No.12

Lead emissions from lead-acid batteries industry based on integrated lead flow and life cycle analysis in China from 2004 to 2030

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Introduction

The integrated lead flow and life cycle analysis model of LABs industry in China was established, which included the LABs production, lead used in LABs, secondary lead production potential in LABs and the deposal and recycling of LABs.

Lead emissions to environment of LABs industry from 2004 to 2014 were quantitatively evaluated from 2004 to 2015 based on the surveyed data.

the predictive lead metabolism and lead emissions were also quantitatively analyzed according to three scenarios of LABs from 2015 to 2030.

The results indicated that the production of LABs increased dramatically from 2004 to 2014 in China and the annual average increasing rate was approximately 15.9%, which resulted in the rapid growth of lead used of LABs, secondary lead production potential of LABs and lead emissions of LABs.

The secondary lead production potential of LABs will continually be reaching the lead demand of LABs. The lead emissions to the environment from LABs will reach the peak of 2.16, 1.67 and 1.36 Mt in 2020, and will decrease to 1.67, 1.26 and 0.78 Mt in 2030, respectively.

Methodology

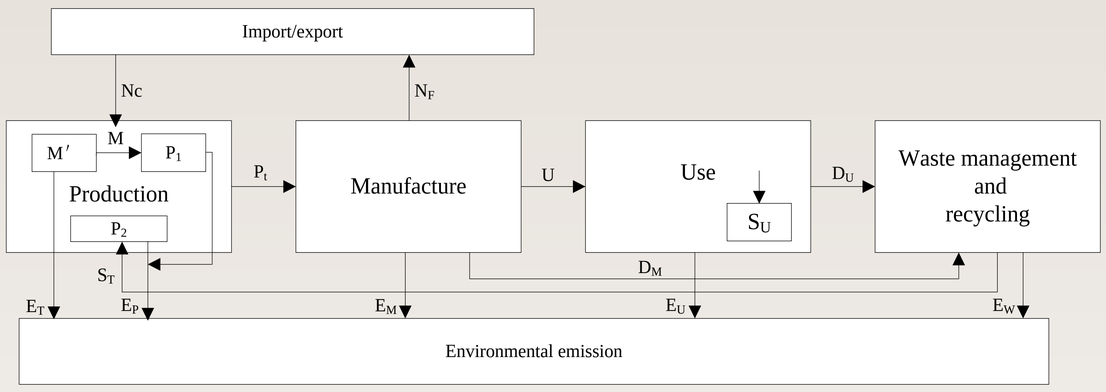


Fig. 1 Framework of lead emissions for LABs industry in China

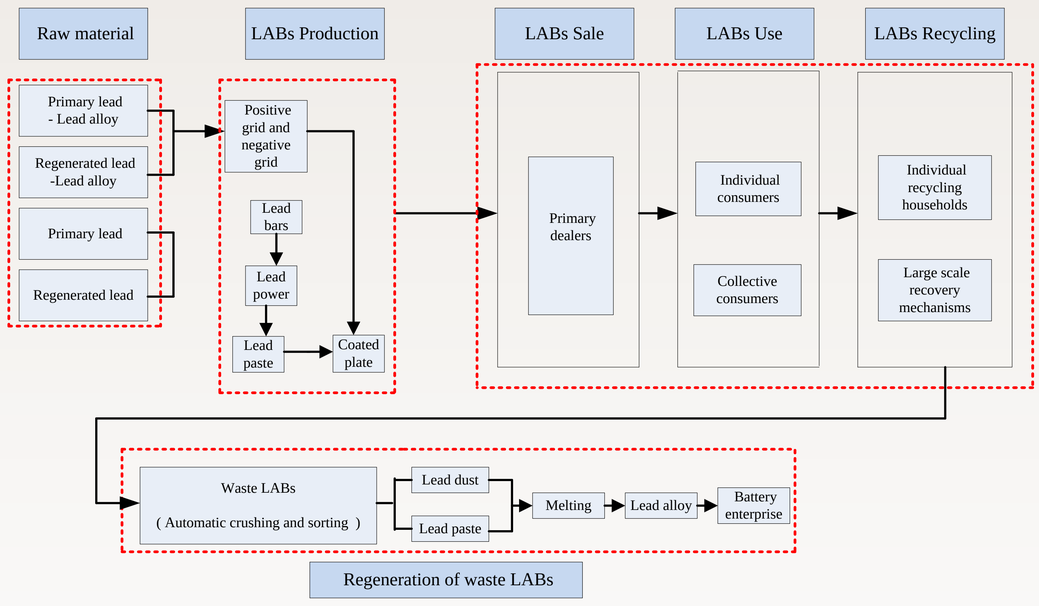


Fig. 2 The life cycle process related to lead of LABs

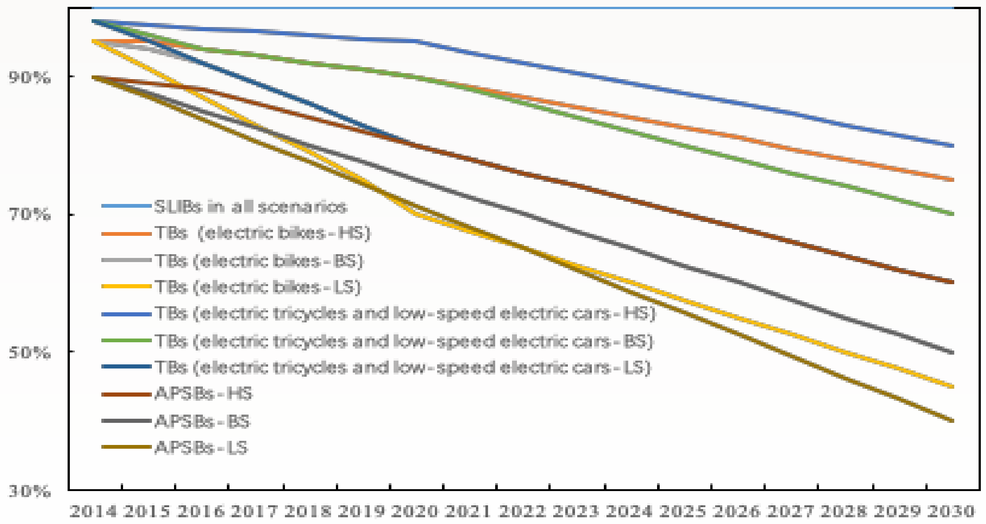


Fig3. Scenarios of LABs shares in different battery categories.

Results and Conclusion

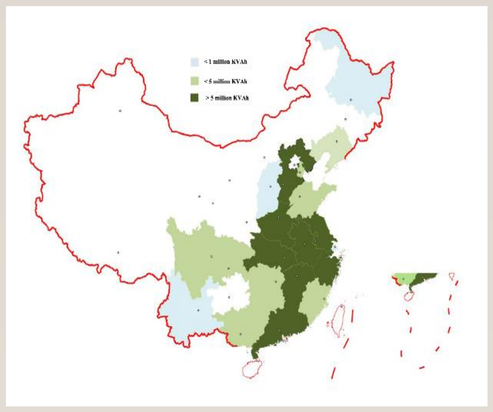
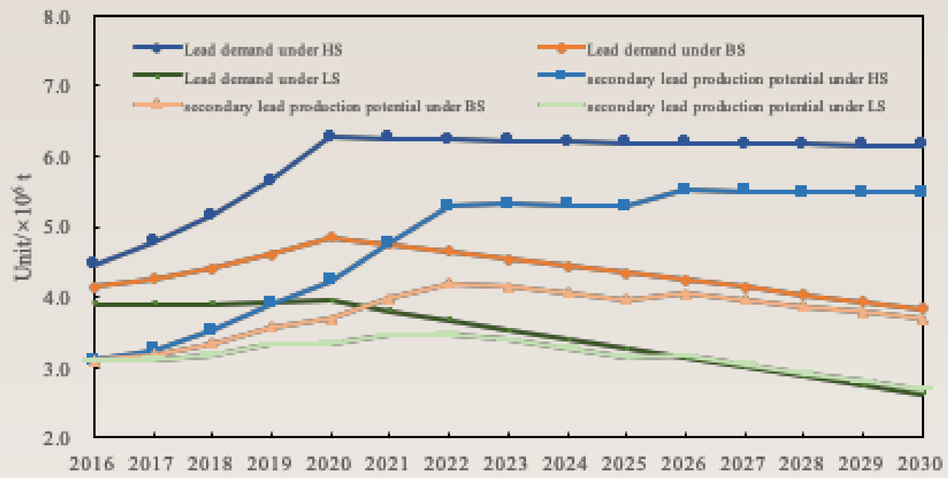
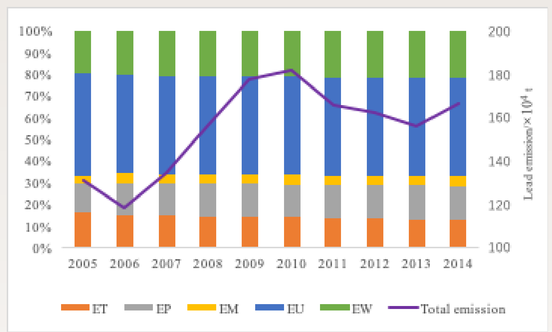


Fig. The production of LABs in China in 2015

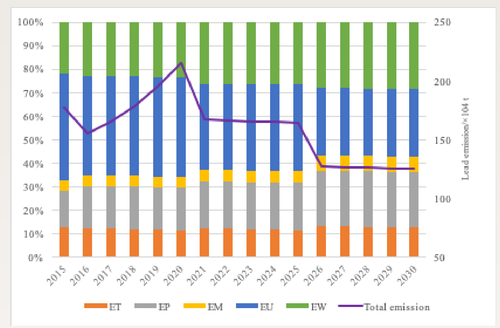
Fig. 10 The lead demand of LABs in China under three scenarios



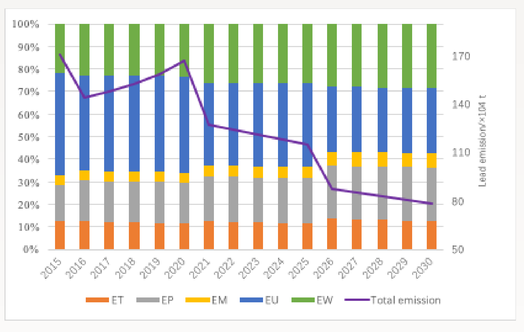
The lead demand of LABs and secondary lead production potential of spent LABs from 2016-2030 under three scenarios



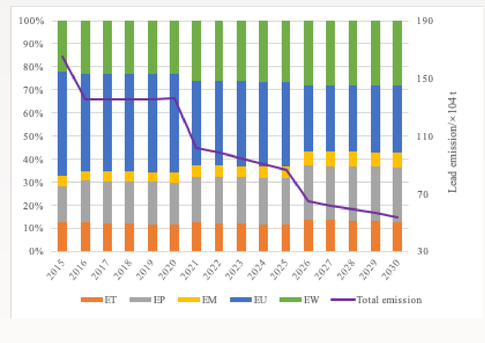
Lead emissions of various LCA stage of LABs



Lead emissions of LABs industry under scenario 1



Lead emission of LABs under scenario 2



Lead emission of LABs under scenario 3

1. **The production of LABs increased dramatically before 2015 in China;**
2. **The secondary lead production potential from spent LABs is about 3.17 Mt in China, which could be more than the lead demand of LABs (3.14 Mt) in China in 2026 under lower increase scenario;**
3. **The total lead emissions will reach a peak in 2020 ,which will be 2.16, 1.67 and 1.36 Mt in 2020 at high, baseline and lower increase scenarioes, respectively.**

Reference：

[1]Sha Chen et al. *Enygies* .2017(10) 1969-1984

[2]. Zhang, Z.J et al. *China Renew. Resour.* 2013, *2*, 67–69

[3] Davidson, A.J. *Int. J. Life Cycle Assess.* 2016, *21*, 1624–1636.

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