OVERVIEW OF ELECTRONIC WASTE RECYCLING IN THE UNITED STATES AND POTENTIAL APPLICATION IN CHINA

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BACKGROUND

Electronic Waste in China

Electronic Waste is the fastest growing sector in municipal solid waste. China tossed away 7.3 million tons (2012 estimate) electronic waste, only second to the United States. Together with imported electronic waste from developed countries, about 70% (United Nations data) of electronic waste globally generated ended up in China, which leads to a lot of environmental issues in China.

Electronic Waste Recycling in the United States

In recent years, the electronics recycling programs in the U.S. are developing successfully and the overall electronic waste recycling system is quite mature as well as its recycling technologies. In 2012, the recycling rate of electronic waste has achieved 29.2%[1] in the U.S.

OBJECTIVE

Since China is now facing serious environmental problems resulting from improper recycling of those abandoned electronic equipment worldwide, the aim of this study is to show how the electronic waste recycling system of the U.S. can be introduced into China and how the possible environmental and social benefits could be.

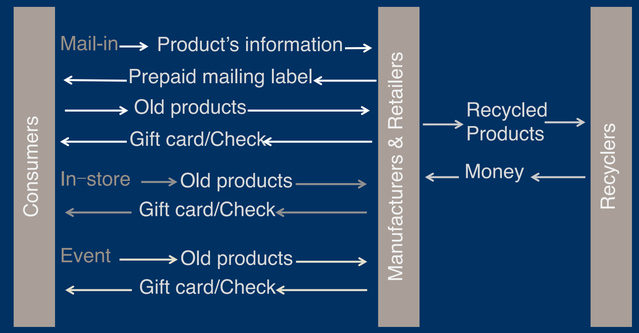
METHOD

Current electronics recycling situation in China will be investigated as baseline scenario and the electronic waste recycling system in the U.S. will be studied comprehensively. Assume similar electronic waste recycling system could be established in China, and then apply Life Cycle Analysis (LCA) to the whole system to see how the environmental benefits could be, as well as social benefit. Also, obstacles will be addressed and related recommendations will be provided. The scope of this research includes computers (desktops, laptops, tablets and computer monitors), televisions (CRT TV, LCD TV, plasma TV and projector) and mobile phones.

PROGRESS

The United States

- 25 states have legislations related to electronic waste recycling. 23 of them use EPR approach. California is the only one applying ARF, while Utah is using ME[2].
- Typical recycling program



- Materials recovery technologies

Fate of Materials in Recycled Electronic Products

Plastics	Used as fuel
Glass	Reused as a fluxing agent
Al, Fe	Lost
Copper	Recovered at integrated smelters/ refineries
Precious Metals	

China

- Though China is a party to the Basel Convention, its regulation holes allow the import of electronic waste through multiple illegal channels. Effective enforcement and monitoring mechanisms are therefore necessary for this policy to be effective.
- There is almost no electronic waste recycling program in China, except very few run by manufacturers like Apple Inc.
- There are two general approaches for processing it, the formal and non-formal. Substandard informal recycling practices include open burning or direct melting of plastics, toner sweeping, dumping of CRTs, acid stripping of PWB, etc. Formal approach uses mechanical shredding and hydrometallurgical recovery. Very few plants are using integrated smelters/refineries[3].
- It was estimated that about 92% of electronic waste went to informal recyclers while only 8% of electronic waste was treated properly by formal recyclers. The stream of e-waste coming to formal recycling facilities can hardly be consistent and sufficiently large due to numerous informal recyclers.
- Unlike the U.S., electronic waste recycling has not been industrialized.

NEXT STAGE

Potential energy saving, GHG emission reduction and hazardous waste reduction will be calculated based on past, current and estimated future sales data as well as related information needed to conduct LCA through the whole recycling process for the proposed electronic waste recycling system in China under expected recycling rate. The final part would be existing problems in current regulation system. And corresponding recommendations or solutions will be discussed.

[1] Electronics Takeback Coalition. (June 25, 2014) *Facts and Figures on E-waste and Recycling.* http://www.electronicstakeback.com/wp-content/uploads/Facts_and_Figures_on_EWaste_and_Recycling.pdf
[2] Electronics Takeback Coalition. *State Legislation.* http://www.electronicstakeback.com/promote-good-laws/state-legislation/
[3] Wang, Feng. "E-waste in China: A country report." (2013).

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