Secondary use of electric vehicle batteries and potential impacts on business models. J Ind Prod Eng 33(5):348–354

Lang J, Cheng S, Zhou Y, Zhao B, Wang H, Zhang S (2013) Energy and environmental implications of hybrid and electric vehicles in China. Energies 6(5):2663–2685

Lu L, Han X, Li J, Hua J, Ouyang M (2013) A review on the key issues for lithium-ion battery management in electric vehicles. J Power Sources 226(3):272–288

Ma H, Balthasar F, Tait N, Riera-Palou X, Harrison A (2012) A new comparison between the life cycle greenhouse gas emissions of battery electric vehicles and internal combustion vehicles. Energy Policy 44(5):160–173

MEP (Ministry of Environmental Protection of the People's Republic of China) (2003) Technical policy for pollution control on waste battery. http://www.zhb.gov.cn/gkml/zj/wj/200910/t20091022_172236.htm. Accessed 29 Apr 2017

MIIT (Ministry of Industry and Information Technology of the People's Republic of China) (2016) Interim measures for the administration of recovery and utilization of power batteries for new energy vehicles (draft for comment). http://www.miit.gov.cn/n1146295/n1652858/n1653100/n3767755/c5392434/content.html. Accessed 19 Apr 2017

NDRC (National Development and Reform Commission) (2016) Technology policy for the recycling of power battery (2015 Edition). http://www.sdpc.gov.cn/zcfb/zcfbgg/201601/t20160128_773250.html. Accessed 17 Apr 2017

Richa K, Babbitt CW, Gaustad G, Wang X (2014) A future perspective on lithium-ion battery waste flows from electric vehicles. Resour Conserv Recycl 83:63–76

Richardson DB (2013) Electric vehicles and the electric grid: a review of modeling approaches, impacts, and renewable energy integration. Renew Sust Energ Rev 19(19):247–254

Shin SM, Kim NH, Sohn JS, Yang DH, Kim YH (2005) Development of a metal recovery process from Li-ion battery wastes. Hydrometallurgy 79(3):172–181

SINA finance and economics (2017) Where are the used power batteries? http://finance.sina.com.cn/manage/mroll/2017-04-19/doc-ifyeimqc4802561.shtml?doct=0&rfunc=100. Accessed 27 Apr 2017

Williams B, Lipman T (2010) Strategy for overcoming cost hurdles of plug-in-hybrid battery in California: integrating post-vehicle secondary use values. Transp Res Rec 2191:59–66

Zeng X, Li J, Ren Y (2012) Prediction of various discarded lithium batteries in China, sustainable systems and technology (ISSST). 2012 I.E. international symposium on IEEE, pp. 1–4

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Author information

Authors and Affiliations

State Key Laboratory of Pollution Control and Resource Reuse, School of Environmental Science and Engineering, Tongji University, Shanghai, 200092, People's Republic of China

ChengJian Xu, Wenxuan Zhang, Wenzhi He, Guangming Li, Juwen Huang & Haochen Zhu

Corresponding author

Correspondence to Wenzhi He.

Additional information

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