



How does the Chinese e-waste disposal fund scheme work?

China is a large producer of electronic and electrical equipment (EEE). According to the Chinese National Bureau of Statistics, in 2010, the total production of televisions, refrigerators, air conditioners and personal computers exceeded 546 million units. As a result, China is a large generator of EEE waste. The All-China Federation of Supply and Marketing Cooperation estimated that China generated about 50 million units of e-waste in 2010 - a number expected to increase rapidly. By 2020, it is estimated that e-waste in China will grow to 137 million units. This is worrying because e-waste contains several precious metals, and other recyclable and hazardous materials, it can cause serious environmental contamination and health problems if disposed or recycled incorrectly.

Accordingly, the former State Administration of Environmental Protection of China promulgated the Administrative Measures on Prevention and Control of E-waste Pollution in September 2007 to regulate the development of e-waste recyclers - especially informal recyclers with sub-standard recycling and disposal techniques and less environmental awareness. Formal e-waste recycling plants were established, however, they face collection problems, low or negative profit, competition from informal recyclers.

1. The “Old-for-new” Scheme for domestic EEE and the e-waste recycling fund

In 2009, the National Development and Reform Commission (NDRC) of China announced the National Old-for-new Home Appliance Replacement Scheme (HARS) - part of a stimulus package to target the 2008 global financial crisis. The Scheme would give consumers a subsidy for purchasing new electronic appliances (including televisions, air conditioners, refrigerators, washing machines, and personal computers) worth 10% of the price, if they sold their old electric goods to certified recycling companies. This dramatically changed domestic EEE recycling. The Scheme was first implemented in nine pilot areas from 1st June 2009 to 31st May 2010, which was then extended to 31st December 2011 and expanded to 28 cities and provinces. The HARS provided a great incentive for consumers to bring their old appliances to certified recyclers, ultimately promoting the development of the formal e-waste recycling industry.

As the Chinese economy recovered, the Government stimulus ended, including HARS on 31st December 2011. This left the formal e-waste recycling industry with the same problems they had faced before the scheme was implemented. As a result, the Central Government pushed for the issue to be put on the table. It is widely agreed that internalizing the environmental externality is a basic solution, which can be done by introducing extended producer responsibility (EPR) policies and establishing an e-waste disposal fund in the form of an advance disposal fee. This approach is defined in the Ordinance for Administration

of Collection and Disposal of Waste Electronic and Electrical Products promulgated by the State Council of China on 25th February 2009. Article 7 states that the State should establish an e-waste disposal fund to subsidize the collection and disposal of e-waste. After a series of consultations with e-waste recycling companies, EEE producers and importers, the Ministry of Finance (MoF), the Ministry of Environmental Protection (MEP), the NDRC, the Ministry of Industry and Information Technology (MIIT), the General Administration of Customs (GAC) and the State Administration of Taxation (SAT) of China jointly elaborated and publicized the Measures for the Collection and Administration of the Funds for the Recovery and Disposal of Waste Electronic and Electrical Products, entering into force on 1st July 2012.

2. Responsibilities of key players in the Chinese E-waste Disposal Fund Scheme

The key players include the producers and importers of EEE, the recyclers of e-waste and the related authorities.

The Scheme's objective is to promote the collection and disposal of e-waste, push forward the comprehensive utilization of resources, protect the environment and safeguard human health (stated in the 1st Article of the Ordinance for Administration of Collection and Disposal of Waste Electronic and Electrical Products and in the 2nd Article of the Measures for the Collection and Administration of the Funds for the Recovery and Disposal of Waste Electronic and Electrical Products). Also an important component of the national strategy is to build a resource-saving and environment-friendly society.

The responsibilities of producers, importers, recyclers and the relevant authorities

Producers and importers of electronic and electrical products must pay for each unit they produce or import, except for those products which are exported. The producers declare and pay into the Fund quarterly via the tax authority, and the importers pay when declaring their import products to the customs via the custom authority. Those who fail to fulfill their obligations will face legal action. The certified recyclers who can provide the necessary proof of the e-waste they have recycled or disposed of will be eligible to apply for a subsidy.

As the Fund is controlled by the Central Government, the MoF is the general administrator (responsible for coordinating collection, utilization and administration of the Fund); SAT



and GAC are the Fund's collectors (responsible for collecting payment from the producers and importers of EEE respectively with the help of their branch agencies across the country); MEP is the recyclers' administrator (responsible for developing and implementing criteria for certification of e-waste recyclers, monitoring their environmental compliance, and monitoring and checking the recyclers' production data with the help of local 4 environmental protection agencies); NDRC, MIIT and the National Audit Office provide supervision to ensure the Scheme's operation runs smoothly.

Product coverage and product levies

In the previous "Old-for-new" Scheme as well as in the new fund, five common household electronic and electrical appliances were/are covered, including televisions, refrigerators, washing machines, air conditioners and personal computers. Based on a series of consultations with experts, producers, importers and recyclers related to e-waste generation and treatment, the fee and subsidy rates were set. The rates are adjusted according to the change in cost for collection and disposal of e-waste when needed, but should be based on consultations with the relevant enterprises and associations. Both the rate charged and the subsidy are unit based (Table 1). The rate is much lower than the subsidy, rendering the total collection received for the products low. This ensures that the authorities distribute and utilize the funds without surplus. The value of the subsidy is based on the basic cost of the recycling and disposal of the five kinds of e-waste, not including the cost of collection.

3. The Scheme's Governance

The technical aspects of the Fund are managed by MEP, who is responsible for developing and implementing the criteria to certify e-waste recyclers, for checking data received from the recyclers for application of the subsidy... Only those recyclers who have the ability to recycle and dispose the e-waste correctly and have been certified accordingly, are qualified to apply and obtain the subsidy.

The criteria that qualify certified recyclers include four aspects, differentiated between those located in the East and Central part of China (comparatively more developed), and those located in the West part of China (comparatively less developed).

a. Sufficient capacity and infrastructure for recycling and disposing of e-waste, including qualified treatment and recycling facilities, workshops, storage sites... (Table 2).

b. Central monitoring systems and facilities to deal with emergencies and provide first aid. The plant should be recorded 24 hours a day by the Central monitoring system.

c. Compliance with environmental management regulations. Waste water discharges, waste gas and noise emissions must comply

Table 1. Charged rates and the subsidy values for the e-waste covered in the Chinese E-waste Disposal Fund Scheme

Products or e-waste/rate	Rate of Charge (CNY/unit)	Rate of subsidy (CNY/unit)
Television	13	85
Refrigerator	12	80
Washing machine	7	35
Air conditioner	7	35
Personal computer	10	85

with the standards of pollution emissions, and solid waste must be sent to competent companies or landfill sites to be disposed of appropriately.

d. A sufficient number of technicians with qualifications in occupational safety and health, quality control and environmental protection. The recycler must have at least 3 technicians with engineering degrees and of which no less than one has expertise in the field of occupational safety and health (OSHA), quality supervision and environmental protection.

The prefecture level environmental protection agency is responsible for the certification of recyclers. Beforehand, it must consult the public by publishing the applicants' information at least 10 working days before receiving the final approval. MoF, MEP, NDRC and MIIT finally approve and publish the list of the certified recycling companies.

Approval requirements

The beneficiaries of the Fund should count and record the types and quantity of e-waste they recycle and dispose of on a quarterly basis and report to the relevant province-level environmental protection authorities. They should provide four kinds of additional supporting materials: (1) Inbound and outbound records of their e-waste; (2) Recycling and disposing work records of their e-waste (dismantling process must be recorded 24 hours a day and the record must be kept as archives for at least one year); (3) Inbound and outbound records of recycled products that can be reused as raw materials and residues; (4) Sale Vouchers of recycled products or that of residue disposed of.

Table 2. Capacity and infrastructure requirements for certification of e-waste recyclers

Location/ requirement	Total capacity of recycling and disposal (tons/year)	Total building area (m ²)	Total workshop area (m ²)
East and Central part of China	≥ 10,000	≥ 20,000	≥ 10,000
West part of China	≥ 5,000	≥ 10,000	≥ 5,000



The province-level environmental protection authorities are responsible to collect and verify the information, endorse and send it to MEP. MEP will re-check the data and provide it to MoF for final verification and the subsidy disbursement.

China Government encourages the producers of EEE to establish their own recycling operations. Local governments provide a fast track procedure for the establishment and certification of e-waste recycling facilities operated by producers. MoF organizes other relevant authorities to elaborate regulations that encourage producers to take measures to improve their products' designs - such as using more environment-friendly materials. These two points are defined separately in Article 19 and 11 in the Measures for the Collection and Administration of the Funds for the Recovery and Disposal of Waste Electronic and Electrical Products.

To ensure high-quality collection, proper utilization of the Fund and to avoid cheating, the following measures are foreseen:

(1) MoF is responsible for establishing an on-line administrative information system to monitor the production and sale of EEE, and the recycling and disposal of e-waste with the help of MEP, NDRC and MIIT. The producers and importers should input their respective production or import data into the information system and the recyclers should build and connect their monitoring systems to the Government's monitoring system.

(2) The tax and custom authorities are responsible for taking measures of monitoring and inspection to ensure the Fund is effectively collected from producers and importers.

(3) The province-level environmental protection authorities should check the data provided by the recyclers, compare the data with that coming from the information system, check the data on site... to verify the accuracy of the information from recyclers. MEP and the provincial environmental protection authorities should publish the statistics, to ensure transparency.

(4) The National Audit Office also takes part in the supervision of the collection and utilization of the Fund. Public supervision is welcomed. Any infringement will be dealt with in accordance with the Law.

4. Current state of policy implementation

The large potential of the e-waste recycling industry in China

Since the implementation of the E-waste Disposal Fund Scheme two batches - 64 e-waste recycling companies in total - have been certified and published by MoF, MEP, NDRC and MIIT jointly. Among the 31 main cities, provinces and autonomous regions (not including Taiwan, Hong Kong and Macau), 22 of them have certified recycling companies, and only 9 cities have not yet received any certifications. Among the 64 certified companies, 32 are from the areas in the Eastern part of China, accounting for 50%; 20 are from the 8 areas in the Central part of China, accounting for 31.25% and only 12 are from the areas in the

Western part of China, accounting for 18.75%. In total 81.25% of the certified recycling companies are from the comparatively more developed areas.

According to the requirements of certification, in the Eastern and Central parts of China the minimum capacity that the relevant company must reach is 10,000 tons per year and in the Western part of China the minimum capacity is 5,000 tons per year. There are currently 52 certified companies in the Eastern and Central parts of China and 12 in the Western part, which means that the minimum capacity of all the certified companies must be more than $10,000 \text{ tons/y} \times 52 + 5,000 \text{ tons/y} \times 12 = 58,000 \text{ tons/y}$. Hence, the theoretical e-waste recycling capacity is about 0.038kg/capita/a. This compares to annual per capita e-waste collection in the EU of 4 to 16kg, which is roughly 200 times more. For comparison, GDP per capita in China is USD 6,000, compared with USD 40,000 in France (a factor of only 6.5). It is therefore obvious that, if successful, the E-waste Fund will require the recycling industry to expand significantly in the future.

Recycled e-waste data published online by recyclers

Some of the certified recycling companies have established very formal and open websites where they have begun to publish their recycling data regularly. For example, the Beijing Hua Xin Green Spring Environmental Co. Ltd (referred to as Beijing Hua Xin) publishes its recycling data monthly for public monitoring and supervision since the beginning of 2013 and the Shanghai Xin Jinqiao Environmental Protection Co. Ltd (Shanghai Xin Jinqiao) has published its recycling data daily since 17th April 2013. From 1st April to 30th June 2013, Beijing Hua Xin collected 265,828 units of e-waste and recycled 258,439 units (254,763 units were television sets, accounting for 95.8% of the total). From 17th April to 30th June 2013, Shanghai Xin Jinqiao collected 122,086 and recycled 123,223 units (117,764 units were television sets, accounting for 96.5% of the total).

From the data we find that the majority of E-waste collected and recycled is television sets. There are a number of reasons that help to explain this fact: (1) China's households are replacing their CRT television sets by LCD ones in large quantities (Table 3,4); (2) Television sets are more easily collected by the certified recyclers than the other four kinds of products that form part of the E-waste Scheme; (3) Collecting and recycling of television sets them is more profitable than that of other e-waste products, because the subsidy rate for television sets is higher than for any other subsidized e-waste product.



Table 3. Certified recycling companies in the main cities, provinces and autonomous regions (not including Taiwan, Hong Kong and Macau)

No.	Area	Enterprises
1	Beijing	1
2	Tianjin	2
3	Hebei	0
4	Shanxi	3
5	Neimenggu	0
6	Liaoning	1
7	Jilin	2
8	Heilongjiang	1
9	Shanghai	4
10	Jiangsu	8
11	Zhejiang	4
12	Anhui	0
13	Fujian	2
14	Jiangxi	4
15	Shandong	4
16	Henan	1
17	Hubei	5
18	Hunan	4
19	Guangdong	4
20	Guangxi	1
21	Hainan	0
22	Chongqing	2
23	Sichuan	5
24	Guizhou	2
25	Yunnan	0
26	Xizang	0
27	Shan'xi	0
28	Gansu	1
29	Qinghai	0
30	Ningxia	0
31	Xinjiang	1
	Total	64

(Source: MoF et al, 2012 and 2013)

At the same time, this indicates that uncertified/informal recyclers are still capturing most other e-waste, despite the fact that they cannot benefit from the subsidies under the E-waste Fund.

Collection and use of resources under the E-Waste Fund

As the levy is collected by the tax and customs authorities, collection is relatively straightforward. According to the budget report of MoF, the Fund raised CNY 854 million in the second half of 2012 since the Scheme began and that sum is expected to rise to CNY 2.8 billion in 2013. However, the funds raised in 2012 have not yet been distributed and have instead been transferred to the following year's budget, thus, CNY 3.654 billion will be added to the 2013 budget. MEP is actively pursuing the implementation of the scheme and conducted extensive on-site verifications in order to facilitate disbursements from the fund. In June and July of 2013, MEP organized expert teams to go to different provinces to check the declarations of certified recyclers. In total, 9,020,491 units of e-waste were declared, after strict paper and on-site checks, 7,678,989 units were verified (accounting for 85.1% of the total declared) and among the approved recycled e-waste, 7,214,083 units were television sets (accounting for 93.9% of total collected units), showing approximately the same percentages posted on Beijing Huaxin's and Shanghai Xin Jinqiao's websites. MEP has sent the verified applications to MoF and the subsidy for the e-waste recycled in the third and fourth quarter of 2012 is due to be disbursed to the applicant companies soon.

5. An initial assessment

Table 4. The five kinds of e-waste collected and recycled by Beijing Hua Xin from 1st April to 30th June 2013

Kind/number	Collected		Recycled	
	Units	Percentage	Units	Percentage
Television	254,763	95.8%	248,050	96.0%
Refrigerator	11,065	4.2%	10,389	4.0%
Air Conditioner	0	0	0	0
Washing Machine	0	0	0	0
Personal Computer	0	0	0	0
Total	265,828	100%	258,439	100%

Table 5. The five kinds of e-waste collected and recycled by Shanghai Xin Jinqiao from 17th April to 30th June

Kind/number	Collected		Recycled	
	Units	Percentage	Units	Percentage
Television (CRT)	117,764	96.5%	117,767	95.6%
Refrigerator	21	0.02%	0	0%
Air Conditioner	422	0.3%	1,025	0.8%
Washing Machine	3	0.002%	0	0%
Personal Computer	3,876	3.2%	4,431	3.6%
Total	122,086	100%	123,223	100%

The Chinese E-waste Disposal Fund Scheme was established just over a year ago, making it too early to do any in-depth analysis. Thus, find below some initial observations.

Key achievements

Firstly, charges are comparatively easy to be levied, because of the participation of tax and custom authorities - the Fund has been efficiently collected since the beginning of 2013.



Secondly, the Fund is clearly helping to develop the e-waste recycling industry. However, there are currently only 64 recycling companies certified, with 9 provinces still without any certified recycling companies at all. Thus, there is still a large potential for the industry's development.

Thirdly, there is a minimum capacity requirement for all recycling companies to be certified. Ultimately, each province should at least have two certified recycling companies to promote quality and efficiency through appropriate levels of competition.

Fourthly, issues of free riders and orphan products should be limited because the subsidies from the e-waste Fund apply to all products entering the waste stream, independent of their type or production date.

Fifthly, transparency requirements under the Scheme are strict and demanding, which should help to limit opportunities for cheating and ensure the sound operation of the Scheme.

Key challenges

Firstly, the current quantities of e-waste collected are still not sufficient as informal e-waste recycling is still profitable and with the exception of television sets, captures the majority of discarded products covered by the Scheme. The Government will need to modify the incentive structure under the Scheme in a way that allows increasing collections by 14 certified recyclers, while at the same time taking account of the impact that this will have on people working in the informal sector.

Secondly, cheating within the Scheme needs to be minimized - all measures listed in the Scheme should be fully implemented, updated and adjusted regularly.

Thirdly, the administration of the Scheme as it currently stands is complicated and costly, resulting in increased pressure on the Chinese administrations in charge of implementing the Scheme. As the Scheme increases scale, its governance may need to be revised. One option might be to hand more responsibility to producers, and to encourage the creation of one or several a producer responsibility organizations (PRO).

Fourthly, the development of incentives to encourage producers to improve product design (product designs that are easier and less costly to recycle) have been considered in the framework of the Scheme. The MoF is planning to elaborate measures to encourage producers to improve designs and to use more environment-friendly materials. This should be done as quickly as possible.

Fifthly, the scope of products covered under the Scheme is still limited. According to MIIT statistics, by the end of March 2013, the number of mobile phone users in China reached 1.146 billion; according to the Ministry of Public Security of China statistics, the total number of automobile vehicles reached 233 million by the end of July 2012. This means that mobile phones and vehicle waste will significantly increase in the near future. Other products such as rechargeable batteries, fluorescent light bulbs, microwave ovens, printers, photocopiers... should also be considered for inclusion into the Scheme.

The main product that is currently collected and recycled is television sets, but the Fund is sourced from fees on four other product groups. The Fund will need to find a better balance between the costs and the revenues that different product groups generate in order to be acceptable to EEE producers and importers, as well as implementing the polluter pays principle.

Sixthly, EPR policy has two principal features: One is the shifting of responsibility (physically and/or economically; fully or partially) upstream to the producer and away from 15 municipalities and the other is to provide incentives for producers to incorporate environmental considerations in the design of their products. The Chinese E-waste Disposal Fund has been successful in beginning to shift the cost of e-waste recycling and disposal from municipalities to producers, but further incentives need to be observed to encourage more environmentally friendly product designs. To achieve optimal environmental effectiveness as well as greater cost-effectiveness China's E-waste Scheme will need to evolve, and experience with the use of different types of EPR in other countries could be helpful in identifying what the options are as well as providing useful guidance.

Seventhly, the establishment of the Chinese E-waste Fund is an important achievement in dealing more effectively with this fast growing waste stream. Over the coming years, the e-waste Scheme will be improved by deepening its implementation. Cooperation and collaboration of different Government departments have played an important role in the establishment and functioning of the e-waste disposal Scheme. Currently, MoF, MEP, NDRC, MIIT, SAT, GAC, the Ministry of Commerce (MoC) and China CO-OP are contributing to the administration of the Scheme. On 21st March 2013, MoC published the Measures on the Administration of Circulation of Old Electronic and Electrical Products to encourage and regulate the circulation of second-hand EEE. China CO-OP is a federation for the supply and marketing affairs of agriculture-related products with branches covering the whole country and a large network of waste and old products collection and recycling - consisting of more than 150,000 depots and 1 million employees. It has set itself high targets for e-waste collection and recycling, which should help to improve China's E-waste management ■

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(Source: OECD.org)